

**Geology Report – HDD Survey
Based on Subbottom Profiler Data Collected in October 2004**

I have inspected the chirp seismic reflection data from the area overlying the proposed HDD shore interface path on the northern side of Moss Landing Harbor.

The internal geometry of the near shore sediments on the shelf areas is revealed in this data down to the first full water column multiple. No interpretations were made of the data below the first water column multiple (2X water depth).

The data shows that the seafloor on the shelf is a strong reflecting surface, and some laterally continuous sub-bottom reflections also occur.

Most profiles cross from the canyon head channel onto the adjacent shelf. Side-echos mask the subsurface reflections from the channel.

Line XY 2000 most closely follows the proposed HDD path from ping 5815 to ping 8500. This section show subsurface reflections that are 2 to 8 m into the bottom that are nearly parallel with the seafloor, but subtly change in thickness laterally. These subsurface reflectors are interpreted to be from sedimentary beds and the 2 to 4 m thick that appear to be deposited as broad lenses. Some finer internal layering within these main beds is suggested in places. This would be consistent with either modern nearshore sands or layers within the Aromas Formation that is believed to be in sub-crop in this area (Wagner et al., 2000). The characteristically strong seafloor reflection thickens from <1 m to ~5 m between ping 6440 and ping 7640. This is interpreted to be a lens of modern sand and gravel which is filling a broad depression or subtle paleo-channel (that is up to 5 m deeper than the surrounding seafloor).

Because the tow fish depth was not corrected for in these profiles, caution must be used in interpreting the raw data from the edge of the channel, where the tow fish depth may have been changing rapidly. Thus, the apparent upward sloping reflectors are likely to be artifacts of the changing tow fish geometry. These horizons are interpreted to be nearly horizontal but outcropping where they are truncated along the side of the eroded channels flank.

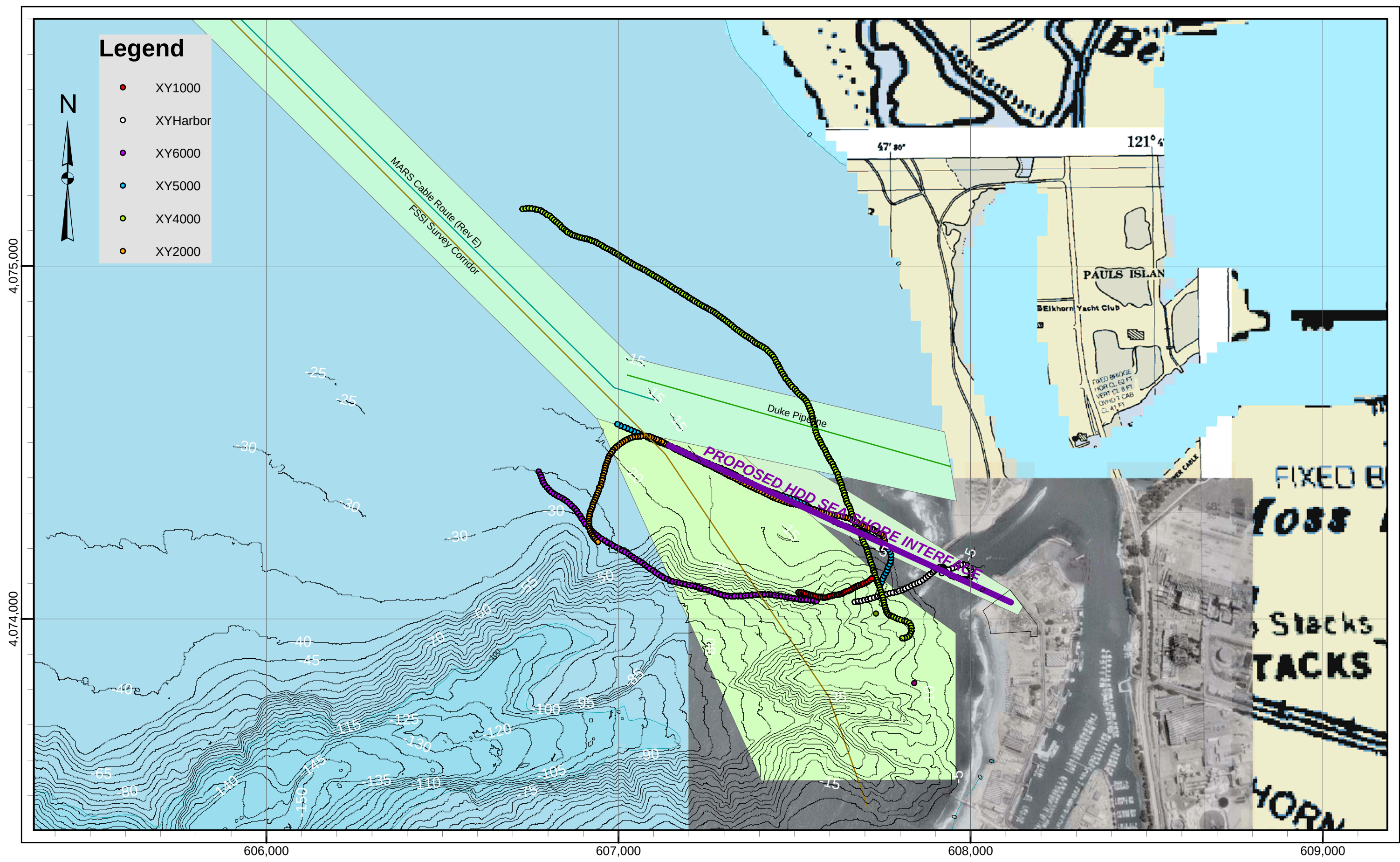
Lines XY 3000 and XY 5000 show essentially the same patterns along the HDD path.

The data collected over the HDD within the channel (Harbor profile) was dominated by side echos and did not resolve the character of the subsurface.

No offsets were seen in any of the reflecting surfaces that would suggest faults or other unanticipated drilling complications exist along the path. This seismic data and existing knowledge of the regional geology suggest that the HDD path will be through either weakly consolidated sands (e.g., Aromas Formation) or unconsolidated sands and gravel.

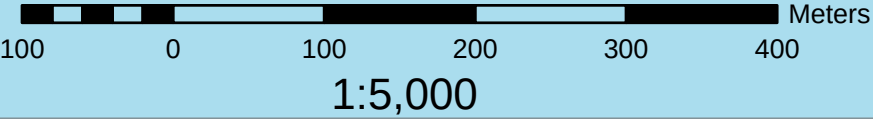
Wagner, D.L., H.G. Greene, J. Saucedo, and C.L., Pridmore (2000), Geologic Map of the Monterey 30' x 60' Quadrangle and Adjacent Areas, California. California Division of Mines and Geology, Scale, 1:100,000.

Submitted by: Charlie Paull, Geologist
November 5, 2004



MARS HDD SURVEY

Datum: WGS1984
Grid: UTM Zone 10N
Survey Date: October 22, 2004



Legend

- XY1000
- XYHarbor
- XY6000
- XY5000
- XY4000
- XY2000

4,075,000

4,074,000

607,000

608,000

