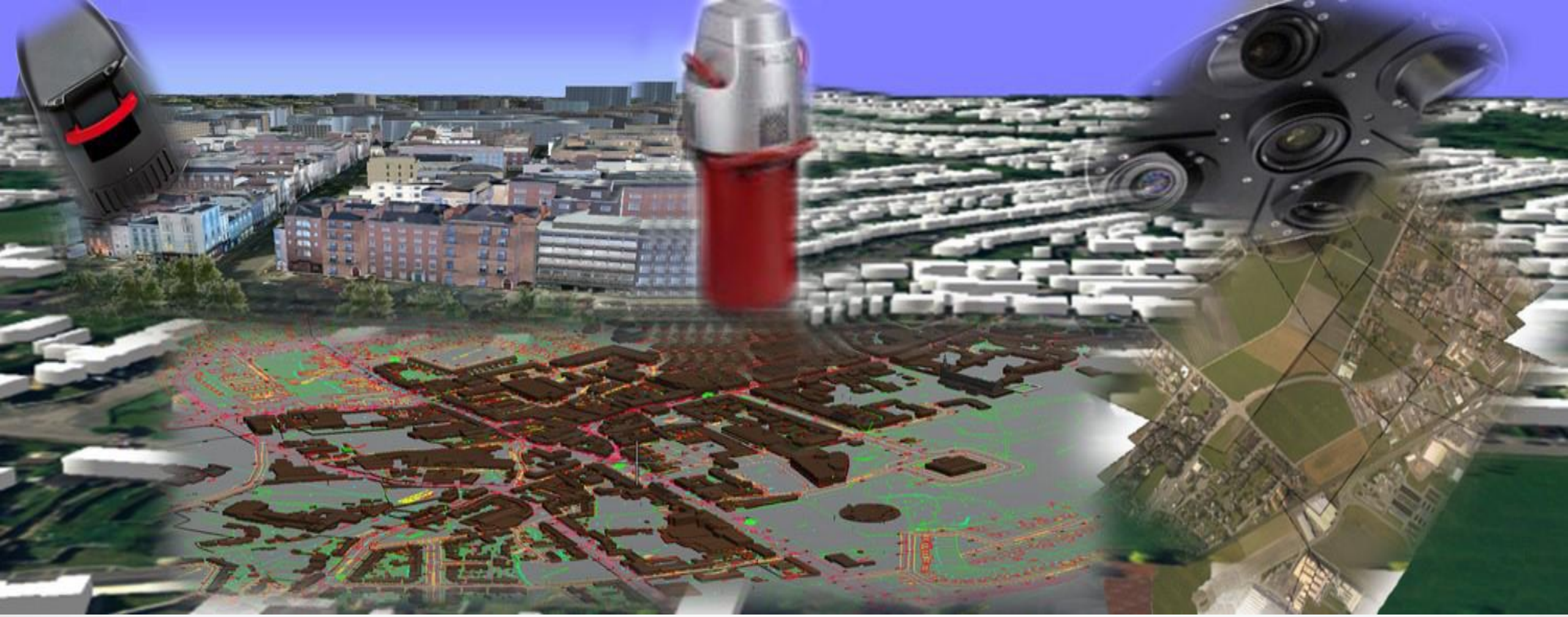


LOD2 From Vertical & Oblique Imagery

Andy Mc Gill

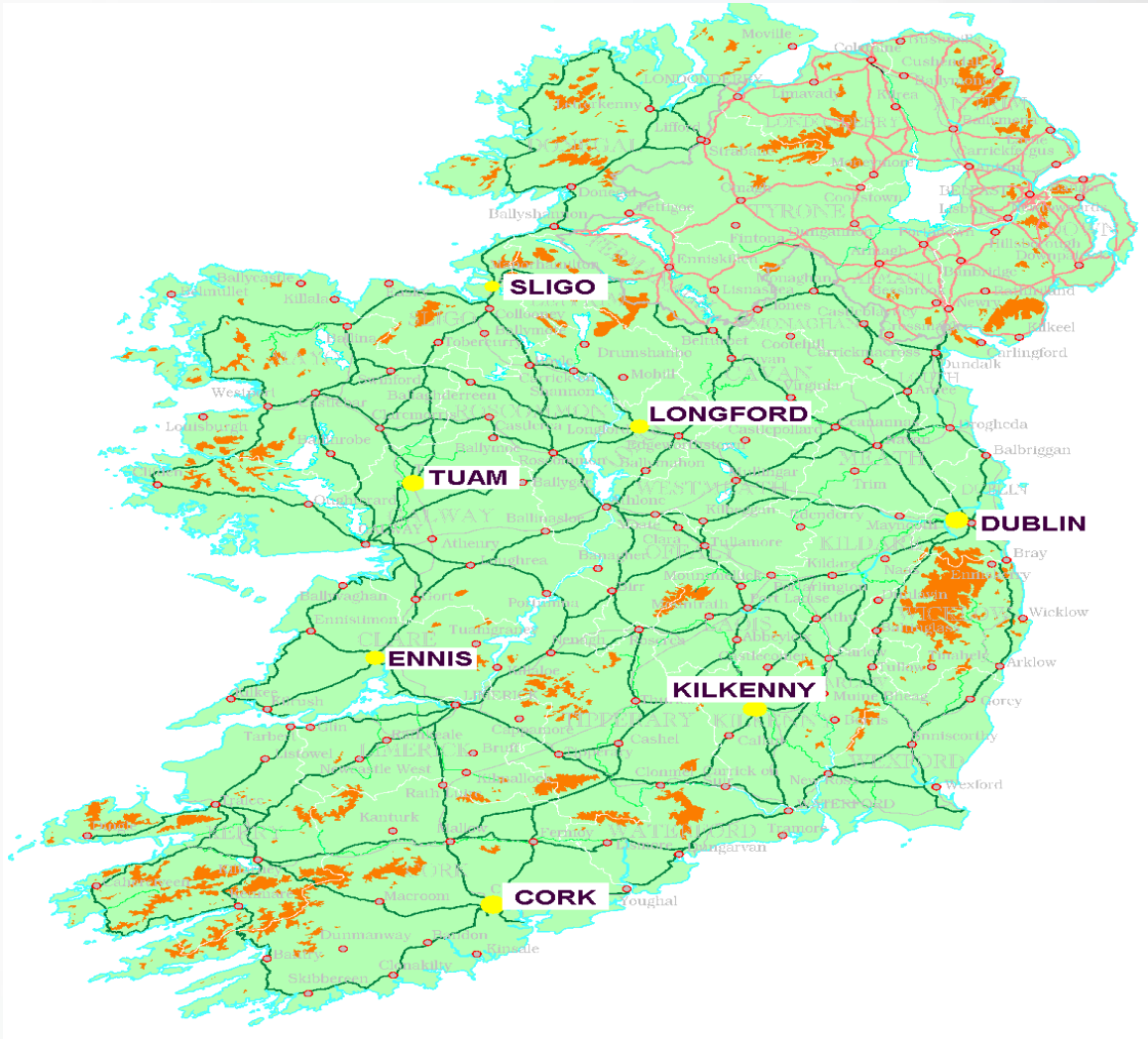
Ordnance Survey Ireland

Overview

- Introduction to OSi
- OSi Mandate
- Purpose
- Area Selected
- Imagery
- Workflow
- Results
- Next Steps

Introduction

- Size: 70,000km2 / Population: 4.6m
- Established in 1824 (191 years)
- Established as a State Body in 2002 under the OSi Act 2001
- 216 staff (public servants)
- Head Office in Phoenix Park, Dublin with 6 Regional Offices
- Merging of OSi, Valuation Office & Property Registration Authority



OSi Mandate

To provide a national mapping service in the State… creating and maintaining the definitive national mapping and related geographic records

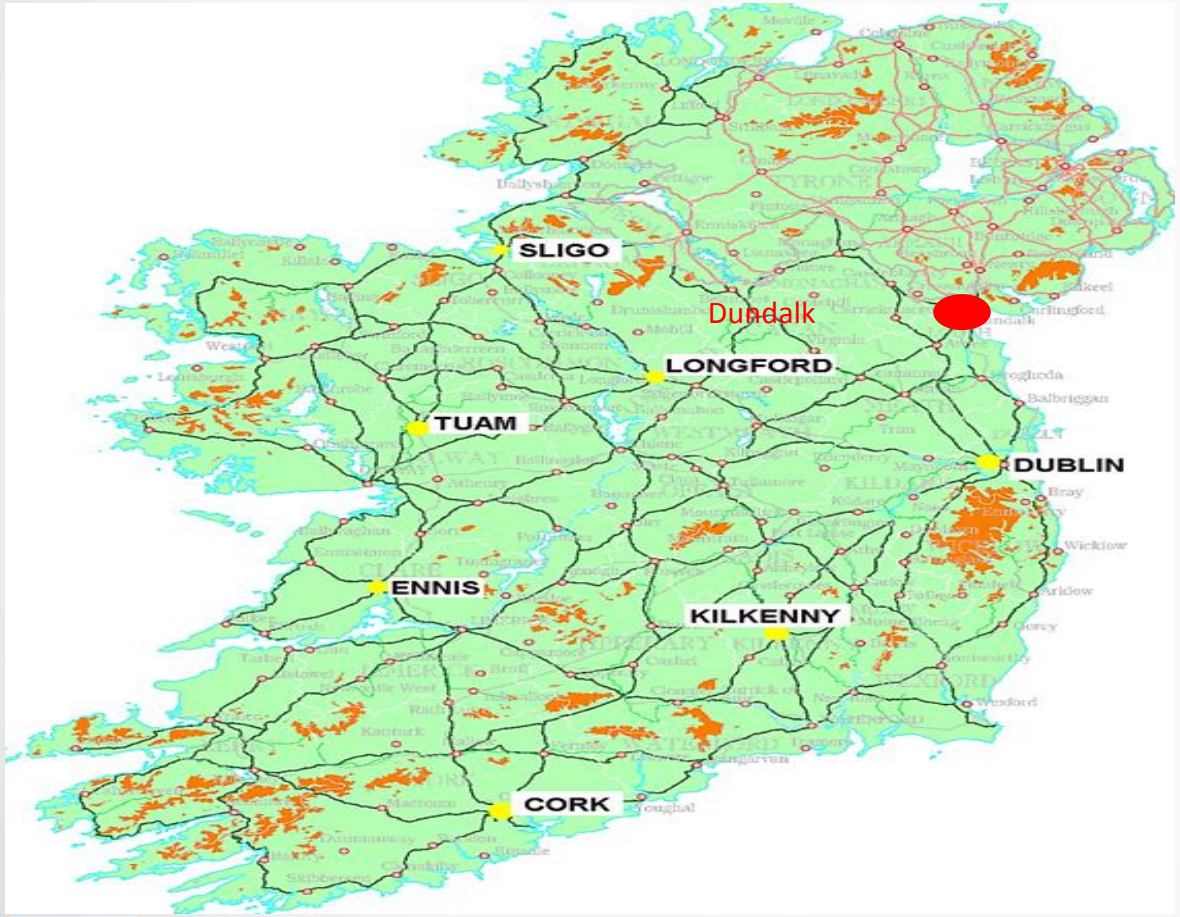
To encourage and promote the benefits of the use of the national mapping and related databases and the developments of products, services and markets to meet national and user needs

- **Maintain & develop the Underlying physical infrastructure**
- **Create & Maintain for the entire State mapping and related geographic databases**
- **Encourage and promote its benefits**
- **Advice to Government on Geographic Information & SDI**
- **Boundary surveys**
- **Protecting copyright**

Purpose

- **To Investigate the following;**
  - A ***practical*** and ***cost effective*** methodology to remap areas with legacy issues
  - A method of updating and managing a 3D Landscape Model of the ***entire state*** in Prime2.
  - Moving our data into the 21st century
  - Achieve this using ***automated*** systems with a ***minimum manual intervention*** **for the conditions we operate in**

Area

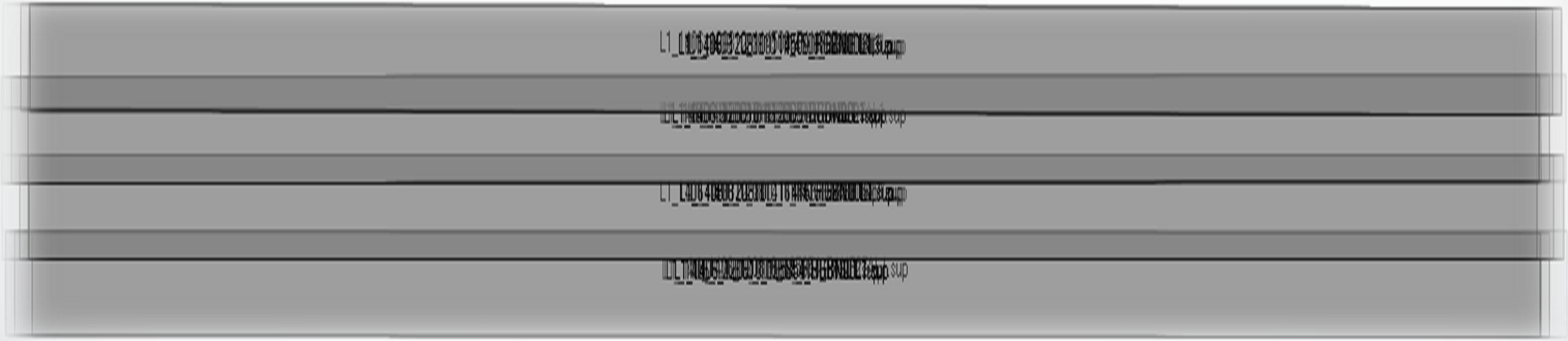


Imagery

- ADS Vertical 15cm res
- RCD Vertical 25cm res
- Pentapod Oblique 10cm res

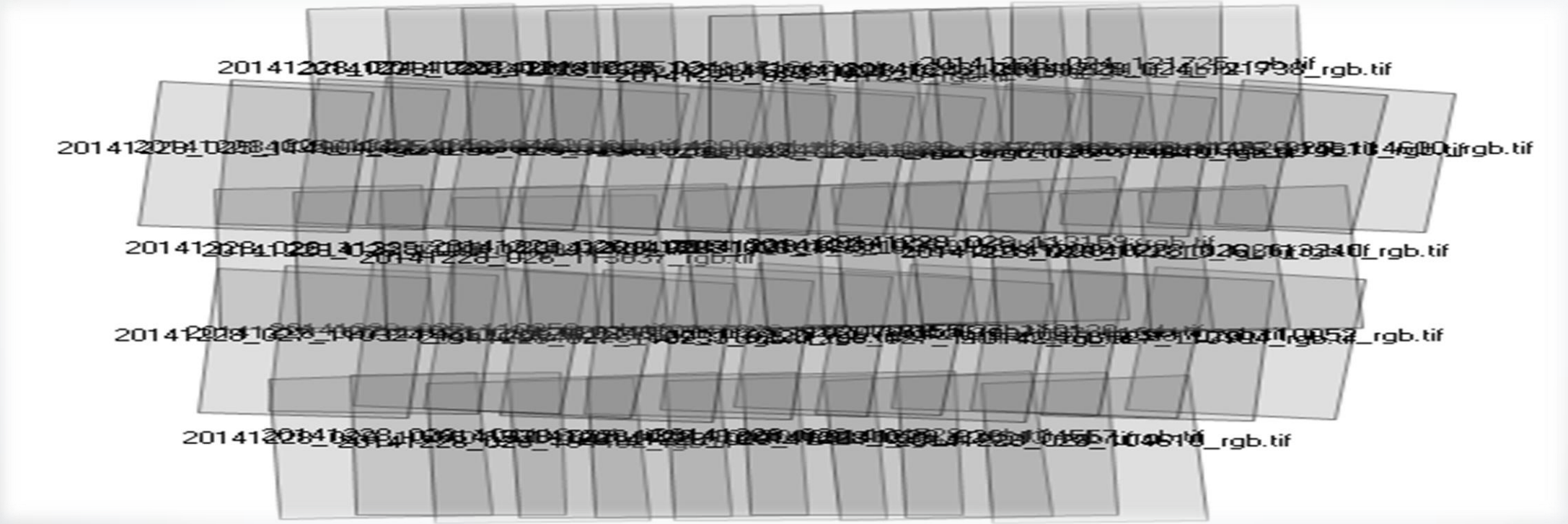
Imagery

- **ADS Coverage**



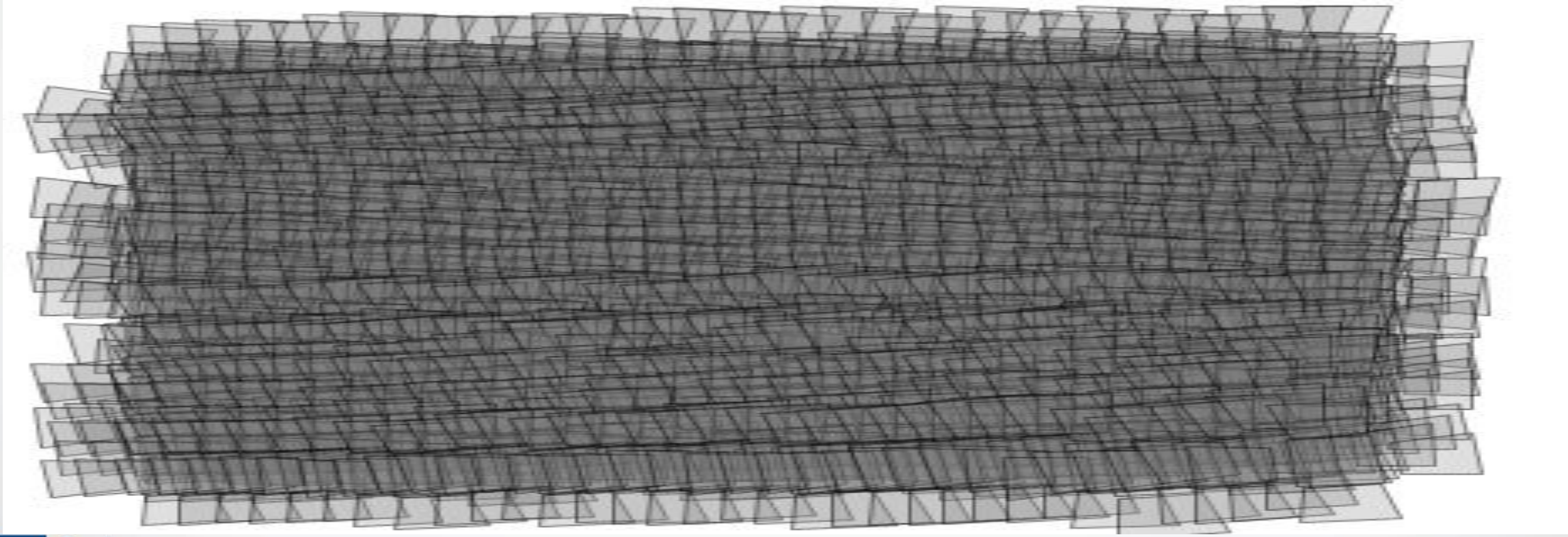
Imagery

- **RCD Coverage**



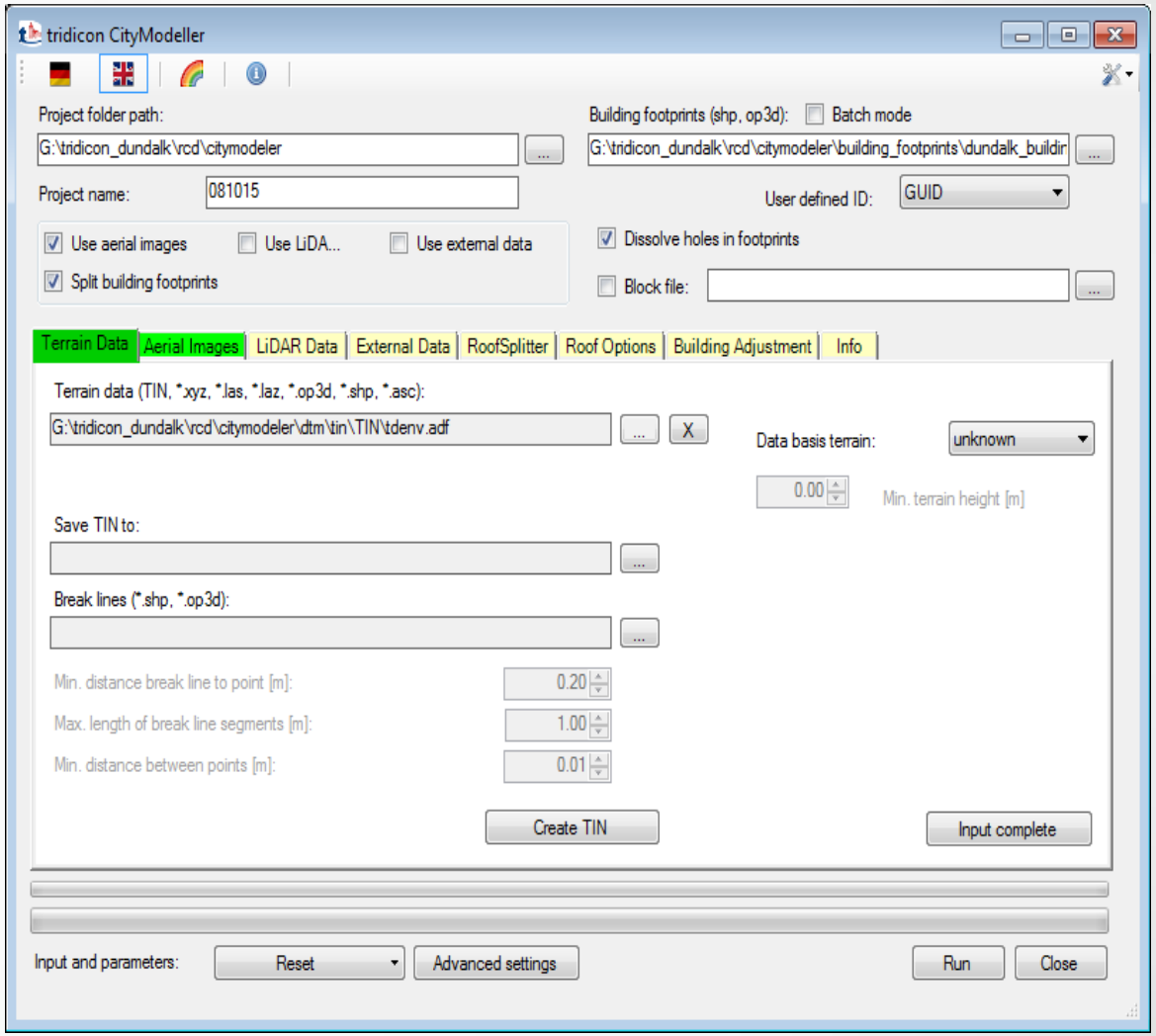
Imagery

- **Penta Coverage**



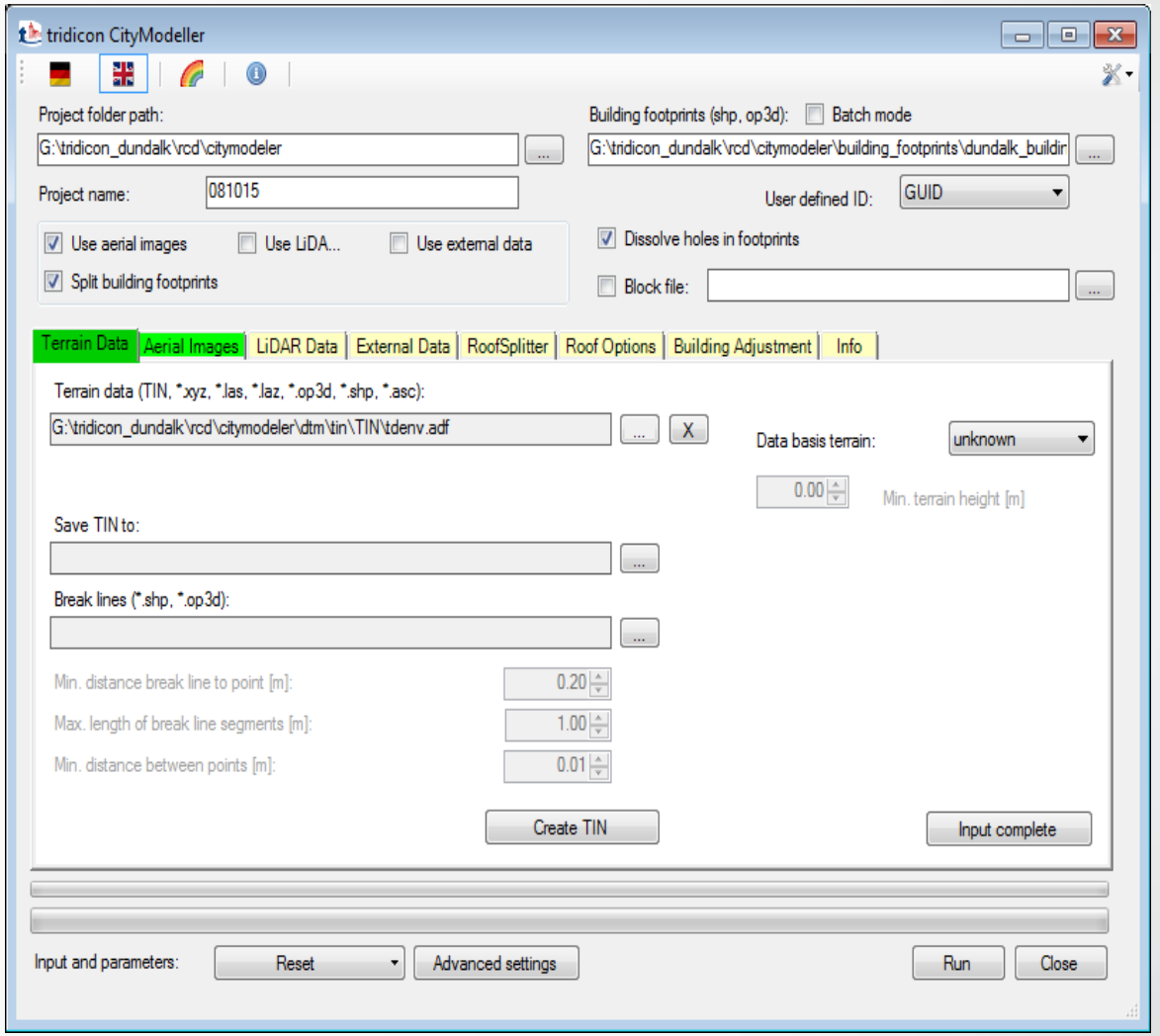
Application

- tridicon
  - City Modeller
  - Building finder



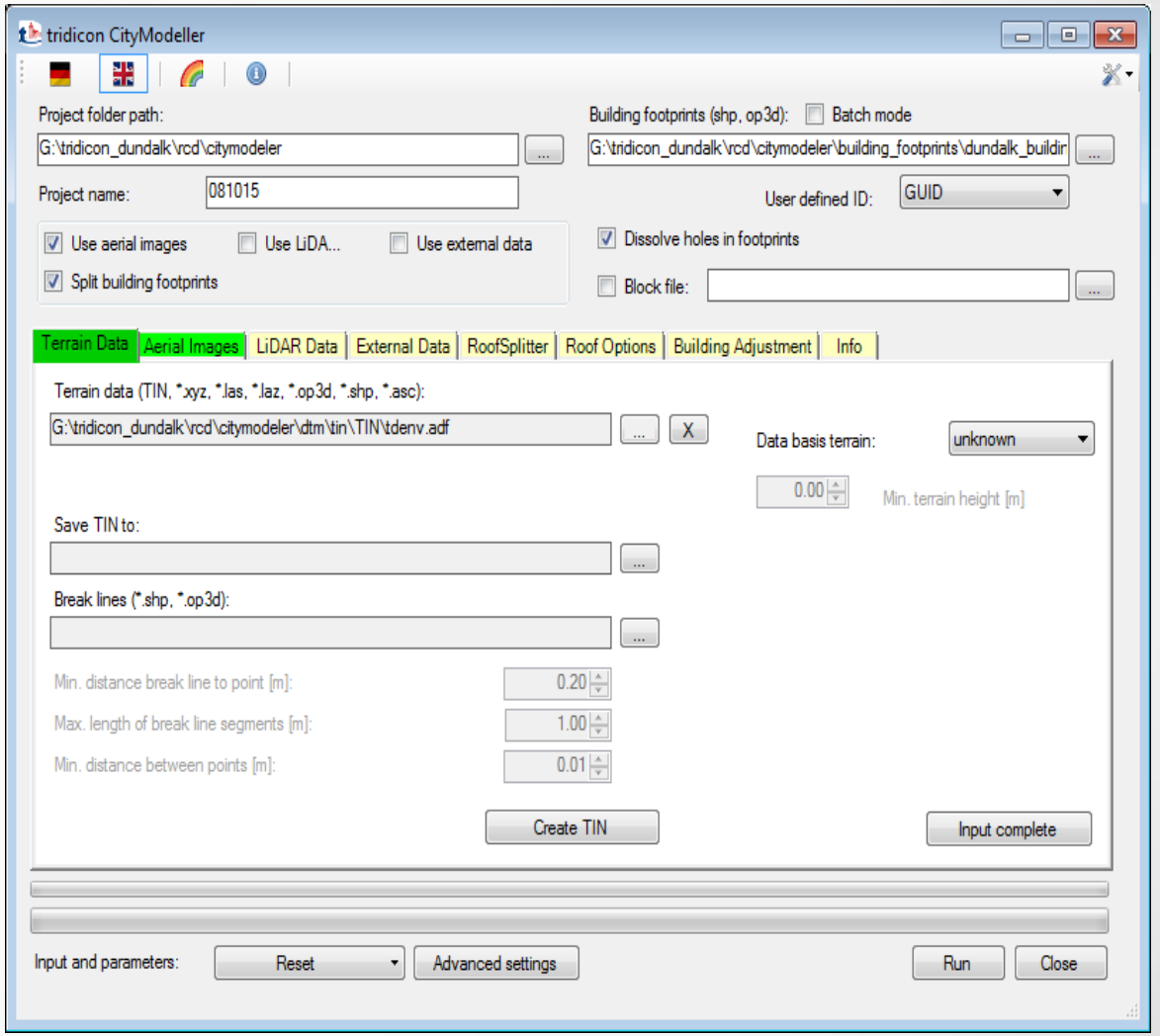
Workflow

- Created Dense Point Cloud from ADS Imagery using XPro
- Inserted this point cloud into City Modeller
- Insert a ground DTM (LiDAR 2m raster grid)
- Inserted polygon footprints from Prime2 dataset.
- Created LOD2 objects from point cloud and footprint datasets



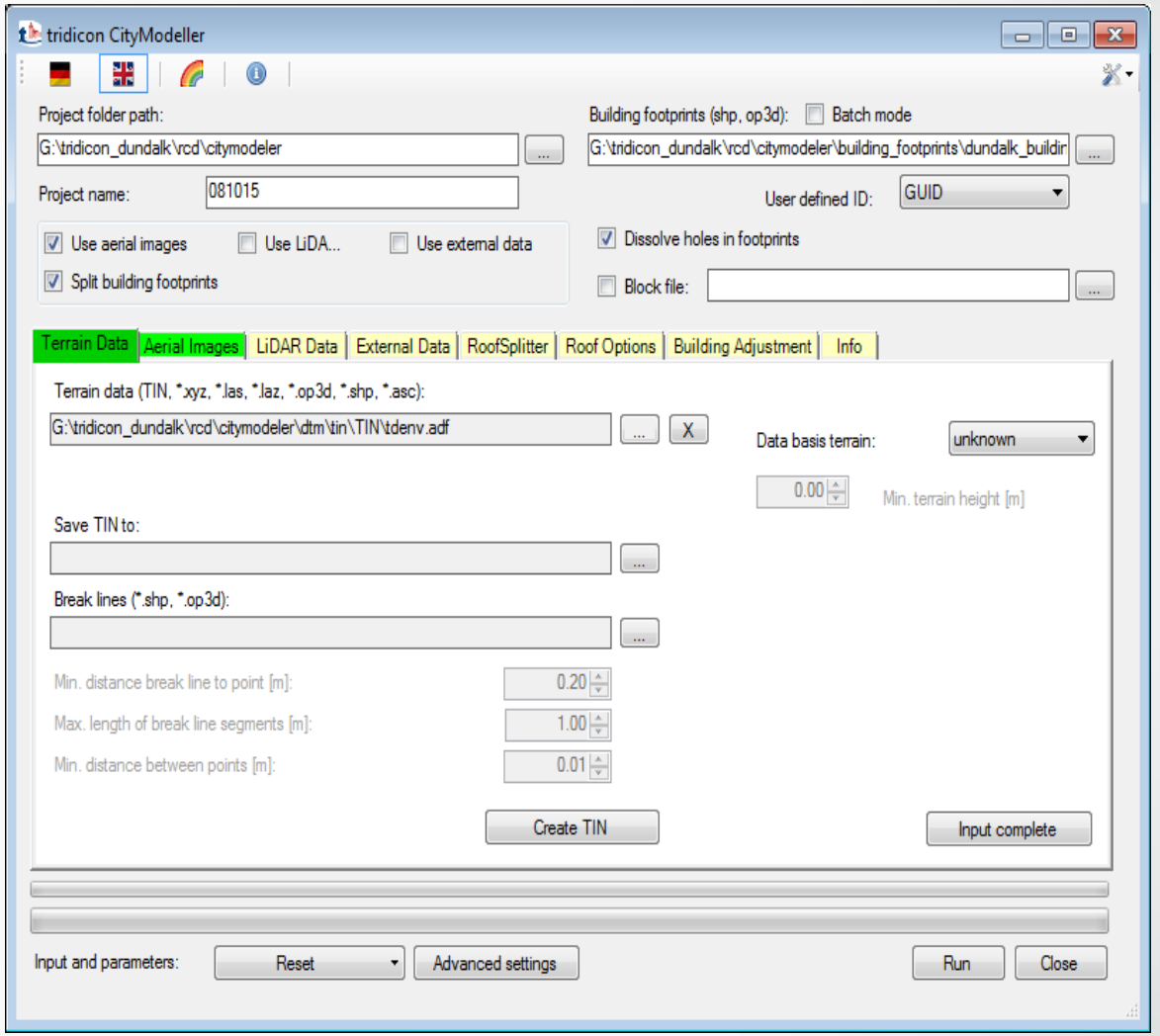
Workflow

- Inserted RCD imagery directly into City Modeller
- Insert a ground DTM (LiDAR 2m raster grid)
- Inserted polygon footprints from Prime2 dataset.
- Created LOD2 objects from point cloud and footprint datasets

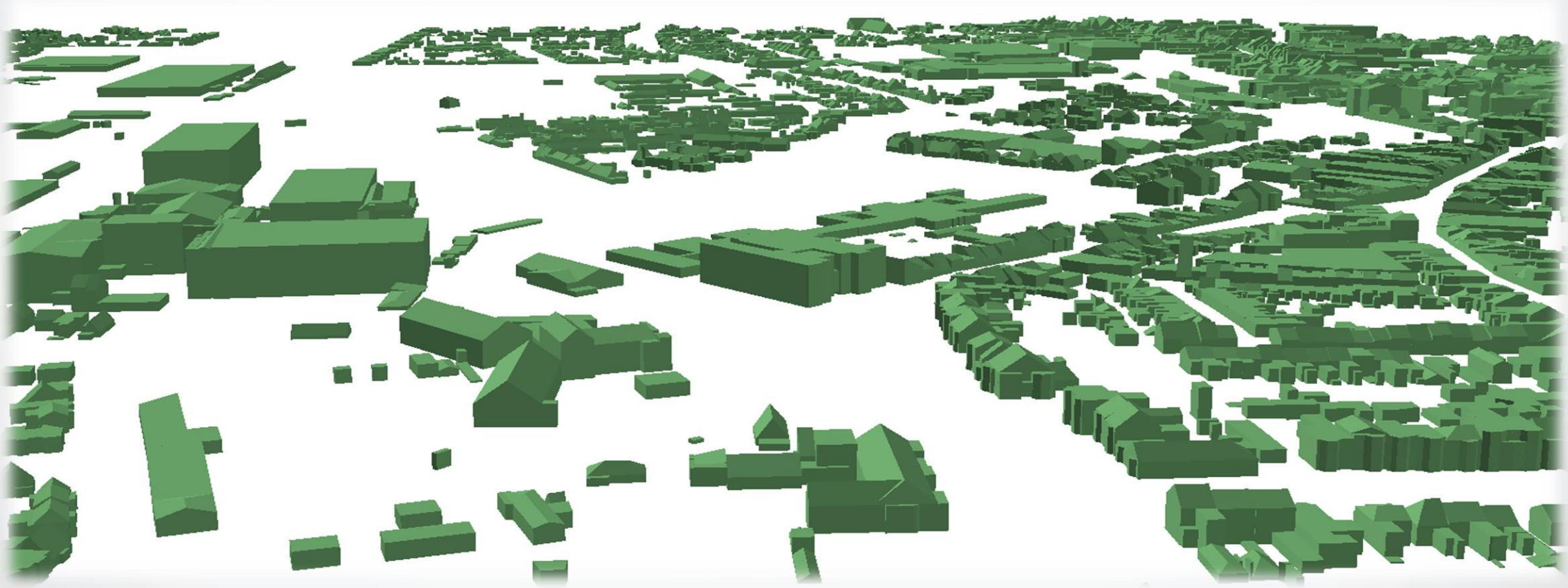


Workflow

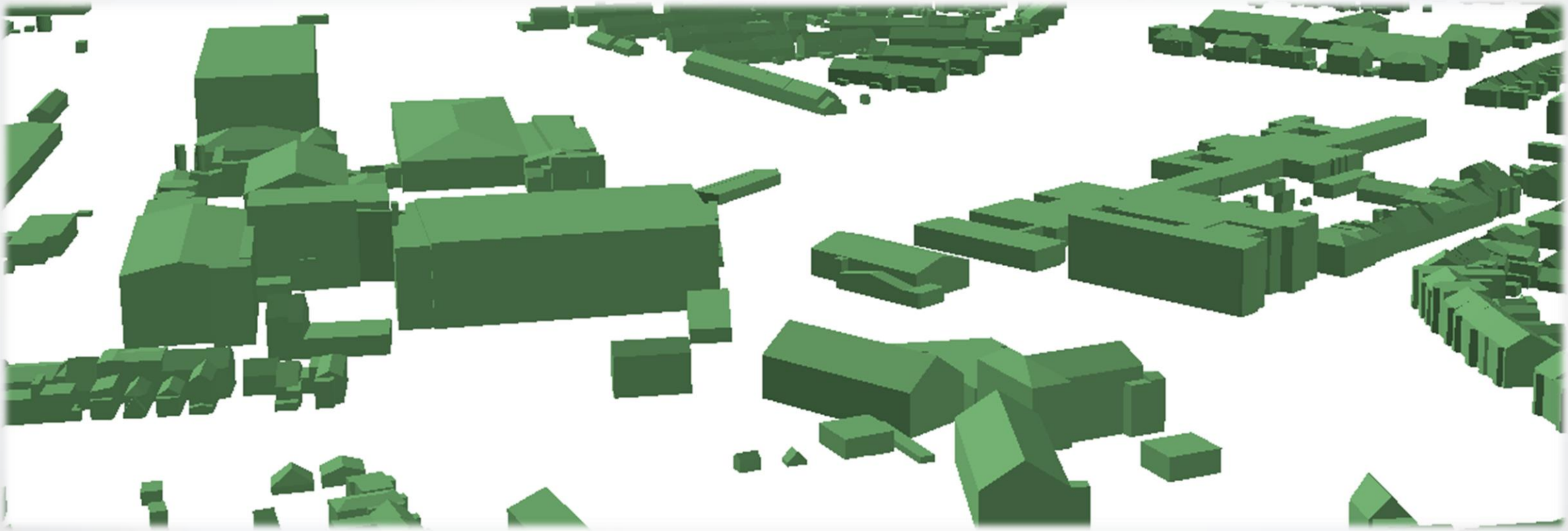
- Inserted Pentapod Nadar imagery directly into City Modeller
- Insert a ground DTM (LiDAR 2m raster grid)
- Inserted polygon footprints from Prime2 dataset.
- Created LOD2 objects from point cloud and footprint datasets



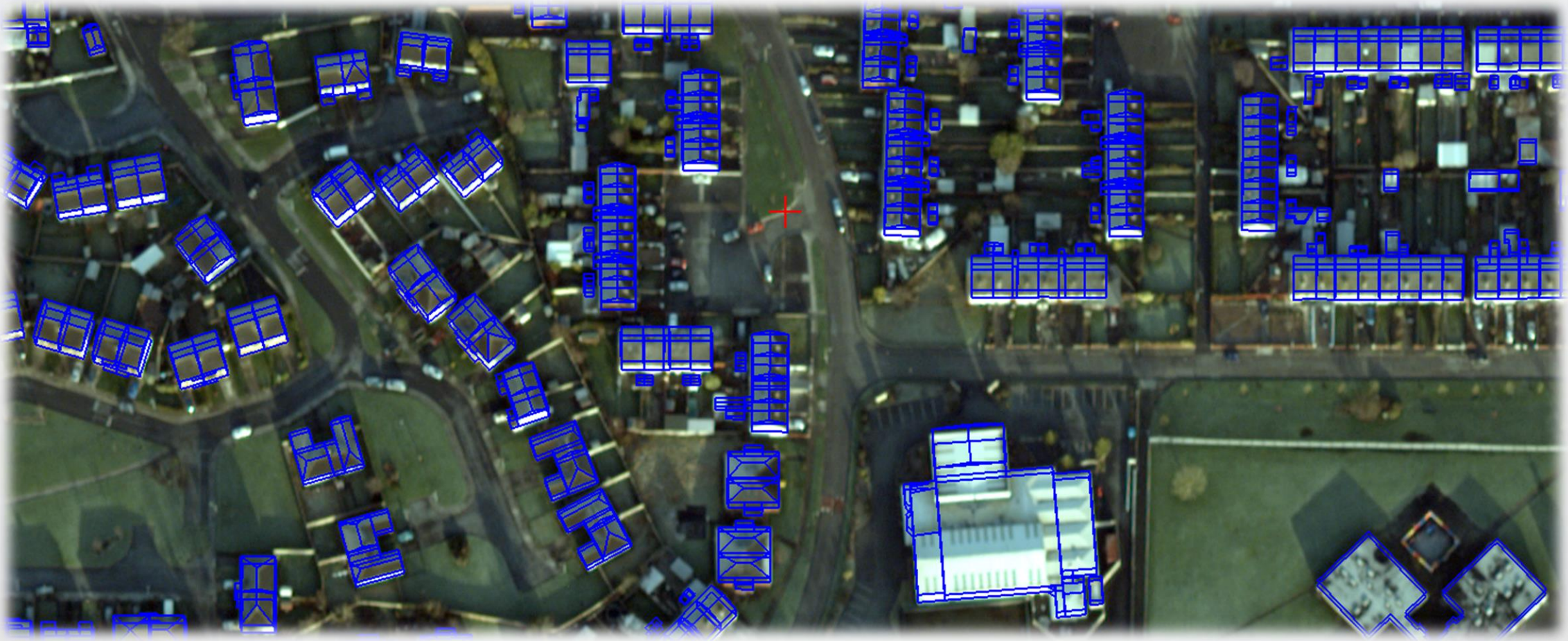
General View



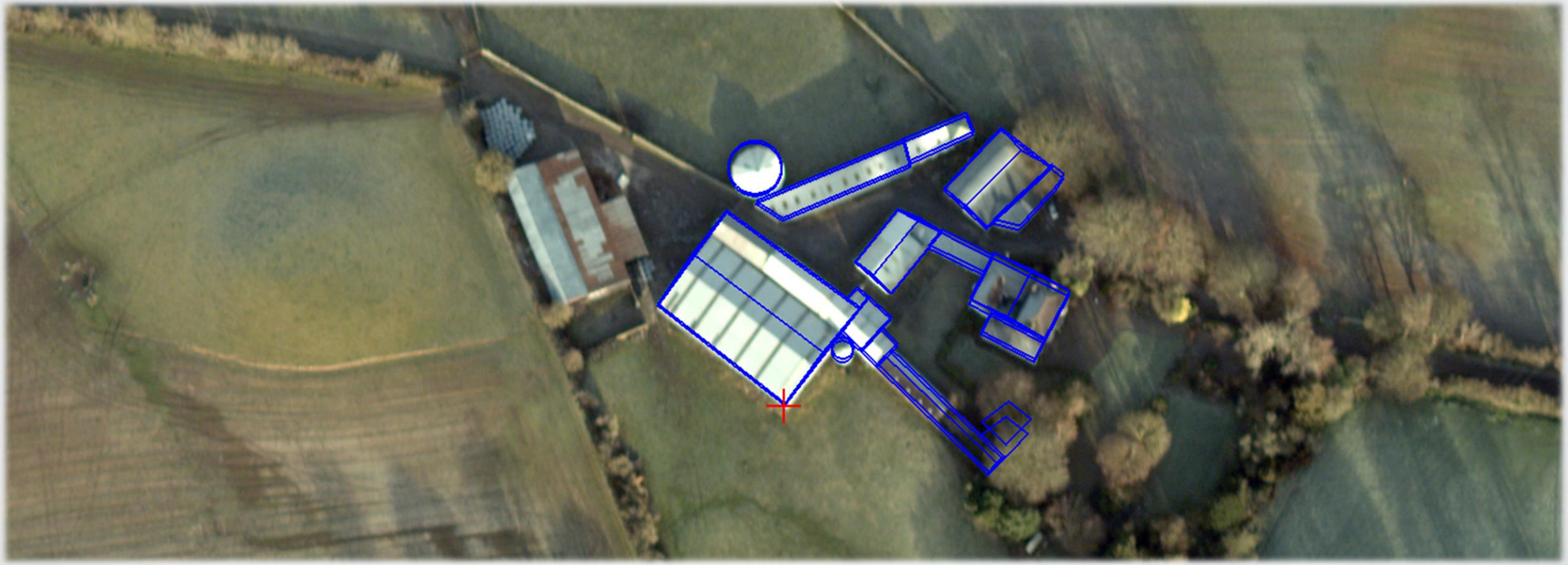
General View



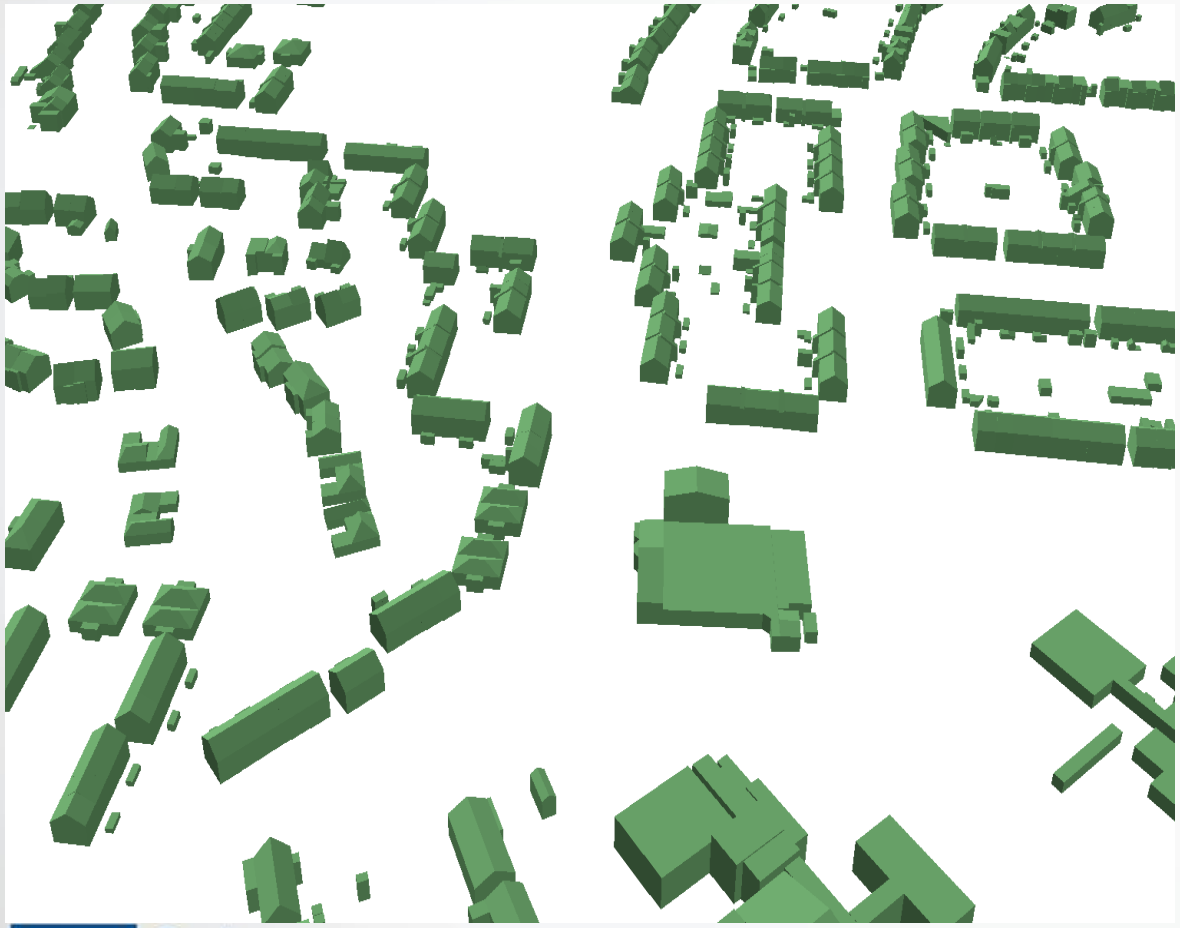
General View



General View

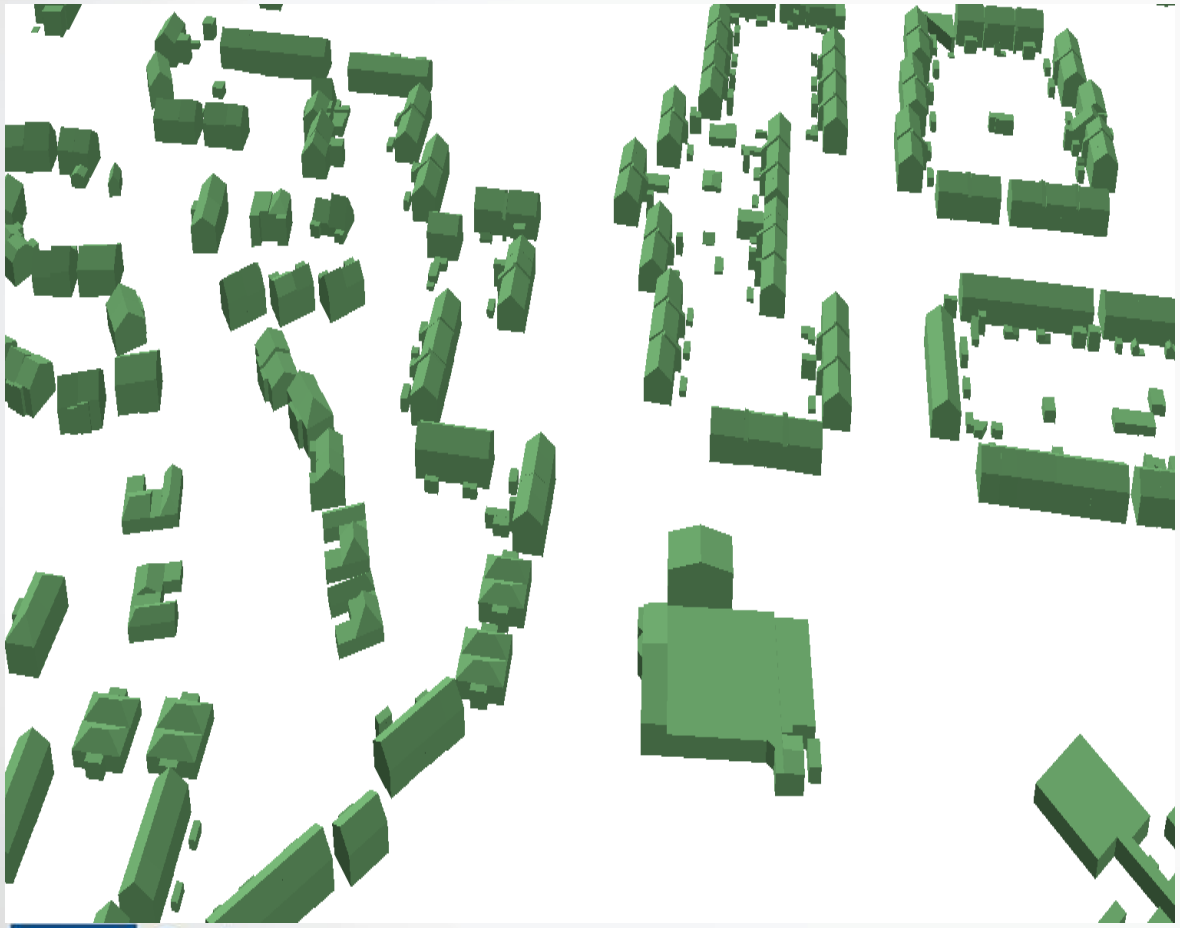


Preliminary Results



Penta City Modeller

Preliminary Results



ADS City Modeller

Preliminary Results

- **Distribution of Ground points**

Preliminary Results

					Varience		
	Ground	ADS	RCD	Penta	ADS	RCD	Penta
Building 1	24.8	23.9	24.2	23.2	0.90	0.60	1.60
Building 2	22.6	22.2	22.1	22	0.40	0.50	0.60
Building 3	28.1	24.1	24.9	26.8	4.00	3.20	1.30
Building 4	24.1	24.1	24.1	24.1	0.00	0.00	0.00
Building 5	22.5	19.8	18.1	18.7	2.70	4.40	3.80
Building 6	17.9	17.9	17.9	17.9	0.00	0.00	0.00
Building 7	17.9	17.9	17.9	17.9	0.00	0.00	0.00
Building 8	16.5	16	16.4	16.4	0.50	0.10	0.10
Building 9	20.6	20.1	19.3	18.9	0.50	1.30	1.70
Building 10	21.7	20.6	20.1	20.6	1.10	1.60	1.10

Preliminary Results

					Varience		
	Ground	ADS	RCD	Penta	ADS	RCD	Penta
Building 11	19.9	20	19.5	19.8	-0.10	0.40	0.10
Building 12	16.7	16.4	16.8	16.7	0.30	-0.10	0.00
Building 13	16.7	16.7	16.7	16.7	0.00	0.00	0.00
Building 14	16.6	16.2	16.9	16.6	0.40	-0.30	0.00
Building 15	18	16.8	17.2	17.9	1.20	0.80	0.10
Building 16	30	30	30.5	30.4	0.00	-0.50	-0.40
Building 17	18.3	18.2	17.4	18.1	0.10	0.90	0.20
Building 18	11.4	11.6	10.2	11.5	-0.20	1.20	-0.10
Building 19	20.1	20.2	20.7	20.5	-0.10	-0.60	-0.40
Building 20	16.7	16.6	16.1	16.7	0.10	0.60	0.00

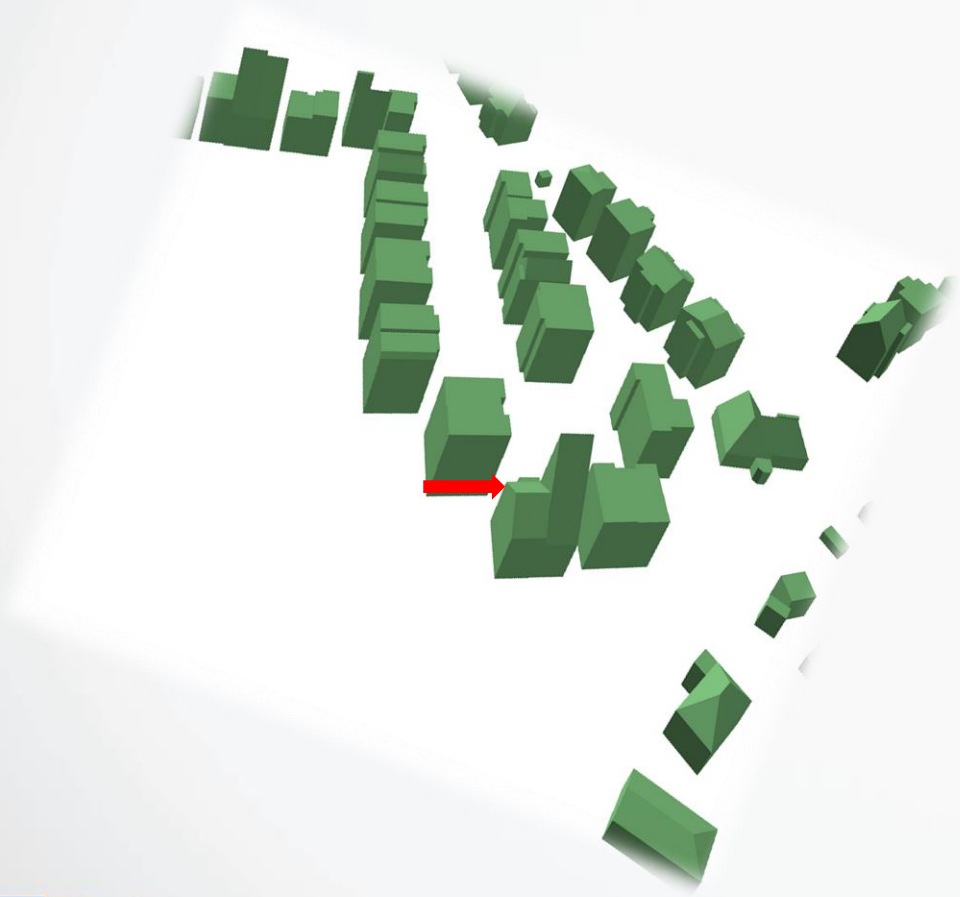
Preliminary Results

					Varience		
	Ground	ADS	RCD	Penta	ADS	RCD	Penta
Building 21	23.4	22.7	20.5	23.2	0.70	2.90	0.20
Building 22	20.9	20.4	18.7	19.7	0.50	2.20	1.20
Building 23	15.7		14	14.1		1.70	1.60
Building 24	9.2		9.2	9.2		0.00	0.00
Building 25	7.7		9	8.8		-1.30	-1.10
Building 26	7.6		8.5	8.4		-0.90	-0.80
Building 27	8.5		6.3	9.4		2.20	-0.90
Building 28	9		7.4	8.5		1.60	0.50
Building 29	8.7		10.8	8.2		-2.10	0.50
Building 30	5.9		5	4.9		0.90	1.00

Preliminary Results

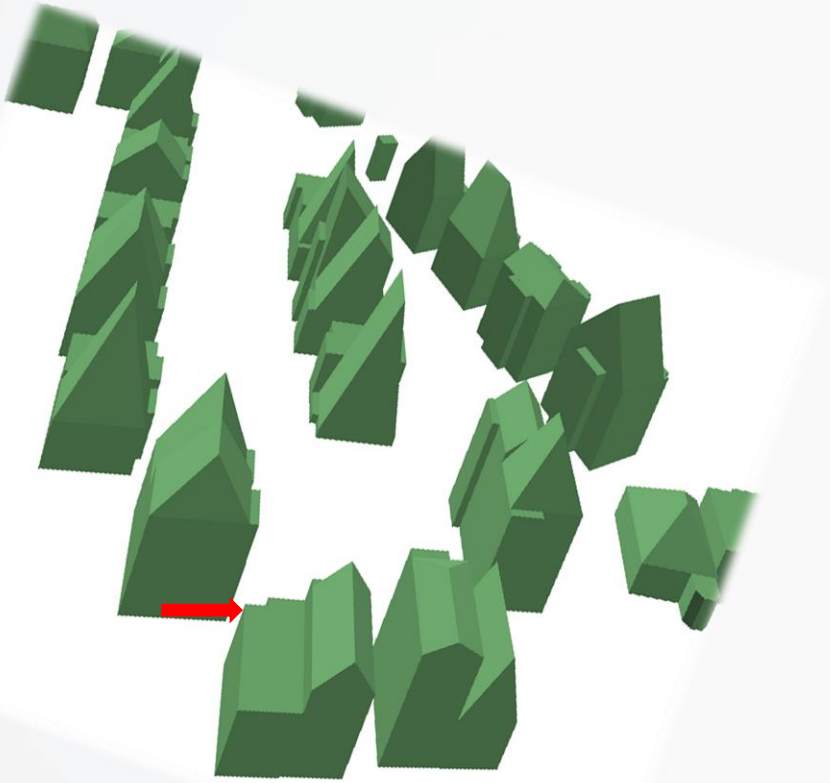
					Varience		
	Ground	ADS	RCD	Penta	ADS	RCD	Penta
Building 31	8.3		7.2	8.3		1.10	0.00
Building 32	12		12	12		0.00	0.00
Building 33	7.6		6.8	6.8		0.80	0.80
Building 34	10.1		9.6	9.9		0.50	0.20
Building 35	12.1		9.7	12		2.40	0.10
Building 36	9.3		10.1	9.1		-0.80	0.20
Building 37	9.3		8.6	9.1		0.70	0.20
Building 38	9.2		9.2	9.2		0.00	0.00
Building 39	6.7		7.3				
Building 40	10.2		10	RMSE	0.59	0.63	0.34

Preliminary Results

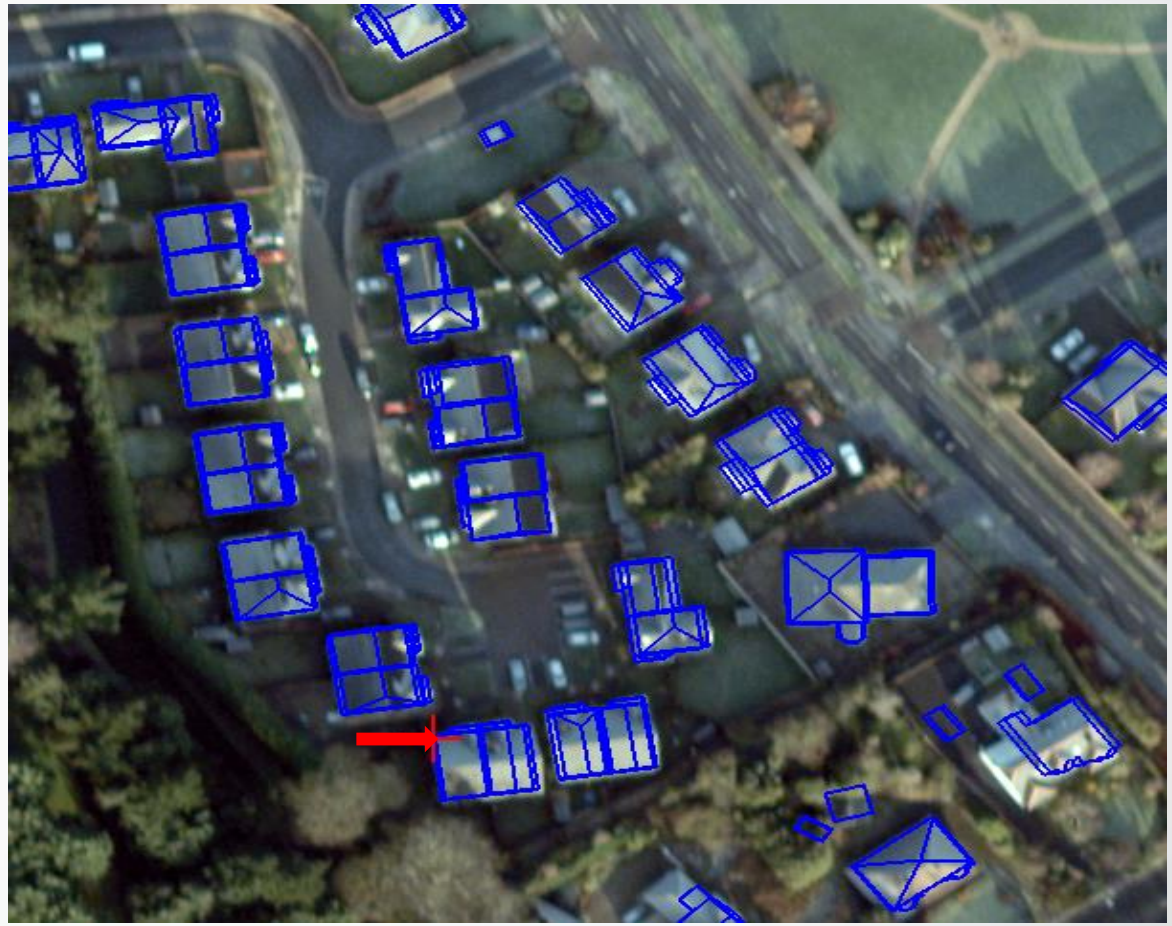


ADS City Modeller Bld 5

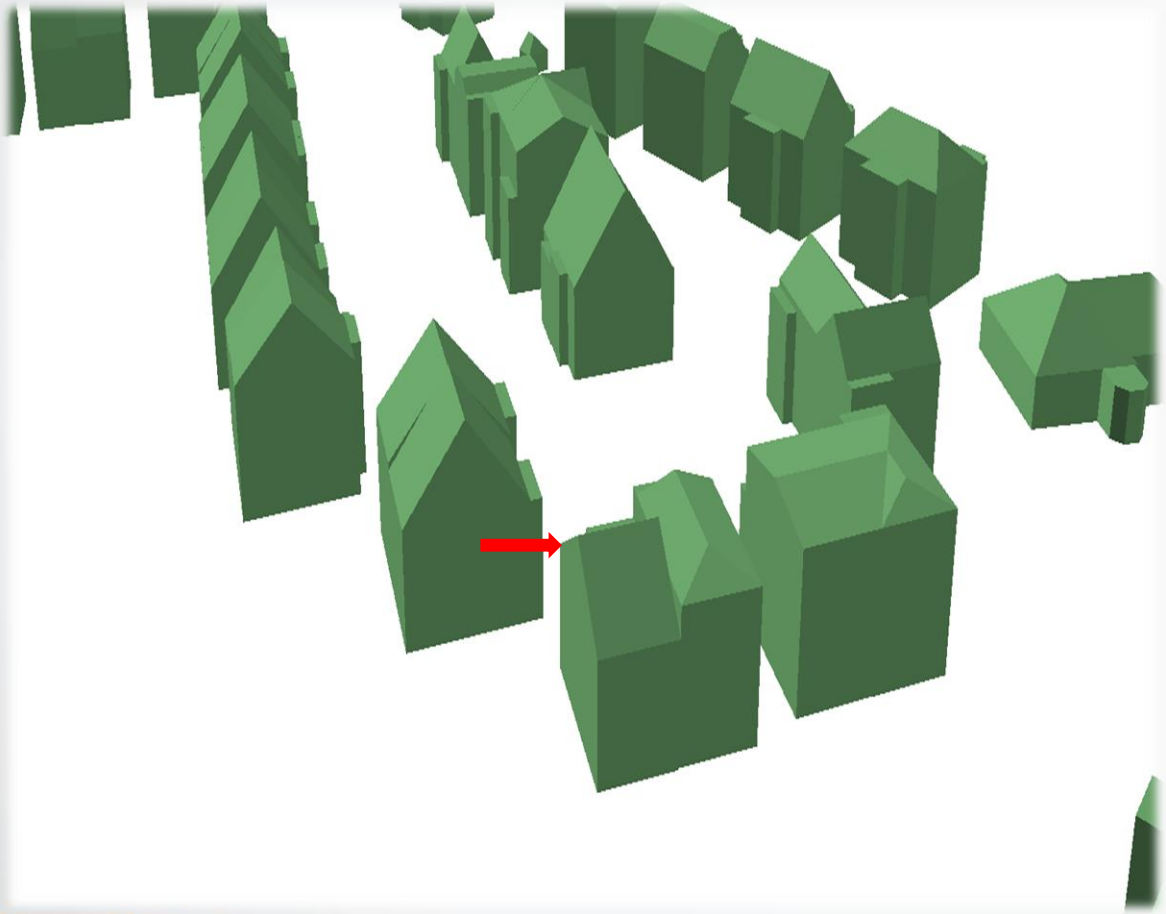
Preliminary Results



RCD City Modeller Bld 5



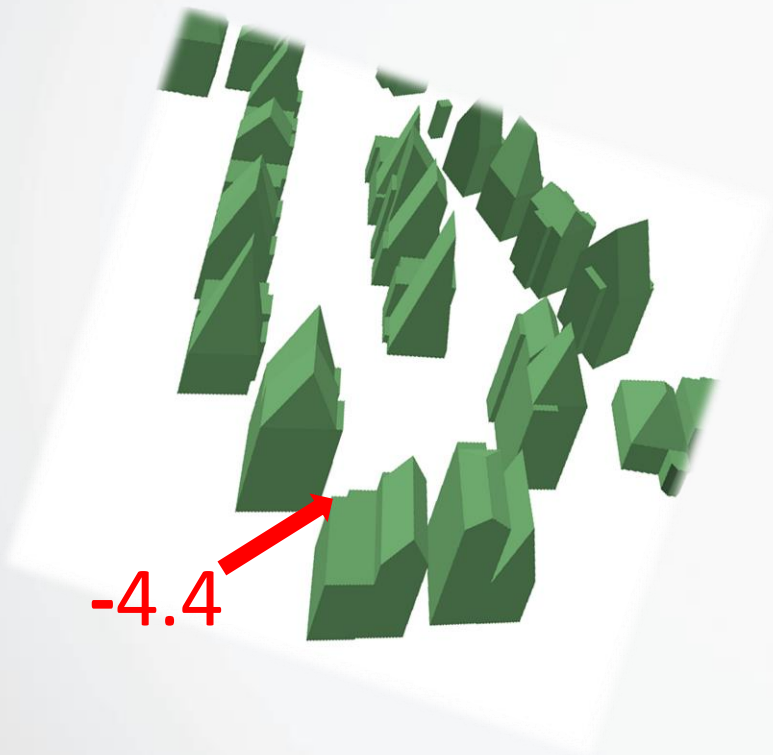
Preliminary Results



Penta City Modeller Bld 5

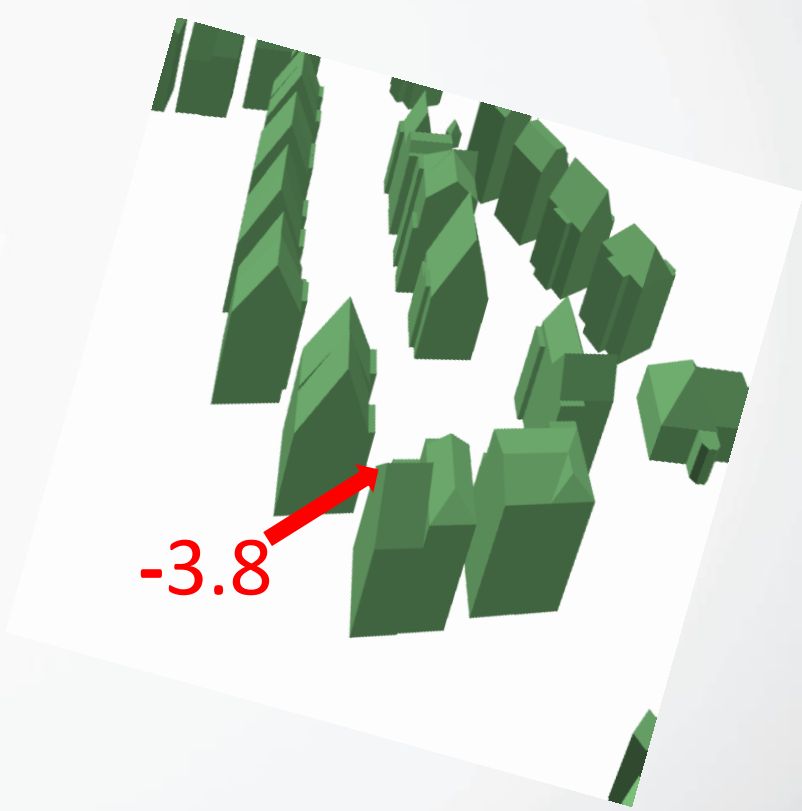
Preliminary Results

RCD City Modeller B5



ADS City Modeller B5

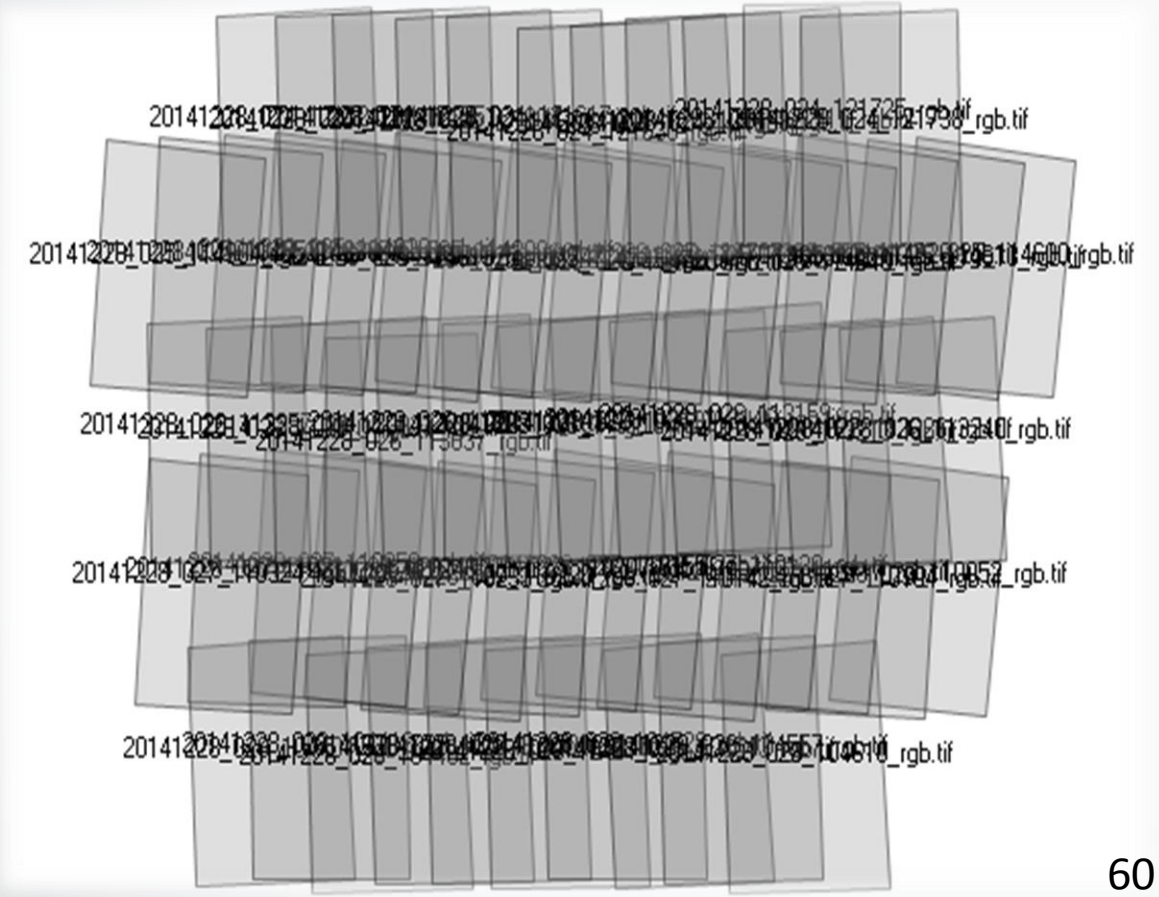
Penta City Modeller B5



Preliminary Results

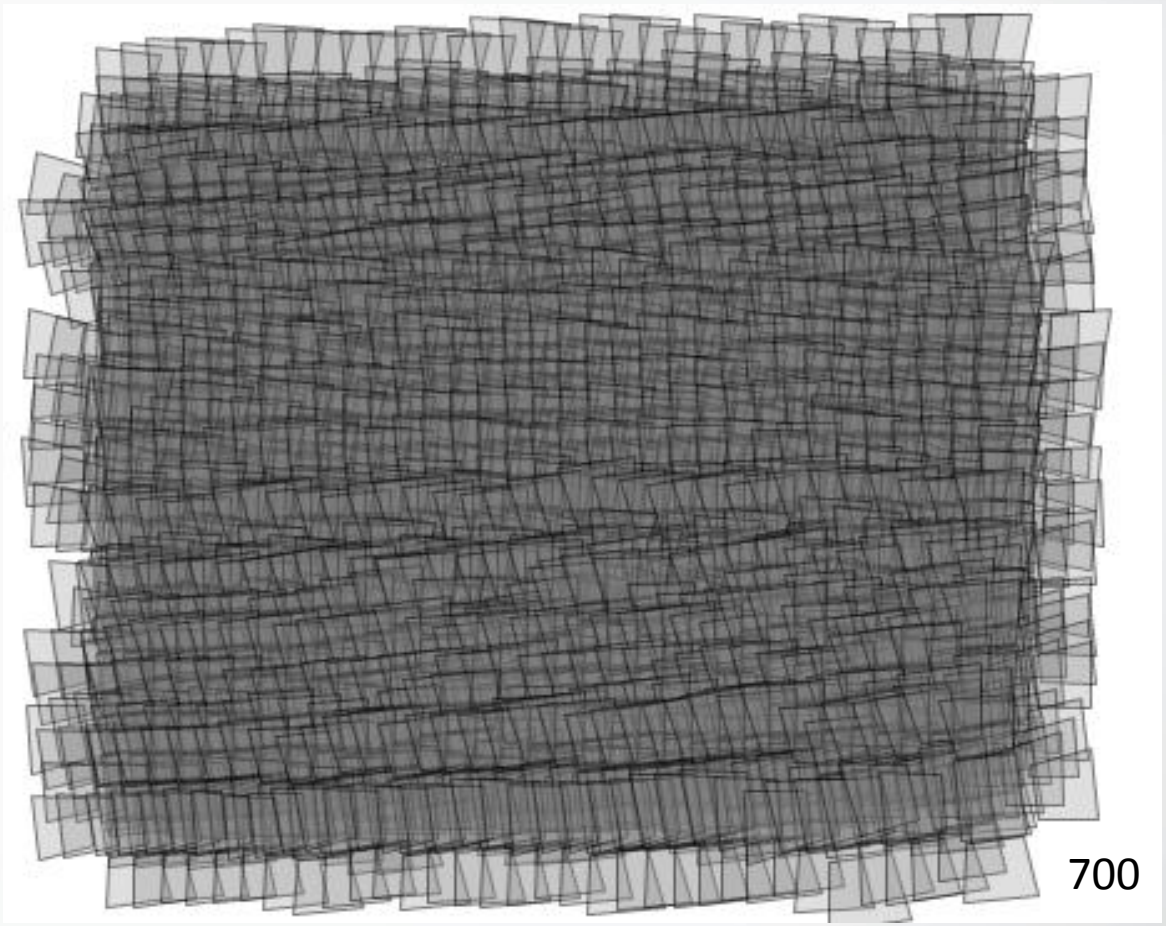
- Computing Times
  - ADS City Modeller 5mins. (ADS Coverage 40% of area)
  - RCD City Modeller 1hr 25mins
  - Penta City Modeller 37hrs
- Computer
  - Dell Precision Wk. Station T3500
    - Quad Core
    - 8Gb Ram

Preliminary Results



60

Penta City Modeller Bld 5



700

Next Steps

- Investigate the factors impacting the results we are getting
  - Flight planning
  - Weather
  - Knowledge of application
  - Building footprints
- Higher quality point clouds
  - Generate point cloud from oblique imagery
  - Find ways to fuse point clouds from other sources
- Continue to investigate the generation of footprints relative to the resolution of the imagery
- Automatic generation of solid objects as an output.