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# ***Modeling Administrator Process***

## ***User Guide***

Version **V8i**

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# 1. Introduction

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The purpose of this document is to guide a system administrator in the creation, configuration and distribution of an Industry Framework data model on any of the following persistence models:

- DGN only
- DGN/Oracle
- SQL Server
- Oracle Spatial (2-Tier)
- Oracle Spatial (3-Tier)

Currently we have the following data models configured in separate spreadsheets:

- Bentley Electric
- Bentley Gas
- Bentley Water

These also can be used to generate one multi-utility environment in which electric, gas and water are combined.

- Bentley Multi Utility

Note: The paths, usernames and passwords are for reference only and should be modified for your installation.

## 2. General:

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For each commodity or multiple commodity release we provide the following files:

**ModelingAdministratorProcess.doc**

Current version of the “Modeling Administrator Process”’s “User Guide”.

**\_Bentley<Commodity Name>\_DL.xls**

These files contain the data model definitions for each commodity, a version of the “Modeling Administrator” macros and the export macros that call the “Modeling Administrator” macros.

**Base Files**

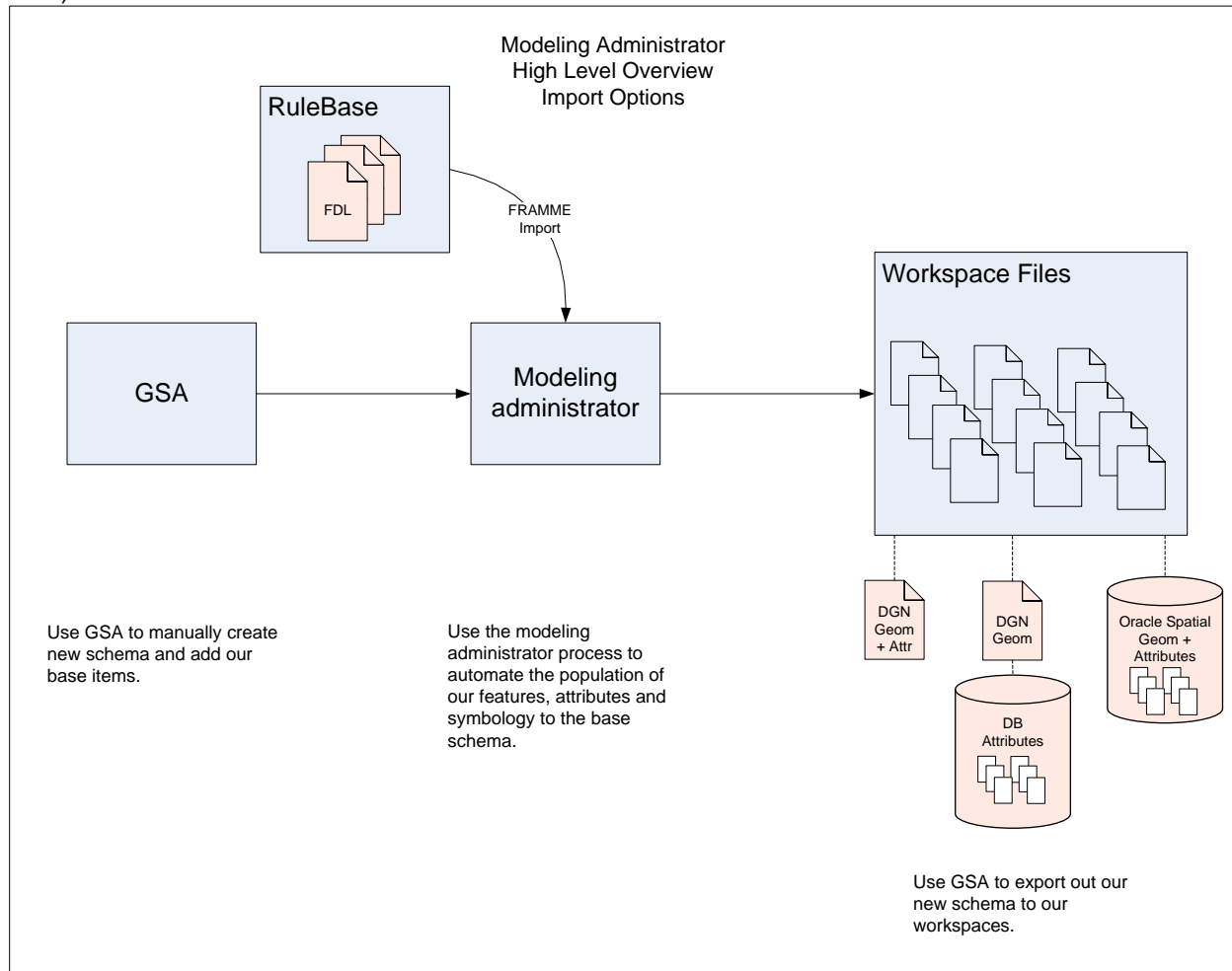
Current versions of all base xml files used in the Modeling Administrator process.

### 2.1 Process Overview

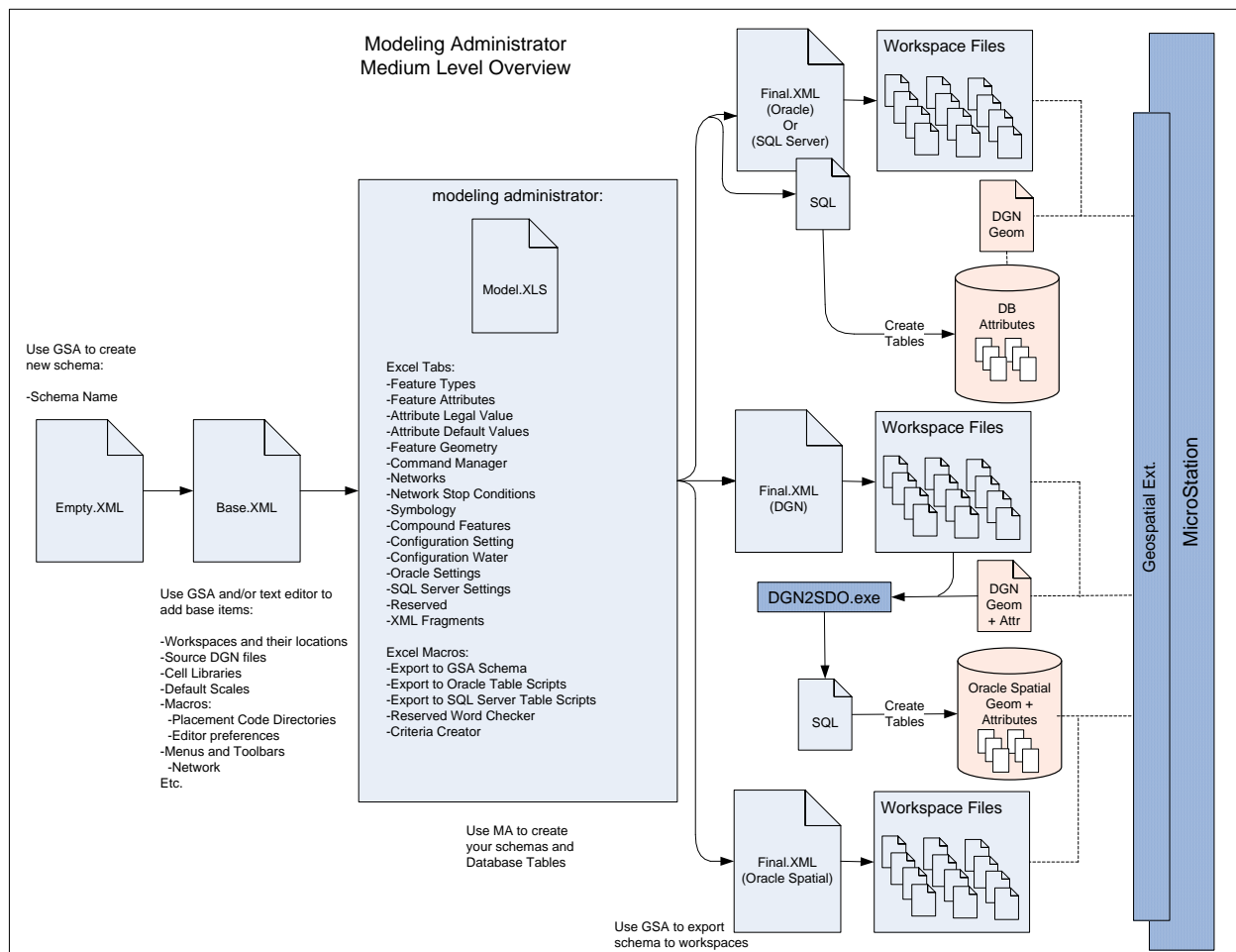
The following diagrams show an overview of the modeling administrator process.

## 2.1.1 High Level

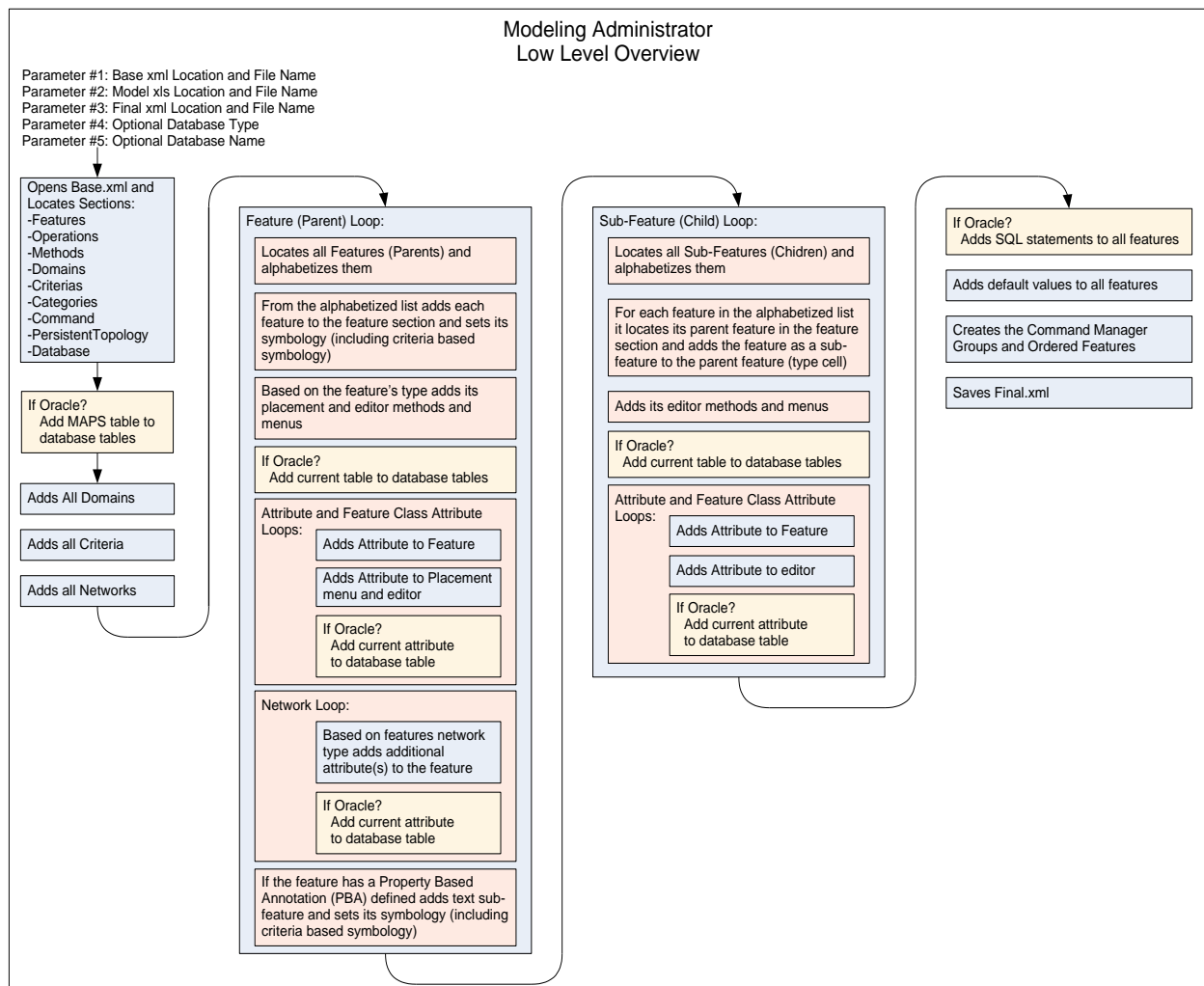
The following diagram shows a high level process diagram of how to create your xfm environments. We currently support the following two environments: DGN (Geom + Attrs), DGN (Geom) /DB (Attrs)-Oracle. And we expect to add support for DGN (Geom) /DB (Attrs)-SQL Server 2005 and Oracle Spatial (Geom + Attrs).



## 2.1.2 Medium Level



## 2.1.3 Low Level



## 3. Modeling Administrator Process

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### 3.1 Prerequisites

#### 3.1.1 Modeling Administrator

The following shows the required references for the vba macro(s) code:

**External References**  
Visual Basic For Applications  
Microsoft EXCEL 11.0 Object Library  
OLE Automation  
Microsoft Forms 2.0 Object Library  
Microsoft Office 12.0 Object Library  
Microsoft ActiveX Data Objects 2.5 Library  
Microsoft Windows Common Controls 6.0 (SP6)  
Microsoft Scripting Runtime  
System  
Microsoft XML, v6.0

#### 3.1.2 Persistent Models

The following shows the prerequisites for each of the five persistent models.

##### 3.1.2.1 DGN

- |                               |             |
|-------------------------------|-------------|
| • MicroStation Pre Requisites | 08.11.xx.xx |
| • MicroStation                | 08.11.xx.xx |
| • MAP                         | 08.11.xx.xx |
| • BUIS                        | 08.11.xx.xx |

##### 3.1.2.2 SQL Server

- |                               |             |
|-------------------------------|-------------|
| • MicroStation Pre Requisites | 08.11.xx.xx |
| • MicroStation                | 08.11.xx.xx |
| • MAP                         | 08.11.xx.xx |
| • BUIS                        | 08.11.xx.xx |
| • Microsoft SQL Server        | 2005        |

##### 3.1.2.3 DGN/Oracle

- |                               |                |
|-------------------------------|----------------|
| Server                        |                |
| • Oracle Server               | 9i, 10G or 11G |
| Client                        |                |
| • MicroStation Pre Requisites | 08.11.xx.xx    |
| • MicroStation                | 08.11.xx.xx    |
| • MAP                         | 08.11.xx.xx    |
| • BUIS                        | 08.11.xx.xx    |
| • Oracle Client               | 11G            |

##### 3.1.2.4 Oracle Spatial (2-tier)

Server		
• Oracle Server		11G
Client		
• MicroStation Pre Requisites		08.11.xx.xx
• MicroStation		08.11.xx.xx
• MAP		08.11.xx.xx
• BUIS		08.11.xx.xx
• Oracle Client		11G

### 3.1.2.5 Oracle Spatial (3-tier)

Server		
• MicroStation Pre Requisites		08.11.xx.xx
• MicroStation		08.11.xx.xx
• MAP		08.11.xx.xx
• BUIS		08.11.xx.xx
• Oracle Server		11G
• ProjectWise Explorer		08.11.xx.xx
• PW Explorer-Geospatial Explorer		08.11.xx.xx
• PW Explorer-Extension for the Oracle Connector		08.11.xx.xx
Client		
• MicroStation Pre Requisites		08.11.xx.xx
• MicroStation		08.11.xx.xx
• MAP		08.11.xx.xx
• BUIS		08.11.xx.xx
• Oracle Client		11G
• ProjectWise Explorer-Client		08.11.xx.xx
• PW Explorer-Geospatial Explorer		08.11.xx.xx
• PW Explorer-Extension for the Oracle Connector		08.11.xx.xx

## 3.2 Schema Creation Instructions

The following steps outline what is required to create a datamodel in the Modeling Administrator spreadsheet as well as the steps needed in order to push it out to the different persistent models.

Sections not dependent on the persistent models:

- Create your Data Model

Sections dependent on the persistent models:

- MA-Export your Data Model
- GSA-Export the workspace
- Opening the workspace

### 3.2.1 Create your Data Model

This section describes the different tabs that the Modeling Administrator uses and how a user would work with the Modeling Administrator in order to manipulate their data model.

#### 3.2.1.1 Modeling Administrator Tabs

This chapter describes the tabs that are used to create/modify your data model. The Modeling Administrator works with the following tabs in the dataloader.

- FeatureTypes
- FeatureAttributes



- AttributeLegalValue
- AttributeDomain
- AttributeDefaultValues
- FeatureGeometry
- MA-CmdMgr
- MA-NetworkStructural
- MA\_StopConditions
- MA-Symbology
- MA-CompoundFeatures
- MA\_ConfigurationSetting
- MA\_Configuration\_Water
- OracleSettings
- SQLServerSettings
- MA\_XmlFragments
- Icons
- Reserved
- MA-PeerTypes
- MA-FeatureRelationships

All other tabs are used to configure Expert Designer. See the Expert Designer product documentation for more details.

To find these sheets, there is an overview-sheet on the last right tab. In the lower right-hand corner is a group of shortcuts, labeled with “Modeling Administrator”.

Modeling Administrator		
<a href="#">FeatureTypes</a>	<a href="#">MA-NetworkStructural</a>	<a href="#">OracleSettings</a>
<a href="#">FeatureAttributes</a>	<a href="#">MA_StopConditions</a>	<a href="#">SQLServerSettings</a>
<a href="#">AttributeLegalValue</a>	<a href="#">MA-Symbology</a>	<a href="#">MA_XmlFragments</a>
<a href="#">AttributeDomain</a>	<a href="#">MA-CompoundFeatures</a>	<a href="#">Icons</a>
<a href="#">AttributeDefaultValues</a>	<a href="#">MA_ConfigurationSetting</a>	<a href="#">Reserved</a>
<a href="#">FeatureGeometry</a>	<a href="#">MA_Configuration_Water</a>	<a href="#">MA-FeatureRelationships</a>
<a href="#">MA-CmdMgr</a>		

► \ Work Log \ **Overview** \ LoadSteps \ DataloaderErrors \ TabConfig \ TOC \ CustomSQL \ FeatureTypes \ G

The following sections describe each tab along with a description of each column in each tab.

In some sections there will be additional sub-sections describing how to setup each tab.

### 3.2.1.1.1 FeatureTypes

Title	Used by MA	Description
NAME	Yes	Display name of feature type, feature class or multi mapped feature type shown by User Interface. This field is used as key for nearly every referencing sheet.
DISPLAYGROUP	No	Used by the User Interface to classify features in the DA catalog.
OH_UG	No	Used by the User Interface to classify features in the DA catalog.
GISTABLE	Yes	The name of the feature's table in the GIS.
ICONGROUP	No	A number specifying the bitmap file that the feature's icon is contained in. NOTE: The UI is not currently using this.
INTERNALTABLE	No	The name of the feature's table in ED3's database.
ISPOINT	No	Yes if the feature is a point type feature. No if it is a span.

ISPLACEABLE	Yes	If yes, the feature will be displayed in the DA catalog.
ISDISPLAYABLE	No	If yes, the feature will be displayed in the DA design lister if present at a Work Location.
ISCOMPOUND	No	Set to yes if the feature has any children. Child features do not need to set as compound.
ISSTRUCTURE	No	Used by the User Interface to classify features in the DA catalog. Will appear in the appropriate structure tab if placeable.
ISCONDUCTOR	No	Used by the User Interface to classify features in the DA catalog. Will appear in the appropriate conductor tab if placeable.
ISDEVICE	No	Used by the User Interface to classify features in the DA catalog. Will appear in the appropriate device tab if placeable.
ISSERVICE	No	Used by the User Interface to classify features in the DA catalog. Will appear in the appropriate service tab if placeable.
ISBOUNDARY	No	Used by the User Interface to classify landbase features in the DA catalog.
AUTOANNOTATE	No	Set to yes if the feature has an annotation type geometry and the annotation should be placed in the GIS.
ICONINDEX	Yes	A numeric value specifying the position of the icon in the MainMenu_Uilities_Ops.xml file. See the Icons tab for more information.
DATASET	Yes	The GIS database which contains the feature's table and maps to the GSA category
Is Non-Mapped	Yes	Column Is Non-Mapped has to be set to "no", otherwise they will not be used in process.
Is CH Feature	Yes	Used to determine if a feature is a design feature. If set to "Yes", any of its properties that are defined as "Mandatory" or "Read Write" in the FeatureAttributes' ALLOWED ACCESS (G) column, will be made as "Read Only" in the schema. Properties that are defined as "None" or "Read Only" will not be effected.
Resolve Order	No	Used by Expert Designer Only
Dataloader Errors:	No	Used by the Expert Designer loader to indicate errors when loading into the database.
IndexName	No	IndexName, Len of Gis Table, Len of Utility Index are only used if you plan to export to Oracle Spatial (if you export to DGN, this fields will be ignored in exportprocess.)
Len of GIS Table	No	Used to verify length constraint by the administrator
Len of Utility Index	No	Used to verify length constraint by the administrator
Process?	Yes	Process flag for the MA export. If errors occur this may be set to no in order for the administrator to locate the rows in error.
GEOMETRY TYPE	Yes	Used to set the main geometry type of the features in MicroStation. Possible values: LINE, POLY, CELL, TEXT, DATA and FTRCLS.
IsRoot	Yes	Used in conjunction with the multi mapped feature names.
Relationship Tab Name	Yes	For specifying the label of the tab where the "relationships" (attach/connect) treeview should be added on the edit form.
Reserved Word Errors (D):	Yes	Used by the reserved word checker
Reserved Word Errors (F):	Yes	Used by the reserved word checker
EditorTabGroupWidth	Yes	Used to control the width of the tab groups on both the placement and edit dialogs. If not defined the default is 27
Tab Rows	Yes	Used to define the number of tab rows for both the placement menu and the editor menu whichever is greater.

### 3.2.1.1.2 FeatureClasses

Title	Used by MA	Description
FEATURE TYPE or FEATURE CLASS	Yes	Feature Type or Feature Class that will inherit from the Feature Class defined by the Super Class Name in column B.

SUPER CLASS NAME	Yes	The Feature Class that is to be inherited by the current Feature Type or Feature Class. The following is a list of tabs that support the Feature Class functionality: FeatureAttributes AttributeDefaultValues MA_ConfigurationSetting ClassificationAssignments
------------------	-----	---

### 3.2.1.1.3 FeatureAttributes

Title	Used by MA	Description
FEATURE TYPE or FEATURE CLASS	Yes	Contains the name of that Feature Type or Feature Class your new Attribute is assigned to. Be sure you use the Featurename which is filled in FeatureTypes [A] and not the Internal or GisTablename.
NAME	Yes	The display name of the attribute used by the User Interface
ATTRIBUTE DOMAIN	Yes	Either: - the type the field value is allowed to have. e.g. DATEVAL, DOUBLEVAL, INTEGERVAL, STRINGVAL, ... - or the name of the domain Possible and legal values are defined in the sheets AttributeDomain and AttributeLegalValue.
EXTERNALNAME	Yes	The field name of the attribute within the GIS. Base the name here on the display name [B]. But use uppercase and don't use spaces (replace spaces them with a _ character). Example: "Object Id" -> "OBJECT_ID"
INTERNALNAME	Yes	The field name of the attribute within the ED3 database. Base the name here on the display name [B]. But use uppercase and don't use spaces (replace spaces them with a _ character). Example: "Object Id" -> "OBJECT_ID"
DISPLAY ORDER	Yes	Used by the User Interface to determine the order in which the attributes are displayed.
ALLOWED ACCESS	Yes	The valid values are: None – the attribute will not be displayed by the User Interface. Read Only – the attribute will not be editable from the User Interface. Read Write – the attribute is editable. Mandatory – the attribute must be populated.
DESIGN ONLY	Yes	No represents both GIS and Expert Designer fields otherwise this Attribute isn't considered in export process.
Dataloader Errors:	Yes	Used by the Expert Designer loader to indicate errors when loading into the database.
OracleDataType	Yes	Used when creating the table creation scripts for Oracle. Defines the field's data type in Oracle.

Display Attr	Yes	If you want Attributefield to be visible, you have to set the Display Attribute [K] value on Yes otherwise that field would be hidden in the property-dialog.
Multimapped Attribute	No	Currently not used.
DrivesSymbology	Yes	<p>Used by the AddSymbologyCriteriaFromFeatureAttributes Macro to add rows to the MA-Symbology tab for each value in the domain list for the current attribute.</p> <p>Note: This can be a major time saver with sitting up symbology. Say for instance you want to change the color of all features based on life cycle status field. You can filter by this attribute name, set this flag to true, run the AddSymbologyCriteriaFromFeatureAttributes macro, then in the MA-Symbology tab, filter by the different values from the domain across multiple features and set all proposed features features one way and all existing features another.</p> <p>The DEFAULT rows need to exist in that sheet prior to running AddSymbologyCriteriaFromFeatureAttributes.</p> <p>Here is how you to auto-generate rows on that sheet:  1) Remove all rows from that sheet for your features (keep the DESIGN features)  2) Export the schema (which builds the DEFAULT rows automatically).  3) Then run AddSymbologyCriteriaFromFeatureAttributes to build out the rows.  Make sure [C] AttributeDomains are correct for rows that are set "yes" in this column.</p>
MA-DomainOverride	Yes	<p>Used by the Modeling Administrator and controls if the primary domain is used for the current attribute or a secondary domain is used.</p> <p>The secondary domain would be a subset of the primary domain is used by multi mapped features where the list of possible values needs to be reduced.</p>
EDProcess?	Yes	1=Process, 0=Not Process by the Expert Designer dataloader
BEProcess?	Yes	1=Process, 0=Not Process by the Modeling Administrator
SQLServerDataType	Yes	Used when creating the table creation scripts for SQL Server. Defines the field's data type in SQL Server.
Tab Name	Yes	Allows the user to specify a editor and placement tab name
Reserved Word Errors (D):	Yes	Used by the reserved word checker
Reserved Word Errors (E):	Yes	Used by the reserved word checker
PreferenceType	Yes	Only used by MA and is used to set the preference type for this attribute. Choices are: none, client, dgnFile or session. The default is session.
EditorAttrValueWidth	Yes	Used to control the width of the value box on both the placement and edit dialogs for each feature attribute. If not defined the default is 13.5.
EditorAttrToolTip	Yes	Used to control the tool tip for each attribute. These can be left blank for attributes with a allowed access of none or read only.

addBlankListEntry	Yes	Used to control if attributes with a domain list will have a blank entry added to the beginning of the list of values. 1=true and anything else is considered false.
ExternalLink	Yes	<p>Identifies attributes that store external links. The possible values include:</p> <p><b>0-Normal Attribute</b></p> <p><b>1-External Link</b>-This can be any type of link that has an associated program though the Windows operating system. When opened, an external process to MicroStation will display the file or address using the associated program.</p> <p>Two additional buttons will be added beside the attribute on both the placement and edit dialogs:</p> <p>“...” Opens a dialog that allows the user to select a file. A default directory can be set using the following MA_ConfigurationSetting variable at the Configuration level: DefaultFileDirectoryExternalLinks</p> <p>“Open” Calls the external program that is associated with the type of file or address.</p> <p><b>2-Image Link</b>-This can be any image file and will be displayed directly on the editor below the attribute.</p> <p>One additional button will be added beside the attribute on both the placement and edit dialogs:</p> <p>“...” Opens a dialog that allows the user to select a file. A default directory can be set using the following MA_ConfigurationSetting variable at the Configuration level: DefaultFileDirectoryImageLinks</p> <p><b>3-Video Link</b>-This can be any video file and will be displayed directly on the editor below the attribute.</p> <p>One additional button will be added beside the attribute on both the placement and edit dialogs:</p> <p>“...” Opens a dialog that allows the user to select a file. A default directory can be set using the following MA_ConfigurationSetting variable at the Configuration level: DefaultFileDirectoryVideoLinks</p> <p><b>4-Stream Link</b>-This can be an address to a video stream and will be displayed directly on the editor below the attribute.</p> <p>This is an example of a YouTube video stream that hasn't been touched. It will display more than just the video stream. Like other videos and advertisements etc.  <a href="http://www.youtube.com/watch?v=VsvaFkXrbg&amp;feature=colike">http://www.youtube.com/watch?v=VsvaFkXrbg&amp;feature=colike</a></p> <p>It must be modified like the following example of the same YouTube video stream that has been modified to only include the video:  <a href="http://www.youtube.com/v/VsvaFkXrbg&amp;hl=en_US&amp;">http://www.youtube.com/v/VsvaFkXrbg&amp;hl=en_US&amp;</a></p>
Video Start Location Attribute	Yes	Identifies the attribute that defines a start location in seconds for video links. Video links are attributes where the ExternalLink above is either a 3 or 4.

### 3.2.1.1.4 AttributeLegalValue

Title	Used by MA	Description
-------	------------	-------------

DOMAIN NAME	Yes	<p>Represents the GSA Domains. A domain allows you to specify a set of legal values (e.g. values that appear in a "Drop Down" Controltype).</p> <p>In Column Domain_Name just write the name of your domain like you defined it on AttributeDomains sheet.</p> <p>To control the order how the items were listed in the Dropdown you can assign a Order index. If you want to use a different value then showed in the control, you can define a StoredValue.</p>
VALUE	Yes	The Value column represents the "display" value.
ALTERNATE VALUE	No	
ANALYSIS VALUE	No	
DISPLAY ORDER	No	To control the order how the items were listed in the Dropdown you can assign an order index
Stored Value	Yes	The Value column represents the "stored" value.

#### 3.2.1.1.5 AttributeDomain

Title	Used by MA	Description
NAME	Yes	Maps to the domains name defined in the Attribute Domain column of the Feature Attribute tab.
VALUE TYPE	Yes	The type the field value is allowed to have. e.g. DATEVAL, DOUBLEVAL, INTEGERVAL, STRINGVAL.
CONTROL TYPE	No	Used to define the control type used in the Expert Designer menus.

#### 3.2.1.1.6 AttributeDefaultValues

Title	Used by MA	Description
ATTRIBUTE SET	Yes	<p>There are two options: System and Non-System If System, this default will be applied to all featuretypes with this attribute. If Non-System, this default will only be applied to the feature defined by the Feature Type Table. Note: Currently the only Non-System attribute set that is supported by the placement routines is Bentley Electric – Master Job Type This will change in future releases so that the user can have multiple default sets.</p>
FEATURE TYPE or FEATURE CLASS	Yes	Used to map against the name of your Feature Type or Feature Class.
ATTRIBUTE	Yes	Used to map against the name of your Attribute.
ATTRIBUTE DOMAIN	No	
VALUE	Yes	If the property has an associated Attribute Domain [D], be sure this value is a valid domain value.
VALUE TYPE	Yes	GSA's Value Type

Errors	No	Used by the Expert Designer loader to indicate errors when loading into the database.
Increment Type	Yes	GSA's Increment Type
Increment Value Type	Yes	GSA's Increment Value Type
Increment Value	Yes	GSA's Increment Value
EDProcess?	Yes	1=Process, 0=Not Process by the Expert Designer dataloader
MAProcess?	Yes	1=Process, 0=Not Process by the Modeling Administrator

### 3.2.1.1.7 FeatureGeometry

Title	Used by MA	Description
FEATURE TYPE	Yes	Used to map against the name of your FeatureType.
NAME	Yes	The GIS name of the geometry.
GEOMTYPE	Yes	The valid values are: ANNOTATION, AREA, LINE, POINT, SPANATPOINT and TEXT Note: MA only processing Annotation in order to create the sub-text features
PLACEMENTTYPE	No	The valid values are: At Work Location – The geometry will be placed at the Work Location (or for annotation, offset from it). At Attachment Point – the geometry will be placed offset from the Work Location. Inline – For point geometries, the geometry is offset along an adjacent span. Offline – For point geometries, the geometry is offset from the attachment point.
GEOMETRYCATEGORY	No	The valid values are: Normal. Network – the principal geometry used for connectivity. Annotation.
Dataloader Errors:	Yes	Used by the Expert Designer loader to indicate errors when loading into the database.
AnnotationType	Yes	Two Options: Major or Minor. Used to control the placement by toggles on the menus.
PlacementMethod	Yes	Defines the placement method called by the editor
minOccurs	Yes	GSA's minOccurs with defines the minimum number of occurrences of this sub-text feature for the current feature.
maxOccurs	Yes	GSA's maxOccurs with defines the maximum number of occurrences of this sub-text feature for the current feature.

### 3.2.1.1.8 MA-CmdMgr

Title	Used by MA	Description
Process?	Yes	1=Process, 0=Not Process by the Modeling Administrator
GISTABLE	Yes	Used to map against the GISTABLE of your FeatureType.

Alias	Yes	Used to map against the name of your FeatureType.
IsMultiMapped	Yes	0=No, 1=Yes
Column E and beyond	Yes	Used to define the group name in the command manager

### 3.2.1.1.9 MA-NetworkStructural

Add a new column for each network to be defined starting in column E.

Title	Used by MA	Description
Process?	Yes	1=Process, 0=Not Process by the Modeling Administrator
Feature Name	Yes	Used to map against the GISTABLE of your FeatureType.
TraceRoleXPath	Yes	Used to filter feature types. Only applies to Source Nodes
LabelProperty	Yes	Used by the network trace ui, and allows you to specify the name of a property for displaying a "user friendly" description to the user (e.g. to help uniquely describe a selected feature).  This property is not required. If not specified (or specified incorrectly), the feature (type) name will be displayed.
Row 1: Internal Network Name	Yes	Internal Network Name: Specify the internal name of your network that will be used to create the feature properties to store the links for this network.
Row 2: External Network Name	Yes	External Network Name: Specify the external name of your network that will be displayed to the user.
Row 3: Network Type	Yes	Network Type: Specify Flow or Attach (Flow networks are typical node-edge connectivity networks) (Attach networks are structural, e.g. for associating elements with a pole)

#### 3.2.1.1.9.1 Flow TraceRole Legend:

Use the values listed in this legend to specify the role that each feature type will play in the associated flow network.

**1=Normal** - the default for Edge and Nodes.

**2=Source Node** - For trace upstream/trace downstream. Examples of source nodes in a water system would be Tank, Well, or Reservoir.

**3=Inline (flow attachment) Node** - For specifying a node that can optionally connect to an at a intermediate (inline) location.

Example use in a water system would be:

1) For connecting a water lateral to an intermediate location along a water main. Network trace routines are able to trace through that inline connection point.

2) For placing isolation valves at an intermediate location along a pipe. Network trace routines can optionally terminate the trace at the isolation point (e.g. to represent a closed valve).

**4=Sink (Load) Node** - not used?

**5=Directed Node** - For specifying a node that only allows flow to pass in one direction (e.g. a Pump in a Water system).

#### 3.2.1.1.9.2 Attach Legend:



Use the values listed in this legend to specify the role that each feature type will play in the associated attach network.

"" = Not in Network  
1=Attachment  
2=Structural

### 3.2.1.1.9.3 Additional Flow and Attach Attributes:

Network connectivity information is maintained as feature properties. The following properties will automatically be added to each feature (for every network they participate in) during the export process.

Edges

<Network Name>\_NetID  
<Network Name>\_StartID  
<Network Name>\_EndID

Nodes

<Network Name>\_NetID  
3's:  
<Network Name>\_AttachedEdgeID  
5's:  
<Network Name>\_DownstreamEdgeID

### 3.2.1.1.10 MA\_StopConditions

Title	Used by MA	Description
Process?	Yes	1=Process, 0=Not Process by the Modeling Administrator
External Network Name	Yes	External Network Name from Row 2 of the MA-NetworkStructural tab that this stop condition applies
StopConditions Name	Yes	Name of stop condition
Feature Name	Yes	Used to map against the GISTABLE of your FeatureType.
XPathQuery	Yes	XPathQuery of the stop condition

### 3.2.1.1.11 MA-CellText

Title	Used by MA	Description
Parent Feature	Yes	Used to map against the name of your parent FeatureType.
CellText Feature	Yes	The GIS name of the Cell Text geometry.
Error	Yes	Used to indicate errors when loading.

### 3.2.1.1.12 MA-Symbology

Title	Used by MA	Description
GEOMTYPE	Yes	Defines the displaytype of your features. These are usually: LINE, TEXT, CELL, POLY, SUBTEXT.
Feature	Yes	Used to map against the GISTABLE of your FeatureType.
Common-ApplyDrawingScale	Yes	All Geometry Types. GSA's ApplyDrawingScale
Common-Color	Yes	All Geometry Types. GSA's Color
Common-R	Yes	All Geometry Types. GSA's R
Common-G	Yes	All Geometry Types. GSA's G

Common-B	Yes	All Geometry Types. GSA's B
Common-Level	Yes	All Geometry Types. GSA's Level. This also can be set to "ByFeatureName" and MA will make the level match the feature's name value. Note: This handles the feature name differences between Oracle Spatial schemas and non Oracle Spatial schemas.
Common-Style	Yes	All Geometry Types. GSA's Style
Common-StyleScale	Yes	All Geometry Types. GSA's StyleScale
Common-Weight	Yes	All Geometry Types. GSA's Weight
Common-Class	Yes	All Geometry Types. GSA's Class
Line / Polygon-FillType	Yes	Line / Polygons Only. GSA's FillType
Line / Polygon-FillMode	Yes	Line / Polygons Only. GSA's FillMode
Line / Polygon-FillColor	Yes	Line / Polygons Only. GSA's FillColor
Line / Polygon-R	Yes	Line / Polygons Only. GSA's R
Line / Polygon-G	Yes	Line / Polygons Only. GSA's G
Line / Polygon-B	Yes	Line / Polygons Only. GSA's B
Line / Polygon-AreaType	Yes	Line / Polygons Only. GSA's AreaType
Cell-CellLibrary	Yes	Cells Only. GSA's CellLibrary
Cell-Cellname	Yes	Cells Only. GSA's Cellname
Cell-OverrideCellSymbology	Yes	Cells Only. GSA's OverrideCellSymbology
Cell-CellType	Yes	Cells Only. GSA's CellType
Cell-CellXScale	Yes	Cells Only. GSA's CellXScale
Cell-CellYScale	Yes	Cells Only. GSA's CellYScale
Cell-CellZScale	Yes	Cells Only. GSA's CellZScale
Cell-CellAngle	Yes	Cells Only. GSA's CellAngle
Text and SubText-Scale	Yes	Text and SubTexts Only. GSA's Scale
Text and SubText-TextStyle	Yes	Text and SubTexts Only. GSA's TextStyle
Text and SubText-Angle	Yes	Text and SubTexts Only. GSA's Angle
Text and SubText-Priority	Yes	Text and SubTexts Only. GSA's Priority
Text and SubText-Transparency	Yes	Text and SubTexts Only. GSA's Transparency
Text and SubText-PBA	Yes	Text and SubTexts Only. GSA's PBA
Criteria Name	Yes	Name of criteria
Criteria	Yes	Criteria definition can be either simple expressions or vb scripts
Source	No	Not Used by MA export but is used to show the source of the data for each row using the following legend: 1=AddSymbologyCriteriaFromFeatureAttributes 2=OptimizeCriteria This is useful when setting up new symbology to see which items are being optimized.

### 3.2.1.1.12.1 Create your cells

All cells are defined in .cel files and referenced in the MA-Symbology tab. The cel file(s) must be pushed out to the workspace. These are already configured to be pushed out to your workspaces so if you can select from the existing cells there is no further action. However, if you need to create a new cel file(s) you will need to perform the following for each cel file:

- Copy your new cel file(s) into  
Users\Application\Data\Bentley\WorkSpace\Projects\Examples\Geospatial\defaults\cell directory.
- In the schema: under each User Workspaces/Workspace (User)/Files/Cell Libraries path add an entry to export the new cel file(s)

- Perform and export

### 3.2.1.1.13 MA-CompoundFeatures

Title	Used by MA	Description
PARENT FEATURE TYPE	Yes	GIS table name of the parent feature.
CHILD FEATURE TYPE	Yes	GIS table name of the child feature.
IS POST	Yes	Yes if the child is placed after the parent, No if the child is placed prior to the parent (e.g. XY and Pole).
PARENT FIELD NAME	Yes	The field on the child which formalises the relationship.
DERIVED TYPE	Yes	The valid values are: String – the number of children is determined by a text field on the parent. Integer - the number of children is determined by a numeric field on the parent. Fixed – Creates a fixed number of children based upon the value in the “Fixed Number of Children” column. None – One child is always placed with the parent.
DERIVED FROM	Yes	The field on the parent which determines the number of children. Only appropriate if the Derive Type is “String” or “Integer”.
DERIVED TO	Yes	The field on the child which is populated from the parent. Only appropriate if the Derive Type is “String”.
GIS AUTO CREATE	Yes	If there are GIS triggers that automatically create children when the parent is placed, this setting should be set to TRUE. If there are no such triggers, the value should be FALSE. Setting this to TRUE will always guarantee the correct behaviour, but will be a performance hit if there are no triggers.
VALID CHARACTERS	Yes	The valid characters that may be stripped from the “DeriveFrom” value if the Derive Type = “Text”. The valid characters should be delimited by colon, “:”, characters, e.g. “A:B:C:ABC – Three Phase”. The valid characters will be processed in order. If the Derive From text is not made up of valid characters, a single child will be created, with a Derive To value equal to the parent's Derive From value (this means that values such as “Unknown” do not need to be configured as valid characters).
FIXED Number Of CHILDREN	Yes	The number of children to be created when the parent is placed. Only used if Derive Type = “Fixed”.
GIS EDIT TRIGGER	Yes	
Process?	Yes	1=Process, 0=Not Process by the Modeling Administrator

### 3.2.1.1.14 MA\_ConfigurationSetting

Title	Used by MA	Description
Section	Yes	Possible values: Configuration, Features, NetworkTypes or Networks

Parent Name	Yes	If NetworkTypes, this defines the network type this name value applies to. If Networks, this defines the network this name value applies to. If Features, this defines the feature type's or feature classes' GISTABLE this name value applies to.
Name	Yes	Name of the configuration setting
Value	Yes	Value of the configuration setting
Description	Yes	Description of the configuration setting
Notes Only	No	Not Used by MA

### 3.2.1.1.15 MA\_Configuration\_Water

Title	Used by MA	Description
Section	Yes	Predefined sections: -Epanet_Defaults -Epanet_Defaults -Epanet_FeatureMapping -Epanet_FeatureDefaults -Epanet_PropertyLookUps -LeakAnalysis -WaterGEMS_FeatureMapping
Parent Name	Yes	Defines the parent that this name and value applies to.
Child Name	Yes	Defines the child that this name and value applies to.
GrandChild Name	Yes	Defines the grandchild that this name and value applies to.
Name	Yes	Name of the configuration setting
Value	Yes	Value of the configuration setting

#### 3.2.1.1.15.1 Leak-analysis

Bentley Gas and Bentley Water expect a configuration file for their leak-analysis component to exist at: \$(MS\_GEOXFM\_XML\_DIR)leakanalysis/g\_leakanalysis (for Bentley Gas) and \$(MS\_GEOXFM\_XML\_DIR)leakanalysis/w\_leakanalysis.xml (for Bentley Water). It serves up the required metadata for the leak-analysis component to work correctly, as described next.

The leak-analysis configuration file is expected to be in XML format. It contains 4 sections:

1. Configuration.
2. Leak features.
3. Pipe features.
4. Split-nodal features.

#### 3.2.1.1.15.1.1 Configuration section

Global settings are specified as a single <defaults> element in the <configuration> section. Supported attributes include:

- leakcountproperty: Property name to use in order to save the number of breaks per pipe values on each pipe feature.
- leakfrequencyproperty: Property name to use in order to save values for the frequency statistics on each pipe feature.

- **tabreportxsltfilename:** XSLT file name (with path, optionally using regular MicroStation macros) to use in order to format the tabular (1-dimensional) report that the leak-analysis component can generate.
- **crosstabreportxsltfilename:** XSLT file name (with path, optionally using regular MicroStation macros) to use in order to format the cross-tabular (2-dimensional) report that the leak-analysis component can generate.
- **leakresultsfilename:** MDB file name (with path, optionally using regular MicroStation macros) to use in order to save leak statistics per pipe during computations.

The following are the default settings in the configuration section:

```
<configuration>
<defaults
    leakcountproperty="LEAKCOUNT"
    leakfrequencyproperty="BREAKPERYRPERDIST"
    tabreportxsltfilename="$(MS_GEOXFM_XML_DIR)leakanalysis/w_leaktabreport.xslt"
    crosstabreportxsltfilename="$(MS_GEOXFM_XML_DIR)leakanalysis/w_leakcrosstab.xslt"
    leakresultsfilename=
        "$(MS_GEOXFM_XML_DIR)leakanalysis\$( _LEAKANALYSIS_CURFILENAME_NOEXT).mdb"/>
</configuration>
```

#### **3.2.1.1.15.1.2 Leak features section**

Metadata about one of more features representing leak/break records can be specified in the <leakfeatures> section. For each <leakfeature>, the following attributes can be configured:

- **name:** Name of the feature representing a layer of leak records.
- **facilityidproperty:** Property name on a leak feature to use as linkage value with its associated pipe feature.
- **recorddateproperty:** Property name on a leak feature storing the occurrence date for this record. During statistics computation, users are prompted for a date-range, which will filter the records to consider for the calculation.
- **associationtolindrawingunits:** Tolerance in-drawing units to use during association operations.
- **xpathfilter:** Custom filter, in XPath format, that will be used to further select the features to consider as leak records during association and computing operations.

#### **3.2.1.1.15.1.3 Pipe features section**

Metadata about one or more features representing pipes that participate in a leak-analysis operation can be specified in the <pipefeatures> section. For each <pipefeature>, the following attributes can be configured:

- **name:** Name of the feature representing a pipe-layer in the context of leak-analysis.
- **facilityidproperty:** Property name on a pipe feature to use as linkage value with its associated break records.
- **installdateproperty:** Property name on a pipe feature storing the installation date for this pipe. During tabular (1-dimensional) report generation, pipes are grouped according to their installation date and leak statistics are presented for each group.
- **localyearsofleakrecordsproperty:** During the computation of the leak-frequency statistic, users are prompted for the leak-data range (in years) available. If such value varies for different sections in a model, users can specify different ranges by storing them in a property on every pipe feature. If that's the case, such property name can be specified by using the localyearsofleakrecordsproperty attribute.
- **skipfromaggregationifnoleaks:** This attribute can be used to avoid the creation of aggregated pipe features if no leak records are associated with any of the involving pipes.

#### 3.2.1.1.15.1.4 Split-nodal features section

Metadata about one or more features representing isolation elements during pipe-aggregation operations can be specified in the <splitnodalfeatures> section. For each <splitnodalfeature>, the following attributes can be configured:

- name: Name of the feature representing an isolation element in the context of leak-analysis.
- xpathfilter: Custom filter, in XPath format, that will be used to further select the features to consider as isolation elements during pipe-aggregation operations.

#### 3.2.1.1.16 Configuration files for Epanet, WaterGEMS, SysHyd and Gas Analysis exporters

Bentley Gas exporters to SisHyd and Gas Analysis as well as Bentley Water exporters to Epanet and WaterCAD/WaterGEMS, by default, expect their configuration files to exist, respectively, at:

```
$(MS_GEOXFM_XML_DIR)interop/g_sishyexport.xml
$(MS_GEOXFM_XML_DIR)interop/g_gasanalysisexport.xml
$(MS_GEOXFM_XML_DIR)interop/w_epanetexport.xml
$(MS_GEOXFM_XML_DIR)interop/w_wtrgexport.xml
```

These files are not generated by Modeling Administrator so they need to be created manually. The default deployment includes base configuration files that can be used as a good starting point. The configuration files for these three data-exporters follow a similar XML format, which contains 3 sections:

- XFM feature-mappings section.
- Supporting data section.
- Global-default values section.

#### 3.2.1.1.16.1 XFM feature-mappings section.

This section contains a collection of <Feature> elements representing their mappings to a specific set of elements for a given product. For each <Feature> block, the following attributes can be configured:

- \* name: Name of the feature representing the layer to map from.
- \* xpathfilter: Custom filter, in XPath format, to narrow the set of elements in the layer to map from.
- \* gisidpropertyname: XFM property name to use as unique feature-identifier for each mapped feature-class. If omitted, XFM feature Uuids are used as unique identifiers by default. In the case of exporting to WaterCAD/WaterGEMS or Gas Analysis, this unique identifier is used to link XFM features with elements on those hydraulic models (via the GIS-ID field on them), enabling subsequent data updates on them by using the same exporter from Bentley Water or Bentley Gas.

Each <Feature> block contains 2 sub-sections: <Mappings> and <FeatureDefaults>. Their details are described in the next sections.

##### 3.2.1.1.16.1.1 Mappings sub-section.

This sub-section contains one or more <Mapping> entries where specific XFM property mappings are specified. Each <Mapping> entry supports the following attributes per product:

#### Epanet

Attribute	Description
section	INP section name to map the current XFM feature to. Please refer to the appendix for the list of section names that can be used.

## WaterCAD/WaterGEMS/Gas Analysis

Attribute	Description
domainelementtype	Domain Element Type name to map the current XFM feature to. Please refer to the appendix for the list of names that can be used.

Each <Mapping> block contains one or more <Property> items describing specific mappings between XFM properties owned by the current XFM feature and product fields. For each <Property> item, the following attributes can be configured per product as follows:

### Epanet

Attribute	Description
name	XFM property name to map values from. Please refer to the list of macros that can be used later in this chapter.
mapstofield	Epanet field-name to assign values to. Please refer to the appendix for the list of Epanet field-names that can be used.
xpathfilter	Custom filter, in XPath format, to control when an assignment should take place.
sourcedimension	For unitized values, this attribute specifies the unit-dimension that the specified value is in. Please refer to the appendix for the list of dimension names that can be used.
sourceunit	For unitized values, this attribute specified the unit that the specified value is in. Please refer to the appendix for the list of unit names that can be used.
loadassignmentrole	If present, makes nodal features to behave as either demand receivers (when its value is "Node") or demand meters (when its value is "Meter").
loadassignmentbehavior	Defines how load/demand is assign from meters to nodes. Valid values are: nearest, farthest, equally-distributed, distance-weighted or element.
propertylookup	Name of a <PropertyLookUp> block to get values from.

## WaterCAD/WaterGEMS/Gas Analysis

Attribute	Description
name	XFM property name to map values from. Please refer to the list of macros that can be used later in this chapter.
mapstofield	WaterCAD/GEMS or Gas Analysis field-name to assign values to. Please refer to the appendix for the list of WaterCAD/GEMS or Gas Analysis field-names that can be used.
xpathfilter	Custom filter, in XPath format, to control when an assignment should take place.
sourcedimension	For unitized values, this attribute specifies the unit-dimension that the specified value is in. Please refer to the appendix for the list of dimension names that can be used.
sourceunit	For unitized values, this attribute specified the unit that the specified value is in. Please refer to the appendix for the list of unit names that



	can be used.
loadassignmentrole	If present, makes nodal features to behave as either demand receivers (when its value is "Node") or demand meters (when its value is "Meter").
loadassignmentbehavior	Defines how load/demand is assign from meters to nodes. Valid values are: nearest, farthest, equally-distributed, distance-weighted or element.
propertylookup	Name of a <PropertyLookUp> block to get values from.
exportmeters	If present on a feature-class mapping behaving as demand meters during load-assignment, controls whether features of that class should be exported as nodes as well. If omitted, demand-meter features are not exported.
paralleldomainelementtype	If a feature-class behaving as demand meters during load-assignment is mapped to a support-element type in WaterCAD/GEMS or Gas Analysis, but it is also required to get its features exported as a domain-elements, this attribute shall be used to specify the domain-element type name of the features to create. It requires "exportmeters" attribute to be present and set to "true".
referencedSupportElement / referenceField	If present, makes a support-element in the model specified by "referencedSupportElement" to be created for each unique value in the mapped XFM property. It needs to be used along with the "referenceField", which specifies the support-element field in the model to map to.

#### 3.2.1.1.16.1.1 XFM Property name macros

The "name" attribute used in <Property> items during individual field mapping support the following macros:

Attribute	Description
\$(FeatureUuid)	Maps the feature's unique Uuid.
\$(OriginPoint)	Maps the feature's origin-point as "X,Y,Z". It applies to nodal features only.
\$(MidPoint)	Maps the feature's mid-point as "X,Y,Z". It applies to linear features only.

#### 3.2.1.1.16.1.2 FeatureDefaults sub-section.

This optional sub-section contains zero or more <FeatureDefault> entries specifying constant values. Each <FeatureDefault> item supports the following attributes per product:

##### Epanet

Attribute	Description
mapstofield	Epanet field-name to assign the specified value to. Please refer to the appendix for the list of Epanet field-names that can be used.
xpathfilter	Custom filter, in XPath format, to narrow the set of elements in the layer to assign the specified value to.



sourcedimension	For unitized values, this attribute specifies the unit-dimension that the specified value is in. Please refer to the appendix for the list of dimension names that can be used.
sourceunit	For unitized values, this attribute specified the unit that the specified value is in. Please refer to the appendix for the list of unit names that can be used.

### WaterCAD/WaterGEMS/Gas Analysis

Attribute	Description
mapstofield	WaterCAD/GEMS or Gas Analysis field-name to assign the specified value to. Please refer to the appendix for the list of WaterCAD/GEMS or Gas Analysis field-names that can be used.
xpathfilter	Custom filter, in XPath format, to narrow the set of elements in the layer to assign the specified value to.
sourcedimension	For unitized values, this attribute specifies the unit-dimension that the specified value is in. Please refer to the appendix for the list of dimension names that can be used.
sourceunit	For unitized values, this attribute specified the unit that the specified value is in. Please refer to the appendix for the list of unit names that can be used.

### Example mapping XFM features to Epanet sections.

```
<Feature name="W_FACILITY" xpathfilter="//*[TYPE=3]">
  <Mappings>
    <Mapping section="PUMPS">
      <Property name="$(FeatureUuid)" mapstofield="LinkID" />
      <Property name="PumpCurveID" mapstofield="HeadID" propertylookup="Pump Curves" />
    </Mapping>
  </Mappings>
</Feature>

<Feature name="W_METER" loadassignmentrole="Meter" loadassignmentbehavior="nearest">
  <Mappings>
    <Mapping>
      <Property name="Demand" mapstofield="BaseDemand" sourcedimension="flow" sourceunit="cfs" />
      <Property name="Pattern" mapstofield="PatternID" propertylookup="Demand Patterns" />
    </Mapping>
  </Mappings>
</Feature>
```

### Example mapping XFM features to WaterCAD/WaterGEMS or Gas Analysis sections.

```
<Feature name="G_METER" gisidpropertyname="CUSTOMER_ID" loadassignmentrole="Meter"
exportmeters="true">
  <Mappings>
    <Mapping supportelementtype="GasCustomer" paralleldomainelementtype="GasNode">
      <Property name="LABEL" mapstofield="Label"/>
      <Property name="FLOW_CAPACITY" mapstofield="GasCustomer_NominalFlow"
sourcedimension="flow" sourceunit="cfs"/>
      <Property name="FLOW_CAPACITY" mapstofield="BaseDemand" sourcedimension="flow"
sourceunit="cfs"/>
    </Mapping>
  </Mappings>
```

```

</Mappings>
</Feature>

<Feature name="G_MAIN" gisidpropertyname="ASSET_ID">
  <Mappings>
    <Mapping domainelementtype="GasPipe">
      <Property name="LABEL" mapstofield="Label"/>
      <Property name="INTERNAL_DIAMETER" mapstofield="Physical_PipeTypeID"
referencedSupportElement="GasPipeType" referenceField="GasPipeType_InnerDiameter"
sourcedimension="length" sourceunit="inches"/>
    </Mapping>
  </Mappings>
</Feature>

```

### 3.2.1.1.16.2 Supporting data section.

This optional section contains zero or more <PropertyLookUp> blocks configuring supporting data that can come from any OLEDB data-source. Supported attributes include:

Attribute	Description
name	Unique name to use as identifier for this <PropertyLookUp> block.
connectionstring	OLEDB connection string to use in order to connect to the data-source.
sqlquery	SQL query that will be used to get data from the OLEDB data-source. Parameters are supported via "?" characters.
keyfield	Column name to use as unique identifier.

<PropertyLookUp> blocks own a list of <ExternalMapping> entries that define the individual field-mappings. Supported attributes include:

Attribute	Description
name	Column name from the OLEDB data-source to map from.
mapstofield	Product-specific field-name to map to.
sourcedimension	For unitized values, this attribute specifies the unit-dimension that the specified value is in. Please refer to the appendix for the list of dimension names that can be used.
sourceunit	For unitized values, this attribute specified the unit that the specified value is in. Please refer to the appendix for the list of unit names that can be used.

Example using an Excel data-source via Excel OLEDB provider, importing pump-curves into Epanet:

```

<PropertyLookUp name="Pump Curves" connectionstring="Provider=Microsoft.Jet.OLEDB.4.0;Data
Source=C:\Water\PumpCurves.xls;Extended Properties="Excel 8.0";" sqlquery="SELECT * FROM
[sheet1$]" keyfield="CurveID">
  <ExternalMapping section="CURVES">
    <ExternalField name="CurveID" mapstofield="CurveID" />
    <ExternalField name="Head" mapstofield="Y" sourcedimension="length" sourceunit="feet" />
    <ExternalField name="Flow" mapstofield="X" sourcedimension="flow" sourceunit="gpm" />
  </ExternalMapping>
</PropertyLookUp>

```

```

</ExternalMapping>
</PropertyLookUp>

<Feature name="Pump">
  <Mappings>
    <Mapping section="PUMPS">
      <Property name="Label" mapstofield="LinkID" />
      <Property name="Curve" mapstofield="HeadID" propertylookup="Pump Curves" />
    </Mapping>
  </Mappings>
</Feature>

```

### 3.2.1.1.16.3 Global-default values section.

This section contains one or more <DefaultValues> blocks configuring global constant or feature-independent values. Each <DefaultValues> and <DefaultValue> blocks can be configured per product as follows:

#### Epanet

Attribute	Description
section	Epanet section-name owning the fields to be assigned in this block. Please refer to the appendix for the list of Epanet section-names that can be used.
field	Epanet field-name to assign. Please refer to the appendix for the list of Epanet field-names that can be used. The Epanet exporter requires at least the flow unit to be used in this section.
seedfile	Path and file-name of an INP file to use as seed-file.

#### WaterCAD/WaterGEMS/Gas Analysis

Attribute	Description
seedfile	Path and file-name of an MDB file to use as seed-file.
seedsettingsfile	Path and file-name of a WTG/GAS file to use as seed settings file.

### 3.2.1.1.17 OracleSettings

Title	Used by MA	Description
Name	Yes	Predefined list of parameter names used in the creation of the Oracle Table Scripts
Value	Yes	Values for predefined list of parameter names used in the creation of the Oracle Table Scripts

### 3.2.1.1.18 SQLServerSettings

Title	Used by MA	Description
Name	Yes	Predefined list of parameter names used in the creation of the SQL Server Table Scripts
Value	Yes	Values for predefined list of parameter names used in the creation of the SQL Server Table Scripts

### 3.2.1.1.19 MA\_XmlFragments

Title	Used by MA	Description
File	Yes	Identifies the file each row is to be applied to. Possible values include: Schema, Networks or BUC
Persistence	Yes	Identifies the persistence model each row is to be applied to. Possible values include: All, DGN, Oracle, SQLServer, OS-2Tier, OS-2Tier-NoSchemaName, OS-3Tier or OS-3Tier-NoSchemaName. The persistence model is set via a parameter of the ExportFeaturesFromXLSToSchema macro.
Base Item	Yes	Identifies if each row is a base item. This is required for the incremental load process and is set via a parameter of the ExportFeaturesFromXLSToSchema macro. This is normally set to true but can be set to false in the incremental load process in which you are adding to an existing schema that already has the base items added.
Commodity	Yes	Identifies the commodity for each row and is controlled by a parameter of the ExportFeaturesFromXLSToSchema macro.
Pre CmdMgr	Yes	This allows you to define which rows to process before and which rows to process after the command manager gets add. Example before would be the user workspaces while and example after would be to add an additional command manager entry.
xpath	Yes	Xpath of the location in the schema to insert the contents of the xml fragment file or modify the attributes.
xml fragment file	Yes	xml fragment file located in directory specified by xmlFragmentDir into the export method or an action which can be one of the following values: REMOVE (Removes the node identified by xpath) , ADD-UPDATE-TEXT (Insures there is a text value for the node identified by xpath), ADD-UPDATE-ATTRIBUTE (Insures there is an Attribute Name with the Attribute Value for the node identified by xpath), REMOVE-ATTRIBUTE (Removes the Attribute from the node identified by xpath)
xml fragment child number	Yes	Defines the child number for this xml fragment location. If unset, the xml fragment will be appended.
Attribute Name	Yes	Blank or the name of the Attribute that is to be processed by the ADD-UPDATE-ATTRIBUTE or REMOVE_ATTRIBUTE operation.
Attribute Value	Yes	Blank or the value of the Attribute that is to be processed by the ADD-UPDATE-ATTRIBUTE or ADD-UPDATE-TEXT operation. This can contain an xpath to a node within the current file in order to look up an existing value. The attribute of that node is defined by Col I (Attribute Value Attribute). If the Attribute Value Attribute is blank,

		the node's text value will be used. Example: Graphical Source for the Oracle Spatial Schemas. The xpath must be contained between "<>" and can have a prefix and/or a suffix Example: before</GeospatialSchema/Workspace>after
Attribute Value Attribute	Yes	Blank to define the node's text value or the name of the attribute to use for the value.
Notes	No	User comments about the current line.

### 3.2.1.1.19.1 Sample xml fragment file

The following is an example xml fragment file. Note that the contents within the XmlFragments will be added to the schema based on the corresponding xpaths for this file.

```
<?xml version="1.0" encoding="utf-16"?>
<XmlFragments>
  <macro name="MS_ADDIN_DEPENDENCYPATH" comment="new macro" operator="&gt;">$_(USTN_BENTLEYROOT)Electric/bin/</macro>
  <macro name="MS_ADDINPATH" comment="new macro" operator="&gt;">$_(USTN_BENTLEYROOT)Electric/bin/</macro>
  <macro name="MS_DGNAPPS" comment="new macro" operator="&gt;">BElectricAddIn</macro>
  <macro name="MS_VBAUTOLOADPROJECTS" comment="Custom event hooks library" operator="&lt;">xfmStdElecLib</macro>
</XmlFragments>
```

### 3.2.1.1.19.2 Sample xpaths

The following are some sample xpaths from an XFM schema. Note that some xpaths can identify multiple locations in the schema. For example, the user workspaces under the Workspaces node.

#### Major xpaths of an XFM Schema:

```
/GeospatialSchema/Workspace/Features
/GeospatialSchema/Workspace/Operations
/GeospatialSchema/Workspace/Methods
/GeospatialSchema/Workspace/Domains
/GeospatialSchema/Workspace/Criterias
/GeospatialSchema/Workspace/Categories
/GeospatialSchema/Workspace/Commands/FeatureMgr
/GeospatialSchema/Workspace/Commands/CmdMsgs
/GeospatialSchema/Workspace/Commands/Tools
/GeospatialSchema/Workspace/Commands/Menus
/GeospatialSchema/Workspace/PersistentTopology
/GeospatialSchema/Workspace/Database
/GeospatialSchema/Workspaces/Workspace[@name='User']/Macros
/GeospatialSchema/Workspaces/Workspace[@name='Designer']/Macros
/GeospatialSchema/Workspaces/Workspace/Features
/GeospatialSchema/Workspaces/Workspace/Operations
/GeospatialSchema/Workspaces/Workspace/Methods
/GeospatialSchema/Workspaces/Workspace/Domains
/GeospatialSchema/Workspaces/Workspace/Criterias
/GeospatialSchema/Workspaces/Workspace/Categories
/GeospatialSchema/Workspaces/Workspace/Scales
/GeospatialSchema/Workspaces/Workspace/Files
/GeospatialSchema/Workspaces/Workspace/Macros
/GeospatialSchema/Workspaces/Workspace/Commands/FeatureMgr
```

/GeospatialSchema/Workspaces/Workspace/Commands/CmdMsgs  
/GeospatialSchema/Workspaces/Workspace/Commands/Tools  
/GeospatialSchema/Workspaces/Workspace/Commands/Menus  
/GeospatialSchema/Workspaces/Workspace/PersistentTopology  
/GeospatialSchema/CoordinateSystems  
/GeospatialSchema/GraphicalSources

The following namespace prefixes are supported:

- xmlns:ec='http://www.bentley.com/schemas/Bentley.ECXML.2.0'
- xmlns:sd='Bentley\_Geospatial\_SeedExtracted.01.00'

#### **3.2.1.1.20 Icons**

This tab is used for reference only by the administrator. It lists all current Icons in the navigator\_tree\_utilities.bmp and MainMenu\_Uilities\_Ops.xml files.

These files are located in the following directories:

navigator\_tree\_utilities.bmp is stored in Directory:  
C:\Program Files\Bentley\Map\icons\

MainMenu\_Uilities\_Ops.xml is stored in Directory:  
C:\Program Files\Bentley\Map\xml\operations\required

Please try to reuse existing icons where possible. If needed, you can customize these icons to your liking.

#### **3.2.1.1.21 Reserved**

When creating your data model it is important to consider where the data will be stored. Depending on this answer you may have different constraints on the data model features, attributes or domain names. As part of the modeling administrator spreadsheet we have created a collaboration of all reserved words and characters as well as a tool to check the current data model for violations.

Tab: Reserved  
Macro: CheckReservedWords()

This macro allows you to define the tabs and columns to analyze as well as a location for flagging the violation rows.

The macro also allows you to control which formats to enforce.

The macro also creates the following log file: c:\ ReserveErrors.log

The following lists all reserved words and characters as well as the source of our information:

- Oracle 9i (All V\$RESERVED\_WORDS)  
ED01
- Oracle 10g ( Not V\$RESERVED\_WORDS)  
[http://download-west.oracle.com/docs/cd/B14117\\_01/server.101/b10759/ap\\_keywd.htm#g691972](http://download-west.oracle.com/docs/cd/B14117_01/server.101/b10759/ap_keywd.htm#g691972)
- Oracle 10g ( V\$RESERVED\_WORDS-RESERVED=Y)
- Oracle 10g ( V\$RESERVED\_WORDS-RESERVED=N)
- Oracle 10g ( V\$RESERVED\_WORDS-RES\_TYPE=N)
- Oracle 10g ( V\$RESERVED\_WORDS-RES\_ATTR=Y)
- Oracle 10g ( V\$RESERVED\_WORDS-RES\_ATTR=N)

- Oracle 10g ( V\$RESERVED\_WORDS-RES\_SEMI=Y)
- Oracle 10g ( V\$RESERVED\_WORDS-RES\_SEMI=N)
- Oracle 10g ( V\$RESERVED\_WORDS-DUPLICATE=Y)
- Oracle 10g ( V\$RESERVED\_WORDS-DUPLICATE=N)  
ELEXCM
- Oracle Spatial  
[http://download-west.oracle.com/docs/cd/B19306\\_01/appdev.102/b14253/long\\_intro.htm#BABFEJCG](http://download-west.oracle.com/docs/cd/B19306_01/appdev.102/b14253/long_intro.htm#BABFEJCG)
- ODBC  
[http://msdn2.microsoft.com/en-us/library/aa238507\(SQL.80\).aspx](http://msdn2.microsoft.com/en-us/library/aa238507(SQL.80).aspx)
- SQL  
<http://publib.boulder.ibm.com/infocenter/db2luw/v8/index.jsp?topic=/com.ibm.db2.udb.doc/admin/r0001095.htm>
- SQL Server 2000  
[http://msdn2.microsoft.com/en-us/library/aa238507\(SQL.80\).aspx](http://msdn2.microsoft.com/en-us/library/aa238507(SQL.80).aspx)
- SQL:1999  
<http://www.postgresql.org/docs/current/static/sql-keywords-appendix.html>
- XML  
<http://msdn2.microsoft.com/en-us/library/ms145315.aspx>
- GSX  
GSX: 8.9.3.44 and MS: 8.9.3.66
- PostgreSQL  
<http://www.postgresql.org/docs/current/static/sql-keywords-appendix.html>
- SQL:2003  
<http://www.postgresql.org/docs/current/static/sql-keywords-appendix.html>
- SQL-92  
<http://www.postgresql.org/docs/current/static/sql-keywords-appendix.html>
- ANSI  
[http://download-west.oracle.com/docs/cd/B14117\\_01/server.101/b10759/ap\\_keywd.htm#g691972](http://download-west.oracle.com/docs/cd/B14117_01/server.101/b10759/ap_keywd.htm#g691972)
- DB2 Universal Database Products  
[ftp://ftp.software.ibm.com/ps/products/db2/info/vr82/pdf/en\\_US/db2s1e81.pdf](ftp://ftp.software.ibm.com/ps/products/db2/info/vr82/pdf/en_US/db2s1e81.pdf)
- ISO/ANSI SQL99  
<http://publib.boulder.ibm.com/infocenter/db2luw/v8/index.jsp?topic=/com.ibm.db2.udb.doc/admin/r0001095.htm>

### 3.2.1.1.22 MA-PeerTypes

This tab is used to define feature relationships between multiple features.

Attribute	Description
PeerType	Contains the name of the Peer Type.
PeerID	Internal ID for storing the peer relationships. The must be unique for each type of peer relationship
TabName (Optional)	Defines the editor tab name that will display the relationships.

Type	Defines the type of relationship. Currently we only support ParentChild but plan to add Peer.
Error	If errors occur during the export this may contain information to resolve the error.

### 3.2.1.1.23 MA-FeatureRelationships

This tab is used to define feature relationships between multiple features.

Attribute	Description
PeerType	Defines the peer type as it relates to the MA-PeerTypes' PeerType (Col A).
Parent Feature Type	Contains the name of the Parent FeatureType for your new Relationship. Be sure you use the Featurename which is filled in FeatureTypes [A] and not the Internal or GisTablename.
Child Feature Type	Contains the name of the Child FeatureType for your new Relationship. Be sure you use the Featurename which is filled in FeatureTypes [A] and not the Internal or GisTablename.
Process?	Process flag for the MA export. If errors occur this may be set to no in order for the administrator to locate the rows in error.
Error	If errors occur during the export this may contain information to resolve the error.

### 3.2.1.1.24 MA\_ImportAttributeMapping

This tab is used to define the feature and attribute mappings for import functions. It is used by a separate process called: ExportWaterEpanetOrWaterGEMSFromXLS and is currently only used in the Waste Water spreadsheet.

Title	Used by MA	Description
Process?	Yes	1=Process, 0=Not Process by the Modeling Administrator
Mapping Name	Yes	Defines which Import mapping this row is for.
Source Feature	Yes	Defines the source feature.
Source Attribute	Yes	Defines the source feature's attribute.
Target Feature	Yes	Defines the target feature.
Target Attribute	Yes	Defines the target feature's attribute.



### 3.2.1.1.25 MA\_OperationProperties

This tab is used to localize labels, tooltips, and combo box items used in feature placement and editor dialogs. Its use is to facilitate localization needs.

Title	Used by MA	Description
Display	Yes	Configurable string used in the dialog
Category1	No	For descriptive purposes, should not be modified
Category2	No	For descriptive purposes, should not be modified
Category3	No	For descriptive purposes, should not be modified
Category4	No	For descriptive purposes, should not be modified
Code Default Display	No	For descriptive purposes, should not be modified
Item	Yes	Key for MA_Code_Processor, should not be modified
MA_Code_Processor	Yes	Name of the MA code process, should not be modified

### 3.2.1.2 Working with the Modeling Administrator

This section describes some common tasks that can be performed while working with the Modeling Administrator. It assumes you have a working knowledge of the Geospatial Administrator (GSA).

#### 3.2.1.2.1 Creating a new Data Model

To start a new data model using the Modeling Administrator (MA) you just need to make a copy of an existing MA spreadsheet. These are delivered with the Utility Industry Suite of products. You will then modify the data in the various tabs that the Modeling Administrator uses in order to configure your datamodel. Once you are done you can follow the steps defined under the "MA-Export your Data Model" section which includes instructions for creating your new GSA base schema.

Note: For the examples below we will be starting with the \_BentleyElectric\_DL.xls.

#### 3.2.1.2.2 Add a Feature

In this section you will learn how to add a new feature to a datamodel. This section will be working with the following tabs:

- FeatureTypes
- MA-Symbology
- MA\_ConfigurationSetting

First you will need to move to the FeatureTypes tab. Remember you can do this by going to the Overview tab and use the MA shortcuts in the lower right hand corner.

Once you are in the FeatureTypes tab you will notice that the existing information is starting on row two for the FeatureTypes tab. Note that the actually row each tab starts on may be different. It is important that you do not start your configuration on any other row as the MA code is configured to start on a particular row for each tab. This is true across all of the MA tabs and in some cases the code also reads the data from left to right starting on a particular column. The MA\_NetworkStructural tab is an example of this.

Also the MA code reads the information until a blank row or column is encountered. This means that any data past the blank row or column will not be processed. In addition to this there is also a process

flag on some of the tabs in which you can control if a particular row or column of information is to be processed. You will noticed that during the export process that if certain errors are found in the data that the processed flags for the rows or columns in error will be changed from on to off. These allow the administrator to quickly find and correct these errors. Just remember to toggle the process flags back on when the error is corrected in order to process that particular row or column of information.

To add a new feature you can create a new row of information by either inserting a row and populating it manually or you can just find an existing row of information that is similar to the feature that you are trying to create and just make a copy of that row. Then you can change the specifics of that row for your new feature. In either case make sure you follow the guidelines for each column of information as defined in the “Modeling Administrator Tabs” section. At the very least you will need to change the NAME (A) and GISTABLE (D) columns. For my example I’m going to be copying the Pole feature and making a Transmission Pole feature by setting the NAME (A) to “Transmission Pole” and the GISTABLE (D) to “E\_TRANSPOLE” for my new FeatureTypes row.

Once you have your new feature row created you can follow the steps outlined in the “MA-Export your Data Model” section. Note that this will do two things. First it will allow you to go through the export steps and allow you to see your new feature in the Geospatial Administrator (GSA) but it will also populate the symbology row in the MA-Symbology tab for you for your new feature. This row will be created with the same defaults as GSA if you where created a new feature in that application. You can use the Excel filtering to locate the new row. Filter on Feature (B) where it equals the NAME (A) from the FeatureTypes tab. Review the data for this row and notice that the Criteria Name (AH) is set to DEFAULT. This means that this will be the default geometry attribution for your feature. Later in section “Add Criteria Based Symbology”, we will discuss adding additional geometry attribution. For now, this row can be modified to fit your specific needs and re-exported in order to make your changes take effect. Also it is a good idea to start with the DGN only persistent model in order to save time and then once you are happy with your changes, you can apply them to another persistent model for final deployment.

In addition to the FeatureTypes and MA-Symbology tabs you will need to configure some specific behaviors for your new feature. For this task you will need to move to the MA\_ConfigurationSetting tab. Remember the Overview tab.

Once you are in the MA\_ConfigurationSetting tab you will noticed that the information in this tab is setup by Sections (A). There are four main sections defined here. They are as follows:

- Configuration – Defines high level configuration settings
- NetworkTypes – Defines configuration settings that apply to each of the two network types.
- Networks – Defines configuration settings for a particular network.
- Features – Defines configuration settings for a particular feature.

The concept here is that the lower level (Features) can override the configuration settings from the higher level (Configuration). For now we will only be dealing with the Features level.

Locate the rows for our example feature E\_POLE by filtering on Section (A) where it equals “Features” and where Parent Name (B) equals “E\_POLE”. Note that E\_POLE matches the GISTABLE (D) from the FeatureTypes tab. Duplicate these rows and change the Parent Name (B) from “E\_POLE” to “E\_TRANSPOLE”.

Once you have the MA\_ConfigurationSetting tab changes done, re-export your schema and verify the results in GSA.

**Extra Credit:** Try duplicating the “OH Primary” creating an “OH Transmission” feature. Also try duplicating the “OH Switch Bank” creating an “OH Transmission Switch Bank” feature.

### **3.2.1.2.3 Add Attributes to a Feature**

In this section you will learn how to add Attributes to a feature. This section will be working with the following tabs:

- FeatureAttributes
- AttributeDomain
- AttributeLegalValue
- AttributeDefaultValues

First you will need to move to the FeatureAttributes tab. Then locate our sample feature by filtering the FEATURE TYPE (A) to "Pole". Duplicate these rows and change FEATURETYPE (A) from "Pole" to "Transmission Pole".

Next we'll change the height field to use a new domain.

To define the domain, navigate to the AttributeDomain tab. Filter the NAME (A) to "POLEHEIGHT". Duplicate this row and change the NAME (A) to "TRANPOLEHEIGHT".

To define the values for our new domain, navigate to the AttributeLegalValue tab. Filter the DOMAINNAME (A) to "POLEHEIGHT". Duplicate these rows and change the DOMAINNAME (A) for each from "POLEHEIGHT" to "TRANPOLEHEIGHT". Then change the VALUE (B) and Stored Value (G) by adding 100 to each where they are numeric.

Then navigate back to the FeatureAttributes tab and filter where FEATURETYPE (A) equals "Transmission Pole" and Name (B) equals "Height". Change the ATTRIBUTE DOMAIN (C) from "POLEHEIGHT" to "TRANPOLEHEIGHT".

Next we'll define the default values that will be used during placement. Navigate to the AttributeDefaultValues tab and filter the FEATURE TYPE TABLE (B) on "Pole". Duplicate these rows and change the FEATURE TYPE TABLE (B) from "Pole" to "Transmission Pole". Then for the row with an Attribute (C) equal to "Height", change the ATTRIBUTE DOMAIN (D) from "POLEHEIGHT" to "TRANPOLEHEIGHT" and change the VALUE (E) from "45" to "145".

**Extra Credit:** Try duplicating the attributes from the "OH Primary" for your "OH Transmission" feature. Also try to create a Transmission Voltage domain instead of using the Primary Voltage for the Voltage attribute. Also duplicate the "OH Switch Bank" attributes for your "OH Transmission Switch Bank" feature.

#### **3.2.1.2.4 Add a Feature to the Command Manager**

In this section you will learn how to add a feature to the Command Manager. This section will be working with the following tabs:

- MA-CmdMgr

First you will need to move to the MA-CmdMgr tab. Then locate our sample feature by filtering the NAME (B) to "E\_POLE". Duplicate this row and change NAME (B) to "E\_TRANSPOLE" and Alias (C) to "Transmission Pole". Then re-export you schema from MA to GSA and then follow the instructions in the "GSA-Export the workspace" section. After that open your environment by following the instructions in the "Opening the workspace" section and verify you can place your new feature.

**Extra Credit:** Try adding your "OH Transmission" and "OH Transmission Switch Bank" feature to the Command Manager.

#### **3.2.1.2.5 Add Annotation to a Feature**

In this section you will learn how to add Annotation to a feature. This section will be working with the following tabs:

- FeatureGeometry
- MA-Symbology

First you will need to move to the FeatureGeometry tab. Filter where FEATURETYPE (A) is equal to "Pole" and GEOMTYPE ( C ) is equal to "ANNOTATION". Duplicate this row and change FEATURETYPE (A) from "Pole" to "Transmission Pole". Also change the Name (B) from "E\_POLEText1" to "E\_TRANSPOLEText1".

Next run the export. This will populate the symbology row in the MA-Symbology tab for you for your new annotation feature. It will not know the value you want to display for the annotation for your feature. To change this, navigate to the MA-Symbology tab and filter by Feature (B) equals to "E\_TRANSPOLEText1". Change the PBA (AG) which stands for Property Based Annotation from "E\_TRANSPOLEText1" to "[HEIGHT]/[POLECLASS]".

Re-export your schema from MA, Export from GSA and verify your annotation placement.

Note: MA only looks at rows with a GEOMTYPE ( C ) equal to "ANNOTATION".

**Extra Credit:** Try duplicating the annotation found on the "OH Primary" for your "OH Transmission" feature. Also duplicate the annotation found on the "OH Switch Bank" for the "OH Transmission Switch Bank".

### 3.2.1.2.6 Add Criteria Based Symbology

In this section you will learn how to add criteria based symbology to a feature. This section will be working with the following tabs:

- MA-FeatureAttributes
- MA-Symbology

First you will need to move to the MA-Symbology tab and filter Feature (B) by "E\_TRANSPOLE". You will notice that there is only one row with a Criteria Name (AH) equal to "DEFAULT".

Next navigate to the MA-FeatureAttributes tab and filter by FEATURE TYPE (A) equals "Transmission Pole". Notice that the DrivesSymbology (M) column is set to "Yes" for both the "Life Cycle Status" and "Height" attributes.

Next we want to run the macro to add the additional criteria rows to the MA-Symbology tab. Do this by select the Tools pull down, then Macro and then Macros. Select the AddSymbologyCriteriaFromFeatureAttributes macro and hit Run.

Next navigate back to the MA-Symbology tab and re-filter Feature (B) by "E\_TRANSPOLE". You will notice that there is now more than one row. It created a separate row for each value in the domains used for the "Life Cycle Status" and "Height" attributes.

If you change your filter so that it returns both "E\_TRANSPOLE" and "E\_POLE" you can see that the E\_POLE was setting some of the Weights (K) and some of the Colors (D) based on the Life Cycle Status. You can also see that the E\_POLE was setting the Cellname (U) based on the Height.

Try and copy the same to the "E\_TRANSPOLE".

Re-export your schema from MA, Export from GSA and verify your symbology differences.

**Extra Credit:** Try duplicating the criteria found on the “OH Primary” for your “OH Transmission” feature. Also duplicate the criteria found on the “OH Switch Bank” for the “OH Transmission Switch Bank”.

### 3.2.1.2.7 Optimize your Symbology

Next we want to optimize our symbology for performance by combining any criterias that are setting the same graphic attribute values.

Example: We can convert the following:

Feature	Color	Weight	Criteria Name	Criteria
W_MAIN	0-255	3	W_LIFECYCLESTATUS_ProposedInstall	COMPARE("[LIFECYCLESTATUS]", "Proposed Install", "I")
W_MAIN	9	3	W_LIFECYCLESTATUS_ProposedRemove	COMPARE("[LIFECYCLESTATUS]", "Proposed Remove", "I")
W_MAIN	9	3	W_LIFECYCLESTATUS_ProposedAbandon	COMPARE("[LIFECYCLESTATUS]", "Proposed Abandon", "I")
W_MAIN	14	3	W_LIFECYCLESTATUS_ProposedTransfer	COMPARE("[LIFECYCLESTATUS]", "Proposed Transfer", "I")
W_MAIN			W_LIFECYCLESTATUS_In-Service	COMPARE("[LIFECYCLESTATUS]", "In-Service", "I")
W_MAIN	9		W_LIFECYCLESTATUS_Removed	COMPARE("[LIFECYCLESTATUS]", "Removed", "I")
W_MAIN	9		W_LIFECYCLESTATUS_Abandoned	COMPARE("[LIFECYCLESTATUS]", "Abandoned", "I")
W_MAIN			W_LIFECYCLESTATUS_Unknown	COMPARE("[LIFECYCLESTATUS]", "Unknown", "I")
W_MAIN			W_LIFECYCLESTATUS_N/A	COMPARE("[LIFECYCLESTATUS]", "N/A", "I")
W_MAIN			W_MainType_DistributionMain	COMPARE("[TYPE]", "I", "I")
W_MAIN			W_MainType_TransmissionMain	COMPARE("[TYPE]", "2", "I")
W_MAIN	1	1	DEFAULT	

To the following:

Feature	Color	Weight	Criteria Name	Criteria
W_MAIN	0-255	3	W_LIFECYCLESTATUS_PI-PR-PA-PT	COMPARE("[LIFECYCLESTATUS]", "Proposed Install Proposed Remove Proposed Abandon Proposed Transfer", "I")
W_MAIN			W_LIFECYCLESTATUS_ProposedInstall	COMPARE("[LIFECYCLESTATUS]", "Proposed Install", "I")
W_MAIN	9		W_LIFECYCLESTATUS_PR-PA-R-A	COMPARE("[LIFECYCLESTATUS]", "Proposed Remove Proposed Abandon Removed Abandoned", "I")
W_MAIN			W_LIFECYCLESTATUS_ProposedRemove	COMPARE("[LIFECYCLESTATUS]", "Proposed Remove", "I")
W_MAIN			W_LIFECYCLESTATUS_ProposedAbandon	COMPARE("[LIFECYCLESTATUS]", "Proposed Abandon", "I")
W_MAIN	14		W_LIFECYCLESTATUS_ProposedTransfer	COMPARE("[LIFECYCLESTATUS]", "Proposed Transfer", "I")
W_MAIN			W_LIFECYCLESTATUS_In-Service	COMPARE("[LIFECYCLESTATUS]", "In-Service", "I")
W_MAIN			W_LIFECYCLESTATUS_Removed	COMPARE("[LIFECYCLESTATUS]", "Removed", "I")
W_MAIN			W_LIFECYCLESTATUS_Abandoned	COMPARE("[LIFECYCLESTATUS]", "Abandoned", "I")
W_MAIN			W_LIFECYCLESTATUS_Unknown	COMPARE("[LIFECYCLESTATUS]", "Unknown", "I")
W_MAIN			W_LIFECYCLESTATUS_N/A	COMPARE("[LIFECYCLESTATUS]", "N/A", "I")
W_MAIN			W_MainType_DistributionMain	COMPARE("[TYPE]", "I", "I")
W_MAIN			W_MainType_TransmissionMain	COMPARE("[TYPE]", "2", "I")
W_MAIN	1	1	DEFAULT	

Notice that the Weight is set by two (2) rows instead of five (5) and the Color is set by three (3) rows instead of six (6) rows.

We have created a macro that will help in identifying and creating the combined rows. Note that this will clear the original values so you may want to back up this tab before running this macro.

You can run the macro by selecting the Tools pull down, then Macro and then Macros. Select the OptimizeCriteria macro and hit Run.

Note: Due to the different formats of the criteria names and criterias, this macro only combines the values and it is your responsibility to change the criteria name and format the actual criterias.

Here are some performance tips:

Try to limit the length of expressions. XFM must pre-process an expression to replace feature property specifications with a property value so a concise expression will be quicker to pre-process.

For example:

a) If you need to compare a single property to numerous values then use the COMPARE function with a delimited list of values instead of separate COMPARE functions.

Instead of:

```
COMPARE("[SIZE]", "220", "") || COMPARE("[SIZE]", "240", "") || COMPARE("[SIZE]", "640", "")
```

Consider using:

```
COMPARE("[SIZE]", "220|240|640", "|")
```

b) If a property is numeric, compare the property value directly to avoid a function call to the COMPARE function.

Instead of:

```
COMPARE("[SIZE]", "220", "")
```

Consider using:

```
[SIZE]==220
```

### 3.2.1.2.8 Add a Network

In this section you will learn how to add a Network, add features to a Network and define stop conditions to your Network. This section will be working with the following tabs:

- MA-NetworkStructural
- MA\_ConfigurationSetting
- MA\_StopConditions

First you will need to move to the MA-NetworkStructural tab. Note that MA reads this tab from left to right starting in column E as well as top to bottom starting in row 4.

First we want to create two new networks for our Transmission features. One will be for flow of electric facilities and the other will be to relate the electric facilities to the structures they depend upon. Insert two new columns before the first network in column E so that we have a empty column E and F.

For the first network set the Internal Network Name (E1) to "TRANSMISSION", set the External Network Name (E2) to "Electric Transmission" and set the Network Type (E3) to "Flow".

For the second network set the Internal Network Name (F1) to "TRANSSTRUCT", set the External Network Name (F2) to "Electric Trans Structural" and set the Network Type (F3) to "Attach".

Next we want to insert rows for our E\_TRANSPOLE (Row 4), E\_OHTRANSMISSION (Row 5) and E\_OHTRANSSWITCHBANK (Row6) assign them to our networks.

For our flow network, set E\_OHTRANSMISSION to be a part of the Electric Transmission network by setting E5 to "1" and the E\_OHTRANSSWITCHBANK by setting E6 to "3" for inline device.

For our attach network, set E\_OHTRANSMISSION as an attachment of a structure by setting F5 to "1". Set E\_TRANSPOLE as a structure by setting F4 to "2".

Next we want to define a stop condition for our Electric Transmission Network. To do this you will need to move to the MA\_StopConditions tab. Filter by External Network Name (B) equals "Electric Primary", Stop Conditions Name ( C ) equals "Default" and Feature Name equals "E\_OHSWITCHBANK". Duplicate this row and set the External Network Name (B) to "Electric Transmission" and the Feature Name (D) = "E\_OHTRANSSWITCHBANK".

Re-export your schema from MA, Export from GSA and verify that you can place an E\_TRANSPOLE, E\_OHTRANSMISSION and an E\_OHTRANSSWITCHBANK. You can also try tracing your network to verify the stop conditions are working.

### **3.2.1.2.9 Add a Sub Feature to a Feature**

In this section you will learn how to add a sub feature to a feature. This section will be working with the following tabs:

- MA-CompoundFeatures
- FeatureTypes
- FeatureAttributes
- MA\_ConfigurationSetting

First you will need to move to the MA-CompoundFeatures tab. Filter on the PARENT FEATURE TYPE (A) equals "Pole". Duplicate this row and set the PARENT FEATURE TYPE (A) equal "Transmission Pole" and the CHILD FEATURE TYPE (B) equal to "Transmission Pole Inspection".

Next Move to the FeatureTypes tab and filter the NAME (A) equals "Pole Inspection". Duplicate this row and change NAME (A) to "Transmission Pole Inspection". Also change the GISTABLE (D) to "E\_TRANSPOLEINSPECTION".

Next move to the FeatureAttributes tab and duplicate the attributes from the Pole Inspection and assign them to your Transmission Pole Inspection.

Also remember to duplicate the Pole Inspection's MA\_ConfigurationSetting values.

Re-export your schema from MA, Export from GSA and verify that you can add a Transmission Pole Inspection to an existing Transmission Pole by going to the Relationships tab and doing a right click on the Children node to add a child.

### **3.2.1.3 Importing into the Modeling Administrator**

The Modeling Administrator has the capability to read an existing GSA schema and import the data into some of the MA tabs. This can be very useful as it will get the majority of the data into the tabs which can then be customized accordingly.

#### **3.2.1.3.1 Limitations:**

The following are the limitations of the import module:

- MA-CompoundFeatures-Unable to determine derived items, defaults to fixed
- FeatureTypes -Doesn 't handle sub-features for text features.
- MA\_ConfigurationSetting-Only some of the 38 types are being set. See MA\_ConfigurationSetting section below for details.
- Need a way to clear the sheets
- Also need a way to control the formatting if there is no data except the headers as the new rows will get the header formatting...
- Note: If you search for "Known issue..." you will find the current outstanding items
  - Properties without an itemSpec      geo\_example.xml



- Properties with an itemSpec type = grid    geo\_example.xml
  - Properties with a type = xmlfragment    geo\_example.xml
  - Symbology node name: OverrideScale    Jim-Comms\CommsTownSpatial.xml"
- No source in a non-BUIS schema for the following tabs:
  - MA\_XMLFragments
  - MA -NetworkStructural
  - MA\_StopConditions
  - FeatureClasses
  - MA\_Configuration\_Water
  - MA -FeatureRelationships
  - MA -PeerTypes
  - MA -CellText
- These tabs do not handle multimapping which is only specific to BUIS schemas:
  - FeatureTypes
  - FeatureGeometry
  - FeatureAttributes
  - AttributeDefaultValues
  - MA -CmdMgr
- FeatureTypes-Cell1 features are coming into the FeatureTypes tab which is only in BUIS schemas.
- All attributes get placed on the "General" tab.
- Currently bringing in the net id properties instead of weeding them out.

### 3.2.1.3.2 MA\_ConfigurationSetting:

In the ModelingAdministrator\_Import Module there is a get\_<variableName> method for each of the possible MA\_ConfigurationSettings that are defined at the features level. Some of the items are already coded to return a value by looking at other parts of the schema or are hard coded to a value. These items can be customized accordingly.

#### 3.2.1.3.2.1 Common Items:

ActualLengthAttribute	Checks ftr attributes for a length field that is a floatval type
CellXScale	Comes from an existing Symbology size
CellYScale	Comes from an existing Symbology size
CellZScale	Comes from an existing Symbology size
CustomPlacementLib	Just set to CommonCustomPlacementCmds for all
DefaultAttachTolerance	Not needed as this is defined at the network level
DefaultFlowTolerance	Not needed as this is defined at the network level
Display Text Type	Just set to expression for all
Display Text Value	Just set to features external name
ExpertDesignerPlacementCellname	Comes from an existing Symbology cell name
InlineAttachmentTolerance	Not needed as this is defined at the network level
IsAnyPoint	Must be manually set or customize the get_<name>
IsInline	Must be manually set or customize the get_<name>
PlaceOnFeatures	Must be manually set or customize the get_<name>
Type	Can come from the feature's geom type

#### 3.2.1.3.2.2 Commodity or Conduit Specific Items:

BankSummaryAttribute	Must be manually set or customize the get_<name>
CabinetTypeAttribute	Must be manually set or customize the get_<name>
CrossSectionFillAttribute	Must be manually set or customize the get_<name>
InConduitValue-No	Must be manually set or customize the get_<name>
IsConduitPlaceable	Must be manually set or customize the get_<name>
IsStructure	Must be manually set or customize the get_<name>
Label Text	Must be manually set or customize the get_<name>



LifeCycleStatusAttribute	Must be manually set or customize the get_<name>
LifeCycleStatusInService	Must be manually set or customize the get_<name>
LifeCycleStatusProposedremove	Must be manually set or customize the get_<name>
IsSwitchCabinet	Must be manually set or customize the get_<name>
IsSwitchCabinetBusBar	Must be manually set or customize the get_<name>
IsSwitchCabinetConnection	Must be manually set or customize the get_<name>
IsSwitchCabinetFusedSwitch	Must be manually set or customize the get_<name>
IsSwitchCabinetGroupSwitch	Must be manually set or customize the get_<name>
LinkedProperties	Must be manually set or customize the get_<name>
UsesBankSummary	Must be manually set or customize the get_<name>
UsesLength	Must be manually set or customize the get_<name>
UsesMultiWire	Must be manually set or customize the get_<name>
UsesNeutral	Must be manually set or customize the get_<name>
UsesNumberOfRuns	Must be manually set or customize the get_<name>
UsesOperatingStatus	Must be manually set or customize the get_<name>
UsesPhase	Must be manually set or customize the get_<name>
PlaceInBundle	Must be manually set or customize the get_<name>

### 3.2.1.3.3 How to Use:

Perform the following steps for importing an existing schema's data into your data loader:

- Open an existing \_Bentley<Commodity Name>\_DL.xls
- If this is the first time you have imported a schema you will need to either modify one of the existing macros or create your own in the Imports module.

Here is an example macro:

```
Sub Import_Water_DGN()
    ImportSchemaToXLS _
    ThisWorkbook.path & "..\Water\BentleyWater_DGN.xml"
End Sub
```

- Run your new or modified import macro.
- Review the information that was pulled in and review the log file. The log file will be the same directory as your import schema with the same name as your import schema along with a xml\_import.log extension.
- Run your normal MA export for generating your schema and configuration files.
- Open the new xml schema from a Bentley Geospatial Administrator session and verify that the new features and properties are visible.
- Export from GSA
- Copy your newly generated configuration files under your workspace.
- Open your new environment.

## 3.2.2 MA-Export your Data Model

There are five different persistent models that can be exported using the Modeling Administrator. Depending on which environment you are creating, follow the export steps in the corresponding section below.

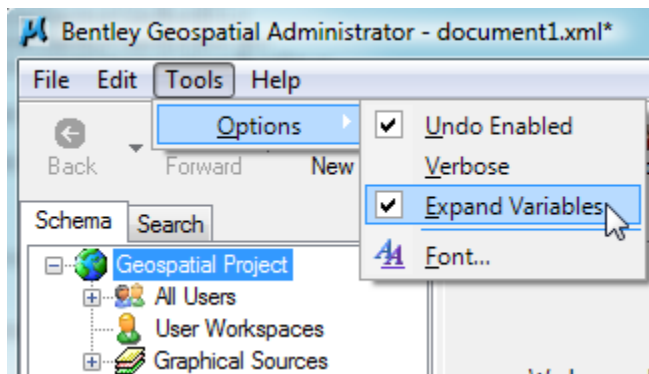
### 3.2.2.1 Geospatial Administrator Configuration

To insure the preservation of variables such as %\_USTN\_WORKSPACEROOT% and %BaseSourceDir%, insure you have the "Expand Variables" option turned off.

Note: You can modify the shortcut to the geospatialadmin.exe by adding the following to insure this option is turned off each time you start GSA.

**-expand=false**

Also note that you can view the current setting under the Tools pull down menu:



### 3.2.2.2 DGN

#### 3.2.2.2.1 Base Schema

Perform the following step for creating a new base schema:

- a. Open a Bentley Geospatial Administrator session
- b. File New
- c. Enter the name of the schema and save as follows:  
"Bentley<Commodity Name>\_DGN"
- d. Save your schema as "Bentley<Commodity Name>\_DGN\_Base" and exit Bentley Geospatial Administrator.

#### 3.2.2.2.2 XML Schema

Perform the following steps for adding your data model to your base schema:

- j. Open \_Bentley<Commodity Name>\_DL.xls
- k. If this is the first time you have exported the schema you may need to modify the path(s) and filename(s) in the following macro: **Export\_<Commodity Name>\_DGN()**
- l. Run the following macros: **Export\_<Commodity Name>\_DGN()**
- m. Open the new xml schema from a Bentley Geospatial Administrator session and verify that the new features and properties are visible.

Note: A log file with the format of <Output Schema Location/File Name> + ".log" is created. Verify that the log file does not contain any "Error"s or "Warning"s. If so, resolve the errors and re-run the macro. Also if you receive any errors or warning when opening the schema with GSA you must resolve the error before proceeding too the next step.

### 3.2.2.3 SQL Server

#### 3.2.2.3.1 Base Schema

Perform the following step for creating a new base schema:

- a. Open a Bentley Geospatial Administrator session
- b. File New
- c. Enter the name of the schema and save as follows:  
"Bentley<Commodity Name>\_SQLServer"
- d. Save your schema as "Bentley<Commodity Name>\_SQLServer\_Base" and exit Bentley Geospatial Administrator.

#### 3.2.2.3.2 XML Schema

Perform the following steps for adding your data model to your base schema:

- a. Open \_Bentley<Commodity Name>\_DL.xls
- b. If this is the first time you have exported the schema you may need to modify the path(s) and filename(s) in the following macro: **Export\_<Commodity Name>\_SQLServer()**
- c. Run the following macros: **Export\_<Commodity Name>\_SQLServer()**
- d. Open the new xml schema from a Bentley Geospatial Administrator session and verify that the new features and properties are visible.

Note: A log file with the format of <Output Schema Location/File Name> + ".log" is created. Verify that the log file does not contain any "Error"s or "Warning"s. If so, resolve the errors and re-run the macro. Also if you receive any errors or warning when opening the schema with GSA you must resolve the error before proceeding too the next step.

Note: If you receive an error while opening the schema you must resolve the error before proceeding too the next step.

### 3.2.2.3.3 SQL Schema

The modeling administrator also has a macro for creating the SQL Server schema required for the “DGN (Geom) /DB (Attr)-SQL Server” environment.

#### 3.2.2.3.3.1 Create the Table Creation Scripts

- Open \_Bentley<Commodity Name>\_DL.xls
- Verify the values in the SQLServerSettings tab for the DATABASENAME. Leave the SCHEMANAME as MSDATA as this is required by GSA.
- Run the CreateSQLServerSchema from Tools/Macros/Macros
- Hit the “Execute” button

Note: This will create a file in your user directory.

Example:

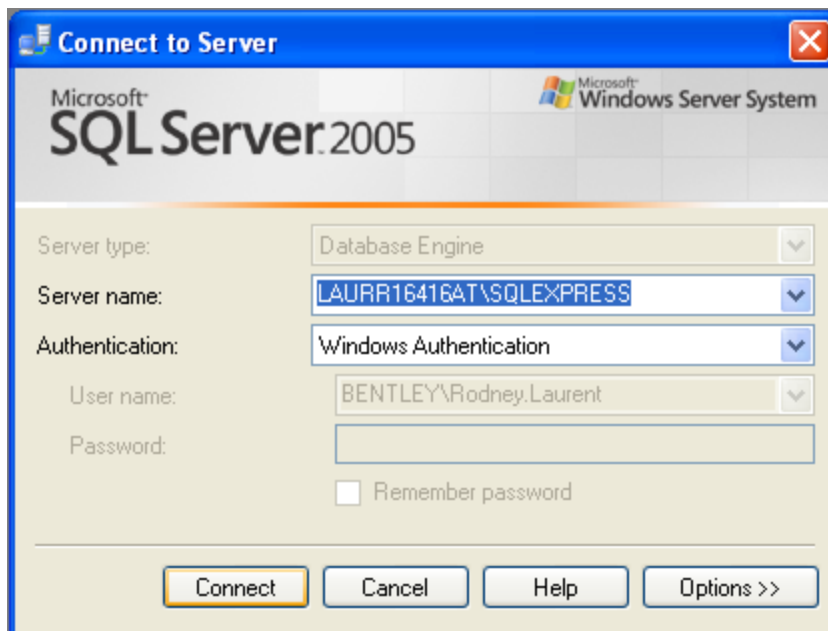
C:\Documents and Settings\<your user name>\BentleySchemaSQLServer.sql

#### 3.2.2.3.3.2 Create the SQL Server Database

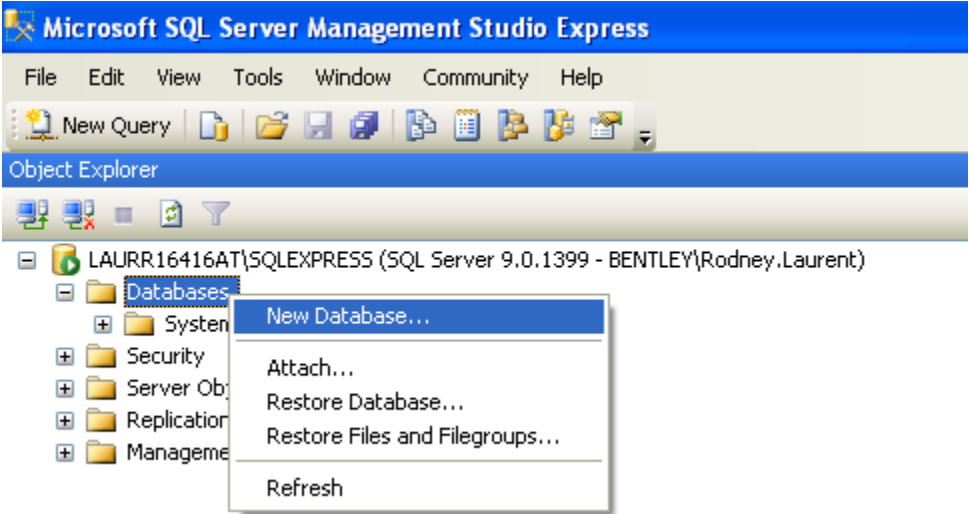
Open SQL Server Management Studio Express from the Start Menu. This is delivered as part of the Microsoft SQL Server 2005 software.



#### 3.2.2.3.3.3 Connect to SQL Server



#### 3.2.2.3.3.4 Create Database



3.2.2.3.3.5 Define Database Name

Script Help

Database name: BENTLEY01

Owner: <default>

☐ Use full-text indexing

Database files:

Logical Name	File Type	Filegroup	Initial Size (MB)	Autogrowth	Path	File
BENTLEY01	Data	PRIMARY	2	By 1 MB, unrestricted growth	C:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\DATA	File
BENTLEY01_log	Log	Not Applicable	1	By 10 percent, unrestricted growth	C:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\DATA	File

Note: Database name must match DATABASENAME in Data Loader’s SQLServerSettings DATABASENAME.

3.2.2.3.3.6 Define Path Locations for Data and Log file types

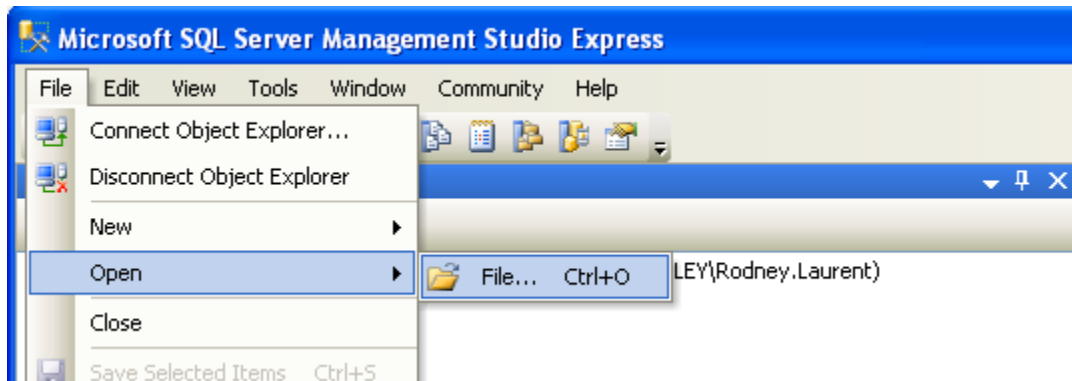
Database files:

Logical Name	File Type	Filegroup	Initial Size (MB)	Autogrowth	Path	File
BENTLEY01	Data	PRIMARY	2	By 1 MB, unrestricted growth	D:\MSSQL\DATA\BENTLEY01	File
BENTLEY01_log	Log	Not Applicable	1	By 10 percent, unrestricted growth	D:\MSSQL\DATA\BENTLEY01	File

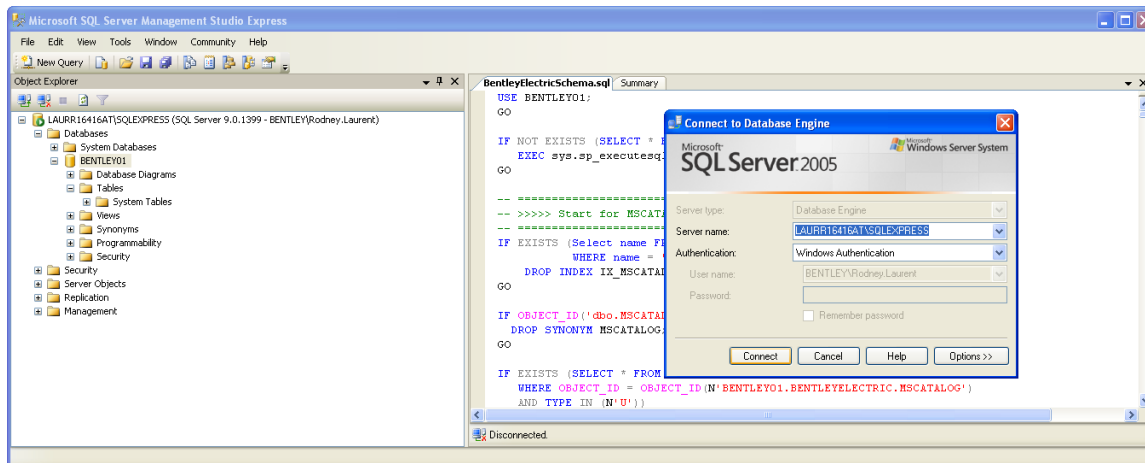
Location can be where you want it.

Then select the OK Button

3.2.2.3.3.7 Load the Schema.sql

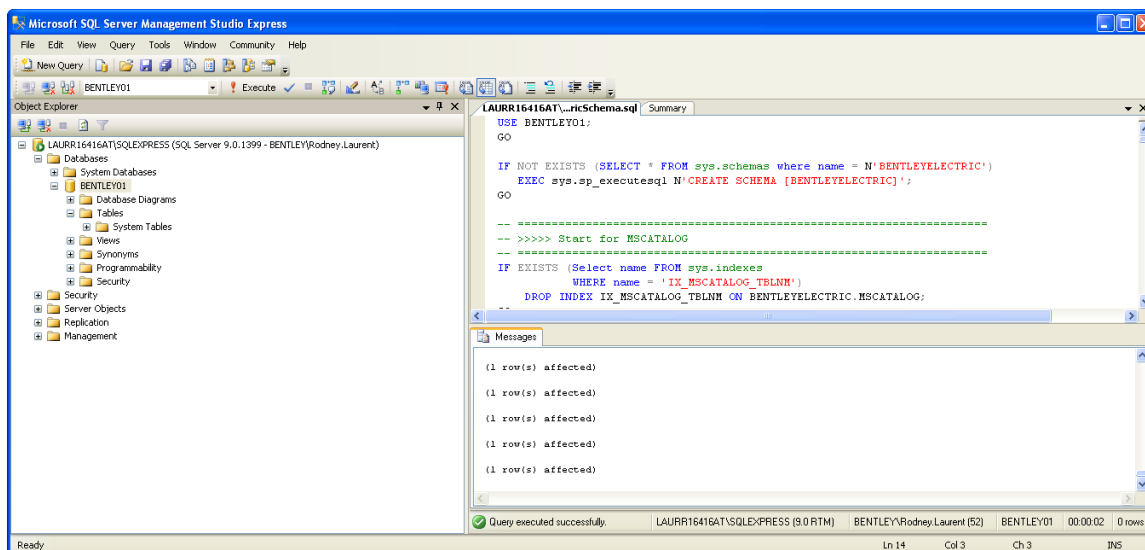


<BentleySchemaSQLServer.sql>

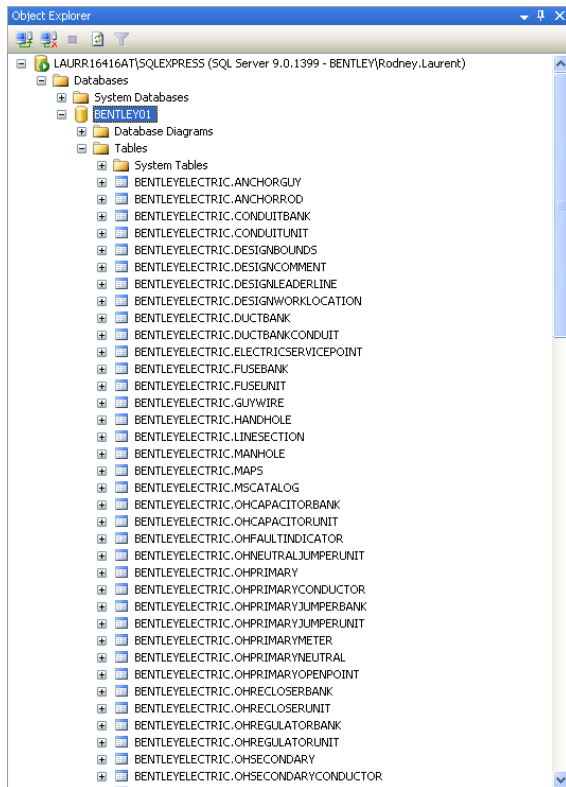


### 3.2.2.3.3.8 Execute the Schema.sql

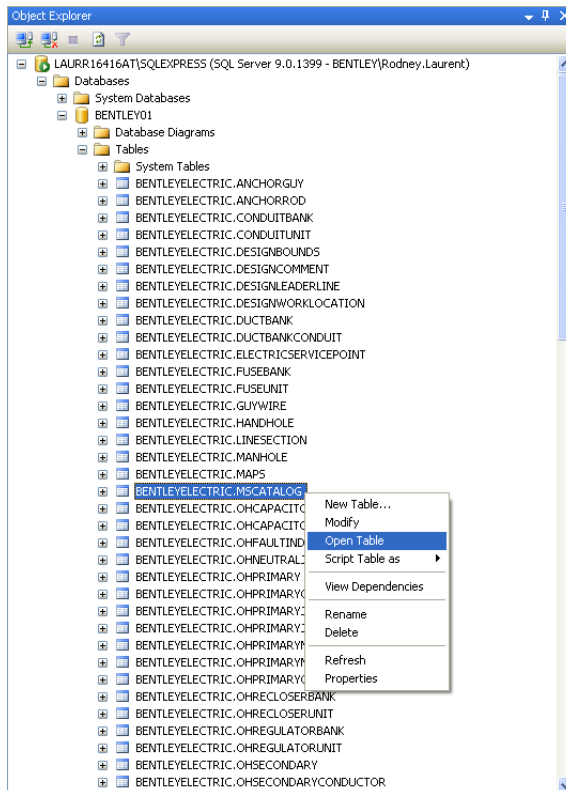
Click in the Schema panel and hit F5 (execute SQL)

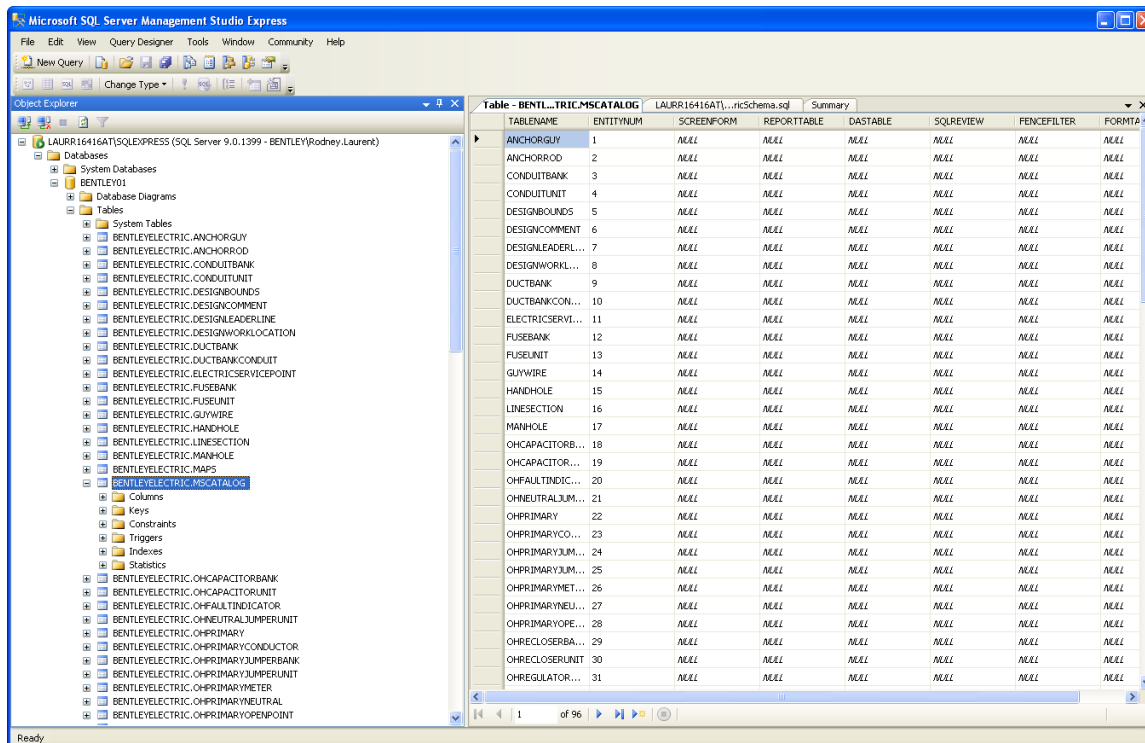


### 3.2.2.3.3.9 Verify that the Tables are created



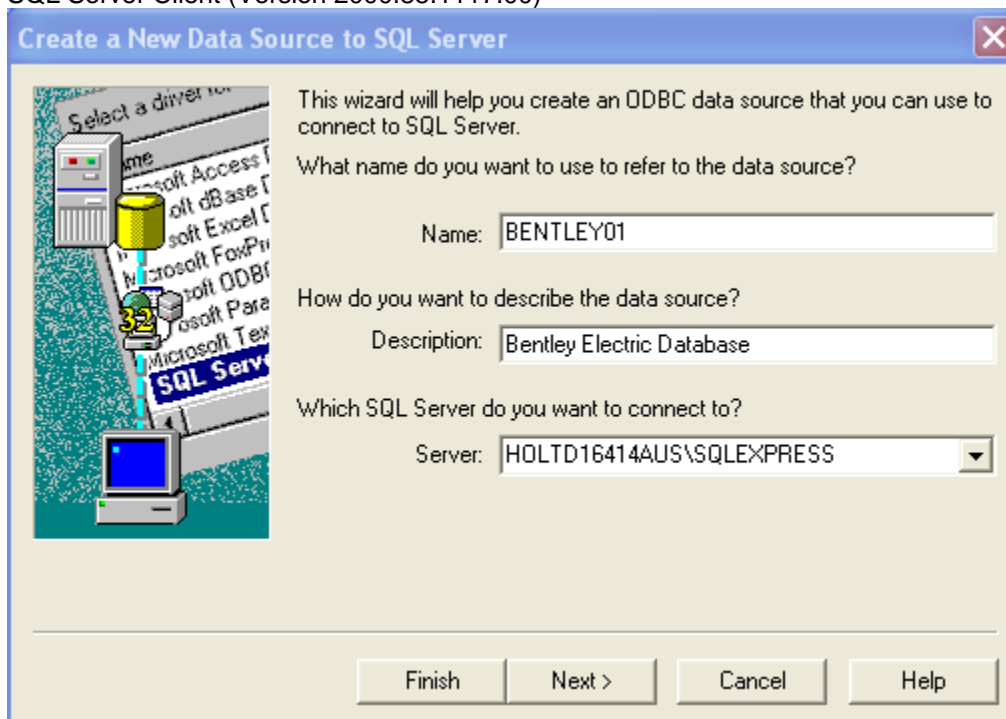
### 3.2.2.3.3.10 Verify that the MSCATALOG table is populated



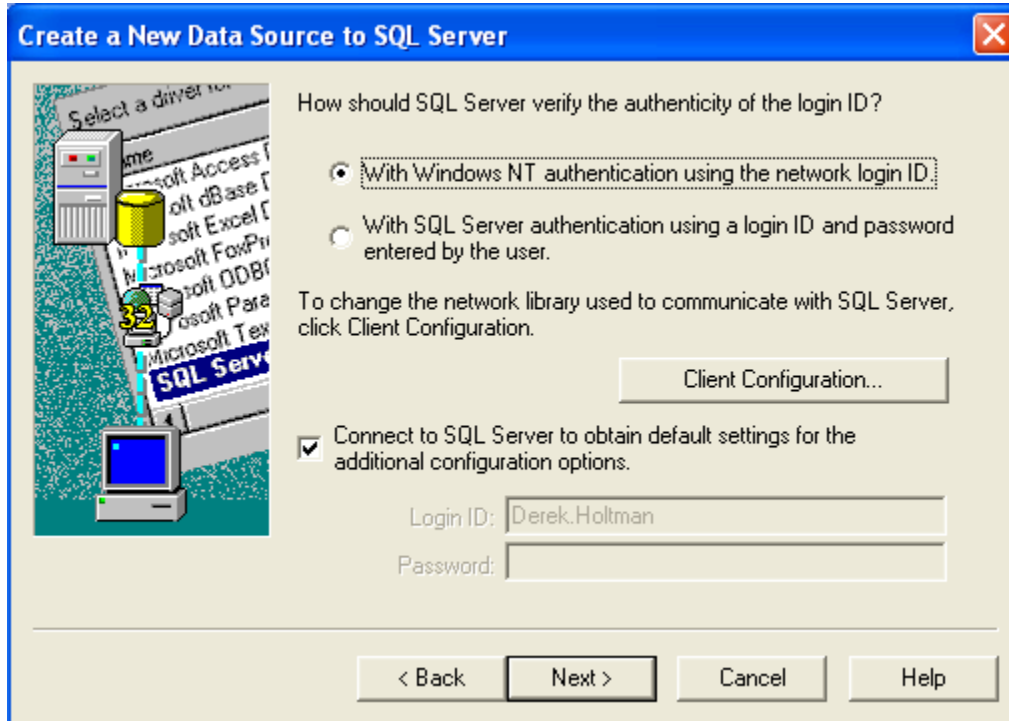


### 3.2.2.3.3.11 Create your ODBC

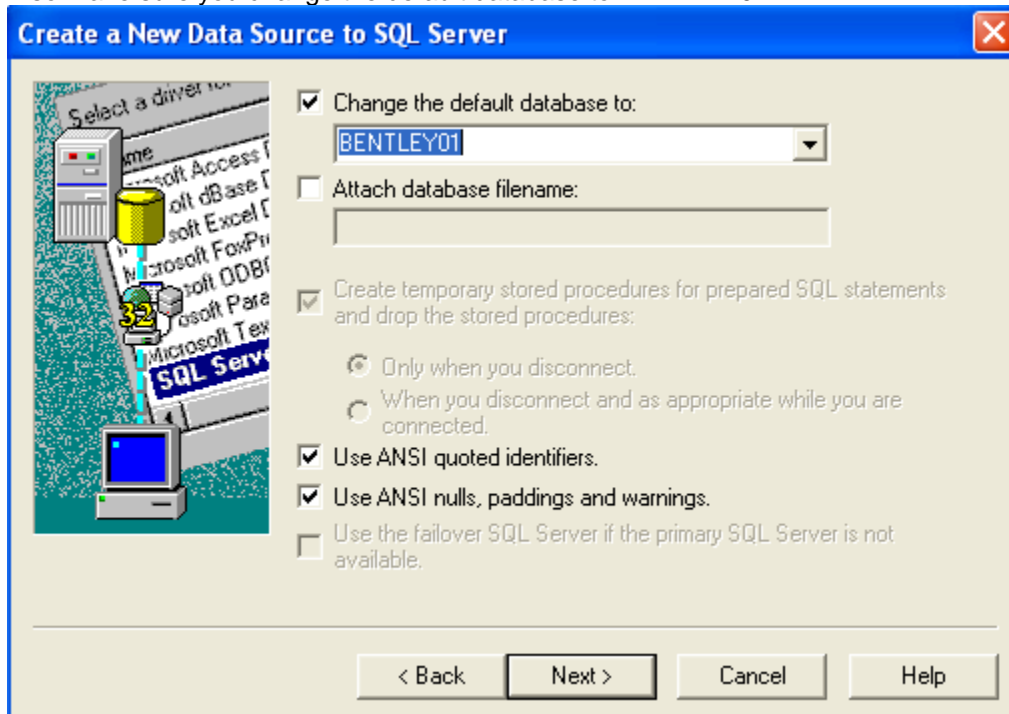
From Administrative Tools / Data Source (ODBC), add a System DSN using the following driver:  
SQL Server Client (Version 2000.85.1117.00)

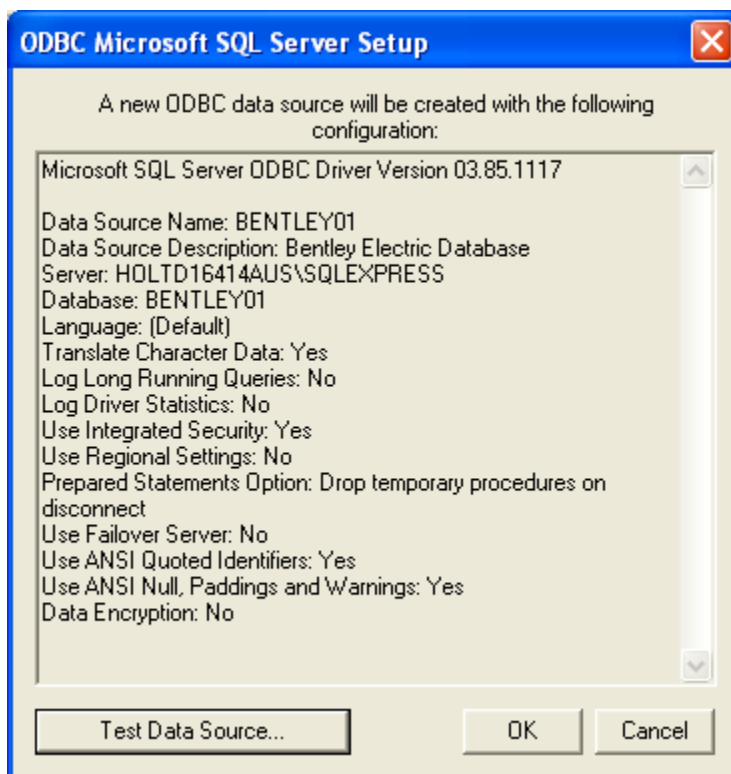
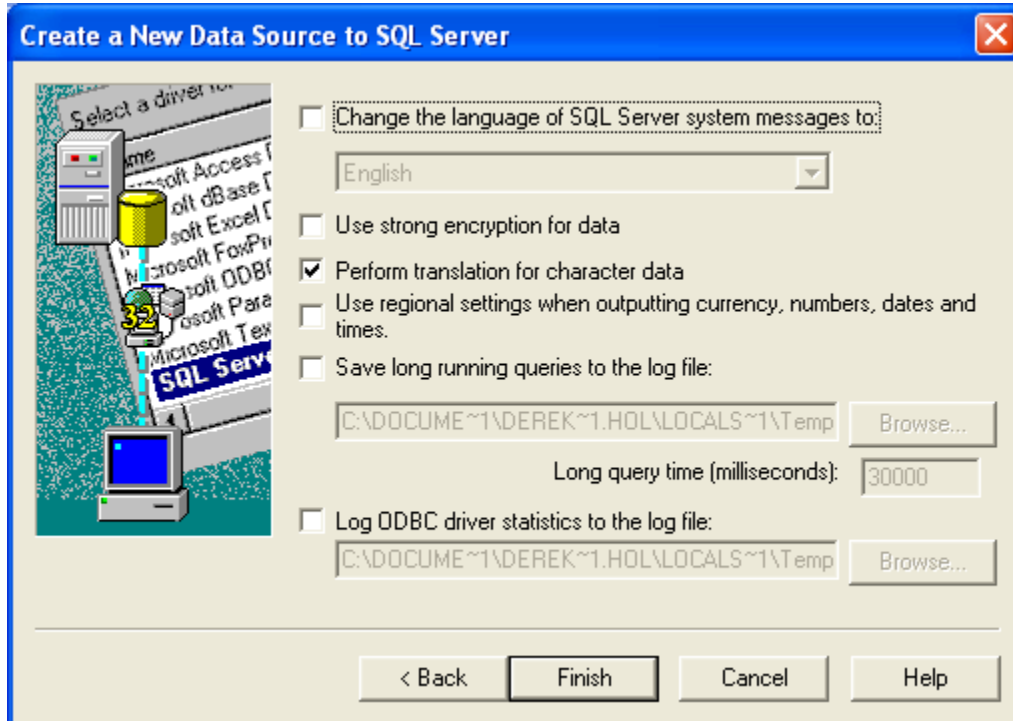




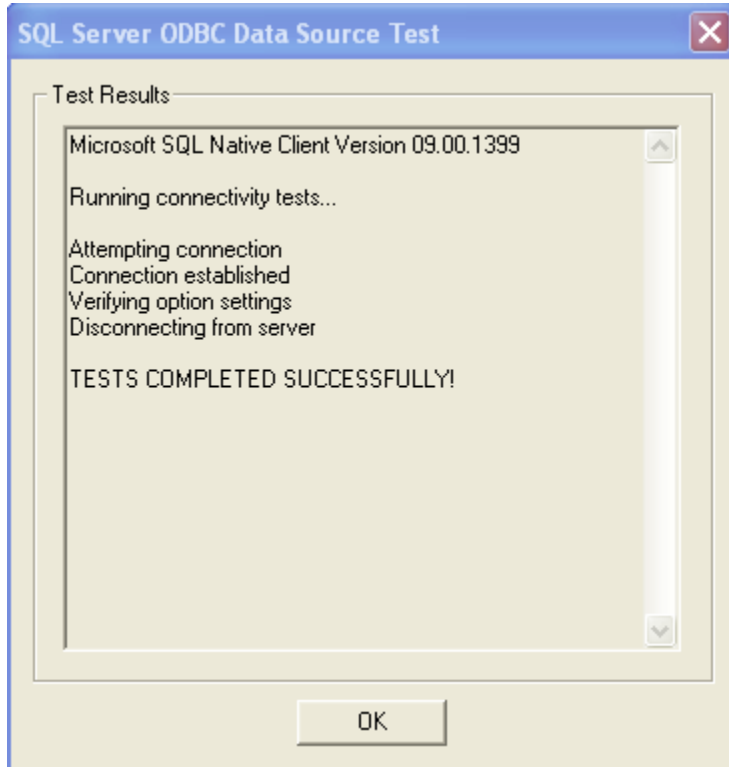


Also make sure you change the default database to BENTLEY01:





And make sure you Test your Data Source:



#### 3.2.2.4 Oracle

##### 3.2.2.4.1 Base Schema

Perform the following step for creating a new base schema:

- a. Open a Bentley Geospatial Administrator session
- b. File New
- c. Enter the name of the schema and save as follows:  
"Bentley<Commodity Name>\_Oracle"
- d. Save your schema as "Bentley<Commodity Name>\_Oracle\_Base" and exit Bentley Geospatial Administrator.

##### 3.2.2.4.2 XML Schema

Perform the following steps for adding your data model to your base schema:

- a. Open \_Bentley<Commodity Name>\_DL.xls
- b. If this is the first time you have exported the schema you may need to modify the path(s) and filename(s) in the following macro: **Export\_<Commodity Name>\_Oracle()**
- c. Run the following macros: **Export\_<Commodity Name>\_Oracle()**
- d. Open the new xml schema from a Bentley Geospatial Administrator session and verify that the new features and properties are visible.

Note: A log file with the format of <Output Schema Location/File Name> + ".log" is created. Verify that the log file does not contain any "Error"s or "Warning"s. If so, resolve the errors and re-run the macro. Also if you receive any errors or warning when opening the schema with GSA you must resolve the error before proceeding too the next step.

Note: If you receive an error while opening the schema you must resolve the error before proceeding to the next step.

### **3.2.2.4.3 SQL Schema**

The modeling administrator also has a macro for creating the Oracle schema required for the “DGN (Geom) /DB (Attrs)-Oracle” environment.

- a. Open `_Bentley<Commodity Name>_DL.xls`
- b. Verify the values in the OracleSettings tab. Especially the DATABASENAME.
- c. Run the CreateOracleSchema from Tools/Macros/Macros
- d. Hit the “Execute” button

Note: This will create a file in your user directory.

Example:

`C:\Documents and Settings\<your user name>\CreateUtilitySchemaOracle.sql`

Next you will need to run this script on your database. Following are the steps required to execute the sql script on the database:

Note: This assumes you already have the schema in your Oracle database as specified by the MSDATAUSERNAME value from the OracleSettings tab in the `_Bentley<Commodity Name>_DL.xls` file.

Note: This assumes that you have the tnsnames.ora entry for your database.

- a. Save the CreateUtilitySchemaOracle.sql file to your hard drive
- b. Verify that everyone is out of the database
- c. Start a dos window by Start/Run/Cmd
- d. Navigate to the directory where you have the .sql files
- e. Connect to the database: `C:\myscripts\sqlplus sys/chadmin@ED01`
- f. Execute the sql script: `sql>@CreateUtilitySchemaOracle.sql`
- g. Exit the sqlplus session: `exit`
- h. Exit the dos window: `exit`

### **3.2.2.5 Oracle Spatial 2-Tier**

Unlike the Oracle and SQL Server 2005 environments where the modeling administrator creates the scripts for creating the Oracle or SQL Server 2005 tables, the Oracle Spatial 2-Tier environment is utilizing some core Map functionality for creating the Oracle Spatial tables and for also populating the feature data in those tables. We use the DGN2SDO.exe found in the “\Program Files\Bentley\Map\bin” directory to create the tables and move the data into Oracle Spatial from the DGN environment previously created with the Modeling Administrator. We then discover the Oracle Spatial environment from GSA and add/revise the xls configuration that is missing using the modeling administrator. This assumes you have an Oracle 10g environment setup with SDO.

#### **3.2.2.5.1 Setup a Oracle Spatial Database**

Further details can be found at [www.Oracle.com](http://www.Oracle.com).

#### **3.2.2.5.2 DGN2SDO Setup**

In order to perform the DGN2SDO process you will need to perform the following task(s) on your Oracle Spatial Database prior to performing the DGSN2SDO step.

Note: This assumes that you have the tnsnames.ora entry for your database.

- a. Create a BentleySchemaOracleSpatial.sql file on your hard drive and populate it with the following information while changing the parameters for the DBF file on your Oracle server:

```
CREATE TABLESPACE "BUIS" LOGGING DATAFILE  
'C:\Oracle11g\oradata\EDELECOS\BUIS.DBF' SIZE 100M AUTOEXTEND ON NEXT 8K  
MAXSIZE UNLIMITED EXTENT MANAGEMENT LOCAL;  
COMMIT;
```

```
CREATE ROLE "BUISROLE" NOT IDENTIFIED;  
GRANT "CONNECT" TO "BUISROLE";  
GRANT "RESOURCE" TO "BUISROLE";  
GRANT "WM_ADMIN_ROLE" TO "BUISROLE";  
COMMIT;
```

```
CREATE USER "BUIS" PROFILE "DEFAULT" IDENTIFIED BY BUIS DEFAULT TABLESPACE  
"BUIS" TEMPORARY TABLESPACE "TEMP" ACCOUNT UNLOCK;  
GRANT UNLIMITED TABLESPACE TO "BUIS";  
GRANT "BUISROLE" TO "BUIS";  
COMMIT;
```

NOTE: If you have an existing tablespace, role and user, you can use the following to remove these before re-creating them.

```
DROP USER "BUIS" CASCADE;  
DROP ROLE "BUISROLE";  
DROP TABLESPACE "BUIS" INCLUDING CONTENTS;  
COMMIT;
```

Note: You may also have to delete the BUIS.DBF file manually.

- b. Verify that everyone is out of the database
- c. Start a dos window by Start/Run/Cmd
- d. Navigate to the directory where you have the .sql files
- e. Connect to the database using a system user: C:\myscripts\sqlplus  
sys/chadmin@ED11OS\_EDELECOS
- f. Execute the sql script: sql>@BentleySchemaOracleSpatial.sql
- g. Exit the sqlplus session: exit
- h. Exit the dos window: exit

### **3.2.2.5.3 DGN2SDO**

If your data model contains multiple datasets defined on the feature types you will need to create separate environments for each unique dataset and perform the DGN2SDO for each. You will also have to either create a common synonyms for the tables in the different schemas or you can grant access to the non-schema owner to the schema objects (tables, view etc) as you can only have one Oracle Spatial connection from within MicroStation. The following instructions assume you only have a common dataset.

Note: If any of the root features do not have geometry, refer to section 3.2.2.4.4 Root Features without Geometry.

- a. Follow the instructions under "Exporting your Data Model" for the "DGN" persistence model.
- b. Export your DGN only schema.
- c. In the DGN only environment, create a dgn with at least one instance of every feature, every annotation and every data sub-feature including data-sub-features that have to be manually inserted.
- d. Create a my\_DGN2SDO.bat file with the following contents:

```
ECHO OFF  
time /t  
REM SET DGN2SDO_LAUNCH_DEBUGGER=1  
SET dgn2sdo="C:\Program Files\Bentley\Map\bin\dgn2sdo.exe"  
SET dgnfile="C:\DGN2SDO\DataFiles\ElectricDGN2SDOData.dgn"
```

```
SET myworkspace=BentleyElectric_DGN_User
SET myoutdir=C:\DGN2SDO\Output\
SET inmetadb=sys/chadmin@ED11OS_EDELECOS
SET featurelist=*. *
rem -----
ECHO %featurelist%
%dgn2sdo% IN_TYPE=XFM IN_FILE=%dgnfile% IN_METADB=%inmetadb%
IN_WU=%myworkspace% IN_FEATURE=%featurelist% OUT_DIR=%myoutdir%
OUT_CS=82131
rem -----
time /t
```

pause

- e. Change the parameters and run the bat file.

Note:

OUT\_CS – the coordinate system to be used – must match coordinate system used in dgnfile. The OUT\_CS value is determined from MDSYS.SDO\_COORD\_REF\_SYS.SRID

NOTE: Before you exit the window, check for errors and/or warnings and correct any that are found before continuing to the next step.

- f. From the command window at C:\DGN2SDO\Output, execute MasterLoad.bat  
BUIS/BUIS@ED11OS\_EDELECOS

Note: Before continuing to the next step, verify that you do not have any files in the output directory that contain any of the following: "Syntax error", "System error" or "Unable to open file".

#### **3.2.2.5.4 Set Grants to the Oracle Spatial Tables**

- a. Create a Create\_BUISRoleGrants.sql file on your hard drive and populate it with the following information:

```
-- Turn off headings and feedback so the output file contains only data
set pagesize 0
set feedback off
set heading off
set linesize 200

-- Generate BUISROLEGRANTS.SQL using the Oracle view ALL_TABLES
spool BUISROLEGRANTS.SQL;

SELECT 'GRANT ALTER, DELETE, INSERT, SELECT, UPDATE ON BUIS.'||TABLE_NAME||' TO BUISROLE;'
From ALL_TABLES where OWNER='BUIS'
Order by TABLE_NAME;

spool off;
```

- b. Start a dos window by Start/Run/Cmd  
c. Navigate to the directory where you have the .sql file  
d. Connect to the database using a system user: C:\myscripts\sqlplus  
BUIS/BUIS@ED11OS\_EDELECOS  
e. Execute the sql script: sql>@Create\_BUISRoleGrants.sql  
f. Execute the sql script: sql>@BUISRoleGrants.sql  
g. Execute a commit: sql>COMMIT;  
h. Exit the sqlplus session: exit  
i. Exit the dos window: exit

#### **3.2.2.5.5 Text Sub-Feature (Work Around)**

We currently have an outstanding MAP TR 251109 that pertains to DGN2SDO in that it does not create the following attributes to the text sub-features on the Oracle Spatial tables:

MS\_ANGLE  
MS\_X\_SCALE  
MS\_Y\_SCALE

So we have created the following work around to create these attributes.

- a. Open `_Bentley<Commodity Name>_DL.xls`
- b. If this is the first time you have ran this work around you may need to modify the path(s) and filename(s) in the following macro: **CreateOSTextAttributeScript()**
  - First parameter is the output filename for the sql script you are generating.
  - Second parameter is the Oracle Schema that contains these tables.
- c. Run the following macros: **CreateOSTextAttributeScript()**
- d. Start a dos window by Start/Run/Cmd
- e. Navigate to the directory where you have the .sql file
- f. Connect to the database using a system user: `C:\myscripts\sqlplus sys/chadmin@ED11OS_EDELECOS`
- g. Execute the sql script: `sql>@E_OSTextAttrs.sql`  
Note: This should be the same as the first parameter to the **CreateOSTextAttributeScript()** macro above.
- h. Exit the sqlplus session: `exit`
- i. Exit the dos window: `exit`

#### **3.2.2.5.6 Relationship tables**

- a. Open `_Bentley<Commodity Name>_DL.xls`
- b. Verify the values in the OracleSpatialSettings tab.
- c. Run the CreateOracleSpatialSchema from Tools/Macros/Macros
- d. Hit the "Execute" button

Note: This will create a file in your user directory.

Example:

`C:\Documents and Settings\<your user name>\BentleySchemaOracleSpatial.sql`

Next you will need to run this script on your database. Following are the steps required to execute the sql script on the database:

Note: This assumes you already have the schema in your Oracle database as specified by the SCHEMANAME value from the OracleSpatialSettings tab in the `_Bentley<Commodity Name>_DL.xls` file.

Note: This assumes that you have the tnsnames.ora entry for your database.

- a. Save the BentleySchemaOracleSpatial.sql file to your hard drive
- b. Verify that everyone is out of the database
- c. Start a dos window by Start/Run/Cmd
- d. Navigate to the directory where you have the .sql files
- e. Connect to the database: `C:\myscripts\sqlplus sys/chadmin@ED11OS_EDELECOS`
- f. Execute the sql script: `sql>@BentleySchemaOracleSpatial.sql`
- g. Exit the sqlplus session: `exit`
- h. Exit the dos window: `exit`
- i. Verify the contents of the BentleySchemaOracleSpatialSQL.txt

#### **3.2.2.5.7 Base Schema**

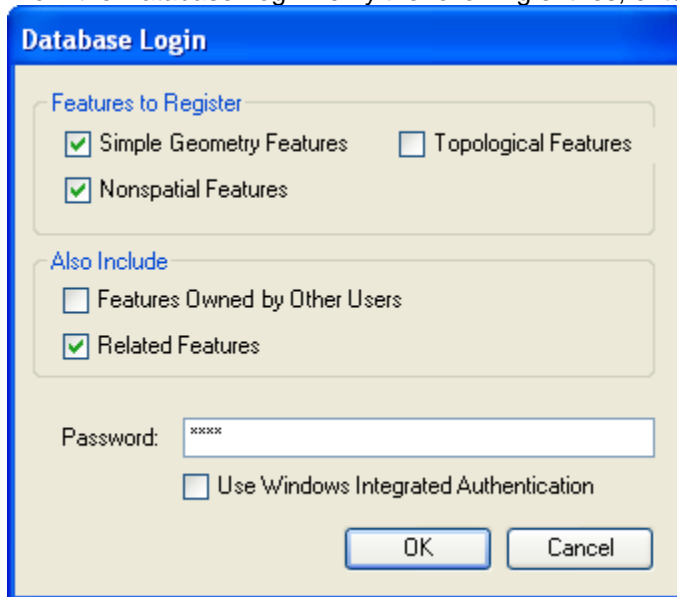
Perform the following step for creating a new base schema:

- a. Open a Bentley Geospatial Administrator session
- b. File New
- c. Enter the name of the schema and save as follows:

- d. Save your schema as “Bentley<Commodity Name>\_OS\_Base” and exit Bentley Geospatial Administrator.

### 3.2.2.5.8 GSA-Add Oracle Spatial Connection and Register Features

- a. Open Bentley<Commodity Name>\_OS\_Base.xml schema from a Bentley Geospatial Administrator
- b. Under Graphical Sources / Oracle Spatial Connection, right click and add new connection with the following parameters:
  - a. Connection Name: <Commodity Name>
  - b. Description: <Commodity Name> Connection
  - c. Connection Type: Oracle Service Name
  - d. Service Name: EDXMOS\_EDELECOS
  - e. User: BUIS
  - f. Password: BUIS
- c. Test the connection to see if valid
- d. If valid, hit the OK to exit the new connection menu.
- e. Then from the new “Named Connection (<Commodity Name>)” node, right click to register features.
- f. From the Database Login verify the following entries, enter the password: BUIS



- g. Hit ok. Note: This may take some time...
- h. From the “Register Features / Welcome to the Register Features Wizard” menu, hit the “Select All” then the “Next” button.
- i. From the “Register Features / Feature Names” menu, just hit the “Next” button.
- j. From the “Register Features / Specify Composite Surfaces Features” menu, check yes for the BUIS\_DESIGNBOUNDS, then select next
- k. From the “Register Features / Point Geometry Rotation and Scale” menu, verify that each point feature and text feature, set Rotation, X Scale and Y Scale:
 

Rotation	MS_ANGLE (Radians)
X Scale	MS_X_SCALE
Y Scale	MS_Y_SCALE

 After all the features’ values are set, select next
- l. From the next “Register Features / Point Geometry Text” menu, do not set any text expressions for cells and set at least one expression for text features. Then hit the “Next” button.
- m. From the “Register Features / Domains Registration” menu, leave all selected and hit the “Next” button.



- n. From the “Register Features / Id Generators” menu, set a Generator Name for each Feature and hit the “Next” button.
- o. From the “Confirm Feature Registration Changes” menu, hit the “Finish” button.
- p. Save the new schema as “Bentley<Commodity Name>\_OS\_Base\_GS\_RF.xml”

### **3.2.2.5.9 Manually remove schema sections**

Currently the modeling administrator does not have update capabilities so we need to remove some of the contents in the all users workspace.

- a. Open “Bentley<Commodity Name>\_OS\_Base\_GS\_RF.xml” using notepad.
- b. Manually remove the contents of the following sections under the all users workspace:
  - a. Features
  - b. Domains
- c. Save the new file as “Bentley<Commodity Name>\_OS\_Base\_MA.xml”.

### **3.2.2.5.10 XML Schema**

- a. Open \_Bentley<Commodity Name>\_DL.xls
- b. If this is the first time you have exported the schema you may need to modify the path(s) and filename(s) in the following macro: **Export\_<Commodity Name>\_OracleSpatial()**. Note: Make sure the starting schema file is set to your manually modified version as created in the previous section.
- c. Run the following macros: **Export\_<Commodity Name>\_OracleSpatial()**
- d. Open the new xml schema from a Bentley Geospatial Administrator session and verify that the new features and properties are visible.

Note: A log file with the format of <Output Schema Location/File Name> + “.log” is created. Verify that the log file does not contain any “Error”s or “Warning”s. If so, resolve the errors and re-run the macro. Also if you receive any errors or warning when opening the schema with GSA you must resolve the error before proceeding too the next step.

Note: If you receive an error while opening the schema you must resolve the error before proceeding too the next step.

### **3.2.2.6 Oracle Spatial 3-Tier**

Unlike the Oracle and SQL Server 2005 environments where the modeling administrator creates the scripts for creating the Oracle or SQL Server 2005 tables, the Oracle Spatial 3-Tier environment is utilizing some core Map functionality for creating the Oracle Spatial tables and for also populating the feature data in those tables. We use the DGN2SDO.exe found in the “\Program Files\Bentley\Map\bin” directory to create the tables and move the data into Oracle Spatial from the DGN environment previously created with the Modeling Administrator. We then discover the Oracle Spatial environment from GSA and add/revise the xls configuration that is missing using the modeling administrator. This assumes you have an Oracle 10g environment setup with SDO.

#### **3.2.2.6.1 Setup (Oracle Spatial Database, Project Wise and Oracle Spatial Connector)**

Further details can be found in the “Bentley Geospatial Server XM Edition Quick Start Guide” found at the following location:

<http://docs.bentley.com/docinfo.php?doc=797>

#### **3.2.2.6.2 DGN2SDO Setup**

In order to perform the DGN2SDO process you will need to perform the following task(s) on your Oracle Spatial Database prior to performing the DGSN2SDO step.

- a. Create a BentleySchemaOracleSpatial.sql file on your hard drive and populate it with the following information while changing the parameters for the DBF file on your Oracle server:

```
CREATE TABLESPACE "BUIS" LOGGING DATAFILE  
'C:\Oracle11g\oradata\EDELECOS\BUIS.DBF' SIZE 100M AUTOEXTEND ON NEXT 8K  
MAXSIZE UNLIMITED EXTENT MANAGEMENT LOCAL;  
COMMIT;
```

```
CREATE ROLE "BUISROLE" NOT IDENTIFIED;  
GRANT "CONNECT" TO "BUISROLE";  
GRANT "RESOURCE" TO "BUISROLE";  
GRANT "WM_ADMIN_ROLE" TO "BUISROLE";  
COMMIT;
```

```
CREATE USER "BUIS" PROFILE "DEFAULT" IDENTIFIED BY BUIS DEFAULT TABLESPACE  
"BUIS" TEMPORARY TABLESPACE "TEMP" ACCOUNT UNLOCK;  
GRANT UNLIMITED TABLESPACE TO "BUIS";  
GRANT "BUISROLE" TO "BUIS";  
COMMIT;
```

NOTE: If you have an existing tablespace, role and user, you can use the following to remove these before re-creating them.

```
DROP USER "BUIS" CASCADE;  
DROP ROLE "BUISROLE";  
DROP TABLESPACE "BUIS" INCLUDING CONTENTS;  
COMMIT;
```

Note: You may also have to delete the BUIS.DBF file manually.

- b. Verify that everyone is out of the database
- c. Start a dos window by Start/Run/Cmd
- d. Navigate to the directory where you have the .sql files
- e. Connect to the database using a system user: C:\myscripts\sqlplus  
sys/chadmin@ED11OS\_EDELECOS
- f. Execute the sql script: sql>@BentleySchemaOracleSpatial.sql
- g. Exit the sqlplus session: exit
- h. Exit the dos window: exit

### **3.2.2.6.3 DGN2SDO**

If your data model contains multiple datasets defined on the feature types you will need to create separate environments for each unique dataset and perform the DGN2SDO for each. You will also have to either create a common synonyms for the tables in the different schemas or you can grant access to the non-schema owner to the schema objects (tables, view etc) as you can only have one Oracle Spatial connection from within MicroStation. The following instructions assume you only have a common dataset.

Note: If any of the root features do not have geometry, refer to section 3.2.2.5.4 Root Features without Geometry.

- a. Follow the instructions under "Exporting your Data Model" for the "DGN" persistence model.
- b. Export your DGN only schema.
- c. In the DGN only environment, create a dgn with at least one instance of every feature, every annotation and every data sub-feature including data-sub-features that have to be manually inserted.
- d. Create a my\_DGN2SDO.bat file with the following contents:

```
ECHO OFF  
time /t  
REM SET DGN2SDO_LAUNCH_DEBUGGER=1  
SET dgn2sdo="C:\Program Files\Bentley\Map\bin\dgn2sdo.exe"
```

```
SET dgnfile="C:\DGN2SDO\DataFiles\ElectricDGN2SDOData.dgn"
SET myworkspace=BentleyElectric_DGN_User
SET myoutdir=C:\DGN2SDO\Output\
SET inmetadb=sys/chadmin@ED11OS_EDELECOS
SET featurelist=*. *
rem -----
ECHO %featurelist%
%dgn2sdo% IN_TYPE=XFM IN_FILE=%dgnfile% IN_METADB=%inmetadb%
IN_WU=%myworkspace% IN_FEATURE=%featurelist% OUT_DIR=%myoutdir%
OUT_CS=82131
rem -----
time /t
```

pause

- e. Change the parameters and run the bat file.

Note:

OUT\_CS – the coordinate system to be used – must match coordinate system used in dgnfile.  
The OUT\_CS value is determined from MDSYS.SDO\_COORD\_REF\_SYS.SRID

NOTE: Before you exit the window, check for errors and/or warnings and correct any that are found before continuing to the next step.

- f. The Domain tables do not require to be registered. Before executing the MasterLoad batch file, comment out the sqls to create and populate the domain tables in OracleSpatial

Change:

```
@echo *****
@echo Creating domain lists...
@echo *****
@echo [-- SQLPLUS %1 @"%EXECUTION_DIR%Domains.SQL8" --]
SQLPLUS %1 @"%EXECUTION_DIR%Domains.SQL8"
```

To:

```
REM @echo *****
REM @echo Creating domain lists...
REM @echo *****
REM @echo [-- SQLPLUS %1 @"%EXECUTION_DIR%Domains.SQL8" --]
REM SQLPLUS %1 @"%EXECUTION_DIR%Domains.SQL8"
```

- g. From the command window at C:\DGN2SDO\Output, execute MasterLoad.bat  
BUIS/BUIS@ED11OS\_EDELECOS

Note: Before continuing to the next step, verify that you do not have any files in the output directory that contain any of the following: "Syntax error", "System error" or "Unable to open file".

#### 3.2.2.6.4 Set Grants to the Oracle Spatial Tables

- a. Create a Create\_BUISRoleGrants.sql file on your hard drive and populate it with the following information:

```
-- Turn off headings and feedback so the output file contains only data
set pagesize 0
set feedback off
set heading off
set linesize 200

-- Generate BUISROLEGRANTS.SQL using the Oracle view ALL_TABLES
spool BUISROLEGRANTS.SQL;
```

```
SELECT 'GRANT ALTER, DELETE, INSERT, SELECT, UPDATE ON BUIS.'||TABLE_NAME||' TO BUISROLE;'  
From ALL_TABLES where OWNER='BUIS'  
Order by TABLE_NAME;
```

spool off;

- b. Start a dos window by Start/Run/Cmd
- c. Navigate to the directory where you have the .sql file
- d. Connect to the database using a system user: C:\myscripts\sqlplus  
BUIS/BUIS@ED11OS\_EDELECOS
- e. Execute the sql script: sql>@Create\_BUISRoleGrants.sql
- f. Execute the sql script: sql>@BUISRoleGrants.sql
- g. Execute a commit: sql>COMMIT;
- h. Exit the sqlplus session: exit
- i. Exit the dos window: exit

### 3.2.2.6.5 Text Sub-Feature (Work Around)

We currently have an outstanding MAP TR 251109 that pertains to DGN2SDO in that it does not create the following attributes to the text sub-features on the Oracle Spatial tables:

MS\_ANGLE  
MS\_X\_SCALE  
MS\_Y\_SCALE

So we have created the following work around to create these attributes.

- a. Open \_Bentley<Commodity Name>\_DL.xls
- b. If this is the first time you have ran this work around you may need to modify the path(s) and filename(s) in the following macro: **CreateOSTextAttributeScript()**
  - First parameter is the output filename for the sql script you are generating.
  - Second parameter is the Oracle Schema that contains these tables.
- c. Run the following macros: **CreateOSTextAttributeScript()**
- d. Start a dos window by Start/Run/Cmd
- e. Navigate to the directory where you have the .sql file
- f. Connect to the database using a system user: C:\myscripts\sqlplus  
sys/chadmin@ED11OS\_EDELECOS
- g. Execute the sql script: sql>@E\_OSTextAttrs.sql  
Note: This should be the same as the first parameter to the **CreateOSTextAttributeScript()** macro above.
- h. Exit the sqlplus session: exit
- i. Exit the dos window: exit

### 3.2.2.6.6 Relationship tables

- a. Open \_Bentley<Commodity Name>\_DL.xls
- b. Verify the values in the OracleSpatialSettings tab.
- c. Run the CreateOracleSpatialSchema from Tools/Macros/Macros
- d. Hit the "Execute" button

Note: This will create a file in your user directory.

Example:

C:\Documents and Settings\<your user name>\BentleySchemaOracleSpatial.sql

Next you will need to run this script on your database. Following are the steps required to execute the sql script on the database:

Note: This assumes you already have the schema in your Oracle database as specified by the SCHEMANAME value from the OracleSpatialSettings tab in the \_Bentley<Commodity Name>\_DL.xls file.

Note: This assumes that you have the tnsnames.ora entry for your database.

- a. Save the BentleySchemaOracleSpatial.sql file to your hard drive
- b. Verify that everyone is out of the database
- c. Start a dos window by Start/Run/Cmd
- d. Navigate to the directory where you have the .sql files
- e. Connect to the database: C:\myscripts\sqlplus sys/chadmin@ED11OS\_EDELECOS
- f. Execute the sql script: sql>@BentleySchemaOracleSpatial.sql
- g. Exit the sqlplus session: exit
- h. Exit the dos window: exit
- i. Verify the contents of the BentleySchemaOracleSpatialSQL.txt

#### **3.2.2.6.7 GSA/Connector – Create an empty schema**

Using the Oracle Spatial instructions create a new ggSchema.xml for our environment. Then rename ggSchema.xml to ggSchema\_Original.xml and ecSchema.xml to ecSchema\_Original.xml for future reference.

#### **3.2.2.6.8 Manually add our base items:**

Then copy ggSchema\_Original.xml and rename it to ggSchema\_Base.xml.

#### **3.2.2.6.9 GSA/Connector - Register Features**

Then replace the original ggSchema.xml file with the new version ggSchema\_Base.xml and Register Features like the Oracle Spatial 2-Tier instructions in section 3.2.2.5.8. Also add the Bentley <Commodity Name> connection and map the two workspaces to it. Then make a copy of this file and name it ggSchema\_GS\_RF.xml. Also rename ecSchema.xml to ecSchema.xml.original.

#### **3.2.2.6.10 Manually remove schema sections**

Then copy ggSchema\_GS\_RF.xml again and rename it to ggSchema\_Base\_MA.xml. And manually remove the following sections from the all users workspace:

- Features
- Operations
- Methods (All but MainMenu\_Uilities and Network method groups)
- Domains Note: If the domains were commented out in MasterLoad, you should not have to do this step.

#### **3.2.2.6.11 XML Schema**

- a. Open \_Bentley<Commodity Name>\_DL.xls
- b. If this is the first time you have exported the schema you may need to modify the path(s) and filename(s) in the following macro: **Export\_<Commodity Name>\_OracleSpatial\_3Tier()**. Note: Make sure the starting schema file is set to your manually modified version as created in the previous section.
- c. Run the following macros: **Export\_<Commodity Name>\_OracleSpatial\_3Tier()**
- d. Open the new xml schema from a Bentley Geospatial Administrator session and verify that the new features and properties are visible.

Note: Export\_<Commodity Name>\_OracleSpatial\_3Tier() which starts with the ggSchema\_Base\_MA.xml and generates the ggSchema.xml. Replace the working version with this version and follow the export/sync instructions for Oracle Spatial.

Note: A log file with the format of <Output Schema Location/File Name> + “.log” is created. Verify that the log file does not contain any “Error”s or “Warning”s. If so, resolve the errors and re-run the macro. Also if you receive any errors or warning when opening the schema with GSA you must resolve the error before proceeding too the next step.

Note: If you receive an error while opening the schema you must resolve the error before proceeding too the next step.

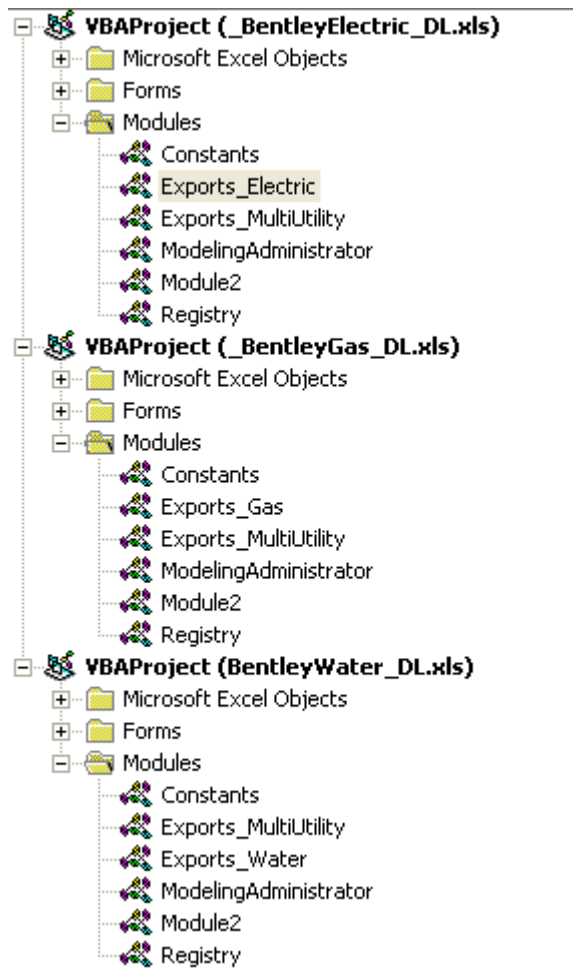
### 3.2.2.7 Exporting multiple Data Models (Incremental Loads)

The Modeling Administrator can perform incremental loads meaning that it can add one data model to another. You can have as many separate data models as you wish.

We can currently demonstrate this functionality with our Electric, Gas and Water data models.

Note. In order for this process to work correctly, you must have a combined version of the base files for both the schema and additional configuration files.

Here is a screen shot of the electric, gas and water modules showing each to have its own module for exporting out the commodity specific schemas. i.e. electric has exports\_electric, gas has exports\_gas etc:



As well each has a module called Exports\_MultiUtility which have the following methods defined:

- Export\_MultiUtilityDGN\_Base\_E()
- Export\_MultiUtilityDGN\_Base\_G()
- Export\_MultiUtilityDGN\_Base\_W()
- Export\_MultiUtilityDGN\_E\_G()
- Export\_MultiUtilityDGN\_E\_W()
- Export\_MultiUtilityDGN\_G\_W()
- Export\_MultiUtilityDGN\_EG\_W()

The last part of the method name indicates the starting seed/base schema and the commodity to be loaded. Note the actual control is in the parms sent to the export method...

i.e.

base\_E would start with base, load the electric and save the schema as electric (E).

E\_G would start with the electric and load the gas and save the schema as electric and gas (EG).

EG\_W would start with the electric and gas schema and load the water and save the schema as electric, gas and water (EGW).

So we have all combinations of the three commodities. If we add commodities, we have more combinations.

Note: This is also handling the configuration files in the same manner. Networks\_E.xml, networks\_EG.xml etc...

Also note that when you are adding in electric you need to run the method from the electric schema, gas from gas and water from water...

This process allows us to add additional commodities as needed.

It also allows for single commodity data loaders that allow different administrators to work on without having access issues.

Note: The incremental load process can be used for all five persistent models.

### **3.2.3 MA-Exporting Just the Symbology**

MA also has the capability to export out just the symbology attributes to a schema instead of generating the whole schema and its additional buc and network xml files. This can be very useful in performing bulk updates to a schema's symbology.

The process would be as follows:

- Use the ImportSchemaToXLS macro to pull in the data from an existing schema.
- Modify the data in the MA-Symbology tab.
- Use the ExportSymbologyFromXLSToSchema macro to export out only the symbology attributes.

### **3.2.4 GSA-Export the workspace**

Now that you have your schema created, this section will walk you through the steps required to export the workspaces. Again there are five different persistent models that can be exported using the Geospatial Administrator. Depending on which environment you are creating, follow the export steps in the corresponding section below.

Note: All exports will need to be performed at the client level. The only exception would be the Oracle Spatial 3-tier which has to be performed on the Oracle Spatial Server.

#### **3.2.4.1 All Non Oracle Spatial 3-Tier**

The following instructions can be used for all environments except the Oracle Spatial 3-tier:

- Open your schema using the Bentley Geospatial Administrator.
  - a. Bentley<Commodity Name>\_DGN.xml
  - b. Bentley<Commodity Name>\_Oracle.xml
  - c. Bentley<Commodity Name>\_OracleSpatial.xml (2-Tier)
  - d. Bentley<Commodity Name>\_SQLServer.xml
- Save your Schema. This will correct the xml indention reformat.
- Run the Export command to create a local workspace and user profiles

#### **3.2.4.2 Oracle Spatial 3-Tier**



For the Oracle Spatial 3-Tier environment, you will need to follow the instructions for doing a “Notify” from your Oracle Spatial 3-tier project using the Bentley Geospatial Connector Administrator.

Further details can be found in the “Bentley Geospatial Server XM Edition Quick Start Guide” found at the following location:

<http://docs.bentley.com/docinfo.php?doc=797>

#### **3.2.4.2.1 3-tier ucf manual fix**

For the Oracle Spatial 3-Tier environment there is a manual work around for making the workspace available from a machine other than the server machine. The work around is to change the value of MS\_GEOWSDIR to use the UNC path to the server's workspaces.

Example:

Changed this

```
%if !defined (MS_GEOWSDIR)
  MS_GEOWSDIR = C:/OracleConnector/Workspace/Projects/Examples/Geospatial/
%endif
```

To this

```
%if !defined (MS_GEOWSDIR)
  MS_GEOWSDIR = \\10.2.16.155\OracleConnector\Workspace\Projects\Examples\Geospatial\
%endif
```

#### **3.2.4.3 All Persistence Models**

Copy the configuration xml files to the workspace's xml\Configuration directory:

- a. Non Oracle Spatial Configuration\
  - BentleyUtilityConfiguration.xml
- b. Oracle Spatial Configuration-OS\
  - BentleyUtilityConfiguration.xml

Note: You may need to create the configuration directories.

Example: C:\Documents and Settings\All Users\Application  
Data\Bentley\WorkSpace\Projects\Examples\Geospatial\Bentley<Commodity Name>\_DGN\xml\Configuration

Copy the configuration xml files to the workspace's xml\network directory:

- c. Non Oracle Spatial Configuration\
  - Networks.xml
- d. Oracle Spatial Configuration-OS\
  - Networks.xml

Note: You may need to create the configuration directories.

Example: C:\Documents and Settings\All Users\Application  
Data\Bentley\WorkSpace\Projects\Examples\Geospatial\Bentley<Commodity Name>\_DGN\xml\network

Note: There is a copyConfigurationFiles.bat file that can be configured to copy these as well.

#### **3.2.4.4 Oracle 2-tier Only**

In the Oracle Spatial 2-tier environment, you will need to add the following to the BentleyUtilityConfiguration.xml:

```
<BentleyUtilityConfiguration>
  <Configuration>
    <Properties>
```



```
        <Property Name="EnvironmentConfiguration">Oracle 2-tier</Property>
      </Properties>
    </Configuration>
  </BentleyUtilityConfiguration>
```

### 3.2.4.5 Commodity Specific

#### 3.2.4.5.1 Electric Only

In addition to the GSA Export and xml copies, Electric will also need the following steps performed:

- a. If you have configure the switch cabinets placement to copy from an existing dgn based on the switch cabinet type, you will need to copy the following dgn file(s) to each of the workspace's user directories:
  - PMH-9.dgn

Note: You may need to create the TemplateDgn\SwitchCabinets directories.

Example: C:\Documents and Settings\All Users\Application  
Data\Bentley\WorkSpace\Projects\Examples\Geospatial\BentleyElectric\_DGN\Designer\TemplateDgn\SwitchCabinets

Note: These files were delivered as part of Bentley Electric. Under the core Bentley Electric workspace you should find the TemplateDgn\SwitchCabinets directories along with the additional dgn files.

#### 3.2.4.5.2 Gas Only

In addition to the GSA Export and xml copies, Gas will also need the following steps performed:

- a. From your configuration directory, copy the following files to your workspace's xml\configuration directory:
  - BentleyGas.xml
- b. From your configuration directory, copy the following files to your workspace's xml\interop directory:
  - g\_sishyexport.xml
- c. From your configuration directory, copy the following files to your workspace's xml\leakanalysis directory:
  - g\_leakanalysis.xml
  - g\_leakcrosstab.xslt
  - g\_leaktabreport.xslt

#### 3.2.4.5.3 Water Only

In addition to the GSA Export and xml copies, Water will also need the following steps performed:

- a. From your configuration directory, copy the following files to your workspace's xml\interop directory:
  - w\_epanetexport.xml
  - w\_wtrgexport.xml
- b. From your configuration directory, copy the following files to your workspace's xml\leakanalysis directory:
  - w\_leakanalysis.xml
  - w\_leakcrosstab.xslt
  - w\_leaktabreport.xslt

#### 3.2.4.5.4 Multi Utility Only

In addition to the GSA Export and xml copies, Multi Utility will require the previous steps for all commodities to be performed:

## **3.2.5 Opening the workspace**

### **3.2.5.1 DGN**

#### **3.2.5.1.1 How to Use**

Select the BentleyElectric\_DGN\_User workspace to open.

#### **3.2.5.1.2 Error/Resolutions**

Currently there are no known errors in this environment.

### **3.2.5.2 SQL Server**

#### **3.2.5.2.1 How to Use**

Select the BentleyElectric\_SQLServer\_User workspace to open.

Once in MicroStation you should be automatically prompted to connect to the database. If not you can go to Settings/Database/Connect and select the ODBC tab and enter the following connection string:

BENTLEY01

#### **3.2.5.2.2 Error/Resolutions**

Currently there are no known errors in this environment.

### **3.2.5.3 Oracle**

#### **3.2.5.3.1 How to Use**

Select the BentleyElectric\_Oracle\_User workspace to open.

Once in MicroStation you should be automatically prompted to connect to the database. If not you can go to Settings/Database/Connect and select the Oracle tab and enter the following connection string:

msdata/chadmin@ed01

#### **3.2.5.3.2 Error/Resolutions**

##### **3.2.5.3.2.1 Version Mismatch Error**

If you get the following error message:

#### **Information**

There is a version mismatch between your Oracle client files and database server. Please check your Oracle home (Path) setting and make sure you client files are compatible.  
OK

**Resolution:** Switch to Oracle 9i

### **3.2.5.4 Oracle Spatial 2-Tier**

#### **3.2.5.4.1 How to Use**

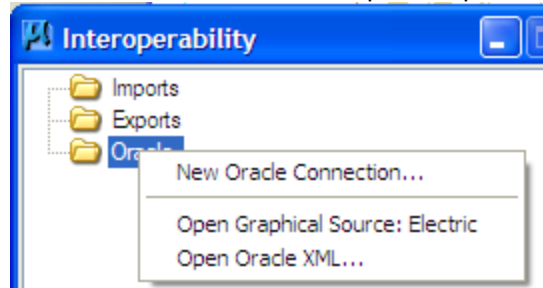
The following steps provide an overview of the extract, modify and post process for the Oracle Spatial 3-Tier environment:

Select the BentleyElectric\_OracleSpatial\_User workspace to open.

#### 3.2.5.4.1.1 Connect to the data base

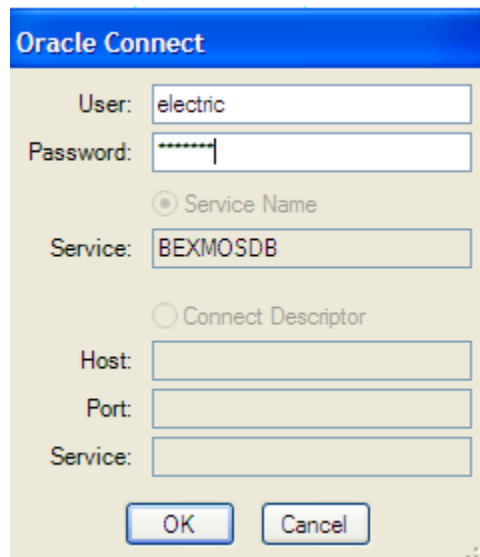
Once in MicroStation you can connect to the data base from File /Open Oracle Spatial which will open the Interoperability menu.

Right click on Oracle and select the “Open Graphical Source: Electric” option.



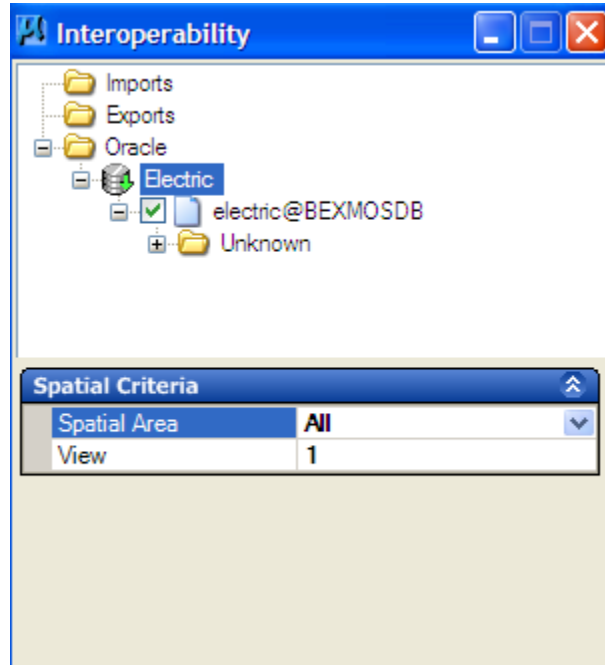
Use the following parameters to connect:

User: electric  
Password: chadmin  
Service: EDOS11\_EDELECOS  
And hit OK



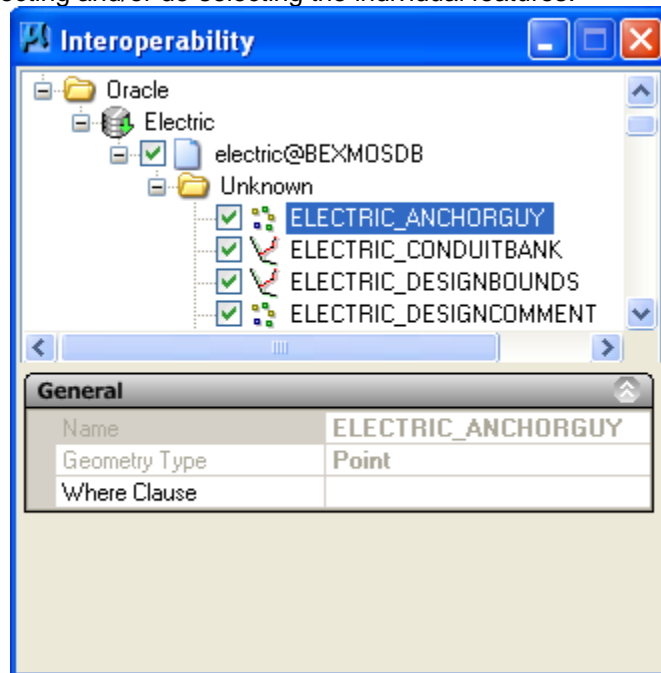
#### 3.2.5.4.1.2 Set spatial Area:

From the Interoperability menu, Select Electric and change Spatial Area to the desired setting.



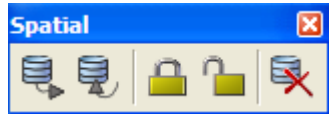
#### 3.2.5.4.1.3 Indicate Features

Also note that you can control which feature are being worked on by expanding the Unknown tree and selecting and/or de-selecting the individual features.

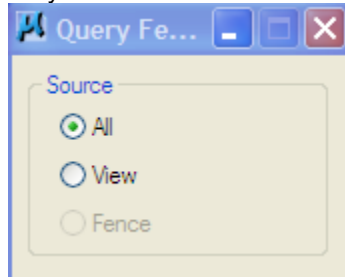


#### 3.2.5.4.1.4 Query Features

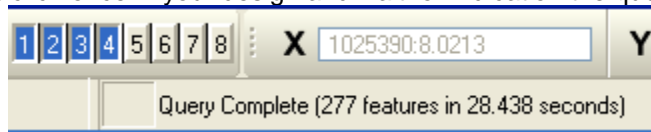
To perform a spatial query – Select the 1<sup>st</sup> Button on the Spatial toolbar.



Set to Query area:



And left-click once in your design and wait for indication the query has completed.



Note: The Spatial toolbar can be activated from Tools/Geospatial/Spatial pull down menu.

#### 3.2.5.4.1.5 Place and/or Modify New Features

Note: In order to modify existing features that were queried from the database, you must first lock the features using the "Lock Spatial Object" button on the "Spatial" toolbar.

Place and Modify Feature using the normal place and editor command from the Command Manager.

#### 3.2.5.4.1.6 Post Features

To post your changes, use the "Spatial Post" button on the "Spatial" toolbar.

Note: This will un-lock all features including any newly place features.

#### 3.2.5.4.2 Error/Resolutions

##### 3.2.5.4.2.1 Error Opening Oracle Storage

If you get the following error message:

###### Information

Error Opening Oracle Storage: Required DLL not found:  
Bentley.Geospatial.SpatialReferenceSystems.Oracle10.OCCI, Version=8.9.0.1,  
Culture=neutral, PublicKeyToken=4bf6c96a266e58d4. Please see the Message Center  
details for the list of dependencies.  
OK

**Resolution:** Switch to Oracle 10g

#### 3.2.5.5 Oracle Spatial 3-Tier

### 3.2.5.5.1 Client Configuration

#### 3.2.5.5.1.1 Configure ProjectWise Explorer

1. Go to Control Panel\Network Connections. Right-click on Local Area Connection and choose Properties.
2. Select Internet Protocol (TCP/IP) and click Properties.
3. Click the Advanced... button
4. Switch to the DNS tab, and in the edit field labeled DNS suffix for this connection, enter bentley.com
5. Click OK to all the open dialogs and return to the control panel.
6. Open the ProjectWise Network application from the control panel.
7. Switch to the Datasource Listing tab and enter the server information:

Example:

<b>Name</b>	<b>Host/IP</b>	<b>Port</b>
pwsql	10.2.16.155	5800

8. Add a entry in the "hosts" file in C:\WINDOWS\system32\drivers\etc

Example:

10.2.16.155      pwdemo101

#### 3.2.5.5.1.2 Open ProjectWise Explorer

Open the ProjectWise Explorer and click on the datasource.

Example:

pwdemo101:pwsql

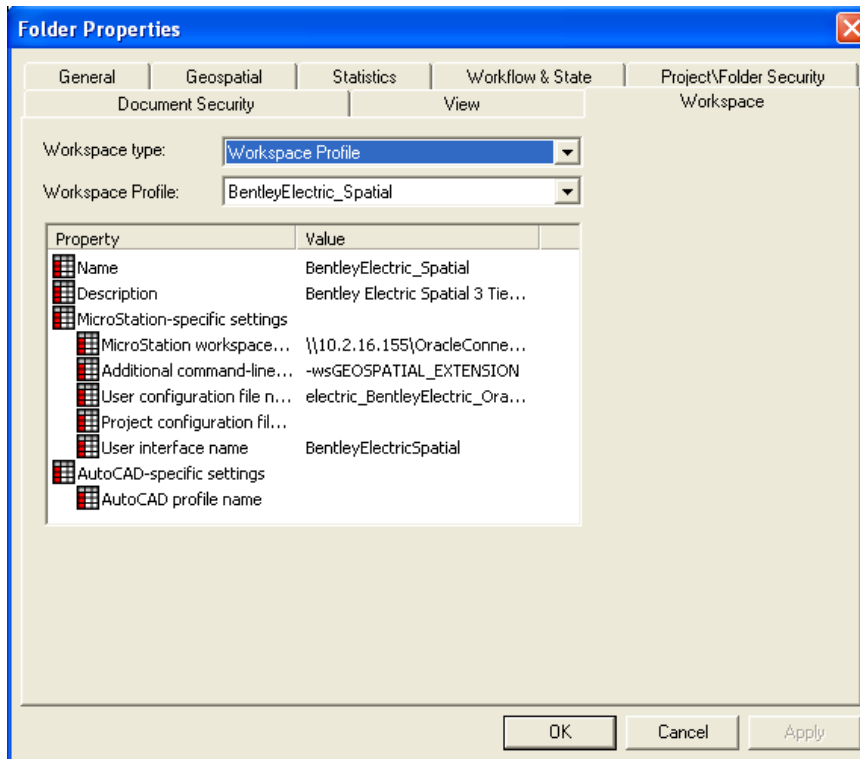
Enter the username and password:

Example:

User:              pwadmin  
Password:        chadmin

#### 3.2.5.5.1.3 Verify the workspace Profile

- Right-click on the DGN folder and select properties.
- On the Workspace tab, select the workspace created earlier.



#### 3.2.5.5.1.4 Verify Access to Server Workspace

From the client, verify that you have access to the workspace directory through windows explorer.

#### 3.2.5.5.2 How to Use

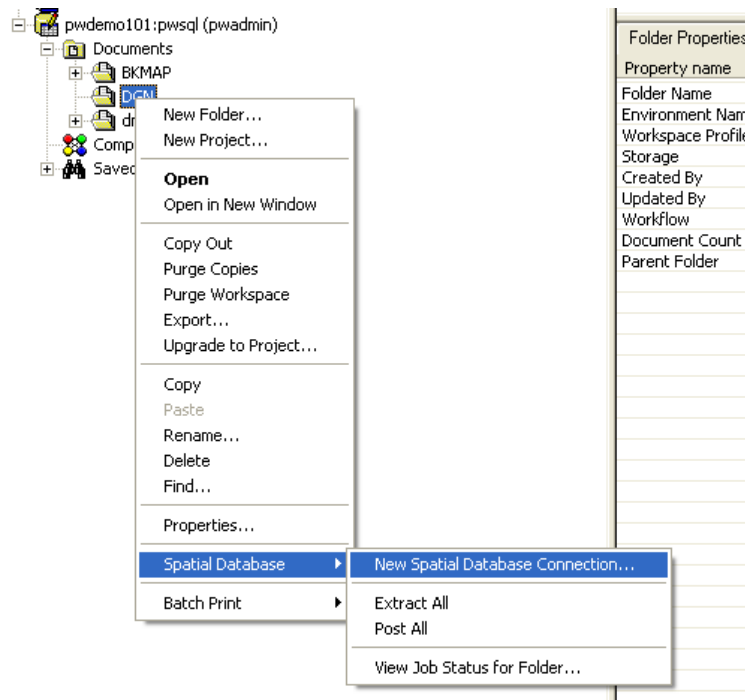
The following steps provide an overview of the extract, modify and post process for the Oracle Spatial 3-Tier environment:

##### 3.2.5.5.2.1 Open ProjectWise Explorer

Open the ProjectWise Explorer and click on your datasource and connect.

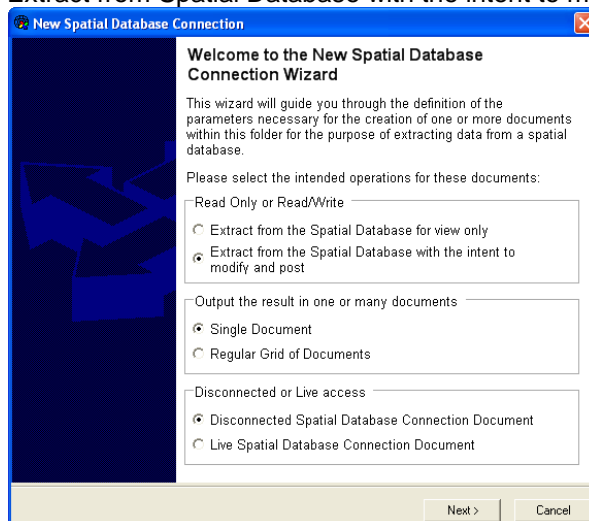
##### 3.2.5.5.2.2 New Spatial Database Connection

Extract from the spatial database by right clicking on the DGN folder, Spatial Database > New Spatial Database Connection



### 3.2.5.5.2.3 Set Intended Operation Options

Extract from Spatial Database with the intent to modify and post and Single Document:

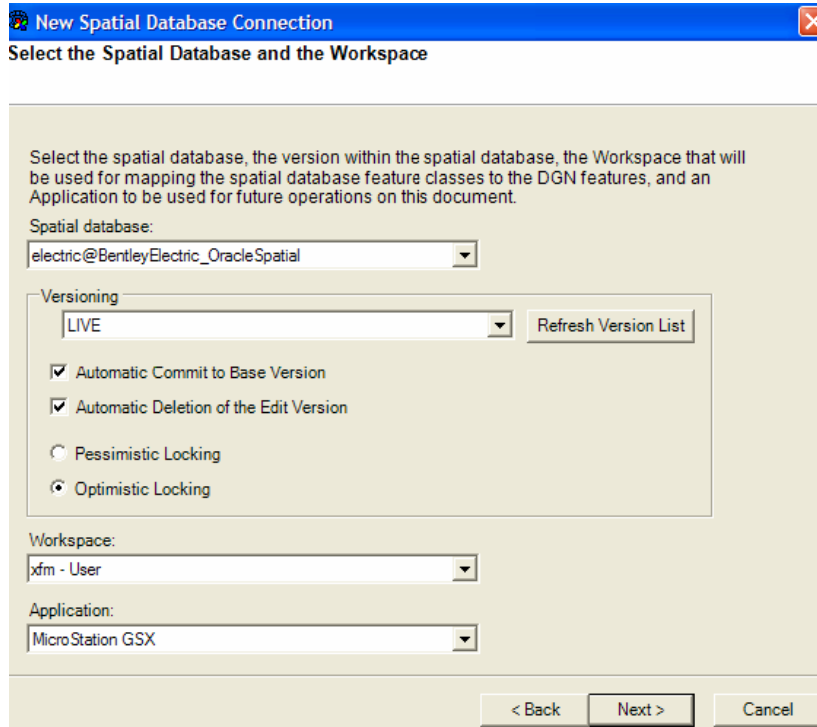


Click Next.

### 3.2.5.5.2.4 Set the Version Information

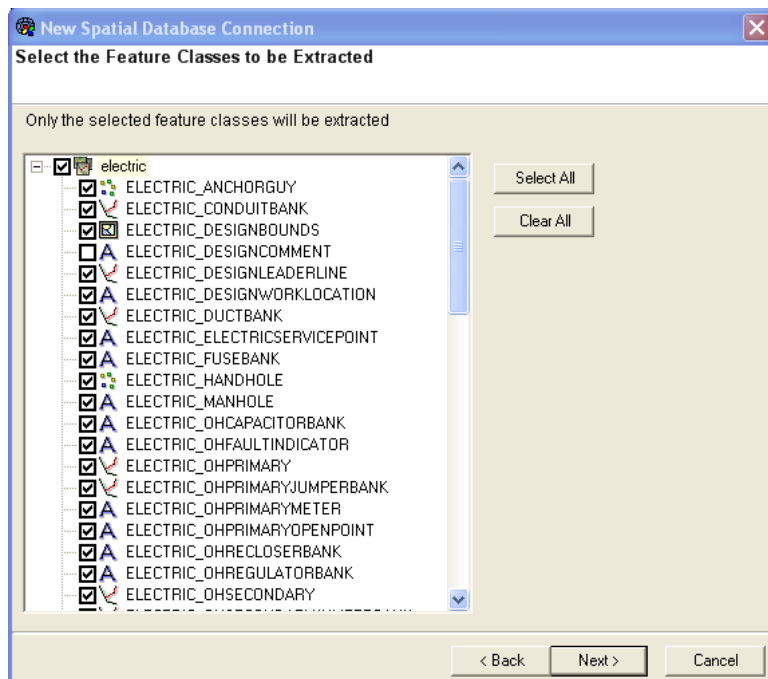
- Select a spatial database
- Turn on Automatic Commit to Base Version
- Turn on Automatic Delete of the Edit Version
- Set to Optimistic Locking
- Click Next





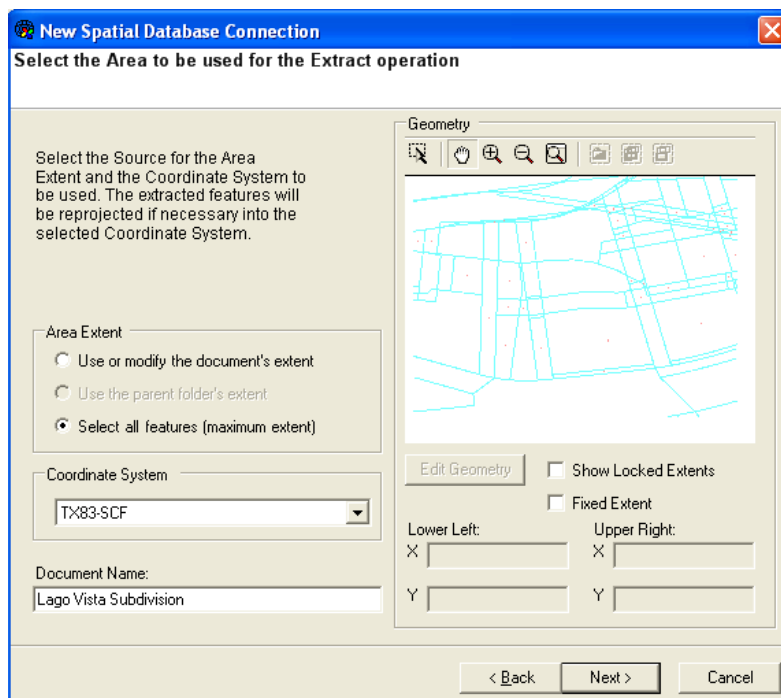
### 3.2.5.5.2.5 Set the Desired Features

- Select the feature classes to be extracted
- First select all, then un-select Design Comment
- Click Next



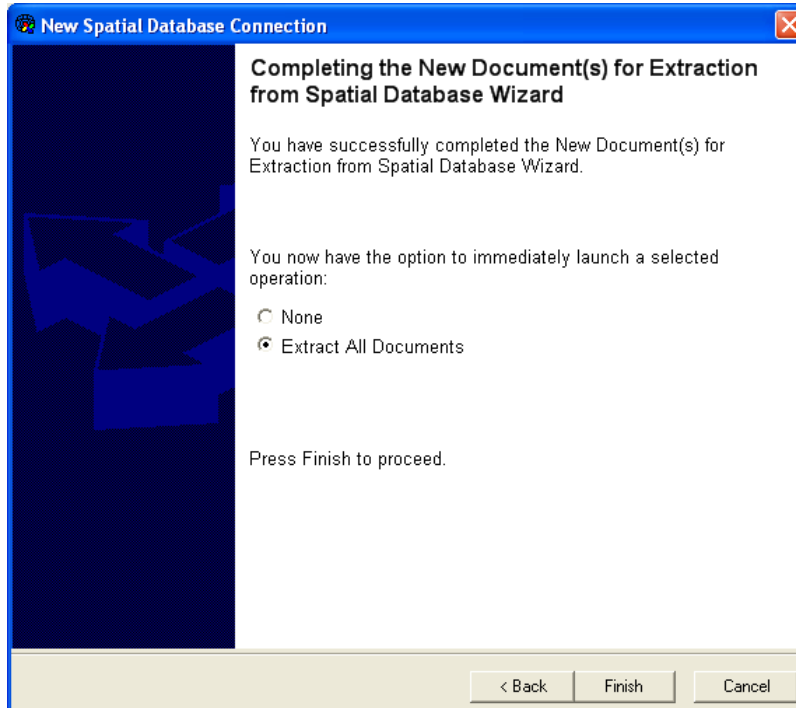
### 3.2.5.5.2.6 Set the Desired Area

- Select all features
- Enter document name
- Click Next



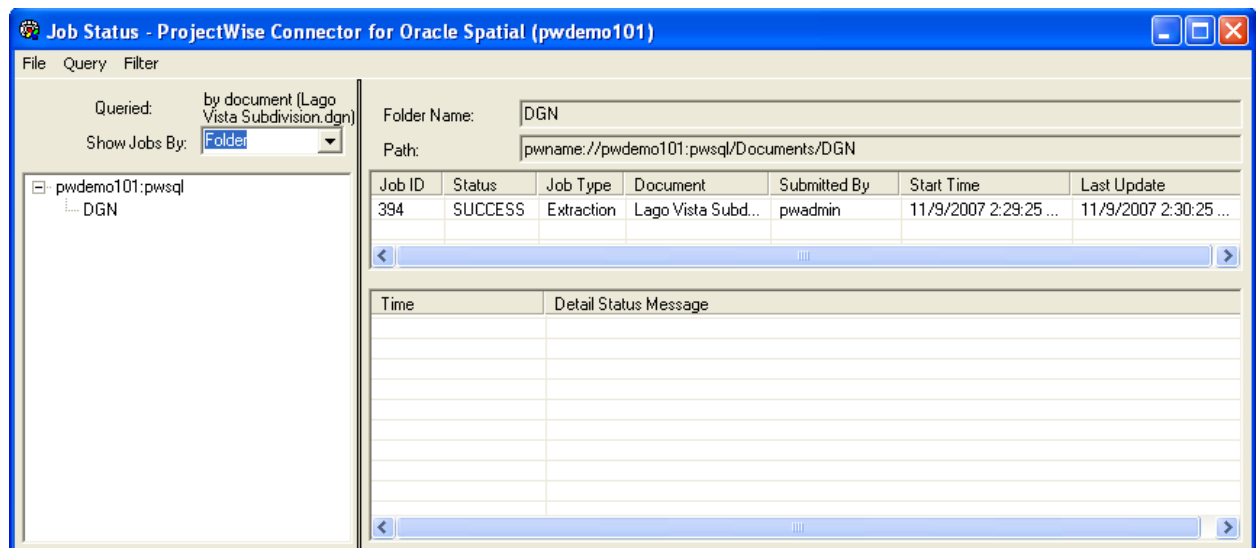
#### 3.2.5.5.2.7 Complete the Extract

- Set to Extract All Documents
- Click Finish



### 3.2.5.5.2.8 View Extraction Job Status

- Select document > Spatial Database > View Job Status for Document
- F5 to refresh – it does not refresh itself



### 3.2.5.5.2.9 Open and Modify your Extract

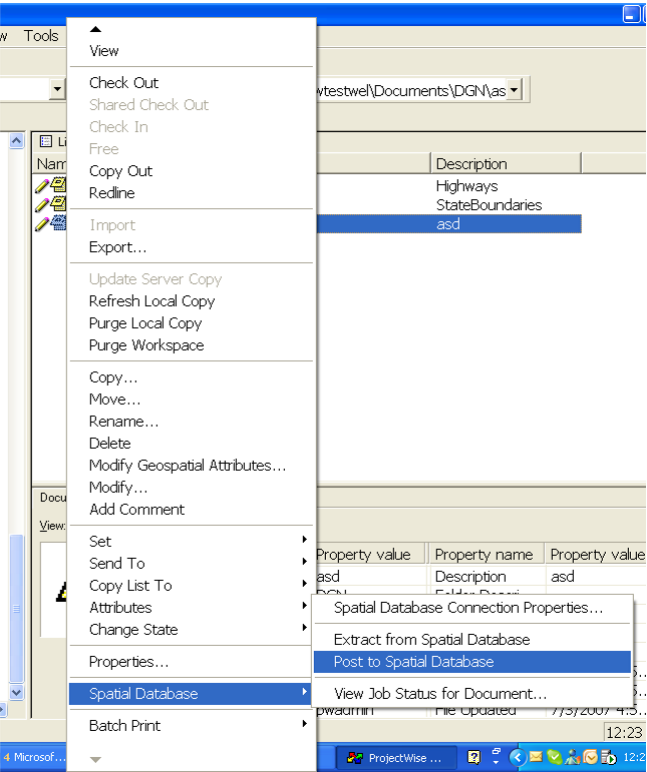
- Select document > Right click Open or double click the file.
- Perform some edits using MicroStation Map, Bentley Map tools or any XFM enabled application.

**3.2.5.5.2.10 Save and Close your Extract**

Save the document and exit MicroStation Map. Accept to check in the document.

**3.2.5.5.2.11 Post your Changes**

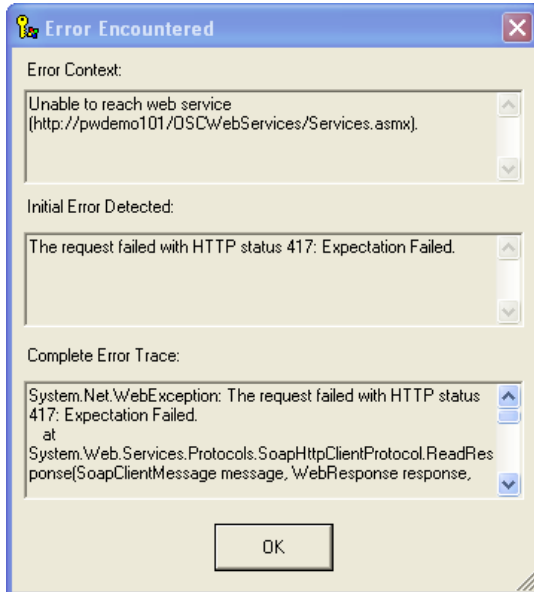
Post the result by right-clicking on the document and selecting Spatial Database > Post to Spatial Database.



**3.2.5.5.3 Error/Resolutions**

**3.2.5.5.3.1 Intended Operation Next Error**

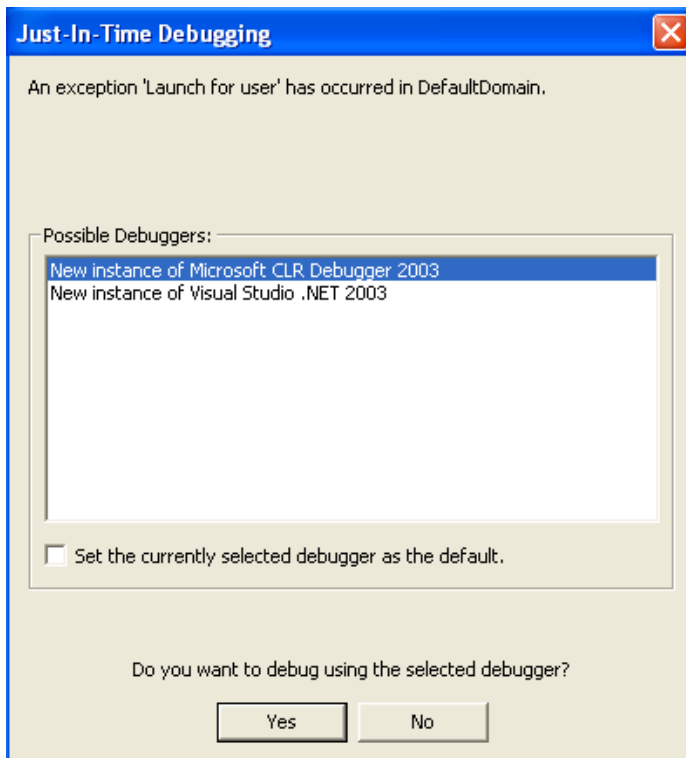
If you receive the following error after setting the Intended use of the extract:



**Resolution:** Verify that you performed step 8 from the Configure ProjectWise Explore section above.

### 3.2.5.5.3.2 Refresh Versions Error #1

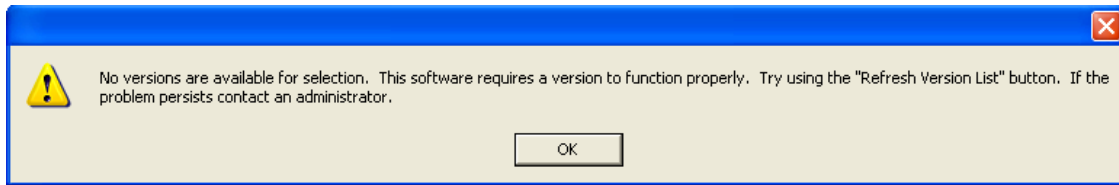
If you receive the following error when selecting the Refresh Versions List:



**Resolution:** Unknown

### 3.2.5.5.3.3 Refresh Versions Error #2

If you receive the following error when selecting the Refresh Versions List:



**Resolution:** Unknown

#### 3.2.5.5.3.4 UCF Not Found

If you received the following error trying to open the dgn:

Exiting, \\10.2.16.155\OracleConnector\Workspace\users\electric\_BentleyElectric\_OracleSpatial\_User.ucf not found, [C:\Program Files\Bentley\MicroStation\config\msconfig.cfg], line 244

**Resolution:** Verify Access to Server Workspace

## 4. Appendixes

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### 4.1 Limitations

- **No Feature to Feature control for connectivity**

Networks Ftr to Ftr Control

- **Globalization and Localization Support**

Currently the Model is only in English but the model could be converted and exported.

- **Dialog property's default**

Dialog property's default values need to have their keys the same as the ftr attributes. I.E. from placing to Bentley Electric - Master Job Type-Anchor Guy  
Effects:

AddOperationPropertySpin

AddOperationPropertyAnnotationMode

- **Sub Feature can only belong to one parent.**

- **Update capability**

Add update capability to the modeling administrator process. The issue I have with this one is I have no way of telling the old version. For example if a attribute changes from attrname to attributename, how do I find the attrname attribute and remove or rename it? Answer: check for attributename if not found add it. At the end remove anything we didn't add. Another example would be changing a field from a domain to not a domain. Bottom line, anything I can add I need to be able to remove then I have to add code to determine if I need to remove it or add it if a table and/or field already exists.

### 4.2 Error/Resolutions

This section is intended to help solve some common problems with the modeling administrator process. As additional items are found and/or solved it is a desirable behavior to update this section in order to avoid any additional time and/or expense of resolving redundant issues. These are intended as reference only and may or may not solve similar issues.

### **4.2.1 BEConnectivity Error**

While starting up Bentley Electric receive the following error:

BEConnectivity Error  
Initialize failed:  
The system cannot find the path specified.  
OK

#### **Resolution:**

Verify that you have the configuration directory under your workspace and that it contains all required xml files. Also verify your .ucf files.

### **4.2.2 Error in ProcessStandardPlacementFinish**

While inserting a feature in xfm I

Error in ProcessStandardPlacementFinish  
ERROR: Lib[XfmConfiguration] Method [Object reference not set to an instance of an object.] Number [91]  
OK

#### **Resolution:**

This is because the configuration code could not find the configuration data in one of the following configuration files:

BentleyUtilityConfiguration.xml  
networks.xml  
StopConditions.xml

Correct and retry...

### **4.2.3 Value cannot be null.**

When placing a feature I recieved the following error:

Error in ProcessStandardPlacementFinish  
ERROR: Lib [mscorlib] Method [Value cannot be null.  
Parameter name: key] Number [5]  
OK

#### **Resolution:**

To correct this I had to make sure I have a value for CustomPlacementLibs at the configuration level and a value for CustomPlacementLib for each feature in the MA\_ConfigurationSetting tab.

### **4.2.4 The given key was not present in the dictionary.**

When placing a feature I recieved the following error:

Error in ProcessStandardPlacementFinish  
ERROR: Lib [mscorlib] Method [ The given key was not present in the dictionary.] Number [5]  
OK

#### **Resolution:**

Make sure you have the CustomPlacmentLib set and that the InitializeCustomPlacement is present and that you have the references also set in the custom mvba file that the CustomPlacementLib points to and that it is being loaded into the workspace.

### 4.2.5 *executeQuery error*

Received the following error when querying for features in the OS 2-tier environment:

```
Information
executeQuery
PrivateExecuteQuery:IECQueryDefinition.Tables:
PrivateExecuteQuery: Table [0] = <ELECTRIC.SPANGUY>
OK
```

**Resolution:**

From the Interoperability menu, Select Electric and change Spatial Area to All and try again.

### 4.2.6 *Maximum Cursor*

Received the following error when querying for features in the OS 2-tier environment.

Now getting ORA-0 1000: maximum open cursors exceeded

**Resolution:**

Get out of MS and from the Interoperability menu, Select Electric and change Spatial Area to All and try again.

### 4.2.7 *UCF not found*

Received the following when opening a workspace:

Exiting, C:\Documents and Settings\All Users\Application Data\Bentley\Workspace\users\BentleyElectric\_OracleSpatial\_User.ucf not found, [C:\Program Files\Bentley\MicroStation\config\msconfig.cfg], line 242

**Resolution:**

Verify the path to the ucf in your shortcut.

### 4.2.8 *OS Extraction Fails*

- Try Extracting a single feature which has always worked. A simple linear feature without Annotation is a good choice. If the Extraction still fails you may need to check your Connector Configuration for errors.
- If simple feature extraction works but Linear Feature with Annotation fails. Open your Schema in GCA and drop the TEXT Sub Feature associated to the Linear Feature. Once this TEXT Sub Feature for Annotation is dropped .Notify the connector .Try Extracting again.

**IF EXTRACTION SUCCEEDS:**

**Cause:**

Connector is Trying to Extract POINT-TEXT subFeatures as POINT- CELLS. Instead of POINT – TEXT Feature for Annotation. Try Reregistering the Features and ensuring that you have set at least ONE Expression for every TEXT FEATURE / TEXT SUB FEATURE You need to Run the Manual Edits to the schema and Model Administrator export again .This should solve the problem



- Extraction of Point Feature fails
  - The point Features which represent facilities in a Network Model may typically have Cell Geometry and Annotation .Edit your Schema drop the associated Annotation Sub Feature .Notify the Connector. ReExtract
    - **If this Succeeds.**  
You have not set any Expression **to** the annotation sub feature .Please re-register and correct this error. Re Run Manual Edits to the Schema and Model Administrator Export
    - **IF This FAILS.**  
You have probably set a expression for the POINT-CELL Feature you will need to Re-register features using the GCA. Ensure that during the registration process you **DO NOT** set an Expression for POINT-CELL Features. You will need to re run the schema modification process after the error is corrected. Notify the Connector and then try extraction

## 4.2.9 DGN2SDO Fails

```
C:\TEMP\Utility Table Scripts>ECHO OFF
01:17 PM
*.
DGN2SDO 8.11.5.42 will be running with MicroStation version (08.11.05.17).
1/23/2009 1:17:36 PM
Effective Workspace Home = (C:\Documents and Settings\All Users\Application Data
\Bentley\MicroStation\WorkSpace\Projects\Examples\Geospatial\BentleyMultiUtility
_DGN\User\)
ERROR: Failed to initialize ECStorage Translator. Error = (Error encountered whi
le trying to connect to specified metadata database (IN_METADB). Error = (The sp
ecified module could not be found. (Exception from HRESULT: 0x8007007E))).
MicroStation engine terminated.
1/23/2009 1:17:37 PM
01:17 PM
Press any key to continue . . .
```

### Resolution:

Verify Oracle prerequisites.

## 4.3 Keywords supported by data exporters

### 4.3.1 Dimensions and units

The following table lists the accepted keywords for the “sourcedimension” and “sourceunits” attributes in the configuration files for the data exporters.

Dimension	Unit
angle	angleDegrees
angle	angleMinutes
angle	angleQuadrants
angle	angleRadians
angle	angleRevolutions
angle	angleSeconds
area	acres
area	hectares
area	squareCentimeters
area	squareFeet
area	squareInches
area	squareKilometers
area	squareMeters
area	squareMiles
area	squareMillimeters
area	squareYards
area	thousandSquareFeet
concentration	microgramsPerLiter
concentration	milliGramsPerLiter
concentration	partsPerBillion
concentration	partsPerMillion
concentration	poundsPerCubicFoot
concentration	poundsPerMillionGallons
costperunitvolume	dollarsPerCubicCentimeters
costperunitvolume	dollarsPerLiters
costperunitvolume	dollarsPerCubicMeters
costperunitvolume	dollarsPerCubicInches
costperunitvolume	dollarsPerGallons
costperunitvolume	dollarsPerImpGallons
costperunitvolume	dollarsPerCubicFeet
costperunitvolume	dollarsPerCubicYards
costperunitvolume	dollarsPerAcreInches
costperunitvolume	dollarsPerAcreFeet
costperunitvolume	dollarsPerMillionGallons
costperunitvolume	dollarsPerThousandGallons
costperunitvolume	dollarsPerThousandLiters
costperunitvolume	dollarsPerMillionLiters
currency	dollars
currencyperenergy	dollarsPerKiloWattHour
currencyperlength	dollarsPerFoot

currencyperlength	dollarsPerMeter
currencyPerPower	dollarsPerKiloWatt
currencyPerPower	dollarsPerHorsepower
density	slugPerCubicFoot
density	poundPerCubicFoot
density	kilogramPerCubicMeter
diameterLength	inchMiles
diameterLength	inchFeet
diameterLength	footMiles
diameterLength	footFeet
diameterLength	millimeterMeters
diameterLength	millimeterKilometers
diameterLength	meterMeters
diameterLength	meterKilometers
diameterLength	inchMeters
diameterLength	millimeterMiles
diffusivity	centistokes
diffusivity	squareFeetPerSecond
diffusivity	squareMetersPerSecond
diffusivity	stokes
dischargeperpressuredrop	cfsPerSquareRootFooH2O
dischargeperpressuredrop	cmsPerSquareRootMeterH2O
dischargeperpressuredrop	lPerSecPerSquareRootKpa
dischargeperpressuredrop	gpmPerSquareRootPsi
electricalFrequency	hertz
emittercoefficient	cfmPerPSI
emittercoefficient	cfsPerPSI
emittercoefficient	cubicFeetPerDayPerPSI
emittercoefficient	cubicFeetPerMinutePerPSI
emittercoefficient	cubicFeetPerSecondPerPSI
emittercoefficient	cubicMetersPerDayPerMetersOfH2O
emittercoefficient	cubicMetersPerHourPerMetersOfH2O
emittercoefficient	cubicMetersPerMinutePerMetersOfH2O
emittercoefficient	cubicMetersPerSecondPerMetersOfH2O
emittercoefficient	gallonsPerDayPerPSI
emittercoefficient	gallonsPerMinutePerPSI
emittercoefficient	gallonsPerSecondPerPSI
emittercoefficient	gpmPerPSI
emittercoefficient	imperialGallonsPerDayPerPSI
emittercoefficient	imperialGallonsPerMinutePerPSI
emittercoefficient	imperialGallonsPerSecondPerPSI

emittercoefficient	litersPerDayPerMetersOfH2O
emittercoefficient	litersPerMinutePerMetersOfH2O
emittercoefficient	litersPerSecondPerMetersOfH2O
emittercoefficient	megaLitersPerDayPerMetersOfH2O
emittercoefficient	mgdPerPSI
emittercoefficient	mgdImperialPerPSI
energy	footPoundals
energy	joules
energy	kiloJoules
energy	kiloWattHours
energyperunitvolume	kiloWattHourPerMillionGallons
energyperunitvolume	kiloWattHourPerMillionLiters
energyperunitvolume	kiloWattHourPerCubicMeters
energyperunitvolume	kiloWattHourPerCubicFeet
flow	acreFeetPerDay
flow	acreFeetPerHour
flow	acreFeetPerMinute
flow	acreInchPerHour
flow	acreInchPerMinute
flow	cfm
flow	cfs
flow	cubicFeetPerDay
flow	cubicFeetPerMinute
flow	cubicFeetPerSecond
flow	cubicMetersPerDay
flow	cubicMetersPerHour
flow	cubicMetersPerMinute
flow	cubicMetersPerSecond
flow	gallonsPerDay
flow	gallonsPerMinute
flow	gallonsPerSecond
flow	gpm
flow	imperialGallonsPerDay
flow	imperialGallonsPerMinute
flow	imperialGallonsPerSecond
flow	litersPerDay
flow	litersPerMinute
flow	litersPerSecond
flow	megaLitersPerDay
flow	mgd
flow	mgdImperial

flow	millionLitersPerDay
flowdensityperarea	cfsPerAcres
flowdensityperarea	cfsPerSquareFeet
flowdensityperarea	cfsPerSquareMiles
flowdensityperarea	cubicMetersPerHectaresPerDay
flowdensityperarea	cubicMetersPerSquareKilometerPerDay
flowdensityperarea	cubicMetersPerSquareMeterPerDay
flowdensityperarea	gpdPerAcres
flowdensityperarea	gpdPerSquareFeet
flowdensityperarea	gpdPerSquareMiles
flowdensityperarea	gpmPerAcres
flowdensityperarea	gpmPerSquareFeet
flowdensityperarea	gpmPerSquareMiles
flowdensityperarea	litersPerHectaresPerDay
flowdensityperarea	litersPerSquareKilometerPerDay
flowdensityperarea	litersPerSquareMeterPerDay
flowpercapita	gpdPerCapita
flowpercapita	litersPerCapitaPerDay
force	poundForce
force	kiloPoundForce
force	newton
force	kiloNewton
inertia	poundSquareFeet
inertia	newtonSquareMeters
inertia	kilogramSquareMeters
infiltrationrate	infiltrationRateCentimetersPerDay
infiltrationrate	infiltrationRateCentimetersPerHour
infiltrationrate	infiltrationRateCentimetersPerMinute
infiltrationrate	infiltrationRateInchesPerDay
infiltrationrate	infiltrationRateInchesPerHour
infiltrationrate	infiltrationRateInchesPerMinute
infiltrationrate	infiltrationRateMillimetersPerDay
infiltrationrate	infiltrationRateMillimetersPerHour
infiltrationrate	infiltrationRateMillimetersPerMinute
length	centimeters
length	decimeters
length	feet
length	inches
length	kilometers
length	meters
length	mfeet

length	miles
length	millifeet
length	millimeters
length	yards
mass	gram
mass	kilograms
mass	milligram
mass	pounds
massPerArea	poundsPerAcre
massPerArea	kilogramsPerHectare
massrate	gramsPerDay
massrate	gramsPerHour
massrate	gramsPerMinute
massrate	gramsPerSecond
massrate	kilogramsPerDay
massrate	kilogramsPerHour
massrate	kilogramsPerMinute
massrate	kilogramsPerSecond
massrate	microgramsPerDay
massrate	microgramsPerHour
massrate	microgramsPerMinute
massrate	microgramsPerSecond
massrate	milliGramsPerDay
massrate	milliGramsPerHour
massrate	milliGramsPerMinute
massrate	milliGramsPerSecond
massrate	poundsPerDay
massrate	poundsPerHour
massrate	poundsPerMinute
massrate	poundsPerSecond
nthorderbulkreactionrate	microgramsPerLiterNPerDay
nthorderbulkreactionrate	microgramsPerLiterNPerSecond
nthorderbulkreactionrate	milliGramsPerLiterNPerDay
nthorderbulkreactionrate	milliGramsPerLiterNPerSecond
nthorderbulkreactionrate	partsPerBillionNPerDay
nthorderbulkreactionrate	partsPerBillionNPerSecond
nthorderbulkreactionrate	partsPerMillionNPerDay
nthorderbulkreactionrate	partsPerMillionNPerSecond
nthorderbulkreactionrate	poundsPerCubicFootNPerDay
nthorderbulkreactionrate	poundsPerCubicFootNPerSecond
nthorderbulkreactionrate	poundsPerMillionGallonsNPerDay

nthorderbulkreactionrate	poundsPerMillionGallonsNPerSecond
percent	percentPercent
percent	unitlessPercent
population	capita
population	customer
population	employee
population	guest
population	hundredCapita
population	passenger
population	person
population	resident
population	student
population	thousandCapita
populationdensityperarea	personsPerAcre
populationdensityperarea	personsPerSquareFeet
populationdensityperarea	personsPerSquareKilometer
populationdensityperarea	personsPerHectares
populationdensityperarea	personsPerSquareMeter
populationdensityperarea	personsPerSquareMile
power	horsepower
power	kilowatts
power	watts
pressure	atmospheres
pressure	bars
pressure	feetOfH2O
pressure	kilogramsPerSquareCentimeter
pressure	kiloPascals
pressure	metersOfH2O
pressure	millimetersOfH2O
pressure	newtonsPerSquareMeter
pressure	poundsPerSquareFoot
pressure	poundsPerSquareInch
pressure	psi
pressure	kilogramsPerSquareMeter
rainfallintensity	centimetersPerDay
rainfallintensity	centimetersPerHour
rainfallintensity	centimetersPerMinute
rainfallintensity	inchesPerDay
rainfallintensity	inchesPerHour
rainfallintensity	inchesPerMinute
rainfallintensity	milliMetersPerDay

rainfallintensity	milliMetersPerHour
rainfallintensity	milliMetersPerMinute
reactionrate	perDay
reactionrate	perSecond
reactionrate	perMinute
reactionrate	perHour
rotationalfrequency	rpm
scaleDimension	feetPerInch
scaleDimension	metersPerCm
slope	centimeterPerMeter
slope	footHorizontalPerFootVertical
slope	footPer1000Feet
slope	footPerFoot
slope	footPerMile
slope	footVerticalPerFootHorizontal
slope	horizontalPerVertical
slope	inchPerFoot
slope	meterHorizontalPerMeterVertical
slope	meterPerKilometer
slope	meterPerMeter
slope	meterVerticalPerMeterHorizontal
slope	millimeterHorizontalPerMeterVertical
slope	millimeterPerMeter
slope	millimeterVerticalPerMeterHorizontal
slope	oneOverSlope
slope	percentSlope
slope	verticalPerHorizontal
specificweight	kiloNewtonsPerCubicMeter
specificweight	newtonsPerCubicMeter
specificweight	poundsForcePerCubicFoot
springconstant	poundPerInch
springconstant	newtonPerMillimeter
surfacereactionrate	feetPerDay
surfacereactionrate	metersPerDay
surfacereactionrate	metersPerSecond
temperature	celsius
temperature	fahrenheit
time	days
time	hours
time	minutes
time	seconds



time	years
time	milliseconds
torque	newtonMeters
torque	poundFeet
unitless	unitlessUnit
velocity	velocityCentimetersPerHour
velocity	velocityCentimetersPerMinute
velocity	velocityCentimetersPerSecond
velocity	velocityFeetPerHour
velocity	velocityFeetPerMinute
velocity	velocityFeetPerSecond
velocity	velocityInchesPerHour
velocity	velocityInchesPerMinute
velocity	velocityInchesPerSecond
velocity	velocityKilometersPerHour
velocity	velocityKnot
velocity	velocityKnotInternational
velocity	velocityMetersPerHour
velocity	velocityMetersPerMinute
velocity	velocityMetersPerSecond
velocity	velocityMilePerHour
volume	acreFeet
volume	acreInches
volume	cubicCentimeters
volume	cubicFeet
volume	cubicInches
volume	cubicMeters
volume	cubicYards
volume	gallons
volume	impGallons
volume	liters
volume	millionGallons
volume	millionLiters
volume	thousandGallons
volume	thousandLiters
weircoefficient	weircoefficientSi
weircoefficient	weircoefficientUs
zeroordersurfacereactionrate	microgramsPerSquareFeetPerDay
zeroordersurfacereactionrate	microgramsPerSquareMeterPerDay
zeroordersurfacereactionrate	microgramsPerSquareMeterPerSecond
zeroordersurfacereactionrate	milliGramsPerSquareFeetPerDay

zeroordersurfacereactionrate	milliGramsPerSquareMeterPerDay
zeroordersurfacereactionrate	milliGramsPerSquareMeterPerSecond

### 4.3.2 Epanet keywords

The following table lists the supported section names and fields that can be used in the “section” and “mapstofield” attributes in the configuration file for the Epanet-exporter in Bentley Water.

Epanet section	Epanet field	XML section to use it in
BACKDROP	Dimensions	Defaults/DefaultValues or seed-file
BACKDROP	Units	Defaults/DefaultValues or seed-file
BACKDROP	File	Defaults/DefaultValues or seed-file
BACKDROP	Offset	Defaults/DefaultValues or seed-file
CURVES	CurveID	PropertyLookUp/Mapping
CURVES	X	PropertyLookUp/Mapping
CURVES	Y	PropertyLookUp/Mapping
DEMANDS	NodeID	PropertyLookUp/Mapping
DEMANDS	BaseDemand	PropertyLookUp/Mapping
DEMANDS	PatternID	PropertyLookUp/Mapping
DEMANDS	Category	PropertyLookUp/Mapping
EMITTERS	NodeID	Feature/Mapping or Feature/FeatureDefaults
EMITTERS	FlowCoefficient	Feature/Mapping or Feature/FeatureDefaults
ENERGY	LinkID	Feature/Mapping or Feature/FeatureDefaults
ENERGY	PumpEfficiency	Feature/Mapping or Feature/FeatureDefaults
ENERGY	GlobalPrice	Feature/Mapping or Feature/FeatureDefaults
ENERGY	GlobalEfficiency	Feature/Mapping or Feature/FeatureDefaults
ENERGY	DemandCharge	Feature/Mapping or Feature/FeatureDefaults
JUNCTIONS	NodeID	Feature/Mapping or Feature/FeatureDefaults
JUNCTIONS	Elevation	Feature/Mapping or Feature/FeatureDefaults
JUNCTIONS	BaseDemand	Feature/Mapping or Feature/FeatureDefaults
JUNCTIONS	PatternID	Feature/Mapping or Feature/FeatureDefaults
LABELS	Coordinate	Defaults/DefaultValues
LABELS	Text	Defaults/DefaultValues
LABELS	Anchor	Defaults/DefaultValues
MIXING	NodeID	Feature/Mapping or Feature/FeatureDefaults
MIXING	MixingModel	Feature/Mapping or Feature/FeatureDefaults
MIXING	CompartmentVolume	Feature/Mapping or Feature/FeatureDefaults
OPTIONS	QualityElementID	Defaults/DefaultValues or seed-file
OPTIONS	Headloss	Defaults/DefaultValues or seed-file
OPTIONS	Quality	Defaults/DefaultValues or seed-file
OPTIONS	Viscosity	Defaults/DefaultValues or seed-file
OPTIONS	Units	Defaults/DefaultValues <required>

PATTERNS	PatternID	PropertyLookUp/Mapping
PATTERNS	Multiplier	PropertyLookUp/Mapping
PIPES	LinkID	Feature/Mapping or Feature/FeatureDefaults
PIPES	StartNodeID	Feature/Mapping or Feature/FeatureDefaults
PIPES	EndNodeID	Feature/Mapping or Feature/FeatureDefaults
PIPES	Length	Feature/Mapping or Feature/FeatureDefaults
PIPES	Diameter	Feature/Mapping or Feature/FeatureDefaults
PIPES	RoughnessCoefficient	Feature/Mapping or Feature/FeatureDefaults
PIPES	MinorlossCoefficient	Feature/Mapping or Feature/FeatureDefaults
PIPES	Status	Feature/Mapping or Feature/FeatureDefaults
PUMPS	LinkID	Feature/Mapping or Feature/FeatureDefaults
PUMPS	StartNodeID	Feature/Mapping or Feature/FeatureDefaults
PUMPS	StopNodeID	Feature/Mapping or Feature/FeatureDefaults
PUMPS	HeadID	Feature/Mapping or Feature/FeatureDefaults
PUMPS	Power	Feature/Mapping or Feature/FeatureDefaults
PUMPS	Speed	Feature/Mapping or Feature/FeatureDefaults
PUMPS	PatternID	Feature/Mapping or Feature/FeatureDefaults
QUALITY	NodeID	Feature/Mapping or Feature/FeatureDefaults
QUALITY	InitialQuality	Feature/Mapping or Feature/FeatureDefaults
REACTIONS	WallElementID	Feature/Mapping or Feature/FeatureDefaults
REACTIONS	WallCoefficient	Feature/Mapping or Feature/FeatureDefaults
RESERVOIRS	NodeID	Feature/Mapping or Feature/FeatureDefaults
RESERVOIRS	Head	Feature/Mapping or Feature/FeatureDefaults
RESERVOIRS	HeadPatternID	Feature/Mapping or Feature/FeatureDefaults
SOURCES	NodeID	Feature/Mapping or Feature/FeatureDefaults
SOURCES	SourceType	Feature/Mapping or Feature/FeatureDefaults
SOURCES	BaselineSourceStrength	Feature/Mapping or Feature/FeatureDefaults
SOURCES	TimePatternID	Feature/Mapping or Feature/FeatureDefaults
STATUS	LinkID	Feature/Mapping or Feature/FeatureDefaults
STATUS	StatusSetting	Feature/Mapping or Feature/FeatureDefaults
TAGS	Keyword	Defaults/DefaultValues or seed-file
TAGS	ID	Defaults/DefaultValues or seed-file
TAGS	Tag	Defaults/DefaultValues or seed-file
TANKS	NodeID	Feature/Mapping or Feature/FeatureDefaults
TANKS	BottomElevation	Feature/Mapping or Feature/FeatureDefaults
TANKS	InitialWaterLevel	Feature/Mapping or Feature/FeatureDefaults
TANKS	MinimumWaterLevel	Feature/Mapping or Feature/FeatureDefaults
TANKS	MaximumWaterLevel	Feature/Mapping or Feature/FeatureDefaults
TANKS	NominalDiameter	Feature/Mapping or Feature/FeatureDefaults
TANKS	MinimumVolume	Feature/Mapping or Feature/FeatureDefaults
TANKS	VolumeCurveID	Feature/Mapping or Feature/FeatureDefaults

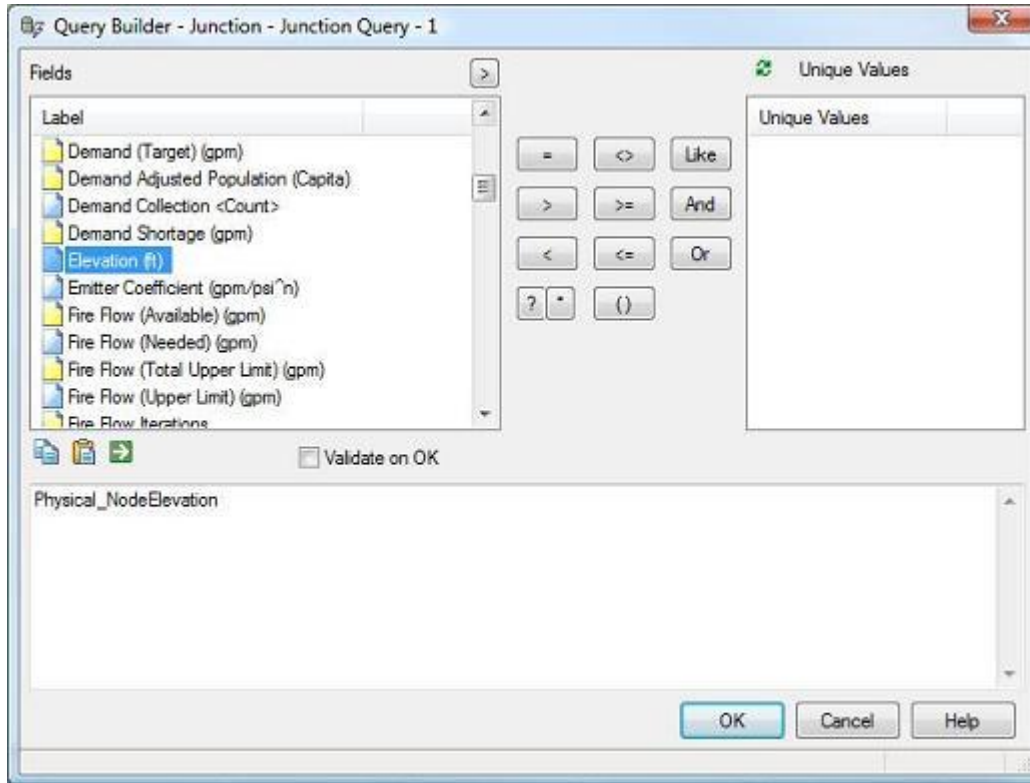
TITLE	Text	Defaults/DefaultValues or seed-file
VALVES	LinkID	Feature/Mapping or Feature/FeatureDefaults
VALVES	StartNodeID	Feature/Mapping or Feature/FeatureDefaults
VALVES	StopNodeID	Feature/Mapping or Feature/FeatureDefaults
VALVES	Diameter	Feature/Mapping or Feature/FeatureDefaults
VALVES	ValveType	Feature/Mapping or Feature/FeatureDefaults
VALVES	Setting	Feature/Mapping or Feature/FeatureDefaults
VALVES	MinorlossCoefficient	Feature/Mapping or Feature/FeatureDefaults

### 4.3.3 WaterCAD/WaterGEMS keywords

The following table lists the supported keywords for the “domainelementtype” attribute in the configuration file for the WaterCAD/WaterGEMS exporter.

Type name	Keyword
Air Valve	AirValve
Check Valve	CheckValve
Discharge to Atmosphere	DischargeToAtmosphere
FCV	FCV
GPV	GPV
Hydrant	IdahoHydrant
Hydropneumatic Tank	HydropneumaticTank
Isolation Valve	PressureIsolationValve
Junction	IdahoJunction
Orifice Between Two Pipes	OrificeBetweenTwoPipes
PBV	PBV
Periodic Head-Flow	PeriodicHeadFlow
Pipe	IdahoPipe
PRV	PRV
PSV	PSV
Pump	StandardPump
Reservoir	IdahoReservoir
Rupture Disk	RuptureDisk
Spot Elevation	IdahoSpotElevation
Surge Tank	SurgeTank
Surge Valve	SavSrv
Tank	IdahoTank
TCV	TCV
Turbine	Turbine
Valve with Linear Area Change	ValveWithLinearAreaChange
Variable Speed Pump Battery	VariableSpeedPumpBattery

The configuration file support the same field-names used by WaterCAD/WaterGEMS. This includes User-defined fields. Those field-names are not the field-labels displayed in Flex-tables or the property-grid but the keywords used internally. Those keywords can be accessed in WaterCAD/WaterGEMS' query-builder. They are the keywords that appear if a field is double-clicked in the list while building a SQL statement.



#### 4.3.4 Gas Analysis keywords

The following table lists the supported keywords for the “domainelementtype” attribute in the configuration file for the Gas Analysis exporter.

Type name	Keyword
Node	GasNode
Pipe	GasPipe
Isolation Valve	GasIsolationValve
Regulating Valve	GasRegulatingValve

The configuration file support the same field-names used by Gas Analysis. This includes User-defined fields. Those field-names are not the field-labels displayed in Flex-tables or the property-grid but the keywords used internally. Those keywords can be accessed in Gas Analysis' query-builder. They are the keywords that appear if a field is double-clicked in the list while building a SQL statement (see screenshot above, under WaterCAD/WaterGEMS keywords section).