



QA⁴LiDAR Quick Start Guide

1. Purpose & Process

QA⁴LiDAR is an easy to use, standard compliance and quality assurance (QA) checking mechanism for airborne LiDAR elevation data. Contracting agencies can use QA⁴LiDAR to perform independent compliance and QA checks on their data, to ensure providers are delivering data that meets the specification before the project is signed off and completed. LiDAR providers can also use the tool and supply the standard report produced by the tool to the contracting agency as part of the project delivery.

2. Requirements for using QA⁴LiDAR

- Users **MUST** have at least an **ArcGIS 10.2** or **10.3** Basic license with the 3D Analyst and Spatial Analyst extensions.
- To be processed as one project, every partial data delivery **MUST** be integrated into the **one overall project directory**, overwriting superseded data. Full deliveries are stand alone project directories.
- The **project extent** shapefile **MUST** be a single (can be multi-part) polygon.
- The **tile index** **MUST** accurately represent data, i.e. for every data tile, a polygon in the tile index and vice versa.
- **Survey Control** data should consist of Ground Control and FVA Check Points which **MUST** be supplied to QA⁴LiDAR as **two separate shapefiles**. Users can also supply custom control and SVA Check Points if available.
- The project extent, tile index and control data shapefiles **MUST** all have the **same coordinate system definition** (as identified in ArcMap layer properties) for control checks to work.
- If the NEDF naming convention is **NOT** used;
 - **Key term rules** as per the user manual **MUST** be used in file naming otherwise data will not be identified.
 - File naming of tiled data **MUST** match **tile name search rules** as per the user manual to identify tiled data.
- The *Output Folder* selected;
 - **MUST** have **sufficient available disk space** (the DEM mosaic requires about one twentieth the size of the DEM dataset, while other outputs require a relatively small amount of space).
 - **MUST** be located **outside** the project folder.
 - As it is shared between users, if there will be **multiple users** of the project, it should be located on a **network drive** so everyone can access it. If there will only be a **single user** for the project, the *Output Folder* should be located on the **local machine or USB 3** connected external disk for increased speed.
- The *Working Directory* selected;
 - **MUST** have **at minimum**, the size of the classified AHD LAS dataset in **available disk space**.
 - **MUST** be located **outside** the project folder and **separate** to the output folder.
 - Is user specific, so should be located on the **local machine or USB 3** connected disk for increased speed.
- The **location of project data** **MUST** be appropriate to perform the *Visual Checks* with greater than one user.
- File and folder names should **NOT** contain **spaces** (use underscores - this is common practice for spatial data).
- Project files should **NOT** be **open** in other software as access issues may occur.
- **Avoid** opening instances of **ArcGIS** on the computer while QA⁴LiDAR is running as conflicts may occur.
- If data **FAILs** the corruption check in the first check group with an error (as opposed to a warning), it **MUST** be **fixed** before running other checks or it may cause them to **crash**.

3. Recommendations for using QA⁴LiDAR

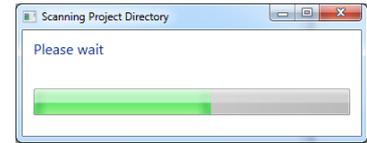
- The QA⁴LiDAR *Tender and Report Forms* are not required but they are **recommended**.
- It is **HIGHLY** recommended to run the *Delivery Completeness & Spatial File Corruption* check **first**.
- **Topographic** and **bathymetric** data should be run as **separate** projects.
- The recommended naming convention is **NEDF**.
- Attributes on the *Tender Form* should be the **EXACT, field name** used in shapefiles so fields can be identified.
- If processing data from and/or to external disk, a **USB 3** connection is **HIGHLY** recommended. If attempted over USB 2 or a network connection processing will be **extremely** slow.
- The use of **long folder path names** for project data, the output folder and the working directory should be **AVOIDED** otherwise files may not be able to be written successfully. Ideally less than 256 characters.
- Once a QA⁴LiDAR project is created, the data within the folders should **NOT** be **renamed or rearranged** as project links will be broken. The user is however able to rescan the project directory to identify changes.

4. Install QA⁴LiDAR

Double click the 'QA⁴LiDAR-Setup-x.x.xx.exe' file to install. The setup wizard will guide you through the installation.

5. Create a QA⁴LiDAR Project

- Run QA⁴LiDAR by double clicking the icon 
- Select **New Project** or **Open Project** and locate the folder containing the data delivery to scan in the project files. 'New Project' creates a new QA⁴LiDAR project (*.cqp), and 'Open Project' opens an existing QA⁴LiDAR project that has previously been created.



6. SETUP: Dashboard

View the *Project Summary* via the **Dashboard**. QA⁴LiDAR is designed to step through the side panel menu in order.

7. SETUP: User Settings

The user's name (required) and email address should be supplied. This information is used by the Visual Checks section to record which user checked each DEM tile, so that tile checking can be tracked and clarification of error mark up is possible if required.

8. SETUP: Project Settings

The **Project Extent** shapefile defining the area of interest, an **Output Folder** for QA⁴LiDAR outputs, and a **Working Directory** for temporary files are required. The QA⁴LiDAR *Tender Form*, *Report Form* and *DEM Mosaic Dataset* can be supplied if available.

9. CHECKS: Automated Checks

- Supply the **Survey Control** shapefiles and parameters
- Supply the **Flightline** polyline shapefile for swath checks if relevant
- Choose a **Raster Cell Size** for rasters output by QA⁴LiDAR
- Tick the checks you wish to run – click **Run**
* *It is highly recommended to initially run only the first check group*
- The **QA Session** screen will provide progress information and log results
- Check the **log** for errors and also click on the Report section in the side panel to check pass/fail results
- If there are errors that require attention, address these i.e. you may have to return to the data provider for resupply if for example some files are missing or corrupt
- If new (corrected/missing) data has been delivered, integrate it into the project folder (replace superseded data), **Rescan** the project from the **Dashboard** and re-run the relevant checks

Automated Checks

- Delivery Completeness & Spatial File Corruption
- File Naming, Shapefile Attributes & Horizontal Coordinate System
- Comparison of Report Form to Tender Form
- Classification Statistics
- Accuracy of Control Network
- Point Density & DEM Resolution
- Flight Line Coverage
- Absolute & Relative Vertical Accuracy

10. CHECKS: Extent Check

- If a DEM Mosaic Dataset was not provided in the Project Settings, either **Return to Settings** to provide one that was supplied with the delivery or pre-generated from project DEM tiles, or choose to **Generate Mosaic Dataset**.
- Once generated, choose to **Generate detailed DEM extents** to identify internal holes and **Continue**, or just **Continue**.
- Investigate the data and determine if the DEM and LAS extents cover the original project extent adequately and whether there are unacceptable internal holes in the DEM. If required, provide a brief description of the problem.

11. CHECKS: Visual DEM Check

- You can choose to visually check a sample of tiles or all tiles. For all tiles, type "100" in the **Sampling %** box and click **Continue**, or to check a random sample type the desired %. To check a targeted sample either manually select the tiles in the map, or load a pre-flagged tile index into the Sampling Tile Index section, select the flag field and **Import**. **Continue**.
- In the Visual Checks screen, use the display options and shortcut keys to efficiently check and mark-up each DEM tile for errors. Refer to the short cut key guide and user manual for more information.

12. OUTPUT: Report

- View the QA results in the **Report** section and alter the compliance if necessary.
- Left click on a red highlighted/failed element for more information about the failure. Hover over any entry in the left hand column of each table, for a **tool tip** giving a brief explanation of what the check does.
- **Print the Report Summary** and the detailed **QA Errors** via the *File menu*.

13. OUTPUT: Map

View the QA Map for a visual representation of whether tiles were delivered and passed or failed automated and visual checks. Refer to the QA⁴LiDAR Map Legend document for explanation of the colour scheme.