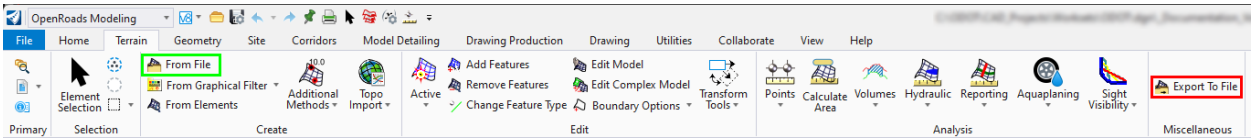
Terrain Export and Import using LandXML

OpenX technology provides the ability to both export and import digital terrain models on the Terrain tab. A terrain may be exported to LandXML using **Terrain>Miscellaneous> Export To File** and the import function is in **Terrain>Create>From File**.

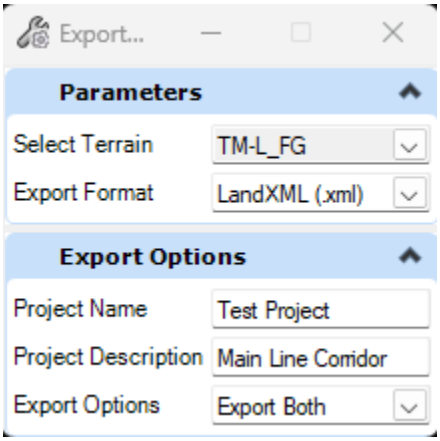


The proposed corridor is typically used to create a terrain, which is then delivered to the Construction phase in Surface LandXML format. The LandXML deliverables are stored in the 1_Milestone\7_3D_Design folder in ProjectWise.

Terrain Export to Surface LandXML

Follow the recommended steps below to create a surface LandXML file that contains both the terrain source data (feature definitions, by name) and the definition (triangles).

1. In DGN (2D or 3D) file that contains a proposed terrain or has one attached as a reference, select **OpenRoads Modeling>Terrain>Miscellaneous>Export to File**.
2. On the **Export to File** tool settings dialog, select the proposed terrain from the pick list, set the Export Format to LandXML (.xml), and **set the Export Options to "Export Both"**. Project Name and Description are optional and are written into the exported file in line near the top of the file.

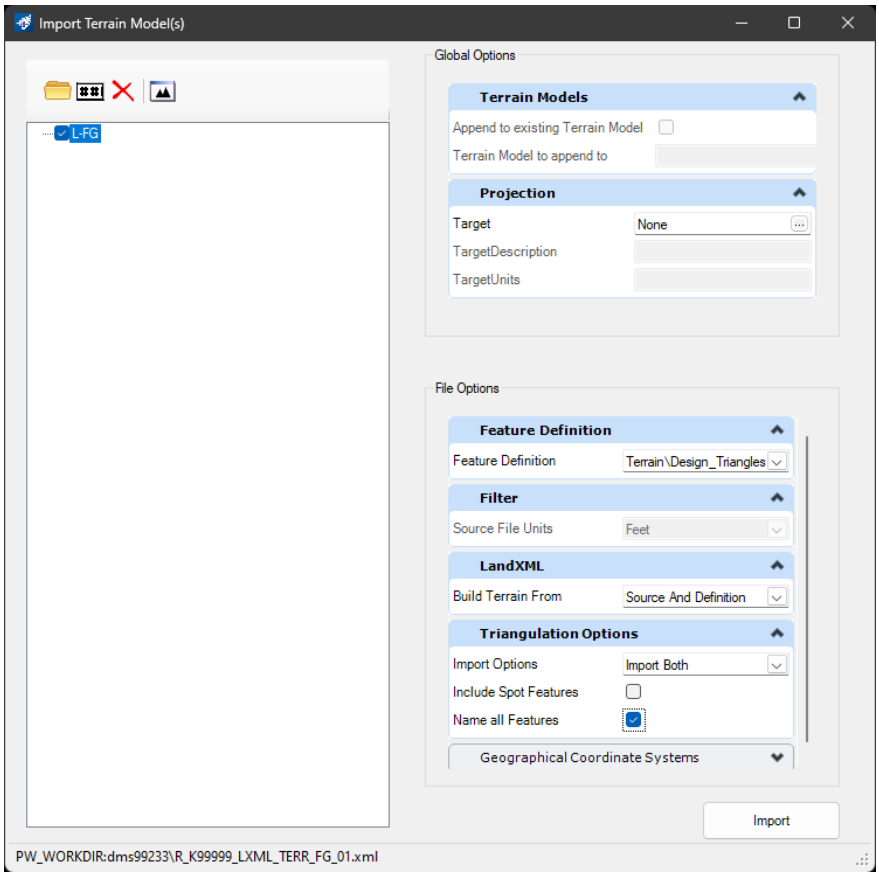


3. Click in the file 4 times to accept the parameters and open the **Export Terrain** dialog.
    a. For ProjectWise on the Select a Wizard dialog, use **No Wizard** and **[Select] 0_Temp** as the folder to create a document that you will move and rename later; click **[Save]**, then **[Check In]** when prompted. Move the document to 1_Milestone\7_3D_Design and rename using the ODOT Naming Tool.
    b. To create the LandXML file on your local computer, choose **[Cancel]**. Then, navigate to a folder, enter a File name, then select **[Save]** to create the LandXML (.xml) file.

Import a Terrain from LandXML

Follow the recommended steps below to create a civil terrain by importing both feature definitions and triangles from a surface LandXML file that contains terrain source data (feature definitions, by name) and definition (triangles).

1. Create a new DGN from a 3D seed in the 3_Construction\Construction_Engineering folder named, CE_K#####_TERR_XXX-YY_##.dgn.
2. Select **OpenSite Modeling>Terrain>Create>From File**.
3. Select an XML file for import.
4. On the Import Terrain Model(s) dialog, it is not necessary to set Global Options. Set the following **File Options** and click **[Import]**.
    a. **Feature Definition** – Terrain\Design_Triangles
    b. **Build Terrain From – Source and Definition**
    c. **Import Options – Import Both**



5. Close the Import Terrain Model(s) dialog with the **[X]** in the upper right corner.
6. Use Fit View to see the terrain.

File Formats for Digital Data Exchange

The ODOT "Construction Surveying Manual for Contractors" sets the preferred format for exchanging data between ODOT and contractors as LandXML for alignments, coordinates, and digital terrain models or surfaces. The LandXML format is probably the easiest way to transfer data

between many civil design and survey programs. Some automated machine guidance systems take input directly in the LandXML format. LandXML separates the data into blocks where specific information is delivered in a particular order that is widely known.

LandXML files may be opened in any text editor – Notepad++ is recommended.

What is Inside a Surface LandXML File?

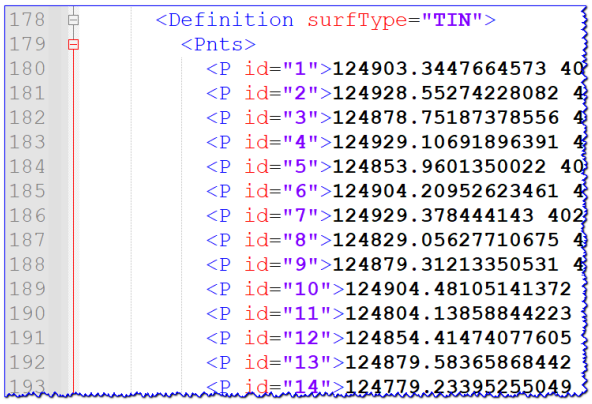
A surface LandXML file has two major separations of the <Surfaces> data. The first "SourceData" block contains linear features or <Breaklines>, and random features called <DataPoints> – this is where the feature names, styles, and locations (YXZ of vertices) are stored. The second large block of information is the "Definition" block that contains the YXZ location of the vertices <Pnts> and the membership of the <Faces> of the triangulated irregular network (TIN) – the names of the points that are connected to form a triangle. In the image below the data sub-sections have been collapsed to show the major groupings highlighted yellow in a surface LandXML file. The breaklines are contained in the source data section and the triangle vertices are in the definition section.

```
  6    <Project name="Test Project" desc="Main Line Corridor"/>
  7    <Application name="OpenRoads Designer" version="23.00.00.129" m
  8    <Surfaces>
  9      <Surface name="TM-L_FG">
 10        <SourceData>
 11          <DataPoints>
 15          <Breaklines>
177        </SourceData>
178        <Definition surfType="TIN">
179          <Pnts>
2036         <Faces>
5485       </Definition>
5486     </Surface>
5487   </Surfaces>
5488 </LandXML>
5489
```

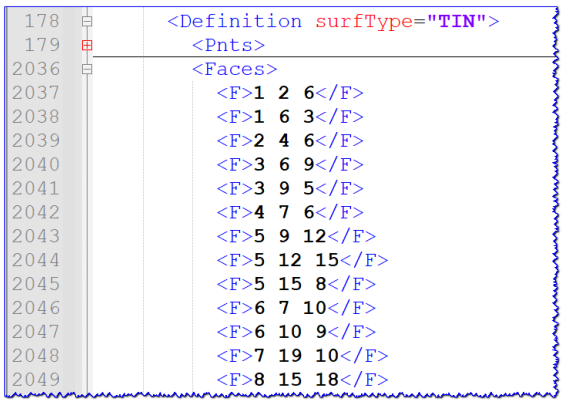
The image below shows the **surface source data** in a surface LandXML file for a Dch_R corridor breakline feature using the Hy_Ditch_P feature definition.

```
32           <Breakline brkType="standard" name="Dch_R">
33             <PntList3D>123334.91340621295 402915.84356892371 486.98749642600126 123
               123311.30123884247 402959.91697986575 488.34852657115943 123299.4951551
               403003.99039080786 489.70955671631771 123275.88298778674 403026.0270962
               491.07058686147582 123252.27082041628 403070.10050722066 491.7511019340
               123228.6586530458 403114.17391816276 493.1121320792131 123216.852569360
               403158.24732910481 494.47316222437126 123193.24040199007 403180.2840345
               495.83419236952949 123169.62823461958 403224.35744551796 496.5147074421
               123146.0160672491 403268.43085646007 497.87573758726671 123134.20998356
34             <Feature code="Breakline">
35               <Property label="id" value="3"/>
36               <Property label="style" value="Linear\Hydro\Hy_Ditch_P"/>
37               <Property label="UsrID" value="20000000"/>
38             </Feature>
39           </Breakline>
```

The images below show **triangle definitions** for the triangulated irregular network (TIN) in a surface LandXML file: triangle vertices in the point list on the left and triangle face definitions in the Faces section on the right.



```
178      <Definition surfType="TIN">
179        <Pnts>
180          <P id="1">124903.3447664573 40
181          <P id="2">124928.55274228082 4
182          <P id="3">124878.75187378556 4
183          <P id="4">124929.10691896391 4
184          <P id="5">124853.9601350022 40
185          <P id="6">124904.20952623461 4
186          <P id="7">124929.378444143 402
187          <P id="8">124829.05627710675 4
188          <P id="9">124879.31213350531 4
189          <P id="10">124904.48105141372
190          <P id="11">124804.13858844223
191          <P id="12">124854.41474077605
192          <P id="13">124879.58365868442
193          <P id="14">124779.23395255049
```



```
178      <Definition surfType="TIN">
179        <Pnts>
2036       <Faces>
2037         <F>1 2 6</F>
2038         <F>1 6 3</F>
2039         <F>2 4 6</F>
2040         <F>3 6 9</F>
2041         <F>3 9 5</F>
2042         <F>4 7 6</F>
2043         <F>5 9 12</F>
2044         <F>5 12 15</F>
2045         <F>5 15 8</F>
2046         <F>6 7 10</F>
2047         <F>6 10 9</F>
2048         <F>7 19 10</F>
2049         <F>8 15 18</F>
```