Flood Risk Intelligence

Flood maps, flood risk assessments and consulting for South Africa

Delta Hydro is a South African flood engineering firm. We build flood models from local rainfall and stream gauge records on 5 m terrain, and supply the results as flood maps, risk assessments and engineering advice to insurers, lenders, developers, municipalities and infrastructure owners.



Jukskei River, Johannesburg. Flood depth from the Delta Hydro 2D model, with the existing municipal floodlines in red.

01

Flood Maps

Flood extent, depth, velocity and hazard for any area of South Africa, at the return periods you need.

02

Flood Risk Assessments

Flood risk and estimated loss for a single site or a whole portfolio, with a report and the data behind it.

03

Consulting

Floodline studies, flood mitigation and stormwater design, dam break assessments and expert reports.

Who we work with: insurers, reinsurers and brokers, banks and lenders, property developers, municipalities, roads agencies, and owners of utility, rail, mining and property assets.

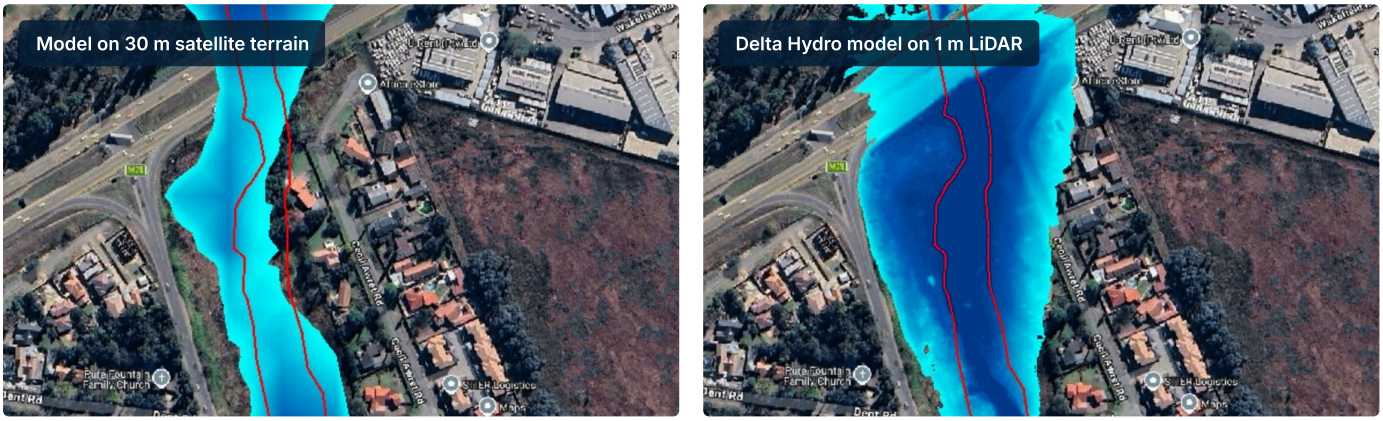
5 m	1 m	2 to 1 000	2D
National terrain model, GeoSmart FUSEDEM	LiDAR terrain where it is available	Year return periods, as required	Hydraulic models, as used for regulatory floodline studies

South African engineering consultancies have produced floodlines for individual towns, developments and rivers for decades. The flood risk data products that cover the whole country, however, are almost all global products. These are built from large international datasets: satellite terrain at around 30 m, rainfall estimated from global records, and no calibration against South African rivers. They give a first view of a country, but they do not resolve the terrain, the road crossings or the storm patterns that decide which properties flood here.

Delta Hydro is the first South African company to produce national flood risk data from local rainfall records and stream gauge data. Our models run on GeoSmart's 5 m FUSEDEM terrain model, with 1 m LiDAR where it is available. We combine current 2D hydraulic models with machine learning and custom in-house tools, so that the method we use for a regulatory floodline study can be applied across whole catchments and portfolios.

WHY TERRAIN RESOLUTION MATTERS

Modderfontein Spruit, Johannesburg



Flood depth 0 — 3 m Existing municipal floodline

The same reach of river in the same flood, modelled on two terrain datasets. On 30 m terrain the channel and the road embankments are smoothed away and the flood follows the valley floor. On 1 m terrain with the crossings included, water is held back at the roads, lies deeper upstream and reaches different properties.

MODEL SPECIFICATION

PERILS	River and surface water (pluvial) flooding. Coastal flooding is in development.
RETURN PERIODS	1:2 to 1:1 000-year, as required.
CLIMATE CHANGE	Future rainfall scenarios modelled on request.
TERRAIN	GeoSmart 5 m FUSEDEM nationally; 1 m LiDAR where available.
RAINFALL	South African design rainfall and SAWS station records.
CALIBRATION	DWS stream gauge records.
METHOD	2D hydraulic models, machine learning and in-house tools.
STRUCTURES	Bridges, culverts and embankments in the hydraulics.
OUTPUTS	Flood extent, depth, velocity, water level and hazard class.
FORMATS	GeoTIFF, GeoPackage, shapefile and CSV; API; Delta Hydro platform.
COORDINATES	Hartebeesthoek94, Lo or UTM.

COVERAGE

We cover the whole of South Africa. Flood maps already exist for parts of Gauteng. Where a client needs flood data for an area we have not yet modelled, we model it, check it and deliver it; the lead time depends on the size of the area and the number of structures in it. Every map passes a set of automated checks before release: flood depths that increase with return period, volume balance within tolerance, and a stated coordinate system and data version.

Bridges, culverts and embankments. Road and rail crossings decide where water backs up and where it spills, so they are in the model. Where survey data for a structure exists, we use it. Where it does not, our tools estimate the opening sizes and embankment heights from the terrain and road data. Where a structure is critical to the result, we go out and survey it ourselves.



Box culverts under a road embankment. Crossings like this control the flood upstream of them.

01 Flood Maps



Flood maps for any area of South Africa, produced with the same 2D hydraulic models we use for regulatory floodline studies. They are suitable for underwriting and accumulation control as well as for planning, design and disaster risk management. Each map set is licensed as GIS data, or served through the Delta Hydro platform and API.

- Floodlines at each return period, as vector polygons
- Flow velocity rasters
- Hazard class, from depth and velocity combined
- Climate change scenarios on request
- Flood depth rasters
- Water surface elevation
- Methodology report and reviewer brief with every set

02 Flood Risk Assessments



Assessments turn the flood maps into answers for a specific site or portfolio. Each one comes with a report that states the method and its limits, and with the data in a form you can load into your own systems. Climate change sensitivity is included on request.

Site assessments

For a single property, site or proposed development: modelled flood depth at the stand and at floor level, hazard class, an estimated loss at each return period and, where asked for, mitigation options. Used for underwriting referrals, lending decisions, due diligence and planning applications.

Portfolio assessments

For a book of policies, a loan portfolio or an asset register: every location scored against the model, with expected annual loss, accumulation along each river and concentration by area. Scores are refreshed as the model is updated.

Post-event loss modelling

After a major flood: the flood footprint, the properties affected and the likely loss, for claims triage, reserving and reinsurance reporting. We also prepare independent hydraulic evidence for disputed flood claims.

EXAMPLE OUTPUT FOR ONE ADDRESS, 1:100-YEAR FLOOD

Depth at the property	Hazard class	Estimated damage	Estimated loss
1.12 m	High	42 %	R 1 543 494

A residential property in Johannesburg, from the Delta Hydro platform. Address withheld. Loss is calculated from the municipal valuation with generic depth-damage curves until South African claims data is available to fit them.

03 Consulting

The engineers who build the flood model also carry out the studies behind it: flood and stormwater engineering for developers, municipalities, roads agencies, mines and utilities, and for insurers and lenders who need a question answered that the data alone cannot.

- Floodline determinations for developments and planning approvals
- Flood risk and mitigation studies for towns, roads and infrastructure
- Stormwater master planning; culvert, bridge and canal design
- Dam break and dam safety assessments
- Review of third-party flood models and floodlines
- Expert reports for disputed flood claims



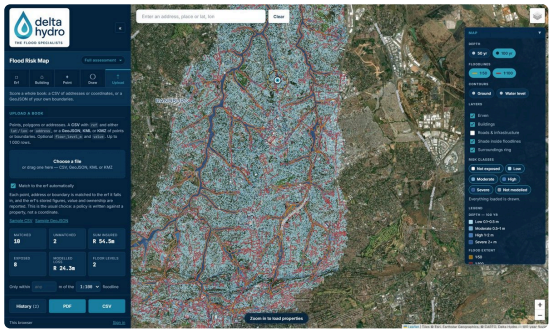
HOW YOU RECEIVE IT

01
Delta Hydro platform
Search an address or upload a list of locations, read the flood depth, hazard class and estimated loss, and download the results.

02
API
Flood depth, hazard class and loss estimate for a location, returned to your rating engine, credit system or GIS when the decision is made.

03
Data delivery
Flood maps and scores as GeoTIFF, GeoPackage, shapefile or CSV. Every value carries its model run and data version.

04
Custom integration
We build the connection into your systems: scoring pipelines, scheduled portfolio refreshes and reporting in your own format.



The Delta Hydro platform. An uploaded list of properties scored against the 1:100-year flood layer.

WHO WE WORK WITH

Insurers
Pricing, underwriting referrals, accumulation control and claims.

Reinsurers and brokers
An independent South African view of flood exposure for treaty placement and pricing.

Banks and lenders
Flood risk on mortgage and asset-finance books, and climate risk disclosure.

Property developers
Floodline determinations, site selection and planning approvals.

Municipalities
Flood hazard mapping, stormwater planning and disaster risk management.

Roads agencies
Flood exposure of road networks, bridges and culverts, and where to spend first.

Asset owners
Utilities, rail, mines and property funds: exposure across every site.

Consulting engineers
Flood maps and design floods as inputs to drainage, bridge and development design.

ABOUT DELTA HYDRO

To discuss a flood map, an assessment or a study, contact one of our engineers.

Delta Hydro is a flood engineering consultancy based in Stellenbosch, with 27 combined years of flood modelling experience across Africa, Europe, Australia and the Middle East. To evaluate the data first, ask us for a sample dataset: flood maps and property scores for a sample area.



The Delta Hydro team out in the field.

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