ROYAL HASKONING

Halcrow

Cell 1 Regional Coastal Monitoring Programme Update Report 3: 'Partial Measures' Survey 2011

Hartlepool Borough Council

HARTLEPOOL BOROUGH COUNCIL

June 2011

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Authors

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Abbreviations and Acronyms

Acronym / Abbreviation	Definition
AONB	Area of Outstanding Natural Beauty
DGM	Digital Ground Model
HAT	Highest Astronomical Tide
LAT	Lowest Astronomical Tide
m	metres
MHWN	Mean High Water Neap
MHWS	Mean High Water Spring
MLWS	Mean Low Water Neap
MLWS	Mean Low Water Spring
MSL	Mean Sea Level
ODN	Ordnance Datum Newlyn

Water Levels Used in Interpretation of Changes

Water Level Parameter	Water Level (mODN)			
	River Tyne to Frenchman's Bay	Frenchman's Bay to Souter Point	Souter Point to Chourdon Point	Chourdon Point to Hartlepool Headland
1 in 200 year	3.41	3.44	3.66	3.91
HAT	2.85	2.88	3.18	3.30
MHWS	2.15	2.18	2.48	2.70
MLWS	-2.15	-2.12	-1.92	-1.90

Water Level Parameter	Water Level (mODN)			
	Hartlepool Headland to Saltburn Scar	Skinningrove	Hummersea Scar to Sandsend Ness	Sandsend Ness to Saltwick Nab
1 in 200 year	3.87	3.86	4.1	3.88
HAT	3.25	3.18	3.15	3.10
MHWS	2.65	2.68	2.65	2.60
MLWS	-1.95	-2.13	-2.15	-2.20

Water Level Parameter	Water Level (mODN)			
	Saltwick Nab to Hundale Point	Hundale Point to White Nab	White Nab to Filey Brigg	Filey Brigg to Flamborough Head
1 in 200 year	3.88	3.93	3.93	4.04
HAT	3.10	3.05	3.05	3.10
MHWS	2.60	2.45	2.45	2.50
MLWS	-2.20	-2.35	-2.35	-2.30

Source: *River Tyne to Flamborough Head Shoreline Management Plan 2*. Royal Haskoning, February 2007.

Glossary of Terms

Term	Definition
Beach nourishment	Artificial process of replenishing a beach with material from another source.
Berm crest	Ridge of sand or gravel deposited by wave action on the shore just above the normal high water mark.
Breaker zone	Area in the sea where the waves break.
Coastal squeeze	The reduction in habitat area which can arise if the natural landward migration of a habitat under sea level rise is prevented by the fixing of the high water mark, e.g. a sea wall.
Downdrift	Direction of alongshore movement of beach materials.
Ebb-tide	The falling tide, part of the tidal cycle between high water and the next low water.
Fetch	Length of water over which a given wind has blown that determines the size of the waves produced.
Flood-tide	Rising tide, part of the tidal cycle between low water and the next high water.
Foreshore	Zone between the high water and low water marks, also known as the intertidal zone.
Geomorphology	The branch of physical geography/geology which deals with the form of the Earth, the general configuration of its surface, the distribution of the land, water, etc.
Groyne	Shore protection structure built perpendicular to the shore; designed to trap sediment.
Mean High Water (MHW)	The average of all high waters observed over a sufficiently long period.
Mean Low Water (MLW)	The average of all low waters observed over a sufficiently long period.
Mean Sea Level (MSL)	Average height of the sea surface over a 19-year period.
Offshore zone	Extends from the low water mark to a water depth of about 15 m and is permanently covered with water.
Storm surge	A rise in the sea surface on an open coast, resulting from a storm.
Swell	Waves that have travelled out of the area in which they were generated.
Tidal prism	The volume of water within the estuary between the level of high and low tide, typically taken for mean spring tides.
Tide	Periodic rising and falling of large bodies of water resulting from the gravitational attraction of the moon and sun acting on the rotating earth.
Topography	Configuration of a surface including its relief and the position of its natural and man-made features.
Transgression	The landward movement of the shoreline in response to a rise in relative sea level.
Updrift	Direction opposite to the predominant movement of longshore transport.
Wave direction	Direction from which a wave approaches.
Wave refraction	Process by which the direction of approach of a wave changes as it moves into shallow water.

Preamble

The Cell 1 Regional Coastal Monitoring Programme covers approximately 300km of the north east coastline, from the Scottish Border (just south of St. Abb's Head) to Flamborough Head in East Yorkshire.

The main elements of the Cell 1 Regional Coastal Monitoring Programme involve:

- beach profile surveys
- topographic surveys
- cliff top recession surveys
- real-time wave data collection
- bathymetric and sea bed characterisation surveys
- aerial photography
- walk-over surveys

The beach profile surveys, topographic surveys and cliff top recession surveys are undertaken as a 'Full Measures' survey in autumn/early winter every year. Some of these surveys are then repeated the following spring as part of a 'Partial Measures' survey.

To date the following reports have been produced:

Table 1 Analytical, Update and Overview Reports Produced to Date

Year		Full Measures		Partial Measures		Cell 1 Overview Report
		Survey	Analytical Report	Survey	Update Report	
1	2008/09	Sep-Dec 08	May 09	Mar-May 09	June 09	-
2	2009/10	Sep-Dec 09	Mar 10	Mar-Apr 10	May 10	-
3	2010/11	Sep-Dec 10	Jan 11	Mar-Apr 11	June 11(*)	July 11

(*) The present report is **Update Report 3** and provides an analysis of the 2011 Partial Measures survey for Hartlepool Borough Council's frontage. It is intended as a brief update of the key findings from this survey to maintain an understanding of ongoing changes.

1. Introduction

1.1 Study Area

Hartlepool Borough Council's frontage extends from Crimdon Beck in the north to the North Gare Breakwater in the south. For the purposes of this report, it has been sub-divided into four areas, namely:

- North Sands
- Hartlepool Headland
- Middleton
- Hartlepool Bay

1.2 Methodology

Along Hartlepool Borough Council's frontage, the following surveying is undertaken:

- Full Measures survey annually each autumn/early winter comprising:
    - Beach profile surveys along 9 no. transect lines
    - Topographic survey along part of North Sands (referred to as Hartlepool North)
    - Topographic survey along Middleton (referred to as Hartlepool Central)
    - Topographic survey along Hartlepool Bay (referred to as Hartlepool South)

- Partial Measures survey annually each spring comprising:
    - Beach profile surveys along 9 no. transect lines

- Additionally, every five years (starting with 2008 as the baseline year), the Full Measures survey at Hartlepool North is extended to fully cover the whole of North Sands and Hartlepool Headland with a topographic survey. This extends across the boundary of jurisdiction between Hartlepool Borough Council and Durham County Council.

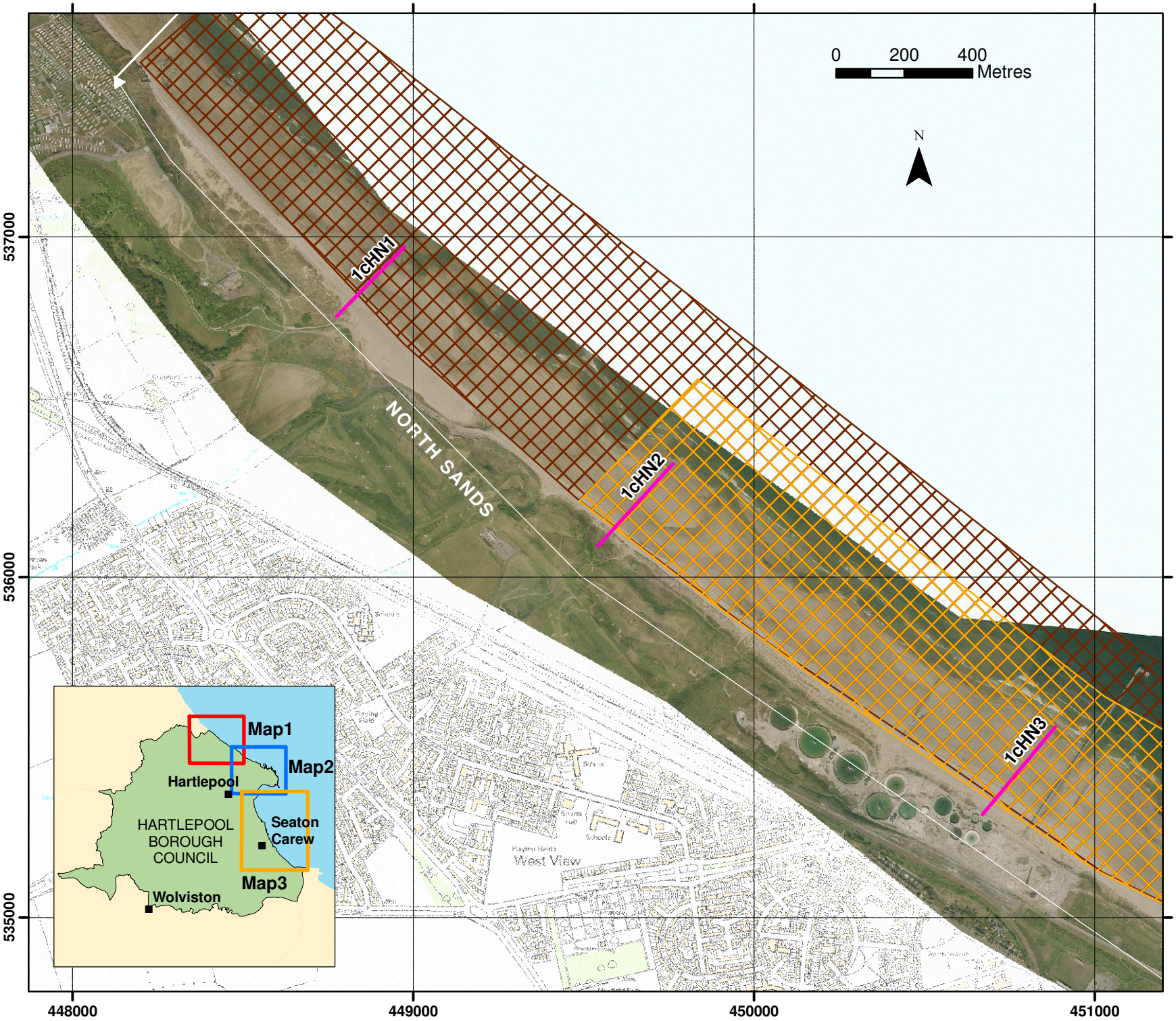
The location of these surveys is shown in Figure 1. They have also previously been provided on a digital file which can be opened in Google Earth showing the locations of the surveys.

The Partial Measures surveys were undertaken in March 2011. During the surveys weather conditions were sunny with a breeze and the sea state was calm.

The Update Report presents the following:

- description of the changes observed since the previous survey and an interpretation of the drivers of these changes (Section 2);
- documentation of any problems encountered during surveying or uncertainties inherent in the analysis (Section 3);
- recommendations for 'fine-tuning' the programme to enhance its outputs (Section 4); and
- providing key conclusions and highlighting any areas of concern (Section 5).

Data from the present survey are presented in a processed form in the Appendices.



SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

Cliff Top Monitoring Pegs

- @ 50 centres
- @ 100 centres
- @ 300 centres

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 1 - Map 1 Hartlepool Borough Council Frontage

Update Report 3
'Partial Measures' Survey 2011

Drawing Scale 1:15,000 at A4

Drawn by:	TC	Date:	05/05/2011
Checked by:	NC	Date:	12/05/2011
Approved by:	NC	Date:	12/05/2011

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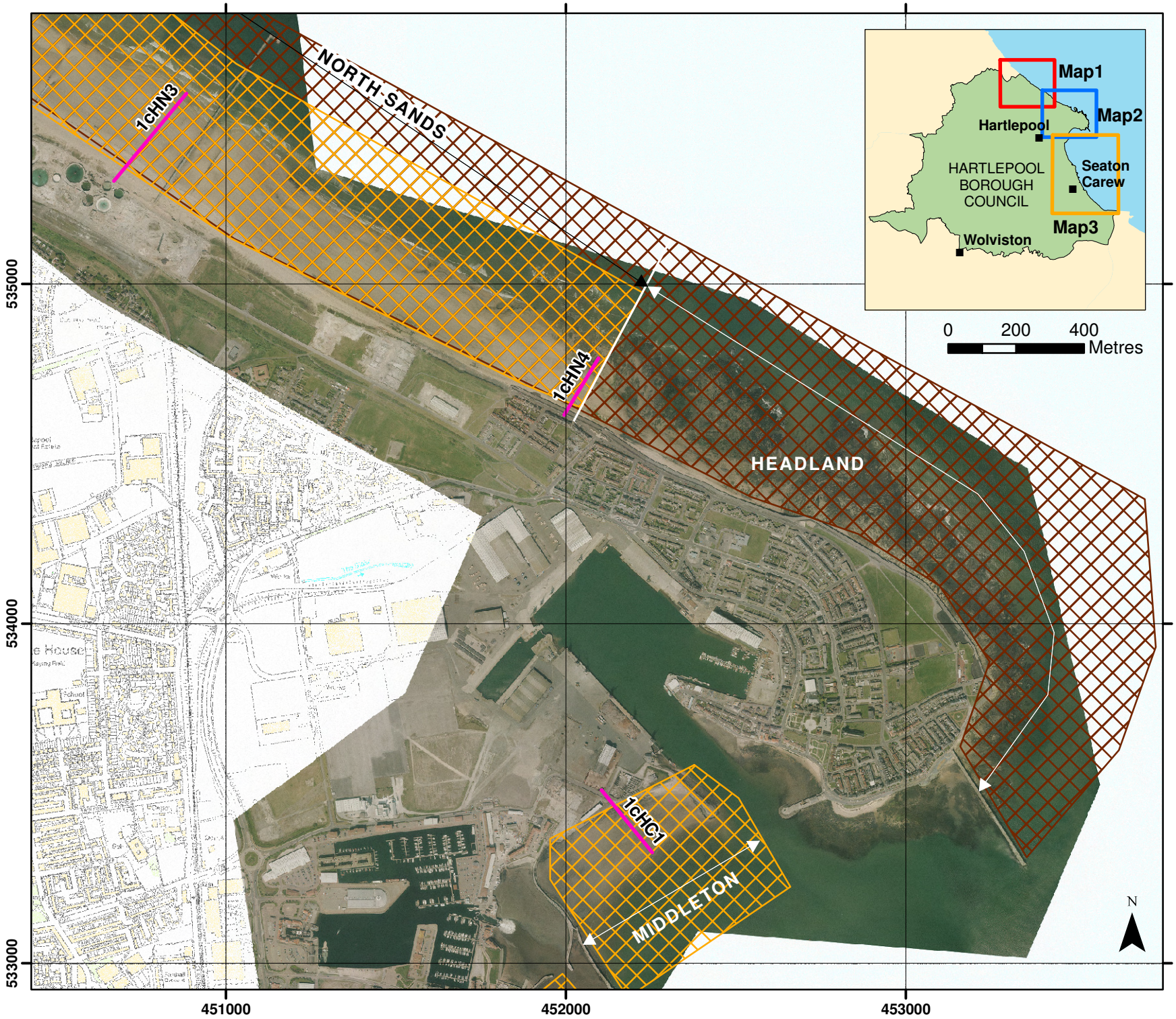

SURVEY LOCATIONS

Topographic Profiles
- Annual
- Bi-Annual

Topographic Surveys
- 6 monthly
- yearly
- 5 yearly

Cliff Top Monitoring Pegs
- @ 50 centres
- @ 100 centres
- @ 300 centres

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 1 - Map 2 Hartlepool Borough Council Frontage

Update Report 3
'Partial Measures' Survey 2011

Drawing Scale 1:15,000 at A4

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TOPOGRAPHIC SURVEY LOCATIONS

- Annual Profile
- Bi-Annual Profile
- 6 monthly Survey
- Yearly Survey
- 5 yearly Survey
- Cliff Top Survey @ 50 centres
- Cliff Top Survey @ 100 centres
- Cliff Top Survey @ 300 centres

(Indicative Survey Extents shown)

Client: North East Coastal Group
Project: Cell 1 Regional Coastal Monitoring Programme

Figure 1 - Map 3 Hartlepool Borough Council Frontage

Update Report 3
'Partial Measures' Survey 2011

Drawing Scale 1:21,000 at A4

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2. Analysis of Survey Data

2.1 North Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
03-2011	**Beach Profiles:** North Sands is covered by four beach profile lines during the Partial Measures survey (Appendix A). HN1 is located within Durham County Council's jurisdiction, about 400m north of the outfall of Crimdon Beck, but has been reported here so changes can be interpreted in association with those observed elsewhere along North Sands at HN2, HN3 and HN4. The form of both the beach and the dune sections of the profile in March 2011 was very similar to that recorded in March 2009, with a trough around MSL and a large, wide berm to seaward. In March 2011 there was additionally a berm on the upper beach, above HAT directly at the toe of the dunes. HN2 showed a degree of accretion since September 2010 along all the profile length except for a small amount of draw-down on the very upper-most section of beach. HN3 exhibited an almost identical form and level in march 2011 compared with September 2010. HN4 showed good beach accretion down to MSL since September 2010, with a healthy berm formed at the toe of the sea wall. Seaward of MSL, the foreshore level was lower than recorded in many previous surveys, but still within the bounds of previous behaviour.	HN1 experiences quite notable changes along the mid and lower beach between successive surveys, largely associated with the development, evolution and flattening of a trough and berm feature. HN2, HN3 and HN4 are comparably more stable, with accretion noted along a substantial width of surveys HN2 and HN4 since September 2010 and HN3 remaining very stable.

2.2 Middleton

Survey Date	Description of Changes Since Last Survey	Interpretation
	Beach Profiles:	
	Middleton is covered by one beach profile line during the Partial Measures survey (Appendix A).	
03-2011	Profile HC1 continues to have low beach levels (around 1.2mODN) at the toe of the sea wall. From around 10m seaward of the toe of the wall down the profile to a chainage of around 135m, the beach levels dropped slightly since September 2010 but remain within previous bounds of behaviour. Seaward of this chainage there was an increase in levels to equal previous record high values.	From the high levels at the toe of the sea wall in September 2009, progressive lowering at the toe was observed to September 2010, but this has now started to stabilise, with levels at the toe in March 2011 similar to those in September 2010. The lower foreshore has accreted sand and this may, in time, be deposited further up the foreshore to restore mid and upper beach levels.

2.3 Hartlepool Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
03-2011	**Beach Profiles:** Hartlepool Bay is covered by four beach profile lines during the Partial Measures survey (Appendix A). HS1 is located approximately 150m south of the root of the South Pier. The profile starts at the wall to the rear of the promenade and extends across the promenade, over the fronting concrete splash wall and down the sloping face of the rock armour revetment before reaching the beach. It then gently slopes down to low water level at the time of the survey. In March 2011, the foreshore levels were higher than previously recorded (surveying began along this section in March 2009). HS2 and HS3 are similar in that they both start across the promenade and then extend down the sea wall to beach level, crossing the rock armour protection at the toe of the wall. The revetment along HS2 is also fronted by boulders. The profiles then both slope gently down to low water mark. Along HS2 the foreshore levels in March 2011 were higher than previously recorded (surveying began along this section in March 2009). Along HS3 foreshore levels were healthy along the whole profile length, with the second highest recorded levels directly at the toe of the defences. HS4 is located further south, around 1km north of the North Gare Breakwater, within the area of undefended dunes at Seaton Carew. The main dune ridge has remained very stable over time, but a foredune developing on the seaward face in October 2010 was reduced in crest height by March 2011. Foreshore levels were at record high values down the profile to a chainage of 480m, with relatively low levels (within previous bounds of behaviour) further seaward.	The dune and beach levels along the measured transects were observed to be healthy along Hartlepool Bay.

3. Problems Encountered and Uncertainty in Analysis

Access constraints mean that parts of the landward sections of transect HC1 can no longer be surveyed. This is not considered significantly adverse because the ability to survey the seaward sections of this profile (seaward of the wall or dune defences) remains unaffected.

Construction work was underway along part of the Hartlepool South frontage, generally in the vicinity of HS3, as part of the 'Northern Management Unit' Phase I Works.

4. Recommendations for 'Fine-tuning' the Monitoring Programme

There are no changes needed at the present time.

5. Conclusions and Areas of Concern

- The dunes and beach levels along the measured transects along the Hartlepool frontages were generally very healthy, especially along Hartlepool Bay.

- Although the level directly at the toe of the wall in Middleton still remains relatively low, there are no major concerns at the present time and the upper foreshore may benefit from the accretion that has been observed along the lower foreshore since October 2010.

Appendices

Appendix A

Beach Profiles

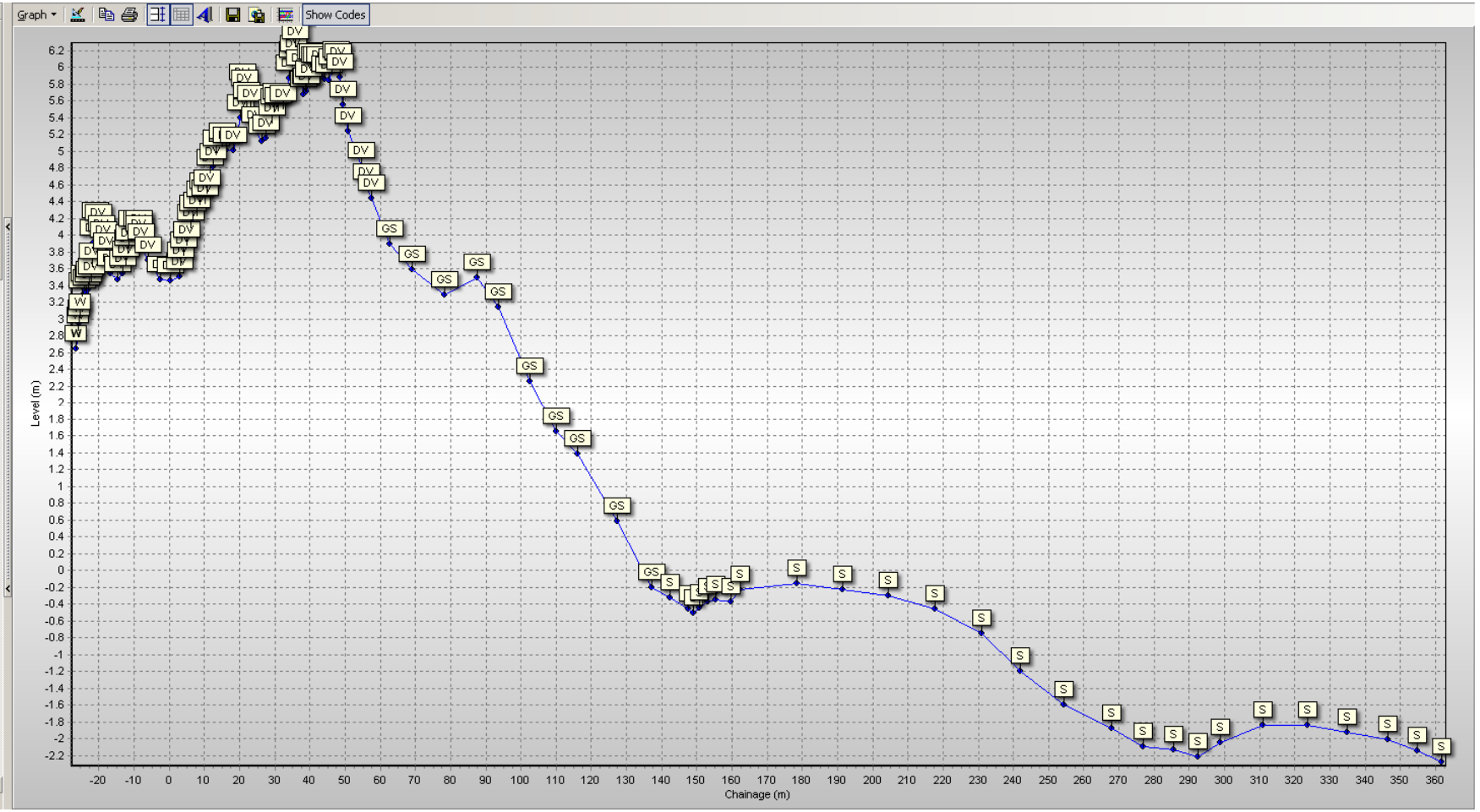
The following sediment feature codes are used on some profile plots:

Code	Description
M	Mud
S	Sand
G	Gravel
GS	Gravel & Sand
GM	Gravel & Mud
MS	Mud & Sand
B	Boulders
R	Rock
SD	Sea Defence
SM	Salt Marsh
GR	Grass
D	Dune (non-vegetated)
DV	Dune (vegetated)
F	Forested
X	Mixture
FB	Obstruction
CT	Cliff Top
CE	Cliff Edge
CF	Cliff Face
SH	Shell
W	Water Body
ZZ	Unknown

Hartlepool North

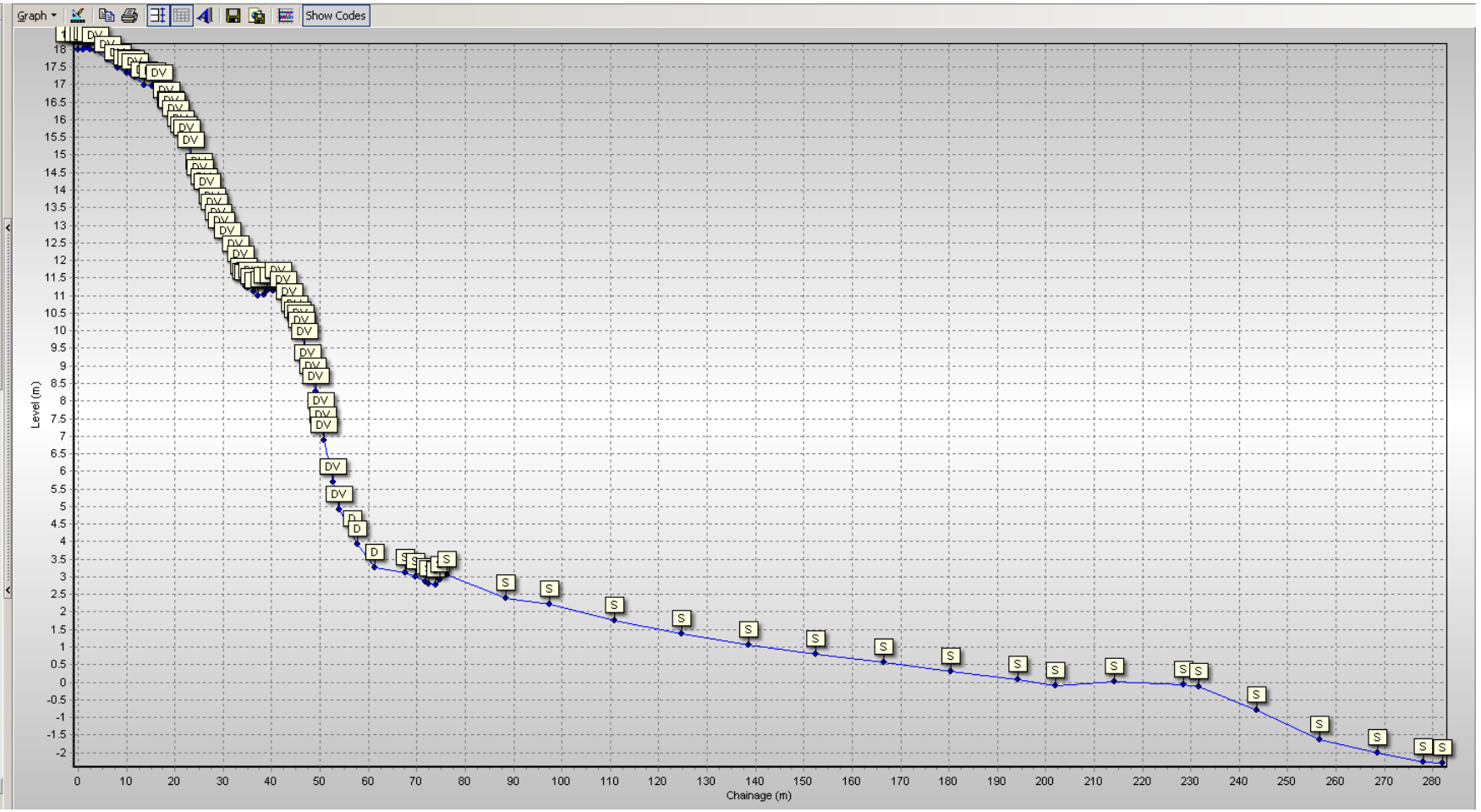
1cHN1 – 22/03/2011

Chainage	Level	Code
-26.486	2.640	W
-25.888	2.860	W
-25.621	2.944	W
-25.391	3.024	W
-24.791	3.275	GR
-24.311	3.355	GR
-23.562	3.311	GR
-23.083	3.344	GR
-22.621	3.405	GR
-22.250	3.441	DV
-21.877	3.625	DV
-21.476	3.904	DV
-20.950	4.114	DV
-20.091	4.091	DV
-19.229	3.949	DV
-18.575	3.874	DV
-17.822	3.742	DV
-16.691	3.537	DV
-14.785	3.462	DV
-13.348	3.539	DV
-12.357	3.645	DV
-11.654	3.779	DV
-11.379	3.845	DV
-10.677	4.018	DV
-9.214	4.014	DV
-8.696	4.015	DV
-8.530	3.947	DV
-8.057	3.860	DV
-6.023	3.704	DV
-2.427	3.466	DV
0.261	3.457	DV
2.953	3.499	DV
3.313	3.633	DV
4.147	3.763	DV
5.085	3.883	DV
6.022	4.087	DV
6.766	4.201	DV
7.988	4.237	DV
8.588	4.369	DV
9.466	4.462	DV
10.111	4.382	DV
10.677	4.502	DV



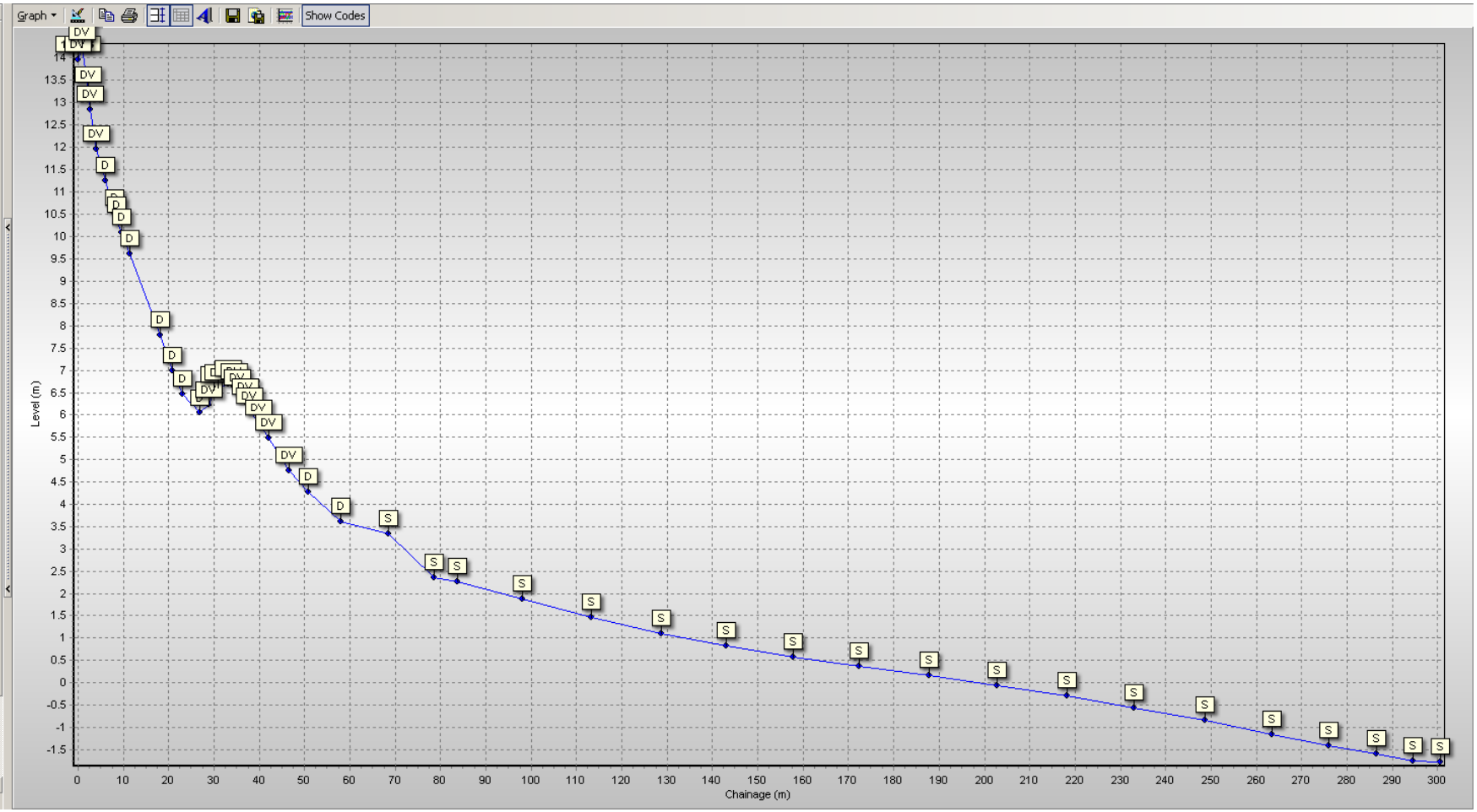
1cHN2 - 22/03/2011

Chainage	Level	Code
0.000	17.987	
0.025	17.987	DV
0.993	18.009	DV
1.794	18.054	DV
2.454	17.993	DV
3.668	17.964	DV
6.086	17.707	DV
8.179	17.480	DV
10.020	17.326	DV
10.960	17.289	DV
11.677	17.207	DV
13.588	16.989	DV
15.310	16.959	DV
16.774	16.889	DV
18.189	16.395	DV
19.036	16.135	DV
19.364	16.125	DV
20.164	15.886	DV
21.236	15.605	DV
21.808	15.432	DV
22.396	15.319	DV
23.357	14.980	DV
24.956	14.384	DV
25.275	14.207	DV
26.054	13.955	DV
26.587	13.801	DV
27.705	13.395	DV
28.159	13.230	DV
28.929	12.918	DV
29.571	12.711	DV
30.852	12.410	DV
32.586	12.037	DV
33.611	11.744	DV
34.153	11.398	DV
34.625	11.254	DV
34.979	11.224	DV
35.810	11.268	DV
36.297	11.117	DV
37.094	10.989	DV
38.454	11.004	DV
39.156	11.135	DV
40.221	11.127	DV



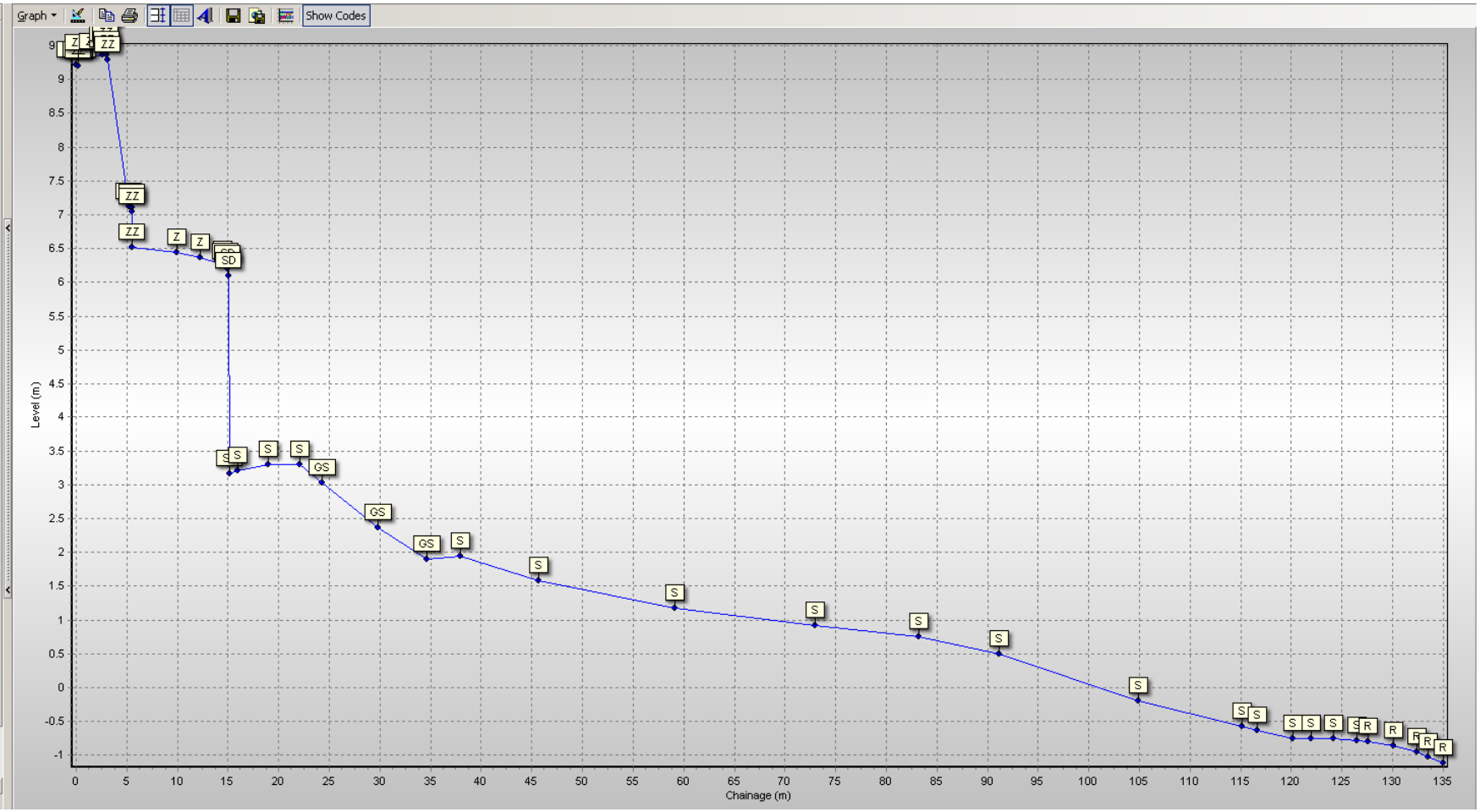
1cHN3 – 22/03/2011

Chainage	Level	Code
0.000	13.968	
0.110	13.968	DV
0.862	14.239	DV
2.295	13.281	DV
2.664	12.844	DV
3.954	11.972	DV
6.131	11.245	D
8.136	10.523	D
8.573	10.367	D
9.712	10.096	D
11.508	9.615	D
18.023	7.798	D
20.768	7.008	D
23.077	6.464	D
26.758	6.048	D
28.808	6.235	DV
29.969	6.571	DV
30.983	6.605	DV
33.151	6.700	DV
34.578	6.642	DV
35.032	6.494	DV
37.001	6.283	DV
37.729	6.082	DV
39.752	5.811	DV
42.117	5.468	DV
46.585	4.743	DV
50.724	4.267	D
58.044	3.597	D
68.469	3.335	S
78.467	2.348	S
83.719	2.263	S
98.015	1.868	S
113.256	1.454	S
128.618	1.110	S
142.977	0.831	S
157.866	0.572	S
172.352	0.367	S
187.784	0.178	S
202.732	-0.062	S
218.237	-0.294	S
233.031	-0.567	S
248.770	-0.838	S

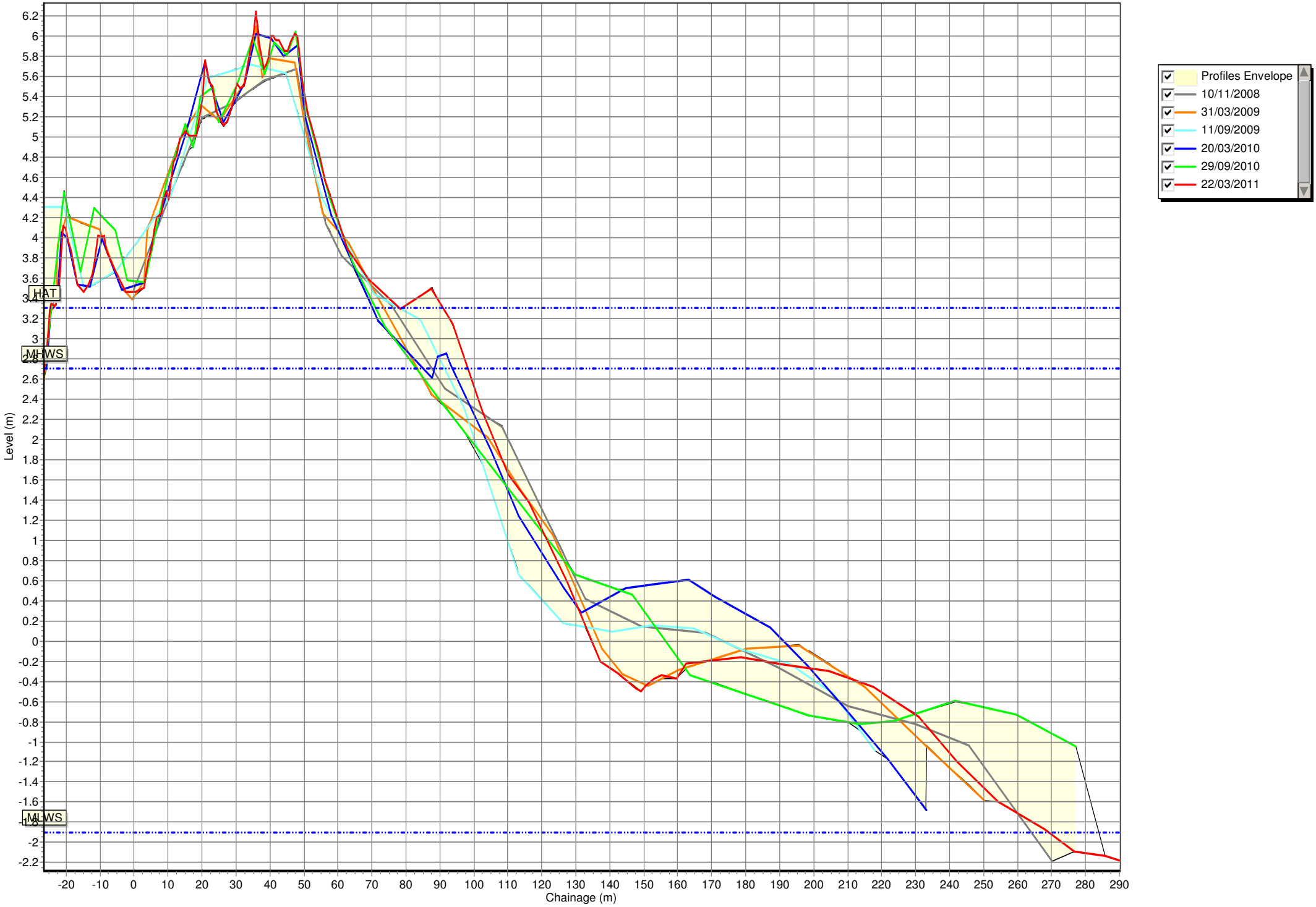


1cHN4N – 22/03/2011

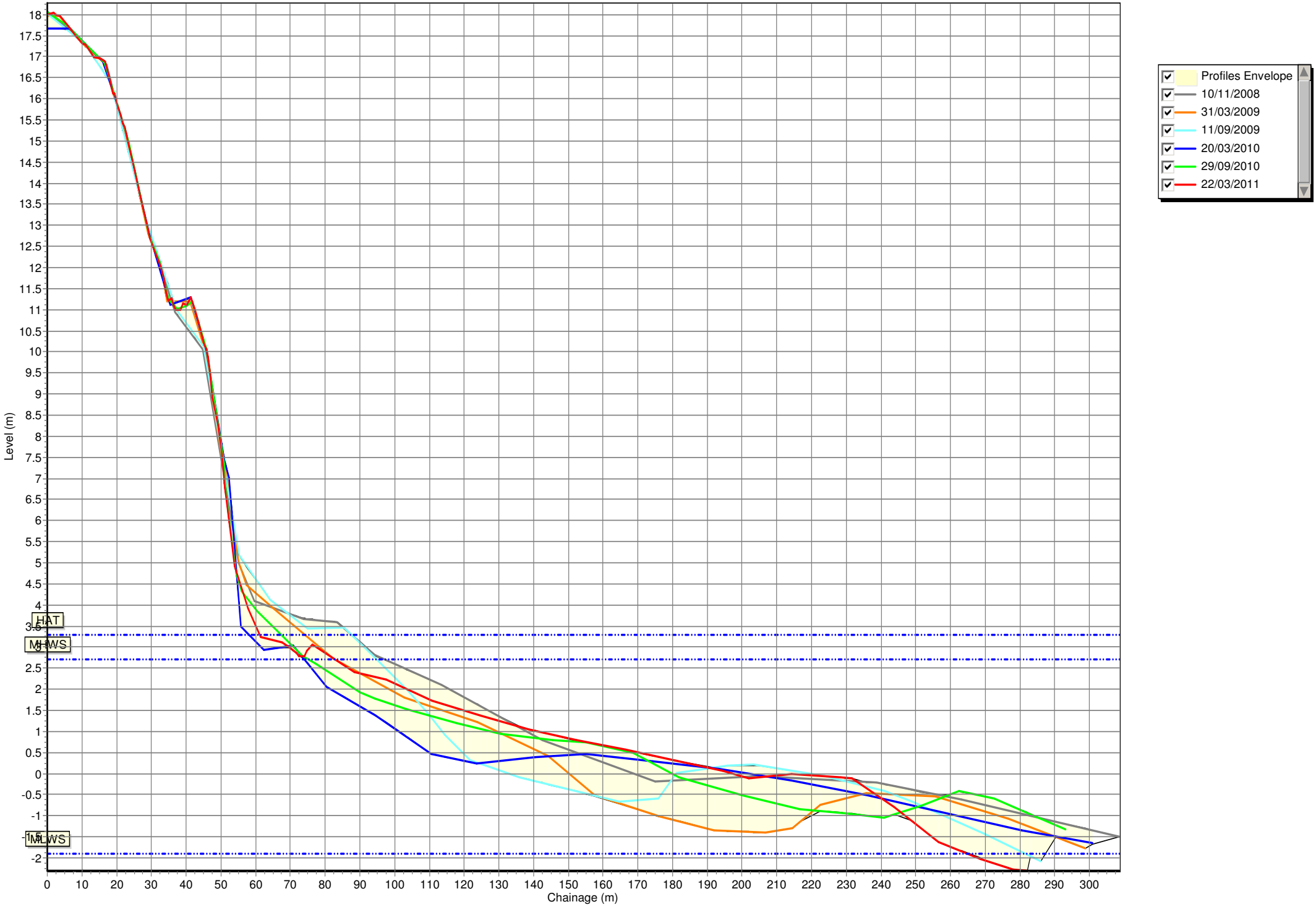
Chainage	Level	Code
0.000	9.212	
0.003	9.212	ZZ
0.157	9.203	ZZ
0.191	9.311	ZZ
1.590	9.339	ZZ
2.602	9.362	ZZ
2.647	9.453	ZZ
2.920	9.469	ZZ
3.059	9.368	ZZ
3.062	9.286	ZZ
5.190	7.128	ZZ
5.481	7.099	ZZ
5.539	7.046	ZZ
5.551	6.522	ZZ
9.930	6.439	Z
12.232	6.367	Z
14.427	6.258	Z
14.751	6.228	SD
14.980	6.208	SD
15.050	6.091	SD
15.127	3.158	SD
16.010	3.210	S
18.923	3.293	S
22.055	3.296	S
24.314	3.027	GS
29.778	2.369	GS
34.602	1.890	GS
37.895	1.936	S
45.712	1.582	S
59.144	1.179	S
72.993	0.921	S
83.190	0.748	S
91.127	0.491	S
104.934	-0.191	S
115.159	-0.577	S
116.686	-0.625	S
120.114	-0.751	S
121.928	-0.760	S
124.199	-0.759	S
126.508	-0.780	S
127.595	-0.796	R
130.111	-0.863	R

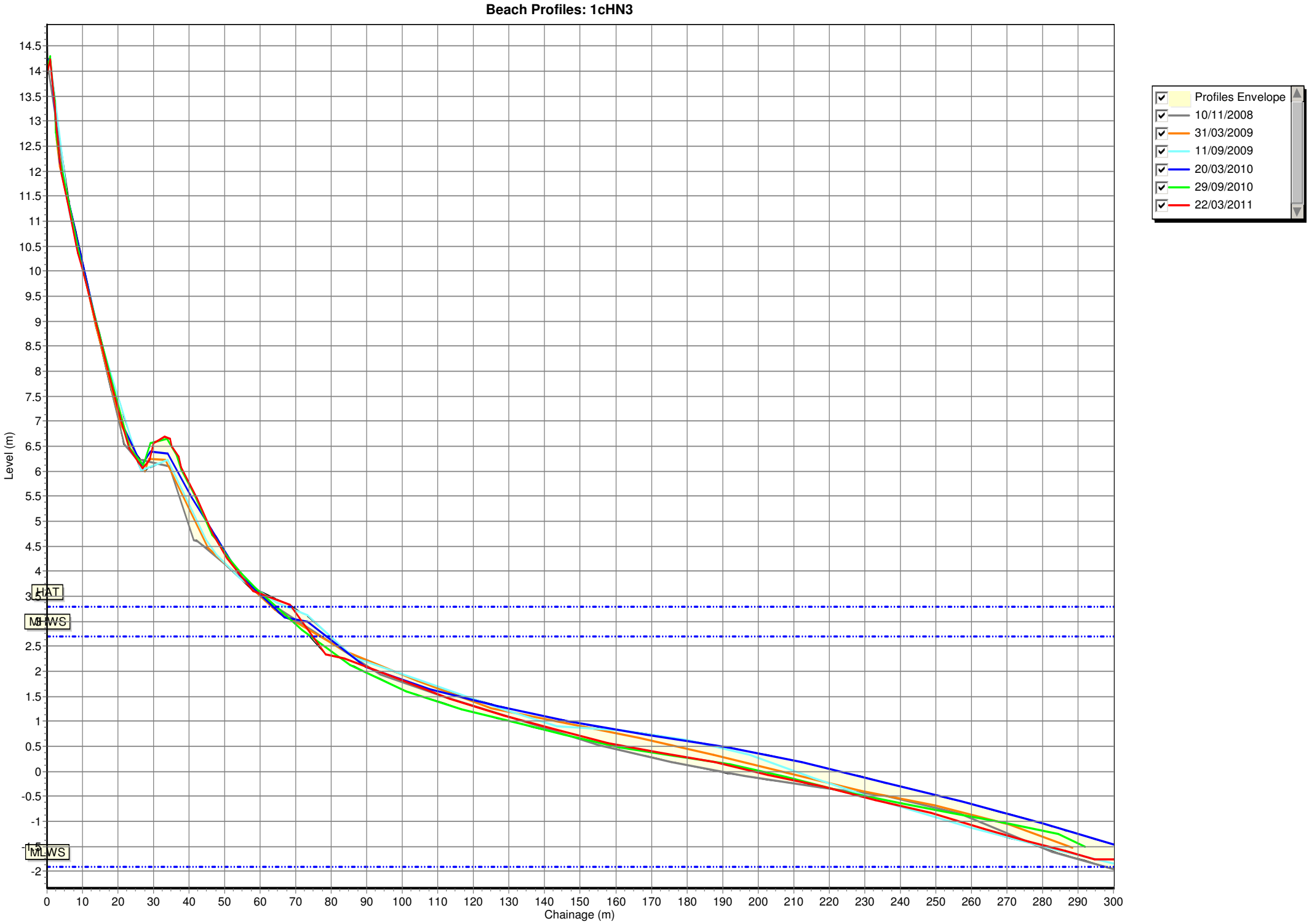


Beach Profiles: 1cHN1

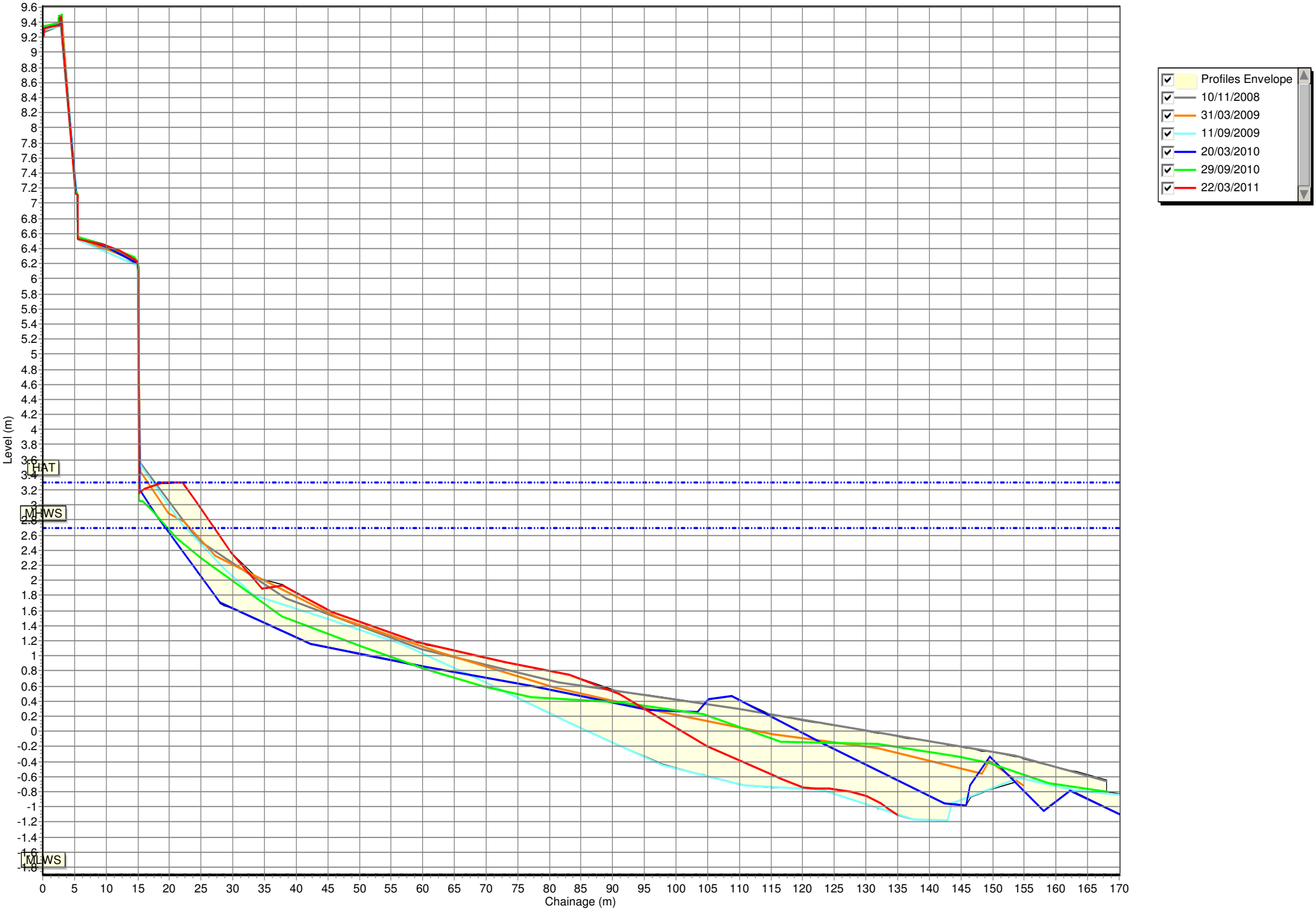


Beach Profiles: 1cHN2




Beach Profiles: 1cHN3
Profiles Envelope
10/11/2008
31/03/2009
11/09/2009
20/03/2010
29/09/2010
22/03/2011
HAT
MHWS
MLWS
Level (m)
Chainage (m)

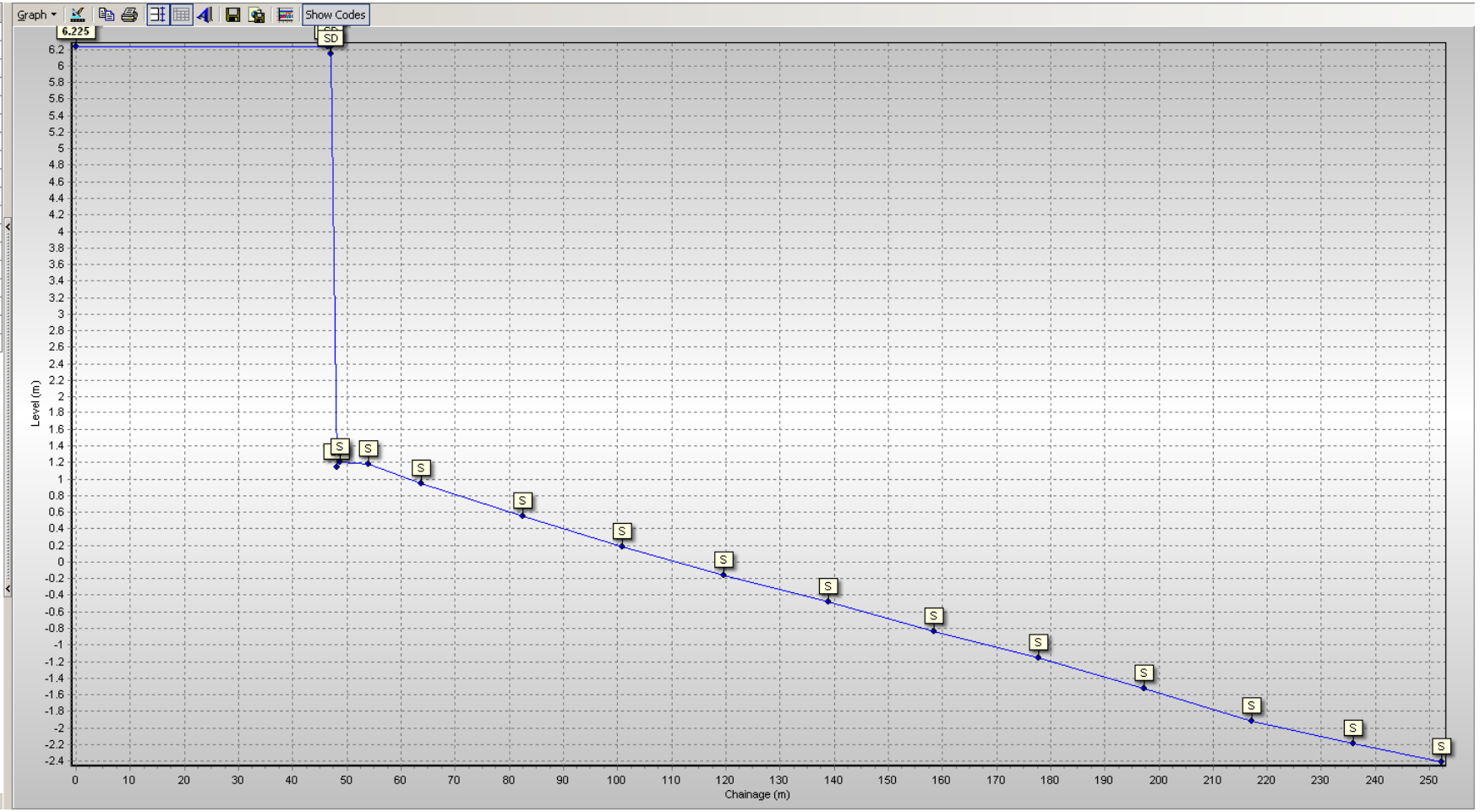
Beach Profiles: 1cHN4



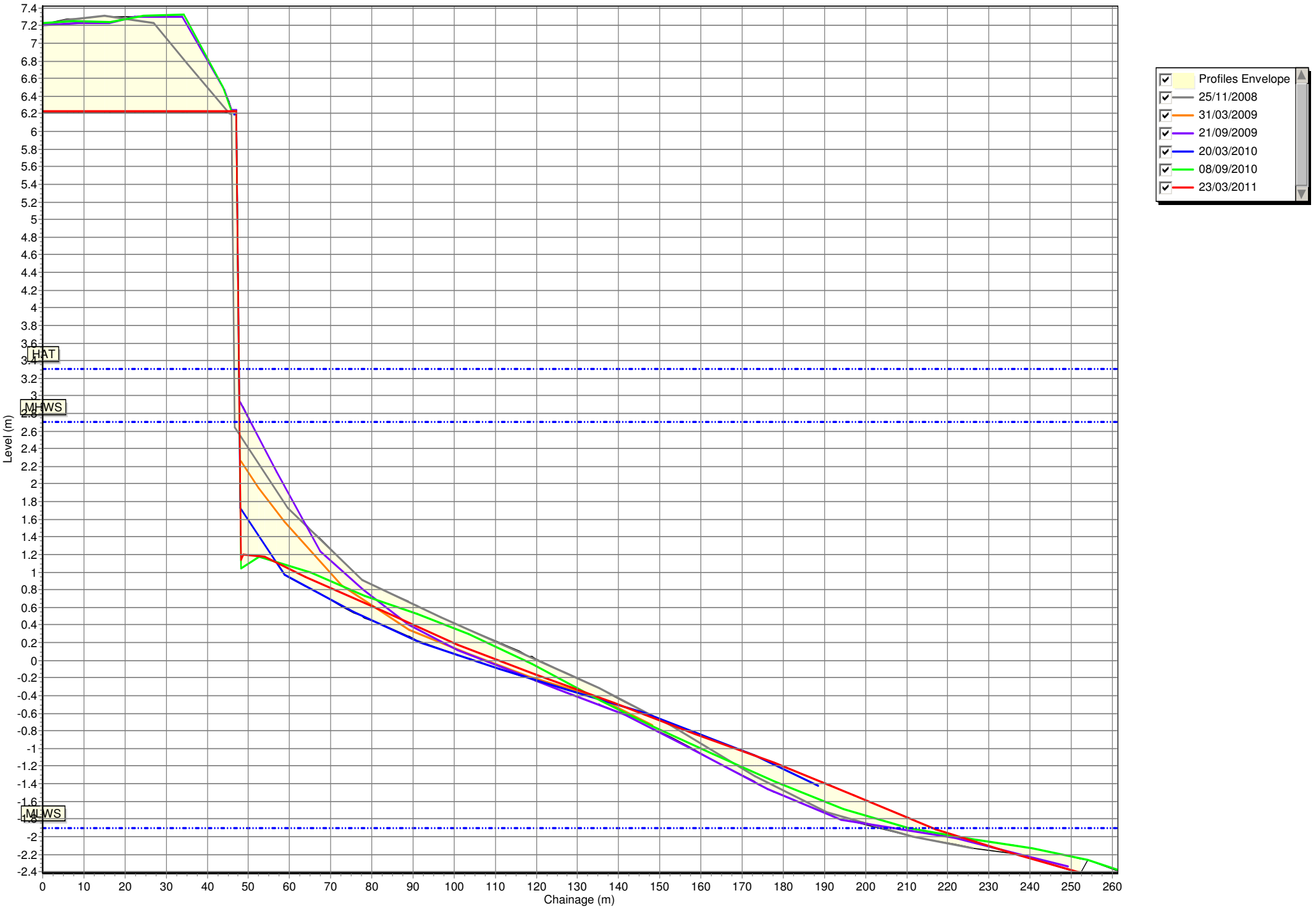
Hartlepool Central

1cHC1 – 23/03/2011

Chainage	Level	Code
0.000	6.225	
46.503	6.225	SD
46.976	6.231	SD
47.047	6.147	SD
48.183	1.145	SD
48.724	1.203	S
54.064	1.180	S
63.749	0.942	S
82.518	0.558	S
100.902	0.182	S
119.715	-0.161	S
138.962	-0.483	S
158.388	-0.832	S
177.757	-1.156	S
197.206	-1.527	S
217.116	-1.920	S
235.830	-2.188	S
252.222	-2.410	S



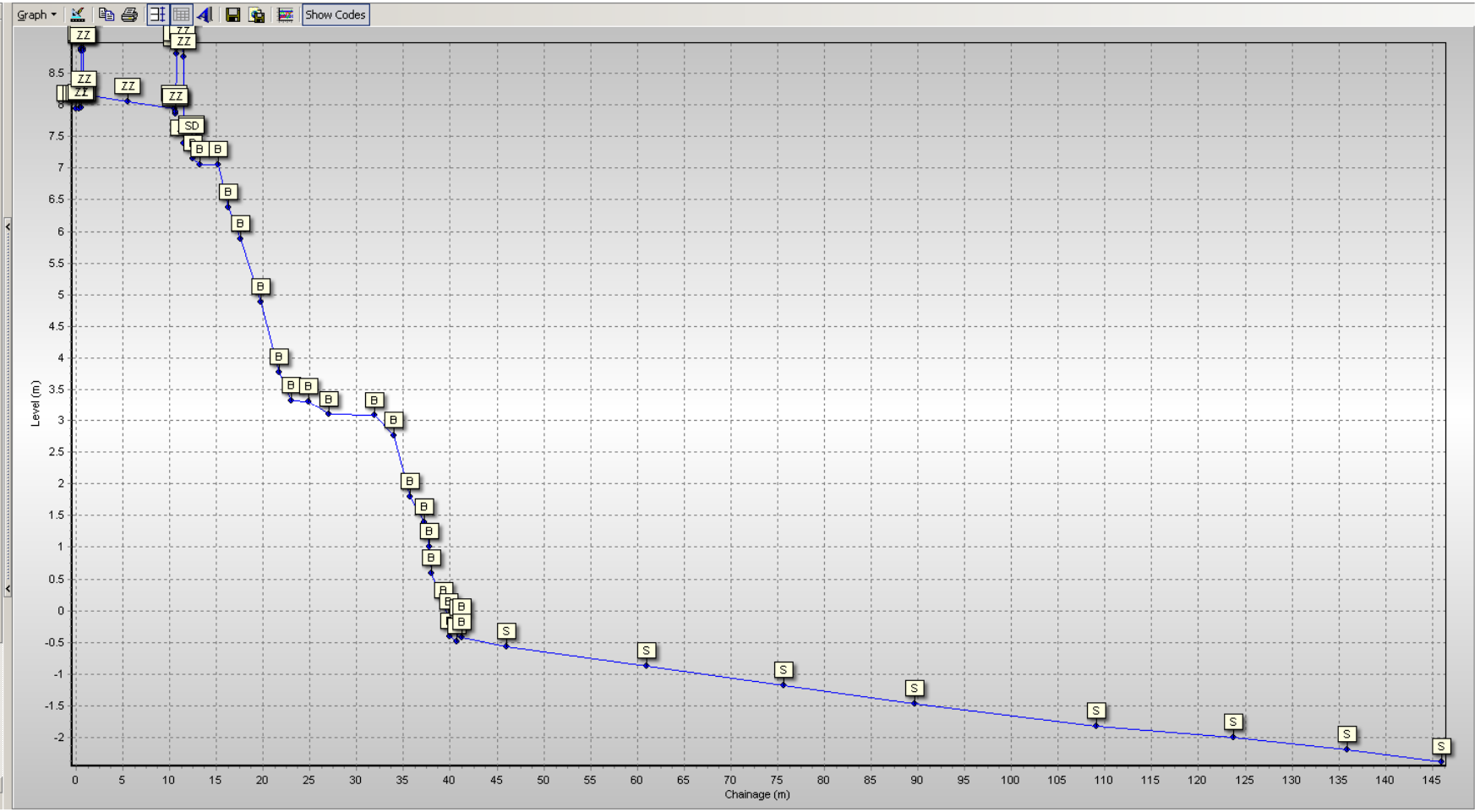
Beach Profiles: 1cHC1



Hartlepool South

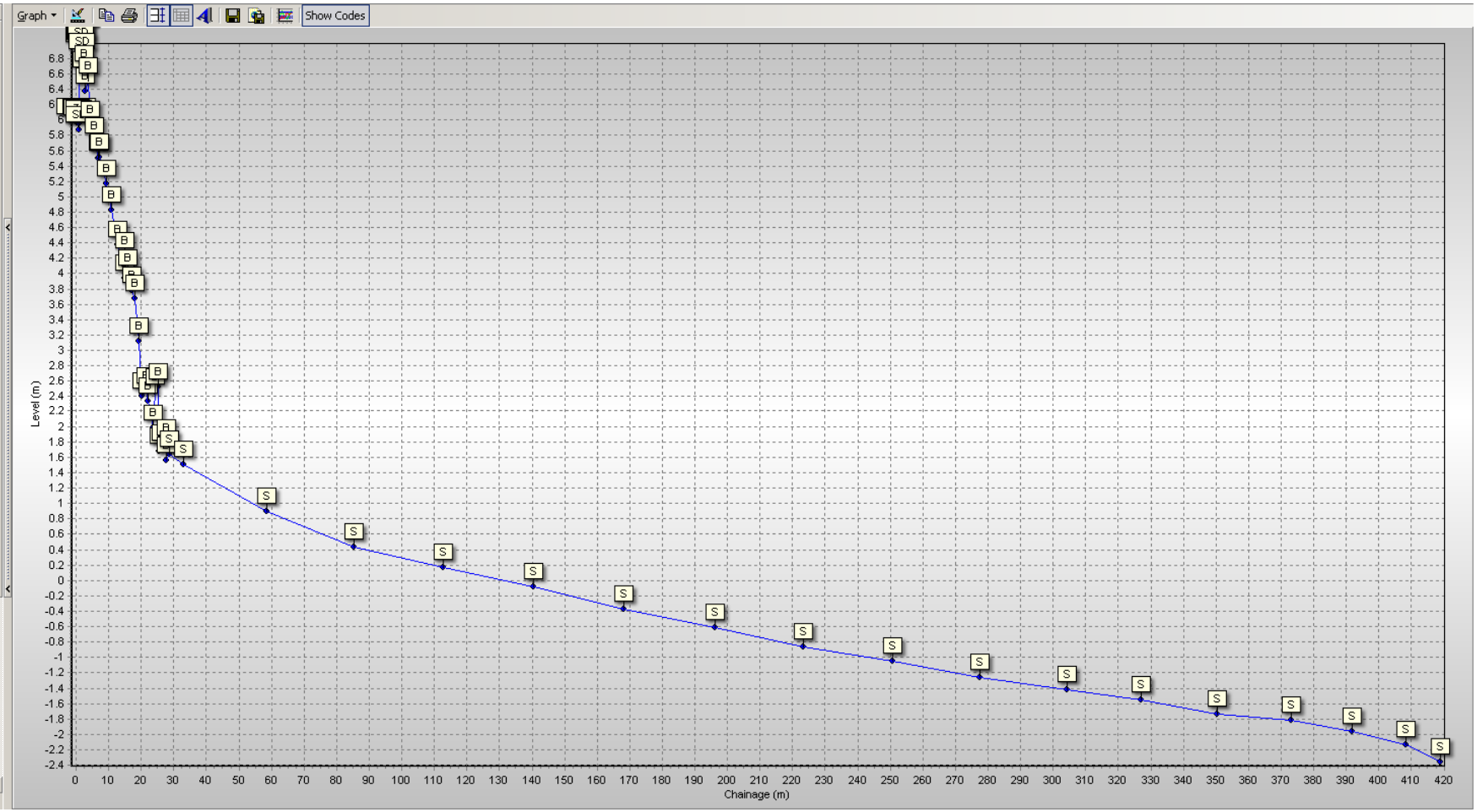
1cHS1 – 23/03/2011

Chainage	Level	Code
0.000	7.944	
0.010	7.944	GR
0.301	7.932	GR
0.503	7.963	ZZ
0.532	8.856	ZZ
0.567	8.893	ZZ
0.773	8.887	ZZ
0.788	8.855	ZZ
0.830	8.168	ZZ
5.534	8.044	ZZ
10.527	7.933	ZZ
10.615	7.857	ZZ
10.682	7.893	ZZ
10.732	8.812	ZZ
10.789	8.892	ZZ
11.435	8.920	ZZ
11.519	8.762	ZZ
11.525	7.388	ZZ
12.341	7.451	SD
12.400	7.430	SD
12.511	7.149	B
13.235	7.057	B
15.153	7.054	B
16.242	6.378	B
17.594	5.883	B
19.718	4.885	B
21.732	3.777	B
23.015	3.319	B
24.876	3.315	B
27.043	3.099	B
31.863	3.082	B
33.956	2.758	B
35.688	1.791	B
37.189	1.393	B
37.775	1.002	B
37.984	0.586	B
39.294	0.077	B
39.881	-0.110	B
39.951	-0.404	B
40.674	-0.489	B
40.912	-0.205	B
41.198	-0.181	B



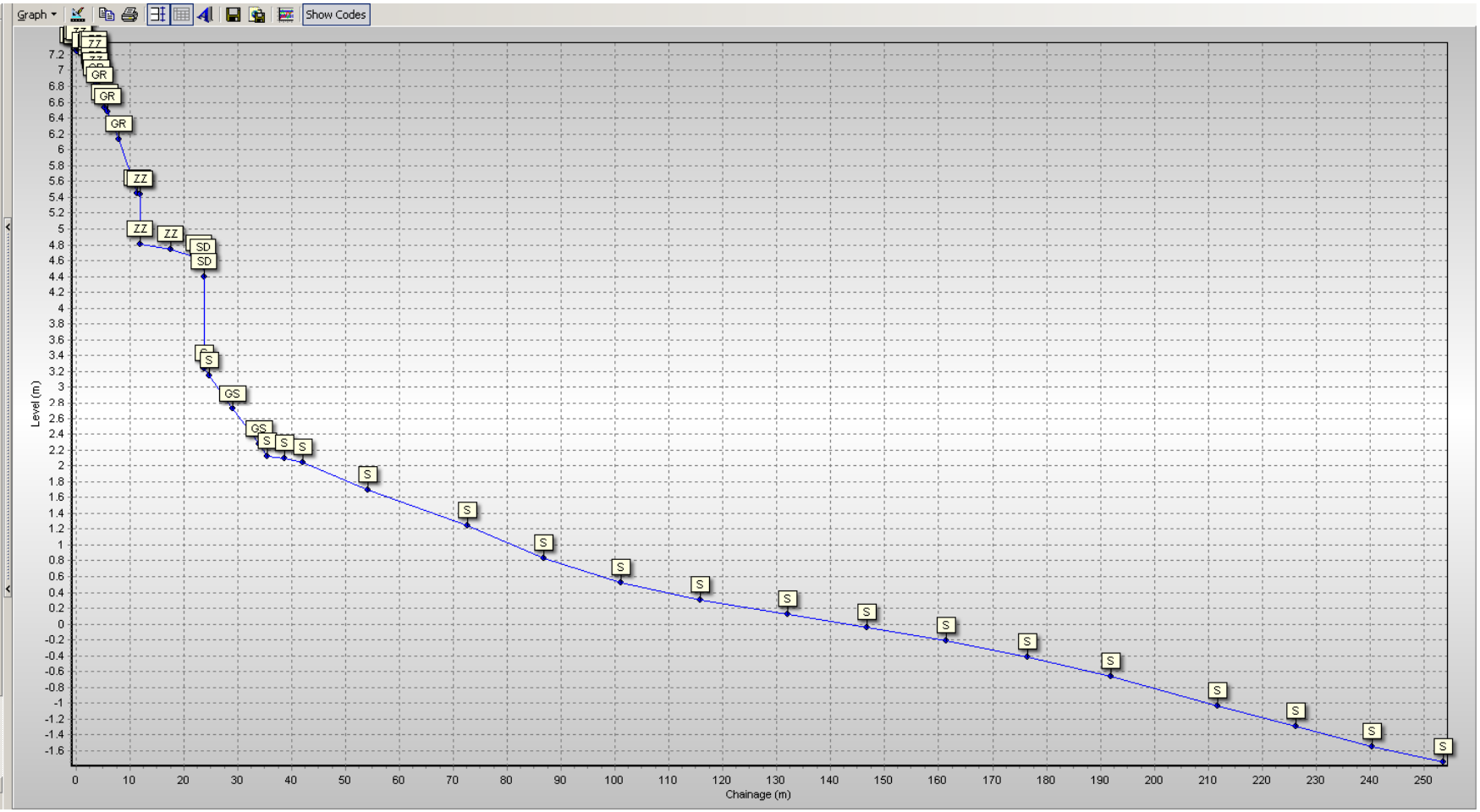
1cHS2 – 23/03/2011

Chainage	Level	Code
0.000	5.981	
0.011	5.981	ZZ
0.368	5.966	ZZ
0.797	5.955	ZZ
0.860	5.870	ZZ
1.009	5.869	SD
1.026	6.912	SD
1.091	6.941	SD
1.622	6.943	SD
1.720	6.821	SD
1.821	6.590	B
2.411	6.659	B
2.797	6.374	B
3.699	6.500	B
4.407	5.943	B
5.640	5.721	B
6.725	5.506	B
7.046	5.519	B
9.414	5.169	B
11.030	4.828	B
12.829	4.380	B
14.887	3.945	B
14.974	4.231	B
15.872	4.010	B
17.029	3.786	B
18.090	3.678	B
19.329	3.123	B
20.130	2.405	B
21.497	2.477	B
22.090	2.340	B
23.635	1.987	B
24.396	2.458	B
25.218	2.520	B
25.648	1.682	B
26.246	1.723	B
27.796	1.788	B
27.809	1.553	B
28.802	1.636	S
32.859	1.507	S
58.513	0.900	S
85.471	0.435	S
112.891	0.172	S



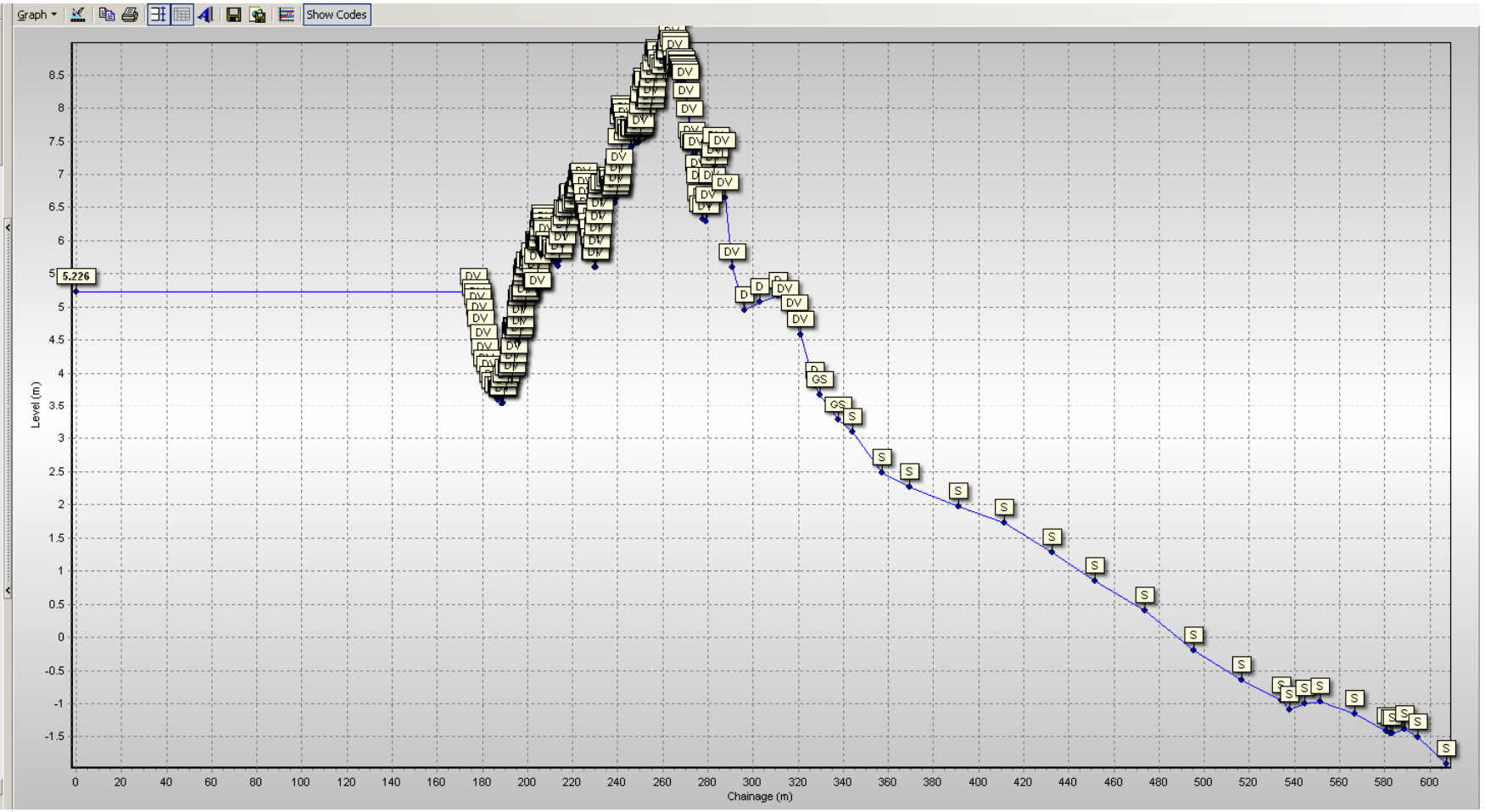
1cHS3 – 23/03/2011

Chainage	Level	Code
0.000	7.250	
0.049	7.250	ZZ
0.256	7.243	ZZ
0.282	7.302	ZZ
0.564	7.283	ZZ
1.630	7.190	ZZ
2.911	7.090	ZZ
2.920	7.161	ZZ
3.004	7.198	ZZ
3.361	7.204	ZZ
3.409	7.140	ZZ
3.417	6.990	ZZ
3.429	6.998	ZZ
3.492	6.930	ZZ
3.775	6.839	GR
4.398	6.755	GR
5.312	6.528	GR
5.790	6.479	GR
8.005	6.125	GR
11.265	5.445	GR
11.823	5.440	ZZ
11.843	4.802	ZZ
17.535	4.740	ZZ
22.756	4.620	ZZ
23.651	4.577	SD
23.788	4.393	SD
23.792	3.240	S
24.779	3.153	S
29.004	2.720	GS
33.977	2.273	GS
35.487	2.115	S
38.629	2.094	S
42.122	2.036	S
54.213	1.688	S
72.624	1.241	S
86.665	0.836	S
100.980	0.528	S
115.752	0.301	S
131.933	0.127	S
146.682	-0.040	S
161.345	-0.207	S
176.556	-0.417	S

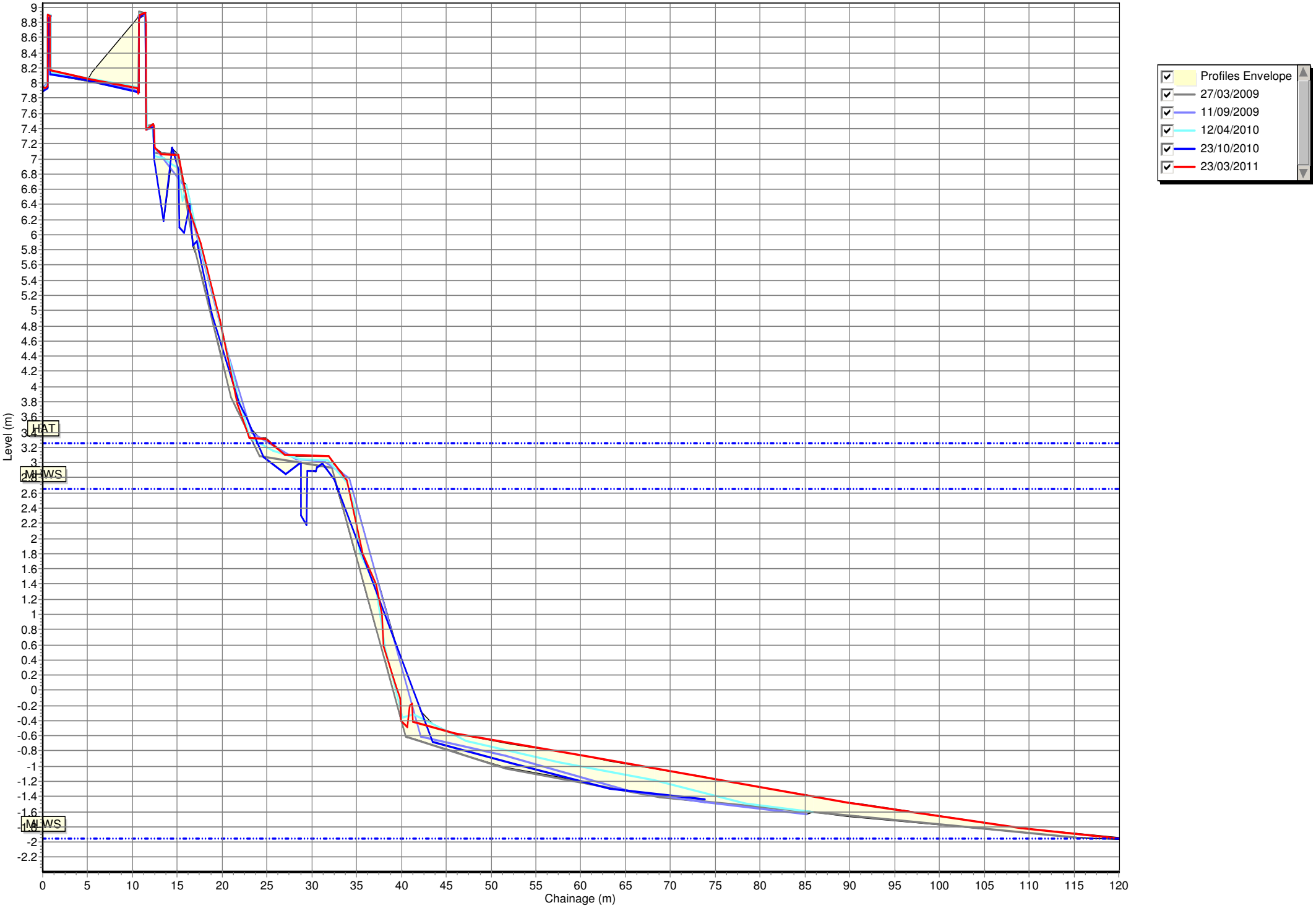


1cHS4 – 23/03/2011

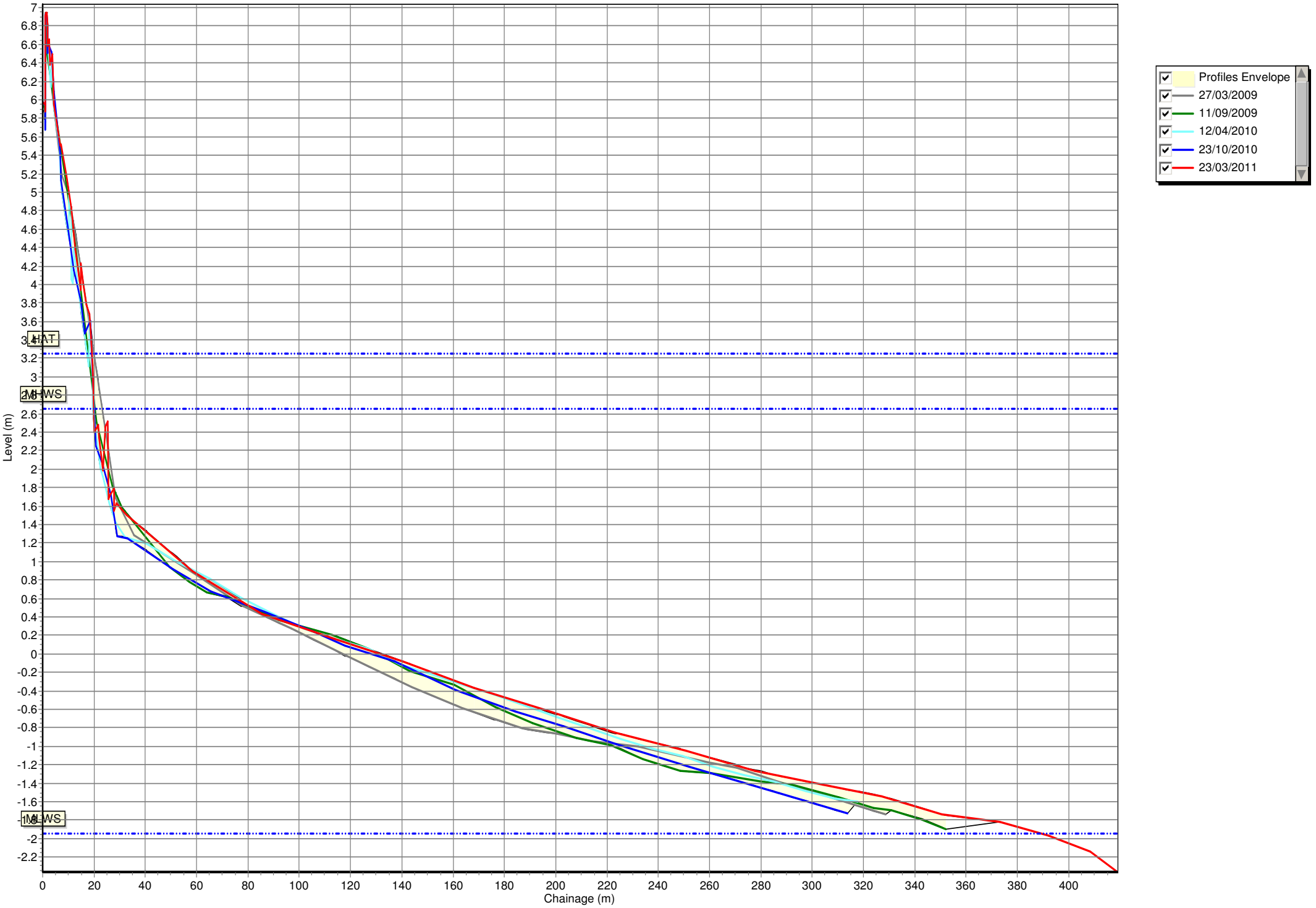
Chainage	Level	Code
0.000	5.226	
176.084	5.226	DV
177.139	5.051	DV
177.782	4.996	DV
178.114	4.923	DV
178.794	4.760	DV
179.421	4.602	DV
180.429	4.387	DV
181.064	4.170	DV
181.971	3.997	DV
183.578	3.895	DV
184.903	3.747	DV
185.501	3.656	DV
187.044	3.598	DV
188.152	3.594	DV
188.599	3.524	DV
189.161	3.545	DV
189.769	3.668	DV
190.363	3.740	DV
191.560	3.859	DV
192.676	3.843	DV
193.276	3.888	DV
193.734	4.043	DV
194.096	4.176	DV
194.497	4.404	DV
195.016	4.486	DV
195.469	4.469	DV
196.044	4.414	DV
196.475	4.451	DV
196.772	4.561	DV
197.039	4.732	DV
197.544	4.899	DV
197.915	4.958	DV
198.588	4.977	DV
199.076	4.988	DV
199.249	5.047	DV
199.394	5.208	DV
199.571	5.274	DV
200.152	5.363	DV
200.657	5.380	DV
201.032	5.467	DV
202.113	5.462	DV



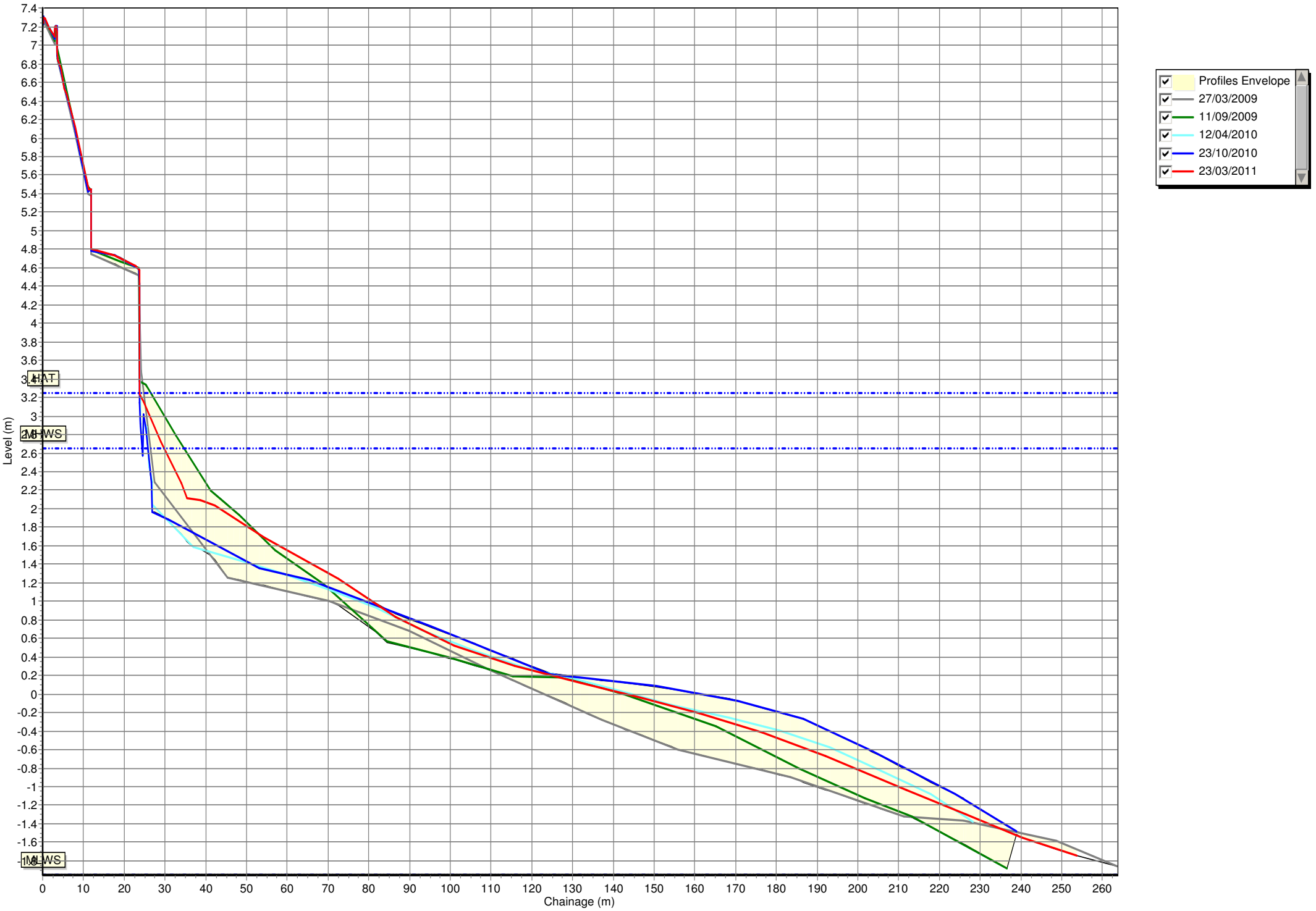
Beach Profiles: 1cHS1



Beach Profiles: 1cHS2



Beach Profiles: 1cHS3



Beach Profiles: 1cHS4