

GC-2 Oil Transit Line Spill

Initial Volume Estimation

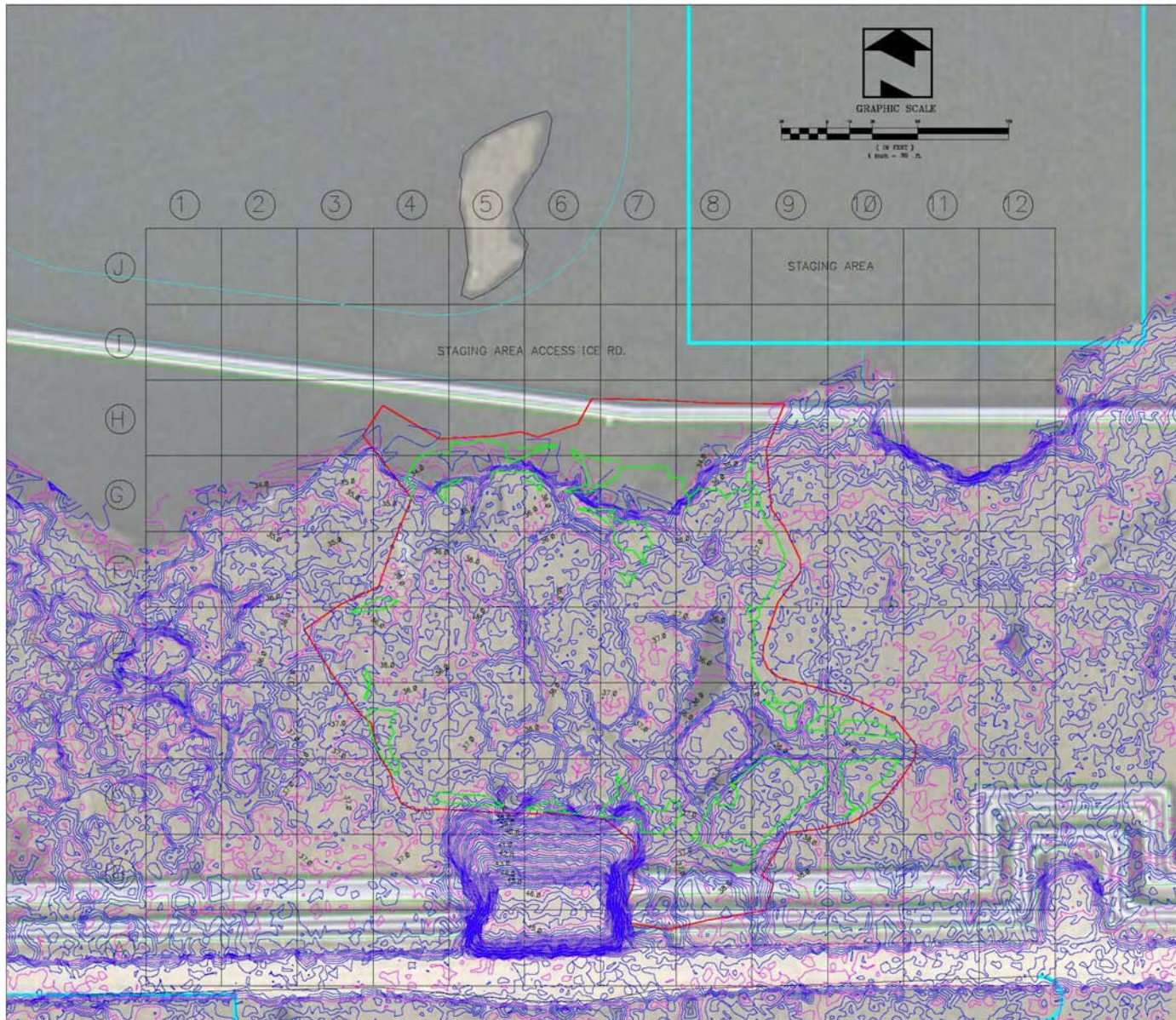
March 9, 2006

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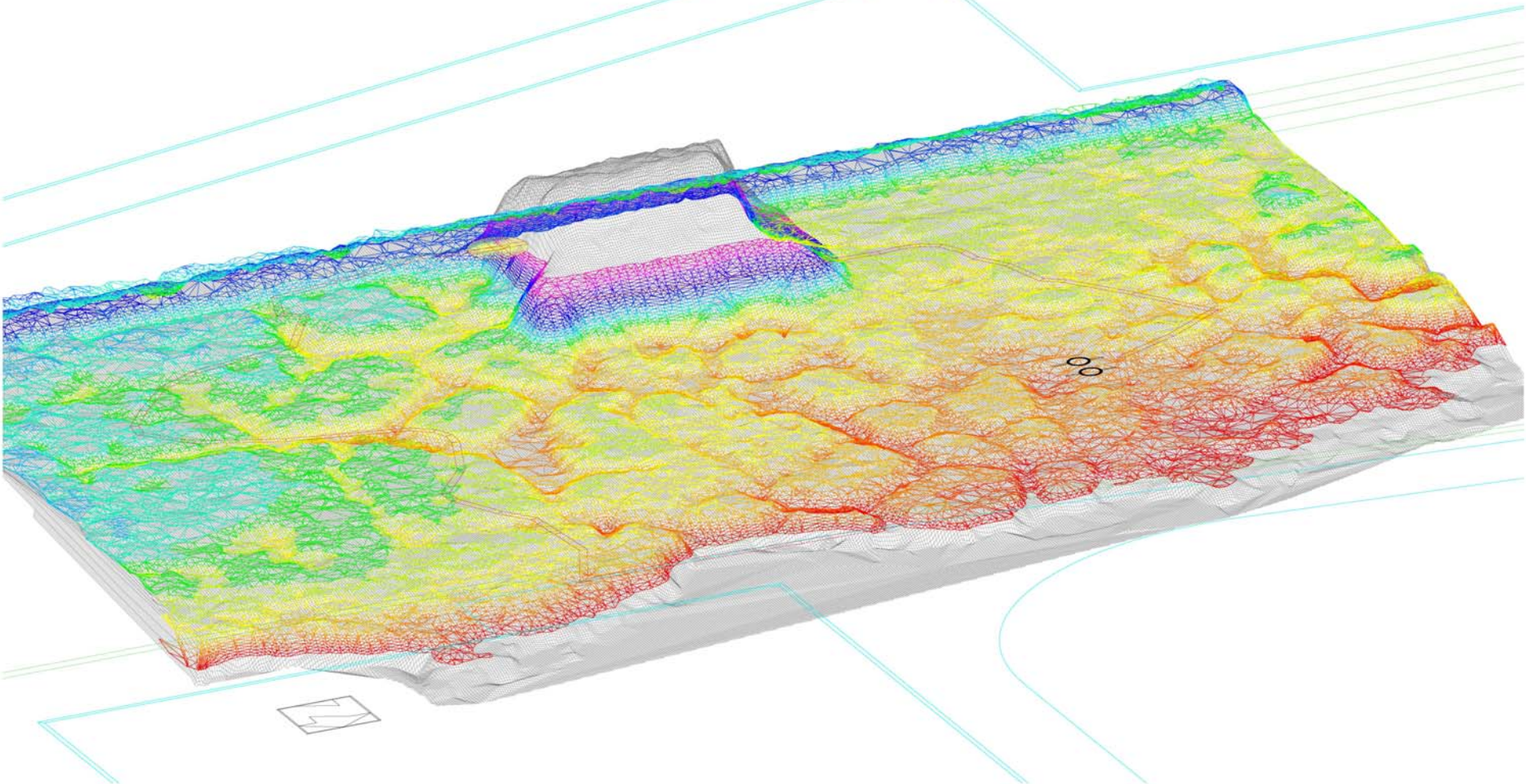
Enhanced aerial photo showing thermokarst structure



Topography of site derived from LIDAR data contour interval = 0.2 ft (2.4 inches)



3d rendering of the LIDAR data
lower elevations are red



Volume calculations

Steps

1. Acquire LIDAR data for base mapping.
2. Collect field data using differential GPS
 - Onsite base Station
 - 5 ft to 7 ft grid
 - Measurement of Bottom (B), Top of Oil (T), Clean (C), and Edge (E).
3. Check LIDAR data with field data (B) to verify data fit. The fit was excellent so the LIDAR data was used for ground surface elevations since it is a denser data set.
4. Used AutoCAD cut and fill algorithm to determine the thickness of the oil.
5. Convert oil thickness to a volume of oil on the surface.
6. Add Flow Station 2 (FS2) dedicated tank #1934 collected oil volume.

Error analysis

- Wicking of oil up into dry snow above: **+ 2 in. and assuming 20% oil**
- Error in positional data (X and Y) and LIDAR (Z): **± 2.5 in.**
- Attempting to apply grid pattern to topography: **Non-issue**
- Measurement tolerances: **Negligible**
- Simultaneous recovery of oil during survey: **Negligible**
- Oil saturation into tundra: **Negligible**
- Averaging effect due to coarse grid pattern: **Minor**
- Oily solid waste: **Minor – mostly tyvek suits and soiled PPE**

Volume Calculation

Volume of oil on surface: 148,249 gal.
Volume of oil in Tank #1934: 52,920 gal.
Total Gross Volume: 201,169 gal.
4,790 bbls.

Error Estimation: Positional errors, GPS, and LIDAR \pm 36%
Wicking + 07%

Total Spill Estimate: 134,783 - - 201,169 - - 267,555
Low estimate High Estimate

Range based on a cumulative error of \pm 33%