

# Green Infrastructure

January 17, 2017

**0.0.1 This cell creates a button to hide/show the cell codes below.**

```
In [ ]: %%HTML
<script>
  var code_show=true; //true -> hide code at first

  function code_toggle() {
    $('div.prompt').hide(); // always hide prompt

    if (code_show){
      $('div.input').hide();
    } else {
      $('div.input').show();
    }
    code_show = !code_show
  }
  $( document ).ready(code_toggle);
</script>
<a href="javascript:code_toggle()">[Toggle Code]</a>
```

**0.1 Here, the Garden Infrastructure Designer web site is loaded for users to create custom GI.**

```
In [6]: %%HTML
<iframe id="myiframe" width="1000px" height="900px" src="http://gidesigner.

<script type="text/javascript">

var eventMethod = window.addEventListener;
var eventer = window[eventMethod];
var messageEvent = "message";

window.addEventListener('message',function(e) {
  var key = e.message ? 'message' : 'data';
  if(key == "data")
  {
    var data = e[key];
    var res = data.split("=");
```

```

var new_key = res[0];
var new_value = res[1];
console.log(new_key);
if(new_key.includes("download_url") )
{
    IPython.notebook.kernel.execute(new_key + '=\'' + new_value + '\'');
    console.log(new_value);
}
else
{
    var json = JSON.parse(new_value);
    var json_string = JSON.stringify(json);
    console.log(json_string);
    IPython.notebook.kernel.execute(new_key + '=\'' + json_string + '\'');
}
};
},false);
</script>

```

<IPython.core.display.HTML object>

## 0.2 How to access data from the GI web site?

### 0.2.1 To access Landcover and Soil Datasets.

After creating GI and clicking on the **Generate buttons** located under the **Notebook Data Preparation tab** there are two ways to access the data for RHESSys workflows. ##### (1) By clicking on the download buttons and saving the zip files to your desktop. Then uploading the files as a HydroShare resource. This method is recommended for final GI design. ##### (2) For experiments and refinements, the other way is to download the files to your notebook workspace.

Here, the notebook demonstrates the second example. By clicking on the generate buttons, global variables are created. By clicking on the **Generate RHESSys Land Cover Dataset** button creates the **landuse\_download\_url** global variable. Clicking on the **Generate RHESSys Soil Dataset** button creates the **soil\_download\_url** global variable. Then to download the data, use these variables with the **!wget** function.

### 0.2.2 To access the Landcover Dataset

```

In [8]: print(landuse_download_url);
        !wget $landuse_download_url

```

```

http://hydroterre.psu.edu/GI_RHESSys/j50bd33a740174902a450af00bf88311d/scratch/GI_L
--2017-01-17 14:59:32-- http://hydroterre.psu.edu/GI_RHESSys/j50bd33a740174902a450
Resolving hydroterre.psu.edu (hydroterre.psu.edu)... 192.5.158.22
Connecting to hydroterre.psu.edu (hydroterre.psu.edu)|192.5.158.22|:80... connected
HTTP request sent, awaiting response... 200 OK
Length: 77446 (76K) [application/x-zip-compressed]
Saving to: 'GI_Landuse.zip.3'

```

```
GI_Landuse.zip.3      100%[=====>]   75.63K   390KB/s   in 0.2s
```

```
2017-01-17 14:59:32 (390 KB/s) - 'GI_Landuse.zip.3' saved [77446/77446]
```

### 0.2.3 To access the Soil Dataset

```
In [ ]: print(soil_download_url);  
        !wget $soil_download_url
```

## 0.3 To access GI geometry and Custom GI definitions

After creating GI under the **Save or Load GI tab** there are two ways to access the data for RHESSys workflows. As before, files can be downloaded and uploaded to HydroShare as a resource. Here, the second method is demonstrated using global variables. Below, shows the steps to access these variables after clicking on the **Save GI variables to HydroShare** button.

### 0.3.1 To access Polygon Marker Geometry (i.e. soils, surfaces)

Use the variable `hs_polygon_markers`

```
In [10]: import json  
         from collections import OrderedDict  
         data = json.loads(hs_polygon_markers, object_pairs_hook=OrderedDict)  
         print(json.dumps(data, indent=4));
```

```
{  
  "2": {  
    "current_surface_type": 0,  
    "id": 2,  
    "area": "103.60",  
    "landuse_value": "1",  
    "surfaceID": "SurfaceA",  
    "visible": true,  
    "latLngs": [  
      {  
        "lat": 39.29374353600439,  
        "lng": -76.74461290240288  
      },  
      {  
        "lat": 39.2937980253836,  
        "lng": -76.74452304840088  
      },  
      {  
        "lat": 39.2937321191767,  
        "lng": -76.74444258213043  
      },  
    ]  
  },  
}
```

```

        {
            "lat": 39.29367140238,
            "lng": -76.74452640116215
        }
    ]
}

```

### 0.3.2 To access Point Marker Geometry (i.e. Tree locations)

Use the variable `hs_point_markers`

```

In [11]: import json
         from collections import OrderedDict
         data = json.loads(hs_point_markers, object_pairs_hook=OrderedDict)
         print(json.dumps(data, indent=4));

{
  "1": {
    "current_surface_type": -1,
    "icon": "icons/tree1_icon_medium.png",
    "id": 1,
    "stratum_value": "2",
    "title": "Drag me!",
    "treeID": "TreeA_sizeM",
    "tree_radius": "2",
    "visible": true,
    "lat": 39.29377415385128,
    "lng": -76.74460887908936
  }
}

```

### 0.3.3 To access GI Tree Properties

Use the variable `hs_tree_dictionary`

```

In [14]: import json
         from collections import OrderedDict
         data = json.loads(hs_tree_dictionary, object_pairs_hook=OrderedDict)
         print(json.dumps(data, indent=4));

{
  "TreeA_sizeL": {
    "type": "TreeA",
    "tree_id": "A",
    "size": "L",
    "pretty_name": "Maple",

```

```

    "radius": "4",
    "landuse": "2",
    "cost": "500",
    "labor_cost": "750",
    "tree_icon": "icons/treel_icon.png",
    "tree_map_icon": "icons/treel_icon"
  },
  "TreeA_sizeM": {
    "type": "TreeA",
    "tree_id": "A",
    "size": "M",
    "pretty_name": "Maple",
    "radius": "2",
    "landuse": "2",
    "cost": "150",
    "labor_cost": "500",
    "tree_icon": "icons/treel_icon.png",
    "tree_map_icon": "icons/treel_icon"
  },
  "TreeA_sizeS": {
    "type": "TreeA",
    "tree_id": "A",
    "size": "S",
    "pretty_name": "Maple",
    "radius": "1",
    "landuse": "2",
    "cost": "50",
    "labor_cost": "150",
    "tree_icon": "icons/treel_icon.png",
    "tree_map_icon": "icons/treel_icon"
  },
  "TreeB_sizeL": {
    "type": "TreeB",
    "tree_id": "B",
    "size": "L",
    "pretty_name": "Sweetgum",
    "radius": "4",
    "landuse": "2",
    "cost": "500",
    "labor_cost": "750",
    "tree_icon": "icons/tree2_icon.png",
    "tree_map_icon": "icons/tree2_icon"
  },
  "TreeB_sizeM": {
    "type": "TreeB",
    "tree_id": "B",
    "size": "M",
    "pretty_name": "Sweetgum",

```

```

        "radius": "2",
        "landuse": "2",
        "cost": "150",
        "labor_cost": "500",
        "tree_icon": "icons/tree2_icon.png",
        "tree_map_icon": "icons/tree2_icon"
    },
    "TreeB_sizeS": {
        "type": "TreeB",
        "tree_id": "B",
        "size": "S",
        "pretty_name": "Sweetgum",
        "radius": "1",
        "landuse": "2",
        "cost": "50",
        "labor_cost": "150",
        "tree_icon": "icons/tree2_icon.png",
        "tree_map_icon": "icons/tree2_icon"
    },
    "TreeC_sizeL": {
        "type": "TreeC",
        "tree_id": "C",
        "size": "L",
        "pretty_name": "Birch",
        "radius": "4",
        "landuse": "2",
        "cost": "500",
        "labor_cost": "750",
        "tree_icon": "icons/tree3_icon.png",
        "tree_map_icon": "icons/tree3_icon"
    },
    "TreeC_sizeM": {
        "type": "TreeC",
        "tree_id": "C",
        "size": "M",
        "pretty_name": "Birch",
        "radius": "2",
        "landuse": "2",
        "cost": "150",
        "labor_cost": "500",
        "tree_icon": "icons/tree3_icon.png",
        "tree_map_icon": "icons/tree3_icon"
    },
    "TreeC_sizeS": {
        "type": "TreeC",
        "tree_id": "C",
        "size": "S",
        "pretty_name": "Birch",

```

```

    "radius": "1",
    "landuse": "2",
    "cost": "50",
    "labor_cost": "150",
    "tree_icon": "icons/tree3_icon.png",
    "tree_map_icon": "icons/tree3_icon"
  },
  "TreeD_sizeL": {
    "type": "TreeD",
    "tree_id": "D",
    "size": "L",
    "pretty_name": "Flowering dogwood",
    "radius": "4",
    "landuse": "2",
    "cost": "500",
    "labor_cost": "750",
    "tree_icon": "icons/tree4_icon.png",
    "tree_map_icon": "icons/tree4_icon"
  },
  "TreeD_sizeM": {
    "type": "TreeD",
    "tree_id": "D",
    "size": "M",
    "pretty_name": "Flowering dogwood",
    "radius": "2",
    "landuse": "2",
    "cost": "150",
    "labor_cost": "500",
    "tree_icon": "icons/tree4_icon.png",
    "tree_map_icon": "icons/tree4_icon"
  },
  "TreeD_sizeS": {
    "type": "TreeD",
    "tree_id": "D",
    "size": "S",
    "pretty_name": "Flowering dogwood",
    "radius": "1",
    "landuse": "2",
    "cost": "50",
    "labor_cost": "150",
    "tree_icon": "icons/tree4_icon.png",
    "tree_map_icon": "icons/tree4_icon"
  },
  "TreeE_sizeL": {
    "type": "TreeE",
    "tree_id": "E",
    "size": "L",
    "pretty_name": "Sugar maple",

```

```

    "radius": "4",
    "landuse": "2",
    "cost": "500",
    "labor_cost": "750",
    "tree_icon": "icons/tree5_icon.png",
    "tree_map_icon": "icons/tree5_icon"
  },
  "TreeE_sizeM": {
    "type": "TreeE",
    "tree_id": "E",
    "size": "M",
    "pretty_name": "Sugar maple",
    "radius": "2",
    "landuse": "2",
    "cost": "150",
    "labor_cost": "500",
    "tree_icon": "icons/tree5_icon.png",
    "tree_map_icon": "icons/tree5_icon"
  },
  "TreeE_sizeS": {
    "type": "TreeE",
    "tree_id": "E",
    "size": "S",
    "pretty_name": "Sugar maple",
    "radius": "1",
    "landuse": "2",
    "cost": "50",
    "labor_cost": "150",
    "tree_icon": "icons/tree5_icon.png",
    "tree_map_icon": "icons/tree5_icon"
  },
  "TreeF_sizeL": {
    "type": "TreeF",
    "tree_id": "F",
    "size": "L",
    "pretty_name": "Quaking aspen",
    "radius": "4",
    "landuse": "2",
    "cost": "500",
    "labor_cost": "750",
    "tree_icon": "icons/tree6_icon.png",
    "tree_map_icon": "icons/tree6_icon"
  },
  "TreeF_sizeM": {
    "type": "TreeF",
    "tree_id": "F",
    "size": "M",
    "pretty_name": "Quaking aspen",

```



```

    "radius": "2",
    "landuse": "2",
    "cost": "150",
    "labor_cost": "500",
    "tree_icon": "icons/tree6_icon.png",
    "tree_map_icon": "icons/tree6_icon"
  },
  "TreeF_sizeS": {
    "type": "TreeF",
    "tree_id": "F",
    "size": "S",
    "pretty_name": "Quaking aspen",
    "radius": "1",
    "landuse": "2",
    "cost": "50",
    "labor_cost": "150",
    "tree_icon": "icons/tree6_icon.png",
    "tree_map_icon": "icons/tree6_icon"
  },
  "TreeG_sizeL": {
    "type": "TreeG",
    "tree_id": "G",
    "size": "L",
    "pretty_name": "Douglas-fir",
    "radius": "4",
    "landuse": "2",
    "cost": "500",
    "labor_cost": "750",
    "tree_icon": "icons/tree7_icon.png",
    "tree_map_icon": "icons/tree7_icon"
  },
  "TreeG_sizeM": {
    "type": "TreeG",
    "tree_id": "G",
    "size": "M",
    "pretty_name": "Douglas-fir",
    "radius": "2",
    "landuse": "2",
    "cost": "150",
    "labor_cost": "500",
    "tree_icon": "icons/tree7_icon.png",
    "tree_map_icon": "icons/tree7_icon"
  },
  "TreeG_sizeS": {
    "type": "TreeG",
    "tree_id": "G",
    "size": "S",
    "pretty_name": "Douglas-fir",

```

```

        "radius": "1",
        "landuse": "2",
        "cost": "50",
        "labor_cost": "150",
        "tree_icon": "icons/tree7_icon.png",
        "tree_map_icon": "icons/tree7_icon"
    }
}

```

### 0.3.4 To access GI Stratum Properties

Use the variable `hs_stratum_dictionary`

```

In [13]: import json
         from collections import OrderedDict
         data = json.loads(hs_stratum_dictionary, object_pairs_hook=OrderedDict)
         print(json.dumps(data, indent=4));

{
  "SurfaceA_depth_sizeL": {
    "surface_name": "SurfaceA",
    "pretty_name": "Evergreen",
    "depth_size": "L",
    "depth_value": "1.0",
    "landuse": "1",
    "cost": "2",
    "labor_cost": "4"
  },
  "SurfaceA_depth_sizeM": {
    "surface_name": "SurfaceA",
    "pretty_name": "Evergreen",
    "depth_size": "M",
    "depth_value": "0.5",
    "landuse": "1",
    "cost": "2",
    "labor_cost": "3"
  },
  "SurfaceA_depth_sizeS": {
    "surface_name": "SurfaceA",
    "pretty_name": "Evergreen",
    "depth_size": "S",
    "depth_value": "0.25",
    "landuse": "1",
    "cost": "2",
    "labor_cost": "2"
  },
  "SurfaceB_depth_sizeL": {

```

```

    "surface_name": "SurfaceB",
    "pretty_name": "Eucalypt",
    "depth_size": "L",
    "depth_value": "1.0",
    "landuse": "11",
    "cost": "2",
    "labor_cost": "4"
  },
  "SurfaceB_depth_sizeM": {
    "surface_name": "SurfaceB",
    "pretty_name": "Eucalypt",
    "depth_size": "M",
    "depth_value": "0.5",
    "landuse": "11",
    "cost": "2",
    "labor_cost": "3"
  },
  "SurfaceB_depth_sizeS": {
    "surface_name": "SurfaceB",
    "pretty_name": "Eucalypt",
    "depth_size": "S",
    "depth_value": "0.25",
    "landuse": "11",
    "cost": "2",
    "labor_cost": "2"
  },
  "SurfaceC_depth_sizeL": {
    "surface_name": "SurfaceC",
    "pretty_name": "Deciduous",
    "depth_size": "L",
    "depth_value": "1.0",
    "landuse": "2",
    "cost": "2",
    "labor_cost": "4"
  },
  "SurfaceC_depth_sizeM": {
    "surface_name": "SurfaceC",
    "pretty_name": "Deciduous",
    "depth_size": "M",
    "depth_value": "0.5",
    "landuse": "2",
    "cost": "2",
    "labor_cost": "3"
  },
  "SurfaceC_depth_sizeS": {
    "surface_name": "SurfaceC",
    "pretty_name": "Deciduous",
    "depth_size": "S",

```

```

    "depth_value": "0.25",
    "landuse": "2",
    "cost": "2",
    "labor_cost": "2"
  },
  "SurfaceD_depth_sizeL": {
    "surface_name": "SurfaceD",
    "pretty_name": "Deciduous_BES",
    "depth_size": "L",
    "depth_value": "1.0",
    "landuse": "21",
    "cost": "2",
    "labor_cost": "4"
  },
  "SurfaceD_depth_sizeM": {
    "surface_name": "SurfaceD",
    "pretty_name": "Deciduous_BES",
    "depth_size": "M",
    "depth_value": "0.5",
    "landuse": "21",
    "cost": "2",
    "labor_cost": "3"
  },
  "SurfaceD_depth_sizeS": {
    "surface_name": "SurfaceD",
    "pretty_name": "Deciduous_BES",
    "depth_size": "S",
    "depth_value": "0.25",
    "landuse": "21",
    "cost": "2",
    "labor_cost": "2"
  },
  "SurfaceE_depth_sizeL": {
    "surface_name": "SurfaceE",
    "pretty_name": "Grass",
    "depth_size": "L",
    "depth_value": "1.0",
    "landuse": "3",
    "cost": "2",
    "labor_cost": "4"
  },
  "SurfaceE_depth_sizeM": {
    "surface_name": "SurfaceE",
    "pretty_name": "Grass",
    "depth_size": "M",
    "depth_value": "0.5",
    "landuse": "3",
    "cost": "2",

```

```

        "labor_cost": "3"
    },
    "SurfaceE_depth_sizeS": {
        "surface_name": "SurfaceE",
        "pretty_name": "Grass",
        "depth_size": "S",
        "depth_value": "0.25",
        "landuse": "3",
        "cost": "2",
        "labor_cost": "2"
    },
    "SurfaceF_depth_sizeL": {
        "surface_name": "SurfaceF",
        "pretty_name": "Lawn_10cm",
        "depth_size": "L",
        "depth_value": "1.0",
        "landuse": "31",
        "cost": "2",
        "labor_cost": "4"
    },
    "SurfaceF_depth_sizeM": {
        "surface_name": "SurfaceF",
        "pretty_name": "Lawn_10cm",
        "depth_size": "M",
        "depth_value": "0.5",
        "landuse": "31",
        "cost": "2",
        "labor_cost": "3"
    },
    "SurfaceF_depth_sizeS": {
        "surface_name": "SurfaceF",
        "pretty_name": "Lawn_10cm",
        "depth_size": "S",
        "depth_value": "0.25",
        "landuse": "31",
        "cost": "2",
        "labor_cost": "2"
    },
    "SurfaceG_depth_sizeL": {
        "surface_name": "SurfaceG",
        "pretty_name": "Lawn_5cm",
        "depth_size": "L",
        "depth_value": "1.0",
        "landuse": "32",
        "cost": "2",
        "labor_cost": "4"
    },
    "SurfaceG_depth_sizeM": {

```

```

        "surface_name": "SurfaceG",
        "pretty_name": "Lawn_5cm",
        "depth_size": "M",
        "depth_value": "0.5",
        "landuse": "32",
        "cost": "2",
        "labor_cost": "3"
    },
    "SurfaceG_depth_sizeS": {
        "surface_name": "SurfaceG",
        "pretty_name": "Lawn_5cm",
        "depth_size": "S",
        "depth_value": "0.25",
        "landuse": "32",
        "cost": "2",
        "labor_cost": "2"
    },
    "SurfaceH_depth_sizeL": {
        "surface_name": "SurfaceH",
        "pretty_name": "Lawn_2cm",
        "depth_size": "L",
        "depth_value": "1.0",
        "landuse": "33",
        "cost": "2",
        "labor_cost": "4"
    },
    "SurfaceH_depth_sizeM": {
        "surface_name": "SurfaceH",
        "pretty_name": "Lawn_2cm",
        "depth_size": "M",
        "depth_value": "0.5",
        "landuse": "33",
        "cost": "2",
        "labor_cost": "3"
    },
    "SurfaceH_depth_sizeS": {
        "surface_name": "SurfaceH",
        "pretty_name": "Lawn_2cm",
        "depth_size": "S",
        "depth_value": "0.25",
        "landuse": "33",
        "cost": "2",
        "labor_cost": "2"
    },
    "SurfaceI_depth_sizeL": {
        "surface_name": "SurfaceI",
        "pretty_name": "NonVeg",
        "depth_size": "L",

```

```

        "depth_value": "1.0",
        "landuse": "4",
        "cost": "2",
        "labor_cost": "4"
    },
    "SurfaceI_depth_sizeM": {
        "surface_name": "SurfaceI",
        "pretty_name": "NonVeg",
        "depth_size": "M",
        "depth_value": "0.5",
        "landuse": "4",
        "cost": "2",
        "labor_cost": "3"
    },
    "SurfaceI_depth_sizeS": {
        "surface_name": "SurfaceI",
        "pretty_name": "NonVeg",
        "depth_size": "S",
        "depth_value": "0.25",
        "landuse": "4",
        "cost": "2",
        "labor_cost": "2"
    }
}

```

### 0.3.5 To access GI Soil Properties

Use the variable **hs\_soil\_dictionary**

```

In [12]: import json
          from collections import OrderedDict
          data = json.loads(hs_tree_dictionary, object_pairs_hook=OrderedDict)
          print(json.dumps(data, indent=4));

{
  "TreeA_sizeL": {
    "type": "TreeA",
    "tree_id": "A",
    "size": "L",
    "pretty_name": "Maple",
    "radius": "4",
    "landuse": "2",
    "cost": "500",
    "labor_cost": "750",
    "tree_icon": "icons/treel_icon.png",
    "tree_map_icon": "icons/treel_icon"
  },

```

```

"TreeA_sizeM": {
  "type": "TreeA",
  "tree_id": "A",
  "size": "M",
  "pretty_name": "Maple",
  "radius": "2",
  "landuse": "2",
  "cost": "150",
  "labor_cost": "500",
  "tree_icon": "icons/tree1_icon.png",
  "tree_map_icon": "icons/tree1_icon"
},
"TreeA_sizeS": {
  "type": "TreeA",
  "tree_id": "A",
  "size": "S",
  "pretty_name": "Maple",
  "radius": "1",
  "landuse": "2",
  "cost": "50",
  "labor_cost": "150",
  "tree_icon": "icons/tree1_icon.png",
  "tree_map_icon": "icons/tree1_icon"
},
"TreeB_sizeL": {
  "type": "TreeB",
  "tree_id": "B",
  "size": "L",
  "pretty_name": "Sweetgum",
  "radius": "4",
  "landuse": "2",
  "cost": "500",
  "labor_cost": "750",
  "tree_icon": "icons/tree2_icon.png",
  "tree_map_icon": "icons/tree2_icon"
},
"TreeB_sizeM": {
  "type": "TreeB",
  "tree_id": "B",
  "size": "M",
  "pretty_name": "Sweetgum",
  "radius": "2",
  "landuse": "2",
  "cost": "150",
  "labor_cost": "500",
  "tree_icon": "icons/tree2_icon.png",
  "tree_map_icon": "icons/tree2_icon"
},

```



```

"TreeB_sizeS": {
  "type": "TreeB",
  "tree_id": "B",
  "size": "S",
  "pretty_name": "Sweetgum",
  "radius": "1",
  "landuse": "2",
  "cost": "50",
  "labor_cost": "150",
  "tree_icon": "icons/tree2_icon.png",
  "tree_map_icon": "icons/tree2_icon"
},
"TreeC_sizeL": {
  "type": "TreeC",
  "tree_id": "C",
  "size": "L",
  "pretty_name": "Birch",
  "radius": "4",
  "landuse": "2",
  "cost": "500",
  "labor_cost": "750",
  "tree_icon": "icons/tree3_icon.png",
  "tree_map_icon": "icons/tree3_icon"
},
"TreeC_sizeM": {
  "type": "TreeC",
  "tree_id": "C",
  "size": "M",
  "pretty_name": "Birch",
  "radius": "2",
  "landuse": "2",
  "cost": "150",
  "labor_cost": "500",
  "tree_icon": "icons/tree3_icon.png",
  "tree_map_icon": "icons/tree3_icon"
},
"TreeC_sizeS": {
  "type": "TreeC",
  "tree_id": "C",
  "size": "S",
  "pretty_name": "Birch",
  "radius": "1",
  "landuse": "2",
  "cost": "50",
  "labor_cost": "150",
  "tree_icon": "icons/tree3_icon.png",
  "tree_map_icon": "icons/tree3_icon"
},

```

```

"TreeD_sizeL": {
  "type": "TreeD",
  "tree_id": "D",
  "size": "L",
  "pretty_name": "Flowering dogwood",
  "radius": "4",
  "landuse": "2",
  "cost": "500",
  "labor_cost": "750",
  "tree_icon": "icons/tree4_icon.png",
  "tree_map_icon": "icons/tree4_icon"
},
"TreeD_sizeM": {
  "type": "TreeD",
  "tree_id": "D",
  "size": "M",
  "pretty_name": "Flowering dogwood",
  "radius": "2",
  "landuse": "2",
  "cost": "150",
  "labor_cost": "500",
  "tree_icon": "icons/tree4_icon.png",
  "tree_map_icon": "icons/tree4_icon"
},
"TreeD_sizeS": {
  "type": "TreeD",
  "tree_id": "D",
  "size": "S",
  "pretty_name": "Flowering dogwood",
  "radius": "1",
  "landuse": "2",
  "cost": "50",
  "labor_cost": "150",
  "tree_icon": "icons/tree4_icon.png",
  "tree_map_icon": "icons/tree4_icon"
},
"TreeE_sizeL": {
  "type": "TreeE",
  "tree_id": "E",
  "size": "L",
  "pretty_name": "Sugar maple",
  "radius": "4",
  "landuse": "2",
  "cost": "500",
  "labor_cost": "750",
  "tree_icon": "icons/tree5_icon.png",
  "tree_map_icon": "icons/tree5_icon"
},

```

```

"TreeE_sizeM": {
  "type": "TreeE",
  "tree_id": "E",
  "size": "M",
  "pretty_name": "Sugar maple",
  "radius": "2",
  "landuse": "2",
  "cost": "150",
  "labor_cost": "500",
  "tree_icon": "icons/tree5_icon.png",
  "tree_map_icon": "icons/tree5_icon"
},
"TreeE_sizeS": {
  "type": "TreeE",
  "tree_id": "E",
  "size": "S",
  "pretty_name": "Sugar maple",
  "radius": "1",
  "landuse": "2",
  "cost": "50",
  "labor_cost": "150",
  "tree_icon": "icons/tree5_icon.png",
  "tree_map_icon": "icons/tree5_icon"
},
"TreeF_sizeL": {
  "type": "TreeF",
  "tree_id": "F",
  "size": "L",
  "pretty_name": "Quaking aspen",
  "radius": "4",
  "landuse": "2",
  "cost": "500",
  "labor_cost": "750",
  "tree_icon": "icons/tree6_icon.png",
  "tree_map_icon": "icons/tree6_icon"
},
"TreeF_sizeM": {
  "type": "TreeF",
  "tree_id": "F",
  "size": "M",
  "pretty_name": "Quaking aspen",
  "radius": "2",
  "landuse": "2",
  "cost": "150",
  "labor_cost": "500",
  "tree_icon": "icons/tree6_icon.png",
  "tree_map_icon": "icons/tree6_icon"
},

```

```

"TreeF_sizeS": {
  "type": "TreeF",
  "tree_id": "F",
  "size": "S",
  "pretty_name": "Quaking aspen",
  "radius": "1",
  "landuse": "2",
  "cost": "50",
  "labor_cost": "150",
  "tree_icon": "icons/tree6_icon.png",
  "tree_map_icon": "icons/tree6_icon"
},
"TreeG_sizeL": {
  "type": "TreeG",
  "tree_id": "G",
  "size": "L",
  "pretty_name": "Douglas-fir",
  "radius": "4",
  "landuse": "2",
  "cost": "500",
  "labor_cost": "750",
  "tree_icon": "icons/tree7_icon.png",
  "tree_map_icon": "icons/tree7_icon"
},
"TreeG_sizeM": {
  "type": "TreeG",
  "tree_id": "G",
  "size": "M",
  "pretty_name": "Douglas-fir",
  "radius": "2",
  "landuse": "2",
  "cost": "150",
  "labor_cost": "500",
  "tree_icon": "icons/tree7_icon.png",
  "tree_map_icon": "icons/tree7_icon"
},
"TreeG_sizeS": {
  "type": "TreeG",
  "tree_id": "G",
  "size": "S",
  "pretty_name": "Douglas-fir",
  "radius": "1",
  "landuse": "2",
  "cost": "50",
  "labor_cost": "150",
  "tree_icon": "icons/tree7_icon.png",
  "tree_map_icon": "icons/tree7_icon"
}

```

```
}
```

```
In [ ]:
```