Autodesk University 2012

CI2456 Visualization Analysis for Transportation

Jack Strongitharm - Autodesk

Visualization is a terrific way to improve communication with non-technical stakeholders, but what's in it for you, the designer? This class will show you three practical workflows that use visualization and validation tools to help make design decisions and create technical exhibits. You have invested time in building a model—now let's take it to the next level with these core activities: visual impact with photomontages using AutoCAD® Civil 3D® and Autodesk® 3ds Max® Design software, lighting levels with street lighting analysis using Civil 3D and 3ds Max Design, traffic impact analysis using Civil 3D, 3ds Max Design, Autodesk® Infrastructure Modeler software, and Quadstone Paramics (a Pitney Bowes company).

Learning Objectives

At the end of this class, you will be able to:

- Use techniques to make your scenes in Autodesk 3ds Max Design more suitable for outdoor scenes
- Use Autodesk® Infrastructure Design Suite to create data and aggregate in others
- Automate your visualization model with content
- Share your model with others outside a video file

Note, this document and presentation assumes that the essentials of using the products for creating models and general awareness of the user interface is already known.

About the Speaker

Autodesk Transportation Industry Solutions Manager.

I have been involved in the development of the civil engineering products and specifically the localization of AutoCAD Civil 3D for the UK and Ireland.

Before joining Autodesk, I have worked as a design engineer for a number of consultants and local authorities where his work spanned designing landscaped surfaces to major road design schemes working with AutoCAD and other civil engineering design products.

I am also known for the blog site I contribute to (www.autodesk.com/fromthegroundup) and also Civil YouTube channel (www.youtube.com/civilfromthegroundup).

Visual impact with photomontages

For every major civil engineering project an environmental statement is produced. This would normally involve technical drawings but also before and after imagery of how the project will fit amongst the landscape.

Producing this type of imagery would be traditionally given to a graphic designer, however the model data is required to be superimposed on the photos taken and then viewed from the aspect of the photographs.

This workflow guide will take you through the steps of taking the photographs, passing the design data from AutoCAD Civil 3D into 3DS Max Design to where the final image of the model will be produced.

This will really take the best advantage of having access to the Infrastructure Suite product in either the Premium or Ultimate editions or the individual separate products.

The workflow assumes that the user has a planning model with Autodesk Infrastructure Modeler or with project detail design data with AutoCAD Civil 3D data and access to 3DS Max Design with the Civil View plugin installed (or automatically installed with the Infrastructure Design suites).

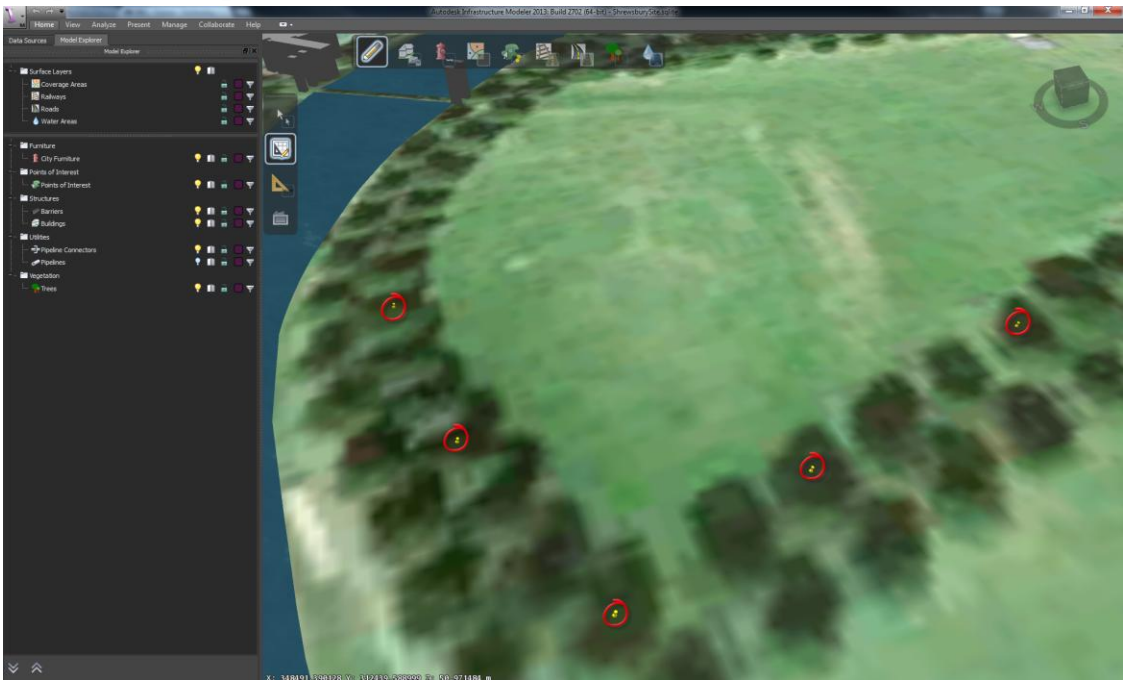
Step One – the site photos

When on site you need to consider some concepts for working with the images.

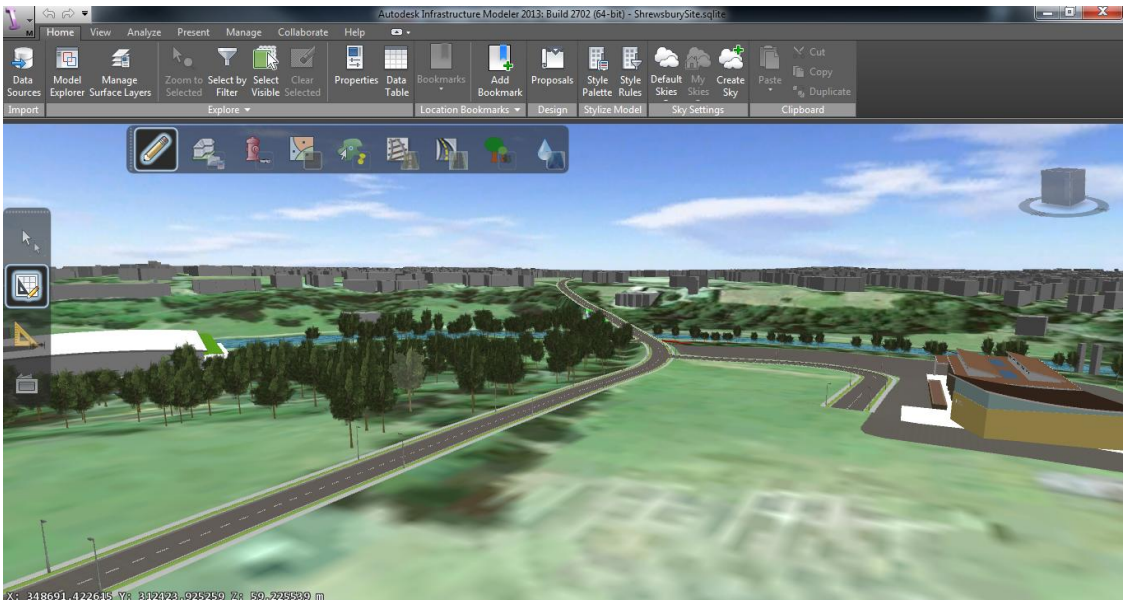
1. Pick out five items in the scene that you can see to the base of the object on the surface.
2. With Autodesk Infrastructure Modeler, add point of interest markers to the same positions
3. With AutoCAD Civil 3D, add cogo points to reference these points
4. Spread out the objects so that they will have a different in level (elevation)
5. If considering a panoramic shot, have objects that common in both photographs.

Depending on what type of data you have to use, move to Step Two for Autodesk Infrastructure Modeler or Step Three for AutoCAD Civil 3D.

Step Two – Exporting data from Autodesk Infrastructure Modeler

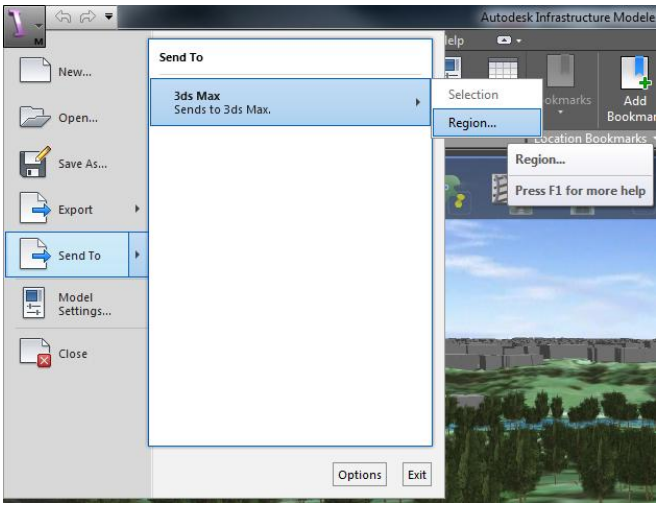


The above shows the points of interest markers highlighting the common points in the photograph that we will match within 3ds Max Design

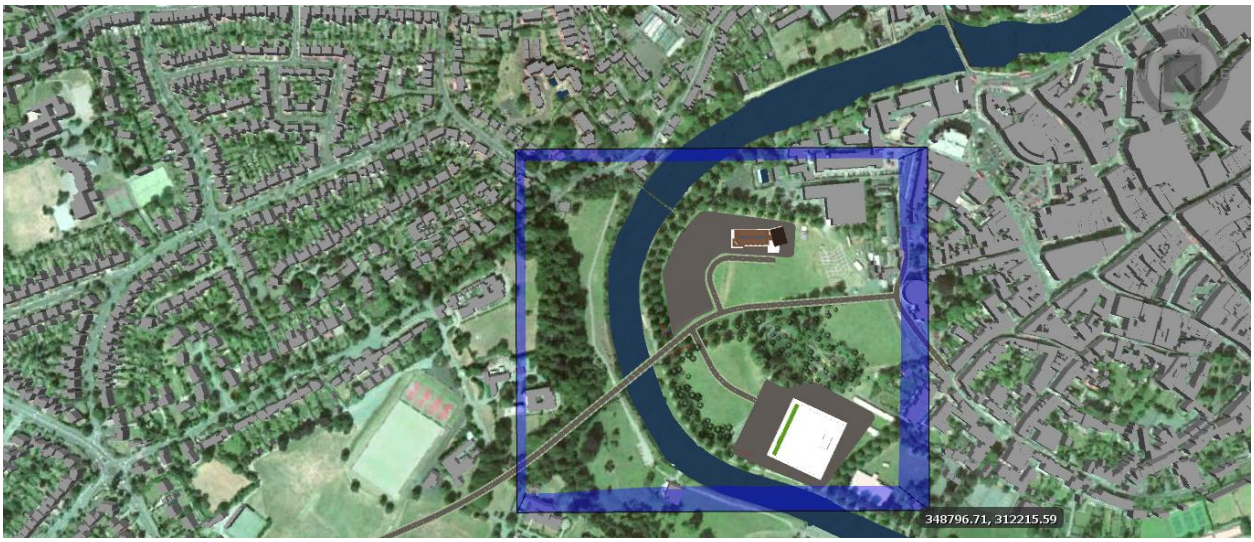


The complete early stage design model to be used for the photomontage

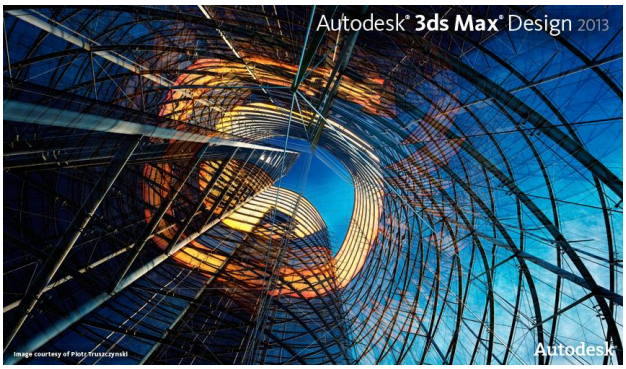
So export the model, either by export to FBX or direcly ‘Send to’ will send the model and open 3DS Max Design automatically and place the model



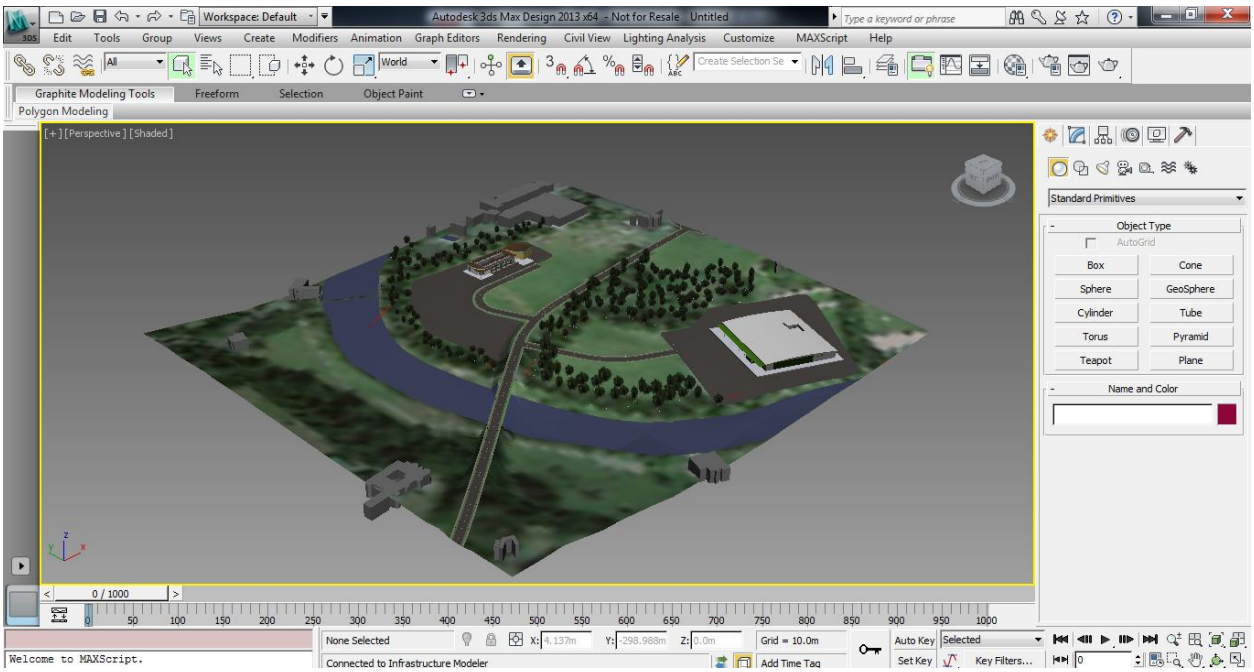
Select just the area of interest rather than the whole model



3ds Max Design will now launch



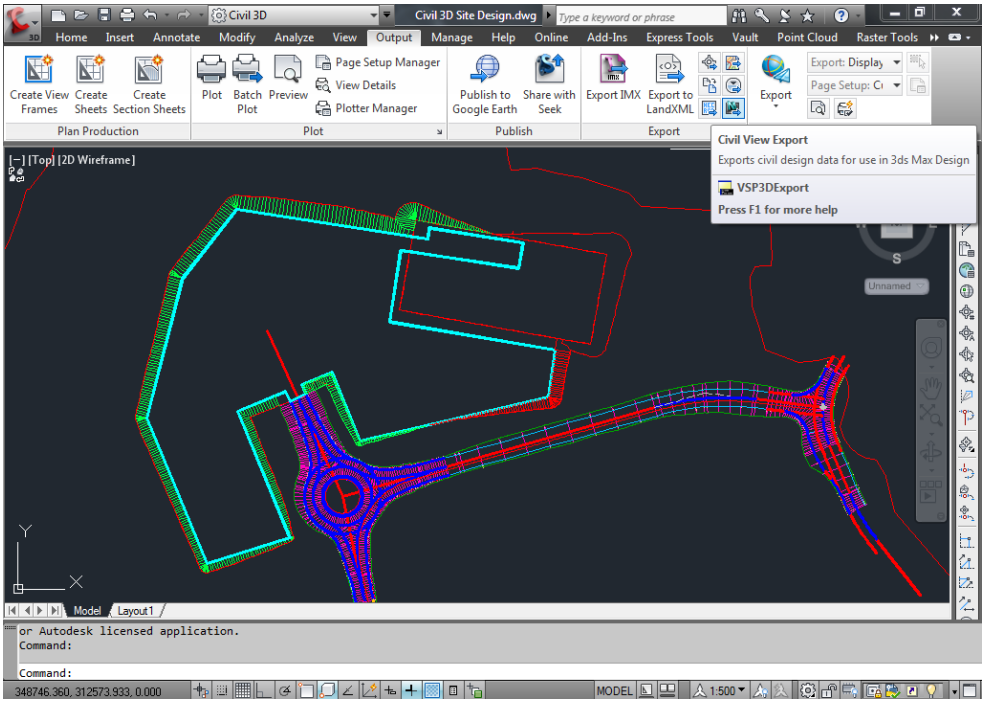
Now we have the model inside 3ds Max Design



Now move to Step Four

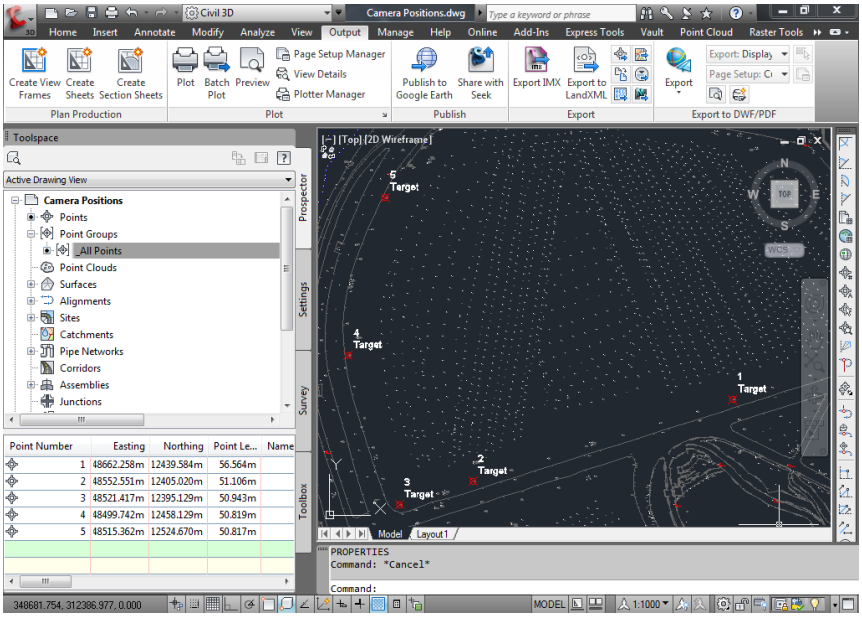
Step Three – Exporting data from AutoCAD Civil 3D

Export your project data from Civil 3D via the Export to Civil View



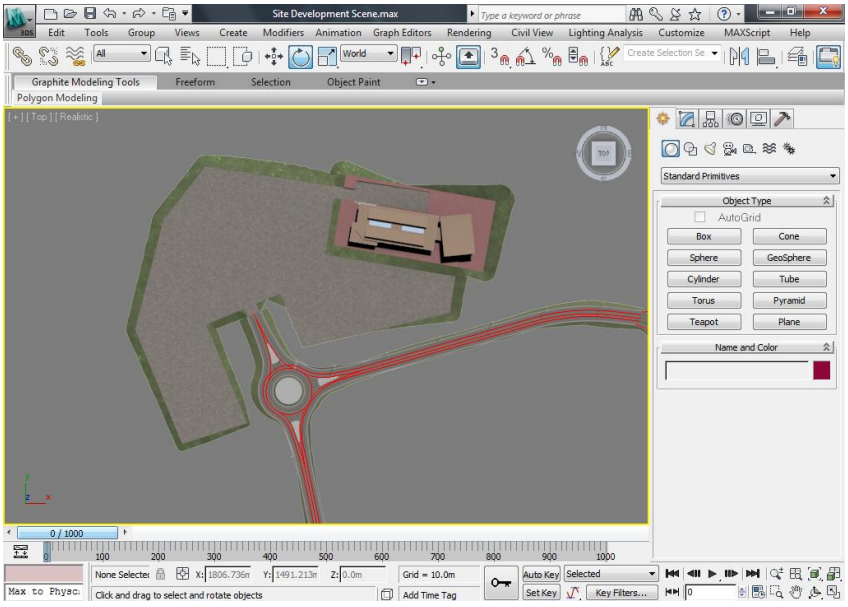
Create COGO points in your survey of the targets you selected when taking the photographs

Export these points as a separate .vsp3d file if preferred

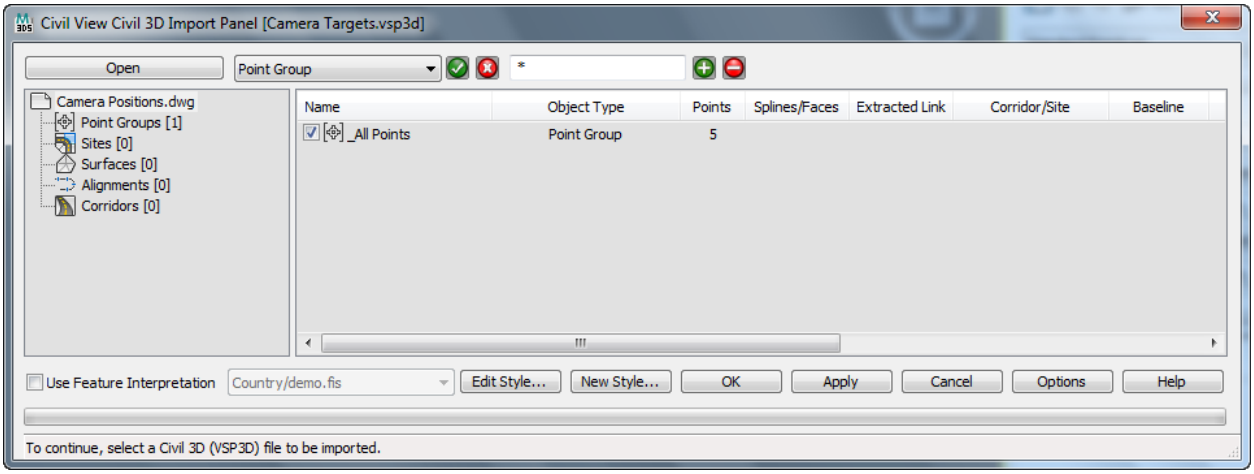


As 3DS Max Design is single point precision application it doesn't work well with large coordinate systems. The Civil View plugin that ships with the product manages a project shift to overcome this and ensures that your project is accurate.

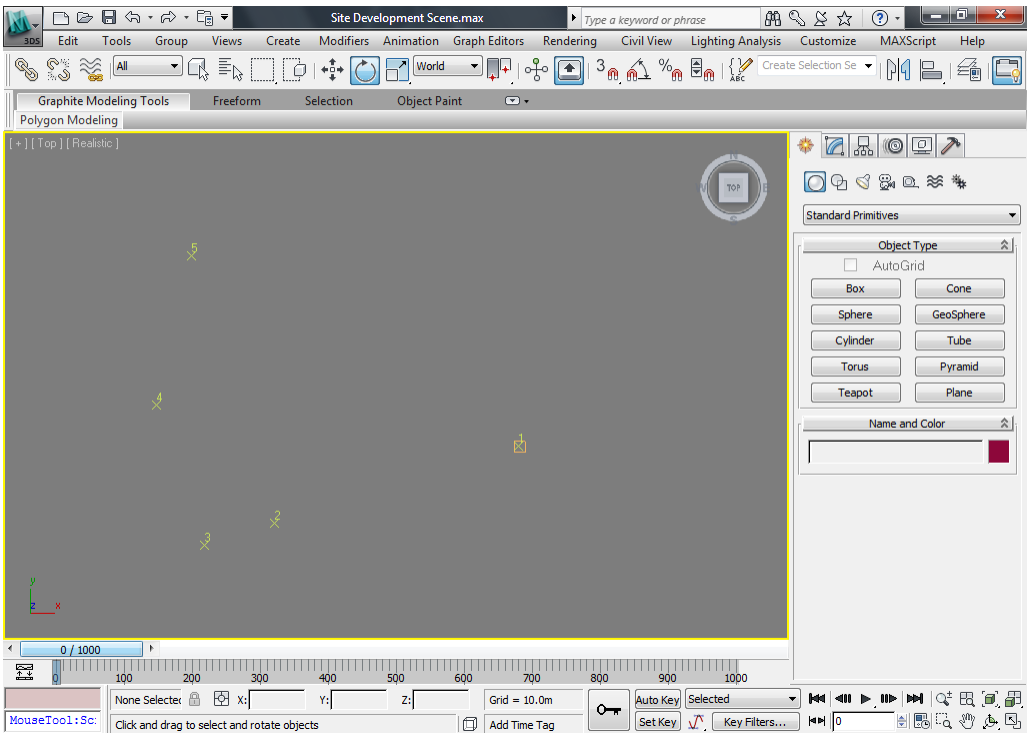
Import the project data and setup as required to form the base visualization (see existing documentation and previous AU classes on how to perform this task)



Import the target points into your scene. As Civil View imports these points with the shift applied

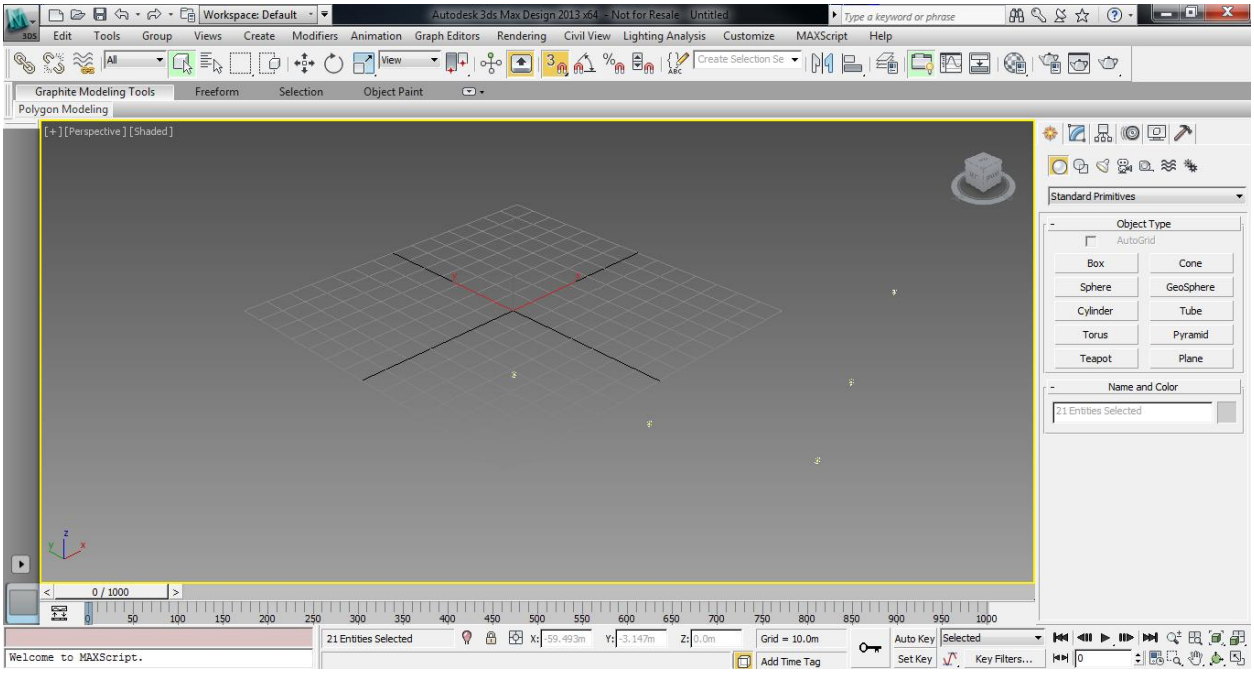


It might be worth hiding your model for the next steps to make it easier to work with.

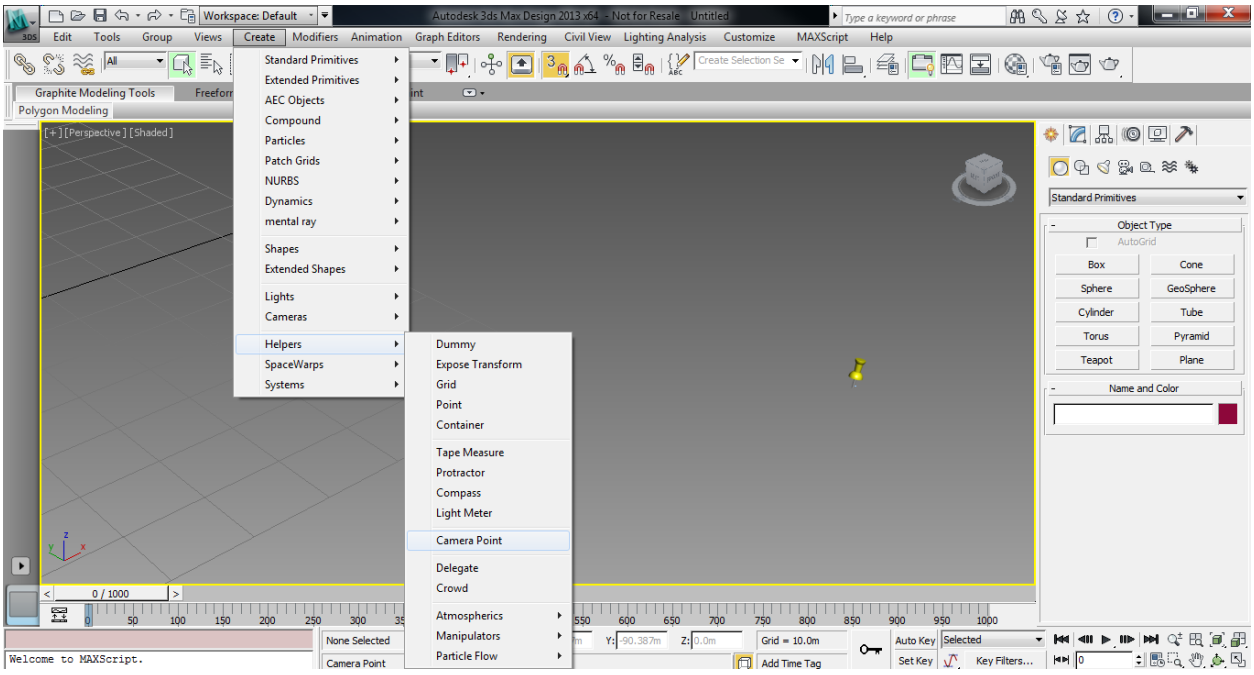


Step Four Creating Camera Point helpers

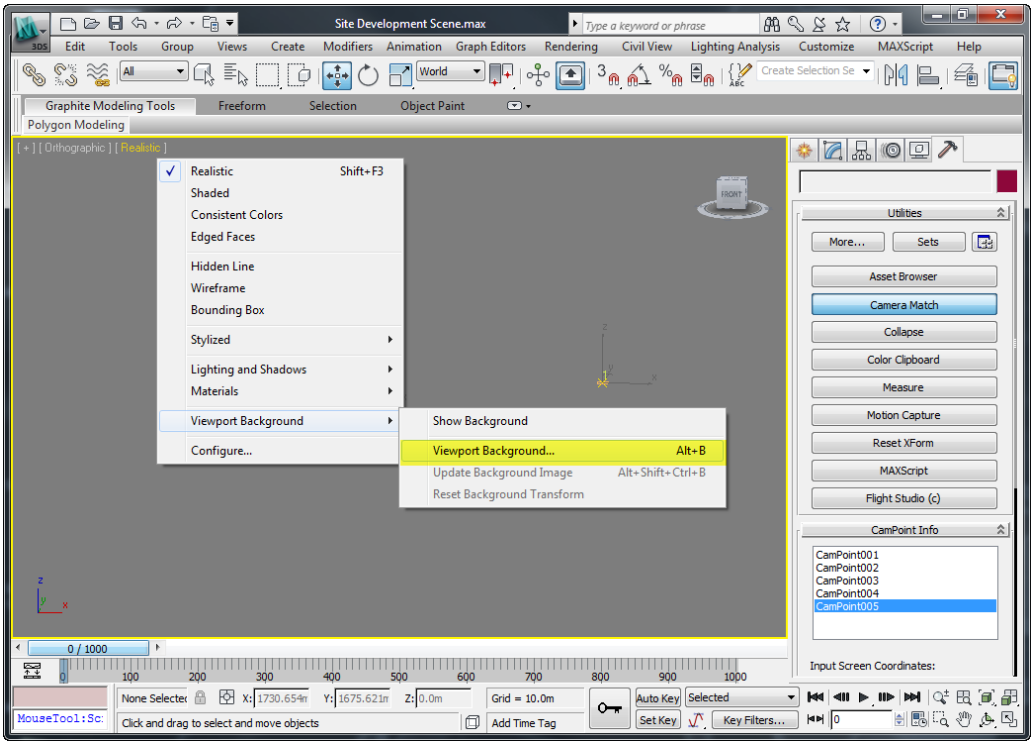
Isolate the points of interest from the rest of your model to make it easy to work with.



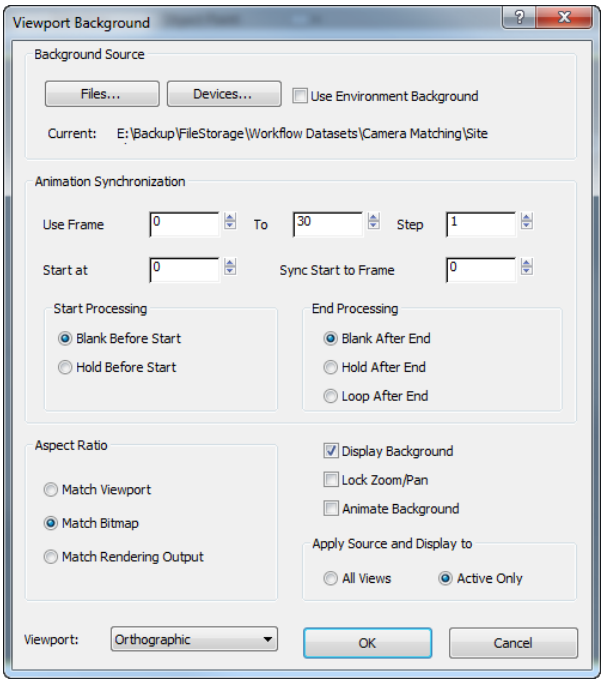
Add the camera point helpers and 3D snap to the base of the pins. If using with Civil 3D data the COGO points you cannot snap to, but an approximate snap will be sufficient. Also move the camera helper point to the elevation to the value found in your AutoCAD Civil 3D model.



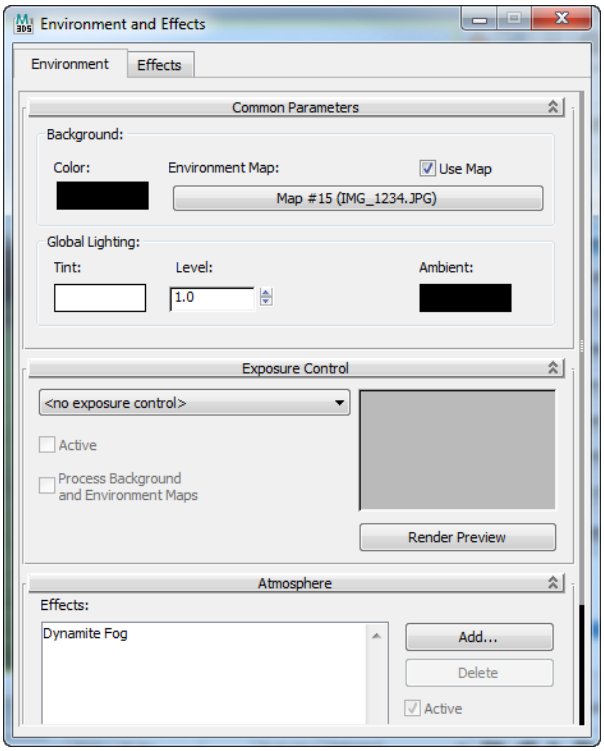
Now select the ‘Viewport Background’ by right clicking on the view style and choosing ‘Viewport Background’



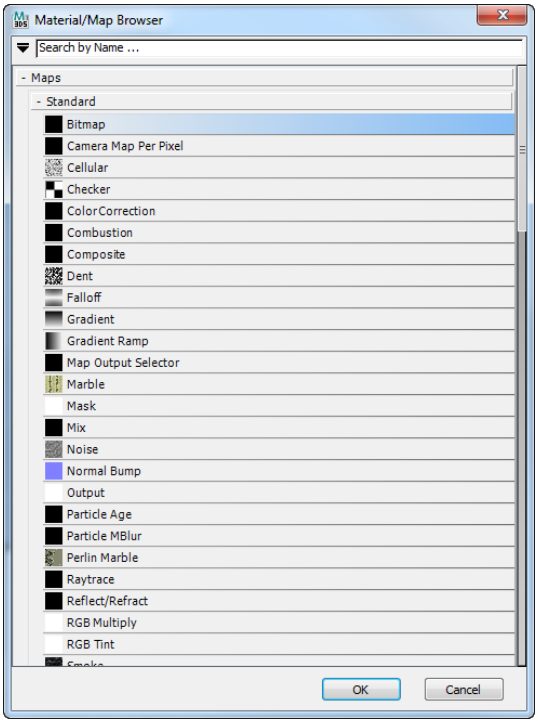
Click on ‘Files’ and select the image of the photograph and choose ‘Match Bitmap’ for aspect ratio



Also under the Rendering menu, choose ‘Environment’ and choose the same image for the Environment Map



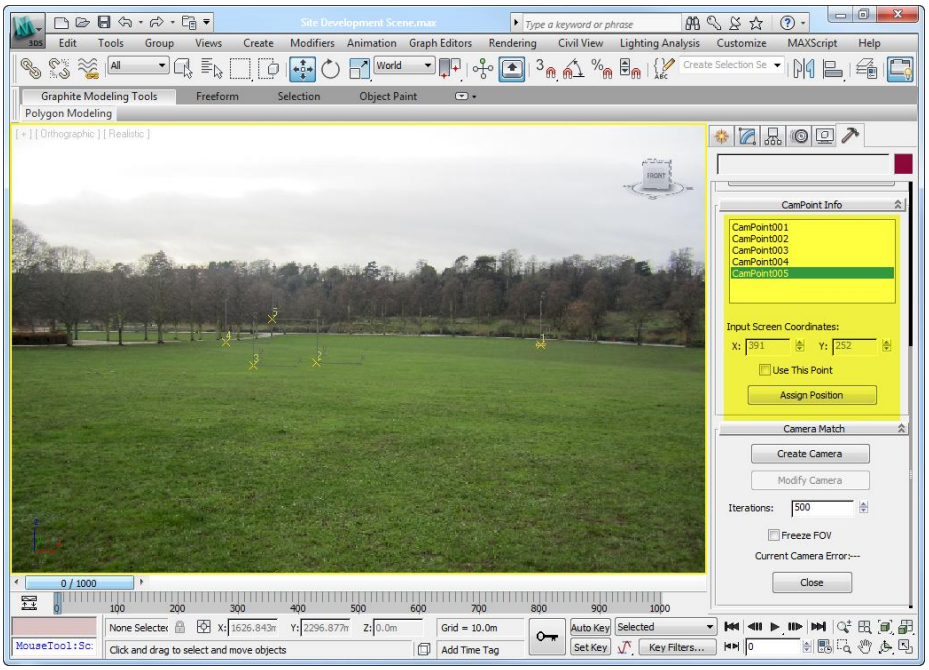
Select ‘Bitmap’ on this panel and your photo.



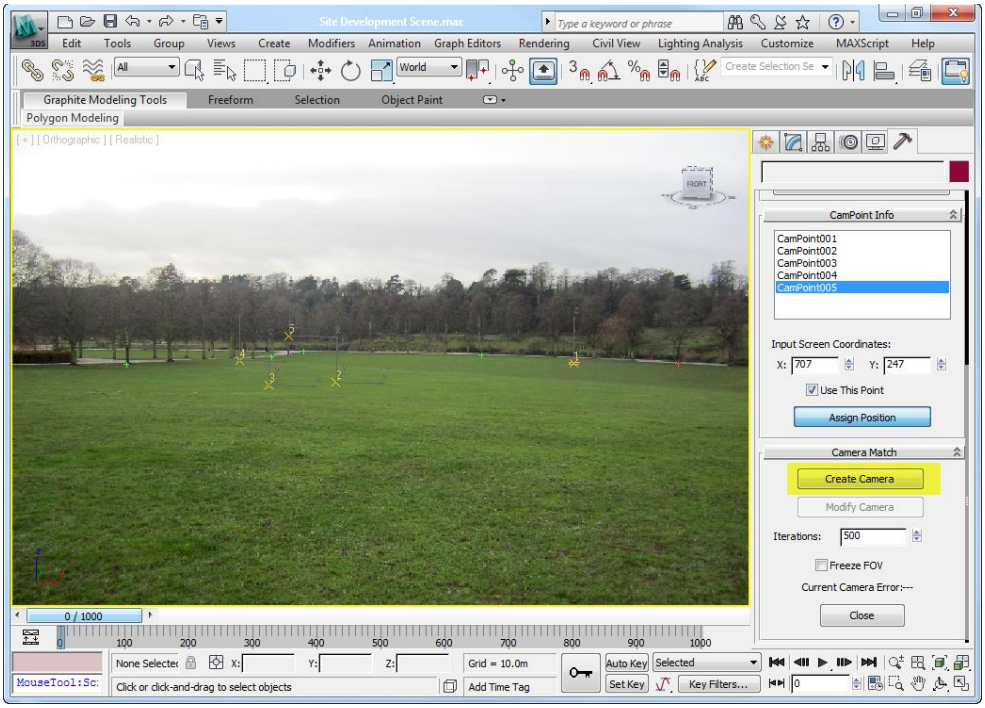
You then will see your photo in the background.

Select the tool tab (looks like a hammer). You will see your campoints displayed.

Select the first point and then the assign position. You now point at the photograph to where that point is referring to. Do this for the remaining four points

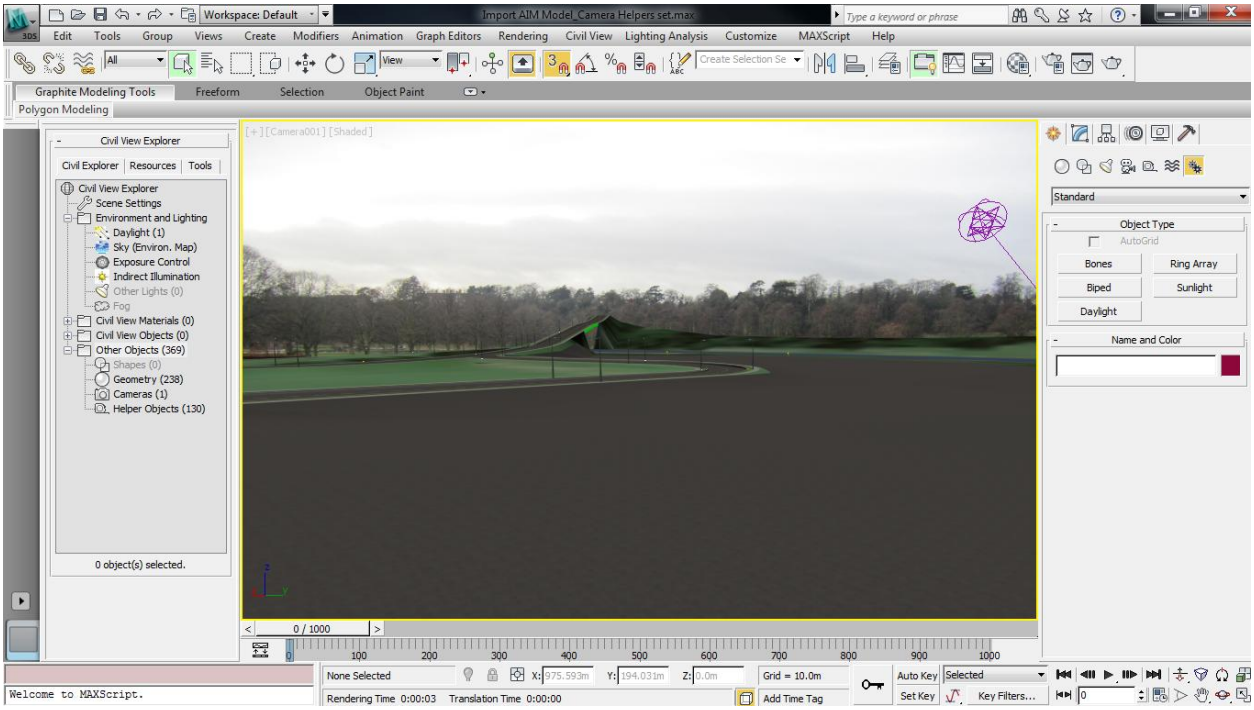


Once all five points are set, select the ‘Create Camera’ button. Press ‘C’ to look from your new camera



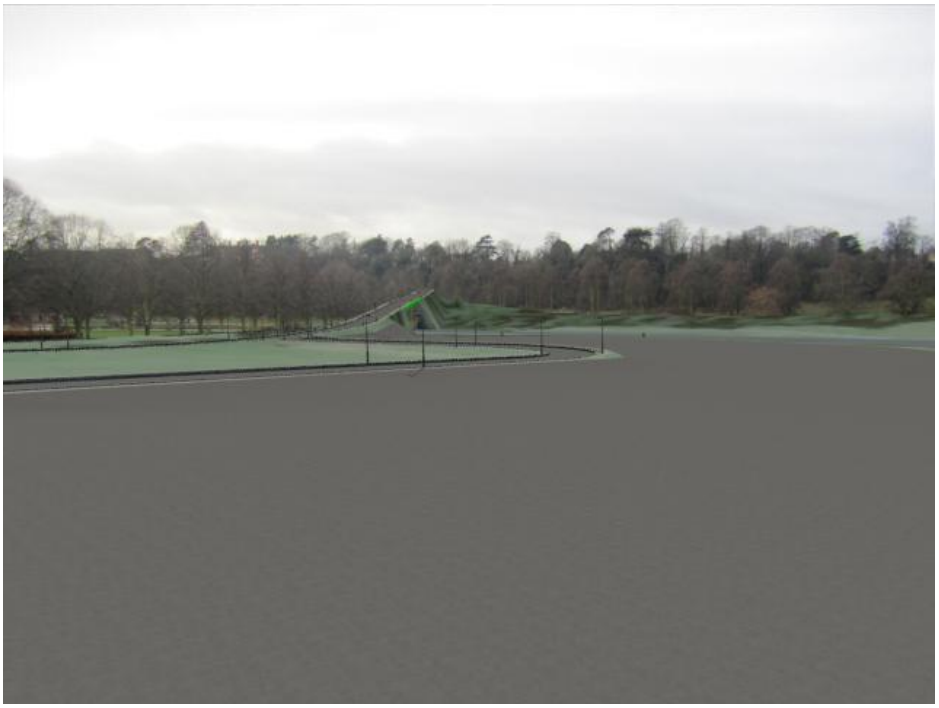
Turn on your model and you will see it in context to your photograph.

Turn off the existing ground in your model as this will be part of your photograph.

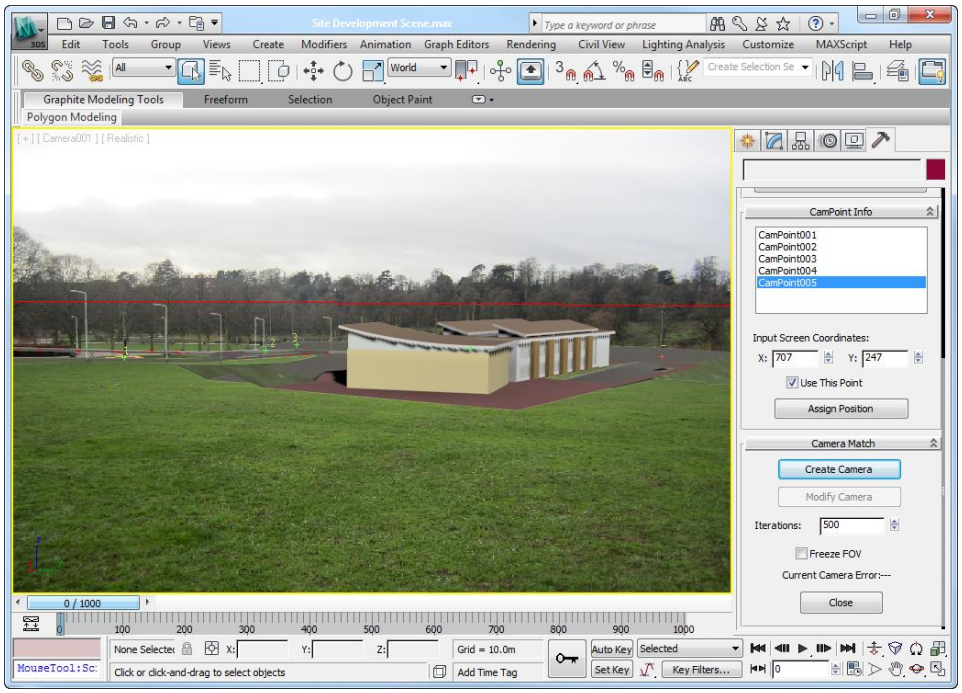


Add a daylight system and appropriate location to get suitable lighting on your scene.

Render the result



AIM model



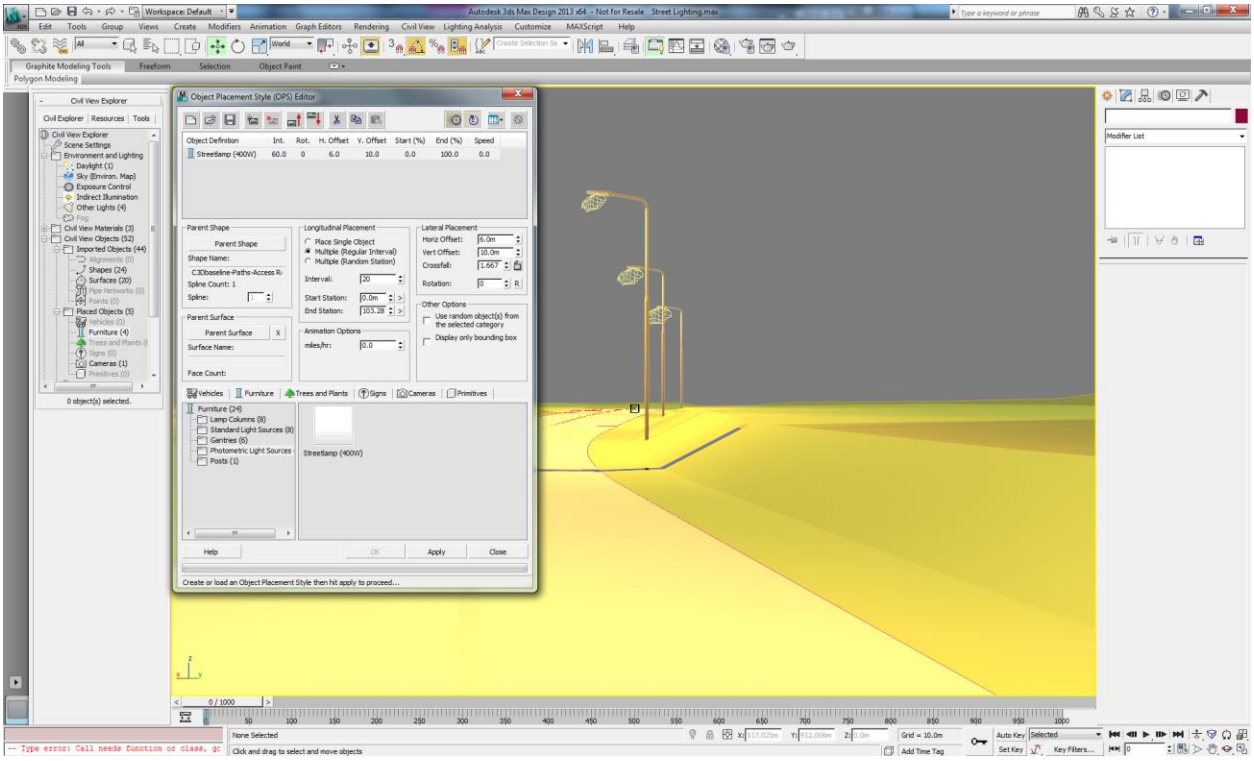
AutoCAD Civil 3D model

Street Lighting Analysis

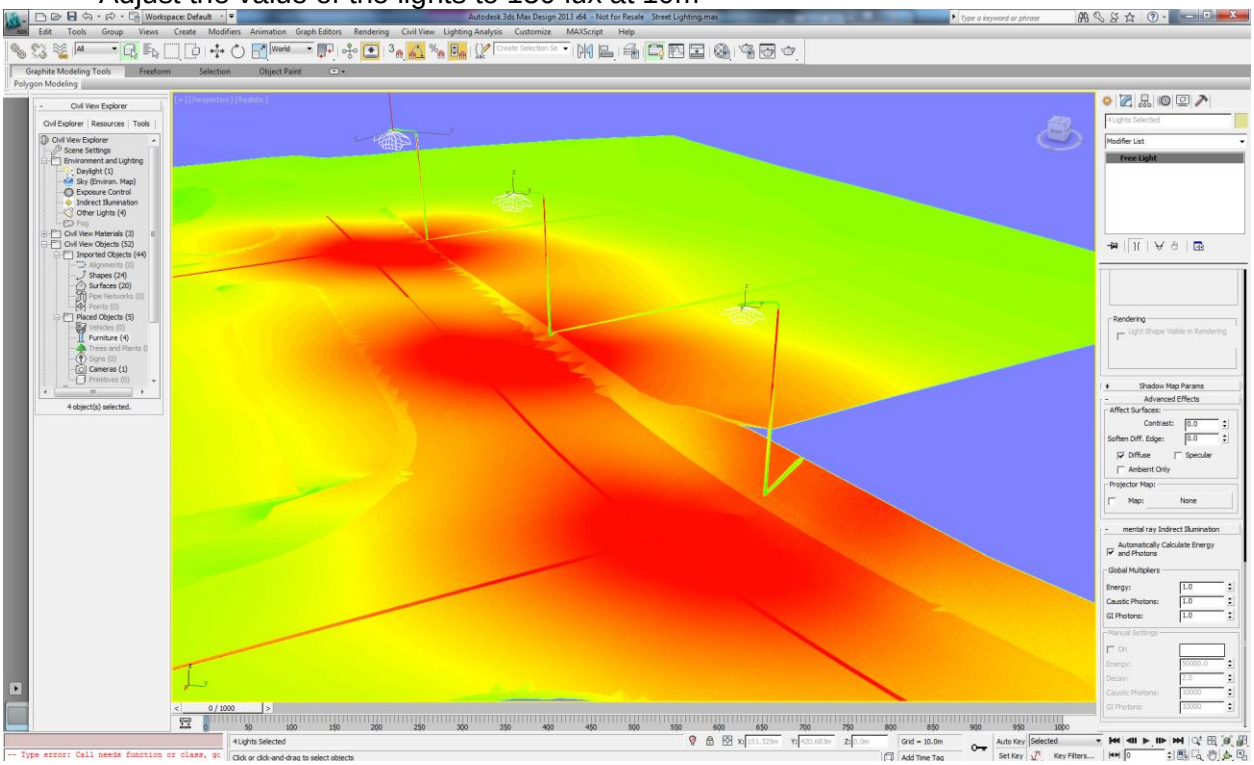
Creating suitable lighting schemes for our project is essential and have to be carried out to achieve minimum lux values required by the local authority for adoption of the system.

With 3ds Max Design includes a lighting analysis capability which we can leverage to maximum effect by transferring either our AIM or AutoCAD Civil 3D model and analyzing the layout of a street lighting system and optimize for the most effective system.

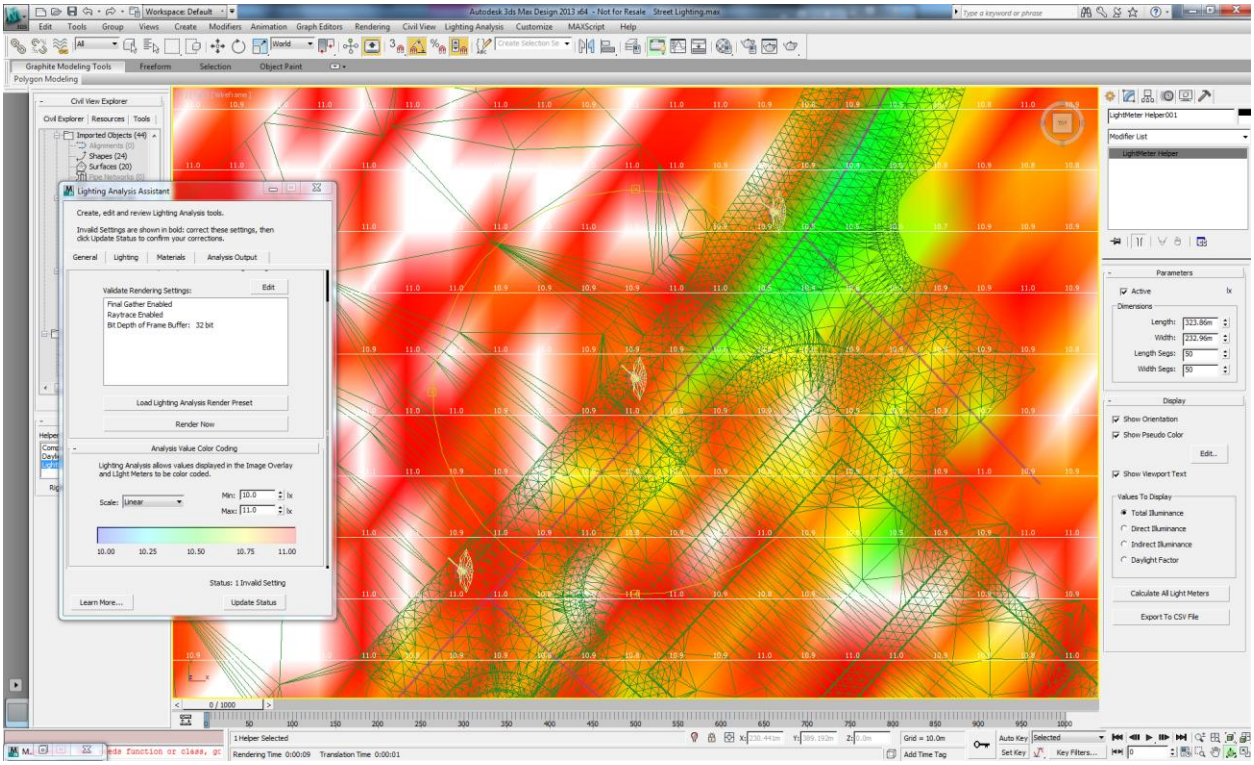
- Import your AutoCAD Civil 3D model into 3ds Max Design via Civil View tools
- Using the Object parameters create street lighting objects and photometric lights along the roadway etc at the required positioning/spacing



- Using the pseudo color exposure control you can get an early view on the intensity of your lighting. Reset this to mr Photographic outdoor night exposure
- Adjust the value of the lights to 150 lux at 10m

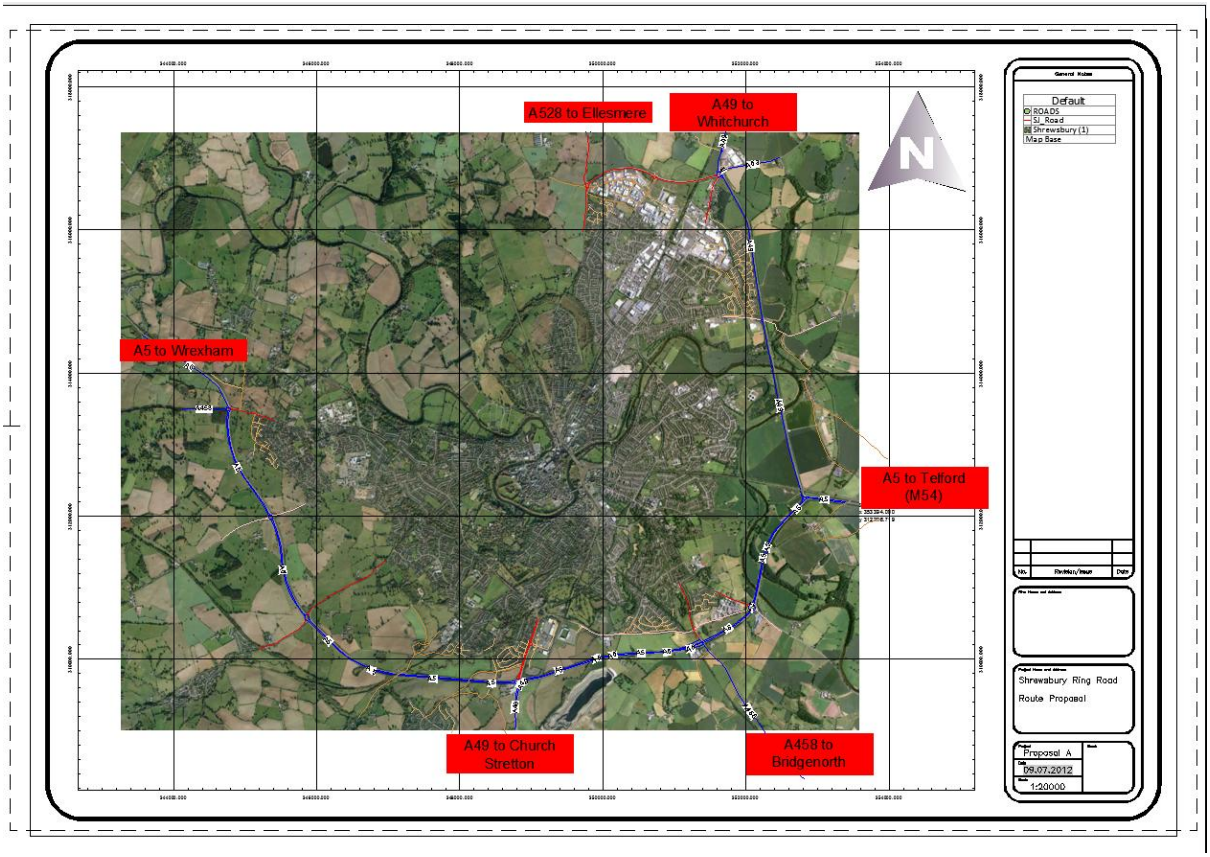


- Using the lighting asistance choose the automatic matierials and daylight system
- Create a lighting meter with a suitable size spacing of lighting grid and move the grid to the surface elevation
- Calculate the lighting meters



Traffic impact analysis

The town in this scenario has an incomplete ring road around the town and suffers from traffic build up at peak times around the current ring road and especially at the links to the Motorway.



The aim is to show how at a planning stage that the effects of a design proposal has on the complete network of the town can have before any detailed design takes place.

The workflow will show how the typical GIS dataset can be utilized with AutoCAD Map 3D/Civil 3D and visualized with Autodesk Infrastructure Modeler.

A proposal is designed and the data is shared to Quadstone Paramics (www.paramics-online.com) for traffic simulation of the network in its current situation and also with the potential of this link road extension to the ring road would have.

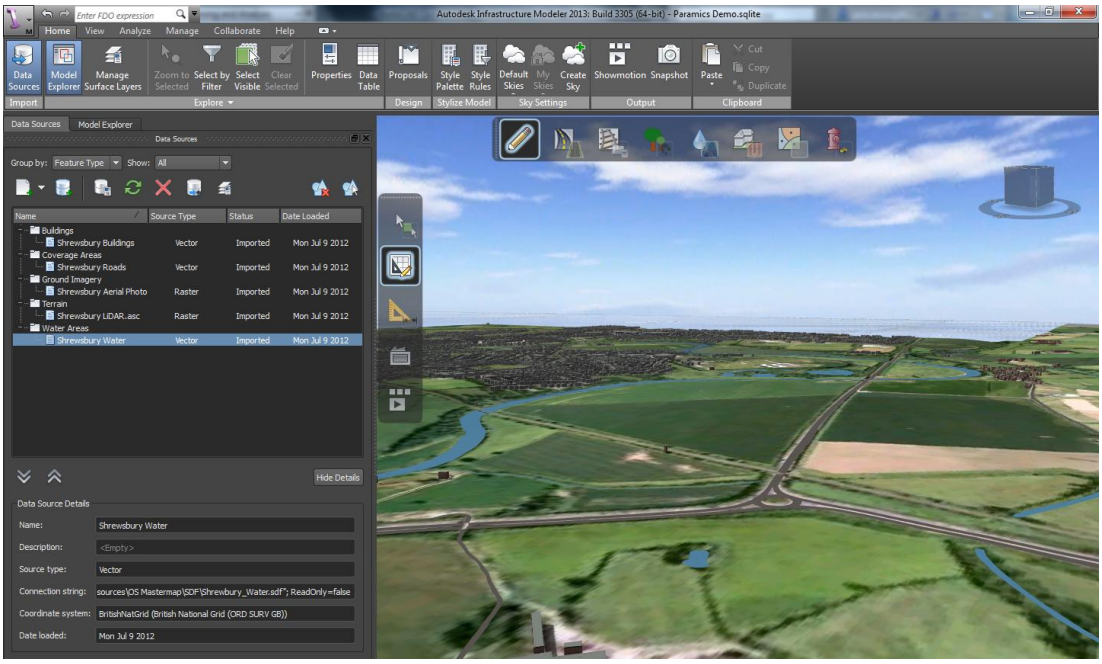
The results are shared back via the SIM file format to be used within 3ds Max Design for animation purposes with the AIM model.

Also exporting the traffic analytic results via .shp format to be visualized in a 3D GIS format in AIM

The solution shows how simulation data can be combined with traditional drawing/GIS outputs aswell as advanced visualization animations to achieve stakeholder and public approvals at an earlier stage of planning a traffic project with no detailed design.

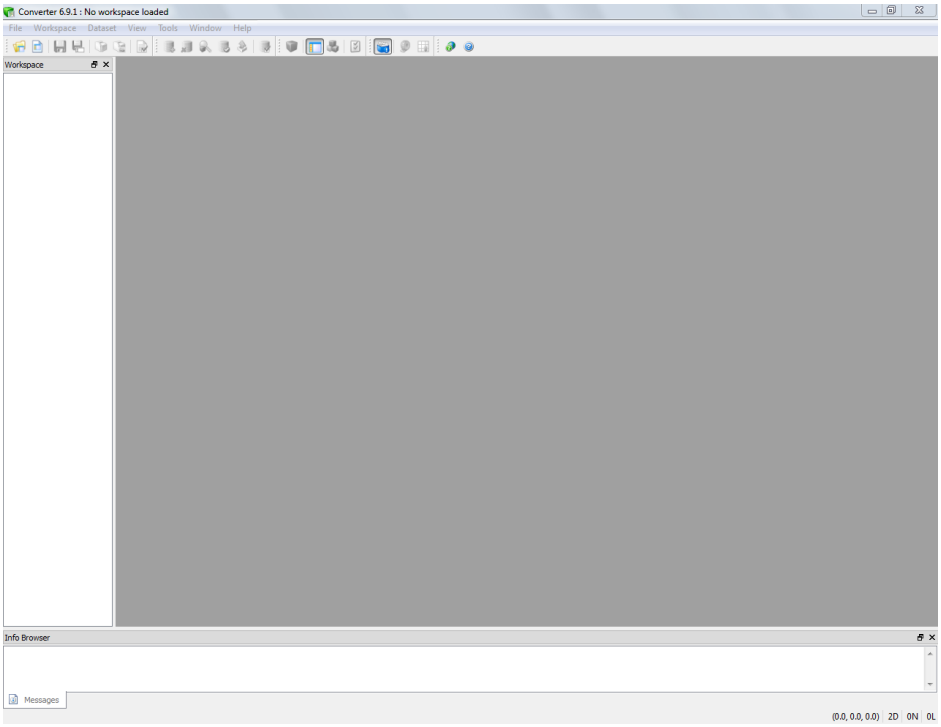
Autodesk Infrastructure Modeler

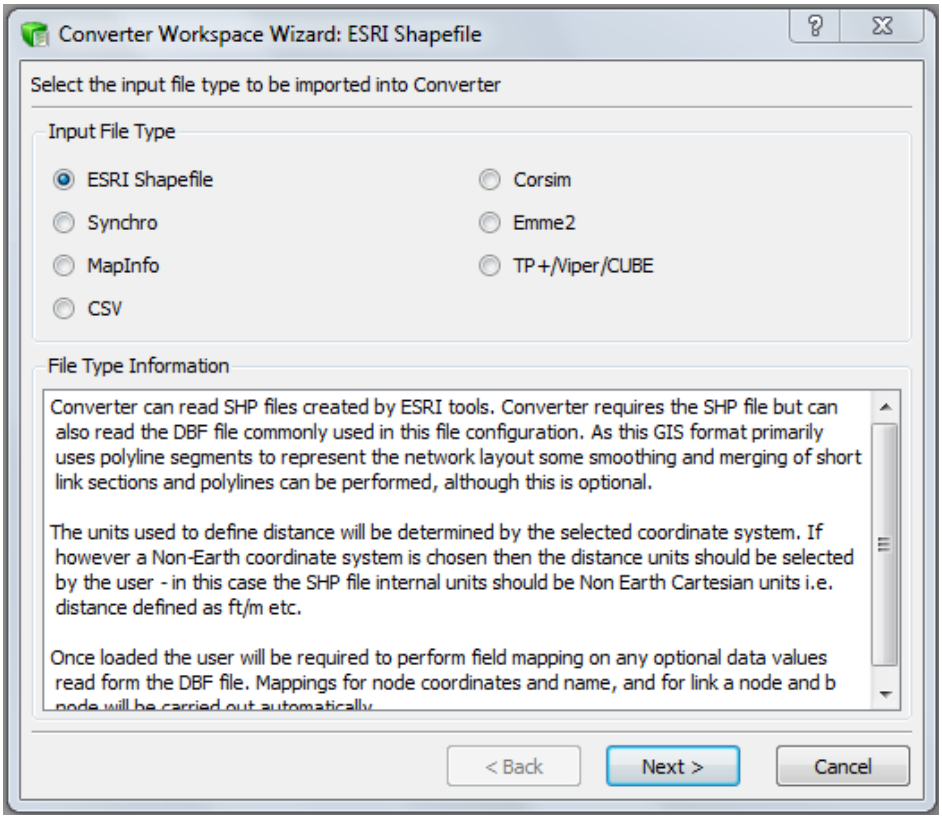
- Build AIM model of existing situation using mapping datasets.

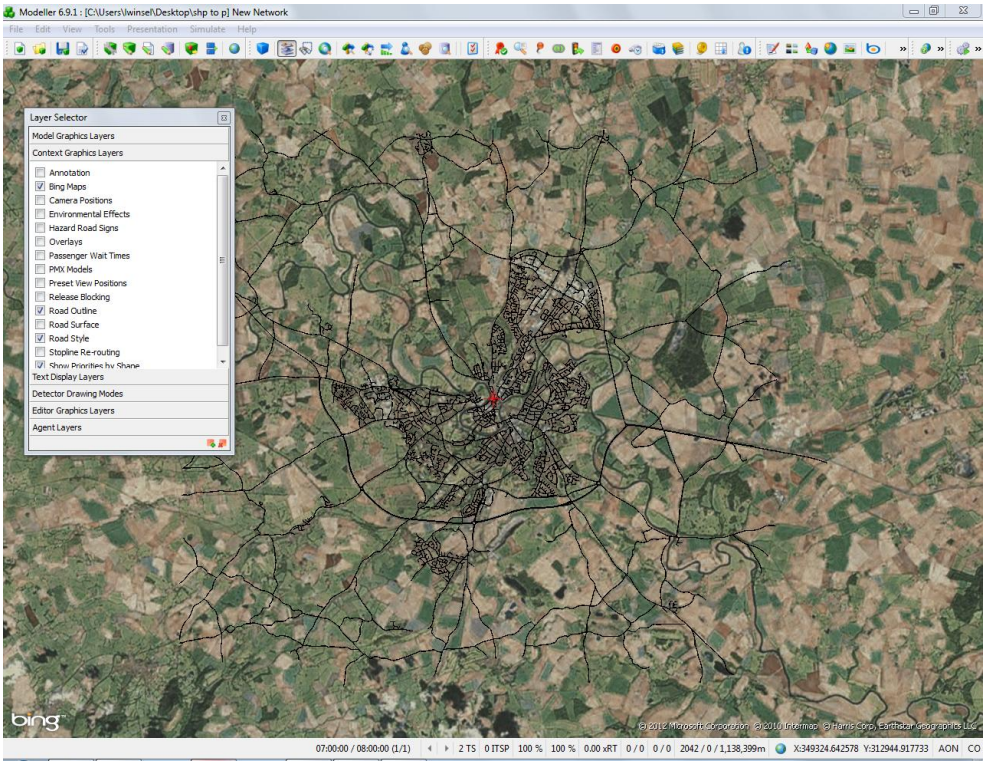


Quadstone Paramics

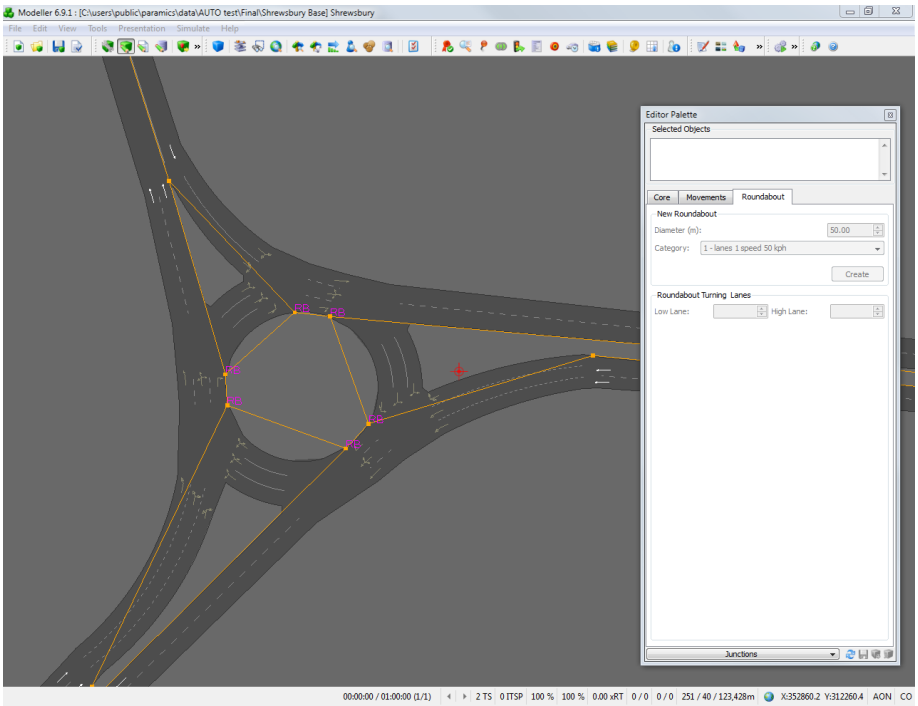
- Launch the Paramics software and import into a workspace the road centerlines


Converter 6.9.1 : No workspace loaded
File Workspace Dataset View Tools Window Help
Workspace
Info Browser
Messages
(0.0, 0.0, 0.0) 2D 0N 0L

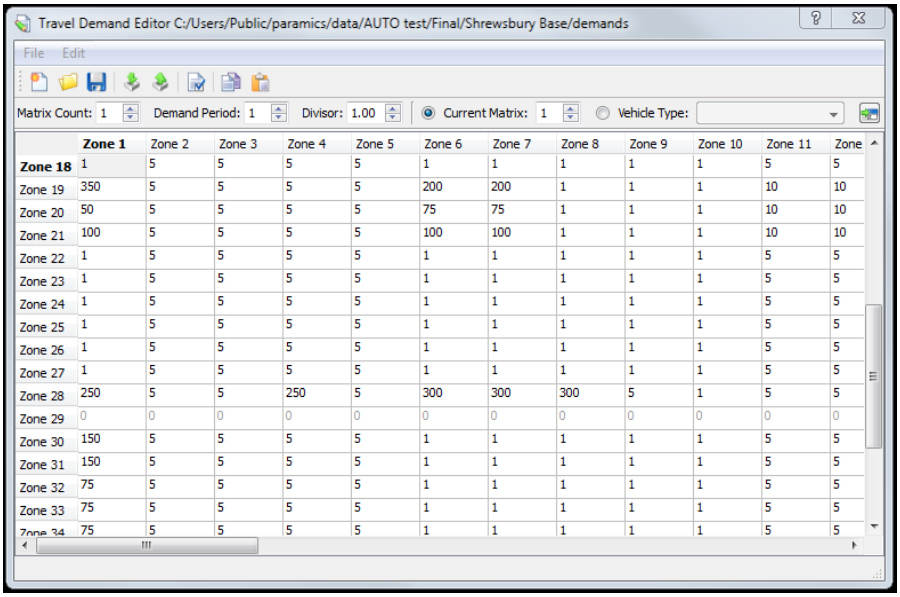

Converter Workspace Wizard: ESRI Shapefile
Select the input file type to be imported into Converter
Input File Type
ESRI Shapefile
Synchro
MapInfo
CSV
Corsim
Emme2
TP+/Viper/CUBE
File Type Information
Converter can read SHP files created by ESRI tools. Converter requires the SHP file but can also read the DBF file commonly used in this file configuration. As this GIS format primarily uses polyline segments to represent the network layout some smoothing and merging of short link sections and polylines can be performed, although this is optional.
The units used to define distance will be determined by the selected coordinate system. If however a Non-Earth coordinate system is chosen then the distance units should be selected by the user - in this case the SHP file internal units should be Non Earth Cartesian units i.e. distance defined as ft/m etc.
Once loaded the user will be required to perform field mapping on any optional data values read form the DBF file. Mappings for node coordinates and name, and for link a node and b
< Back
Next >
Cancel



Detail the network with the suitable parameters to model the existing road network characteristics



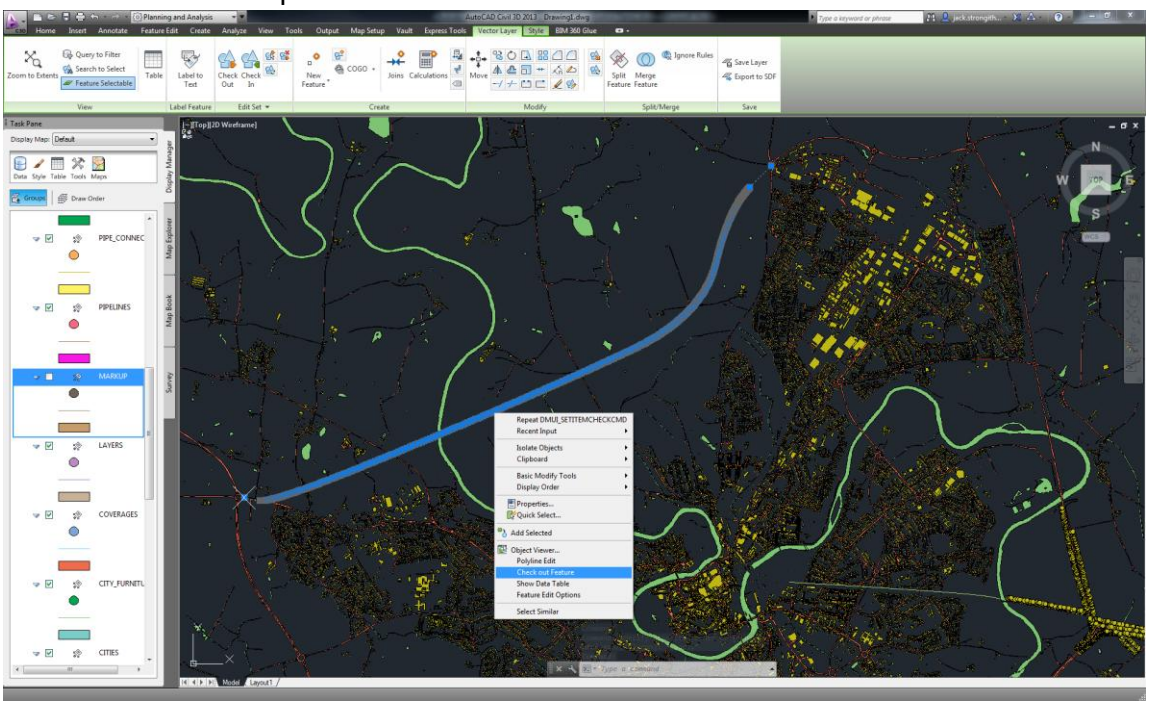
- Set traffic demand and profiles under Travel Demand Editor



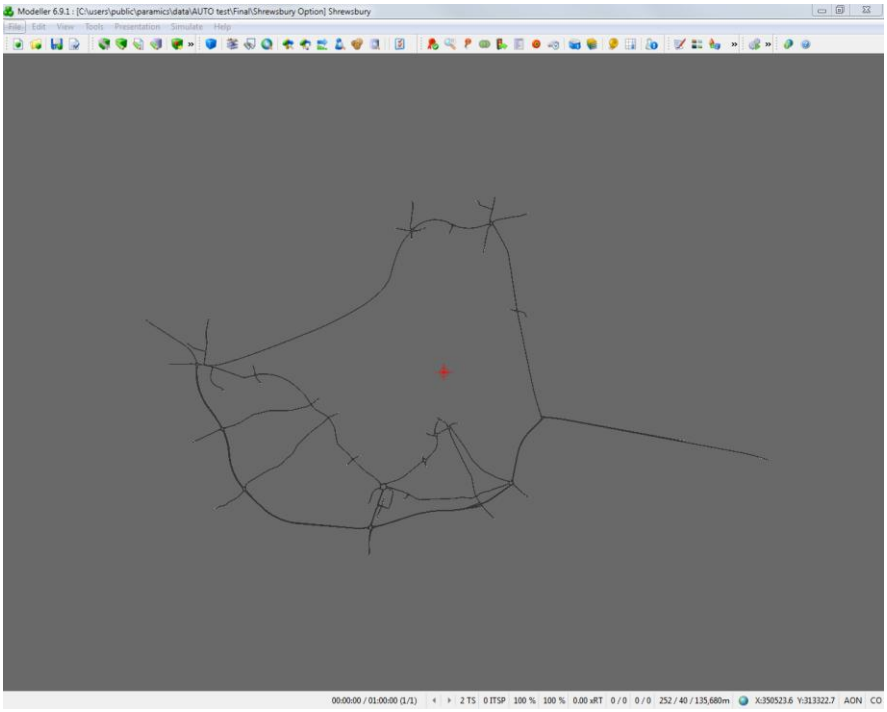
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	Zone
Zone 18	1	5	5	5	5	1	1	1	1	1	5	5
Zone 19	350	5	5	5	5	200	200	1	1	1	10	10
Zone 20	50	5	5	5	5	75	75	1	1	1	10	10
Zone 21	100	5	5	5	5	100	100	1	1	1	10	10
Zone 22	1	5	5	5	5	1	1	1	1	1	5	5
Zone 23	1	5	5	5	5	1	1	1	1	1	5	5
Zone 24	1	5	5	5	5	1	1	1	1	1	5	5
Zone 25	1	5	5	5	5	1	1	1	1	1	5	5
Zone 26	1	5	5	5	5	1	1	1	1	1	5	5
Zone 27	1	5	5	5	5	1	1	1	1	1	5	5
Zone 28	250	5	5	250	5	300	300	300	5	1	5	5
Zone 29	0	0	0	0	0	0	0	0	0	0	0	0
Zone 30	150	5	5	5	5	1	1	1	1	1	5	5
Zone 31	150	5	5	5	5	1	1	1	1	1	5	5
Zone 32	75	5	5	5	5	1	1	1	1	1	5	5
Zone 33	75	5	5	5	5	1	1	1	1	1	5	5
Zone 34	75	5	5	5	5	1	1	1	1	1	5	5

AutoCAD Map/Civil 3D

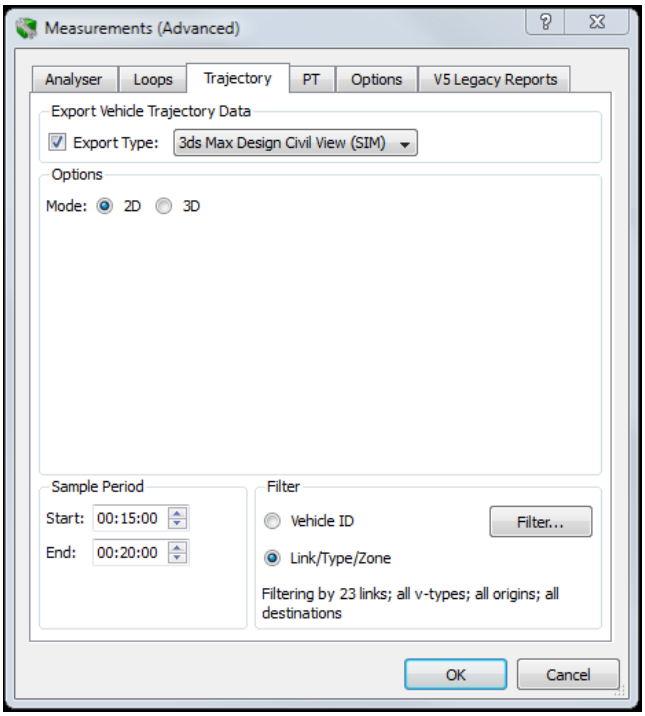
- Check out from SQLite AIM Data new link road in Map, explode once and use 'MAPEXPORT' to .shp for use in Paramics



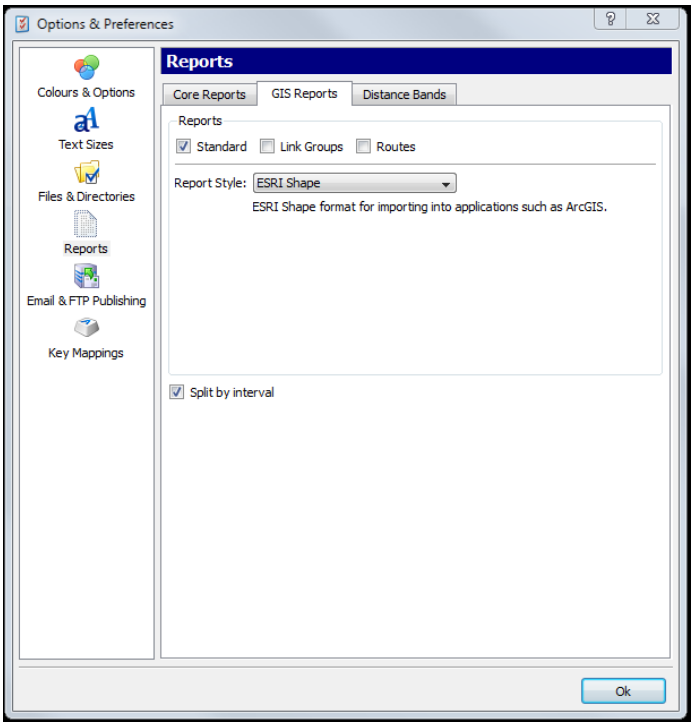
- Update the network with the proposed route as designed in AIM



- Set vehicle trajectory output file .SIM format for both existing and proposed networks for comparison. This file we will use to create animated vehicles.



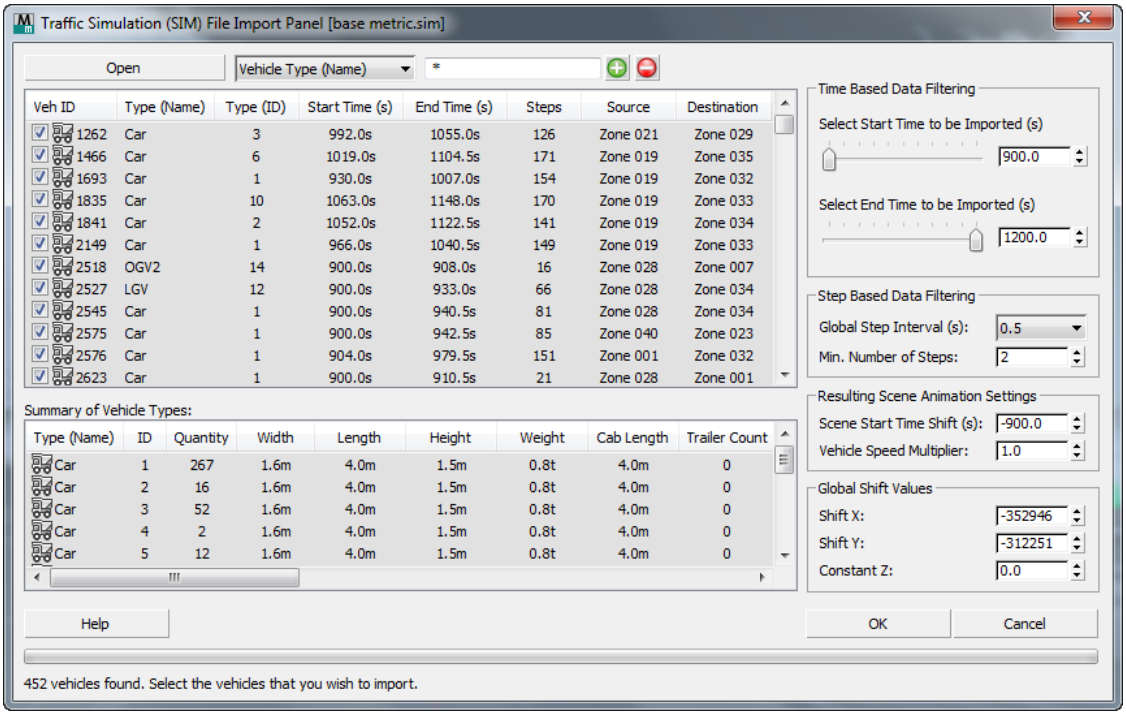
- Export the analytics results to .shp file for use in AIM.



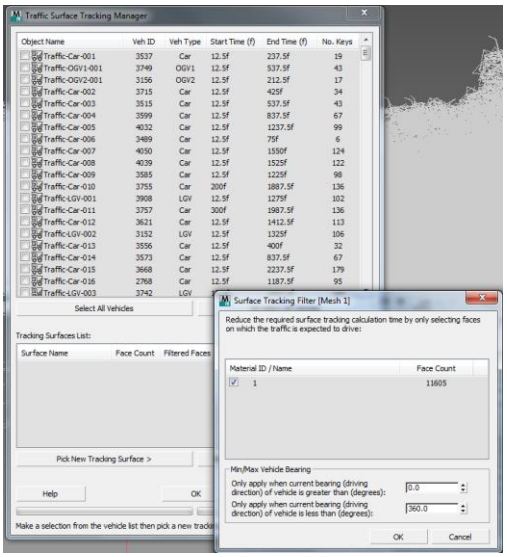
3ds Max Design using Civil View

- Import the area of interest from AIM via Send to '3ds Max Design' option
- For surface tracking purposes build a new model in AIM of the surface within the limits of this same area and export to FBX and apply the model shift as found in C:\Users\<user login>\AppData\Local\Temp .pos file

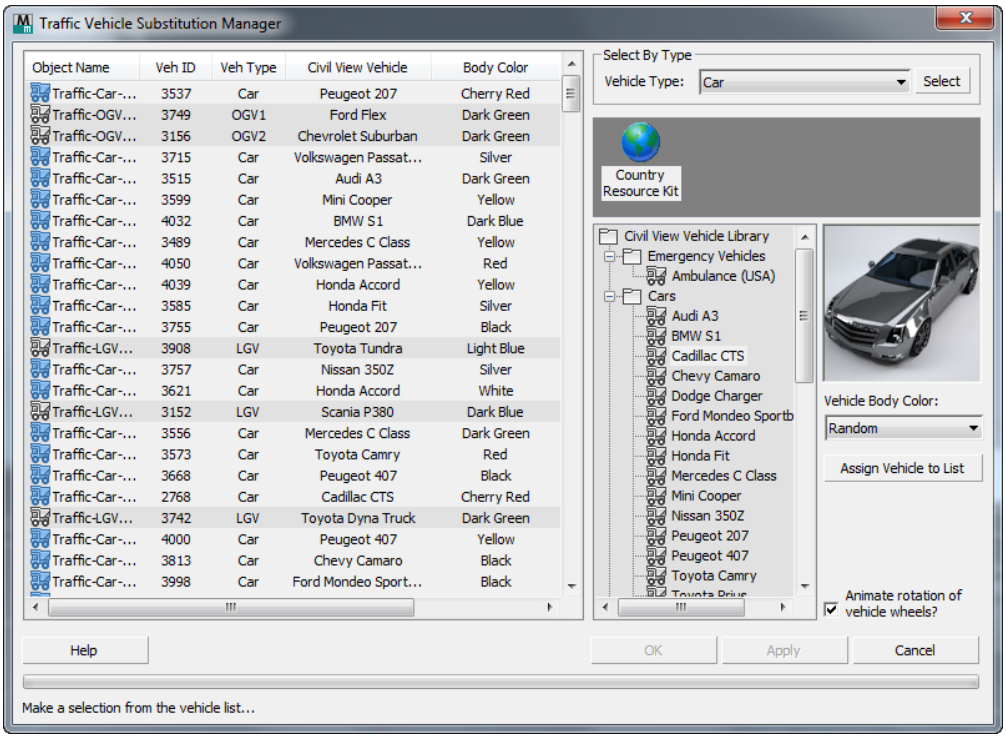
- Import SIM file and apply the model shift applied by AIM



- Apply surface tracking and select the temporary surface, then delete the temporary surface

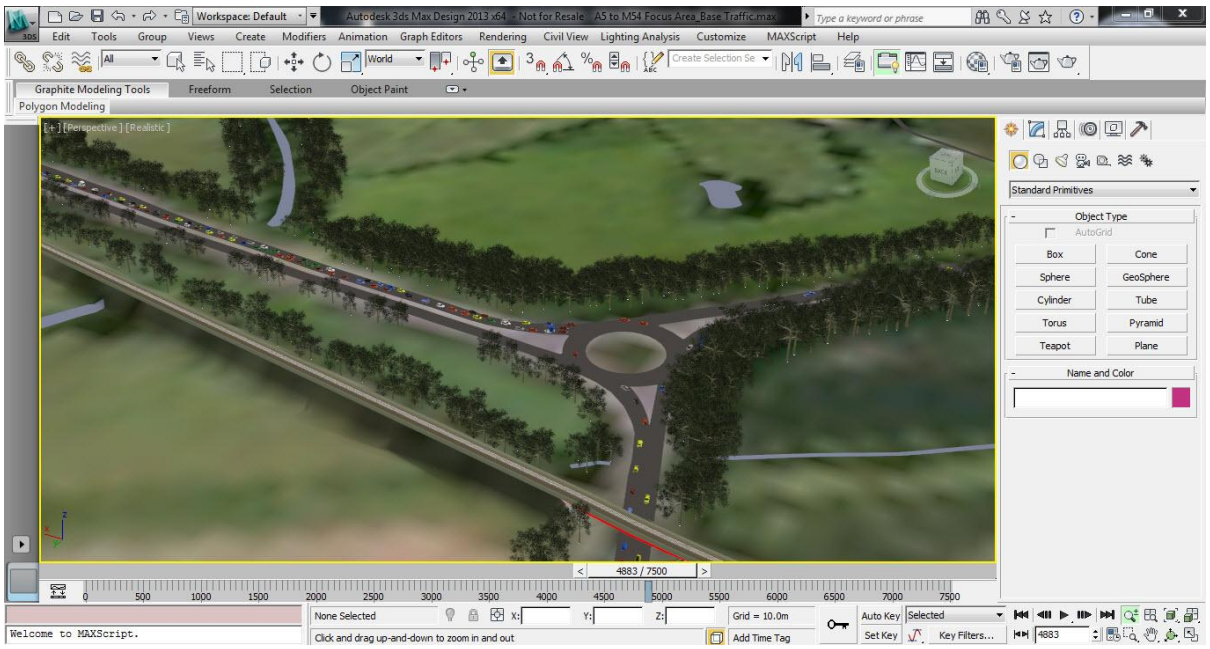


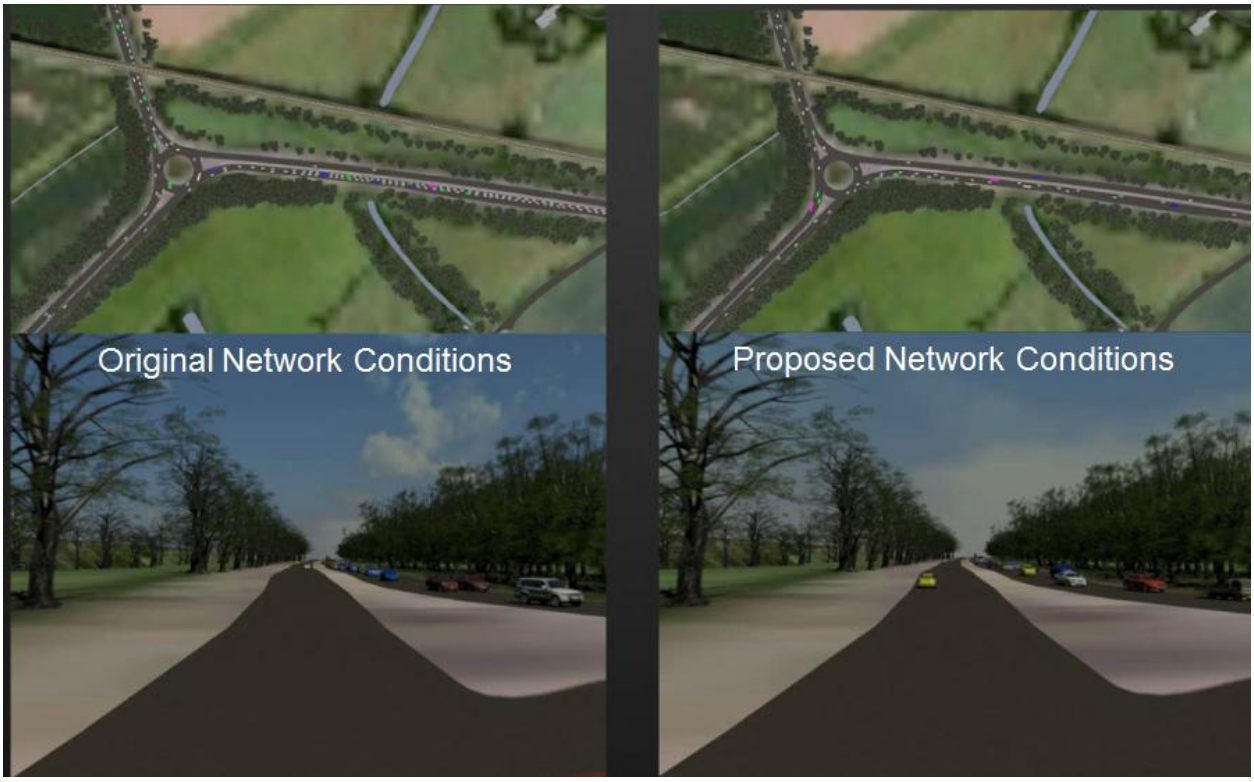
- Apply vehicle substitution



(Note, animation of rotation of wheels will drastically increase model size and rendering)

- Render the results from various angles and paths.





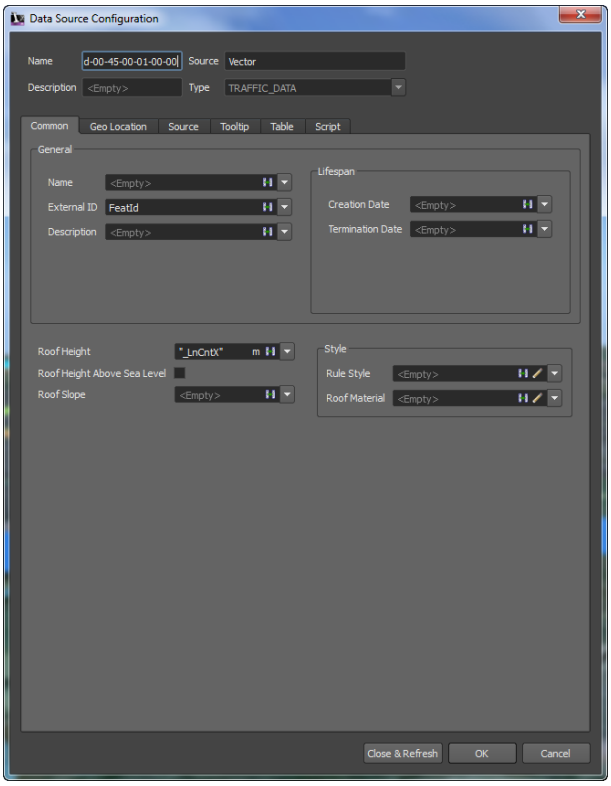
Autodesk Infrastructure Modeler

From the base model, create a proposal for Counts , Queues, Existing Delay, Proposed Delay

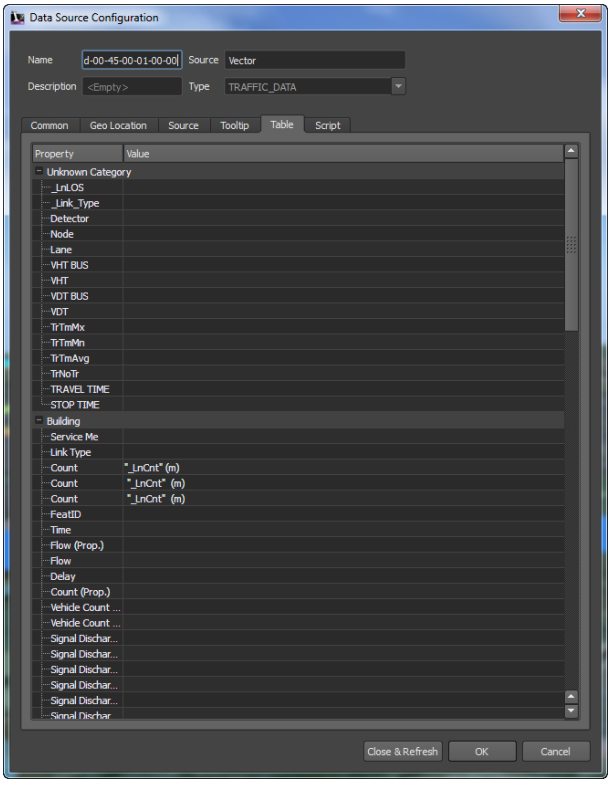
Attach the queue and link shp files

When applying this data, apply the ‘Traffic Data’ classification and using the building height option you can set this height to reflect the value of the analysis property you require, such as count for example.

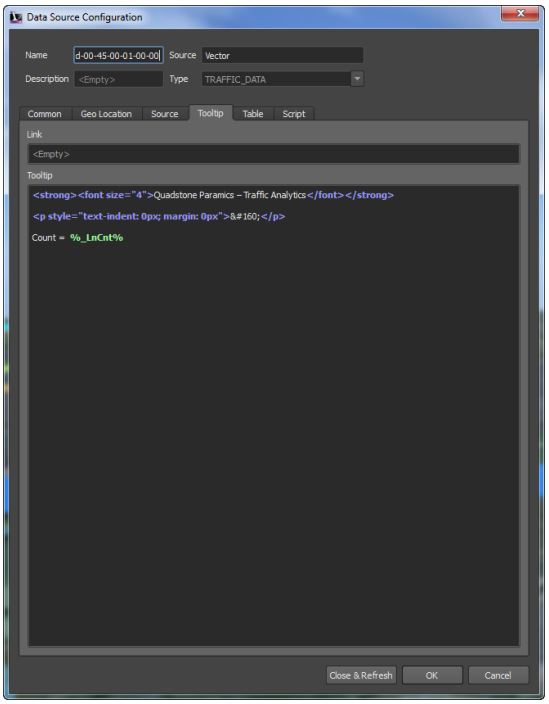
(The AIM schema needs to be updated with the supplied schema file to extend the classification system)



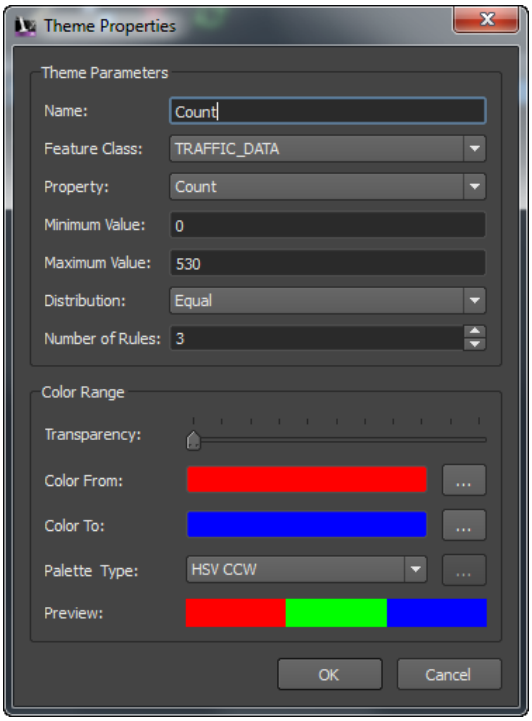
Within the table tab, set the count to _LnCnt attribute

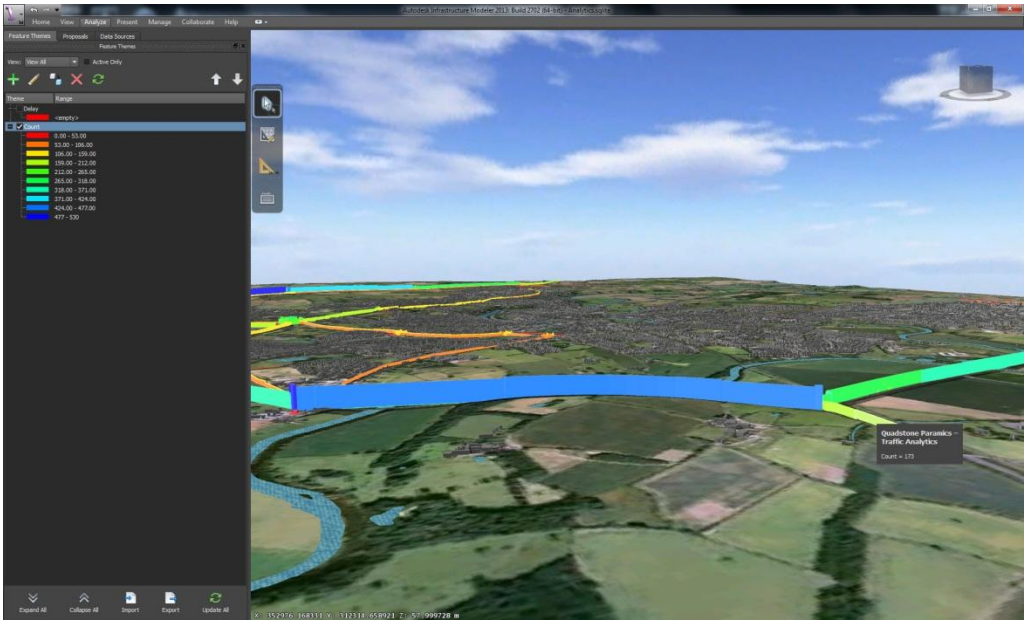


In the tooltip tab, add the variable you want to report in the tooltip with the % symbol activating the list of attributes to choose from and also add text for titles, this can contain html formatting



Using the feature theming, you can apply a colour theme to the attribute property you are displaying with standard theming analysis.





Autodesk AIM360

From the model in Infrastructure Modeler, the data can be published to the cloud and an scenario of the model made available to all stakeholders required to view this data either through the web viewer in an internet browser, alternatively a link to view the model in the Ipad application available through the iTunes store.

The layer for TRAFFIC_DATA can be switched on.

Note: increase the ‘level of detail’ display and show backfaces.