

**Demonstration that surface intervention during tunnelling (involving constructing an access chamber in Sruwaddacon Bay) is a low probability event based on more certain knowledge of the ground conditions. The likelihood of surface intervention being required decreases as the number of boreholes and other investigations increases the density of the information available.**

The current ground investigation works within Sruwaddacon Bay commenced on 19 July 2010 and are expected to be completed by end September/early October 2010. The works are undertaken using cable percussion (CP) and rotary core drilling (CD) together with cone penetration testing (CPT). The ground investigation works have been performed from two jack-up rig barges within the bay and a Meercat marine vessel for CPT solely. The currently completed part of the ground investigation up to 31 August 2010 has a typical spacing of about 120m. This coverage will satisfy the spacing requirements of 20m to 200m for pipelines as set out in IS EN 1997-2: 1997 (Eurocode 7), Annex B.

The following number of exploratory holes has been completed within the bay up to 31 August 2010:

- Seventeen (17) CP's,
- Nineteen (19) CD's,
- Forty three (43) CPT's and
- Laboratory testing of soil samples, rock samples and water samples.

These exploratory holes ranged from 5.3m (CP62 and CPT62) to 41.7m (CD42) below seabed level. The 2010 ground investigation work has confirmed ground conditions as presented in the EIS and is summarised below in Table 1.

**Table 1.** Summary of Ground Conditions below Sruwaddacon Bay

<b>Strata</b>	<b>Depth to Top of Strata (m bsl) <sup>(Note 1)</sup></b>	<b>Maximum Thickness of Strata (m) <sup>(Note 2)</sup></b>
Fine to medium sand (estuarine deposit)	Seabed level	20.4
Organic silt and very localised peat	12 to 14	2
Sand and gravel (possible glacial soil)	2 to 20.4	0.1 to 10.2
Bedrock	5.2 to 24.8	-

Notes:

- (1) Depth given as metres below seabed level (m bsl)
- (2) Maximum recorded strata thickness is based on the current ground investigation data.

**Estuarine Deposits:**

- Very loose to dense;
- Predominantly SAND & occasionally slightly gravelly; and,
- Up to 20.4m thick.

**Organic Silt and Peat:**

- Slightly organic SILT, up to 1.5m thick; and,
- Compressed highly decomposed amorphous PEAT with some woody fragments, to 0.5m thick.

**Sand and Gravel - Possible Glacial Soil:**

- Medium dense to very dense;
- Mixture of sandy GRAVEL/silty gravelly SAND/sandy gravelly SILT; and,
- Varies in thickness, 0.1m to 10.2m.

**Bedrock:**

- Strong to extremely strong;
- Very highly abrasive rock;
- Minor weathered zone typically 2m thick in outer part of Bay; and,
- PSAMMITE and MICA/SEMI-PELITIC SCHIST.

The geotechnical risk register in Appendix M4 of the EIS 2010 identifies the potential hazards and provides risk control measures (RCM) under the Design Control column. As indicated on the register, the risk rating for each potential hazard is reduced by applying design control measures including, inter alia, detailed site investigation along the route to verify ground conditions. The ground conditions have been verified and the risk rating is accordingly reduced reflecting the increased level of confidence in the ground conditions throughout the proposed route.

**SUMMARY**

The 2010 ground investigation works have verified the ground conditions as presented in Table 1 above and as presented in the EIS on 31<sup>st</sup> May 2010. This confirmation provides significant confidence in the ground model, and the homogeneity of sands and gravels is confirmed. Overall, the increased confidence in the ground model demonstrates that the requirement for an intervention pit is likely to be extremely low. The density or spatial distribution of the completed investigations works is sufficient to satisfy the requirements of IS EN 1997-2: 1997 (Eurocode 7), Annex B.