Digital Terrain Modelling — User Guide

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What the app does

Upload one survey file and the app builds a terrain model of the site. From it you get:

- a contour plan;
- the natural drainage network;
- GIS and CAD files.

The model then opens a set of design tools:

- cross-sections;
- catchments and peak flows;
- culvert and ditch sizing;
- land preparation (cut and fill to a platform);
- road alignment;
- drainage channels;
- an estate layout.

Everything it produces is a **preliminary** design aid, to be checked and sealed by a licensed engineer.

Before you start

You need one survey file: one row per surveyed point.

Item	What it must be
File	.csv, .txt or .xlsx (first sheet)
Columns	ID, Easting, Northing, Elevation, Code. Include a header row: it removes all guessing about which column is which
Coordinates	Projected, in metres (for example UTM). Convert latitude and longitude before you upload
Levels	Metres, on one datum throughout

The codes decide the surface. Only ground points build the terrain model:

- **GL** or **SH**: ground and spot heights;
- **CL**: the centreline;
- **L1/R1** and further offsets;
- **DRN**: drain ground;
- **CUL**: culvert ground.

Everything else is plotted and labelled, but never contoured:

- buildings (BLD);
- poles (EP, HT);
- inverts (INV);
- benchmarks (TBM);
- any code the app does not recognise.

For the estate layout, code the boundary pegs **BDY1, BDY2, …** in walking order.

Step by step

1. **Sign in** with your Bespa licence email and key, and open Digital Terrain Modelling.
2. **Upload the survey** and set the options:
    - **Project name** goes on every drawing's title block.
    - **Contour interval:** default 0.5 m. Every fifth contour is labelled.
    - **Grid cell size:** default 2.5 m. Use about half the spacing of your survey shots. Every design tool works on this grid.
    - **EPSG** (optional) only labels the GeoTIFF with your grid. It does not convert coordinates.
    - Leave **Draw drainage channels** on. The design tools need it.
3. Press **Build DTM** and check the results bar:
    - **Points** should be close to the number of ground shots in your file.
    - **Relief** should match the range of levels you surveyed.
    - **Blunders removed** counts levels the app *corrected* to their neighbours' average, not points it deleted.
4. **Open the viewer** to use the tools: Cross-section, Catchment + Discharge, Culvert sizing, Ditch sizing, Land preparation, Horizontal and Vertical alignment, and 3-D terrain.
5. **Design roads and channels.** On the **Roads** and **Drainage channels** pages, draw and name each line, then design it. In the **Alignment Editor**, set the design speed, curve radii, maximum grade and vertical points, then export the plan-and-profile sheet.

6. **Estate layout** (optional). Enter the plot frontage and depth, the park share, the road widths and the setbacks. The site boundary comes from the BDY pegs, or from a plan you upload (CSV or DXF).
7. **Download** what you need, and **keep the run link**: it is the only way back into a run.

What you download

File	For
Contour plan (PDF, PNG)	The drawing: colour relief, contours, survey points, features, title block
TIN and hillshade, 3-D view (PNG)	Checking that the survey covers the site
Layered DXF	AutoCAD and Civil 3D: points by layer, contours, features
Grid (ASCII .asc, XYZ, GeoTIFF)	QGIS, ArcGIS, Civil 3D
Drainage plan (PDF, GeoJSON)	The natural channels, ranked by size
Contours, points, features (GeoJSON)	Your GIS
Alignment sheet (PDF) and workbook (XLSX)	Plan and profile, curve tables, cut and fill
Drainage design (PDF, XLSX)	Each designed channel and road drainage, with the rainfall used
Estate layout (DXF, PDF, schedules XLSX)	Plots, roads, reserves and areas
Summary	The run's figures in plain text

Common problems

You see	What to do
Far fewer **Points** than ground shots in your file	Ground shots carry a code the app does not treat as ground. Recode them GL or SH and run again
Contours that make no sense	Add a header row (ID, Easting, Northing, Elevation, Code) so no column is guessed

You see	What to do
Relief smaller than the range you surveyed	Sharp ground (banks, ditches, quarry faces) is rounded off by the level check. Take critical levels, such as outfalls and culvert inverts, from the survey, not the model
The GeoTIFF or 3-D view is missing	That file failed quietly; the rest of the run is fine. Use the ASCII grid, or run again
A culvert comes back **not sized**	Allow more barrels or a higher headwater (HW/D)
A ditch shows a velocity warning	The water will scour an unlined ditch. Flatten the grade, widen the section, add drops or line it
The estate outline is the survey extent	No BDY pegs were found. Upload the registered plan as CSV or DXF
You can't find an earlier run	Runs are opened only by their link. Keep it with the drawings

Limits, and the engineer's sign-off

- **Rainfall is yours to set.** The defaults are placeholders: intensity 125 mm/h for channels and roads, IDF constants for catchments, and C = 0.5. Enter your site's values before sizing anything a client will build.
- **Hydrology** uses the Rational method only: no storage, routing or detention.
- **Culverts and ditches** are sized hydraulically only. There is no scour, outlet protection or structural design.
- **Roads** are low-speed (around 30 km/h, up to 60 km/h). There is no superelevation and there are no transition curves. Earthworks are not balanced: adjust the vertical points until cut and fill are close.
- **No breaklines.** Kerbs, ditch lips and walls are contoured through, not along.
- **Estate layout** is a planning concept, not a cadastral or construction-issue layout.
- Treat a run link like the drawing itself, and don't share it widely.

Every output is preliminary and must be checked and sealed by a licensed engineer before use. For detailed questions, contact Bespa Support at info@bespa.online.