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The Secret to Landscape Modeling with InfraWorks

Raquel Bascones Recio
Autodesk

Learning Objectives

- Model most common soft and hard landscape elements in InfraWorks
- Create illustrative materials for your presentation
- Connect to other file formats and data sources (Revit, GIS, 3D Models, Civil 3D, etc.)
- Use BIM360 to collaborate and share InfraWorks models with consultants and clients

Description

In 2050, 66% of the world's population will reside in urban areas. Landscape and Urban designers will be required to design more and better cities, with less impact on the environment.

One of the most attractive characteristic of Landscape Design is its scale variety, ranging from balconies to huge campuses. In the "The Secret to Landscape Modeling with Revit", we learned how landscape designs can be built in Revit, as well as the main challenges with the software. Large scale was one of these challenges.

InfraWorks is the software that completes the Landscape Architect toolset for large scale modeling. In this class, we will discover how to model landscape elements in InfraWorks. We will also explore how to import information in your model from different data sources (GIS, Revit, 3D Models, Civil 3D) and collaborate in BIM360. Finally, you will learn how to present and visualize your project using Infraworks tools.

Speaker

Raquel studied for her Masters in Architecture at the Technical University of Madrid. She then worked as an Architect in a small practice in Madrid, mostly focusing on residential and conservation architecture. In 2011 she won a runner-up award in the 'European 11' competition for young European architects.

Her interest in sustainable urban design, accessibility and public realm design led her to study a Master in Landscape Architecture and Gardening. She improved her planting design skills working with the curator of the Royal Botanic Garden in Madrid.

In 2013 Raquel moved to London and worked on several sports, public realm, resort and masterplanning projects including the Al Wakrah Stadium in Qatar, Four Seasons Montenegro

and North West Cambridge development.

Raquel joined Populous in 2015 to lead the transition to BIM in the Landscape Team. She has been working closely with the BIM Manager to develop best practices and protocols for Landscape, as well as managing the BIM models. Raquel also participated in AU 2016 as a speaker on 'The secret to landscape modeling with Revit'.

In 2017, Raquel moved to Barcelona to join Autodesk as a BIM Specialist in the Premium Support Services.

Raquel's interest lies in the relationship between Architecture, Urbanism and Landscape, and how the three disciplines must work together to design better and more liveable green cities.

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1. Introduction

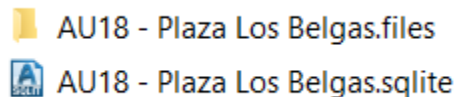
What is InfraWorks?

InfraWorks is a Cloud and Desktop software that supports connected BIM processes. It enables designers to plan and design infrastructure and land development projects in the context of the real world.

InfraWorks is a fully 3D platform that includes tools for design and communication. It combines aspects of Geographic Information Systems (GIS), 3D Visualization and Civil Engineering Design.

InfraWorks features two different sets of tools: Core Tools and Design Tools. Core Tools are basic functionalities for all disciplines including model authoring, analysis, communication, graphics, etc. There are three modules of Design Tools: Road Design, Bridge Design and Drainage Design. These modules include tools to plan, design and analyse parametrically roads, bridges, tunnels and drainage networks.

InfraWorks “file type” is a bit peculiar. Information is saved in a resources folder and a SQLite file that are named the same.



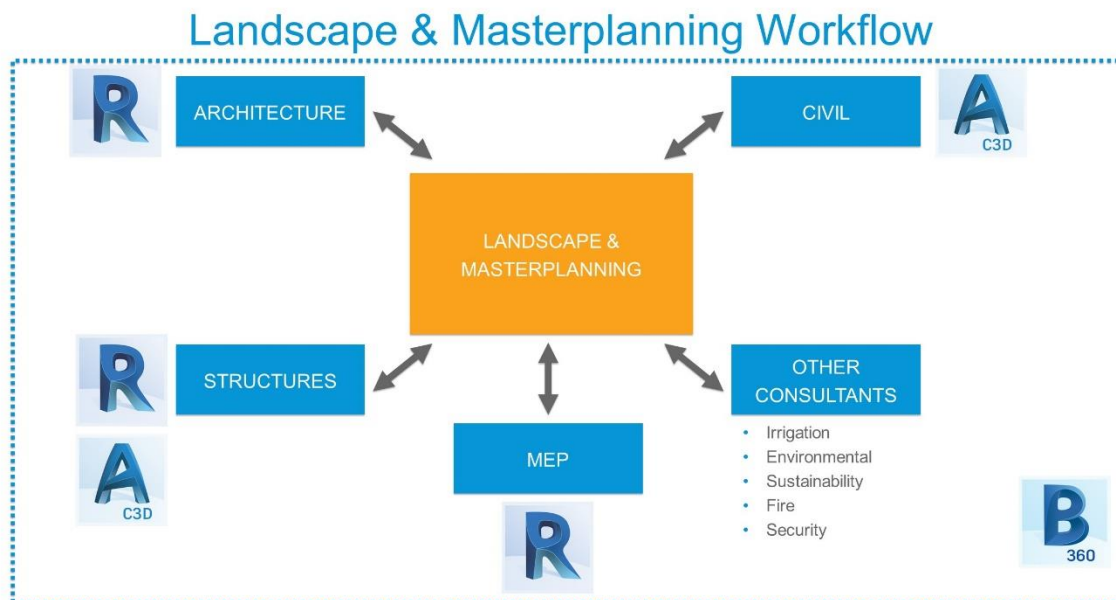
There are many different file types supported for import:

- 3D Model (.3DS, .DAE, .DXF, .FBX, .OBJ)
- Civil 3D (.DWG)
- AutoCAD DWG 3D and 2D objects (.DWG,.DXF)
- Autodesk IMX (.IMX)
- Autodesk Revit (.RVT,.RFA)
- CityGML Files (.CITYGML, .GML, .XML)
- DGN 3D Model (.DGN)
- IFC Files (.IFC)
- LandXML Files (.XML, .LANDXML)
- Point Cloud (.RCS, .RCP)
- Raster Files (Various)
- Spatial Data Format (.SDF)
- Shape Definition Files (.SHP)
- SketchUp Files (.SKP)
- SQLite Files (.SDX, .SQLITE, .DB)

Why InfraWorks for Landscape and Masterplanning?

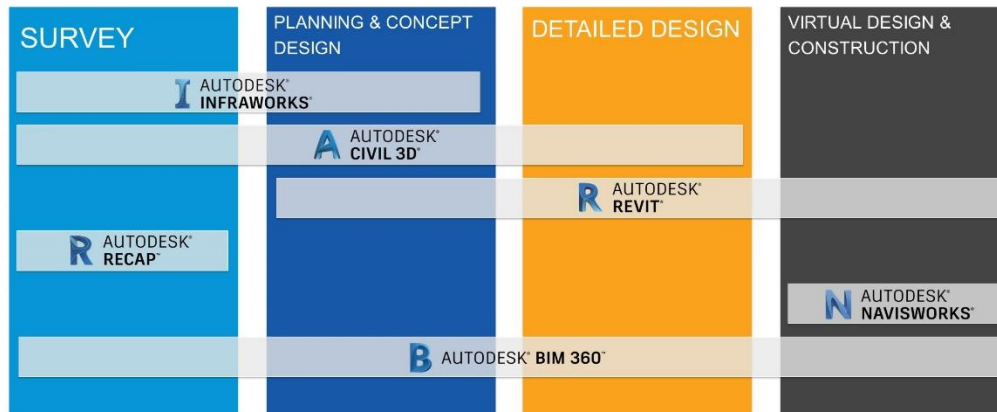
Landscape Architects rarely work in isolation. When working on external projects, most of the times they need to collaborate and coordinate with Architects, Civil Engineers, Structural Engineers, MEP Engineers and other consultants such as Irrigation, Environmental, Fire, Security, etc.

Each of these disciplines works with their own software and file types. In many cases, the Landscape or Masterplan files become the master model where everything else is imported into. How to then collaborate between Revit, Civil 3D, AutoCAD, GIS...? InfraWorks is the solution.



However, Landscape Architects should master not only InfraWorks but also Revit and Civil 3D to cover all stages of the design:

Stages & Toolset



Many users ask why they need to know InfraWorks, Revit and Civil 3D. It is because each tool is best for a part of the job.

InfraWorks is best for preliminary design. It is fully 3D, no plan production is included in the software. It gives an easy and quick way to start projects and give a context to them. The learning curve is smooth.

Revit and Civil 3D are 3D and 2D tools designed for the completion of the detailed design. They give the user full control of the features. Both include plan production tools.

Best tool for the job



InfraWorks

- Preliminary design
- Visual
- Full-time 3D
- Context
- Easy to learn



Civil 3D / Revit

- Completion of detailed design
- Full user control
- Plan production
- 3D & 2D
- Adherence to graphical standards

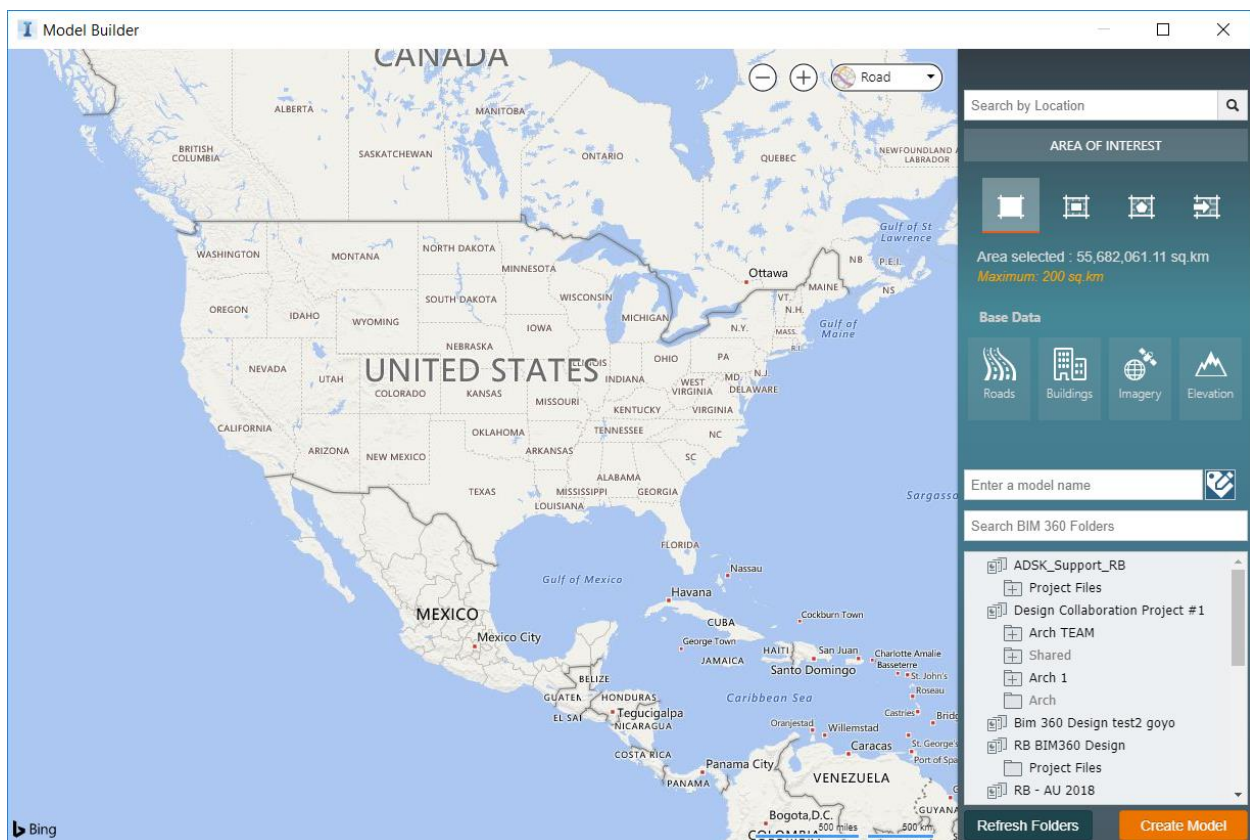
2. Starting a Model

Model Builder

Model Builder is a tool included in InfraWorks. It creates a new model of an area of your choice including aerial images and terrain elevation from Bing Maps and other layers of information from Open Street Maps (roads, buildings, coverages, etc).

It is a powerful feature that allows to start a project with a context when there is no much information, or the survey is not still available. Later, you can add other data to your model to more accurately reflect the existing conditions.

Model Builder uses the cloud to create the new models, so an internet connection is required. The model takes few minutes to generate. You will receive an email when it is ready to open. If you are a BIM360 user, your model will be hosted in the Cloud, but you can afterwards duplicate and save locally. If you are not entitled to BIM360, your model will still be created in the Cloud but after creation you will be able to download and save locally to continue your design.



Data Sources

To continue your design or start from scratch, you can import all the different file types stated in the previous section. It is important that these files are prepared in their native source, so you do not bring any corruption or elements that are unwanted (i.e. Purge and audit for AutoCAD files).

To import a file, you can directly drag it to InfraWorks or open the Data Sources panel in the Core Tools. The import process can be done in the Cloud or Locally. For some file types, you will need to have Navisworks installed to perform the import locally (and in the same version as InfraWorks).

Once a file is imported, it needs to be configured to be properly seen in your model. Data type, geolocation, style and tooltip are some of the settings that can be adjusted in the configuration. It is important to note that data type cannot be changed after the first configuration.



Reality Capture

Today's surveys are no longer restricted to conventional GPS surveys. More projects are using reality capture techniques (i.e. drones) to accurately collect all the existing conditions of the site or even the as-build status.

Autodesk Recap computes all the data and creates point cloud files that can be used in other software.

Point Cloud files can be imported in InfraWorks to display existing conditions. InfraWorks has tools to automatically extract information from Point Clouds like vertical or linear structures.

1. CAPTURE



2. COMPUTE



3. CREATE



3. Model Authoring: Hard Landscape

Hard Landscape using Components Roads

Components roads in InfraWorks are created with the Road Design Module. They are fully parametric and highly customizable. Many hardscape elements are linear features that can be modelled using component roads.

PARAMETRIC DESIGN

Component roads allow editing parameters to customize design.

LINEAR FEATURES

Ideal for landscape linear elements like footpaths, cycle lanes or street design.

FLEXIBILITY

Each component is individually editable. Change material, size and shape.

CUSTOMIZABLE

Use the library materials or import your own. Add in or remove components to adjust your design.

Hard Landscape using Core Tools

For elements where component roads are not suitable, there are options on InfraWorks Core Tools. The most common are coverages and land areas (preview tool).

Coverage areas are draped to the surface of the terrain, and can also be used to shape terrain, create terrain holes, specify avoidance areas, and create surface modifications. You can choose from the materials in the style palette or create your own styles.

Land areas automatically flatten the terrain surface, and use grading styles to specify desired cut, fill and material properties.

COVERAGE

- Drapes on terrain
- Grips on perimeter to adjust extent and elevation
- Edits on grips will shape terrain
- Can flatten terrain at certain elevation



LAND AREAS

- Flattens the area
- Grading styles can be adjusted



Hard Landscape from File

Data sources can be configured as coverages or land areas to model hard landscape elements. Simply select the correct data type when importing and choose the style you would like to apply. The style can be edited after the import. The elements created from the file are individually editable and its style can be changed.

4. Model Authoring: Soft Landscape

Tree and Understory modelling

There are several tools that can be used to model trees and understory elements in InfraWorks with both core and design tools.

- **UNIQUE ELEMENT**

Using the “City Furniture” tool in the Core tools, trees can be placed individually at mouse clicks. Each element is individually editable and parametric. Any style from the library can be placed (out of the box or custom styles).



- **ROW OF TREES**

Trees can be placed using the row of trees tool. You can sketch a line in the model and trees from the selected style will be placed along it. Density and scale can be controlled to adjust to the desired effect. Trees can be individually edited and changed to another style. It is recommended to first adjust scale and density globally as changing them will reset all individual changes.



- **STAND OF TREES**

This tool is like the row of trees, but in this case the trees will be placed randomly within the sketched area. Density and scale can be controlled to adjust to the desired effect. Trees can be individually edited and changed to another style. It is recommended to first adjust scale and density globally as changing them will reset all individual changes.



- **TREES AS COMPONENT ROAD DECORATION**

Trees and other 3D elements can be placed as road decoration in component roads. Trees will be placed at equal distances along a seam. The vertical and horizontal offsets can be changed. All the instances placed are the same, with same size and it does not admit individual edits.

- **TREES FROM FILE**

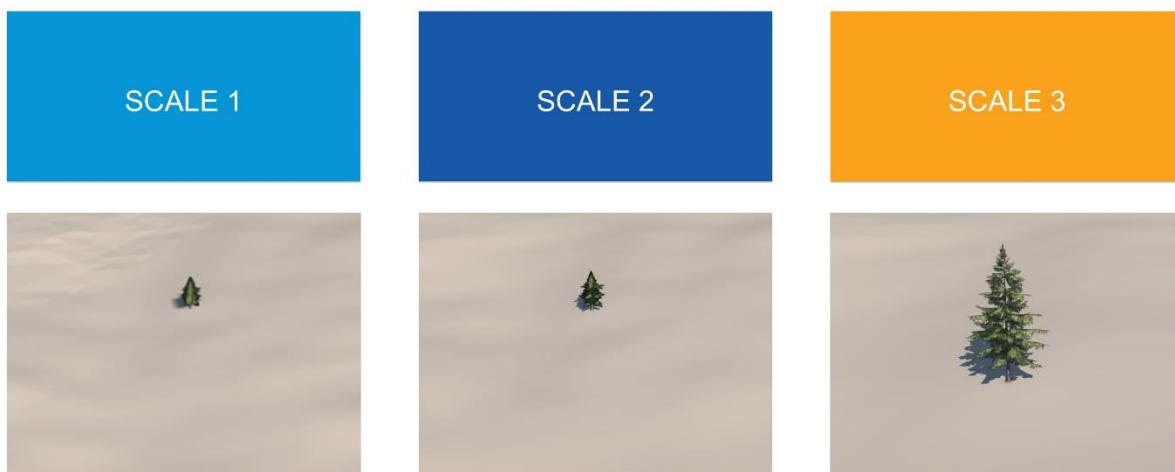
A data source can also be used to place trees or shrubs in a model. When importing the file, select “Trees” as the data type and choose the style from the library. Each element will be individually editable in its parameters, style and location.

Adaptive or Level of Detail (LOD) Trees

Adaptive or LOD tree styles adapt its level of detail to the scale and zoom of the scene. The styles are configured with several 3D models that increase its detail level. When zoom reaches the distance setup in the style, the element switches to the appropriate 3D model.

This type of objects can be created with any 3D Model, not only trees. However, trees are the only adaptive styles available in InfraWorks out-of-the-box. There are three adaptive tree styles, but users can create their own and import them to the library.

Using adaptive trees is a good practice for big models with large forest areas as they help improving the performance of the model.



Groundcover modelling

Groundcover areas can be model with core tools as coverages or land areas. They work in the same way as coverage areas for hard landscape surfaces, it is just needed to change to the correct style.

COVERAGE

- Drapes on terrain
- Grips on perimeter to adjust extent and elevation
- Edits on grips will shape terrain
- Can flatten terrain at certain elevation



LAND AREAS

- Flattens the area
- Grading styles can be adjusted



Green areas or groundcovers can also be predefined as 3D Models and be placed with the same methods as other styles (See next chapter).

5. Model Authoring: Furniture and other 3D elements

Furniture and other 3D elements modelling

Furniture, playground equipment, bollards, lighting poles and other elements can be placed in your InfraWorks model using different tools. In essence, they do not differ from tree modelling as InfraWorks treats all of them as 3D models.

- **UNIQUE ELEMENT**

Using the “City Furniture” tool in the Core tools, instances can be placed individually at mouse clicks. Each element is individually editable and parametric. Any style from the palette can be placed (out of the box or custom styles).



- **ROW/STAND OF TREES**

Any style from the style palette can be placed using the row of trees tool, not necessary from the trees catalog. It is important to remember that size and rotation will be random, so this tool is not fit for placing elements that must remain the same (i.e. light poles, bins, etc.).



- **3D ELEMENTS AS COMPONENT ROAD DECORATION**

3D elements can be placed as road decoration in component roads. Instances will be placed at equal distances along a seam. The vertical and horizontal offsets can be changed. All the instances placed are the same, with same size and it does not admit individual edits.

The spacing by default is 10 meters but can be adjusted afterwards. For elements meant to be continuous (i.e. a fence), it is recommended to set the spacing to 1 meter. This method is the most suitable to place light poles, bins, benches or similar elements that need to keep the same properties and spacing.

- **3D ELEMENTS FROM FILE**

As seen previously, an imported file can be configured as any of the data types included in the data base schema. In the configuration window you can select the style, style rules, tooltip and other custom properties.

Bonus trick: Null roads

Sometimes when modelling your landscape projects, you will find that you need to place 3D elements as road decoration, but it is not possible or accurate to place a road. The workaround is to create a component road with the assembly “Null”. An alignment will be generated but no

grading or geometry will appear in your model. Afterwards, you can add components or decorations as needed to define your design.

Animate your model

In InfraWorks you can also place 3D models that are not necessary design elements. People, cars and others can be included in your model to give realism, help to scale the spaces and animate your views. You can even import animated models via collada files.

Adding new styles

InfraWorks style palette is quite comprehensive. However, there are some instances where custom models are needed to better communicate your design. These are the steps to create your own 3D models in the Style Palette:

1. Open the Style Palette. It is accessible from different areas in InfraWorks (i.e. Core tools, Presentation tools, etc)
2. Browse to the category tab (i.e. 3D models, trees)
3. You can create your new style in an existing catalog (folder) or create your own in the top menu
4. Browse to the correct catalog inside the category and click on create new style at the bottom of the Style Palette window.
5. Select the file from your computer. Supported files for 3D models are 3DS, DAE, DXF, FBX, OBJ, SFF, SVF
6. Choose the anchor point between:
 - Local origin
 - 3D Centre
 - 2D Centre
 - Lower Left Front
7. Adjust the render detail:
 - Simplify model: Select percentage
 - Model Handling: Define how LOD is managed in the model
8. Adjust your model (invert, rotate, translate, scale, etc) and check the result in the preview window

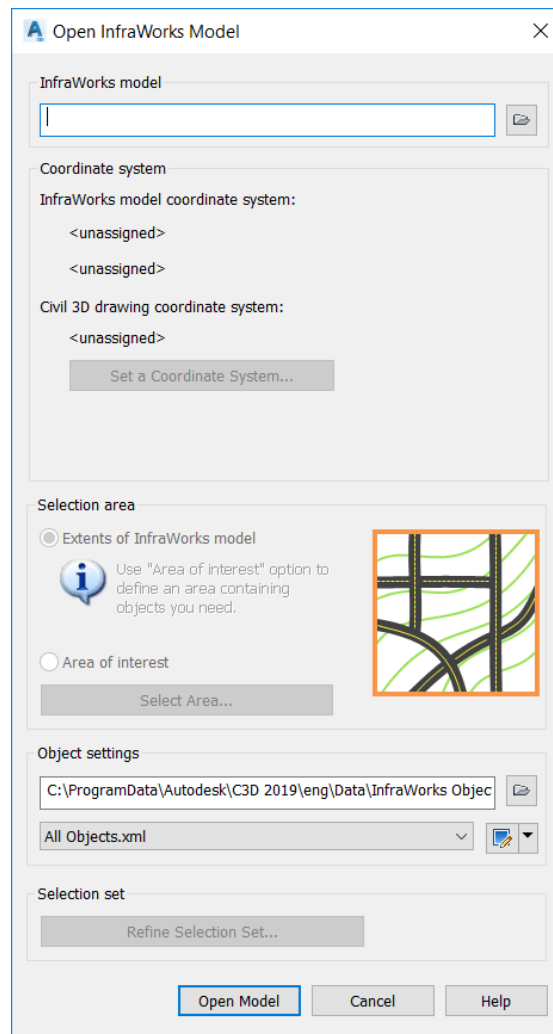
Once created, your style will be available to be used in the tools described in previous sections.

6. Collaboration

Autodesk Civil 3D Interoperability

As seen in the introduction, InfraWorks is a tool suited for preliminary design. To continue with the detailed design, you will need to use Civil 3D or Revit. However, InfraWorks can be used during the whole project cycle as a visualization and communication tool.

- BRINGING INFRAWORKS DATA INTO CIVIL 3D**
 There are two main workflows to bring your InfraWorks model into Civil 3D.
 The first method is to use IMX files. You can export your InfraWorks model into IMX and import directly in Civil 3D from the Autodesk InfraWorks tab.
 Second option is open directly your InfraWorks model in Civil 3D from the Autodesk InfraWorks tab. This method gives you more control as you can select the mapping between InfraWorks elements and Civil 3D elements as well as the coordinates system correlation.

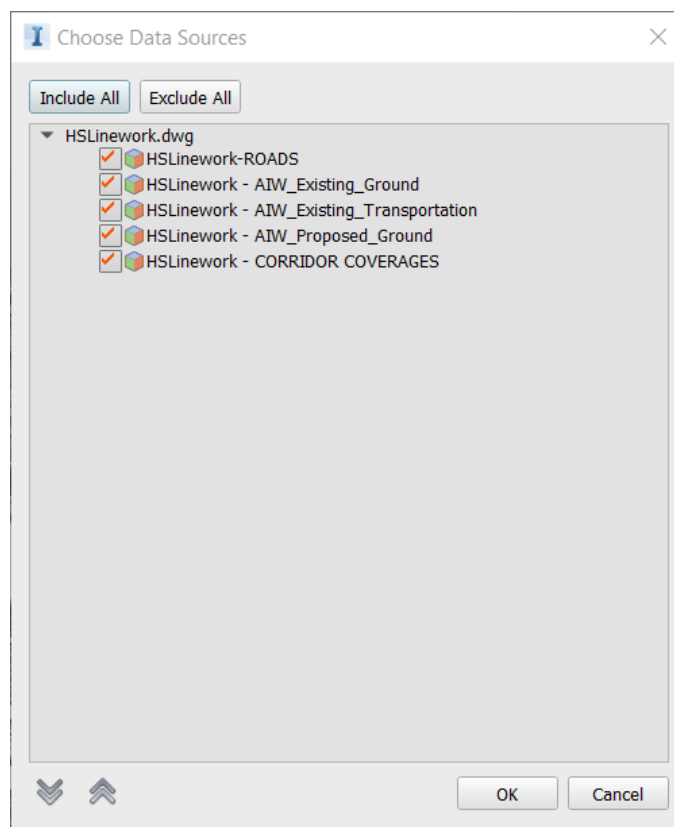


- **IMPORTING CIVIL 3D DATA INTO INFRAWORKS**

It is key to be able to roundtrip data from Civil 3D and InfraWorks. Both programs are used for the first stages of the design and it is important to keep updated the project in both formats.

The first option to import Civil 3D files into InfraWorks is via a DWG. This method allows you to control which elements from the DWG file you import into InfraWorks. The program automatically assigns data type to your import (i.e. roads, terrain, etc) and splits the data in the Data Source menu.

Second method is to export your Civil 3D into an IMX. Similarly to the first option, you can choose which data would like to import to the model. The main difference is the extra work in exporting the file in Civil 3D.



Finally, you can also export your Civil 3D data to GIS formats (i.e. SDF, SHP) and import using the Data Source panel. You will need to manually configure this data to match the correct data type. This last method is suitable to export certain elements like coverages, trees or buildings.

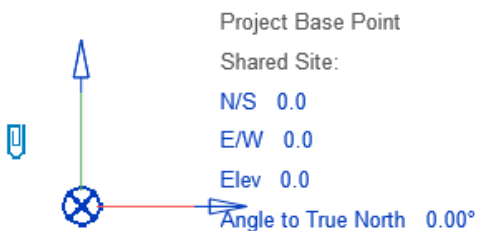
Autodesk Revit Interoperability

As mentioned in previous sections, Landscape Architects work closely with Architects and Engineers working on Revit. It is important to keep the data flow between the two applications to ensure data accuracy across the project models.

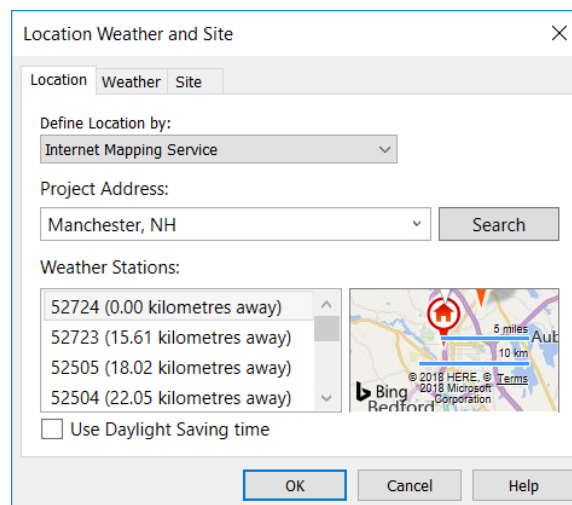
- **IMPORTING REVIT DATA INTO INFRAWORKS**

Revit files (both RVT and RFA) are supported in InfraWorks for import. They can be imported directly from the Data sources window (or dragging the file into the InfraWorks application). However, Revit files have some particularities when configuring the imported file.

First singularity is in the Geolocation. If you are familiar with Revit, you will know that it works with relative coordinates not coordinate system. This means that all elements' coordinates in Revit are calculated in based to a point's coordinates, named the Project Base Point (PBP). The coordinates of the PBP are editable per user needs, either by manually imputing the coordinates or by acquiring coordinates from a linked file (DWG or RVT). PBP has four parameters: North/South, East/West, Elevation and Angle to True North.



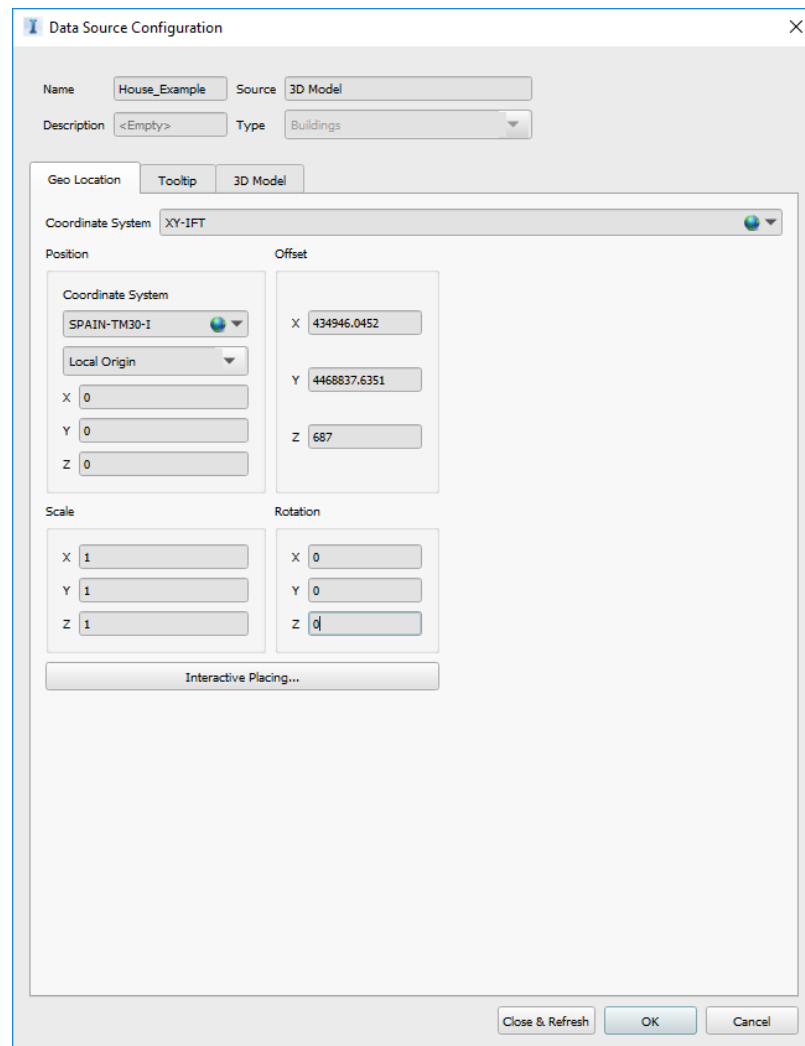
Revit has a second location feature. It is the “Location, Weather and Site” window in the Manage tab. In it, you can input the project location in latitude and longitude and it is used by Revit for some analysis as sun exposure or energy consumption.



When importing a Revit file into InfraWorks we need to know the values from these two features to introduce them in the Geo Location tab from the Data Source configuration window.

InfraWorks will not recognize the Coordinate System directly. You will need to set it up to XY-IFT. Despite working on Metric or other Imperial units rather than Feet, this setting need to be the same for all Revit file. It is due to the Revit API being coded in Imperial. In the position field, input the data from the “Location, Weather and Site”. If the information is in latitude and longitude, input LL84 as the coordinate system.

In the Offset fields, the data from the Project Base Point needs to be input. Please remind that the order is reversed as the N/S will be the Y value and the E/W will be the X value. Finally, the “Angle to True North” data needs to be placed in the Z value of the Rotation field.



Data Source Configuration

Name: Source:

Description: Type:

Geo Location | Tooltip | 3D Model

Coordinate System:

Position

Coordinate System:

Local Origin:

X: Y: Z:

Offset

X: Y: Z:

Scale

X: Y: Z:

Rotation

X: Y: Z:

- **BRINGING INFRAWORKS DATA INTO REVIT**

There are two methods to read your InfraWorks data into Revit.

Firstly, for Bridges and Tunnels in InfraWorks, you can use directly the tool “Send to Revit”. It will create a RVT file with the selected geometry.

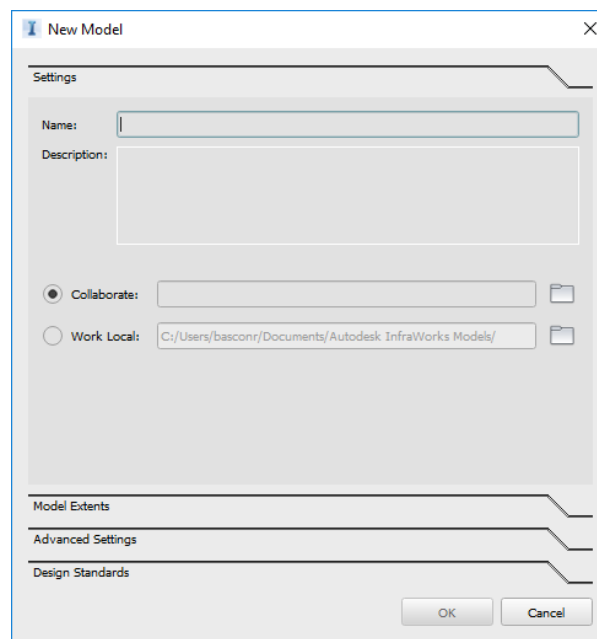
For other InfraWorks elements, the workflow consists in export to FBX and import into Revit. You will need them to leverage Navisworks as Revit does not read FBX files:

1. Export your InfraWorks model to FBX. Be mindful of the size as Revit does not perform well with geometry larger than 33 km or 20 miles.
2. Open the FBX in Navisworks. Make sure that Navisworks has the same units as your FBX model.
3. Save the Navisworks file as NWD coordination model.
4. Link the model in Revit using the Origin to Origin option. (Make sure your Revit model has the appropriate coordinates in the Project Base Point)

BIM360 Collaboration

From InfraWorks 2019+ versions, you can connect and synchronize your models to BIM360 platform. It is required that you are entitled to both BIM360 and InfraWorks licenses and you have a project open in BIM360.

Your models can either be created directly in BIM360 (using both “New” and “Model Builder” tools) or uploaded later to the Cloud. When creating new models, you just need to select the option “Collaborate” and browse to your chosen location in BIM360. Model Builder models will by default be created in BIM360 in the selected location, but you can always duplicate to create local models if you do not wish to work in the Cloud.



Cloud models can be workshared, meaning that several users can work at the same time on the same model. All users must have entitlement to BIM360 and rights to access and edit the project in BIM360. There are different permission levels in BIM360. To be able to see and open the model in InfraWorks, user must have at least View + Upload + Edit permissions.

Permission Level:  View-only

Permission Level:  View + Upload

Permission Level:  View + Upload + Edit

Permission Level:  View + Upload + Edit + Control

When working on workshared models, it is important to synchronize regularly to upload your changes and get modifications from the Cloud. In the “Synchronize Model” dialog you can check which proposal have changes both in the Cloud and your local, and you can select whether share your changes or not.

It is helpful to describe your changes in the comments section, so others can see what has been modified in the new version.

Synchronize Model

BIM360: RB - AU 2018/Project Files
Refresh

Model: AU18 - Plaza Los Belgas

Sync Model Changes

Model Elements	Cloud Changes	My Changes	Share My Changes?
master	None	None	
Existing	None	None	
Furniture	None	None	
HardLandscape	None	None	
Playground	None	None	
Roads	None	None	
SoftLandscape	None	None	
Video		Not in cloud	☒
Common Resources	None		☒

Describe Changes

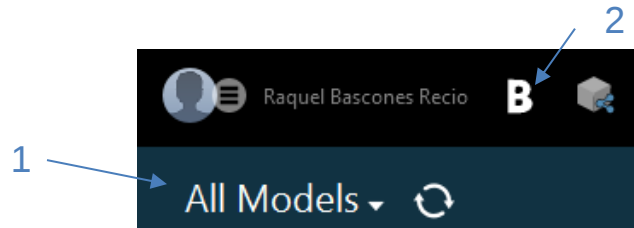
History...

<none>

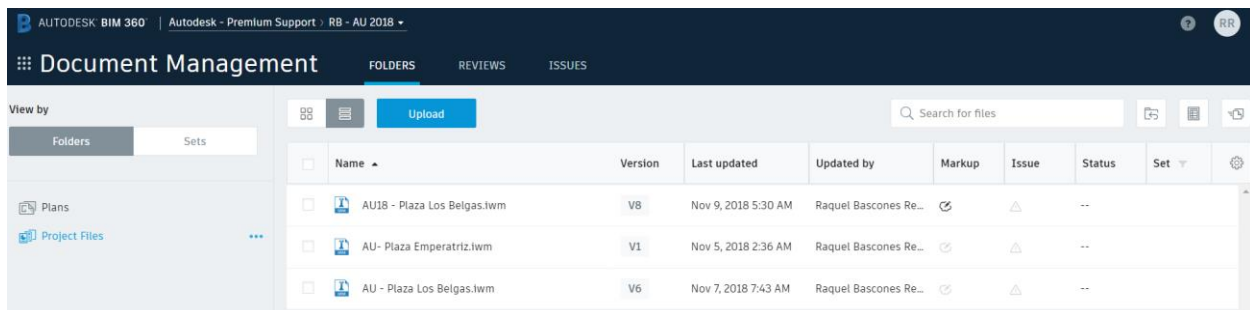
Sync

Close

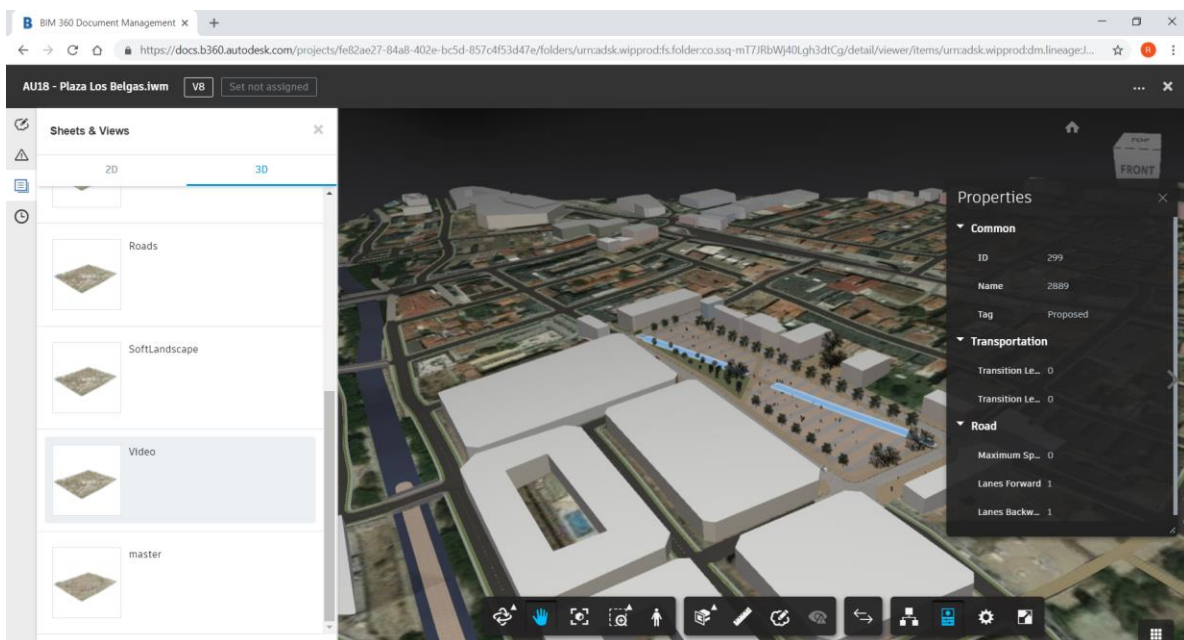
In InfraWorks desktop application, you can see your BIM360 models as tiles. Use the drop-down menu on the top left corner to filter by BIM360 project (1). Also, you can click on the B (2) next to your username to pop up a browser window and see your BIM360 account.



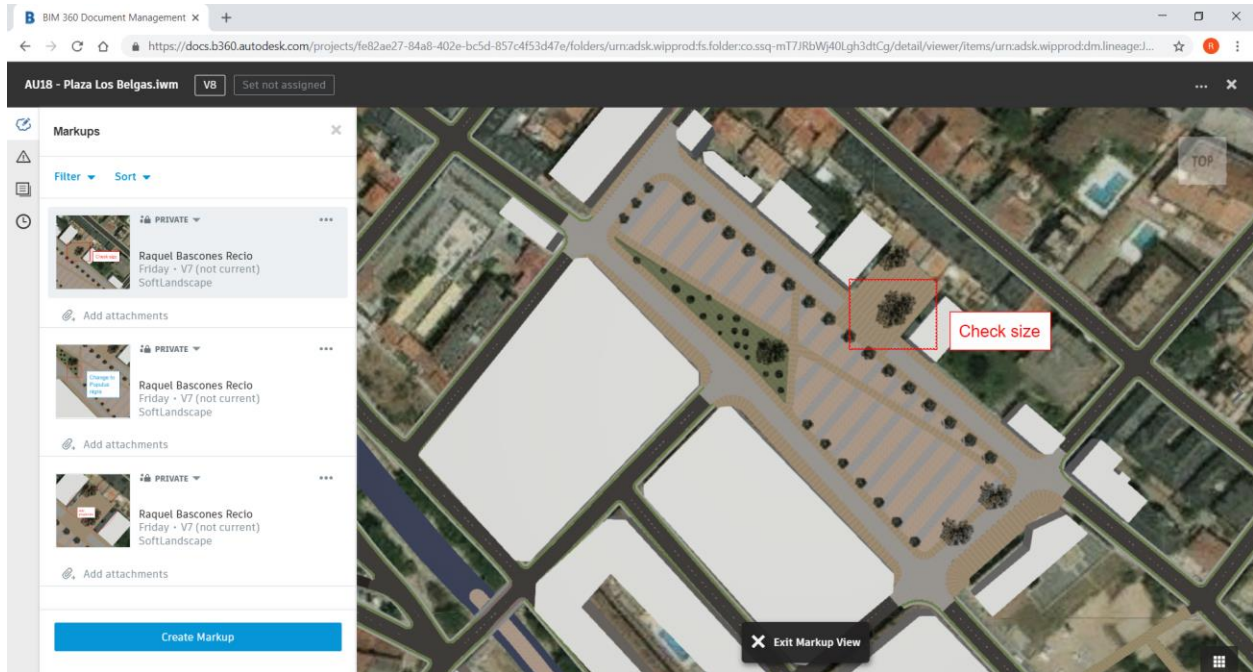
In the browser, you can view your model and check mark ups and issues from other users. Users with only viewing permissions can visualize and comment the model in the browser.



In the viewer, you can navigate the 3D model switching between proposals and check element's properties.



Mark ups and Issues can be created directly in the viewer, assigned to users and marked as solved.



All these features allow a seamless collaboration between team members to ensure a fully coordinated project.

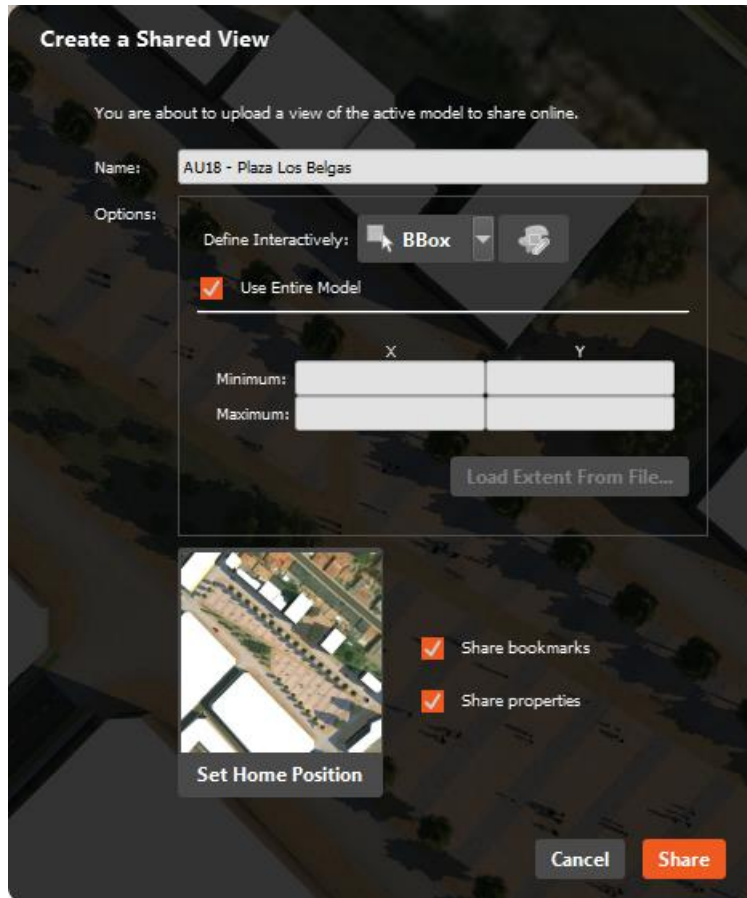
Shared Views

From InfraWorks 2019+ versions, you can use Shared Views to collaborate online without needing a BIM360 account. Shared Views leverages Autodesk Viewer to share a 3D interactive view of your model that others can review and comment with just following a link. It allows stakeholders to review the model without needing BIM360 or InfraWorks.

A shared view is created directly from InfraWorks desktop. The Shared Views dialog (1) is next to your username:



A shared view is created from the active view. Make sure that you are showing the correct proposal when generating it. The view can include the whole extension of the model or just part of it. You can define the area graphically or entering the max/min coordinates in X and Y axis. In the creation dialog, you can also check if you would like to share bookmarks and properties of your elements.



Create a Shared View

You are about to upload a view of the active model to share online.

Name: AU18 - Plaza Los Belgas

Options:

Define Interactively: **BBBox**

☒ Use Entire Model

Minimum: X Y

Maximum: X Y

Load Extent From File...

 **Set Home Position**

☒ Share bookmarks

☒ Share properties

Cancel Share

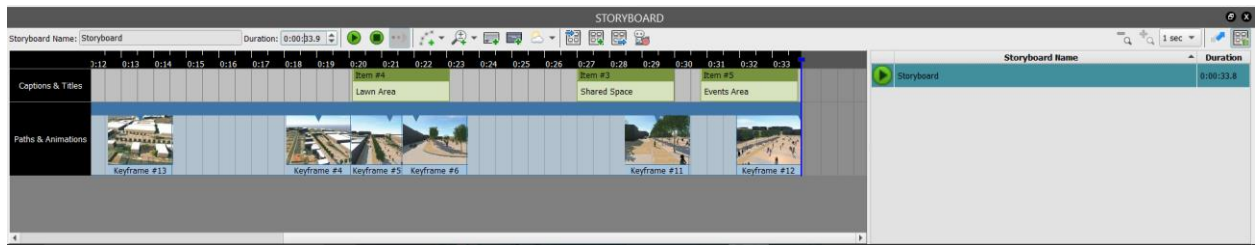
Once created, you will receive a link that you can share with others. By default, the shared view will be active for 30 days. From InfraWorks, you can extent this period or delete the view if you no longer need it.

7. Communication

InfraWorks offers several tools that will help you communicate your model with others and present your design.

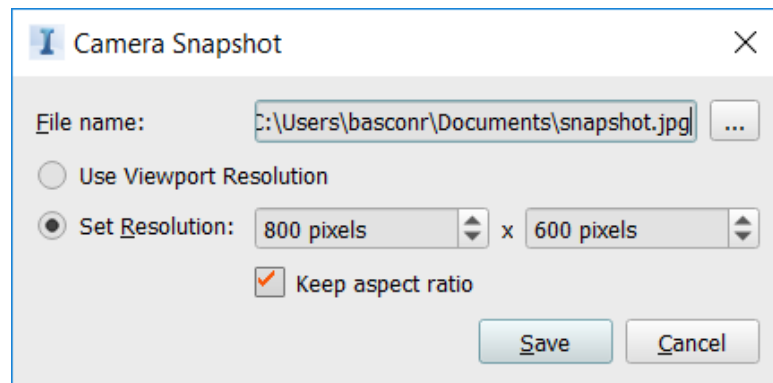
Storyboards

InfraWorks include a tool to create videos from your model. It allows you to create highly customized videos with titles, captions, transitions, etc. You can control the speed of the video and the keyframe location. Videos can be created from camera path defined in the model, imported from a file or following a component road. Date, sun and sky settings can be controlled for the video.



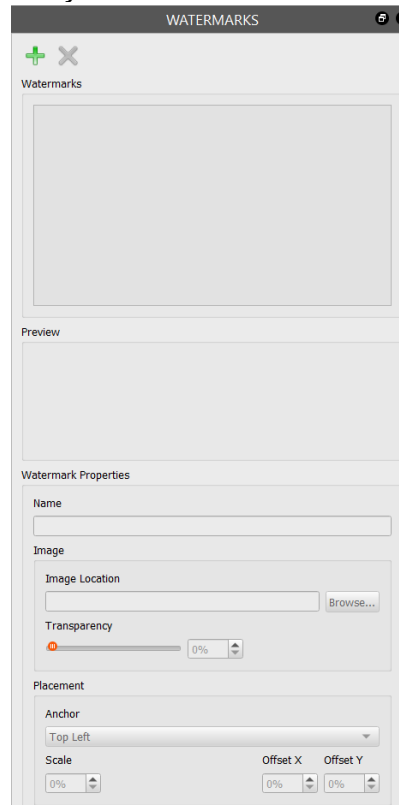
Snapshots

Create images from your model using the active view. You can set up the resolution or keep the screen resolution. Your image will be saved in JPG, PNG or TIFF formats.



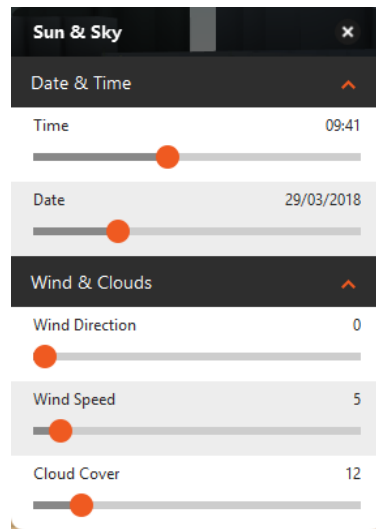
Watermarks

Include watermarks and logos in your model.



Sun & Sky Settings

Control the appearance of your model by selecting a date and time. The sun position will adjust and will show the correct shadows. Also, you can control the animation of the sky (wind direction and speed, cloud cover)



8. Advanced Workflows

The precedent sections have shown you how to model, collaborate and present your landscape designs using InfraWorks. If you master the InfraWorks tools explained earlier in this document, I strongly recommend you check the following advanced workflows to enhance your InfraWorks projects.

Custom Database Schema

The default schema definition (that defines categories, attributes, etc) is incorporated in the model itself. It is a JSON file that is in the model.file folder. In order to create custom categories, you need to duplicate the JSON file and edit to incorporate your custom categories.

There are three different levels of data that accept new elements: “Classes”, “Attributes” and “Display”.

Classes are the categories that will be seen in the model explorer as the build-in City Furniture or Coverages. It will appear also when configuring your data sources.

Attributes are the properties of the classes. You can add new attributes to new or existing classes. The data can only be Integer, Double, DateTime, Boolean or String.

Finally, you can edit the Display or the way and order that the attributes are displayed in the properties window.

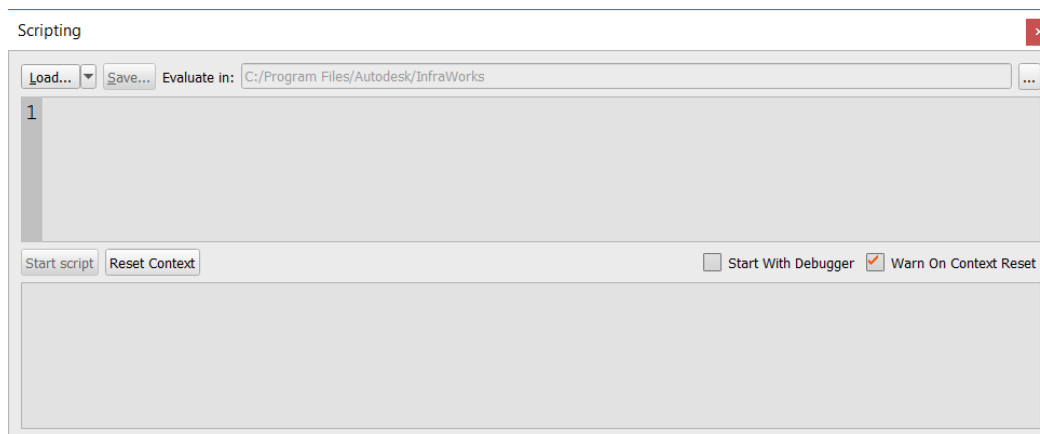
```

schema - Notepad
File Edit Format View Help
{
  "name": "Default",
  "classes": [
    {
      "name": "SCHEMA_VERSION",
      "description": "",
      "id": "ID",
      "properties": [
        { "name": "ID", "type": 6 },
        { "name": "VERSION", "type": 9 }
      ]
    },
    {
      "name": "ABUTMENTS",
      "description": "228",
      "id": "ID",
      "primary_geometry": "GEOMETRY",
      "properties": [
        { "name": "ID", "type": 7 },
        { "name": "GUID", "type": 9 },
        { "name": "NAME", "type": 9 },
        { "name": "DESCRIPTION", "type": 9 },
        { "name": "GEOMETRY", "type": -1, "srs_name": "Default", "srs_code": "LL84", "srs_wkt": "GEOGCS[\"LL84\", DATUM[\"WGS84\",
        { "name": "DATA_SOURCE_ID", "type": 9 },
        { "name": "EXTERNAL_ID", "type": 9 },
        { "name": "EDIT_STATE", "type": 7 },
        { "name": "FK_PARENT_TABLE", "type": 9 },
        { "name": "FK_PARENT_GUID", "type": 9 },
        { "name": "TAG", "type": 9 },
        { "name": "USER_DATA", "type": 9 },
        { "name": "TOOLTIP", "type": 9 },
        { "name": "LINK", "type": 9 },
        { "name": "CREATION_DATE", "type": 2 },
        { "name": "TERMINATION_DATE", "type": 2 },
        { "name": "RULE_STYLE", "type": 9 },
        { "name": "MANUAL_STYLE", "type": 9 },
        { "name": "ELEVATION_OFFSET", "type": 4 },
        { "name": "GENERALIZATION", "type": 4 },

```

Scripting with Javascript

You can create and run scripts in Infraworks using Javascript to simplify workflows. InfraWorks has a scripting console under the Core Tools.



With scripts you can import, export, modify or delete InfraWorks objects.

Some examples of workflows that can be automated:

- Add Google maps information to tooltips
- Get Geolocation data from pictures, place POI and display images in tooltips
- Randomize building heights
- Batch creation of snapshots

Style Rules

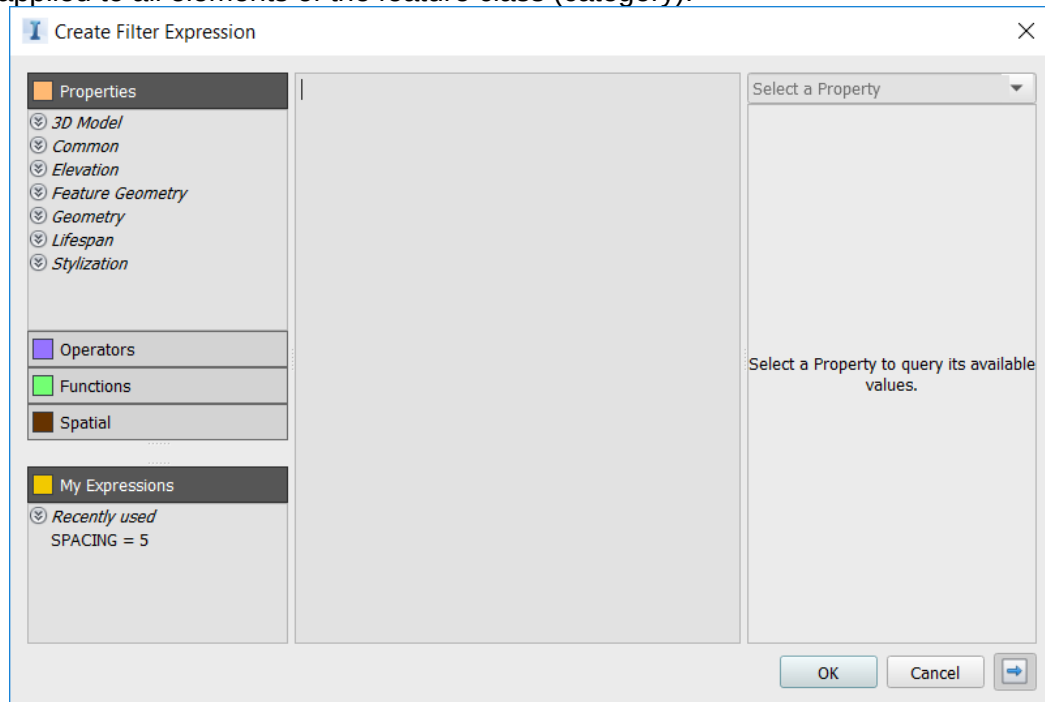
Style Rules use expressions to determine which style will be applied to certain elements depending on a data source property or data source property. It allows to create subsets of elements based on a property and apply certain style/styles.

The Style Rules can be found under the InfraWorks Core Tools:



The key components to a style rule are:

- **NAME:** Decide on a name that is representative for all users. Always follow company standards.
- **DESCRIPTION:** Explain with detail what this style rule will make to your InfraWorks elements.
- **EXPRESSION:** Elements will be filtered using this expression so only the style/s will only be applied to those how meet the criteria. If no expression is defined, the style rule will be applied to all elements of the feature class (category).



- **STYLE:** You can select one or several styles to be applied to the selected elements. If selecting several elements, you can control the probability of occurrence changing the probability number.

Styles:

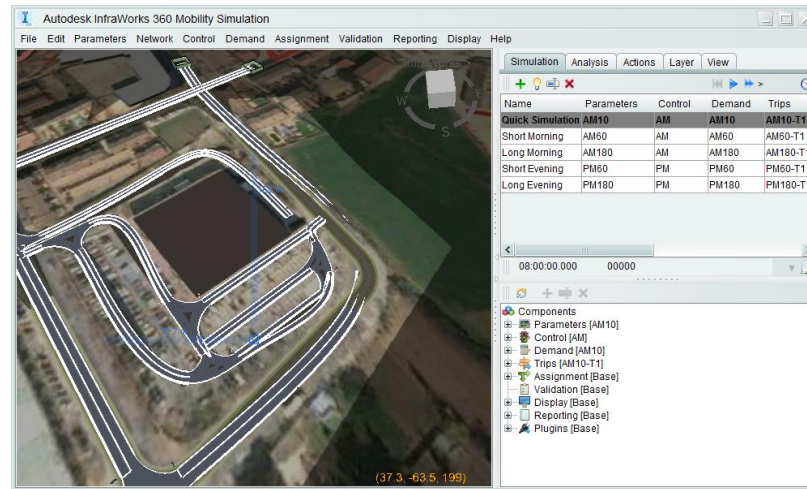
	Preview	Name	ID	Probability
1		Pinus Pinaster	3D Model/Vegetation/Pinus Pinaster	1.00
2		Populus Nigra	3D Model/Vegetation/Populus Nigra	1.00
3		T19-V02 Yellow	3D Model/Vegetation/T19-V02 Yellow	1.00

 Add
  Remove

Analysis Tools

Out of the box InfraWorks has several analysis tools that will help you inform your design from early stages of the project. Here there is a list of analysis tools that are relevant for Landscape design.

- **MOBILITY SIMULATION**
 Mobility Simulation is an external tool included in InfraWorks. It is based on software Commuter (Azalient) acquired by Autodesk in 2014.
 It automatically brings the study area from your model into the tool, although please note that only component roads can be analysed.
 This application can simulate vehicle, pedestrian, cycle, public transport and freight movement.
 The simulation can be saved as .AZA file and the results exported to .CSV or .XLS for reporting.



- FLOOD ANALYSIS**
 Flood simulation is only supported for users who have installed the third-party application RiverFlow2D plugin from Hidronia. It allows to simulate, visualize and analyse 2D flood simulations, both inland and coastal, in your model.