GRAL Air Dispersion Modeling

Trinity Consultants

Predict air quality impacts and exhaust re-entrainment among complex structures with the Graz Lagrangian Model (GRAL).

Trinity Consultants offers advanced air dispersion modeling services using GRAL—a building-resolving model designed to simulate pollutant transport near structures that influence local airflow. GRAL is particularly effective in scenarios where conventional models like AERMOD or CALPUFF underperform, such as in areas affected by building wake effects, low-level releases, recirculation zones and exhaust re-entrainment.

GRAL combines a computational wind field solver with a Lagrangian particle dispersion module, providing high-resolution predictions of pollutant concentrations near industrial sources.

Tailored solutions for semiconductor and data center industries

Semiconductor facilities pose unique challenges due to the proximity of air intakes to scrubber exhausts, use of reactive gases, and dense layouts. GRAL enables precise assessment of exhaust re-entrainment from sources such as wet scrubbers and acid gas treatment systems. We evaluate design options to minimize pollutant concentrations at air intakes.

For data centers, GRAL supports the evaluation of power generators emissions and recirculation into HVAC intakes. This helps reduce corrosion risks and supports equipment protection. We assist clients with worst-case meteorological assessments and developing robust siting and stack design strategies.

Our capabilities

Air dispersion modelling
- Analize the spread of pollutants fromm various sources, including point sources (industrial stacks), road sources (traffic emissions), area sources (large industrial facilities), and tunnel portals.

Post-processing and analysis
- Extract insights from data through post-processing and analysis, generating reports and visualizations tailored to your needs.

Faster turnaround times
- We can deliver results faster than Computational Fluid Dynamics (CFD) modeling and at a fraction of the cost.

GRAL vs CFD: A Practical Alternative for Complex Built Environments

GRAL is a high-resolution alternative to CFD that delivers dispersion modeling results in one to three weeks, compared to the extended timelines often required for CFD. It supports full-year meteorological inputs and accurately captures the influence of buildings on airflow.

For semiconductor fabs and data centers, GRAL allows efficient evaluation of exhaust dispersion, re-entrainment, and intake placement—achieving practical outcomes faster and at significantly lower cost than CFD.
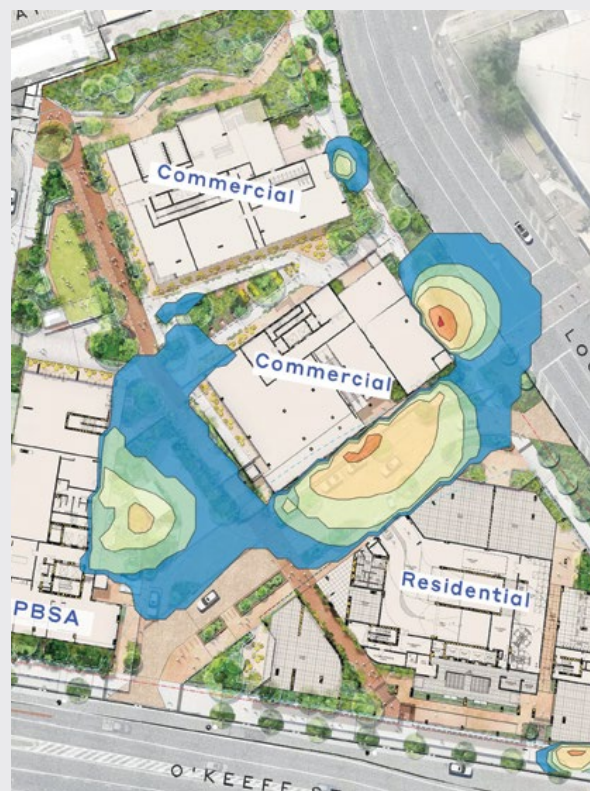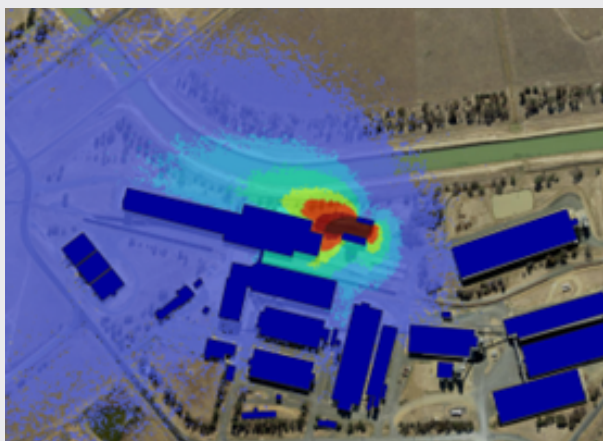
Sample GRAL wind field output
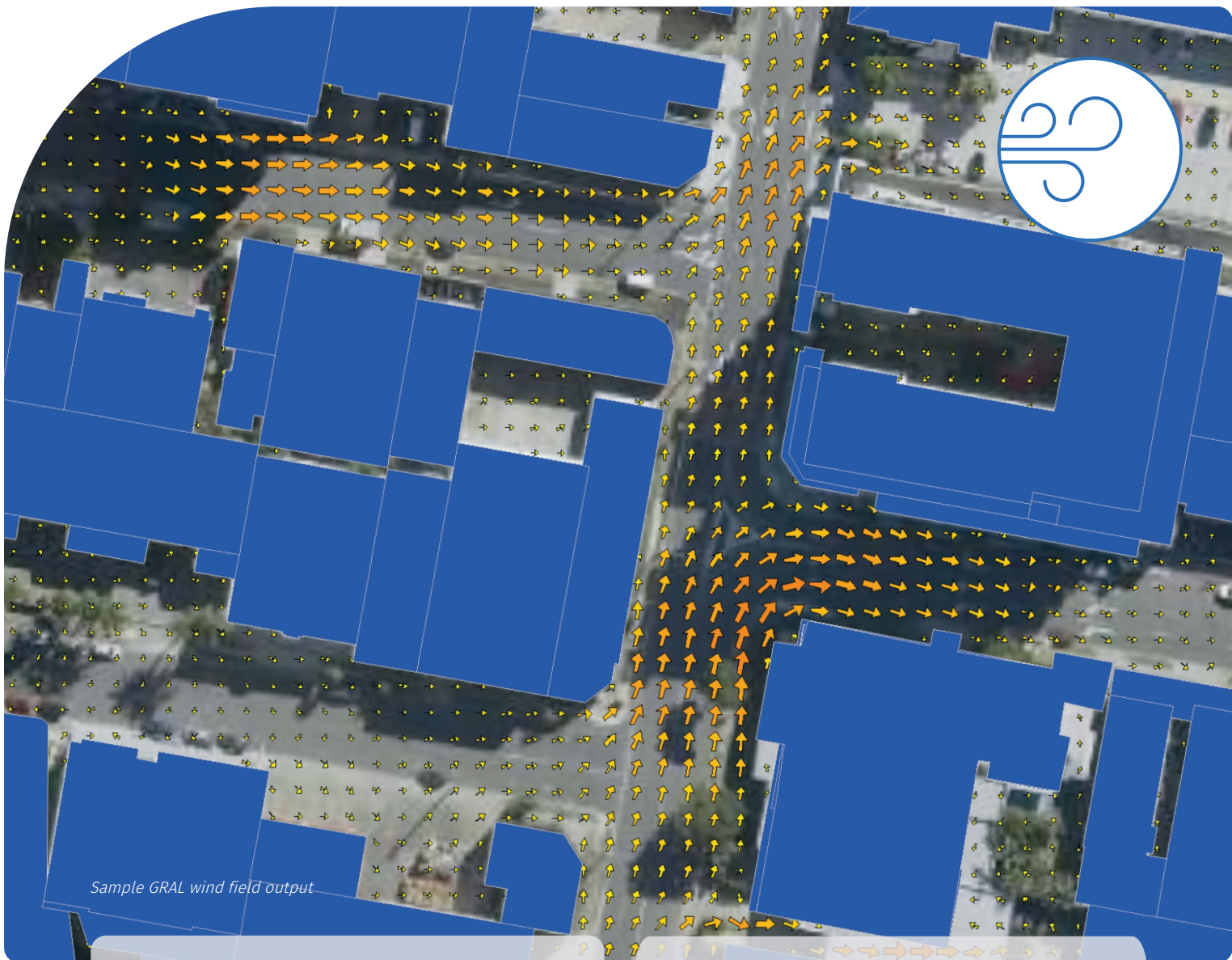
Trusted experience

Our air dispersion modeling assessments are recognized and trusted throughout the world.

They are routinely included in environmental approval applications submitted to local governments or state environmental permitting/licensing applications.

Sample GRAL concentrations output

Sample GRAL concentrations output

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