

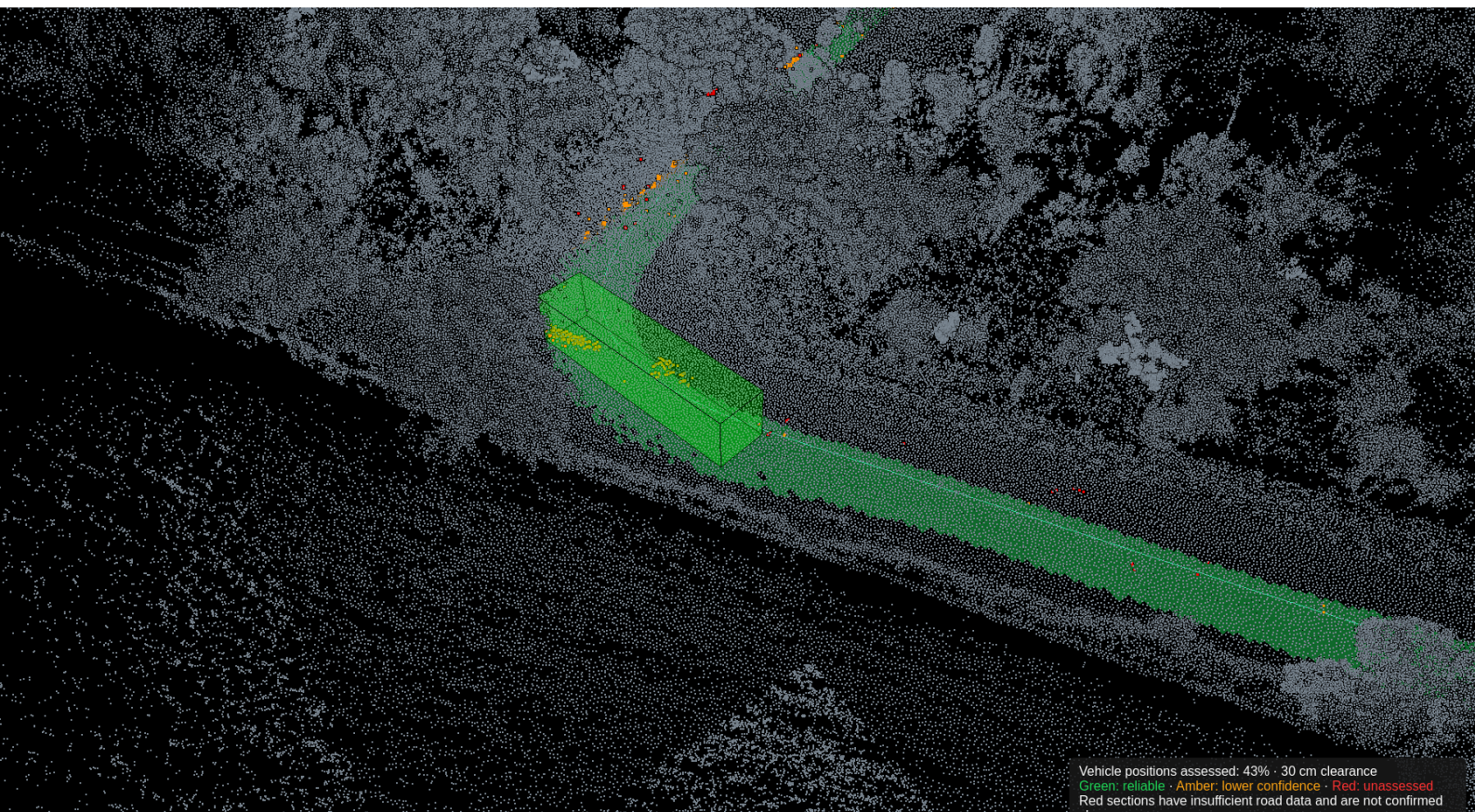
VEHICLE CLEARANCE, IN THE CONTEXT OF YOUR SCAN

Orbis

Crash detection.

WITH ROAD-SURFACE ASSESSMENT

Define your vehicle. Follow the road surface. Inspect clashes, adjust the route and calculate again.



Current road-surface revision: surveyed corridor, road confidence patches, vehicle envelope and clash returns. Beryl recording; selected section.

Model the envelope

Set vehicle length, width and height to suit the movement you need to assess.

Follow the road

Review local road support, vehicle attitude and assessed coverage.

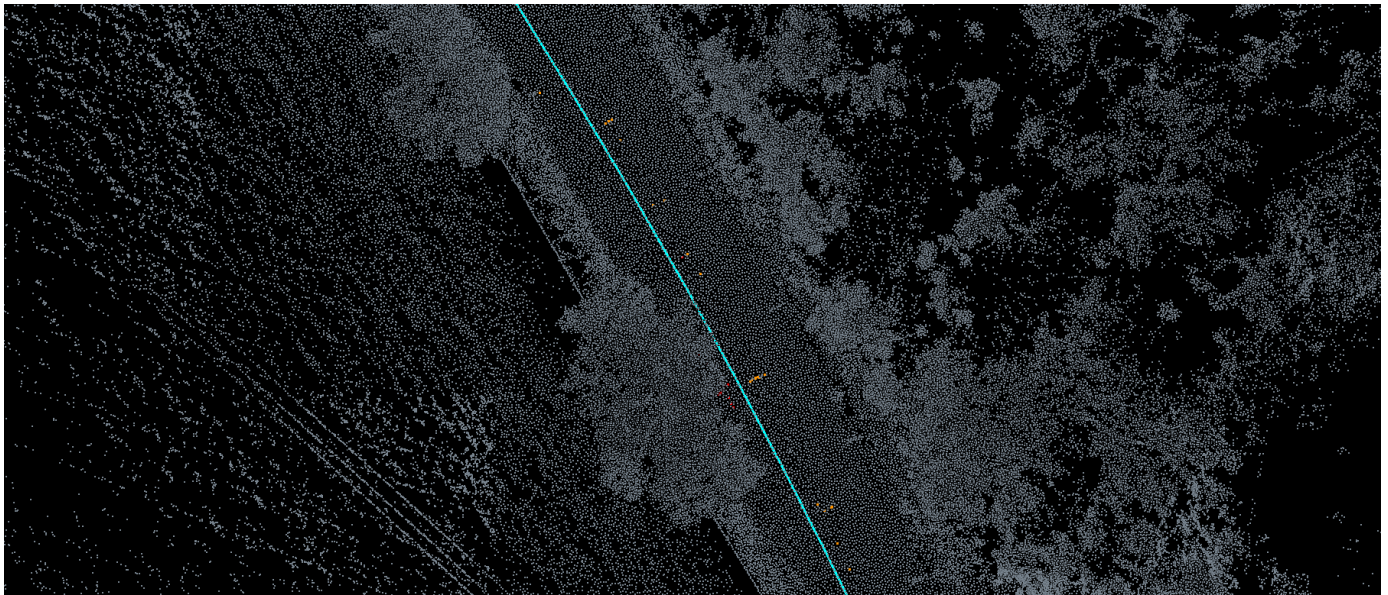
Refine the route

Edit the trajectory in the viewer and calculate a new result.

01 / THE WORKFLOW

From surveyed corridor to a better route.

Bring the vehicle and the surrounding environment into the same three-dimensional view.



Earlier revision. Orbis viewer capture: plan view of the scanned corridor with the editable route and existing clash results.

- 01 Prepare the recording.** Open a processed point cloud with its associated trajectory. Both must share a consistent spatial reference.
- 02 Set the vehicle.** Enter the full length, width and height in the ClashDetection process settings.
- 03 Run the check.** The engine fits local road support and tests vehicle boxes at supported positions against captured points.
- 04 Inspect the result.** Review clash points, road confidence and unassessed sections alongside the scan.
- 05 Adjust the trajectory.** Drag a route control to move the local path around a constraint.
- 06 Rerun and review.** Wait for the new calculation, then inspect the updated result in the viewer.

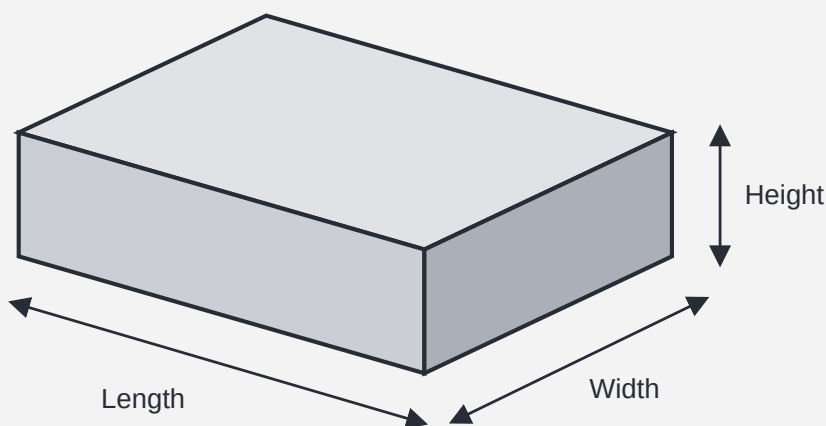
The scan provides the spatial context. The route defines the proposed movement. The vehicle dimensions define the volume being checked.

02 / DEFINE THE VEHICLE

Your dimensions. One explicit envelope.

Use a rectangular volume to represent the overall space occupied by the vehicle or load.

Specify the complete vehicle envelope



CAPTURED RUN EXAMPLE

23.86 m

length

5.20 m

width

5.70 m

height

Illustration, not to scale.
Not a product size limit.

Dimension illustration. Example dimensions are read from the vehicle-box output used in the screenshots.

Choose the full extents

Length is measured along the vehicle's forward axis, width across it and height along its local up axis. Enter values in metres. Include the equipment or load that must pass through the corridor.

The current model uses an oriented box. It does not import the detailed shape of a vehicle or identify components such as mirrors, wheels or booms.

Enter the process parameters

In **Process Settings**, select the **ClashDetection** process and set its **Default Parameters**. The current interface accepts semicolon-separated values.

```
VehicleLength:23.86;  
VehicleWidth:5.2;  
VehicleHeight:5.7;
```

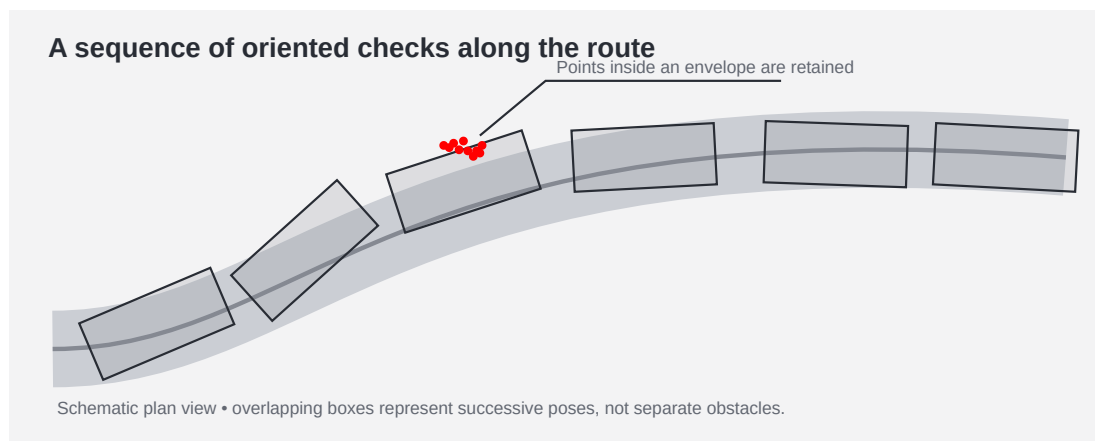
Reruns reuse the configured vehicle. The route-edit request sends the edited path. The server reads the ClashDetection process parameters when it queues the new run. Check these settings before comparing vehicle options.

A larger envelope can represent an agreed allowance, but the current interface does not provide a separate clearance-margin control. Document any allowance included in the dimensions.

03 / INSIDE THE CALCULATION

How Orbis finds a clash.

At each sampled route pose, the detector asks which captured points lie inside the vehicle envelope.



Conceptual illustration of sampled vehicle poses. The actual calculation operates in three dimensions.

1. Build the route

The initial calculation constructs spline sections from the recorded trajectory. Edited runs use the saved control points and a centripetal Catmull–Rom curve matching the viewer’s route representation.

2. Orient the vehicle

Heading follows the path. A plane fitted across nine footprint locations sets local height, pitch and bank. Positions without sufficient support are unassessed.

3. Apply underside clearance

The tested box begins 0.30 m above its support plane. Its roof stays at the configured height; clearance trims the underside rather than raising the vehicle.

4. Gather nearby points

A spatial index narrows the search to points near the route. An edited run also captures points around the new path, so its search can extend beyond the original driven line.

5. Test inside the box

Inside-box returns are checked against the local road. Reliable returns below the clearance are excluded; uncertain ground classifications remain potential clashes.

6. Prepare the result

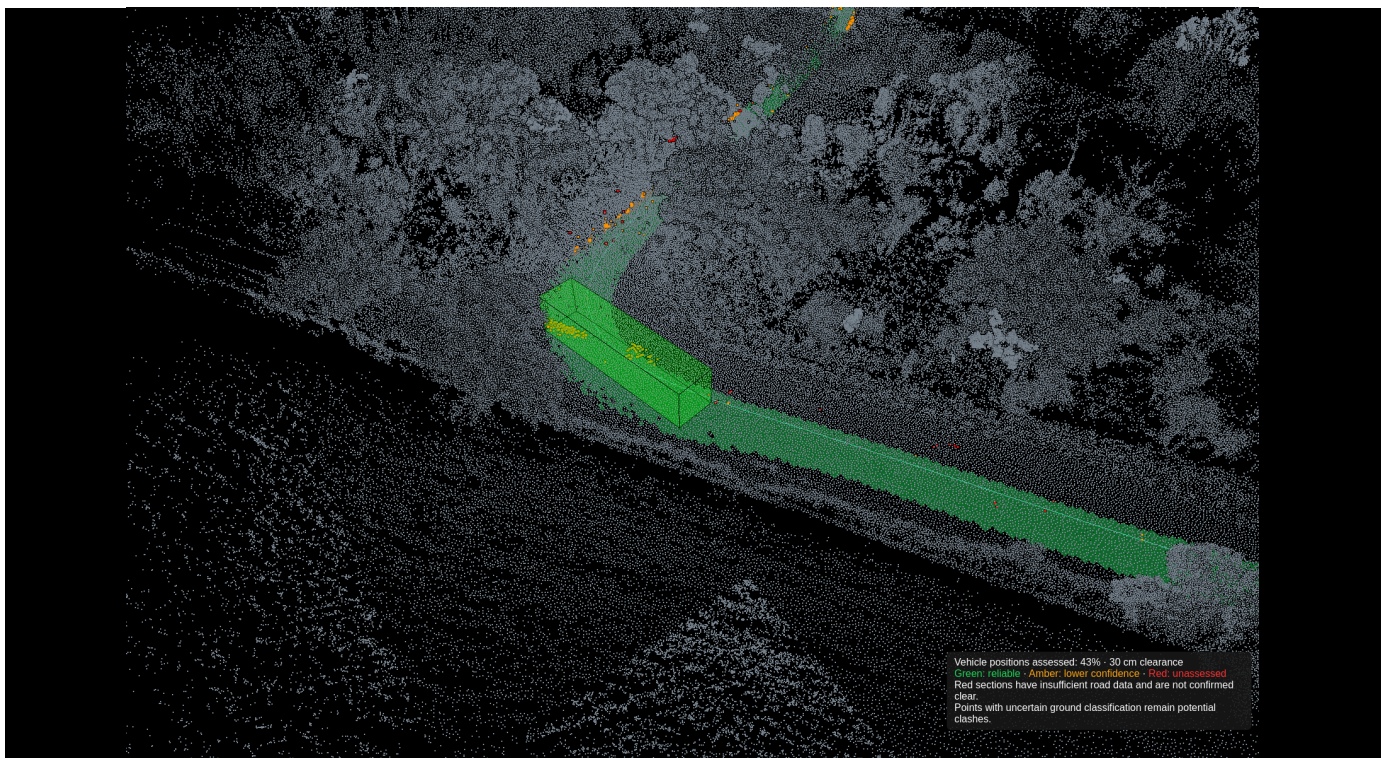
The pipeline prepares clash points, vehicle boxes and a road assessment. The saved revision carries the road data and coverage summary.

Sampled geometry. Edited paths are sampled at approximately 0.5 m intervals. This is a sequence of oriented box checks; it is not a vehicle dynamics or steering simulation.

04 / ROAD SURFACE

Follow the road. See what supports the vehicle.

The road beneath the route now helps position the envelope and explain where the clash check could be completed.



Current Beryl revision: native road confidence patches, road-following path, an actual vehicle box and calculated clash returns. Survey context is grey.

Adapt to the surveyed surface

Local road height and banking influence the rigid vehicle box. Moving the route sideways can change both its elevation and attitude when the calculation runs again.

Separate road from intrusions

Reliable local road returns below the underside clearance are excluded. Points whose ground classification is uncertain remain potential clashes.

See the assessment coverage

The Road Surface layer shows patch confidence and the road-following path. Unsupported positions are explicitly unassessed.

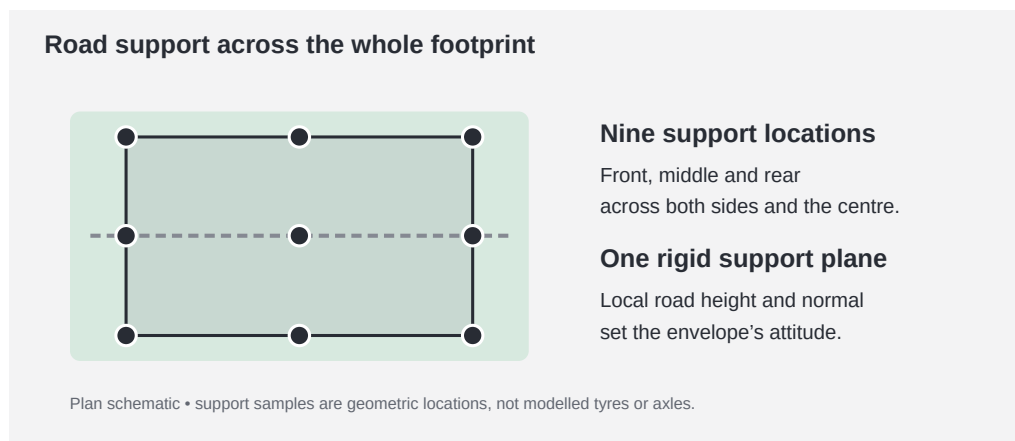
Keep the edit and result distinct

The original spline remains the editing reference. Its controls move horizontally; the engine recomputes road support when you submit a rerun.

05 / BUILD ROAD SUPPORT

Fit locally. Check the full footprint.

A supported road beneath the vehicle centre is a starting point. The complete footprint must also pass the model's checks.



The model follows connected patches from the driven route to the proposed position and across nine footprint locations.

Start with the driven route

A median sensor-height estimate provides the road-height prior. Trusted fits along the original route seed a sparse, layered road model.

Fit measured road patches

The engine uses a 0.5 m cell grid and a 1 m neighbourhood radius. Spatial sampling prevents dense repeated returns from dominating a fit; robust plane fitting checks point spread and residual error.

Keep separate levels separate

Height priors and compatible layers help distinguish overlapping surfaces, such as an upper road and the area below it.

Follow connected support

Edited positions are reached in successive supported steps. The model does not jump directly to a nearby low or dense surface and assume it is the same road.

Fit the vehicle's support plane

Nine samples span the length and width. Their fitted plane supplies height, pitch and bank; heading still comes from the proposed path.

Leave unsupported poses unassessed

Missing footprint support, abrupt changes or a poor rigid-plane fit can stop assessment. Longer or wider vehicles may require evidence beyond the clearly scanned road centre.

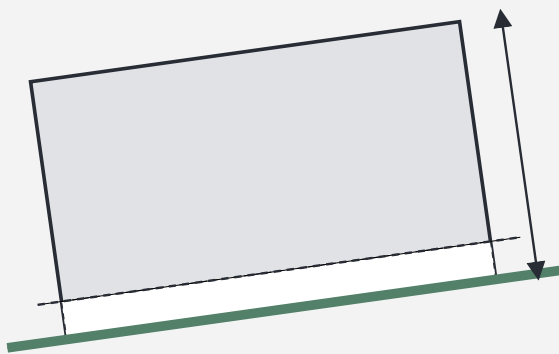
Only a small, bracketed one-cell hole can be interpolated. Interpolated support may help placement, but it is never used to suppress a potential clash point.

06 / GROUND CLEARANCE

A defined underside. An unchanged roof.

The current engine uses 0.30 m of ground clearance along the local support-plane normal.

Trim the underside. Keep the roof height.



Banked cross-section schematic • fixed engine setting; not a driver-adjustable clearance control.

Roof = configured height H

Measured along local road normal.

Tested vertical extent

From 0.30 m to H above support.

Effective box height = $H - 0.30$ m

The roof is not moved up by 0.30 m.

Illustration of the active geometry. H is the configured full vehicle height; the illustration is not to scale.

Apply clearance consistently

The box centre is placed at $(H + 0.30 \text{ m}) / 2$ above the support plane. Its tested height is $H - 0.30$ m. Length and width retain their configured full extents.

Road banking tilts this local coordinate frame. The 0.30 m value is an engine setting, not a separate viewer field or a free-space margin around every face.

Reject an invalid height

The engine requires vehicle height to exceed the underside clearance. Confirm positive, sensible dimensions before queuing a run.

Check the local road again

A candidate inside the oriented box is compared with its local measured road patch. A reliably classified return below the clearance is excluded from the output.

Retain uncertain returns

If reliable local ground classification is unavailable, the inside-box return remains a potential clash. Interpolation does not justify removing it.

Interpret the remaining points

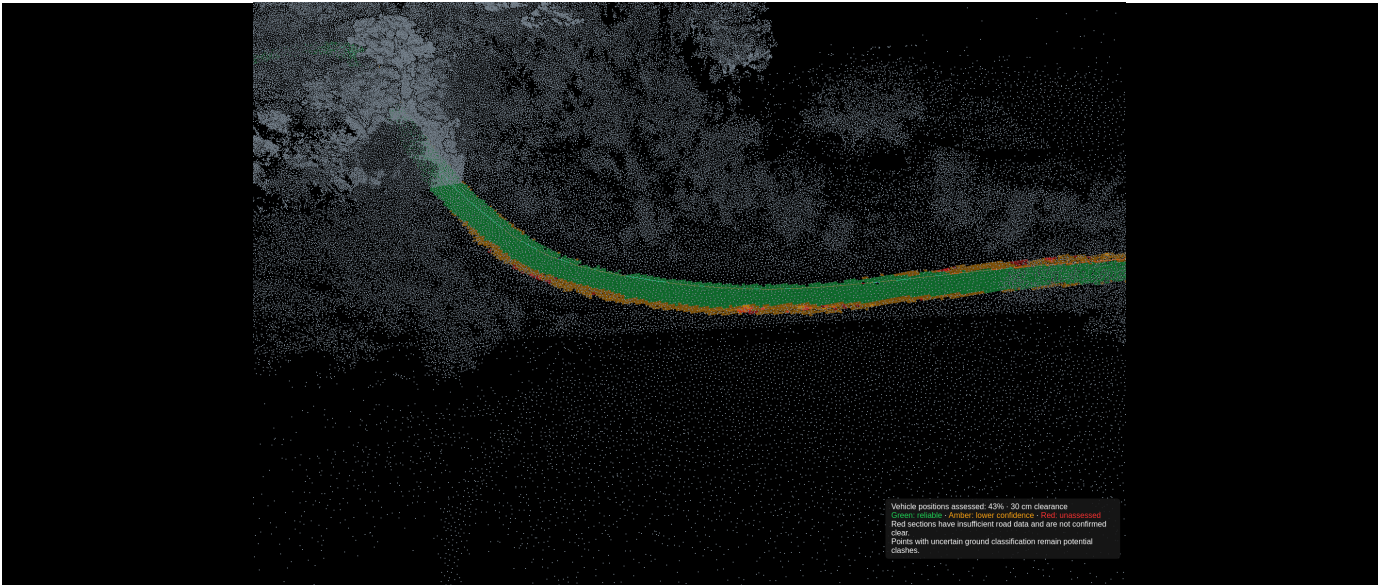
Red and orange clash points still describe upper and lower position within the tested box. They do not measure penetration depth or severity.

This is a rigid envelope assessment. It does not model tyres, axle contact, suspension travel, chassis shape or articulated trailer motion.

07 / READ THE ROAD LAYER

Confidence is visible. Unknown stays unknown.

Use the Road Surface layer alongside the source scan and clash result to understand the assessment.



Current Beryl revision: native road patches and assessment notice. Clash points and vehicle boxes are hidden here to make the road layer easier to inspect.

Road-layer cue	Meaning
Green patches	Reliable local fit: confidence at least 0.65.
Amber patches	A valid fit with lower confidence, below 0.65.
Red patches / route	Unknown patch or unsupported vehicle position. Red route sections are not confirmed clear.

Toggle for inspection

The scene tree lists **Road Surface** with assessed coverage. Switch the layer on or off to compare the model with the captured points.

Read the right colour system

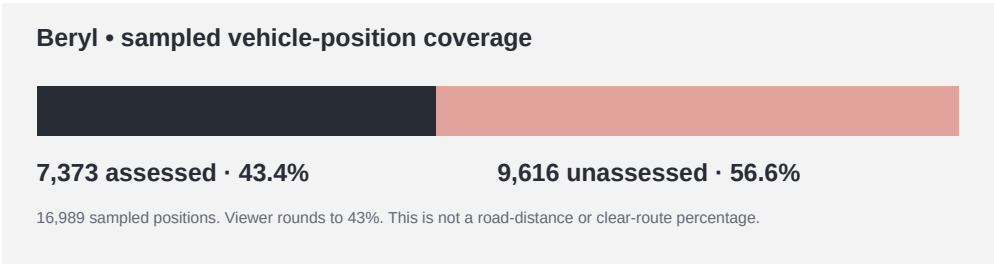
Road colours describe support confidence. Clash-point red/orange describes position inside the envelope. A green vehicle box is simply display geometry.

Green patches beneath the centre can coexist with an unassessed vehicle position when support across the full footprint is insufficient.

08 / A PUBLISHED EXAMPLE

Read coverage before comparing totals.

The completed Beryl road-surface run provides a practical example of assessed and unassessed positions.



Saved revision 4606dba1...9827, recording 2026_05_21_00_19_11Z_Beryl. Counts read from the published run.

Published result	Value
Configured vehicle	23.86 × 5.20 × 5.70 m
Road clearance / cell size	0.30 m / 0.50 m
Residual ground entries excluded	483,183
Entries with uncertain ground classification retained	954,892
Output clash entries	71,408,514

Understand what was tested

7,373 positions had supported vehicle placement. At the other 9,616 positions, the detector skipped clash testing because the road support was insufficient.

Coverage is a count of sampled vehicle positions. It is not the proportion of road length that is clear or a probability of safe passage.

Compare like with like

A lower clash total can reflect a changed route, excluded ground returns or more unassessed positions. Inspect those causes before drawing a conclusion.

Repeated points may appear in overlapping envelopes. Output entries are not unique obstacles, and retained uncertainty counts are not a separate obstacle inventory.

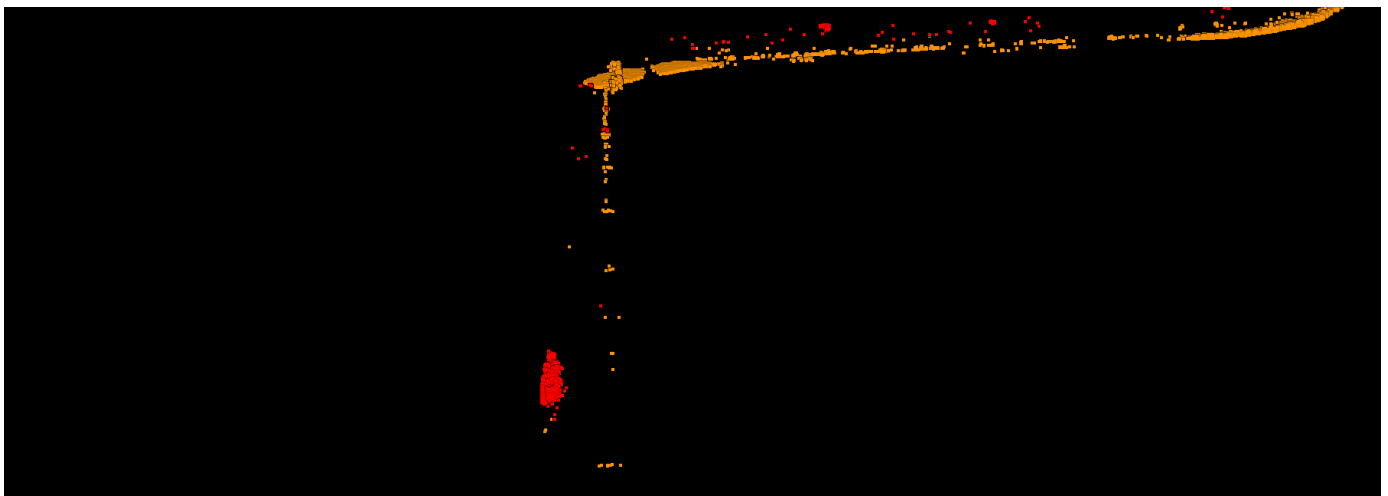
Each new saved revision includes its road assessment. The server requires the assessment before publishing the result. If the viewer cannot load it, it reports that route clearance is unverified.

Existing published result; no new production run was submitted for this brochure. The accompanying review separates current unit checks from historical deployment and full-run evidence.

09 / INTERPRET THE RESULT

See the intrusion. Keep the context.

Use the coloured clash layer to locate captured points inside the tested volume, then inspect the surrounding scan.



Earlier revision. Orbis viewer capture: clash returns isolated from the survey context for inspection. The colours are generated by the detector.

Read the colour in the vehicle's local frame



Rear-view schematic

Red — upper half

Clash returns at or above the envelope centre.

Orange — lower half

Clash returns below the envelope centre.

Colour describes position, not intrusion depth or severity.

The upper/lower split follows the box's local up direction, including pitch and banking on the road.

Three useful visual cues

Survey cloud: the captured surroundings, shown in grey in this brochure. **Cyan line:** the editable route. **Green box:** a displayed vehicle envelope. The box colour alone does not indicate a clear result.

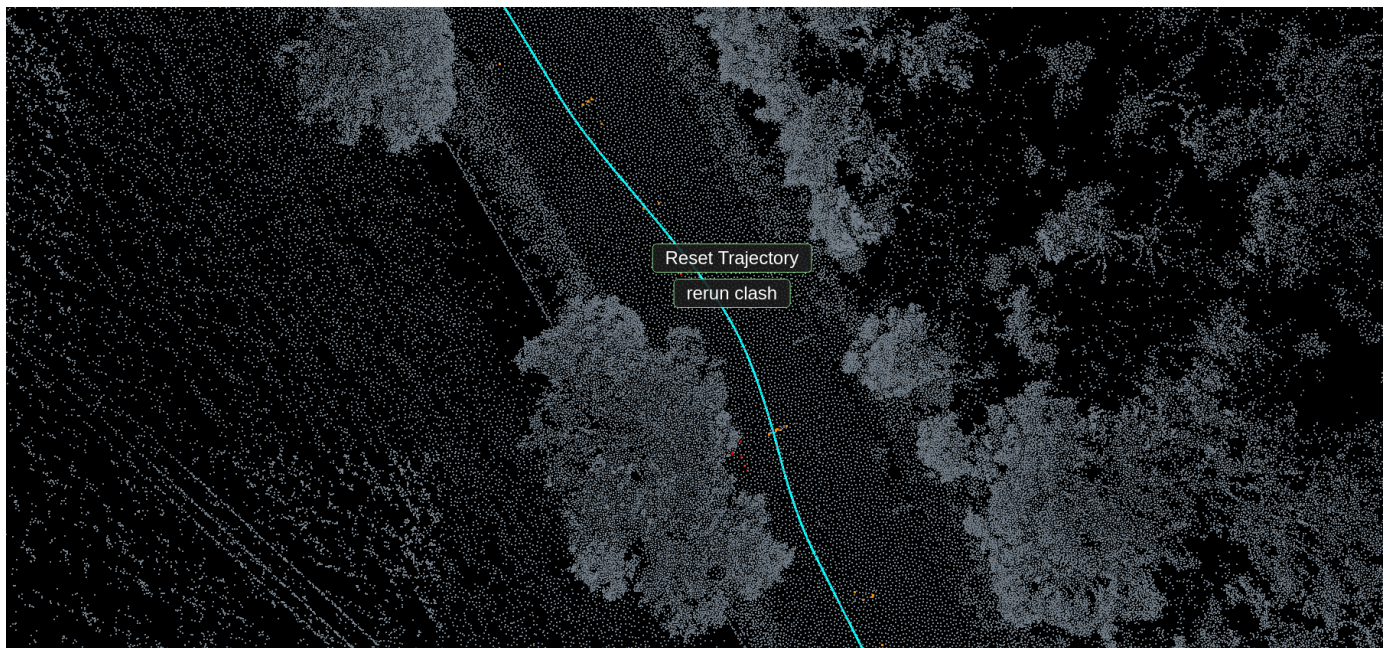
Read clusters, not just totals

Overlapping poses can write the same spatial point more than once. A clash-point total describes output records; it is not a count of unique obstacles, a penetration-depth measurement or an intrusion volume.

10 / EDIT THE PATH

Move the route where it matters.

Refine a local section directly in the point-cloud viewer, while keeping the wider route in context.



Earlier revision. Orbis trajectory editor capture: a local path adjustment with the native “rerun clash” and “Reset Trajectory” controls. The edit is an unsaved demonstration; displayed clash points belong to the previous completed run.

Drag a control point

Move the pointer onto the cyan spline to locate a control handle, then drag with the left mouse button. The editor moves the selected control in a horizontal plane and preserves its elevation.

Nearby controls move with a smooth falloff. The current default influence extends 20 m along the path on either side, helping a local adjustment blend into the surrounding route.

Review the proposed line

Zoom into a plan or elevated view to reveal the contextual controls and judge lateral movement around a constraint. Inspect the transition into and out of the edit as well as the immediate obstruction.

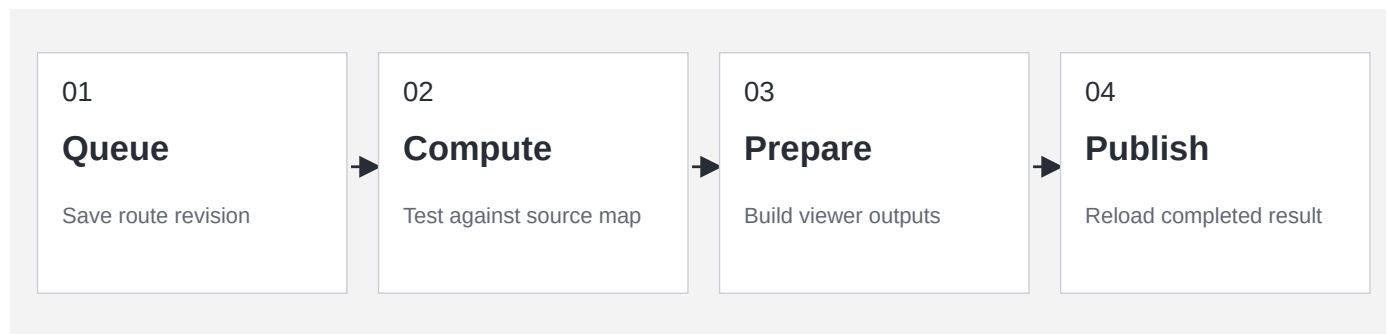
Moving the line changes the proposal immediately. The clash cloud and road assessment remain from the previous calculation until a rerun completes.

The editor supports route refinement. It does not automatically enforce minimum turning radius, steering limits or articulated vehicle behaviour. Review the practicality of the proposed movement as part of your planning process.

11 / RERUN AND SAVE

Turn an edit into a new result.

A completed rerun links the revised path to its calculated clash output.



Processing lifecycle verified in the GeoFuse implementation.

Submit the proposal

Select **rerun clash** after editing. Orbis sends the control points to the server and creates a distinct revision for that run. The button reports whether processing is queued or running.

Calculate and publish

The server reassesses road support on the edited spline and prepares the viewer assets. It publishes the path, clash result and required road assessment together.

The viewer then reloads the completed revision. Reopening the recording restores that saved route and its corresponding output.

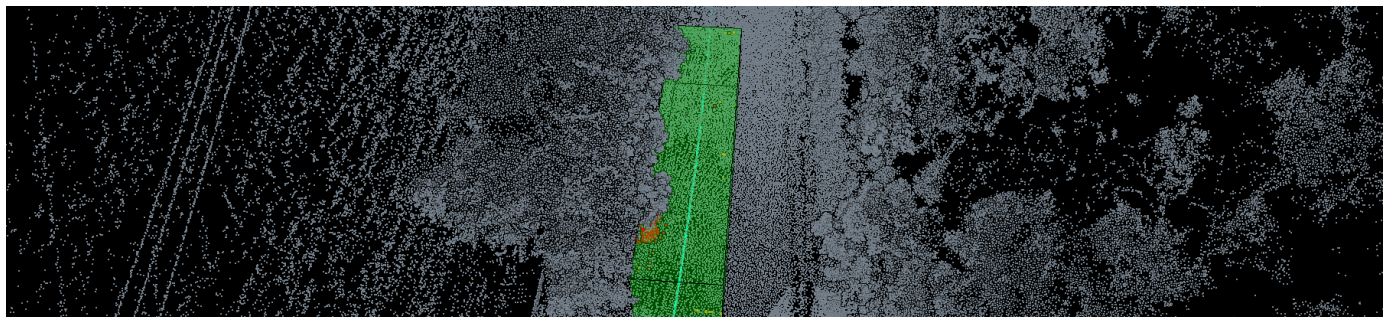
Recover or return to the original

If a run fails, the previous completed result remains available. Review the pipeline status and retry after addressing the failure.

Reset Trajectory restores the original trajectory from the recording, rather than reverting to the last edited path. Rerun the clash calculation to save the reset path and update its result.

Handle an empty result

A successful run with zero clash points retains the edited path. Its road assessment still matters: unsupported positions were not tested for clashes.



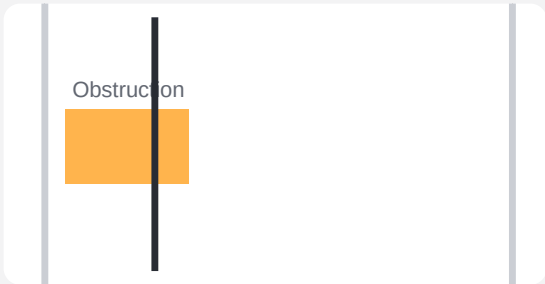
Earlier revision. Orbis viewer capture: vehicle envelope placed along the tested route. Saved route revisions keep the path and completed result associated.

12 / AN ITERATIVE ASSESSMENT

Inspect. Adjust. Calculate again.

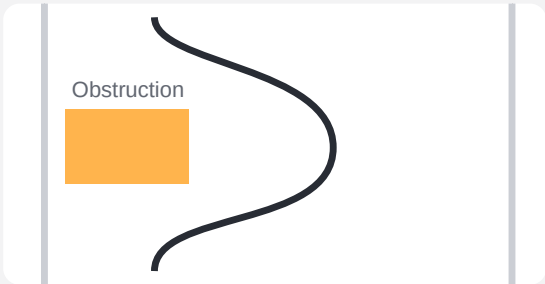
Use each result to decide which local change is worth testing next.

01 Existing route



The selected envelope intersects scan returns.

02 Proposed route



Shift locally, then rerun the detector.

Illustrative route alternatives, not a measured before/after result. The proposed path still needs a clash calculation.

Start with a specific constraint

Find a cluster of clash returns and inspect it from more than one angle. Establish whether it represents a verge, structure, vegetation or another scanned feature.

Change one assumption at a time

Keep the same scan and vehicle dimensions while exploring route edits. This makes it easier to relate a change in the output to a change in the path.

Check the transition

A local shift can reduce one intrusion and introduce another further along the route. Review the approaches, the altered section and the departure together.

Rerun before drawing conclusions

The cyan proposal line is a geometric edit. It does not establish that the vehicle fits. Run the detector again and inspect the completed output before accepting the change.

Record the assessment context

Retain scan identity, survey date, dimensions, road coverage and route. Capture the relevant views and note any allowances or remaining intrusions for the project team.

Understand the optimisation

The user steers the iteration. Orbis calculates the clashes for each submitted route; the reviewed implementation does not automatically find a minimum-intrusion path.

A useful route change is one you can explain in the scan—and verify in a fresh calculation.

13 / ASSESSMENT QUALITY

Make the result meaningful.

The calculation reflects the captured environment, the modelled envelope and the route you submit.

Check	Why it matters
Survey coverage	Occluded or unscanned surfaces are absent from the point cloud. A result can only report intersections with the captured returns available to the detector.
Survey condition	Confirm that the scan represents the corridor you intend to use. Temporary objects, vegetation and changes since capture can affect interpretation.
Coordinates and units	Use a consistent spatial reference for the cloud and trajectory. Enter full vehicle dimensions in metres and confirm the envelope's placement in the viewer.
Ground reference	Local road patches support a plane across the vehicle footprint. The 0.30 m underside clearance does not raise the roof. Unsupported positions remain unassessed.
Vehicle representation	The rigid box follows route heading and road-derived pitch and bank. Detailed meshes, suspension, axle contact and articulated trailer motion are outside this model.
Sampling and returns	The check is spatially sampled. Point density, missing returns and overlapping sampled poses affect the output and its interpretation.

What a clash tells you

Captured points were found inside one or more tested vehicle boxes. Inspect their location and the underlying scan to understand the constraint.

What zero clashes tells you

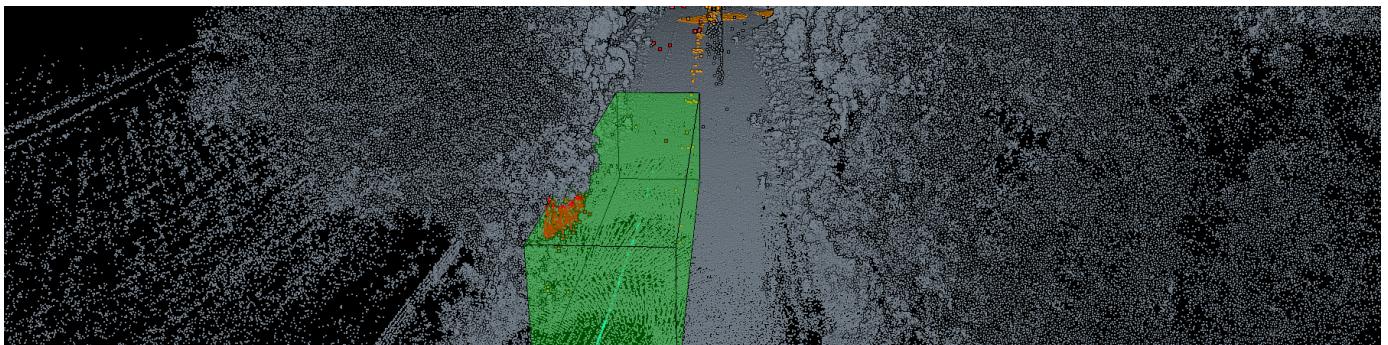
No points were written by that completed calculation. Check assessed coverage: unsupported positions and missing surfaces cannot be declared clear.

Version matters. Road assessment requires the updated engine and viewer. Earlier results may lack it; recalculate with the updated pipeline to obtain road support and coverage.

14 / PUT IT TO WORK

Plan the movement with the scan in view.

Bring vehicle dimensions and corridor constraints together before choosing a route.



Earlier revision. Orbis viewer capture from an existing completed run. Screenshot display settings emphasise the vehicle envelope and clash returns.

Where the workflow helps

Road and site access: inspect a proposed vehicle envelope against scanned roadside features and access constraints.

Plant and infrastructure corridors: review local passage restrictions in the context of surrounding equipment and structures.

Underground and enclosed routes: assess side and overhead intrusions where suitable scan and trajectory data are available.

Bring to a demonstration

A representative processed recording and trajectory; the proposed vehicle's full length, width and height; and a route section containing the constraint you want to investigate.

Agree on the scan coverage, the modelled envelope and any allowances. Then work through the first calculation, a local edit and a rerun with your team.

Explore Orbis clash detection

Discuss your vehicle, scan and route with AutoMap.

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automap.io/contact

Prepared from the GeoFuse, Fuse and OrbisFuseEngine implementations reviewed on 13 September 2026. Screenshots use the deployed Orbis viewer with existing scan and clash outputs; selected geometry and display settings aid clarity. Illustrations are explanatory schematics. Capture details and source references accompany the editable master.