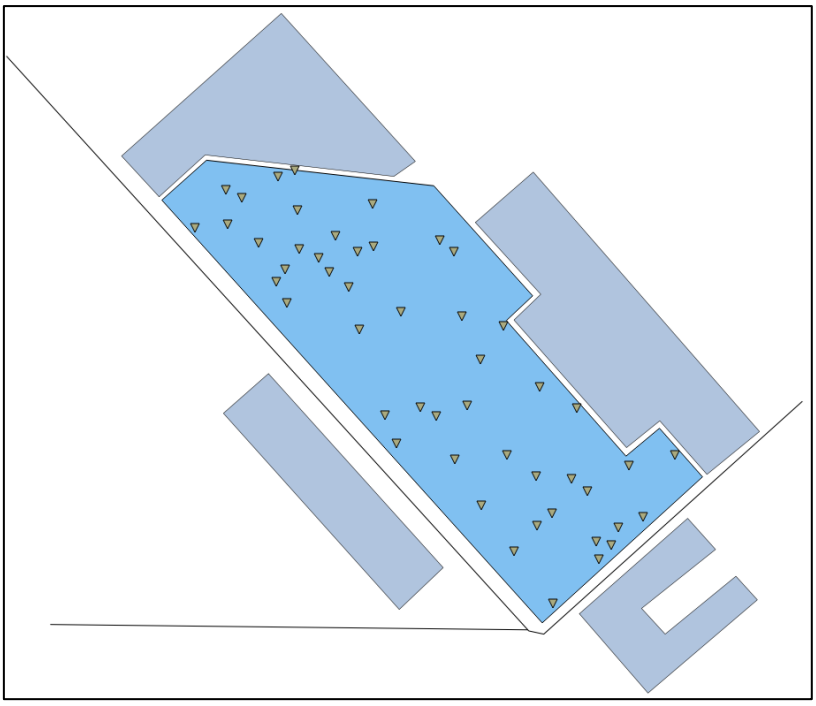
How to deal with sampling strategy into Kartotrak

With the **Sampling Plan** functionality, Kartotrak enables sampling plan design. The sampling strategy is to be adapted to the evaluation objective (which can changed with the project progress) and to the estimation precision level required (amount of measures, spatial distribution).
The tool allows the definition of sample locations inside a defined zone according to different possible sampling strategies:

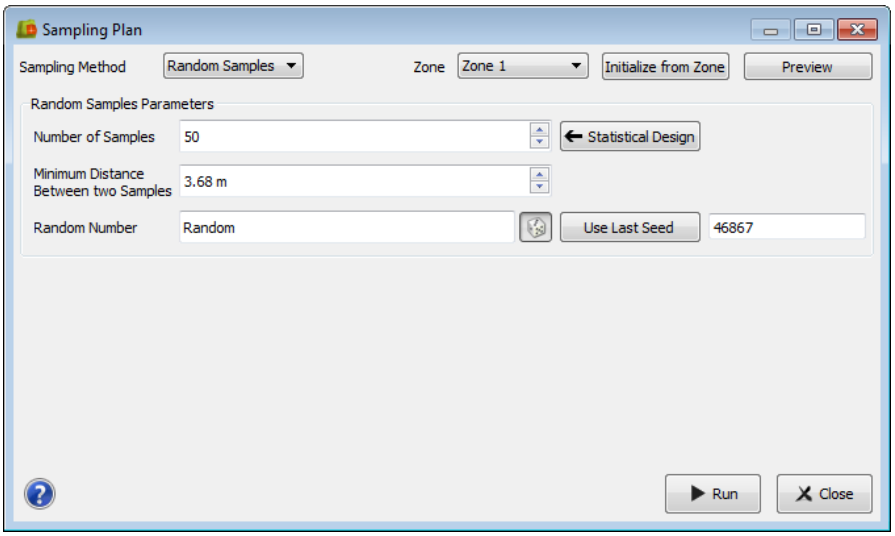
1. The Random strategy.

Sample locations are randomly localized. This Random strategy is used when no information (previous campaigns, historical information...) is available and when the site is supposed to be cleaned.

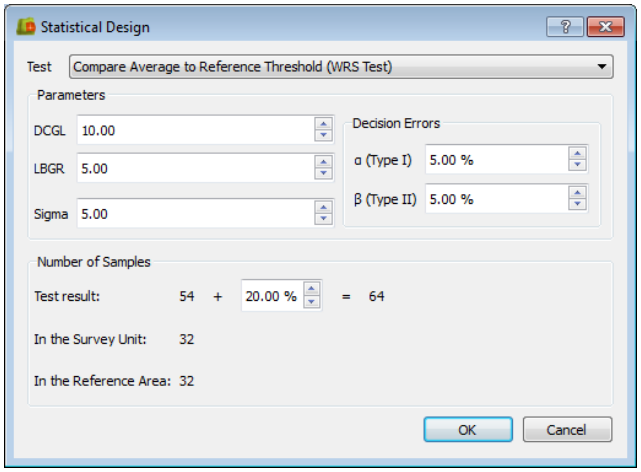
This sampling requires having an homogeneous site. Statistical tests (Sign test, WRS test and Wilks formula) are available to compute the number of samples to be considered. A parameter of minimum distance between two samples avoids having too close points.



Random strategy



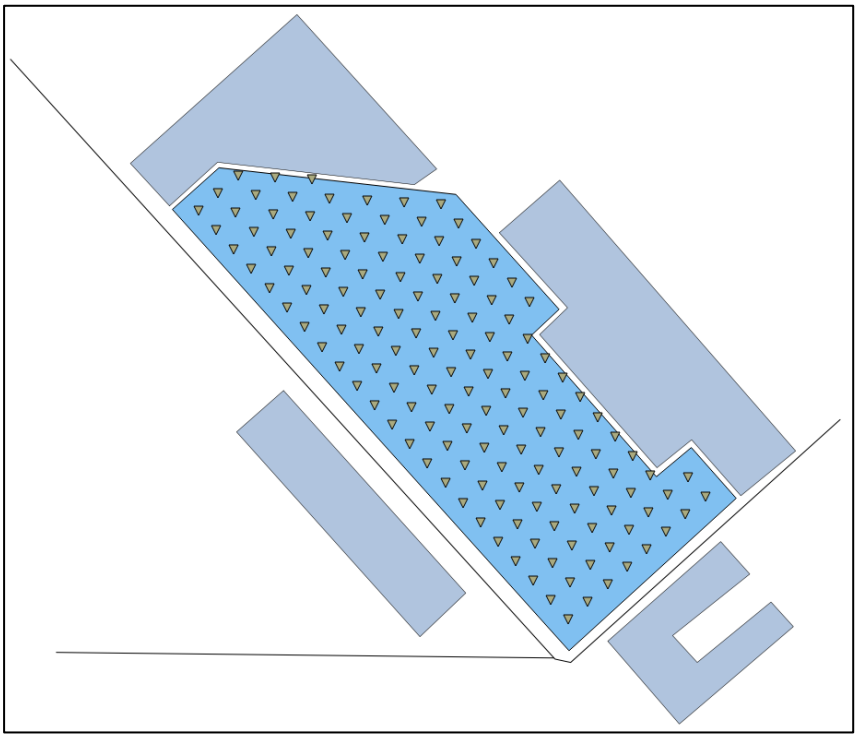
Random sampling method into Kartotrak



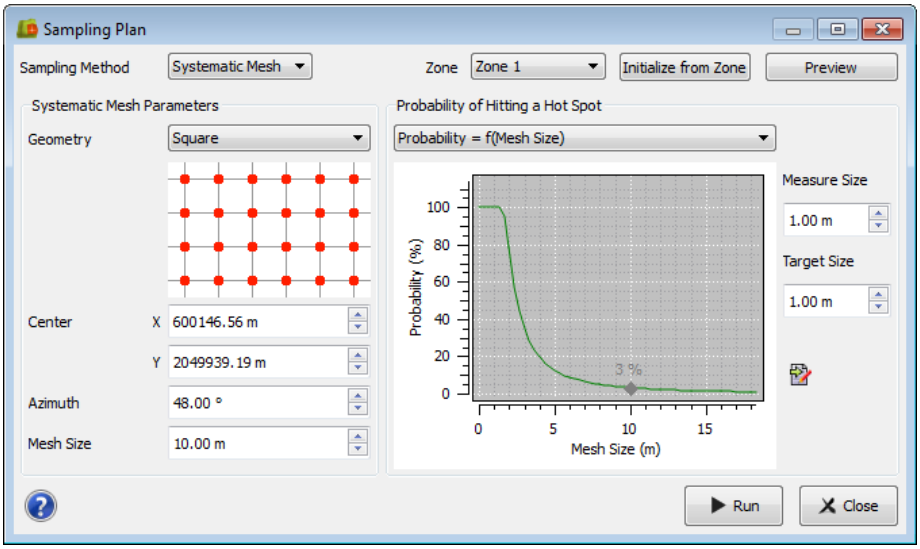
Statistical tests to compute number of samples

2. The Systematic strategy.

Sample locations are regularly localized (with a **square** or a **triangular mesh**). The Systematic strategy is used in the case of an extended contamination. A geometric calculation allows the display of a curve representing the **probability of hitting a hot spot**. The results are directly linked to the mesh size, the measure size and the target size (the contamination size that you do not want to miss). This sampling presents the inconvenience of potentially defining many measures to collect.

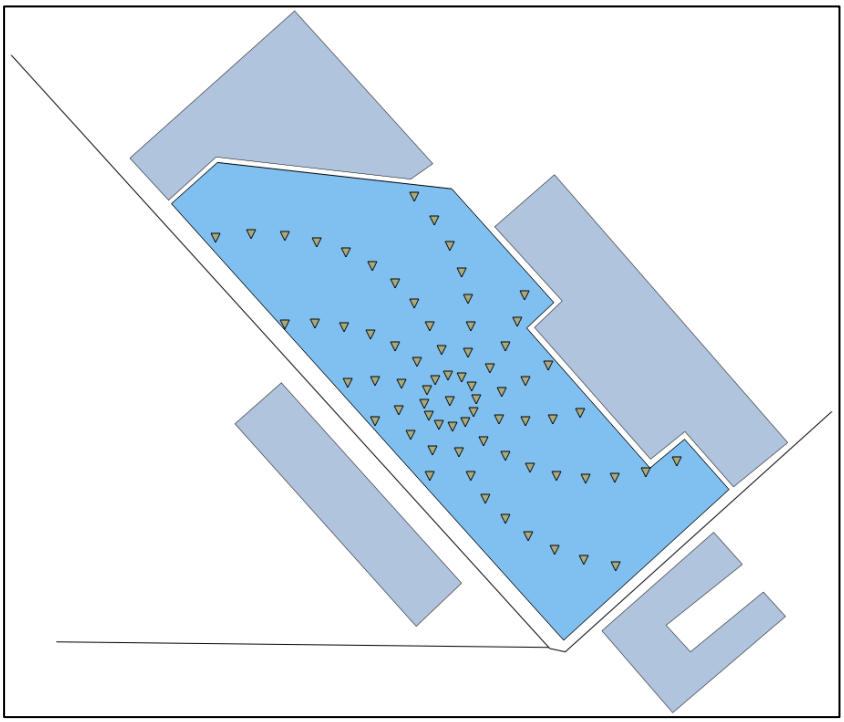


Square mesh

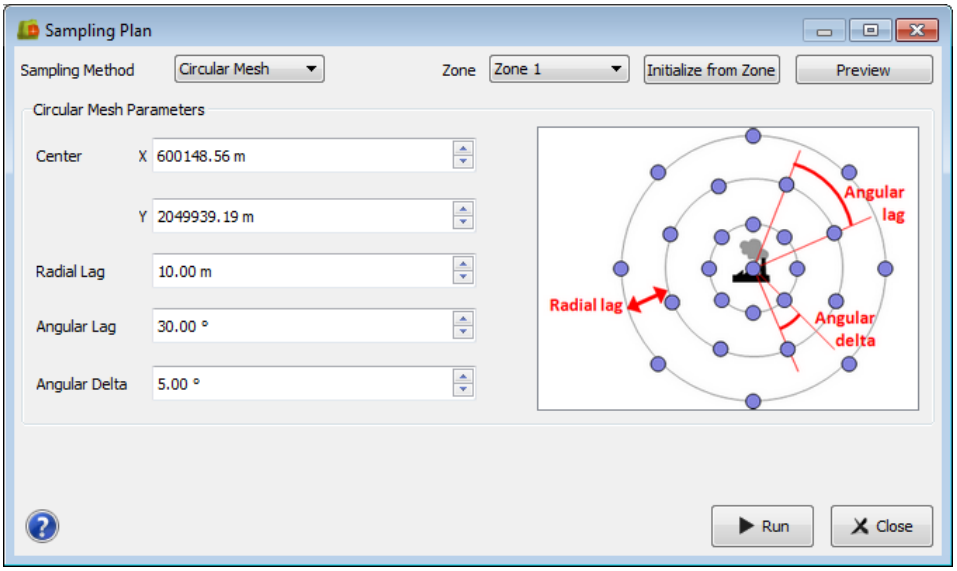


Square/triangular mesh into Kartotrak – Probability of hitting a hot spot

Another systematic strategy consists in localizing samples on a **circular grid**. This method is applied to measure the contamination extension around a source (atmospheric rejection, explosion…) or to quantify a diffusion gradient. The measured information will be sparser along the concentric circles as we go away from the source.



Circular mesh



Circular mesh into Kartotrak

3. The Preferential strategy.

Here, the selection of the samples locations is subjective and depends on a preliminary knowledge of the site or on observations (suspicious trace, odor...). The objective is to remove doubts with few samples. As such sampling is based on personal judgment, a bias is necessarily introduced.

Another example of preferential strategy is in the case of a contamination along linear sites (leaks in pipes), where it could be interesting to regularly localize samples along profiles.

In the Map tab of Kartotrak, new sample locations can be set manually and interactively thanks to a dedicated tool. For that, the Acquisition layer must be activated. Then click on **Start Acquisition Editing** and choose **Add Acquisition Point** in the map tool bar. By clicking the correct locations in the Map view, you can add as many samples as you want. New points will be directly added to the Map and associated coordinates will be visible in the Acquisition data table.

All these strategies can be combined to achieve the objectives. For example, a regular sampling can be deployed to characterize a site, combined with sampling crosses to capture the spatial variability at small scale and samples based on the site history (accidents inventory) and on observations.

If some areas still show too high uncertainties, a second sampling can be applied. Thanks to the **Sampling Optimization** functionality, Kartotrak offers the possibility to determine and locate additional measures to achieve a given precision.