Virtual Site Tour Workflow

The following document shares HQ Hydraulics' standard practices for 360 photo collection and virtual site tour (VST) development for fish passage and stream restoration projects.

In supplement to this written equipment list and workflow, the following video tutorials step through 360 photo collection, Kuula tour construction, and a demonstration of an example VST, as applied to WSDOT Fish Passage projects.

VST Video Tutorials:

360 Photo Collection

Tour Creation

Fish Passage VST Demonstration

CAMERA EQUIPMENT

- 360 Camera
- Tripod
- SD Card (spare recommended)
- Battery (spare recommended)
- Remote (recommended)
- Lens protectors (recommended)
- Carrying case (recommended)
- Supplemental light sources (recommended)
- Typical site safety plan and PPE

ACCOUNTS/APPS

Kuula is an online platform used to store 360 photos and tours. Kuula offers a range of plans at various levels of pricing and services. Teams should select either the Pro or Business plan. Further details about the use of Kuula are provided in the *Tour Building* section of this workflow.

GoPro Quik is a free mobile application which allows the photographer to link their GoPro and smartphone. GoPro Quik allows the photographer to preview and capture photo and video via their phone. This application is optional.

PREPARATION & DESKTOP RESEARCH

- Identify the site and scope of the project. Consider the utility of a VST and what level of effort, regarding 360 photo collection, is appropriate.

- Site familiarization - terrain, hazards, construction activity, sensitive habitat, etc.
- Consider weather and stream conditions when scheduling 360 photo collection. Example: Raindrops on a camera lens can obscure details, so rainy days should be avoided if possible. An ephemeral stream or tidal site may require multiple visits to capture what is happening during typical winter/summer low-flow conditions or high/low tides.
- If possible, plan around seasonal obstacles/limitations. Example: Site A may be inaccessible or critical features may be obscured in the winter due to accumulations of snow and ice, so a winter visit should be avoided. Conversely, Site B may be at a lower elevation and heavily vegetated; critical features may be obscured in the summer and more visible in the winter.

PHOTO COLLECTION

- Identify starting point for collection (e.g., upstream limits of reference reach, downstream grading extents, etc.)
- Priority is on safety. Never go out on site alone. Maintain awareness of surroundings and do not set up the camera in the potential path of any construction equipment, in a machine operator's blind spot, or any other location that could put a person at risk.
- Set camera at the appropriate height. If the tripod is not stable, hold the camera out over the stream. Confirm auto-levelling setting is on and keep the lenses directed toward the horizon. Leveling will also be refined in photo processing.
- Move as linearly as possible (e.g., work from downstream to upstream), taking photos at intervals that are frequent enough that viewers will be able to discern details of the stream in areas between photo locations. Avoid taking sequential photos that do not maintain line-of-sight between photo locations. Depending on the site and the importance of accuracy, consider recording the project station or the distance from structure.
- Organized photo collection significantly improves efficiency in photo processing. If multiple people are involved in collection, develop an allocation plan prior to photo collection. For example, assign one person to collect photos along the channel, and another person to collect photos in the overbank areas.
- Limit the number of people on site to avoid obscuring features from the camera's view and to minimize impact on the stream. Groups should consist of 2-4 people. If a larger group is unavoidable, establish a data collection plan that minimizes the number of people in the camera's view.
- Be cognizant of sensitive habitat. Consider whether fish and/or redds are present. Minimize/avoid stepping in or placing the tripod in the stream when possible and particularly if fish are assumed to be present.
- Use supplemental light sources if necessary. Many structures do not get enough natural light to enable cameras to capture features in adequate detail.

- Additional photo collection tips are available on the Kuula website: Getting started with 360 photography (kuula.co) (Note: Kuula's instructions are primarily for real estate, but are still applicable to stream projects.)
- Most cameras have a feature that allows users to enable the use of GPS. This feature can help during the photo processing and tour building processes. However, users should be aware that the GPS function is frequently only accurate to a range of 16+ feet and should be used for informational purposes only.

Typical Collection Scenarios

- For pre-construction photo collection:
    - Document the existing condition of the crossing and the project reach.
    - Dependent on VST purpose, document the reference/design reach, further upstream and downstream, or beyond the immediate project vicinity.
- For construction photo collection:
    - Take photos before streambed work commences.
    - When possible, periodically take photos to document important work such as LWM and complexity feature installation.
    - Do a walkthrough and collect photos after streambed work is complete and before TSD is removed.
- For post-construction photo collection:
    - Document the site after TSD is removed and before the first events of the rainy season.
    - If possible, document the site after the first bankfull event.
    - Collect photos at various time intervals for site monitoring purposes. E.g., collect the as built condition the overwinter condition.

TOUR BUILDING

Start/structure

- Identify purpose of and target audience for the tour to determine appropriate level of effort. Example: If the site is relatively low complexity and/or the tour will not be shared with a wide audience, the process may be considered complete after photos are processed and linked, but supplementary material might not be included. If the site is high complexity and/or the tour will be shared with a wide audience, the tour should be informative and organized so

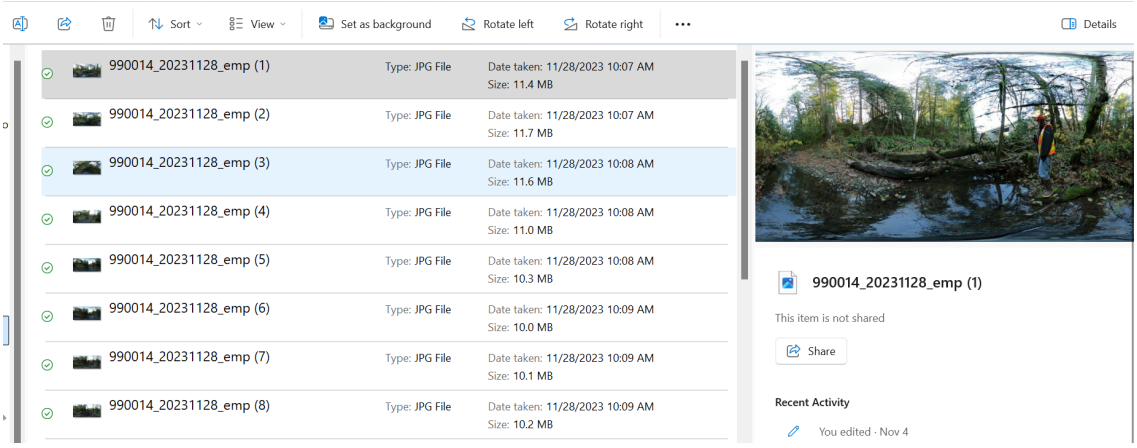
that various viewers can navigate through the 360 photos and intuitively use the VST to access site information.

  - Low effort - estimated 2 hours
  - Medium effort - estimated 2-10 hours
  - High effort - 10+ hours

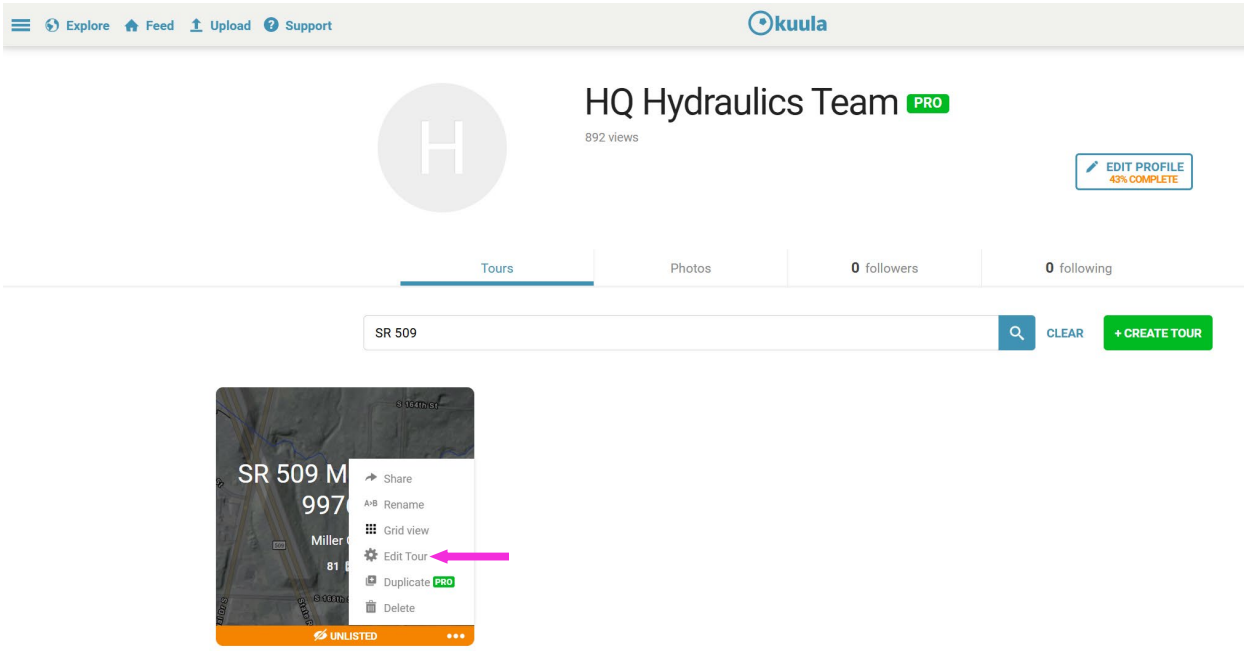
- Identify available/desired supplementary material. This may include figures from the PHD/FHD, RFC plans, drone footage, timelapse video, LiDAR and topographic maps, or any other material that enhances a viewer's understanding of the site and project. Be mindful of the scope of the tour. Do not overwhelm the audience with irrelevant content. Refer the audience to the PHD/FHD for more detailed exposition.
  - Note: Do not use any sensitive information. Only include supplementary material that is publicly available, or material that could be made available through a public records request.

Develop

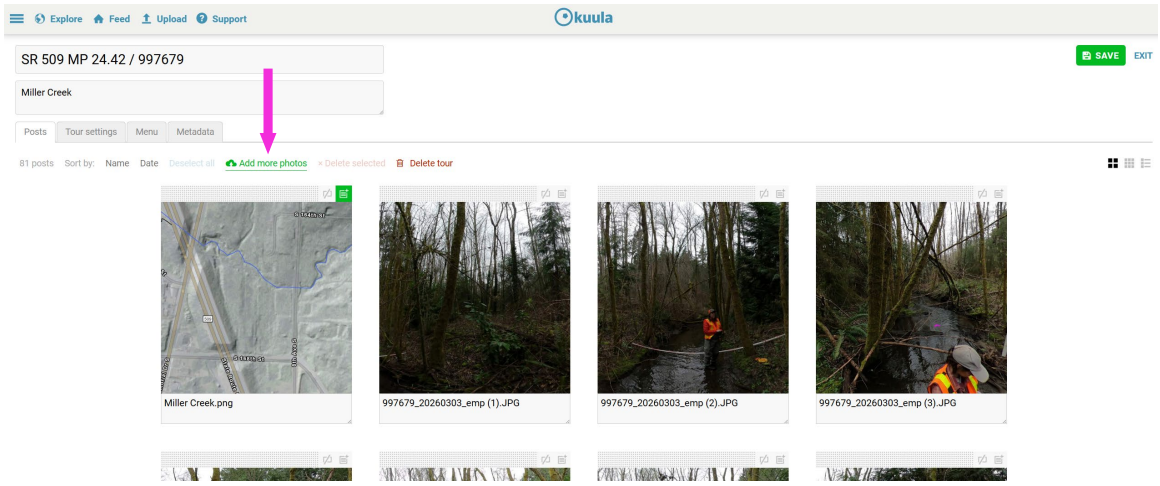
- Prior to uploading, bulk rename files
  - In Windows Explorer view, select all photos.
  - Select F2 and rename the first file using the following format:
    - [WDFW ID]_[DATE]_[photographer's initials]
    - Date should be entered in YYYYMMDD format
    - Note: After you press F2, it will look like only one file is selected and only one file is about to be renamed. As long as you select all before pressing F2 and typing in the name, you're fine.
  - Press Enter; all files after the first will be renamed as WDFW ID_DATE_INITIALS (n).



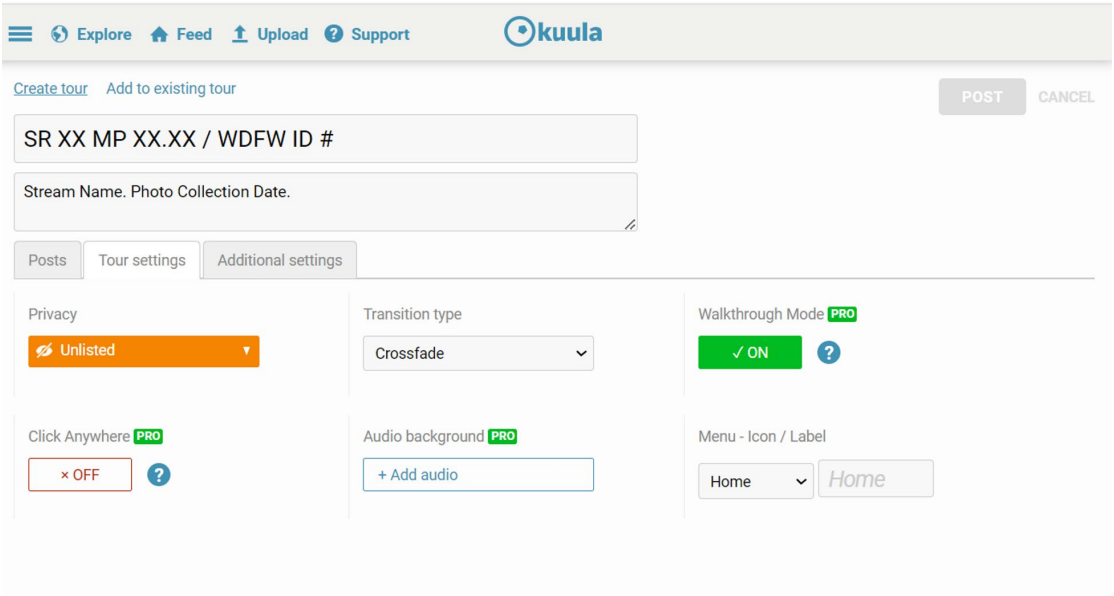
- Search the Kuula collection or check the VST Web map to identify if there is an existing tour for the project site.



- If there is an existing tour, choose to *Edit Tour*. Under the *Posts* tab select *Add more photos,* and upload the newly collected photos to the existing tour



- If there is no existing tour, choose to *Create Tour*
    - Tour title should include SR and MP and WDFW ID at a minimum
    - Tour title and subtitle should be intuitive.
    - Set the privacy settings to either Unlisted or Private. If the tour is to be shared with others, the privacy settings must be set to Unlisted.



- Upload photos to Kuula
- Process photos
    - Delete duds
    - Correct level & exposure
    - Reorder images in the grid view into a linear sequence as needed
- Link photos/supplementary materials
    - Take time to place hotspots in the approximate location of the linked photo. High attention to detail when linking photos is key to creating a navigable VST. Order/ delete photos in the grid view or skip photos when linking to create a clean, linear sequence of photos.
    - Icons should be as high contrast as possible and be consistent throughout the tour. Example: If using red arrows pointing downstream to navigate from Photo 1 to the Photo 2, all other photos should also use red arrows pointing downstream to navigate between photos.
    - Link supplementary material. It is sometimes better/more intuitive to link some supplementary materials to specific photos rather than to the map/homepage. Example: screenshots from 2D modeling, sediment gradation plots.

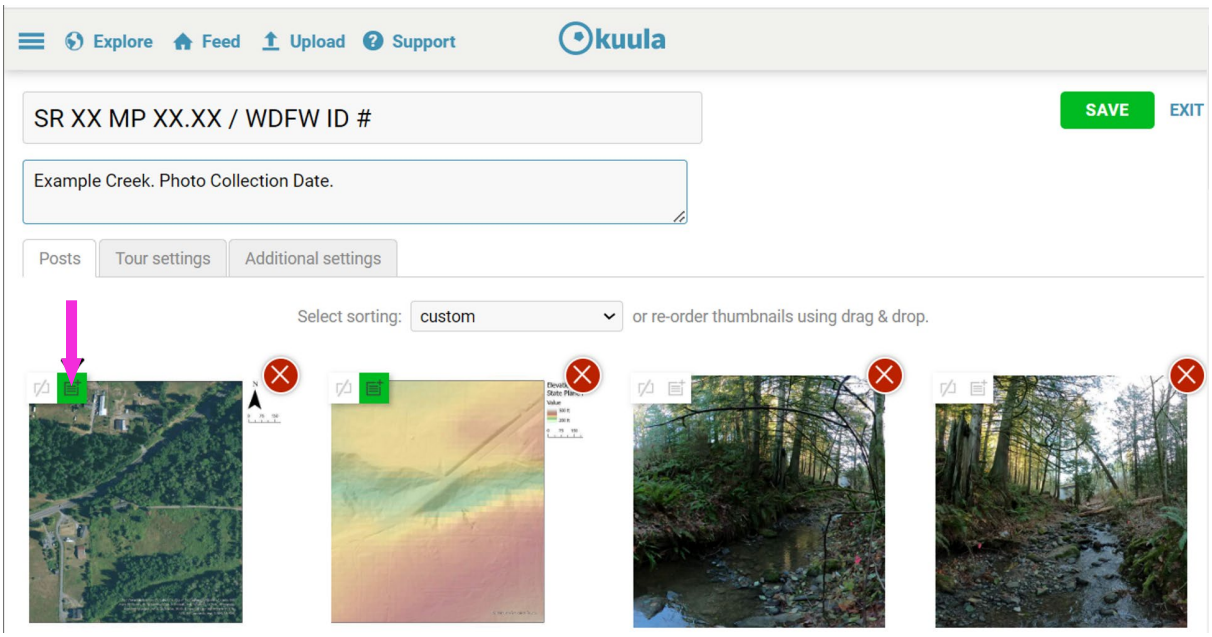
- Standard Symbols:

Symbol	Purpose/Data
	**Action: Go to another post.** Use symbol on tour map to link to photos within stream view. Place in approximate location on map.
	**Action: Go to another post.** Use symbol in stream-view to link between photos linearly. Place in approximate location of linked photo. Option to use advanced rotation settings to customize orientation and lower visual clutter.
	**Action: Open Card (video, photo, text) or Open URL.** Use on tour map and within stream-view to link/embed records, documentation, or site story/tour narrative.
	**Action: Open Card (video, photo, text).** Use on tour map and within stream-view to embed drone photo/video.
	**Action: Open Card (video, photo, text) or Open URL.** Use on tour map and within stream-view to embed YouTube video (e.g. video from site visits or timelapse video).

Note: These symbols are built-in assets from Kuula. It is possible to import custom symbols.

Customization to improve tour quality is encouraged, for example the tour builder should use high contrast colors and may import additional or alternative symbols if relevant. Tours could include parallel walk-throughs for separate collection dates; these may be distinguished with different color symbols or accessed separately via the home map. These standard symbols are recommendations to establish some consistency across Fish Passage VSTs. The tour map should provide a key/legend to define each hotspot used and provide some instruction for tour navigation. Tour builder may also use hover text function.

- Upload map. Within the *Edit Tour* tool, set a photo as the home map using the *add to menu* icon



- Link key photos to map
    - Map/homepage must clearly depict the stream and include the following at a minimum:
        - Map legend or key
        - Hotspots linking to points of interest at the site
        - Scale bar
        - North arrow
    - Use hotspots to link key photos to the map. To avoid cluttering the map, identify key locations at the site (e.g., structure inlet/outlet, complexity feature, grade break, etc.). Users should be able to select the hotspots and use the key photo to navigate to the other photos.
- Kuula tutorials:
    - Tour creation: Virtual Tour Tutorial (kuula.co)
    - Photo uploads: How to upload an image and create a new post (kuula.co)
    - Hotspot creation and editing: Add interactive hotspots, connect photos, create Virtual Tours (kuula.co)
    - Editing addons: Editing Addons (kuula.co)
    - Map/homepage (Note: This tutorial is for a floorplan, but the instructions here apply to a site map.): Floor Plan (kuula.co)

- Employing supplementary material via interactive cards: Interactive Cards (kuula.co)
- Level correction: Level Correction (kuula.co)

DELIVER

Share the tour link with intended users.

Email the following completed table to FPSRD@WSDOT.WA.GOV with subject: VST deliverable

Stream Name	State Route	Mile Post	WDFW ID	VST Link

The tour will be added to the Open Data Portal VST Web Map:

WSDOT - Hydraulics Virtual Site Tour - Overview

VSTs are also accessible via the *WSDOT Hydraulics VST* layer in the WSDOT Fish Passage Map:

WSDOT Fish Passage Inventory Web App