

— PRODUCT SPECIFICATION

GroundMap Fusion™

New multi-pass capture and every earlier survey of your site, fused into one model. Every point graded by how many passes measured it and whether they agree.

01 Packages

SCOPED TO YOUR SITE · COMBINE AS NEEDED

Fusion Multi-Pass

Extra passes at new headings and angles, cross-checked into one model.

INPUT

New capture: extra passes at new headings and look angles over the same ground.

ADDS

Walls, facades and ground between lines measured rather than modelled; every surface cross-checked.

SUITED TO

Cities, structures, steep and vegetated sites.

Fusion Archive

Earlier surveys of the site, from any year or datum, aligned with your new capture.

INPUT

Earlier surveys from any year, provider or datum, with new capture or your own data.

ADDS

Ground under canopy from every survey, change since the first one, and a baseline.

SUITED TO

Baselines, due diligence, approvals and closure.

Fusion Monitor

Repeat capture on your schedule. Real change, beyond each pair's measured scatter at 95 % confidence, kept as its own layer.

INPUT

Repeat capture on your schedule.

ADDS

Each epoch graded; real change as its own layer; volumes with their confidence.

SUITED TO

Pits, dumps and stockpiles, slopes, coast and rehabilitation.

02 Inputs and outputs

Inputs	New multi-pass capture (airborne, drone, terrestrial or mobile), earlier surveys from any year or provider, and your own data.
Tiers	Fusion: Your passes and earlier surveys, aligned and fused into one point cloud, every point graded by how many passes agree. Fusion Graded: Adds a confidence class to every point and flags every modelled surface. Real change, beyond each pair's measured scatter at 95 % confidence, kept as its own layer. Fusion Spectra: LiDAR and imagery fused. Points measured from overlapping imagery join the laser-measured ones, each with its own confidence, and the colour comes from the photographs themselves.
Reference systems	GDA2020 / MGA coordinates, with heights on the Australian Height Datum, or as your project requires. New Zealand: NZGD2000 / NZTM2000 coordinates, with heights on NZVD2016. United States: NAD83 State Plane or UTM coordinates, with heights on NAVD88.
Point cloud	LAS 1.4 / LAZ with ASPRS classes, and confidence, source pass and agreement on every point. Modelled points flagged; change as ICSM class 22.
Rasters	Fused DTM and DSM (GeoTIFF / COG), with coverage, agreement and confidence rasters and a modelled-area mask.
Accuracy	Agreement between aligned passes on every point. Vertical accuracy against independent survey control, stated per job.
Documentation	Processing lineage, per-pass co-registration report, QA report, ISO 19115 metadata and a 3D web view.
Specifications	ICSM Australian Airborne LiDAR Acquisition Specification v2.0; LINZ National Aerial LiDAR Base Specification v1.2; USGS Lidar Base Specification 2025 rev. A.
Delivery	Tiled to your grid, through your portal, an encrypted link or an encrypted drive.

03 Accuracy

Accuracy is measured on every job and stated per job. Every point carries the agreement between aligned passes (**confirmed, agree_cm**): vertical accuracy is measured on independent check points held out of processing (ICSM v2.0 sections 3.4 to 3.9). Government aircraft LiDAR, a check of the method: 43 State survey marks held out of GroundMap's processing: median ~3 mm, 33 of 43 within 10 cm, RMSE 0.12 m. Drone and ground scanning: USS Pampanito, 98 % of held-out overlap within 1 cm, point to plane; El Teniente, 98.7 % where two or more scans overlap, each scan within 1 cm of the shared surface. Registration agreement between scans, not absolute accuracy against control. Hobart Fusion: on stable open ground, checked independently of the alignment, the 2011 survey agrees with the 2024 survey to a median ~6 mm (NMAD 64 mm, 95th percentile 157 mm; 94.4 % within 15 cm): relative agreement between surveys, not absolute accuracy.

Survey marks: LIST Survey Control, the LIST © State of Tasmania, CC BY 3.0 AU. Drone and ground scanning credits: page 2.

04 Every point graded

HOBART SHOWCASE SHARE OF 398,268,618 POINTS

CLASS	DEFINITION	SCORE	HOBART
■ 3 passes agree	After alignment, both other passes measure the surface height within 15 cm of the reference pass.	100 / 90	2.2 %
■ 2 passes agree	After alignment, two passes measure the surface height within 15 cm of each other.	85 / 75	14.0 %
■ Single pass	Measured, not cross-checked: one pass reached it, or it lies below the top surface, such as under canopy.	55 / 50	64.5 %
■ Change detected	Passes differ by more than 15 cm: real change, or disagreement between surveys. Change maps test it separately.	40	6.8 %
■ Modelled	Filled by geometric modelling where no pass measured, such as walls. Flagged, never counted as confirmed.	5	12.5 %

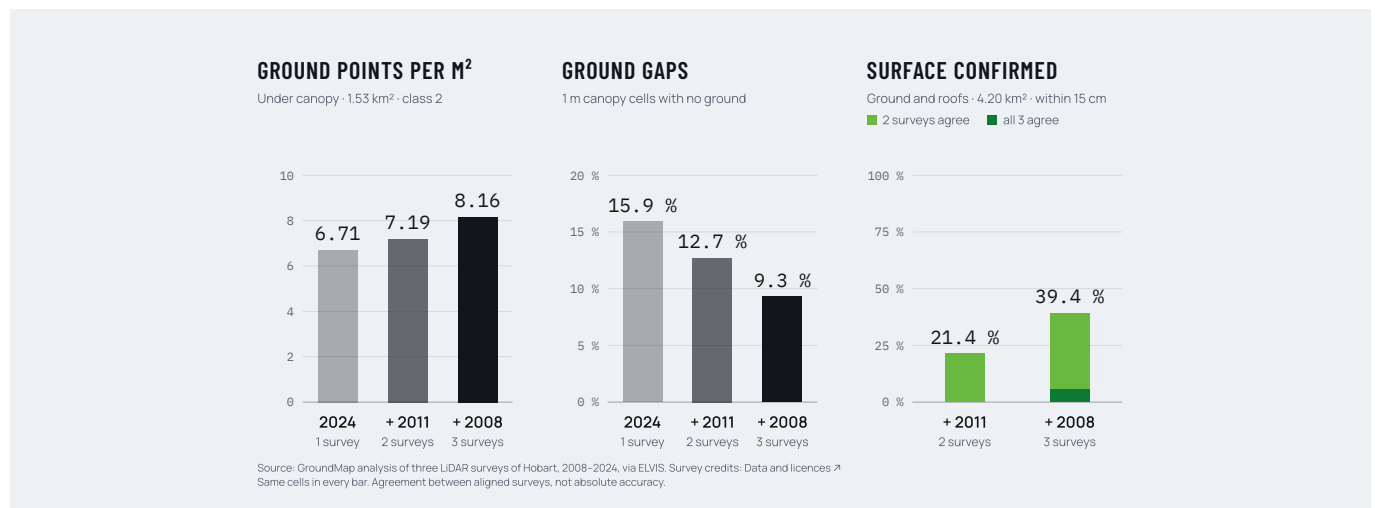
05 Fields on every point

IN EVERY DELIVERY

classification	ASPRS and ICSM classes; change between surveys as class 22, Temporal Exclusion (the Hobart showcase keeps the suppliers' classes and marks change with accuracy 40)	synthetic flag	Set on every modelled point, so any software can exclude them
point_source_id	The flight line that measured the point	red, green, blue	True colour from imagery; points without their own colour take the nearest coloured point (identified by survey_year and generated)
survey_year	The survey that measured the point; 0 = modelled	generated	0 measured as recorded · 1 measured, height smoothed onto the frame surface · 2 modelled
confirmed	Passes, frame included, agreeing within 0.15 m in the point's 0.5 m cell; 0 = off the top surface	agree_cm	Height difference to the closest other pass in the cell, cm; 65535 = none there
accuracy	Confidence grade score (section 04), not an accuracy value: 100 or 90, 85 or 75, 55 or 50, 40, 5	confidence	Point-density score 0–100 (completeness, not the grade) from measured points in the point's 1 m column

06 The evidence

HOBART · PUBLIC DATA · NOT CLIENT WORK



Surveys added in turn: Hobart City 2023/24, Mount Wellington 2011, Climate Futures Derwent 2008. Survey data: Hobart City 2023/24 (captured by Fugro for the State of Tasmania; theLIST; CC BY 3.0 AU), Climate Futures Derwent 2008 (captured by DiMAP for ACE CRC; ACE CRC licence) and Mount Wellington 2011 (no licence on record), via ELVIS. Processing: GroundMap. Licences: per survey, listed at groundmap.com.au/about/data-and-licences/. Attribution: Hobart City 2023/24 LiDAR from theLIST © State of Tasmania. Licence: CC BY 3.0 AU. Climate Futures Derwent 2008 LiDAR: The LiDAR Dataset was collected as part of the Climate Futures for Tasmania project; a project managed and delivered by the Antarctic Climate & Ecosystems Cooperative Research Centre. The dataset was funded primarily by the State Government of Tasmania through the State Emergency Service and the Commonwealth Natural Disaster Mitigation Program. Licence: ACE CRC licence (Australia wide; commercial use, adaptation and sub-licence). Mount Wellington 2011 LiDAR, flown 20 to 28 January 2011, obtained via ELVIS (Geoscience Australia). Licence: No licence on record.

Drone and ground scanning figures, page 1. USS Pampanito: Survey data: USS Pampanito, Autodesk, Topcon, 3D Robotics, USS Pampanito 2020: USS Pampanito Submarine - LiDAR - Terrestrial, Photogrammetry - Aerial. Distributed by Open Heritage 3D. <https://doi.org/10.26301/qdpd-2250> (CC BY-NC-SA 4.0). Processing: GroundMap. No affiliation with the museum ship's operator or the dataset authors. El Teniente: Survey data: Chilean underground mine dataset, Advanced Mining Technology Center (AMTC), Universidad de Chile (Leung et al., IJRR 2017; CC BY-NC-ND 3.0 CL). Processing: GroundMap. No affiliation with the mine operator or the dataset authors.

The methodology paper and a worked QA example: groundmap.com.au/groundmap-fusion/. The accuracy statement: groundmap.com.au/accuracy/. Sample data on request.