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LP360

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# LP360 Land Users Guide

LP360

TRUEVIEW

Version 2024.2.107.0

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## ABOUT MDGROUP

mdGroup is an aerial digital twin maker for industrial applications. It operates its digital twin making business through its portfolio companies Microdrones and GeoCue.

To learn more about mdGroup, visit www.group-md.com

## ABOUT GEOCUE

GeoCue is a U.S. based LiDAR data technology company offering software, hardware, training, support and consulting services for high accuracy LiDAR and imaging drone mapping to help civil engineering and surveying professionals achieve successful data collection, processing, and management.

With its TrueView drone LiDAR/Imaging sensors and LP360 point cloud data processing software, GeoCue is the leader in LiDAR mapping processing in North America.

To learn more about GeoCue, visit www.geocue.com

## ABOUT CHC NAVIGATION

Founded in 2003, CHC Navigation (Huace:300627.SZ) creates innovative GNSS navigation and positioning solutions to make customers' work more efficient. CHCNAV products and solutions cover multiple industries such as geospatial, construction, agriculture and marine.

With a presence across the globe, distributors in more than 120 countries and more than 1,700 employees, CHC Navigation is today recognized as one of the fastest growing companies in geomatics technologies. To learn more, visit chcnav.com.

## ABOUT LP360 LAND

LP360 is a 64-bit Windows® desktop application used for many years by the LP360 Geospatial community for processing traditional aerial, mobile, and terrestrial tripod laser scanner data. The LP360 Land community is the focus of this Users Guide containing the LP360 workflows for processing and exploiting TrueView and other handheld sensor data. LP360 Land is GeoCue's LP360 point cloud exploitation product with the addition of a collection of tools and workflows for processing handheld data. LP360 Land is the software used to post-process your raw data to generate a 3D LiDAR point cloud in LAS format, colorize the point cloud, and geotag the images collected. LP360 also has many tools for assessing and processing point cloud data, such as accuracy assessment, automatic and manual ground classification, and contour/ surface generation. LP360 Land is available in the following licensing levels:

- **LPViewer** – A free viewer level of LP360 for viewing a point cloud.
- **LP360 Land** – Enables PPK processing for systems, such as the DJI P4P RTK, plus TrueView 2DIS and 3DIS. This is the next generation ASPSuite Advanced and is equivalent to LP360 Standard with the addition of the sensor workflow tools and tools for ground classification and volumetric computations. It is limited to product areas of no more than 10 $km^2$ of LAS data. Available as an annual subscription or a perpetual license.
- **LP360 Land +3D Accuracy** – Enables the automatic detection of Accuracy Stars and related target types. Available as an annual subscription or a perpetual license.
- **LP360 Land+Photo** – Enables local Ortho Mapping. Available as an annual subscription or a perpetual license.
- **LP360 Land+Photogrammetry with Agisoft** – Enables local Agisoft Ortho Mapping, if you have a Metashape license, and Cloud based Agisoft Ortho Mapping (using LP360 Points). Available as an annual subscription or a perpetual license.
- **LP360 Land+Cloud Photo 3000** – Enables both the local Ortho Mapping, local Agisoft Ortho Mapping processing if you have your own Metashape license, and Cloud based Agisoft Ortho Mapping (includes 3000 photos per month, additional photos may be processed using LP360 Points). Available as an annual subscription license.
- **LP360 Land+Strip Align** – Enables Strip Align and Strip Adjustment tools for adjusting for dynamic trajectory errors in the dataset. Available as an annual subscription or a perpetual license.
- **LP360 Land+Business Intelligence Tools** – Enables specific point cloud tasks designed for extraction of non-ground features, such as rail, power lines, buildings, trees. Available as an annual subscription or a perpetual license.
- **LP360 Land+Unlimited** – this is the same functionally as LP360 Land with the size limit removed. Available as an annual subscription or a perpetual license.
- **LP360 Land+Experimental** – this is the same functionality as LP360 Land with the addition of features classed as experimental. We may occasionally have features that we call experimental where we have limited access available only to those organizations specifically working with us on those features. Or, at times, a pre-release version being used for training.

## ABOUT LP360 ONLINE

LP360 Online is an Amazon Web Services (AWS) hosted platform that is used for a variety of purposes in TrueView (and other) workflows. It provides services such as (items marked with a $T are extra cost, paid in Points):

- Project data hosting and visualization ($T)
- Data archival ($T)
- Management and automatic delivery of sensor calibration files
- Automatic sensor health check
- Transfer of sensor Cycle data to GeoCue for technical support
- Management of Points for services that are paid via a metering scheme (marked in this list with $T)
- Transaction history of sensor usage
- other related services

LP360 Online is accessed from within LP360 Land in various workflows. These workflows might require an LP360 Land user to provide their login credentials. LP360 Online has a web interface for data visualization, processing, and account monitoring.

Every customer is provided an LP360 Online account.

## ABOUT LP360 CLOUD

LP360 Cloud is an ever-growing collection of cloud-based tools and resources that will make it easy for you to manage, archive, share and collaborate on geospatial projects.

LP360 has four LP360 Cloud Addon products that are subscription licenses. The **LP360 Cloud Access** license is required to use all additional cloud add-on licenses:

- **LP360 Cloud Access** → Storing and sharing data
- **LP360 Cloud Starter** → Power Search, streaming, and cloud data processing.
- **DJI L1/L2 Cloud Batch Processing** → DJI L1/L2 raw data processing
- **Automatic Cloud Ground Classification** → Automatic and AI ground classification

See the LP360 website for the latest that LP360 Cloud has to offer and activate or renew your subscription today in the LP360 Portal.

Note: These license types are not included in the Desktop License. Access will need to be granted to each user within the LP360 Portal. For information on how to assign Cloud Licenses, please see LP360 Portal License Management > Cloud License Management.

## ACCESSING AND MANAGING LP360 ONLINE FROM A WEB BROWSER

LP360 Online, is the infrastructure for LP360 Points and online data storage via LP360 Cloud. LP360 Online allows your account admin to add users who can use your account's LP360 Points and licenses for processing.

1. If you did not create your online account when making your first subscription license purchase then GeoCue will create your account's LP360 Online account, which you can access at the URLs:

   LP360 Portal for user, subscription license and LP360 points management:
   *https://portal.lp360.com/*
   LP360 Cloud for data storage, archiving, sharing, and streaming:
   *https://cloud.lp360.com/*
2. GeoCue will assign someone from your account as the point of contact. This person will be the store administrator of your LP360 Cloud account and may invite additional users who are allowed to process. The point of contact will receive an email after purchase which contains the invitation to create login credentials.
3. Additional users may be added at any time by your LP360 Portal Admin.
4. An invitation email is sent to new user(s) by the LP360 Portal.
   a. The user selects the *Setup Account* link in the LP360 Invitation e-mail to confirm the e-mail and create a password.
   b. The password can be reset by the user by accessing one of the LP360 Online URLs and using the "*Forgot Password?"* link on the login page. Note: The password reset will only work if the user has previously confirmed their e-mail address within the specified timeframe in the LP360 Invitation e-mail. Contact support to have your invitation e-mail re-sent.

## A CYCLE

All TrueView sensors, write their various data streams to a standard file folder structure called a "Cycle" on the USB drive or internal memory. The term cycle refers to a sensor power cycle because TrueView datasets are started and terminated by the sensor power cycles. It is possible to have multiple collections (flights, in the case of a drone) in a single Cycle, so it is not necessarily correct to think of Cycle as being synonymous with flight, though it is typically.

# LICENSING AND INSTALLATION

## SYSTEM REQUIREMENTS

**Recommended systems for LP360 Land Processing:**

- Windows Version 10, Professional (64-bit) or Windows 11 Professional, or their server equivalents.
- i7 or equivalent CPU. The more cores, the faster the processing.
- 16 GB RAM (32 GB recommended).
- Nvidia Graphics recommended but not required.
- Graphics must support Open GL 4.5.
- Internal Solid State Disk (SSD) with a minimum capacity of 256 GB.
- Secondary storage recommended but not required (e.g., 2 TB spinning disk).
- USB 3.0 Required for data transfer from the TrueView USB Mass Storage (TrueView USB memory stick).
- High speed network access required for TrueView Cloud processing (cloud processing of the trajectory is the only mode supported for rental systems).
- A minimum 1920 x 1080 resolution display recommended. High resolution, 4k displays, require configuring LP360 Land shortcut properties per Microsoft's recommendations.
- Dual Display is highly recommended for office setups.

## INSTALLING LP360 LAND

When your TrueView system or LP360 Land is purchased, or a rental or subscription is to begin, your account's point of contact will receive an email from support with instructions for downloading the latest version of LP360 Land from the LP360 Portal, or from the LP360 Installers page on our searchable support knowledge base. For perpetual licenses, a username, password, and link for your LP360 Online account should be provided in the email, along with your perpetual License String. For subscription licenses and licenses provided with a TrueView rental, the first time your organization rents or uses LP360, you will receive an invitation to confirm your e-mail address and create a password to access the LP360 Portal to download LP360 and to also use as your license credentials.

### PERPETUAL USERS

Download the latest version of LP360 Land from the LP360 Portal or the LP360 Installers page on our searchable support knowledge base and copy to a local drive on your computer. Double-click on the installation file to install LP360 Land. Once installed, use the steps below to activate LP360 Land using the License String provided in your licensing email.

*Note: It is necessary to enable outbound communications to TCP ports **5053,** and the **customer specific port** outlined in your licensing email, on any firewalls for the product to communicate with the hosted license server. These ports are normally open by default on most firewalls.*

### SUBSCRIPTION USERS AND TRUEVIEW RENTALS

Download the latest version of LP360 Land from the LP360 Portal and save to a local drive on your computer. Double-click on the installation file to install LP360 Land. Once installed, use the steps below to activate LP360 Land using a login and password.

## PERPETUAL LICENSING FOR LP360 LAND

1. Open LP360 Land and select **License Manager** from the Startup dialog, or **File -> License Manager**
    a. If your version of LP360 Land is currently unlicensed, you will get an error and be prompted to open License Manager when you try to open it.
2. On the Activation tab, under Credentials, select **Perpetual**, then copy and paste the License String, which includes a password, into the License String field.
3. Select "Set" to set the License String. Once successfully set there is no need to set the License String again.
    a. If you encounter an Invalid License String Error message, see the probable resolutions on our searchable support knowledge base.
4. The *Available Licenses* portion of the license manager should now be highlighted. Select the dropdown to select the LP360 Land license.
5. **Select C*heck out floating license* to use your floating license**. An Internet connection must be maintained while using a floating license.

a. If you need to use the license without internet connectivity, check the box to roam the license, and then check out the license. A license can be roamed for up to 30 days. Other users with access to this license will not be able to use it while the license is roamed.

6. The *Current License* portion of the dialog should now show the license type with a green checkmark (Figure 1) indicating that the license has been activated.

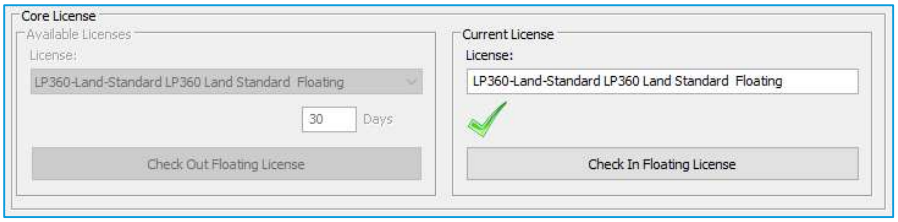



**Figure 1 - License Manager**

7. The license is now activated, and LP360 Land can be used for processing.
8. If applicable, select additional addon products from the Available Products list and select "Check Out License" to enable the addon license in addition to the base LP360 Land license.
9. Select Close to close the LP360 Land Manager and open LP360 Land at the desired license level.
10. You can reopen the LP360 Land License Manager at any time from within LP360 Land (File -> License Manager) to change license levels.
11. Repeat this process for all desired machines.

The LP360 Land license comes standard as a floating license, which means the license can be shared easily within your organization. Just install LP360 Land on all the machines that need to use the software, then repeat steps 1-6. Only one machine can use the license for one instance of LP360 Land at a time. The license can be checked in and out as needed if it is not in use by another machine.

| ***Feature Level*** | ***LP360*** | ***LP360 Drone*** | ***LP360 Land*** |
|---|---|---|---|
| Visualization | Viewer (V) | Explorer (X) | Viewer (V) |
| PPK processing | | Drone (D) | |
| TVGO processing | | | Land Basic |
| Registration tools | Advanced | BIT addon | Land Standard |
| Auto detect 2D and 3D targets in the Control Report | Advanced | 3D Accuracy addon | 3D Accuracy addon |
| Creating Products | Basic | | Land Standard |
| Interactive Edit | Standard | | Land Standard |
| Automated Extraction, TrueView 3DIS® Post-Processing (Drone Only) | Drone (D)[1], Advanced | BIT addon | BIT addon |

| *Feature Level* | *LP360* | *LP360 Drone* | *LP360 Land* |
|---|---|---|---|
| Removes 10 km2 size restriction | | Unlimited addon | Unlimited addon |
| Experimental | Advanced | Experimental addon | Experimental addon |

**Table 1 - Licensing Levels of LP360**

## SUBSCRIPTION LICENSING FOR LP360 LAND

1. Open LP360 Land and select **License Manager** from the Startup dialog, or **File -> License Manager**
    a. If your version of LP360 Land is currently unlicensed, you will get an error and be prompted to open License Manager when you try to open it.
2. On the Activation tab, under Credentials, select **Subscription**, then enter the same credentials you created when completing your invitation to the LP360 Portal to access the licenses for your organization.
3. The *Available Licenses* portion of the license manager should now be highlighted. Select the dropdown to select the LP360 Land license.
4. **Select C*heck out floating license* to use your floating license**. An Internet connection must be maintained while using a floating license.
    a. If you need to use the license without an internet connection, check the box to roam the license, and then check out the license. A license can be roamed for up to 30 days. Other users with access to this license will not be able to use it while the license is roamed, and a roamed license will not be automatically checked in when the LP360 session is closed.
5. The *Current License* portion of the dialog should now show the license type with a green checkmark (Figure 1) indicating that the license has been activated.

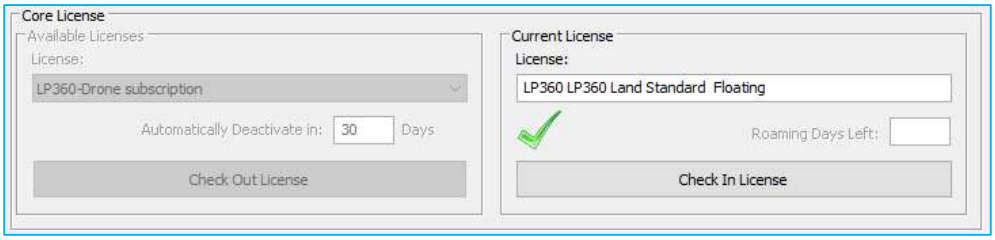



**Figure 2 - License Manager**

6. The license is now activated, and LP360 Land can be used for processing.
7. If applicable, select additional addon products from the Available Products list and select "Check Out License" to enable the addon license in addition to the base LP360 Land license.
8. Select Close to close the LP360 Land License Manager and open LP360 Land at the desired license level.
9. You can reopen the LP360 Land License Manager at any time from within LP360 Land (File -> License Manager) to change license levels.

10. Repeat this process for all desired machines.

## STARTUP DIALOG

Upon launching LP360 Land, you will be presented with the LP360 Startup dialog containing the frequent starting places.

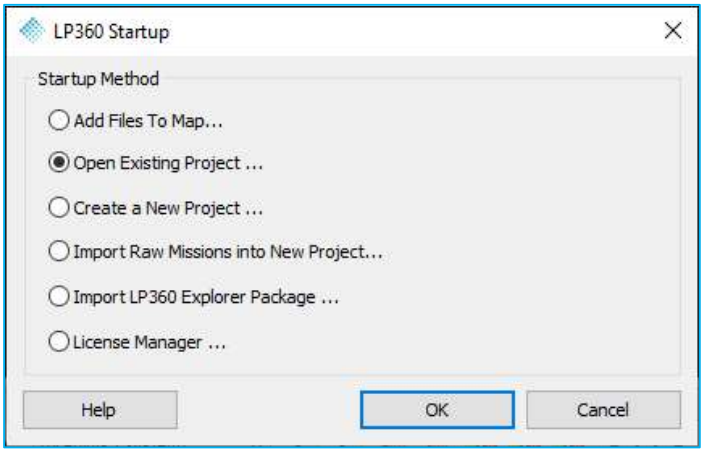



**Figure 3 - Startup dialog**

- **Add Files to Map –** The typical starting place for geospatial users to start a project by adding LAS, Raster, Feature files, etc. to the session.
- **Open Existing Project** – Launches Project Manager and presents the list of previously opened projects, defaulting to the last opened project.
- **Create a New Project** – Opens the Create Project dialog for when you wish to create a new project from existing LAS/Raster/Feature/True Pose Photo data instead of a Cycle. Not typical for a TrueView workflow as a new project is created when importing the first Cycle into a NEW project.
- **Import Raw Mission into New Project** – Opens the Raw Mission Import Wizard to walk you through creating a new project while importing raw mission (Cycle/Flight) data from a TrueView, microdrones, other supported sensor, or sensor trajectory and LAS from any sensor into LP360.
- **Import LP360 Explorer Package** – Opens the Import Explorer Package dialog to create a new project from an Explorer Package. This is the starting place for the LP360 Explorer license user who has received an Explorer Package from a TrueView sensor owner.
- **License Manager** – Invoke the License Manager dialog to license or change the desired license level. Upon closing the License Manager dialog, returns to the Startup dialog.

Note: Cancelling the Startup dialog will bring you into a blank session of LP360 Land.

## LP360 ONLINE LOGIN IN LP360 LAND

LP360 Online is used for a variety of purposes in TrueView workflows. To facilitate, the settings use a universal online login in the upper right of the LP360 Land main frame (Figure 4). For perpetual licenses, this login is separate from your license credentials, but are the same credentials for subscription users with LP360 Online. Users with LP360 Online licenses are automatically logged into LP360 Online and will not see the Online Account Sign in dialog when selecting on the [Sign In] button. LP360 Online subscription license users do not have a log out option.

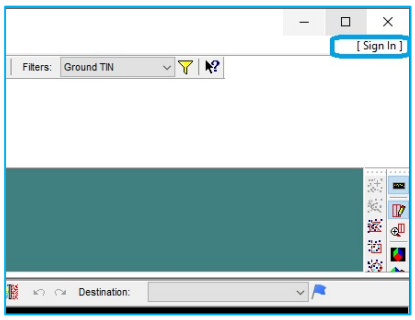



**Figure 4 - Unified Online Login**

The login string shows information about the login in the following format:

*email of logged in user* (*Account*) [*Point balance*]

To sign in or change online accounts, the user left clicks on the login bar, opening the *Online Account Sign In* dialog (Figure 5).

> For LP360 Online, the user should be automatically signed when using subscription license credentials.
>
> TrueView Reckon has been deprecated. **DO NOT USE**. Please use your LP360 Online account.

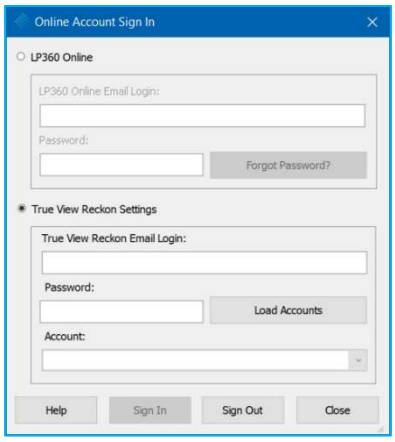



**Figure 5 – Online Account Sign In dialog**

Note: It is not necessary to sign into your online account if you are not going to do any online related processing, but there are more functions being added to LP360 that utilize LP360 Online as time goes on.

## UPDATING LP360 LAND

Users already running LP360 Land v2024.2 or later may update LP360 Land by the prompt they will see when starting LP360 Land, or by selecting Help -> Check for Updates in the LP360 Land dialog. The latest version of LP360 Land may also be downloaded from the LP360 Portal or from the LP360 Installers page on our searchable support knowledge base and installed over the older version.

**Release** – The default and recommended selection is to automatically download and install the latest LP360 Land release.

**Patch** – Installs small patches for defect fixes and changes without needing to perform an entire service pack installation.

**Service Pack** – A roll up of the available patches into a complete installer that includes the full release installer.

**Experimental** – Access to the experimental version is granted based on the organization and uses the LP360 Online login. We may occasionally have products or features that we call experimental where we have a limited version available only to those accounts specifically working with us on those features or products. Or, at times, a pre-release version being used for training and available from the TrueView Training account.

**Figure 6 - Check for Updates**

## CREATING A NEW LAND PROJECT

The following steps will guide you through each step of the workflow, importing data to create a land project, generating a LiDAR point cloud, tagging photos, or performing registration. Importing a Cycle is the first step, post data acquisition, of the Sensor workflow. A Cycle can be imported into LP360 Land to form a new project or, if a project already exists, to add a Cycle to that project.

1. Open LP360 Land and check out your license if necessary. See the Licensing LP360 Land section in this document.
2. Insert the USB drive, which contains your Cycles/Flights (raw flight data), into your computer.
3. Select **Cycle Import** on the **Sensor** tab (Figure 7) to open the *Raw Mission Import Wizard*. If the wizard is run outside of an existing LP360 project, then it will create a new project. If you run the wizard from within an existing project, the occurrences of "NEW" in Figure 8 are replaced with "CURRENT".

**Note:** If the *Cycle Import* button is greyed out, then you do not have a valid LP360 Land license checked out. See the Licensing LP360 Land section in this document.

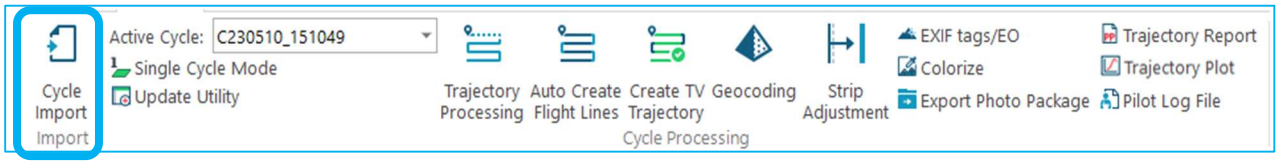



**Figure 7 – Import Cycle**

## RAW MISSION IMPORT WIZARD

Selecting **Cycle Import** on the Sensor tab brings up the first page of the Raw Mission Import wizard (Figure 8).

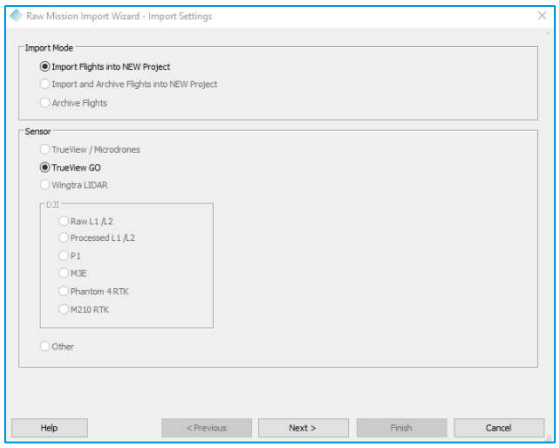



**Figure 8 - First page of Import Cycle Wizard for a NEW Project**

An alternative way to enter to the Raw Mission Import Wizard is via the "LP360 Startup" onboarding window.

1. Select "Import Raw Mission into New Project…"

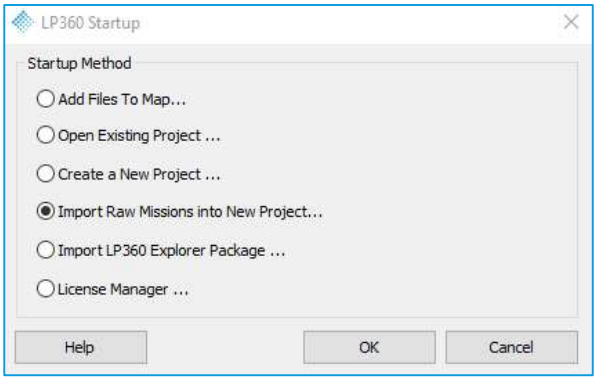



**Figure 9: Startup window**

### IMPORT MODE

The import mode options allow you to import a Cycle. **Import Flights into NEW/CURRENT Project** – this option imports a Cycle into an existing or new project.

### INPUT TRUEVIEW GO CYCLES

Step by step how to process a TrueView GO (TVGO) handheld mapping dataset in LP360.

1. Select "Import Raw Missions into New Project…"

2. Select "TrueView GO".

3. Press "Folder" to import the raw data from the sensor. You can select 1 or more cycles (datasets) to be process in the same project.
   **Note:** the very first time you select TVGO data the software will ask you to install the LP360 sensor extension.

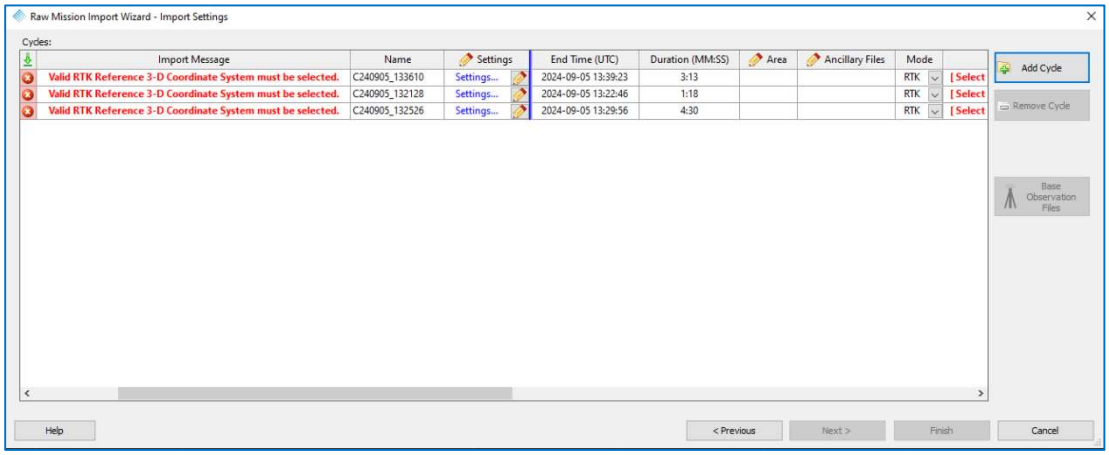



**Figure 10: Import wizard TVGO**

5. Settings , the TrueView Go Advanced Settings provides extra settings to the TVGO processing

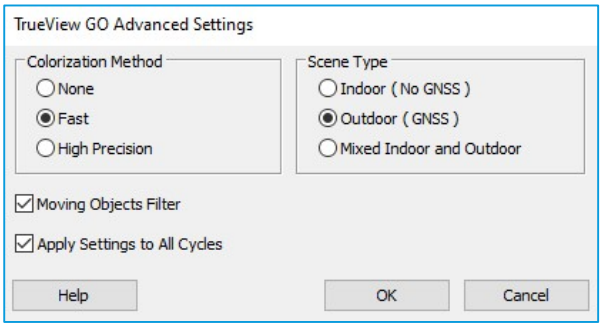



**Figure 11: TVGO Advance Settings**

1. Colorization Method: this setting controls the colorization type required
   1. None: generates a non-colorized point cloud
   2. Fast: Recommended colorization point cloud
   3. High Precision: Highly intensive colorization that preserves better the real features colours. However, it is time consuming.
      Note: This setting requires a NVIDIA graphics card. It is recommended a 3050Ti series and above GPU, Intel Corei7 and above CPU.

2. Scene Type: this setting helps the algorithm to improve the 3D reconstruction
    1. Indoor (No GNSS): Recommended for Indoor areas. It will be automatically selected if the user selects "SLAM" mode.
    2. Outdoor (GNSS): Recommended for Outdoor areas with GNSS reception. It will be automatically selected if the user selects "RTK" or "PPK" mode.
    3. Mixed Indoor and Outdoor: Recommended for projects with areas outdoor and indoor, in this type of projects most of the work is done outside with GNSS reception, however there will be small areas surveyed indoor without GNSS reception.
3. Moving Objects Filter: Filter that will try to clean moving objects from the point cloud.
4. Apply Settings to All Cycles: Select this option to apply the same settings selected to all the cycles.

6. Now, select the processing mode in the "Mode" column. There are 3 different types:
    1. SLAM--> dataset acquired in a local coordinate system
    2. RTK --> dataset georeferenced with a global coordinate system. The user needs to select the RTK Geographic CRS. The most common geographic CRS are: "WGS84 + Ellipsoidal" (world), "NAD83(2011) + Ellipsoidal" (CONUS) and "ETRS89 + Ellipsoidal" (Europe).
    3. PPK --> dataset georeferenced with a global coordinate system, it requires a base station. The user needs to select a RINEX file and the coordinates of the base station.

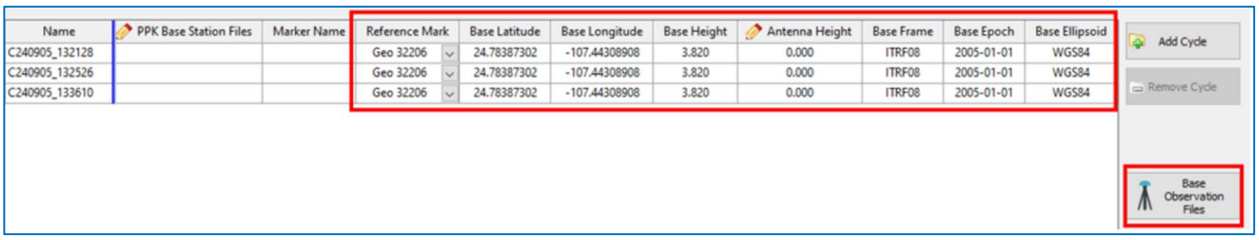



**Figure 12: PPK processing TVGO**

7. Press Next.
8. Select the Project Root Folder and the Project Name.
9. Select the desired CRS.

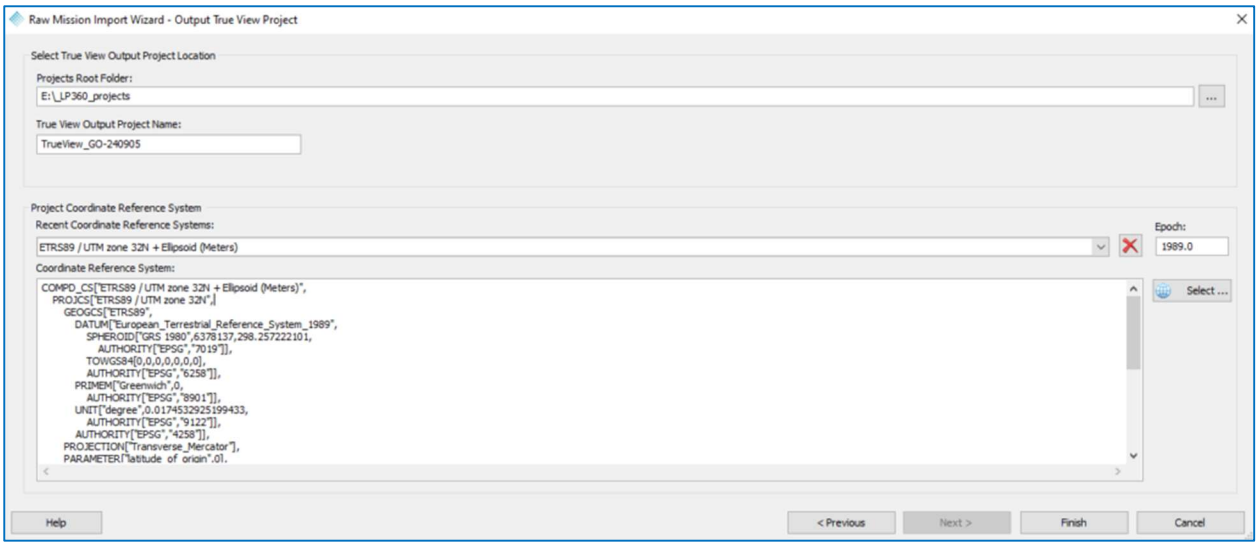



**Figure 13: Project Root and CRS selection**

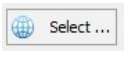
**Tip:** Select "Local Coordinate system" for SLAM datasets

10. Press Next –> The summary will be display –> Press next.
11. Data imported.

## SETTING TRUEVIEW PROJECT, COORDINATE REFERENCE SYSTEM AND EPOCH

If creating a new TrueView Project during the import (i.e., you are not running this wizard from within an existing TrueView Project), you will be presented the dialog of Figure 13. Browse to the top-level folder where you would like the TrueView Project folder to be created. There is a **Default Projects Root Folder** setting on the File -> Project Settings -> Project tab if you would always like your projects created in the same location (recommended). Under the "TrueView Output Project Name", type in the name of your new project. You will receive an error message if a Project of that name already exists in the selected project folder. If this occurs, choose a different project name (or location).

If running the Wizard from within an existing TrueView Project, the Cycle being imported will be added to this project (which, of course, is already named), hence the import Wizard will skip this step.

In the lower section of the dialog, set the Coordinate Reference System (CRS) that will be used for the project by selecting from the Recent Coordinate Reference System list or by selecting the 

to open the Select Project Coordinate Reference System dialog (Figure 14). Remove an item from the Most Recent Used list by selecting the item to delete and pressing the ✖ tool. The suggested UTM zone is provided to assist users processing to UTM, but unsure of in which zone the data resides.

**Note: If adding a Cycle/Flight to an existing project, this section of the dialog will show the current project CRS but will not allow you to change it (you can change a project CRS via other LP360 tools).**

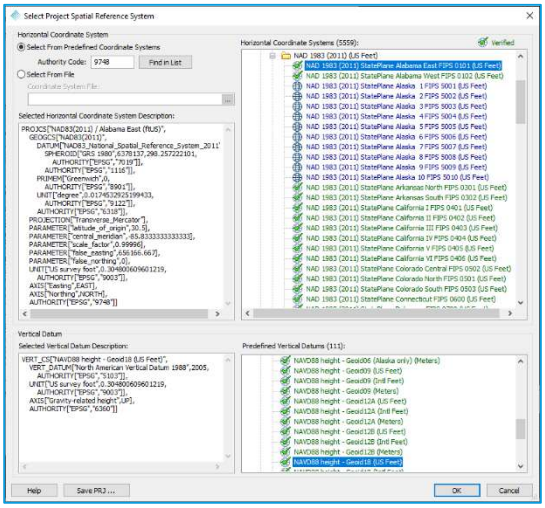



**Figure 14 - Select Project Coordinate Reference System**

The project epoch is set when the project CRS is selected if one is known for the datum of the selected project CRS. It can be verified (File -> Project Settings -> Project -> Project Epoch) and modified after Import Cycle has completed. Use the decimal year of the **Cycle Date** for coordinate reference systems using variable ellipsoid and variable epoch, such as the WGS84 datum, otherwise select enter the applicable epoch for the datum of your coordinate reference system. For example, NAD83(2011) has a fixed ellipsoid and variable epoch date of 2010.0. Typically, the epoch date for your project datum should be selected by default.

## EXAMINING IMPORTED FILES

After the import is complete, the trajectory files will be displayed in the map view of LP360 Land. A WMS layer will be displayed behind the data so the user can see approximately where flight path occurred. The white box on the left side is the Table of Contents (TOC), the map area on the right is referred to as the Map View. Each layer in the TOC is named after the Cycle date and time, with a name appended to the end that represents the type of information contained in the layer and prepended by the Area Name (Area_Name_Cycle_Flight). A layer can be selected by left clicking on the desired layer until it is highlighted. Once selected, right-click the layer and select Feature Analyst to open the Feature Analyst dialog to review the attributes of features on the layer.

**Figure 15: TOC and Map View**

a) **Trajectory Line Layer** – Shows the real-time trajectory from the beginning to the end of the Cycle.
b) **Trajectory Points Layer** – TrueView Go sensors collect a location point every second based on the real-time navigation position information from the Position and Orientation System. You can select a Trajectory Point with the info tool to show metadata such as location and height in the info pane of the TOC. These points can be used to Manually Create Flight Lines.
c) **Retain Photos Layer –** This layer contains information about the photos acquired in the area of interest, keeping all the True Pose information. These photos are the same as the photos contained in the Photo Layer but narrowed to the area of interest.
d) **Photos Layer** – This layer contains information about each photo and photos can be viewed in Feature Analyst. The icons in the Map View represent the location each photo was taken, using the navigation grade solution (real-time) of the TrueView Position and Orientation System (POS). If your sensor has multiple cameras, you will see an icon for each photo from each camera. Thus, if you zoom in on the display, you will usually see photo icons close together. This occurs because TrueView sensors with multiple cameras usually fire the cameras at approximately the same time. You can quickly *inspect* information about any *feature* in LP360 by selecting the Info tool (the "I" icon on the main toolbar), left clicking the item you wish to inspect and viewing the attribute data in the Info pane of the TOC. This is illustrated for a photo in Figure 17.
e) **WMS Layer** – A WMS backdrop layer, such as Google Hybrid or Bing Aerial with Labels, allows the user to check the flight for coverage and rough location.
f) Layer toggle On/Off – Each layer can be toggled on/off and viewed independently by toggling the checkbox next to the layer.
g) Layer in Map – Each layer is plotted on the map view as shown in) in the order they are listed, from top to bottom, in the TOC.

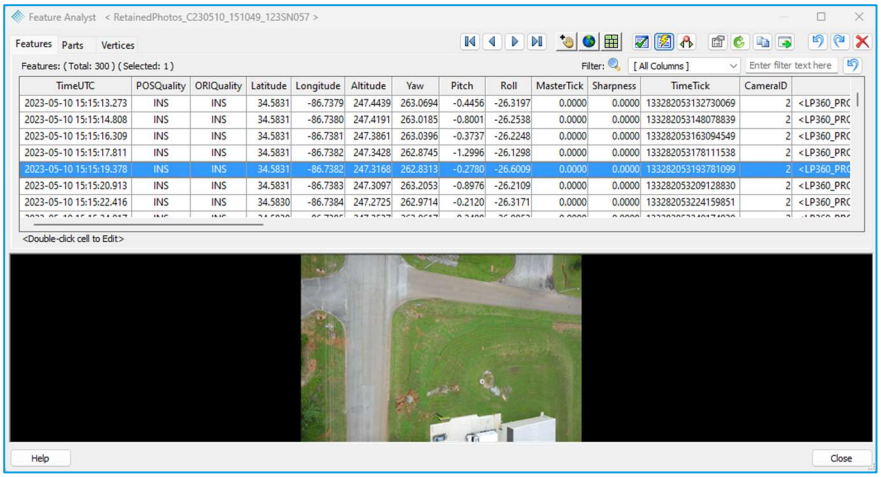



**Figure 16 – Feature Analyst**

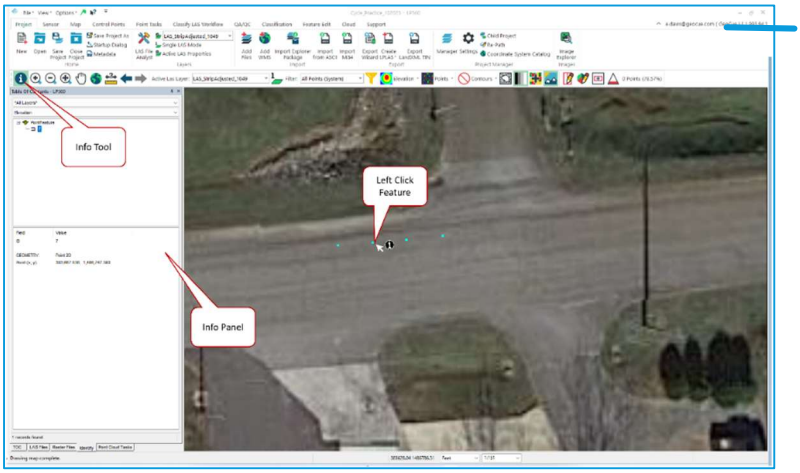



**Figure 17 - Inspecting a Feature**

Repeat the TrueView Import Wizard to add more datasets to the same project. After the data has been imported and the files have been examined.

## SINGLE CYCLE MODE

Enabling **Single Cycle Mode** will display layers relevant to the Active Cycle making for efficient review of the layers for each imported Cycle/Mission. The Single Cycle Mode is a shortcut configuration for the standard Use mode in Project Manager where, layers are live and you can modify the display by changing the layers listed in the Table of Contents. Members of the active Cycle display group are configured automatically during Cycle Import but may be modified by using the Groups -> Build mode on the Groups/Layers tab of Project Manager. The build mode allows one to set up new groups, edit existing groups, and delete groups you no longer need. You can also automatically create groups based on unique cycle or temporal data. Use the Refresh button to update the Table of Contents to see any

changes you have made. In build mode, select the group to modify on the left, then layers can be configured as **V**isible, **M**ember, **B**ase, and/or **I**mage**E**xplorer.

**V**isible – The layer is enabled in the TOC and visible in the map view when the view group is selected when in the Use mode.

**M**ember – The layer is part of the selected group and displayed on the TOC when the view group is selected when in the Use mode.

**B**ase – Denotes the layer is a base layer, such as a WMS layer.

**I**mage **E**xplorer – Denotes the layer is suitable for use by Image Explorer. LP360 disables the photo layer when it creates the Retained Photos layer to remove the photos in turns and takeoff and landing from being displayed in Image Explorer.

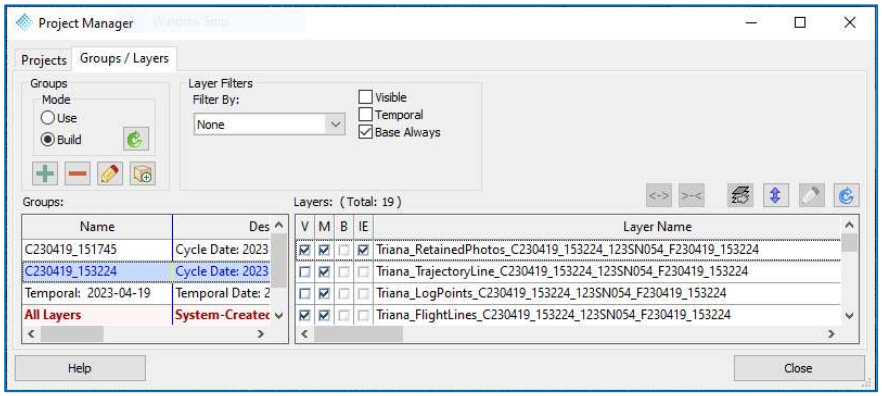



**Figure 18 - Build Mode in the Groups/Layers tab of Project Manager**

# TRUEVIEW GO PROCESSING WORKFLOW

This section provides a step-by-step guide to processing TrueView GO data from the point of project creation to a colorized point cloud, exporting a photo package for downstream processing, or aligning multiple datasets.

## TRUEVIEW GO POINT CLOUD GENERATION

Once the cycles are imported into LP360, it will automatically start processing the raw data.

### JOB MANAGER

2. The TrueView GO (TGO) job progress may be monitored using Job Manager.

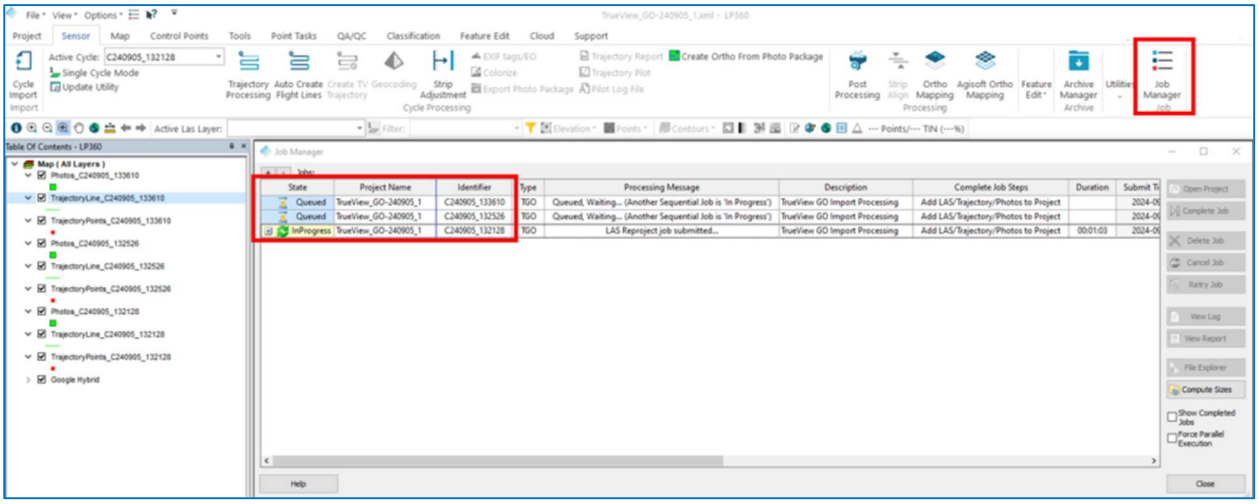


**Figure 19: Job manager with TVGO jobs**

3. Upon completion of the TGO job by the Job Manager:
    1. Job Manager will indicate completion by the green checkmark flashing on the Job Manager icon indicating it is in the Ready state.
    2. The job will need to be completed to add the resulting LAS layer and/or LAS files to the open project.
4. In Job Manager, select the applicable TGO job, then select View Log to review the processing log.
5. In Job Manager, select the applicable TGO job, then select Open Project to open the applicable project for the job, if not currently open.
6. Then, select **Complete Job** to add the unfiltered point cloud as a new LAS Layer to the currently open project.
7. When desired, in Job Manager, select the applicable TGO job, then select Delete Job to clean up the temporary files generated while processing the job.

## CREATING FLIGHT LINES AND TRUEVIEW TRAJECTORIES

This step is optional, and only suggested to users who want to crop part of the trajectory. Most of the users can skip this step.

There are 2 modes of cropping the trajectory:

- Auto create flight lines: this mode is only recommended for user that walked in strait lines, and can recognize each acquisition line. Most of the time this tool will not be used.
- Manual flight lines: this mode is the recommended for TVGO data, the user will select the first and last trajectory point, to create the desired trajectory.

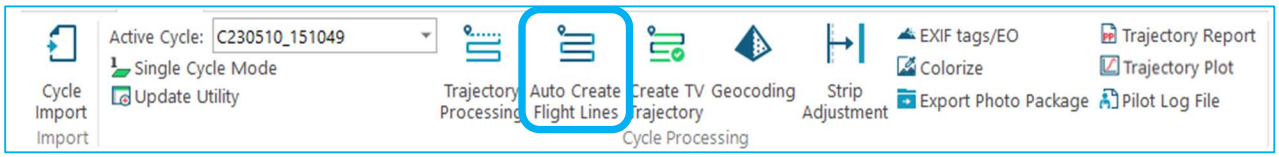



**Figure 20 – Auto Create Flight Lines**

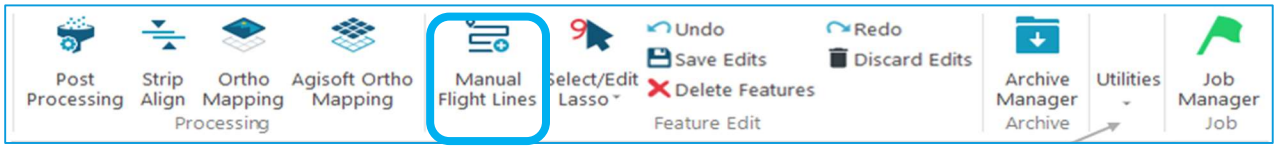



**Figure 21 - Create Flight Lines from Selected Trajectory Points**

## MANUALLY CREATE FLIGHT LINES

1. Flight lines can be added manually by selecting trajectory points (red points) at the beginning and end of each line.
    a) Select the ***Select/ Edit Features*** tool on the LP360 Feature Edit tab (**Error! Reference source not found.**).
    b) Select a trajectory point at the beginning of the desired flight line. The point will be highlighted when selected.
    c) Hold control, then select a trajectory point at the end of the flight line. Both trajectory points should now be highlighted.

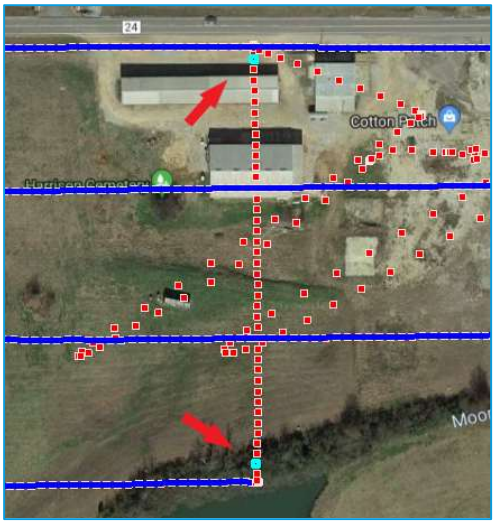


Figure 22 – Manually Creating Flight Lines

d) Select ***Create Flight Lines from Selected Trajectory Points*** on the Sensor tab (Figure 21) and a new flight line should be created.

e) Select the **Save Feature Edits** icon on the LP360 Feature Edit tab (**Error! Reference source not found.**) to save the edits.

Note: If you select Trajectory Point patterns that do not form the required base for creating a flight line, you will receive an error message that explains the issue (Figure 23).

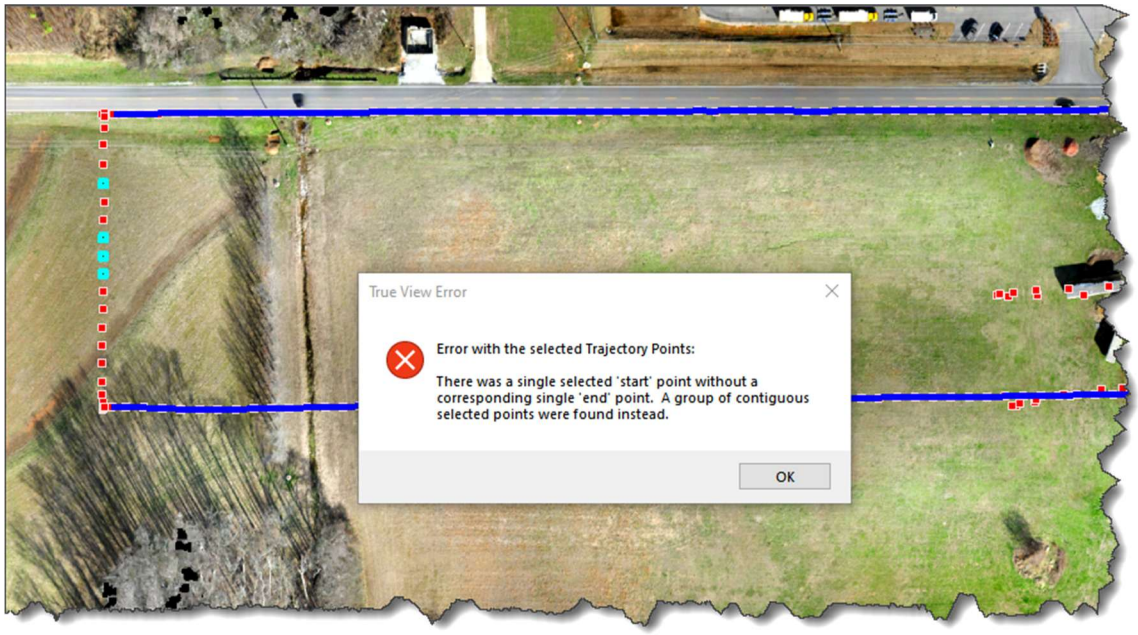



Figure 23 - A pattern of Trajectory Points not compatible with forming a flight line

## POST PROCESSING

The Post Processing tool can be used for all TVGO sensoro. The purpose of this tool is to prepare datasets for post processing tools. The main need is to use the flight line layer to create a trajectory file for each flight line from the sensor trajectory file(s) and cut the LAS data into files corresponding to those flight lines, plus, apply any additional user desired filtering while performing this operation. This tool is helpful for filtering noise.

1. Go to Sensor ribbon –> Post Processing tool.
2. Select the Clip Angle. **Tip:** Disable the filter for TVGO since we want to use the full 360° FOV of the sensor.
3. Select the filtering and photos.

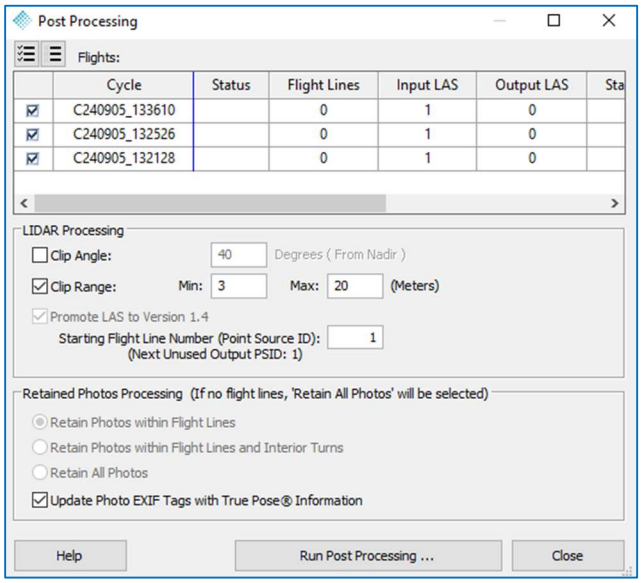



**Figure 24: Post Processing**

- **Clip Angle** – Enter the processing angle in degrees. This number represents the half angle off Nadir of the scanner. If 40 is entered, LiDAR data will be geocoded if it falls between +40° and -40° creating a total field of view (FOV) of 80° (not recommended for the TVGO).
- **Clip Range** – Enter the minimum and maximum range to be geocoded. No points with a range less than and/or greater than these values, respectively, will be geocoded. Useful when no Clip Angle is used to pick up features beside the system.
- **Promote LAS to Version 1.4** – Default is checked. This ensures the output LAS file format will be 1.4.
- **Starting Flight Line Number (Point Source ID)** – When there are multiple Cycles or flights in a project it is important to assign unique point source IDs, or flight line numbers to each line. Selecting a unique starting ID allows the user to determine the best values between 1 and 65535 to use for each line. For multi-Cycle projects it is suggested to use a nomenclature, such as

CCCFF, where CCC is the Cycles flown for the project, 1-645, and FF is the flight line per Cycle, 1-99, to keep the point source IDs unique within the project.

- **Retained Photos Layer Settings** – This section will only become available when a photo layer is detected. Allows the user to specify the photos to be kept for geotagging and export to photogrammetric software packages using Export Photo Package or for processing in Agisoft Ortho Mapping, or for processing in Ortho Mapping. The notion of "Retained Photos" creates a layer of the retained photos on a new layer called "RetainedPhotos."
    i. ***Retain Photos within Flight Lines*** – This option retains only the photos that occur between the start and end of each flight line (flight lines were defined in the prior Create Flight Lines step). This option eliminates photos in turns. (Recommended). Selecting the option to "Retain Photos within Flight Lines." creates a new layer in the Table of Contents (TOC) called "RetainedPhotos". The resultant layer is shown in **Error! Reference source not found.**. Note that only photos that are between the beginning and end of each flight line are retained.
    ii. ***Retain Photos within Flights Lines and Interior Turns*** – This option retains all photos from the start of the first flight line (*start* as defined by GPS time) and the end of the last flight line. Thus, all ferry line photos are retained.
    iii. ***Retain All Photos*** – All project photos are retained.

4. Run Post Processing …

5. Post processing point cloud is generated.

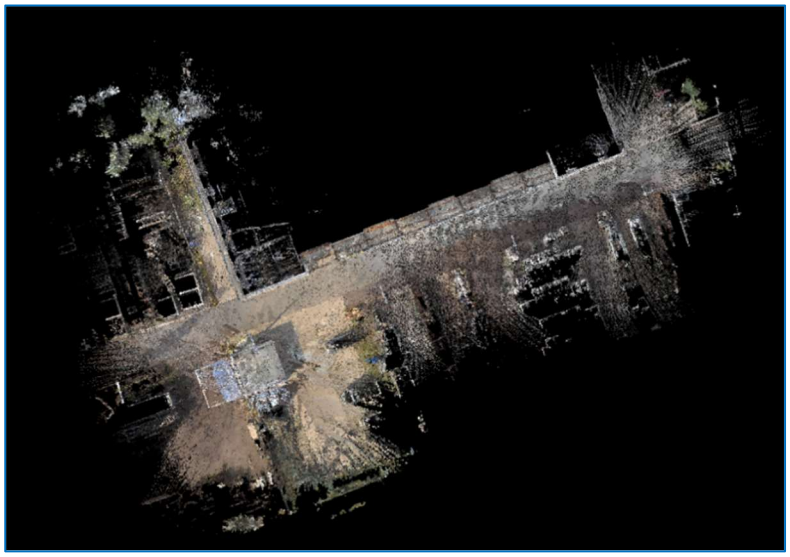


**Figure 25: Point cloud generated from post processing**

### DIFFERENCE BETWEEN POST PROCESSING LAS AND JOB MANAGER LAS

Both point clouds come from the same raw data, however one has all the data captured from the sensor (TGO point cloud) and the other is filtered by the defined "flight lines" and filters of the "Post Processing" tool.

In the following example it is possible to see how the clip range filter has removed long range points captured by the sensor. Recall the TVGO has a range of up to 80 meters.

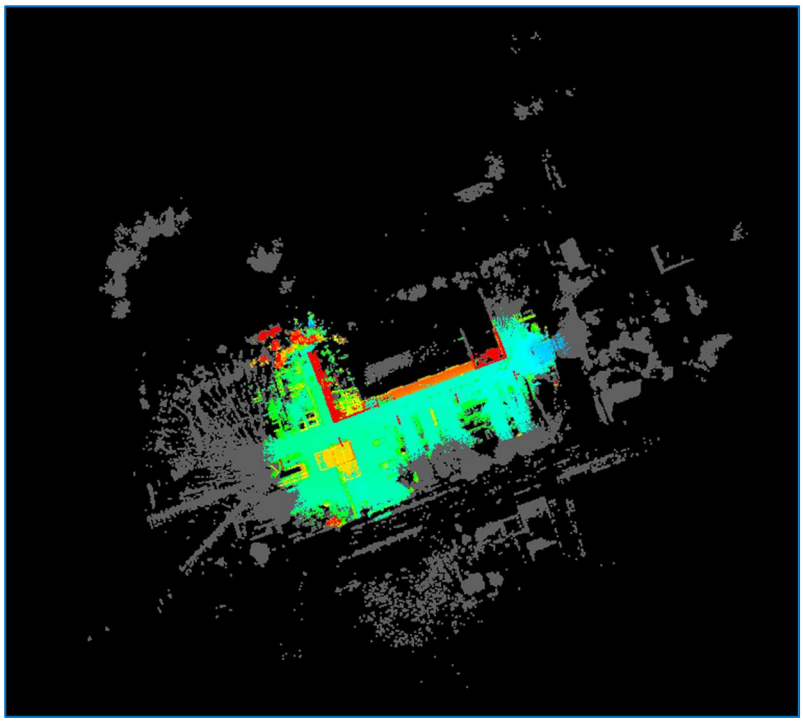


**Figure 26: Job manager LAS in grey and PP LAS in green colours**

## REGISTRATION TOOLS

Registration tools are a group of tools that modify the position of a point cloud to align in with a reference. The tools perform a rigid registration getting the values from different sources.

**Figure 27: Registration tools**

There are 3 registration tools:

- LAS to LAS Manual Registration
- LAS to LAS Auto Registration
- LAS to Control Registration

## LAS TO LAS MANUAL REGISTRATION

Manual registration is a tool performing coarse alignment, in other words it performs a rigid registration where the user manually aligns multiple LAS.

Before using LAS to LAS manual registration, make sure to have at least 2-point clouds, and identify each point cloud. One will be used as a reference and the other will be registered.

1. Open LAS to LAS Manual Registration tool.
2. Select the "Reference LAS Layer"
3. Select the "Registered LAS Layer"
4. Press "Pick A New Pair"

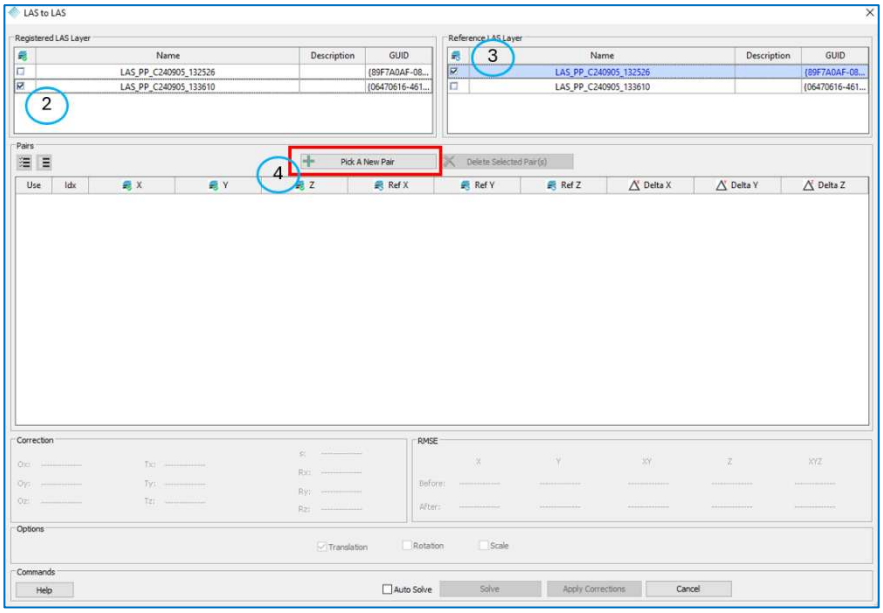



**Figure 28: LAS to LAS Registration**

5. Select one pair of common point in both point clouds
6. Measure a common point in the "Registered" point cloud.
7. Measure a common point in the "Reference" point cloud.

8. Press "Validate The Picked Pair"

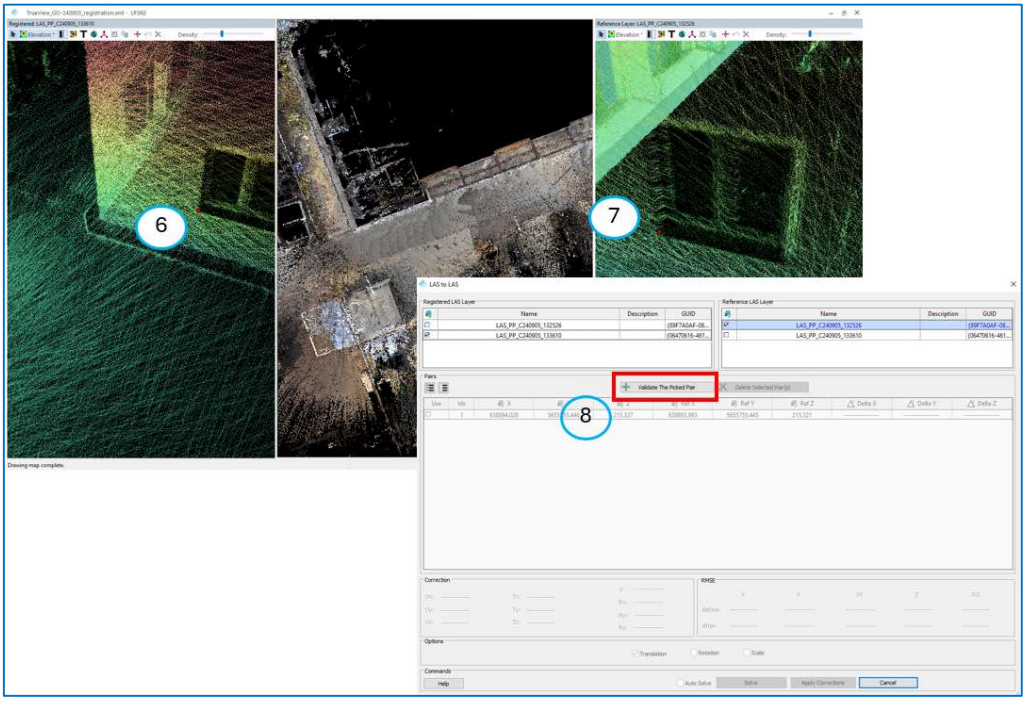



**Figure 29: Measuring a Pair**

9. Repeat the process until you have multiple pairs measured
10. Select the registration correction type:
- Translation: always recommended.
- Rotation: recommended if you can identify multiple pairs of points spread around the point cloud.
- Scale: only for advance users. It can deform the 3D model if not applied properly.
11. Press "Solve", the tool will calculate the values to be applied to the registration
12. Review the registration values.

Note: If a pair of points is not accurate enough the tool will warm the user

13. Press "Apply Corrections"

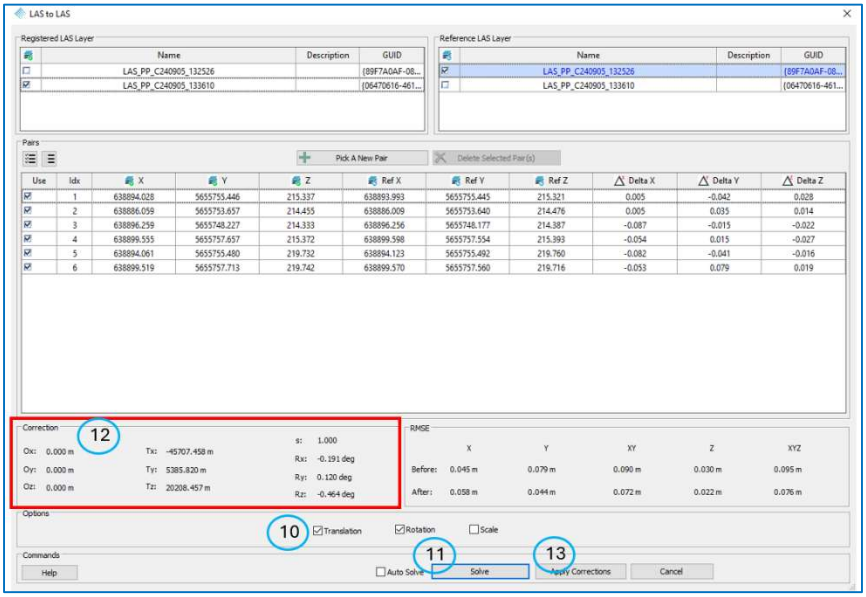



Figure 30: Statistics registration

14. A new registered point cloud will be created in the table of content

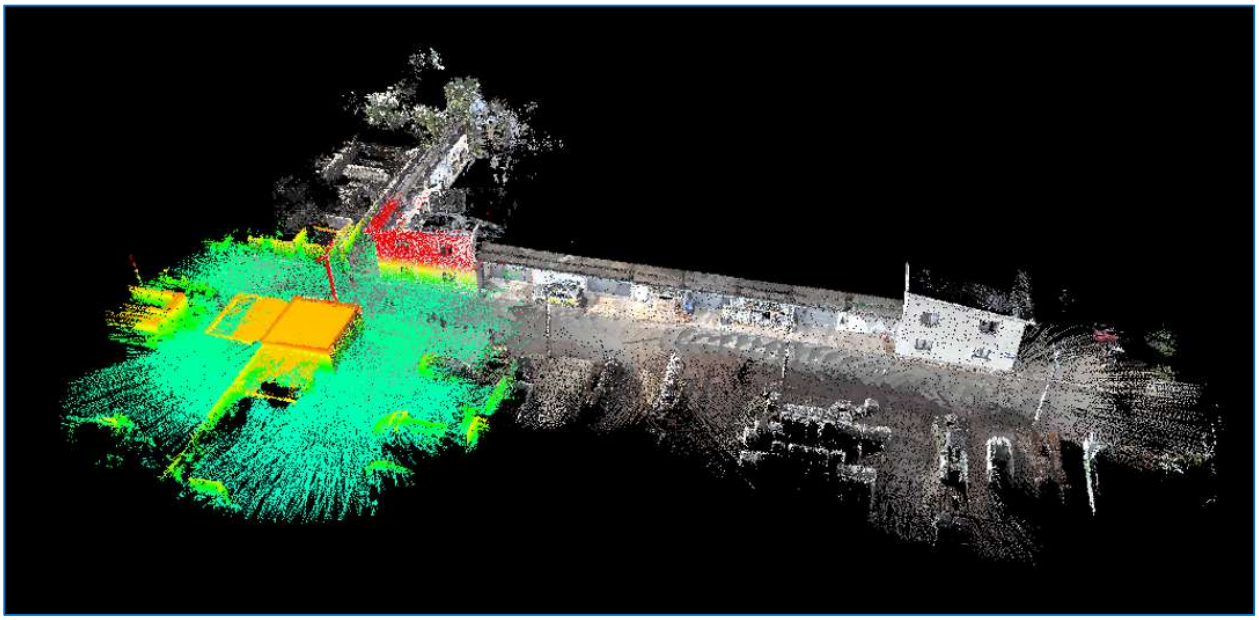


Figure 31: LAS Registered

## GOOD PRACTICES

- Use at least 3 pairs of common points for translation (minimum required is 1).
- Use at least 6 pairs of common points for rotation (minimum required is 3).
- Spread the measurement pairs across the point cloud, avoid measuring all the pairs of points next to each other.
- In case of having multiple point clouds to register, use the most confidence point cloud as reference. For example:

a) Multiple SLAM point clouds. Use the point cloud that overlaps with more point cloud as a reference.
b) SLAM and RTK/PPK. Use the georeferenced point cloud from RTK/PPK as a reference.
c) Drone mapping and SLAM. Use the georeferenced point cloud from drone mapping as a reference.
d) Drone mapping and RTK/PPK. Use the georeferenced point cloud from drone mapping as a reference.

## LAS TO LAS AUTO REGISTRATION

Auto registration is a tool performing fine alignment, in other words it performs an automatic alignment once 2 LAS are close to each other or it refines their alignment.

Before using LAS to LAS automatic registration, ensure the reference and registered point clouds are initially well-aligned, with overlapping regular surfaces.
LAS to LAS automatic registration can only be performed with point clouds with overlap surfaces areas.

## PREREQUISITES

The tool is used to refine the alignment between two models that are relatively aligned with each other. This means that the tools are not able to directly align automatically two models that are apart, for example a SLAM and a RTK/PPK. In these cases, a pre-requisite will be required:

**Cases**:

a) SLAM to SLAM: Use LAS to LAS manual registration before performing automatic registration, at least to have both point clouds relatively aligned.
b) SLAM to RTK/PPK: Use LAS to LAS manual registration before.
c) RTK/PPK to RTK/PPK: Directly use automatic registration.
d) SLAM to drone mapping: Use LAS to LAS manual registration before.
e) RTK/PPK to drone mapping: Directly use automatic registration.

## HOW TO USE IT

1. Open LAS to LAS Auto Registration tool.
2. Select the "Reference LAS Layer"
3. Select the "Registered LAS Layer"
4. Press "Solve", the tool will calculate the values to be applied to the registration
5. Review the registration values.

**Tip**: review the fitness score, it means how well 2 points clouds align with each other. The "After" value

should be smaller than the "Before" value.

6. Press "Apply Corrections"

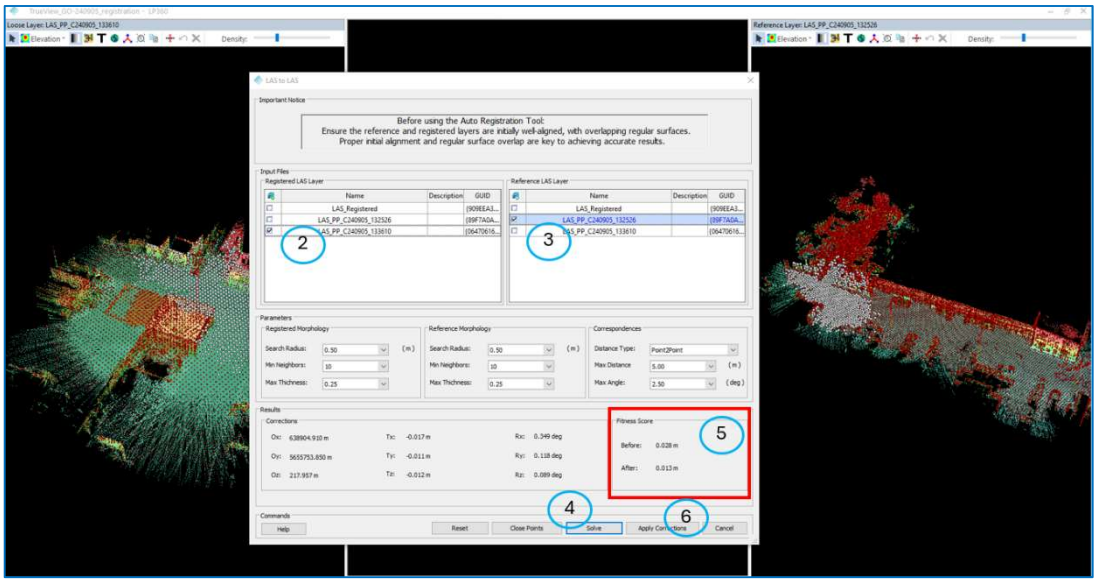



Figure 32: LAS to LAS Auto Registration

7. A new registered point cloud will be created in the table of content

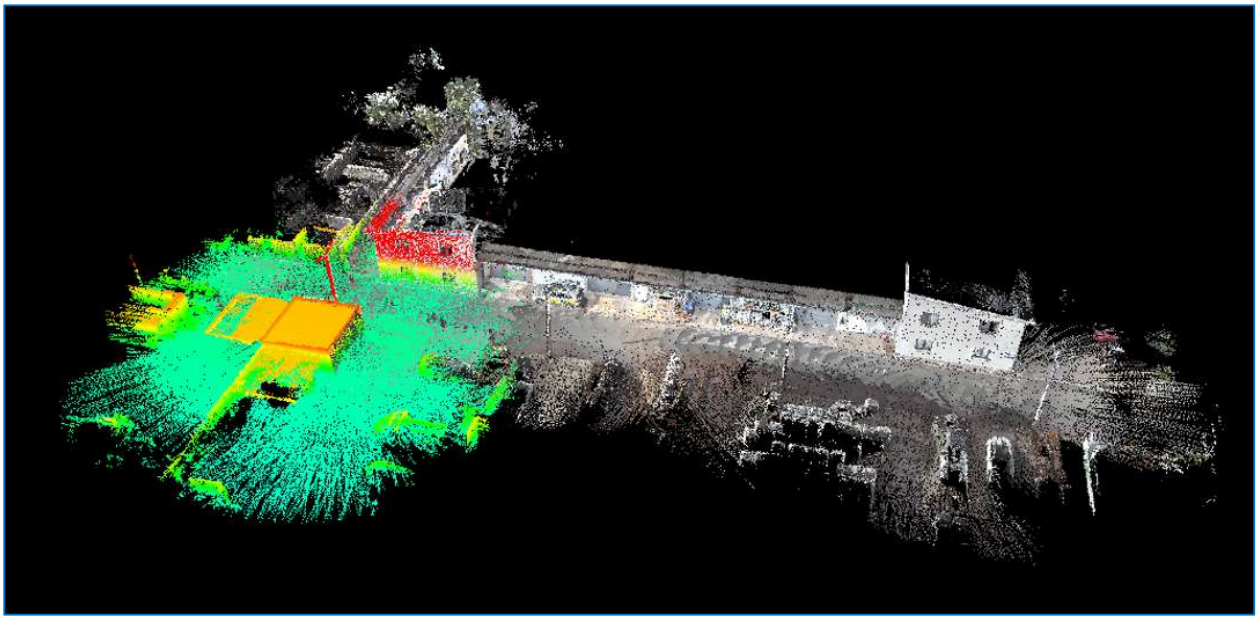


Figure 33: LAS registered

## ADVANCE SETTINGS

**Search Radius:** To define the area around each point that will be used to determine the morphology of the terrain at this point

**Min Neighbors**: Minimum number of points about a point to be considered

**Max Thickness**: Maximum thickness (obtained after determining the morphology) for a point to be considered

**Max distance**: max distance to consider a correspondence

**Max angle:** max angle between normals to consider a correspondence

**Distance Type**:

- Point2Point: Euclidean distance based correspondence estimation
- Point2PointWithAngleNormal: Euclidean distance based correspondence estimation considering normals of points
- Point2Line: Point to Line based correspondence estimation

## GOOD PRACTICES

- When registering SLAM data to georeferenced data, always perform LAS to LAS manual registration before.
- It is important to have common overlap surfaces between point clouds.
- Use the most confidence point cloud as reference.
- Review the "Key points" and "Used Key points" after pressing "Solve", in the previous screenshot you can see them in "white" and "red" color. They should be consistent in all the overlap area. These points should be picked in flat surfaces and not in irregular features like trees.

## DIFFERENCE BETWEEN MANUAL AND AUTOMATIC REGISTRATION

The main difference will be the quality of the alignment between the two-point clouds. Manual registration will perform a coarse alignment while auto registration will perform a fine alignment.

This means that every time a LAS is manually registered, it is recommended to refine the alignment using the automatic registration.

## LAS TO CONTROL REGISTRATION

Control registration is a tool performing coarse alignment, in other words it performs a rigid registration where the user manually aligns a LAS to Control Points.

Before using LAS to Control manual registration, make sure that the control points are visible in the LAS. Translation requires a minimum of 1 Control Point, Rotation requires a minimum of 3 Control Points. It is recommended to perform Translation and Rotation.

1. Import the GPS to LP360, you can use the "Import" tool from the "Control Points" ribbon
2. Open LAS to Control Registration tool.
3. Select the "Registered LAS Layer"
4. Select the "Features layer" (the control points shapefile)

5. Select a control point from the list

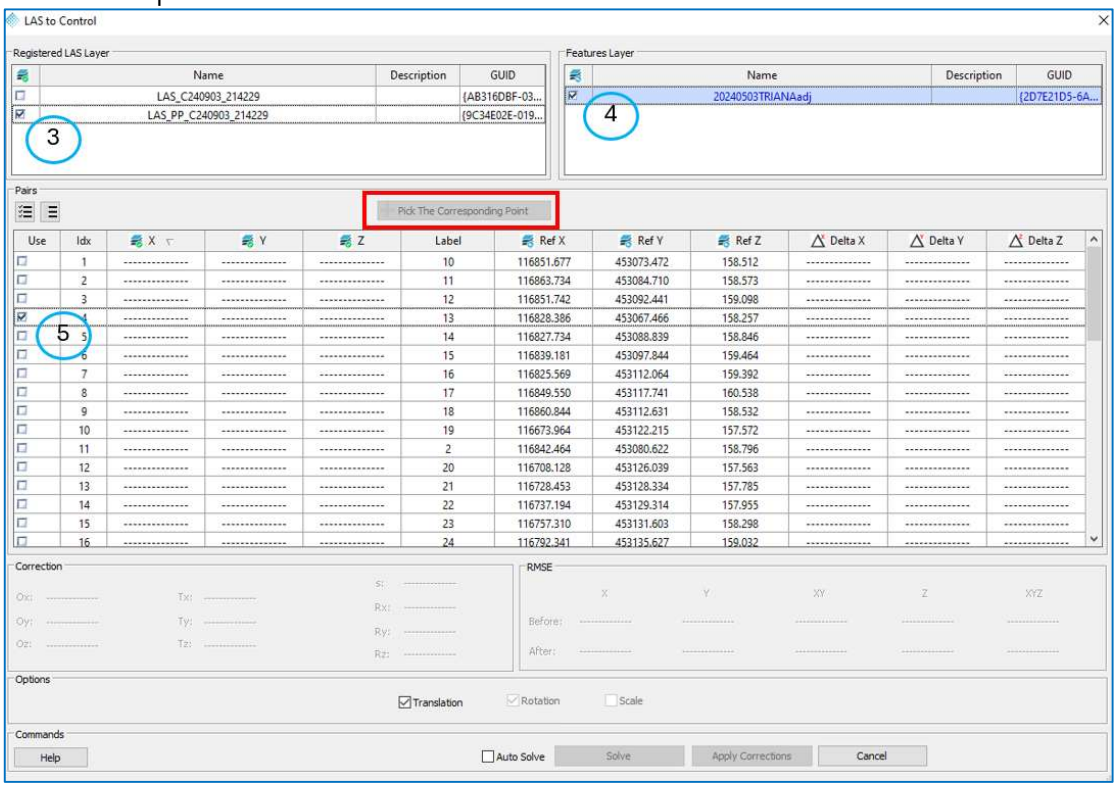



**Figure 34: LAS to Control**

6. Press "Pick The Corresponding Point"
7. Measure the point in the point cloud

8. Press "Validate The Picked Point"

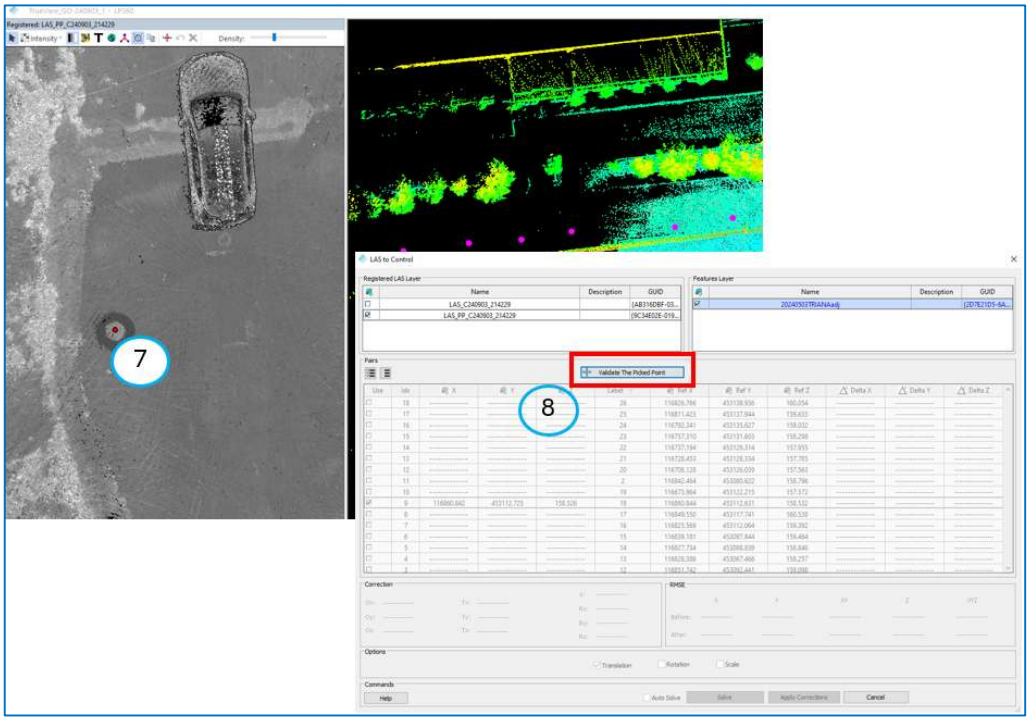



**Figure 35: Measuring a control point**

9. Repeat the process until you have multiple points measured
10. Select the registration correction type:
- Translation: always recommended.
- Rotation: recommended if you can identify multiple pairs of points spread around the point cloud.
- Scale: only for advance users. It can deform the 3D model if not applied properly.
11. Press "Solve", the tool will calculate the values to be applied to the registration
12. Review the registration values.

Note: If a point is not accurate enough the tool will warm the user

13. Press "Apply Corrections"

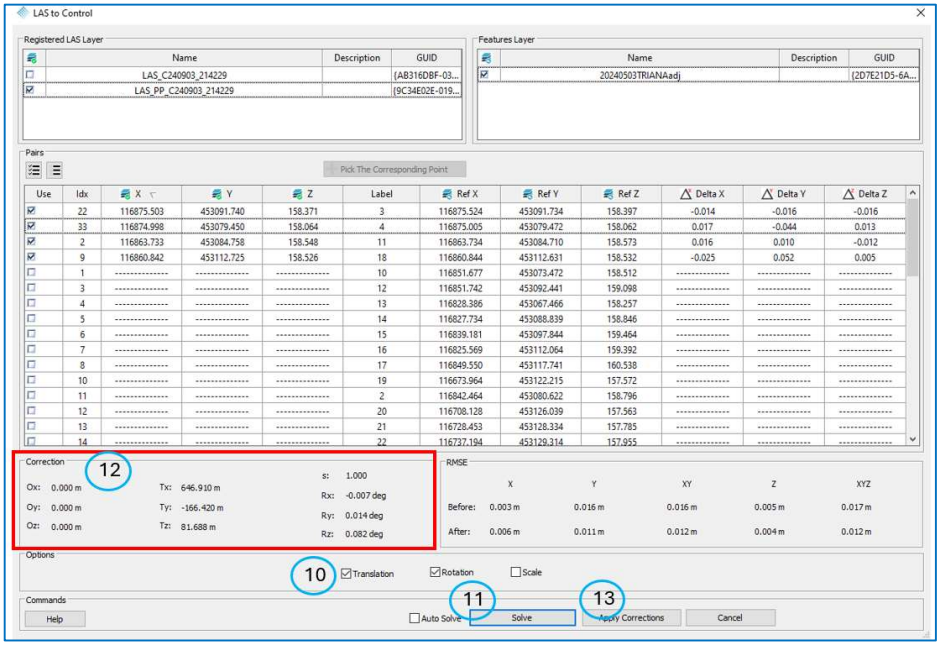



Figure 36: Statistics of the registration

14. A new registered point cloud will be created in the table of content

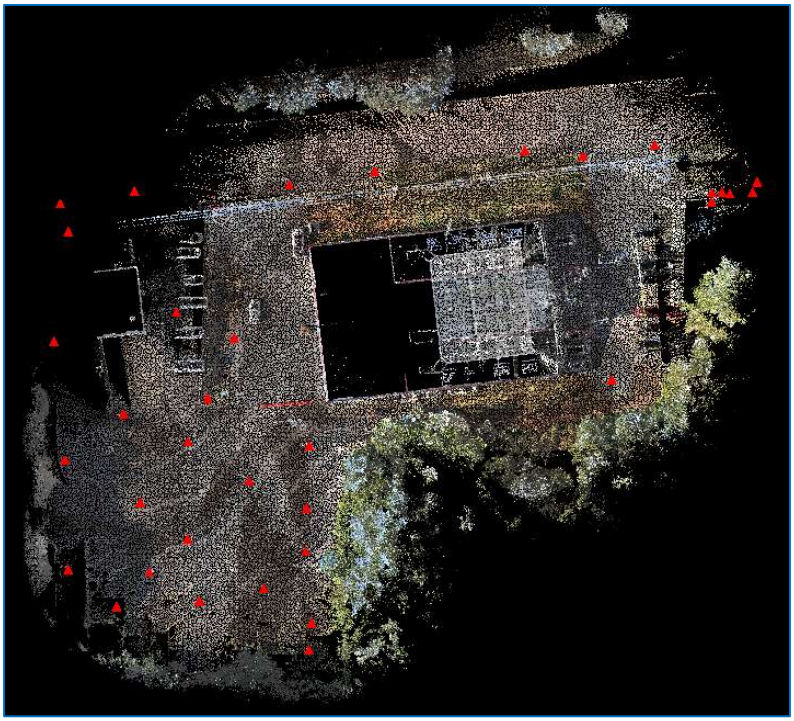


Figure 37: Registered LAS to Control

## SURVEY NAIL MANAGER

The management of *a priori* survey base station locations (so-called "survey nail" or "reference mark") is done using the Survey Nail Manager found on the Sensor tab and is used throughout LP360 Land where access to these data are needed.

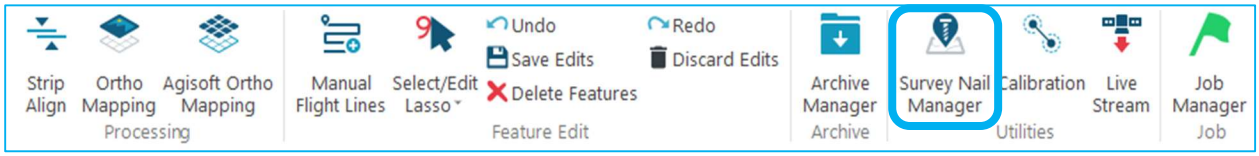



**Figure 38 - Survey Nail Manager**

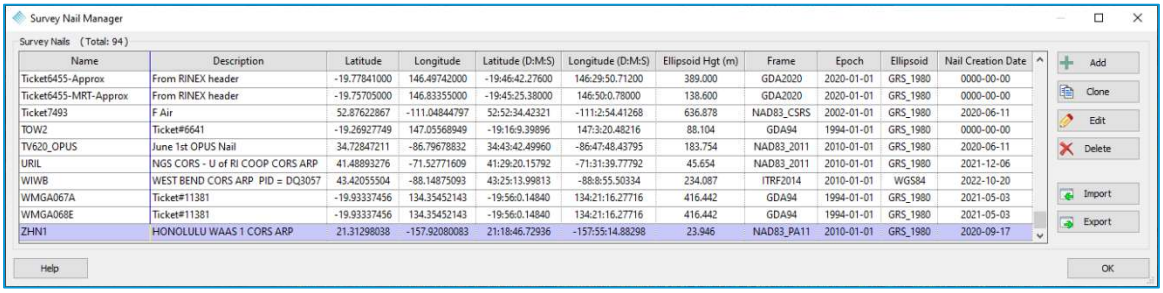



**Figure 39 - Survey Nail Manager Dialog**

Selecting *Add*

will invoke the Add Survey Nail dialog

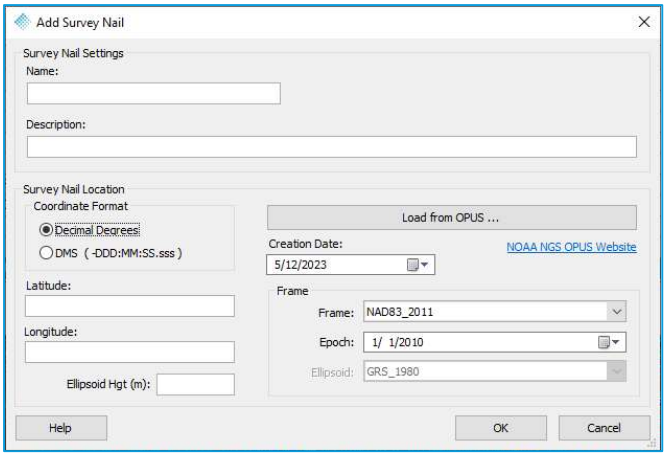



**Figure 40 - Add Survey Nail dialog**

a) **Name –** Enter a unique name for the new Survey Nail
b) **Description –** Optionally add a description for the new Survey Nail
c) **Survey Nail Location** – Enter the Latitude and Longitude in decimal degrees or degrees minutes seconds (DMS) as per the selected *Coordinate Format*, and Ellipsoid height in meters. Be sure to separate the Degrees, minutes, and seconds, with a colon (DD:MM:SS.sssss).

i. If an OPUS solution is being used, save the OPUS results in a simple text file, and import it into LP360 using the *Load from OPUS* button. The Latitude, Longitude, and ellipsoid elevation will be automatically read from the text file and populated in the applicable fields.

d) **Creation Date** – Enter the date when the nail was established.

e) **Frame** – Choose the correct reference frame and epoch for the base station coordinate. The ellipsoid for the selected frame will be shown for reference. LP360 uses this information to perform any datum and epoch transformations necessary for processing.

Selecting *Clone*

invokes the Clone Survey Nail dialog with an exact copy of the selected nail in the Survey Nail Manager dialog. Edits may then be made as desired. Note it is necessary to change the name to a unique name before saving the cloned nail.

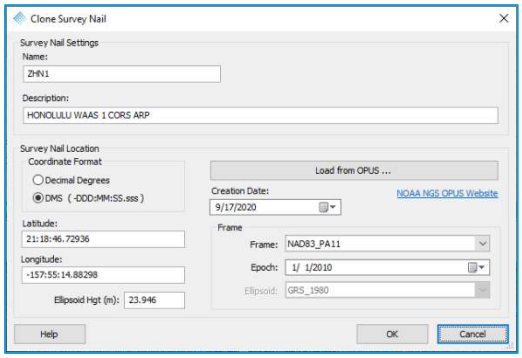



**Figure 41 - Clone Survey Nail dialog**

Selecting *Edit*

will invoke the Edit Survey Nail dialog for the selected nail in the Survey Nail Manager dialog to make modifications as desired.

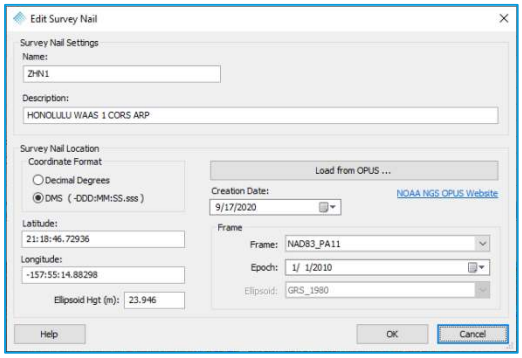



**Figure 42 - Edit Survey Nail dialog**

*Delete*, *Import*, *Export* tools are also available for managing the saved survey nail locations and moving them around between processing machines.

## CONTROL POINTS PROCESSING (TVGCPS)

It is possible to georeferenced the point cloud using control points surveyed with the TVGO during the scanning.

A minimum of 4 control points are needed to properly reference a point cloud, increasing this number will improve point cloud alignment even further. Remember to Place the metal tip over the control point and click "Add control point" on the tablet.

**Figure 43: GCP measurement**

Control Points workflow:

1. Create a .CSV file
2. The first four comma-separated columns must be name, northing, easting, elevation in the Project CRS, example of the format:

PP131,5654721.269,32404008.225,281.101
PP132,5654736.233,32404010.793,281.057
PP133,5654739.959,32404044.002,281.785
PP134,5654737.254,32404078.968,282.121

3. For a GCP to be used, the name must match the name used at collection time
4. Copy the file at: <rawFolder>\GPS\Ctrl
5. Import the data into LP360 LAND and continue the processing

It is possible to check the name used during the surveying with the TVGO by opening with notepad the file <rawFolder>\GPS\Ctrl\ctrl.point

# JOB MANAGER

The LP360 Job Manager, located on the LP360 Quick Access toolbar and in the Sensor tab, is a convenient way to queue and manage background task processing. Typically, only one job may execute at any given time, but a user may queue many jobs of the same or differing types from within a project or across multiple projects. The processing of the queue occurs in order of submittal time on the machine on which the queue is created.

## SUBMITTING JOBS TO THE JOB MANAGER

A growing list of tools, such as TVGO processing can be submitted to the Job Manager.

## MONITORING THE JOB MANAGER

Jobs in the Job Manager queue may be monitored by opening the Job Manager dialog (Figure 44). Note: The Job Manager is modeless and may be left open or closed without affecting the queue. The Job Manager icon will flash with a green checkmark when one or more jobs has completed regardless of the currently open project in the session.

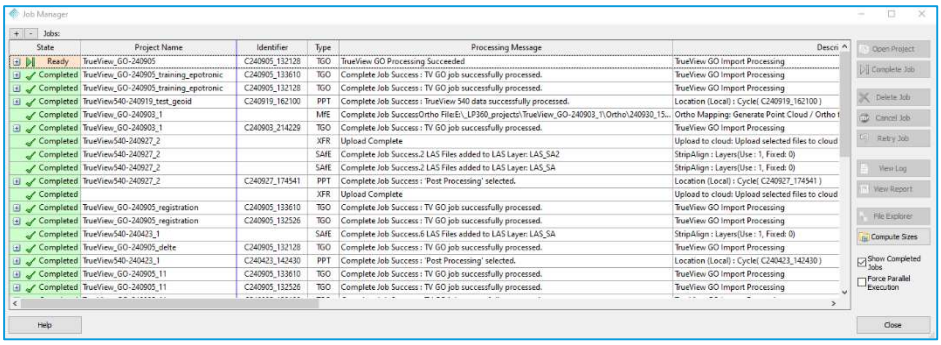



**Figure 44 - Job Manager dialog**

**Open Project** – Closes the current project in the session, prompting to save the project, and opens the project associated with the selected job in the grid.

**Complete Job** – If the status of a job is Ready, selecting the job, then the Complete Job button will perform the operation shown in the Complete Job Steps column. For instance, with a "Strip Align for LP360" job the Complete Job will create a new LAS Layer and/or add LAS files to the specified layer in the project.

**Delete Job** – Deletes the temporary files associated with the selected job and removes the job from the Job Manager.

**Cancel Job** – If possible, will cancel the selected job at the next possible opportunity after being selected.

**Retry Job** – Where applicable, the selected job can be executed again after initially being cancelled or experiencing a failure.

**View Log** – Where applicable, opens the default viewer with the log for the selected job.

**View Report** – Where applicable, opens the default viewer with the report that was generated by the job.

**File Explorer** – Opens in File Explorer the folder location for the selected job.

**Compute Sizes** – Computes the current size on disk of the temporary files associated will all jobs in Job Manager.

**Show Competed Jobs** – When enabled, all Completed Jobs will be visible in the Job Manager. When disabled, the Completed Jobs will be hidden.

**Force Parallel Execution** – Allow multiple jobs to run at the same time, however it is likely jobs will compete for resources and conflicts may cause destabilization. Intended for advanced users who understand what jobs they're running and what resource requirements are at various stages for those jobs.

Locking your machine or closing LP360 will not affect the processing queue in Job Manager, however, logging out of your machine will have the unintended consequence of closing the background processes, including those in the Job Manager.

Job Manager creates a directory called "Jobs" directly under the folder in which your project xml file is stored (the "Project Folder"). Each submitted Job will have a unique folder under the Jobs folder. You can quickly access this folder by selecting the desired row in Job Manager and pressing the File Explorer button. Data within a Jobs directory is only used until the Job finishes. However, these folders are kept until you explicitly delete them using the Delete Job command. This allows you do still view reports, logs and so forth at some future time. Job files can consume a lot of space. The amount of space being taken up by a Job is listed in the Size column of the Job row in Job Manager.

## EXPORT PHOTO PACKAGE

The ***Export Photo Package*** on the Sensor tab will allow the user to export the photos on the retained layer and associated camera calibration files. This tool facilitates the downstream import of images into photogrammetric processing software.

**Figure 45 - Export Photo Package**

1. If not already done, on the Sensor tab make active the Cycle/Flight combination to be processed.
2. Select ***Export Photo Package*** on the Sensor tab to open the Update EXIF tags dialog (Figure 46).

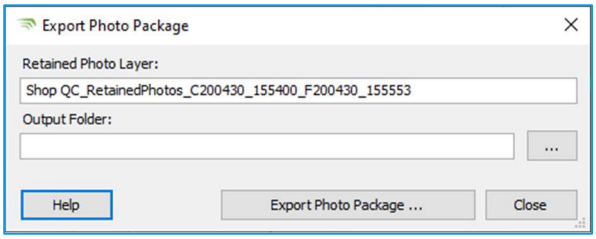



**Figure 46 - Export Photo Package dialog**

3. The Retained Photos Layer is selected based on the active Cycle/Flight on the Sensor tab.
4. Select the desired output folder to write the geotagged images and associated camera calibration files.
5. Select *Export Photo Package* to write the geotagged images and associated camera calibration files into the selected folder.
6. A progress bar will inform you of the export progress.
7. A confirmation dialog will appear showing the number of images and calibration files written to the output folder. Select *OK* to continue.
8. Repeat for each Cycle/Flight combination in the project, being sure to select the same output folder for each so there is one photo package per project.

**The exported photo package contains:**

a) Images are sorted into folders by camera serial number and named with a Cycle_Flight_ImageNumberCameraPosition nomenclature.

b) Camera calibration files are also placed in each camera folder.

i. The xml files named *Port_cameraserial#.xml*, *Starboard_cameraserial#.xml*, or *Nadir_cameraserial#.xml* can be **directly imported into** Agisoft Metashape.

ii. The text files named *Port_cameraserial#_P4D.txt*, *Starboard_cameraserial#_P4D.txt*, or *Nadir_cameraserial#_P4D.txt* **can be used in Pix4D**.

iii. For other photogrammetric packages you may need to convert these camera calibration values to something applicable to the respective package. For example, Converting Focal Length from Pixels to Millimeters to use in Bentley Context Capture.

c) While **Metashape** and **PIX4D** (v4.6.4) read the updated EXIF tags, some photogrammetric packages require the information be read from a file:

i. The CSV file named "Cycle_Flight_image_geo_opk.csv" contains the image position file in geographic coordinates, height in meters, with the orientation angles represented as omega, phi, kappa in degrees for each Cycle/Flight combination that was exported.

ii. The CSV file named "merged_image_geo_opk.csv" is a merged file of all the Cycle/Flight combinations that have been exported into the same Exported Photo Package folder. **This file is configured to be used in Pix4D**.

d) **Default.prj** – Contains the coordinate reference system information from the project.

e) A DEM folder is generated for use with 3DIS® processing.

# EXPLORER PACKAGE

## EXPORT/PUBLISH EXPLORER PACKAGE

Export Explorer package is a tool found in Project Manager (PM) , located on the Project tab. This package will create an archive of the layers selected in Project Manager.

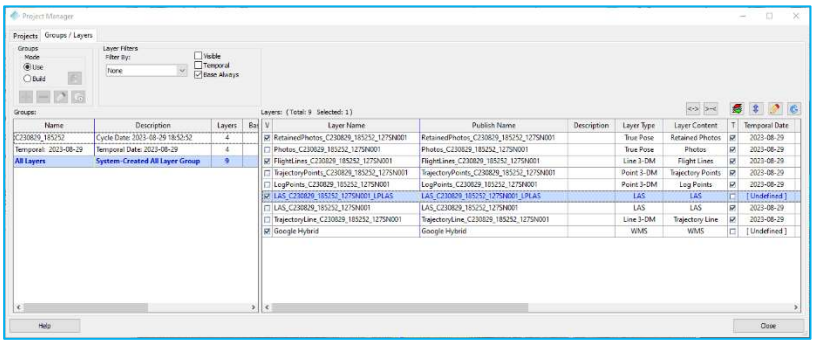


Figure 47 - Project Manager - Groups/Layers

1. Set the published name for layers as desire.

   Project Manager has a "Publish Name" column that lets you set a name that will be used as the new layer name when the package is imported to create a new LP360 Explorer package. This was added to allow you to turn Cycle layer names into something more readable. There is a handy tool that will automatically create short names for you. Just select the layers for which you want short (*publish*) names and press the "Set Published name …" . If you do not like the auto name, you can edit the fields of the row; *select* the row and press Edit (the pencil tool at the right of the dialog) or just double-click the row.

   NOTE – Publish names of rows to be exported must be unique since these will become the layer names in the recreated project.

2. Select one or more rows to select the layers that are to be included in the exported package. Use the usual Windows Explorer multi-select keyboard commands.
3. Press the Export/Publish Explorer Package tool to open the Export Explorer Package.
4. Check the box beside **Export Explorer Package** to create an Explorer Package that you can share with a colleague or client.
   a) Set a destination path, filename for the package. The file extension is "evx".
5. Select "Export Explorer Package". Confirm. The dialog will provide status as the compression takes place. This can take quite some time for a large project.
   a) If **Export Explorer Package** was selected, the data associated with the selected layer(s) will be packaged into a compressed archive with an extension of "evx". This package can be imported by LP360 with a viewer license or higher by using the Open LP360 Explorer Package tool .

## OPEN AN LP360 EXPLORER PACKAGE

To open or import an Explorer Package (a compressed "evx" package) created by the Export/Publish Explorer Package tool in Project Manager, use File -> Open -> Explorer Package (Figure 48), in any LP360, v2021.1.12, or later, or on the Project tab of the ribbon, to open the **Import Explorer Package** dialog . Or simply select "*Import LP360 Explorer Package…*" from the Startup dialog when you first open LP360 Land.

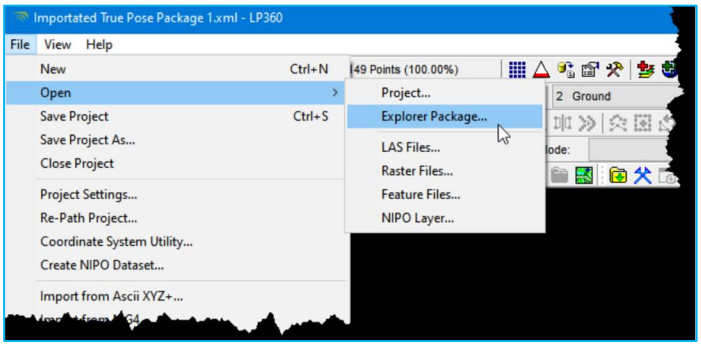



**Figure 48 - Open Explorer Package**

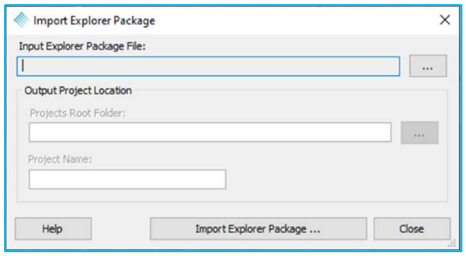



**Figure 49 - Import Explorer Package dialog**

On the Input line, browse to the Explorer Package (the "evx" archive). Under Output Project Location, The Projects Root Folder will default to the location set in Project Settings, if set, in either case you can browse to the location for the top level of the LP360 project that will be created. The Project Name will default to the name of the Explorer Package, and can be modified at this time, if desired. After filling out these fields, press Import Explorer Package. The package is imported, and an LP360 project is created. This can take some time since the archive has to be decompressed and all file locations redirected.

When the decompression and import is complete you will have a new LP360 project containing the layers from the package.

Note – You cannot use this import to add layers to an existing project. If you are in an LP360 project when you perform an import, you will be asked if you wish to Save the current project. After the save (if you elect this option), a new project will be created containing the imported layers.

If you examine the directory structure (Figure 50) of the newly created project, you will see that it has been reorganized into what we might call a canonical LP360 project structure. There is a parent folder for the project with a set of top-level subfolders for each *data type* that LP360 is capable of managing:

- LAS
- Raster
- Photo (True Pose® photos)
- Feature

Under each of these is a folder for each layer of that type as well as folders containing the files that are associated with the layer.

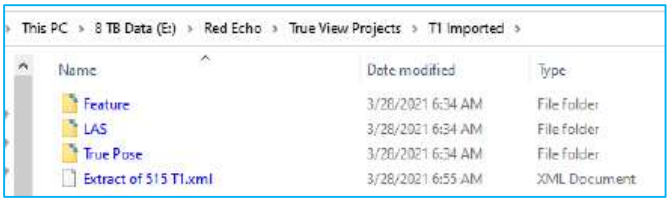



**Figure 50 - Directory structure of imported package**

Thus, one nice use of this Export tool is to collect up scattered projects. For example, if you have a project that accesses data from several other LP360 projects the export will collect up all the elements you need and deposit them into an organized, hierarchical project.

## MULTI-CYCLE PROCESSING TIPS

For a lot of project areas, it is necessary fly multiple Cycles to cover the project area. Follow these tips to help process efficiently.

- Import all Cycles that cover the project area into the same LP360 project.
- Use Project Manager to build Cycle and Temporal layer groups.
  - Open **Project Manager** .
  - Change Groups mode to Build.
  - Use to automatically create layer Groups for each unique Cycle and Temporal date included in the project.
- Use the Cycle layer groups to help move from Cycle to Cycle to process in a methodical manner through to colorized point clouds for 3DIS®, and updated EXIF tags for all systems.
  - Open **Project Manager** .
  - With Groups mode set to Use, select the desired Cycle Group from the available Groups in the left pane. The layer group shown in the TOC will change as you select a different group in Project Manager. When only one Cycle is in a layer Group, the Cycle selector on the Sensor tab automatically changes to match. You may leave Project Manager open to make it easier to change between groups, or close and re-open as needed.

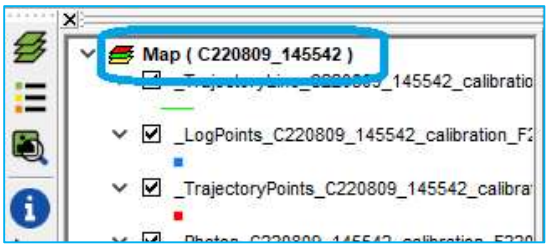



**Figure 51 - Selected Layer Group being displayed in the TOC**

- It is typically best to QC the individual Cycle LAS layers before merging as it is easiest to correct or make elevation adjustments when the Cycles are separated. If using registration tools, you probably do not need to make any elevation adjustments to the individual Cycles but should still perform the QC.
  - You can do some manual comparisons of the Cycles to each other by toggling the active LAS layer while reviewing the profile and 3D View to compare.
  - Run a control report of each Cycle LAS layer to your check points to see if there are any issues such as a large offset in one of the Cycles due to mistakes in the trajectory processing.
  - A quick review of the attributes and coverage of each LAS layer for any issues.
  - Use the **Affine Transform LAS PCT** to adjust any significant elevation offsets of lines or Cycles to better match when they are merged.

- The TOC, select the desired LAS Layers to be merged or copied, and use the right-click -> **Merge LAS Layers** command or **Copy LAS Layers** command to open the Merge LAS Layers dialog or Copy LAS Layers dialog in order to merge or copy the individual Cycle/Flight LAS layers into a single combined LAS layer before smoothing or ground classification.

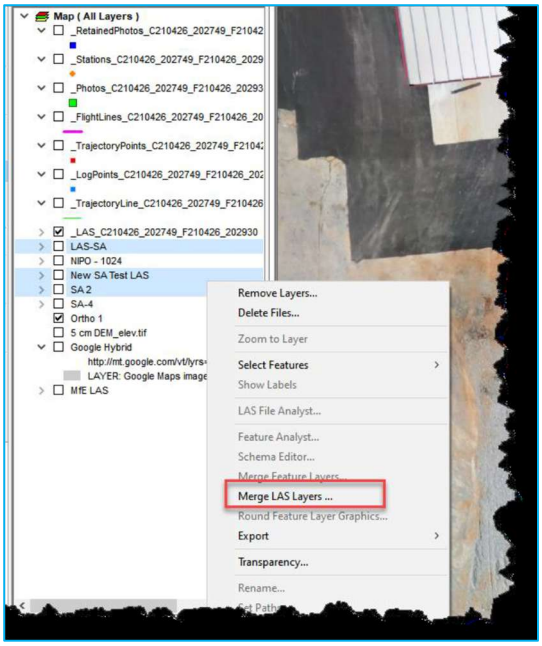



Figure 52 - Merge LAS Layers RCM Command

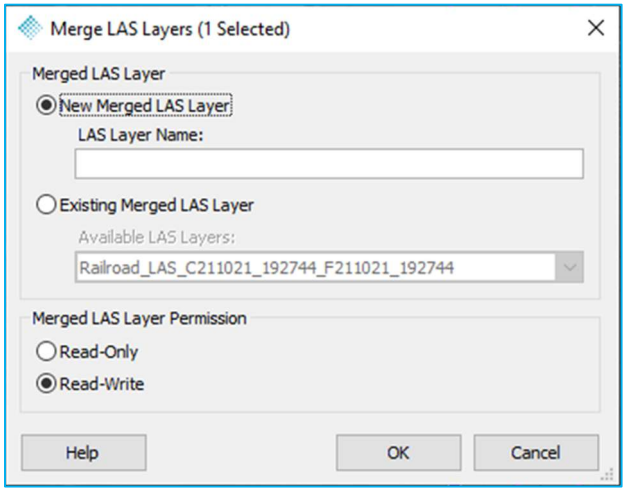



Figure 53 - Merge LAS Layers options dialog

- For more selective processing you might select individual LAS file(s) in the LAS Files tab and use the right-click -> **Move Selected File(s) to Layer** command (Figure 54) to open the Move LAS Files to Layer options dialog (Figure 55). This command allows you to move one or more LAS files from one LAS Layer to another. You can also create a new destination LAS Layer with this command.

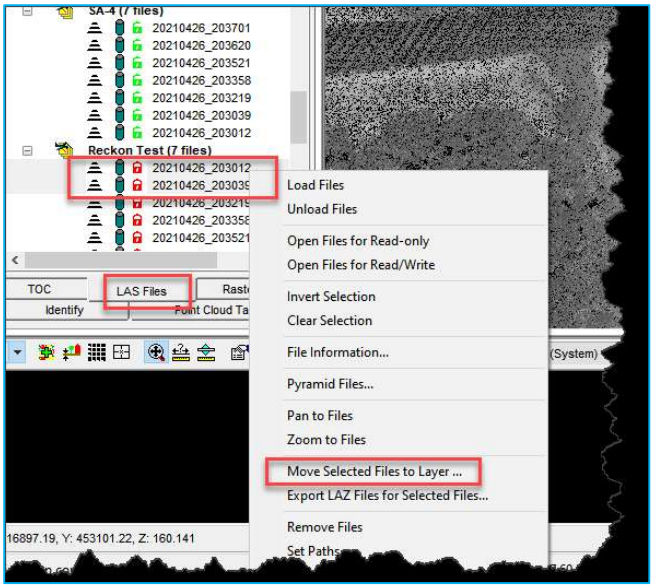



Figure 54 - Invoking the Move Selected File(s) to Layer Command

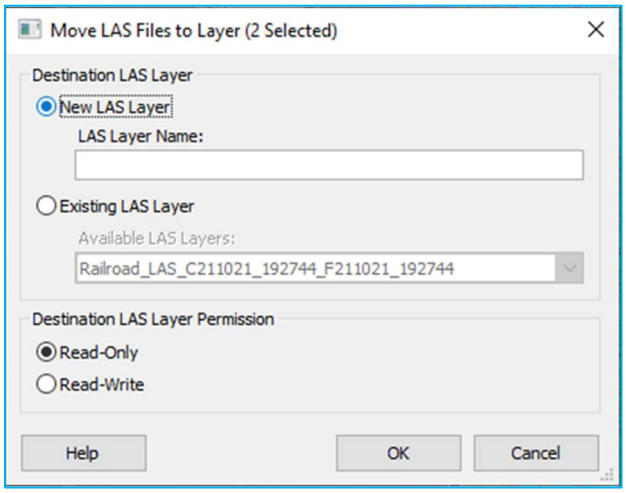



Figure 55 - Move Selected Files to Layer command dialog

- TVGO, if running the Smoothing Point Cloud PCT after Registration after merging/copying LAS Layers, select the Output Structure as "Tiled Files" to create suitable sized LAS files for downstream processing in LP360 such as ground classification, etc., when using QVR pyramids. This is not necessary when using LPLAS.
- If not running the Smoothing Point Cloud PCT, then after merging/copying LAS Layers, use the Merge Point Cloud PCT to create suitable sized LAS files for downstream processing in LP360 such as ground classification, etc. Files should be no larger than 256MB on disk for optimal performance when using QVR pyramids. This is not necessary when using LPLAS.
- If you wish to subset RetainedPhotos layer(s), select the desired layer(s) in the TOC and use the right-click **Merge Feature Layers** and/or **Copy Feature Layer** command, as applicable, to create an editable copy that is easy to delete and re-create if needed.

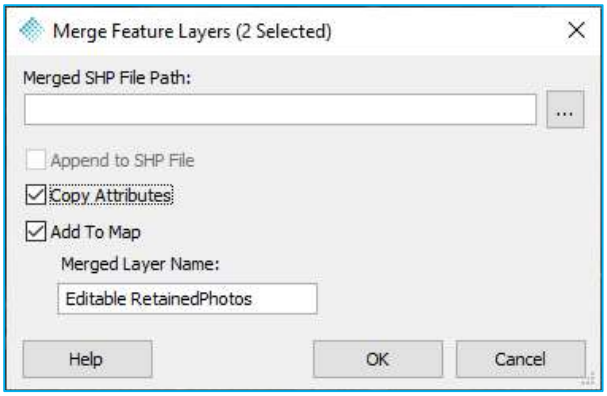



**Figure 56 - Merge Feature Layers command dialog**

- Create a single photo package for all Cycle/Flight RetainedPhotos layers by always selecting the same output folder for the Export Photo Package tool as you toggle between each applicable Cycle/Flight combination.
    - If your project area is very large and has a lot of photos, then you may need to section it into overlapping sub areas depending on the capabilities of your photogrammetric software and the capabilities of your hardware.

## SUPPORT

Our searchable support knowledge base contains information on workflows, tips, hints, and probable resolutions to error messages or commonly encountered situations.

https://support.geocue.com/

Normal support business hours are **Monday - Friday, 8 AM — 5 PM** USA Central Time.

If a support request is sent during business hours a representative will typically get back to you within 4 hours. If received after hours, a response will be sent the following day. To speed response time please include the following information in your request:

- Contact information - please include e-mail address and phone number
- Account name
- TrueView Model and Serial Number
- TrueView Cycle log

If your request includes problems pertaining to a specific error message, please include a screenshot of the error message.

TrueView Cycles may be easily transferred to support by first moving/copying them to your LP360 Cloud Cycle-Archive (see TrueView Archive Manager). Then, log into your LP360 Cloud account, select the Cycle-Archive folder, locate the desired archived Cycle(s) and select share with everyone to generate a link that you can share with us in your support ticket.

For all other data types, use the **Upload to Support** tool found on the Support tab in LP360 to browse for a folder and have LP360 compress the contents of the selected folder and any subfolders, with an option to exclude JPG images when not needed for the support ticket, and upload the compressed folder to the Support folder of your LP360 Cloud account. Then, log into your LP360 Cloud account, locate Support folder, then the desired layer(s) and select share with everyone to generate a link that you can share with us in your support ticket.

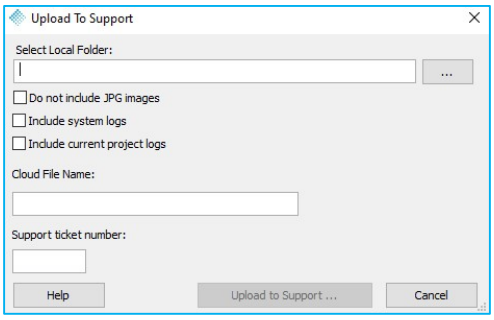



**Figure 57: Upload To Support dialog**

For LP360 Land and TrueView hardware support contact: **support@geocue.com**