Cell 1 Regional Coastal Monitoring Programme Analytical Report 9: 'Full Measures' Survey 2016

Northumberland County Council

March 2017

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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
MHWN	Mean High Water Neap
MHWS	Mean High Water Spring
MLWS	Mean Low Water Neap
MLWS	Mean Low Water Spring
m	metres
ODN	Ordnance Datum Newlyn

Water Levels Used in Interpretation of Changes

Water Level Parameter	Water Level (m AOD) Berwick upon Tweed	Holy Island	North Sunderland
1 in 200 year	3.4	3.4	3.5
HAT	2.8	2.8	2.8
MHWS	2.2	2.4	2.4
MLWS	-1.9	-1.8	-1.7
Water Level Parameter	**Water Level (m AOD) Amble**	**Blyth**	**River Tyne**
1 in 200 year	3.5	3.6	3.7
HAT	3.1	3.1	3.1
MHWS	2.4	2.4	2.4
MLWS	-1.9	-1.8	-1.9

Source: *Scottish Border to River Tyne Shoreline Management Plan 2.* Royal Haskoning, May 2009.

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. This coastline is often referred to as 'Coastal Sediment Cell 1' in England and Wales (Figure 1). Within this frontage, the coastal landforms vary considerably, comprising low-lying tidal flats with fringing salt marshes, hard rock cliffs that are mantled with glacial sediment to varying thicknesses, softer rock cliffs and extensive landslide complexes.

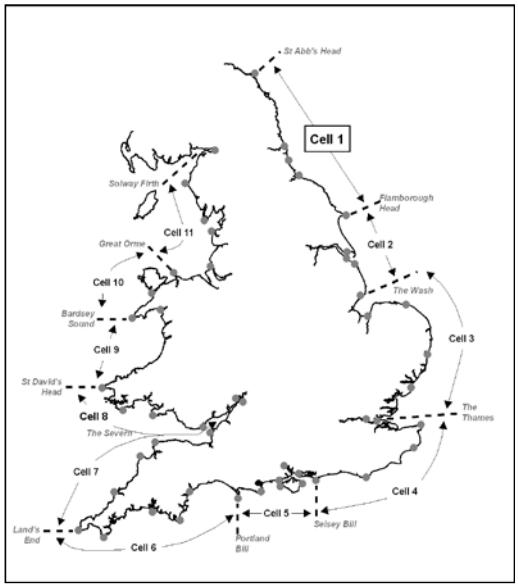


Figure 1 Sediment Cells in England and Wales

The work commenced with a three-year monitoring programme in September 2008 that was managed by Scarborough Borough Council on behalf of the North East Coastal Group. This initial phase has been followed by a five-year programme of work, which started in October 2011. The work is funded by the Environment Agency, working in partnership with the following organisations:

Northumberland County Council
North Tyneside Council
South Tyneside Council
Northumberland Coast AONB
Sunderland City Council
Durham County Council
Redcar & Cleveland Borough Council
Hartlepool Borough Council
Whitby Scarborough Filey Borough of Scarborough
A great place to live, work & play
East Riding of Yorkshire Council
Environment Agency
Natural England
The National Trust

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.

Each year, an Analytical Report is produced for each individual authority, providing a detailed analysis and interpretation of the 'Full Measures' surveys. This is followed by a brief Update Report for each individual authority, providing ongoing findings from the 'Partial Measures' surveys.

Annually, a Cell 1 Overview Report is also produced. This provides a region-wide summary of the main findings relating to trends and interactions along the entire Cell 1 frontage. 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	Sept-Dec 08	May 09	Mar-May 09		-
2	2009/10	Sept-Dec 09	Mar 10	Feb-Mar 10	July 10	-
3	2010/11	Aug-Nov 10	Feb 11	Feb-Apr 11	Aug 11	Sept 11
4	2011/12	Oct-Nov 11	Oct 12	Mar-May 12	Feb13	-
5	2012/13	Sept-Nov 12	Mar 13	Mar-April 13	June 13	
6	2013/2014	Sept-Oct 13	Feb 14	Mar-Apr 14	July 14	
7	2014/2015	Sept-Nov 14	Feb 15	Mar – Apr 15	July 15	
8	2015/2016	Sept–Dec 15	Feb 16	Mar-May 16	Jul 16	Aug 16
9	2016/2017					

(*) The present report is **Analytical Report 9** and provides an analysis of the 2016 Full Measures survey for Northumberland County Council's frontage.

In addition, separate reports are produced for other elements of the programme as and when specific components are undertaken, such as wave data collection, bathymetric and sea bed sediment data collection, aerial photography, and walk-over visual inspections.

For purposes of analysis, the Cell 1 frontage has been split into the sub-sections listed in the Table 2.

Table 2 Sub-divisions of the Cell 1 Coastline

Authority	Zone
Northumberland County Council	Spittal A
	Spittal B
	Goswick Sands
	Holy Island
	Bamburgh
	Beadnell Village
	Beadnell Bay
	Embelton Bay
	Boulmer
	Alnmouth Bay
	High Hauxley and Druridge Bay
	Lynemouth Bay
	Newbiggin Bay
	Cambois Bay
	Blyth South Beach
North Tyneside Council	Whitley Sands
	Cullercoats Bay
	Tynemouth Long Sands
	King Edward's Bay
South Tyneside Council	Littehaven Beach
	Herd Sands
	Trow Quarry (incl. Frenchman's Bay)
	Marsden Bay
Sunderland Council	Whitburn Bay
	Harbour and Docks
	Hendon to Ryhope (incl. Halliwell Banks)
Durham County Council	Featherbed Rocks
	Seaham
	Blast Beach
	Hawthorn Hive
	Blackhall Colliery
Hartlepool Borough Council	North Sands
	Headland
	Middleton
	Hartlepool Bay
Redcar & Cleveland Borough Council	Coatham Sands
	Redcar Sands
	Marske Sands
	Saltburn Sands
	Cattersty Sands (Skinningrove)
	Staithes
Scarborough Borough Council	Staithes
	Runswick Bay
	Sandsend Beach, Upgang Beach and Whitby Sands
	Robin Hood's Bay
	Scarborough North Bay
	Scarborough South Bay
	Cayton Bay
	Filey Bay

1. Introduction

1.1 Study Area

Northumberland County Council's frontage extends from the Scottish border in the north to Hartley, just south of Blyth, in the south. For the purposes of this report and for consistency with previous reporting, it has been sub-divided into 15 areas, namely:

- Sandstell Point (Spittal A)
- Spittal (Spittal B)
- Goswick Sands
- Holy Island
- Bamburgh
- Beadnell Village
- Beadnell Bay
- Embleton Bay
- Boulmer
- Alnmouth Bay
- High Hauxley and Druridge Bay
- Lynemouth Bay
- Newbiggin-by-the-Sea
- Cambois
- Blyth South Beach

1.2 Methodology

Along the Northumberland frontage, the following surveying is undertaken:

Full Measures survey annually each autumn comprising:

- Beach profile surveys along 78 transect lines (commenced 2002)
- Beach profile surveys along an additional ten transect lines (commenced 2007)
- Beach profile surveys along an additional 26 transect lines (commenced 2010)
- Topographic survey along Holy Island (commenced 2004)
- Topographic survey along Alnmouth Bay (commenced 2005)
- Topographic survey along Sandstell Point (commenced 2009)
- Topographic survey along Newbiggin Bay (commenced 2010)

Partial Measures survey annually each spring comprising:

- Beach profile surveys along 29 transect lines (commenced 2002)
- Beach profile surveys along an additional ten transect lines (commenced 2007)
- Beach profile surveys along an additional one transect line (commenced 2010)
- Beach profile surveys along an additional two transect lines (commenced 2011)
- Topographic survey along Alnmouth Bay (commenced 2005)
- Topographic survey along Sandstell Point (commenced 2009)
- Topographic survey along Newbiggin Bay (commenced 2010)

Cliff top survey (bi-annually) at:

- Cliff top survey at Lynemouth Bay (commenced 2008)
- Cliff top survey at Cambois Bay (Sandy Bay) (commenced 2008)
- Cliff top survey at Cambois Bay (Cambois) (commenced 2009)

Sand extent survey (bi-annually) at:

- Edge of sand survey at Newbiggin Bay, Spital Carrs, (commenced 2011 to determine potential adverse impact on foreshore SSSI of the Newbiggin beach recharge scheme)

For all cliff-top surveys prior to Full Measures 2011, the data was previously saved in '.kmz' format for plotting and visual comparison in GoogleEarth. This data has been visualised in GIS, which revealed the quality was variable and reliable interpretations of short-term cliff change could not be made. For the present and future surveys, the data will be plotted in GIS and change will qualified along a series of pre-defined transect lines. The resulting data on amount and rate of change is presented in tables and the survey results are compared.

The location of these surveys is shown in Figure 2. The Full Measures survey was undertaken along this frontage between 22nd August and 17th November 2016. During this time, weather conditions varied considerably; refer to the survey reports for details of the weather conditions over this survey period.

All data have been captured in a manner commensurate with the principles of the Environment Agency's *National Standard Contract and Specification for Surveying Services* and stored in a file format compatible with the software systems being used for the data analysis, namely SANDS and ArcGIS. This data collection approach and file format is comparable to that being used on other regional coastal monitoring programmes, such as in the South East and South West of England.

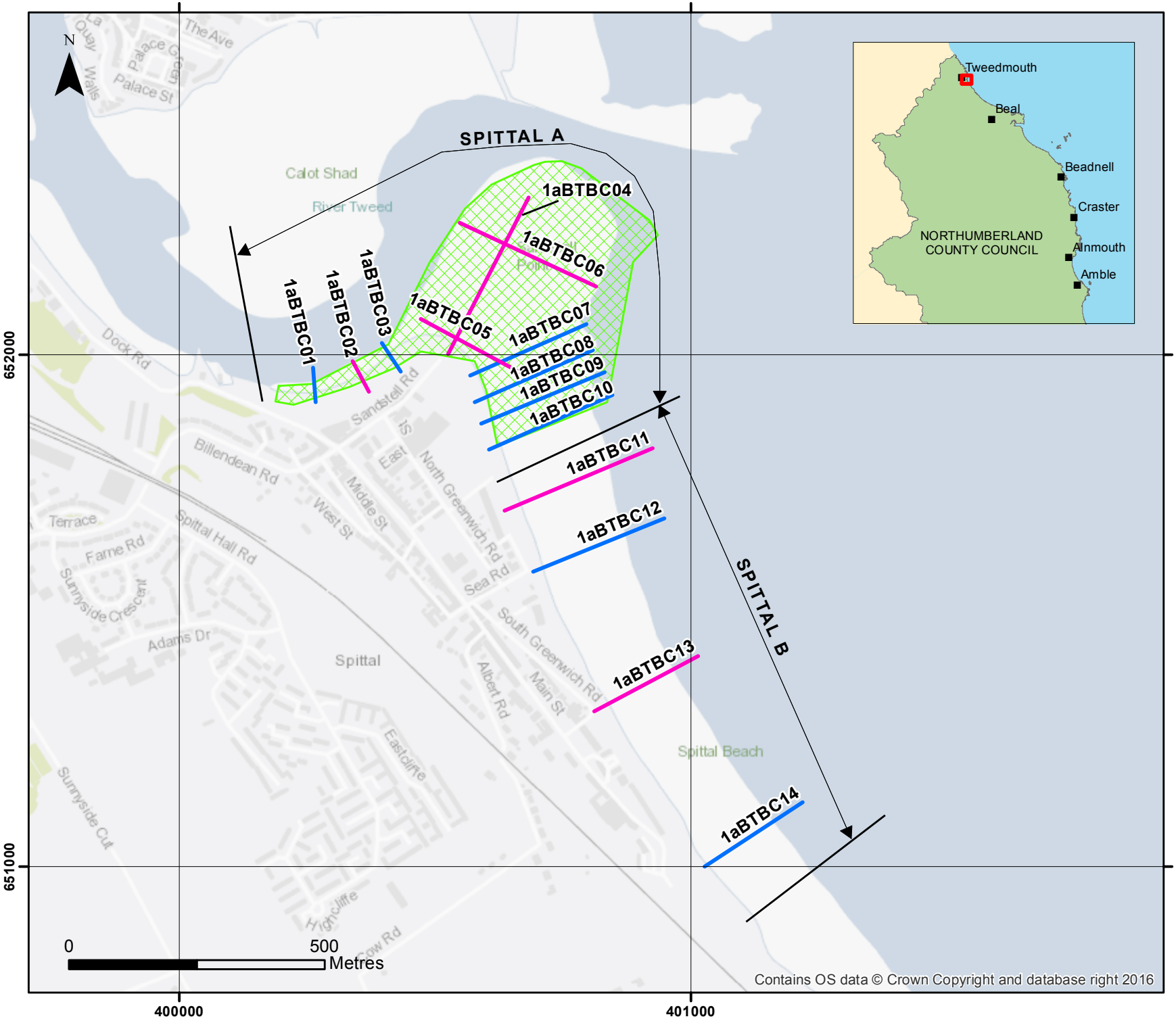
Upon receipt of the data from the survey team, they are quality assured and then uploaded onto the programme website for storage and availability to others and also input to SANDS and GIS for subsequent analysis.

The Analytical Report is then produced following a standard structure for each authority. This involves:

- 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.

1.3



Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 1

Northumberland County Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:10,000

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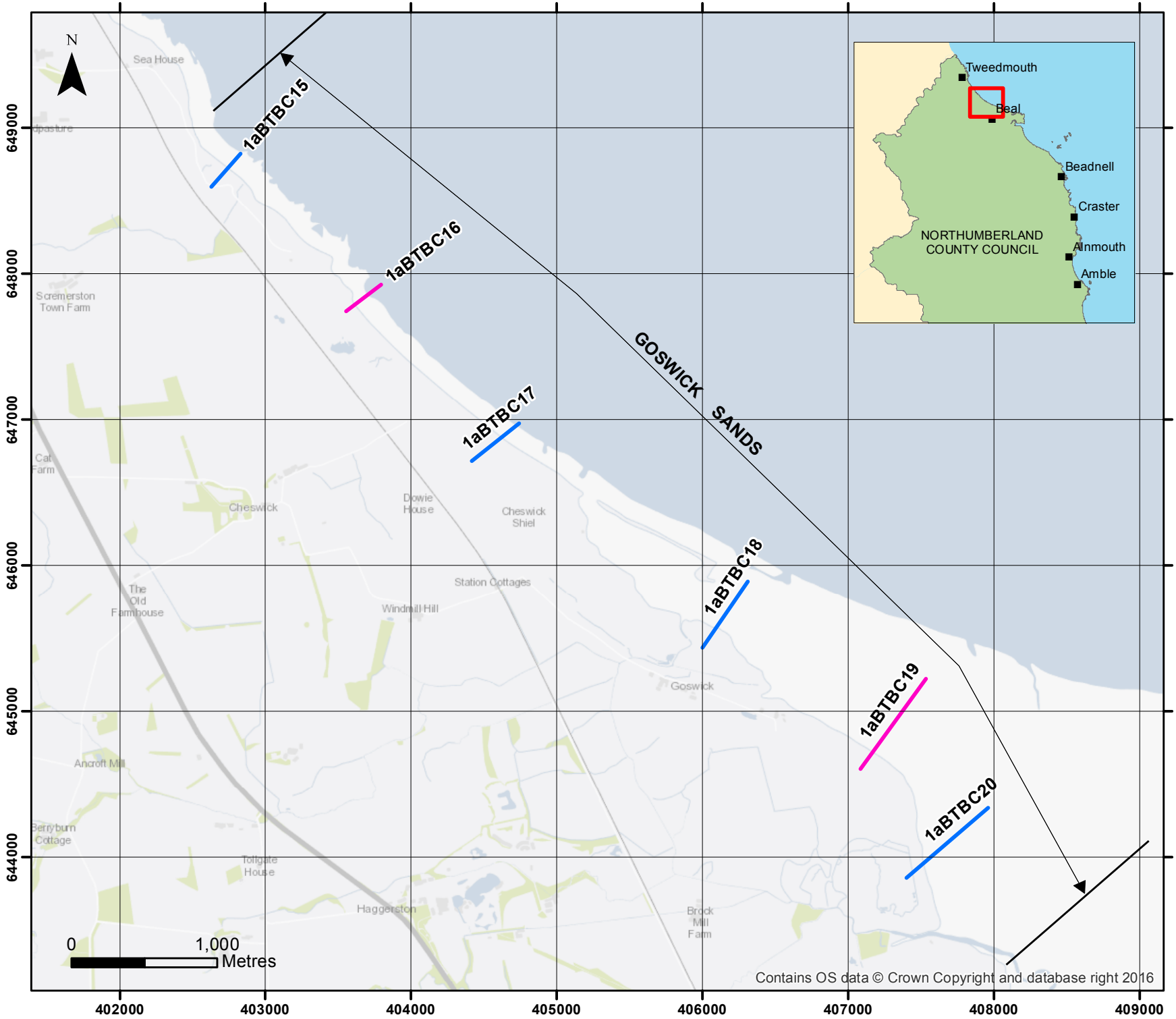

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 2

Northumberland County Council Frontage

Analytical Report
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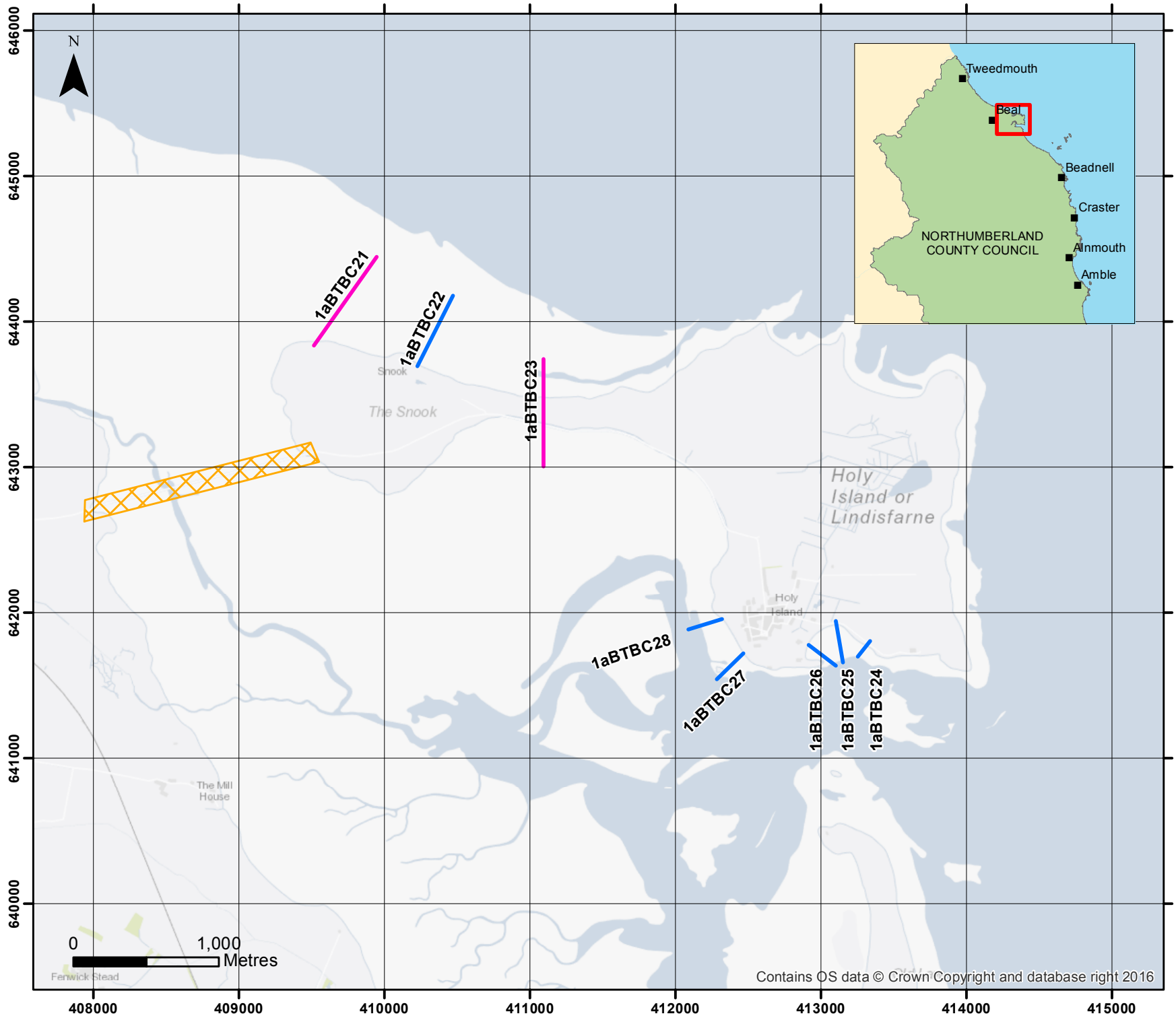

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 3

Northumberland County Council Frontage

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Topo Surveys

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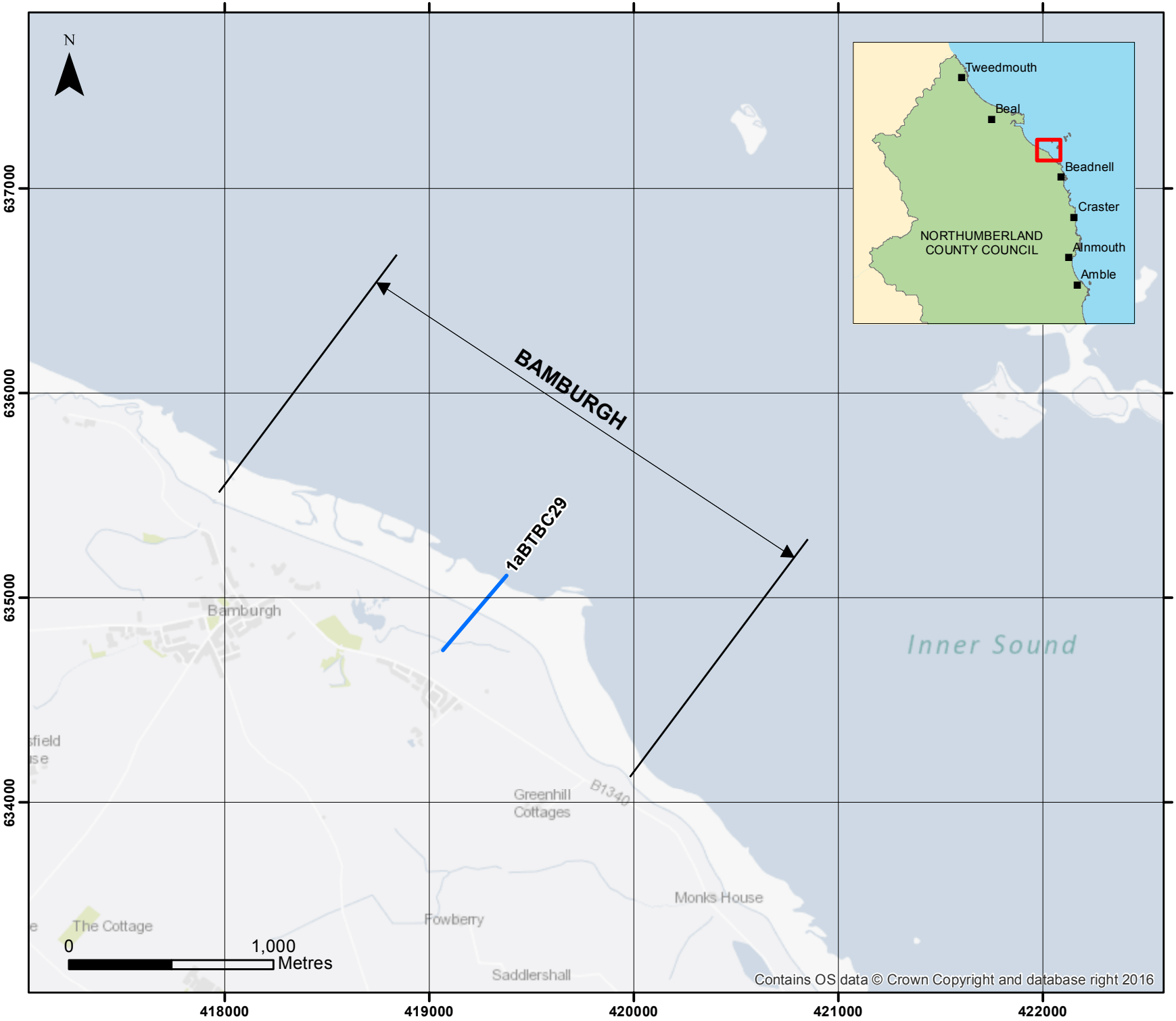

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 4

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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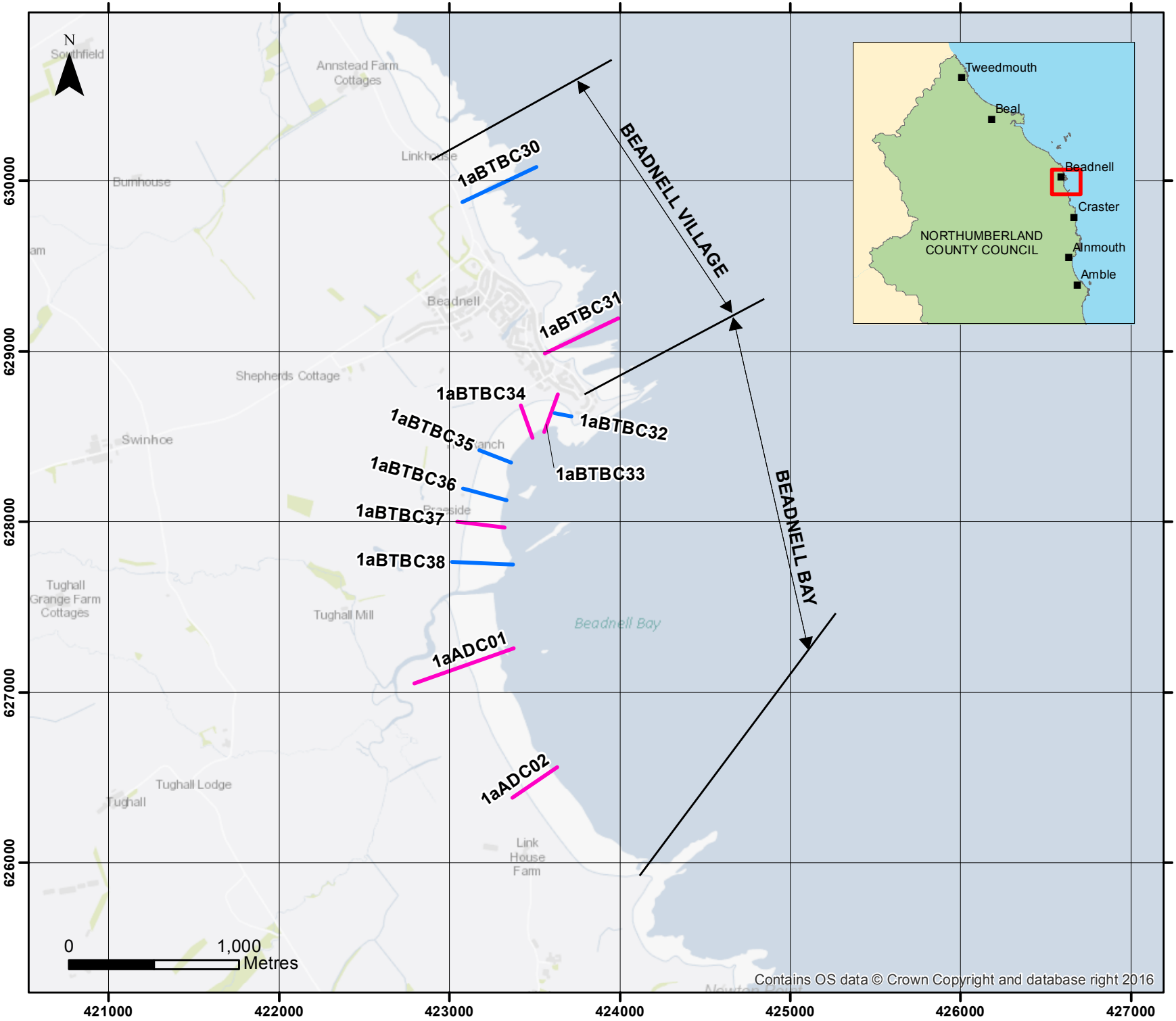

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 5

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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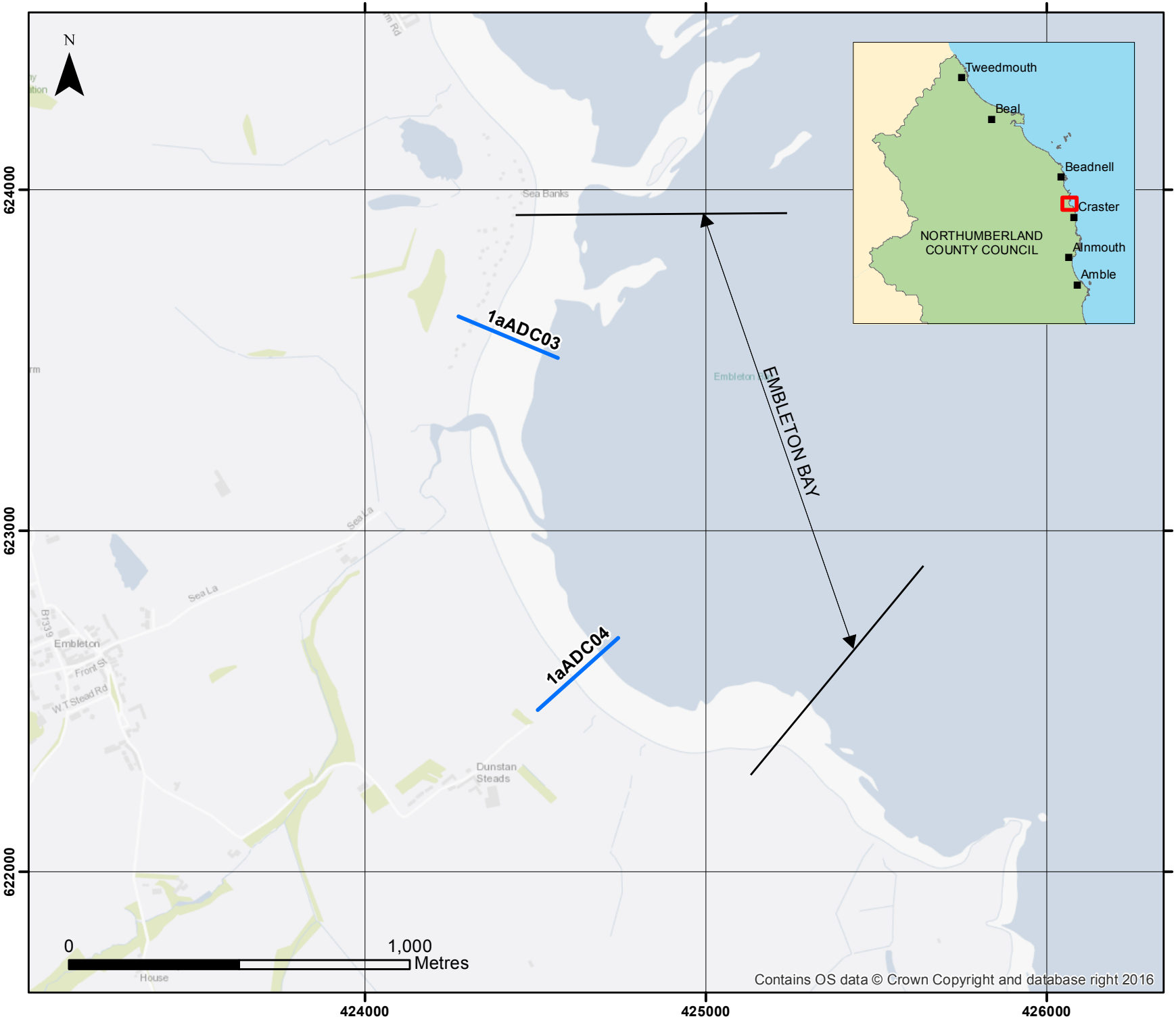

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 6

Northumberland County Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:15,000

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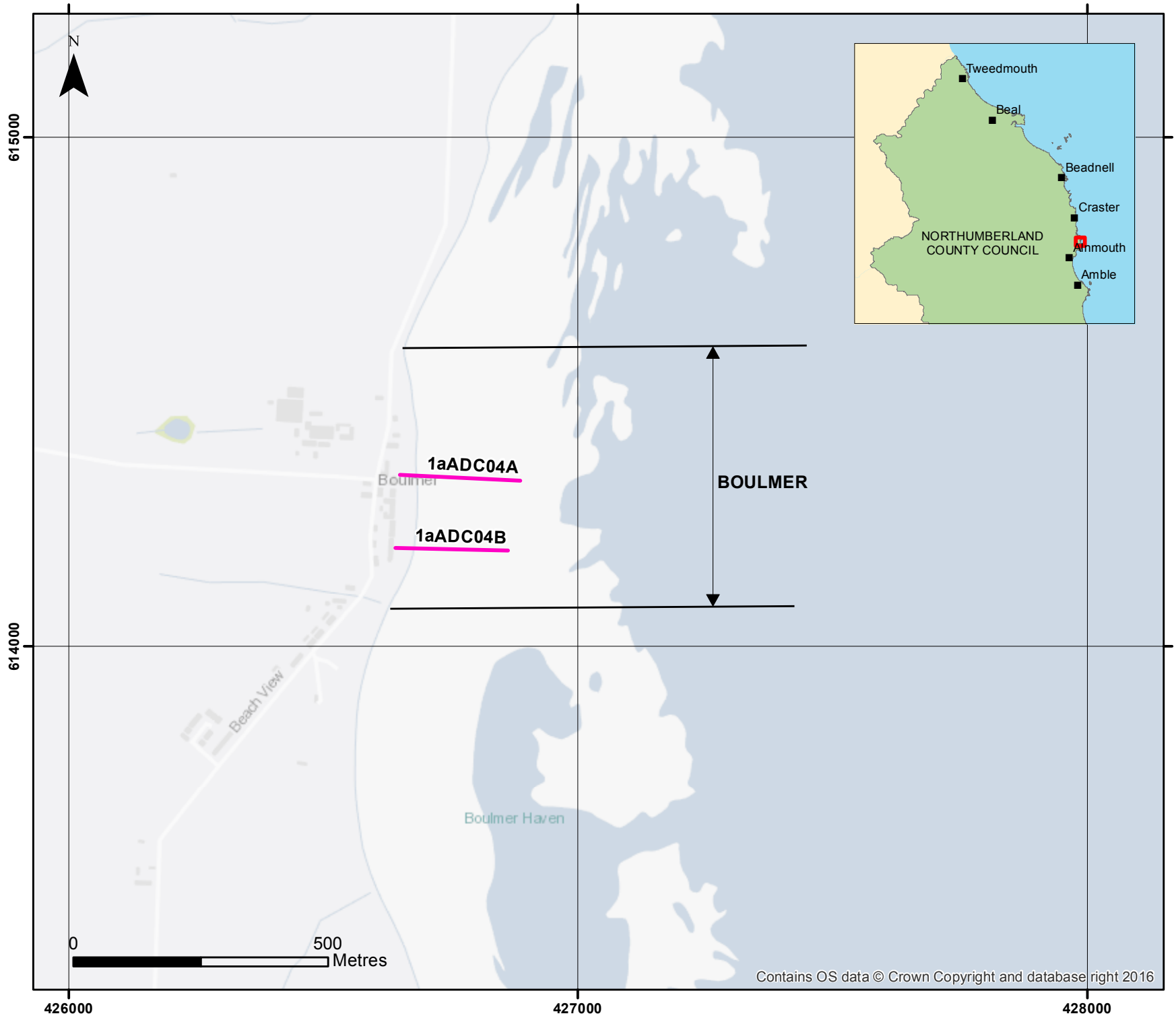

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 7

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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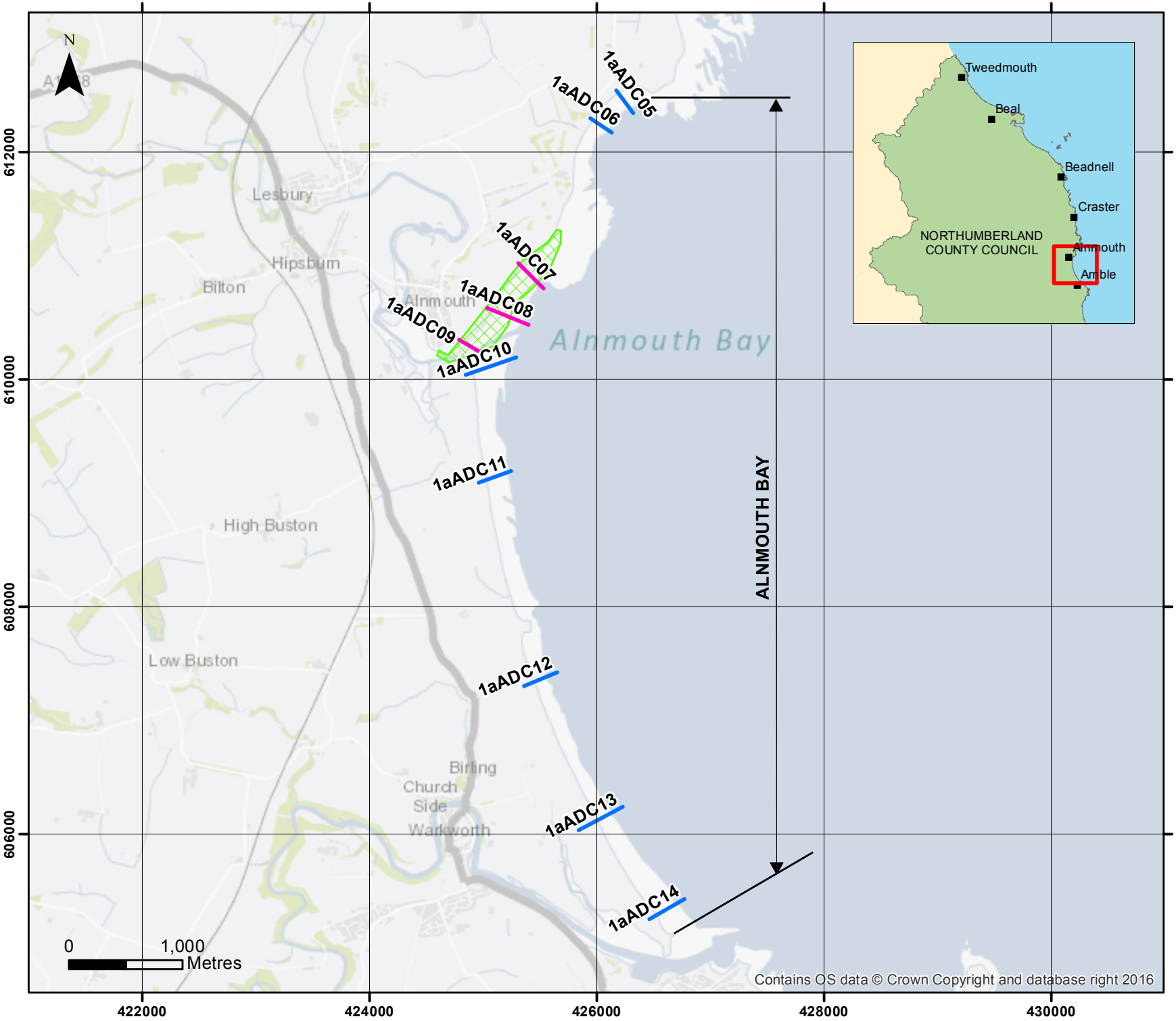

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 8

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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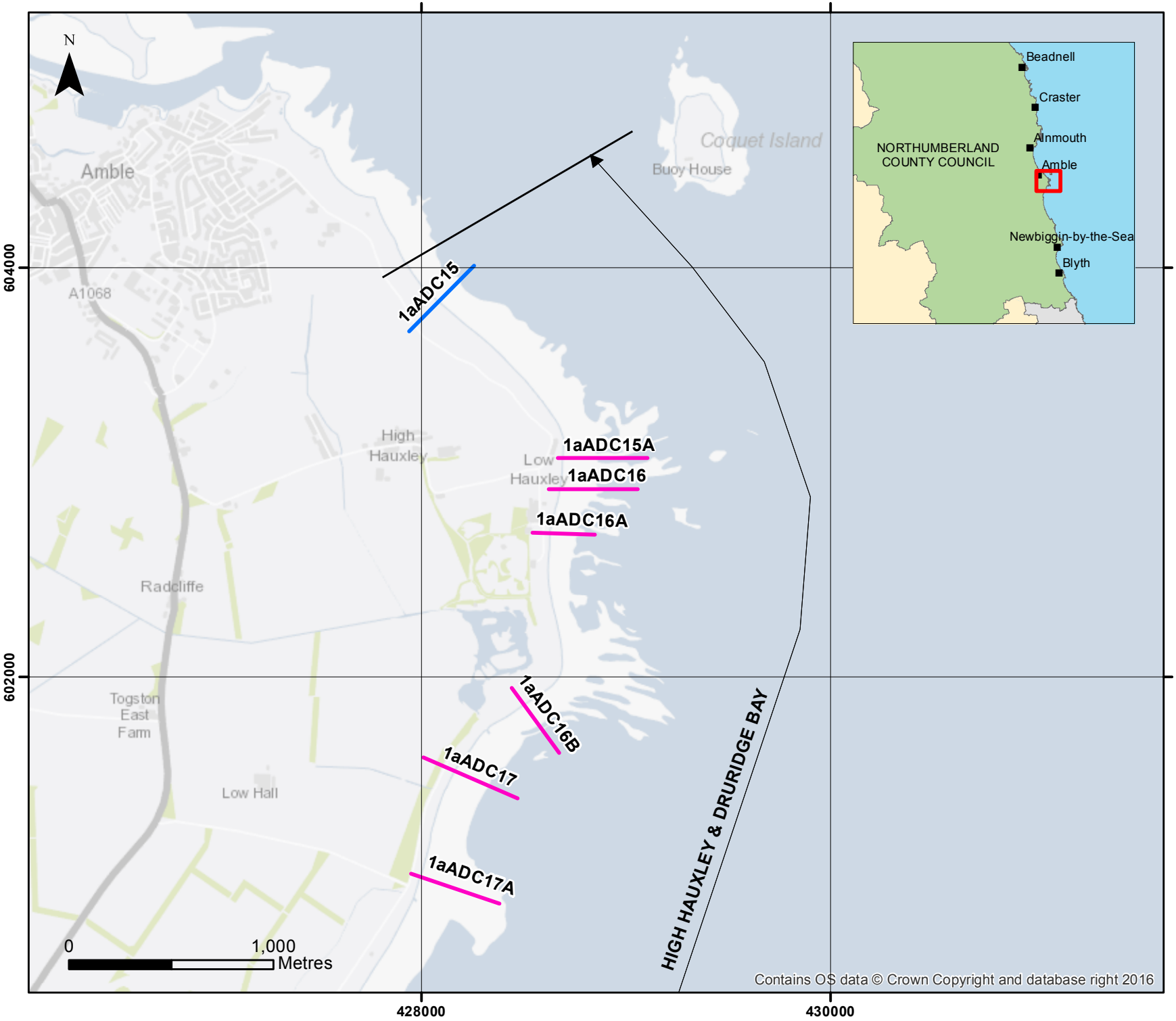

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 9

Northumberland County Council Frontage

Analytical Report
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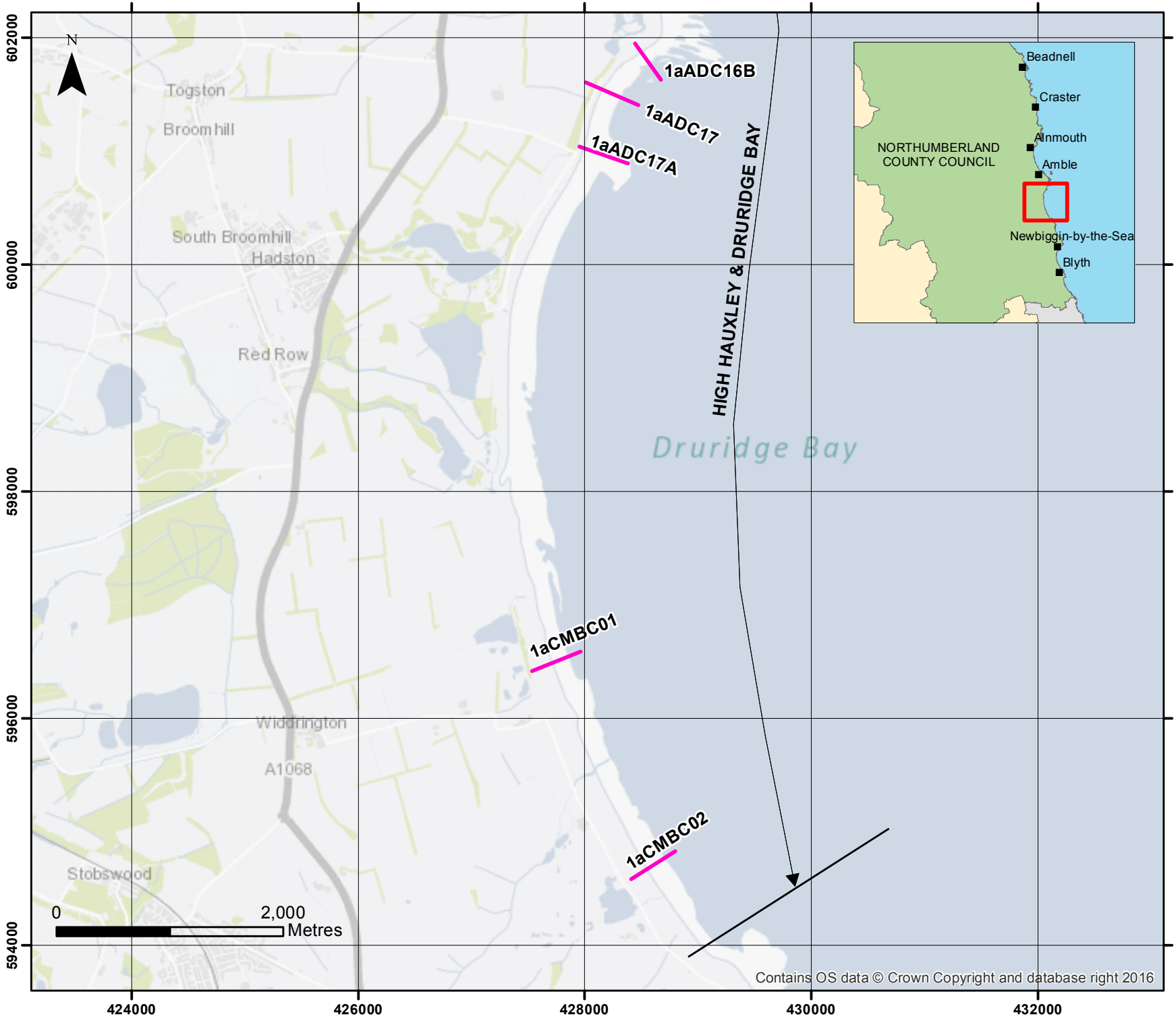

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 10

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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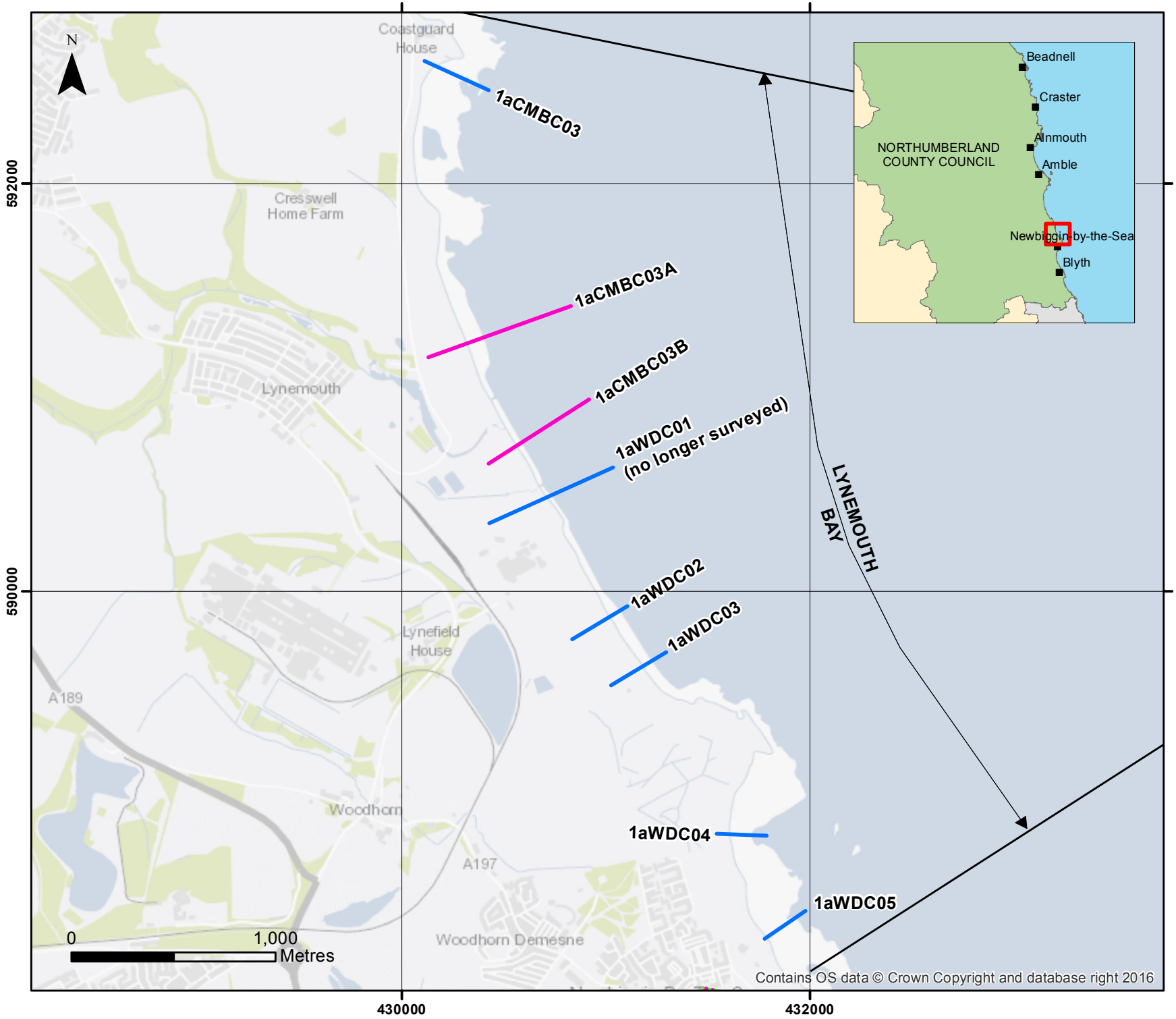

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 11

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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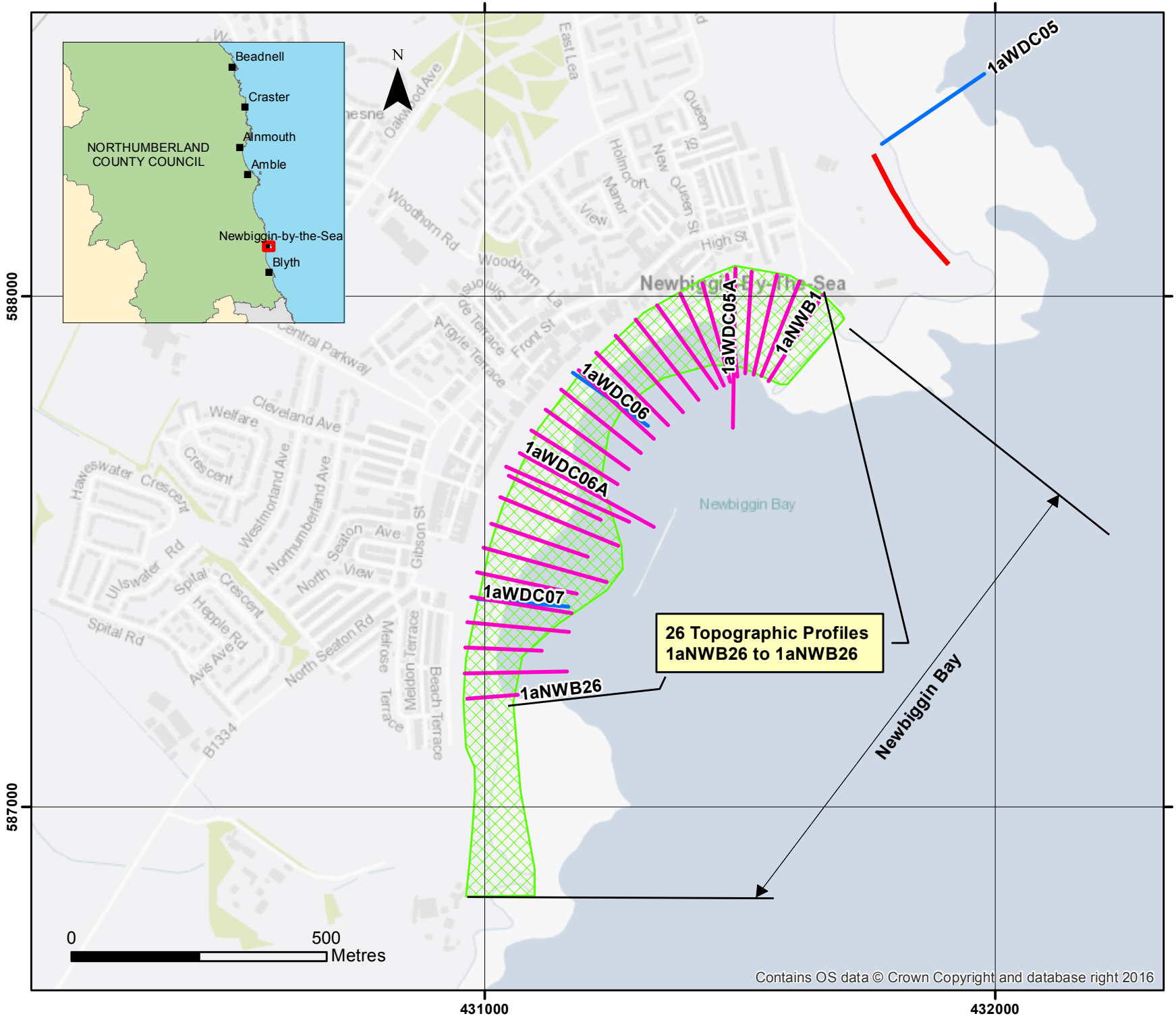

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly
- Cliff Top Edge Survey

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 12

Northumberland County Council Frontage

Analytical Report
Topo Surveys

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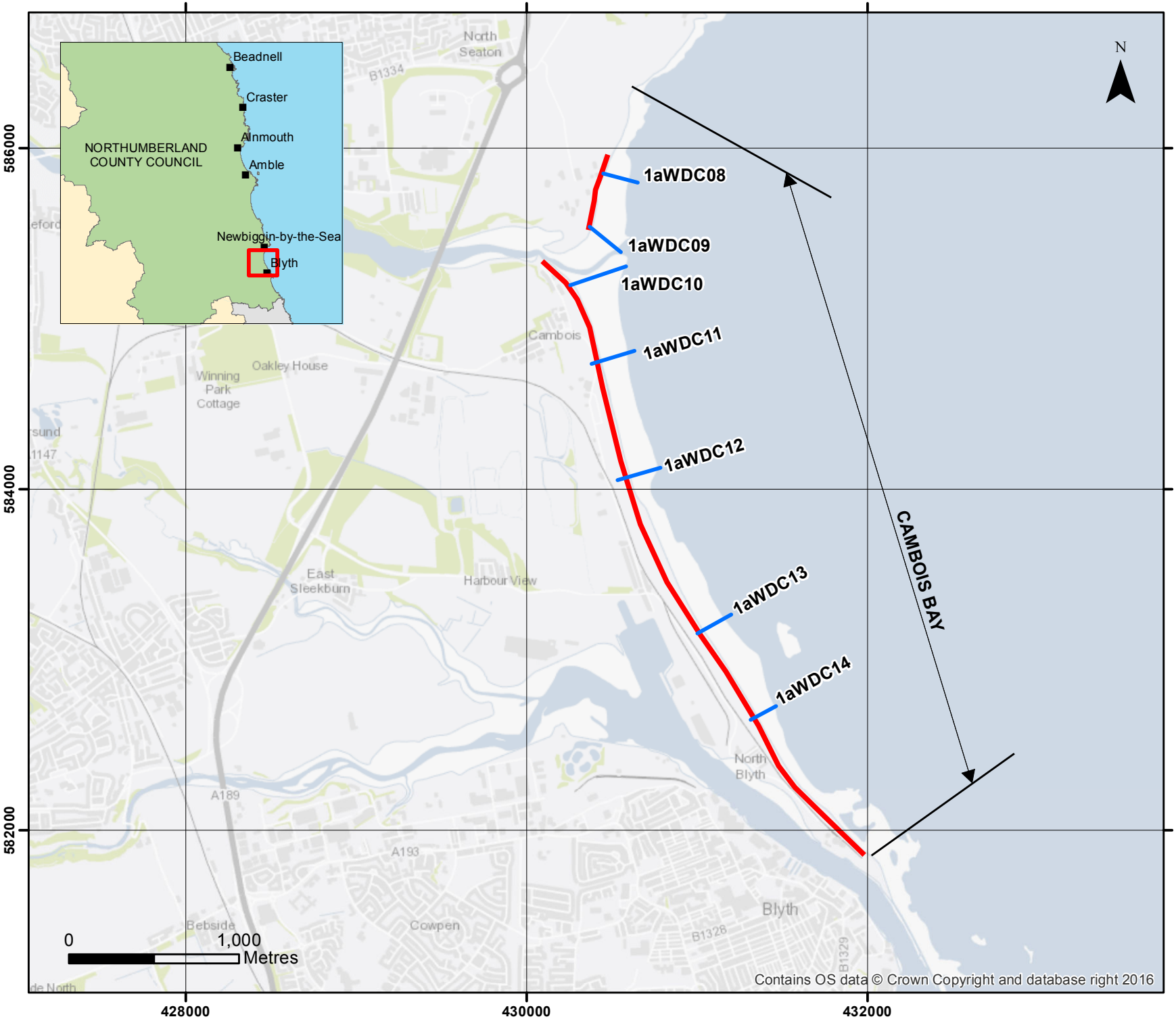

Key

SURVEY LOCATIONS

Topographic Profiles

- Annual
- Bi-Annual
- Cliff Top Edge Survey

Topographic Surveys

- 6 monthly
- yearly
- 5 yearly

(Indicative Survey Extents shown)

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 2 - Map 13

Northumberland County Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:30,000

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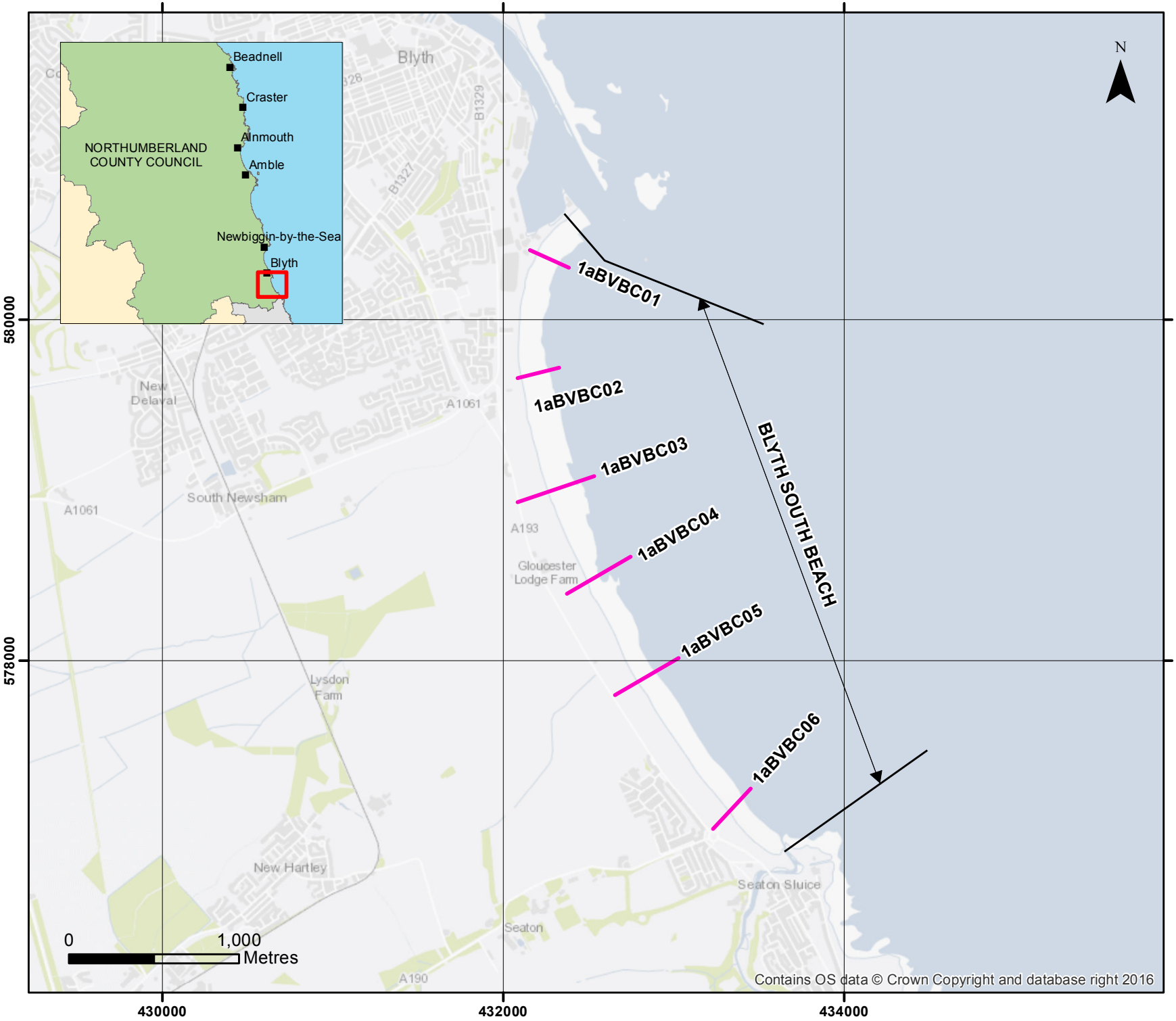

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Figure 2 - Map 14

Northumberland County Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:30,000

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2. Analysis of Survey Data

2.1 Sandstell Point (Spittal A)

Survey Date	Description of Changes Since Last Survey	Interpretation
3rd September 2016	**Beach Profiles:** Sandstell Point is covered by ten beach profile lines for the Full Measures survey (Appendix A). Profiles 1aBTBC02, 1aBTBC04, 1aBTBC05, and 1aBTBC06 were last surveyed during the Partial Measures Spring survey, 2016. Profiles 1aBTBC01, 1aBTBC03, and 1aBTBC7 to 10 were last surveyed during the Full Measures autumn survey 2015. Profiles **1aBTBC01** to **1aBTBC03** are located on the southern bank of the River Tweed in front of the dunes. At **1aBTBC01,** the dunes have remained mostly stable. Between 44m chainage and the end of the profile there has been an increase in beach elevation of up to 0.3m. Overall, the profile is at a medium level compared to the range recorded from previous surveys, except on the lower beach, which is relatively low. At profile, **1aBTBC02** there has been little change in the dunes with accretion or erosion ≤0.1m. The front edge of the dunes appears to have receded by c.1m and the beach levels at the toe of the dunes (chainage 41m to 54m) have dropped by up to 0.4m. From chainage, 54m to 73m there has been accretion of up to 0.4m forming a mid-beach berm at chainage 57m. Overall, the beach is relatively low compared to the range recorded from previous surveys particularly in the upper beach (chainage 41m to 54m) which shows the lowest recorded levels. At profile **1aBTBC03,** the seaward face of the dunes between 50m and 62m chainage has accreted by up to 0.4m since the previous survey. The beach levels have also increased significantly along the entire profile by up to 1.2m forming a steeper convex profile. Overall, the profile is the highest recorded compared to previous surveys, except between chainage 80m and 93m where it is exceeded only by the September 2010 profile. Profiles **1aBTBC04** (longitudinal section) and **1aBTBC05** and **1aBTBC06** (both cross-sections) cover the spit at Sandstell Point.	Since the last survey, the dunes on south bank of River Tweed have remained unchanged, except at profile 1aBTBC02 where the dune front has receded slightly, the beach sections of the profile generally show accretion and are at medium to low levels, except for profile 1aBTBC03 which shows its highest recorded level. There have been significant changes at the spit, with changes in the position of the berm. Rollover of sediment from the seaward side of the berm to the river side has occurred at the landward end, with the head of the spit showing accretion on both sides of the berm. There has been an increase in berm height. The pattern in the profiles along the open coast show a reversal in trend compared to the previous autumn survey, with general movement of sediment from the back of the beach with little change in the lower foreshore, suggesting movement of material offshore. **Longer term trends:** The dunes have remained stable over the past 12 years, and along the south bank of the River Tweed the seaward face of the dunes are the highest since surveys began (April 2002).

Survey Date	Description of Changes Since Last Survey	Interpretation
	At profile **1aBTBC04**, the beach profile shows significant change. The beach has dropped significantly by up to 1.4m between the toe of the rock armour (chainage 10) and chainage 160m. Between chainage 160m and 260m there has been a corresponding increase in beach levels of up to 1m with a berm forming at chainage 220m, indicating beach drawdown. Overall, the profile is at a low level compared to the range recorded from previous surveys, though at a more medium level between chainage 130m and 250m. Profiles **1aBTBC05** and **1aBTBC06** are transects across the spit, with the open sea on the left-hand side of the plot and the river channel to the right. At profile **1aBTBC05** between the start of the profile and the groyne at chainage, 65m there has been accretion of up to 0.6m. The berm has migrated towards the river, with the seawards face receding by c.60m (largest decrease in level of 1.5m). The opposite face of the berm has moved riverwards by 20m-50m. The crest of the berm has increased in level by 0.5m. Overall, the berm crest is relatively high and riverwards compared to the range recorded from previous surveys. At profile **1aBTBC06**, there has been an increase in levels across the profile, with growth on both sides of the berm. The seawards face of the berm has increased by c.0.5m with the formation of a secondary berm at the seawards edge (chainage -60m) 2.3m above the level recorded on the previous survey. The main berm crest at chainage 120m has increased in level by 1.4m and has remained in the same location. The runnel recorded in the autumn 2015 survey has returned at chainage 140m. The river face of the berm has increased by up to 1m. Overall the berm is at a high level compared to the range recorded by previous surveys and in a relatively seawards position. Profiles **1aBTBC07** to **1aBTBC10** are located along the open coast, at the intersection of the southern side of the spit at Sandstell Point and northern end of Spittal Beach. At profile **1aBTBC07**, between the rock revetment and 70m chainage beach levels have dropped by up to 2m. Between 70m and 130m chainage, the level of the beach has increased by up to 0.4m. From chainage 130m to the end of the profile the berm which developed on the autumn 2015 survey remains with very little change in levels (erosion of <0.2m). Overall, the upper beach is at a relatively low level compared to the range recorded on previous surveys whilst the lower beach is relatively high. . At profile **1aBTBC08**, a similar pattern is observed with an drop in beach levels of up to 1.4m between 30m (toe of the rock revetment) and 70m chainage, a small (<0.4m) increase in beach levels between	Changes in beach levels are generally within the bounds of previous surveys.

Survey Date	Description of Changes Since Last Survey	Interpretation
	70m and 110m chainage and very little change (erosion of <0.2m) seaward from there to the end of the profile. Overall, the upper beach is at a relatively low level compared to the range recorded on previous surveys whilst the lower beach is relatively high. Profile **1aBTBC09** again shows a similar pattern, with a drop in beach levels of up to 1.2m in front of the rock revetment as far as 60m chainage, a small increase in beach level (<0.4m) between 60m and 110m chainage and very little change (erosion of <0.2m) seaward from there to the end of the profile. Overall, the upper beach is at a relatively low level compared to the range recorded on previous surveys whilst the lower beach is relatively high. Profile **1aBTBC10** again shows a similar pattern, with a drop in beach levels of up to 1.2m in front of the rock revetment as far as 60m chainage, a very small increase in beach level (<0.1m) between 60m and 90m chainage and very little change (erosion of <0.2m) seaward from there to the end of the profile. Overall, the upper beach is at a relatively low level compared to the range recorded on previous surveys whilst the lower beach is relatively high.	
30th October 2016	**Topographic Survey:** Due to the significant changes that have been observed from the beach profiles along the spit at Sandstell Point, and the three dimensional nature of these changes, a topographic survey was introduced to the monitoring programme in November 2011. The previous survey was undertaken for the Partial Measures survey in spring 2016. Data from the most recent topographic survey (Full Measures, autumn 2016) have been used to create a digital ground model (DGM) (Appendix B – Map 1) using a Geographical Information System (GIS). A difference plot has also been produced using the DGM (Appendix B – Map 5) produced from the last topographic survey and the present survey. The difference plot shows a general movement of sediment from the seaward parts of the spit to the riverward edge. The accretion continues up the river frontage. However, there is a large area of accretion on the seawards side of the spit roughly halfway along its length. Along the open sea frontage to the south of the spit, the pattern is linear with alternating bands of erosion and accretion. Erosion dominates at the toe of the rock revetment and lower beach, with accretion in the middle beach and the nearshore area.	Together the changes shown in the topographic survey comparison indicate a redistribution of sediment across the spit over summer, resulting in a repositioning of the berm crest further towards the river mouth.

2.2 Spittal (Spittal B)

Survey Date	Description of Changes Since Last Survey	Interpretation
3rd September 2016	**Beach Profiles:** Spittal B is covered by four beach profile lines for the Full Measures survey (Appendix A). Profiles 1aBTBC11 and 1aBTBC13 were last surveyed during the Partial Measures spring survey, 2016. Profiles 1aBTBC12 and 1aBTBC14 were last surveyed during the Full Measures autumn survey 2015. Profile **1aBTBC11** is located to the north of Spittal Beach. Since the last survey, there has been smoothing out of the profile. The upper beach shows a drop of 1.2m at the toe of the seawall, with some small areas of accretion of up to 0.2m at chainage 10m and 25m. The upper beach between chainage 30m and 55m shows erosion of up to 0.4m. The dip in the previous profile between chainage 55m and 90m has been infilled by up to 0.4m. From chainage 90m to the end of the profile, the beach levels have dropped by 0.2m. Overall, the profile is at a medium level compared to the range recorded from previous surveys. Profile **1aBTBC12** shows a drop in levels of 0.8m at the toe of the seawall, with accretion of up to 0.8m across the upper beach between chainage 8m and 42m. Seawards of here to the end of the profile the beach levels have dropped by up to 0.4m. Overall, the profile is at a medium-high level compared with the range recorded from previous surveys. Profile **1aBTBC13** shows a drop in levels of 0.6m at the toe of the seawall, with accretion of up to 0.8m across the upper beach between chainage 5m and 55m. Seawards of here to chainage 140m the beach levels have dropped by up to 0.3m, with the end of the profile showing accretion of <0.2m. the profile has smoothed out compared to the previous survey, removing the berm at chainage 60m. Overall, the profile is at a medium-high level compared with the range recorded from previous surveys. At profile **1aBTBC14**, there has generally been accretion across the whole profile, with the exception of a small area of erosion between chainage 30m and 40m where levels have dropped by <0.2m exposing a small area of rock. The upper beach has accreted by up to 1.2m, with the largest increase at start of profile decreasing to chainage 30m. The lower beach shows increasing amounts of accretion rom chainage 40m of up to 1.2m at the seawards end of the profile, covering up the previously exposed rocky platform. Overall, the profile is at a high-medium level compared to the range recorded from previous surveys; from chainage 80m seawards the profile is the highest recorded.	Since the last survey, beach levels along Spittal have fluctuated, generally showing a drop immediately at the toe of the seawall with an increase in the upper beach and corresponding fall in the lower beach. Overall, all the profiles show the beach is at a relatively medium-high level compared to previous surveys. **Longer term trends:** At all profile locations along Spittal Beach, the changes observed from the present survey are within the bounds of previous surveys, with the exception of the lowest part of the foreshore in profile 1aBTBC14 where levels are now at their highest having been at their lowest in the previous survey.

2.3 Goswick Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
17th November 2016	**Beach Profiles:** Goswick Sands are covered by six beach profile lines for the Full Measures survey (Appendix A. Profiles 1aBTBC16 and 1aBTBC19 were last surveyed during the partial measures spring survey, 2016. Profiles 1aBTBC15, 1aBTBC17 to 1aBTBC18, and 1aBTBC20 were last surveyed during the full measures autumn survey, 2015. The profiles along this frontage extend from **1aBTBC15** to **1aBTBC20** in a north to south direction. The seaward face of the dunes along the length of Goswick Sands has not changed form or position since the last survey (Partial Measures, spring 2015), with the exception of profile 1aBTBC16 where the dunes have moved seaward by c.10m. At profile **1aBTBC15** there has been accretion of ≤0.2m indicating very minimal change along most of the profile. On the lower foreshore from chainage, 240m a berm has formed with accretion of up to 0.4m. Overall, the profile is at a high level compared to the range recorded from previous surveys, with the section from chainage 130m seawards being the highest recorded. At profile **1aBTBC16,** the dunes have moved seawards by c.10m, though there is no change in height. The beach has accreted by up to 0.8m across its full length, with the formation of a berm on the lower foreshore. Comparing the profile to the range recorded from previous surveys shows that the dunes are at their most seawards position, whilst the beach is at a relatively high level. At profile **1aBTBC17,** the small berm at the toe of the dunes has disappeared. The upper beach shows little change with accretion of <0.2m to chainage 270m. Between 270m and 330m there has been a drop in beach levels of up to 0.6m. From 330m chainage seawards there has been little change with areas of both erosion and accretion of <0.2m. The overall effect is a smoother more concave profile. Overall the profile is at a relatively high level compared to the range recorded from previous surveys, with the upper beach (chainage 230m to 250m) and lower beach (390m to 430m) being the highest on record.. At profile **1aBTBC18** beach levels have changed very little as far as 430m chainage, with the two small island dunes grow in in height by 0.2m-0.4m. The crest of the barrier feature shown on the previous	Beach level change has varied along the length of Goswick Sands since the last survey. Greater movement appears to have occurred in the north of the area, although these appear to be redistributions of sediment across the profile. At the southern end of Goswick Sands, the beach has remained stable with no discernible change to the profile form or position. One notable exception is the movement of the barrier feature visible in the seaward end of profile 1aBTBC18 **Longer term trends:** The majority of change is a continuation of seasonal behaviour. In the previous analytical report, the formation of a new vegetated mound at profile 1aBTBC18 was identified, which still remains. The notable barrier feature developed further seaward in this profile in autumn 2015 had not attained its current height since 2003. Subsequent surveys show a gradual reduction in the feature's height and ongoing landward migration, a pattern which this survey shows repeating

Survey Date	Description of Changes Since Last Survey	Interpretation
	survey at chainage 550m has moved landwards by c.60m and dropped in height by 0.5m. At profile **1aBTBC19** beach levels have increased across the length of the profile by <0.1m with no change to the profile form and could therefore be the result of error within the survey methods. Overall, the beach is at a relatively high level compared to the range recorded from previous surveys. At **1aBTBC20,** the beach has generally remained stable since the last survey, with accretion of 0.1m or less. The crest of the dune and the berm halfway down the front face of the dune has also increased in level by 0.1m. Overall, the beach is at the highest recorded level across most of its length.	

2.4 Holy Island

Survey Date	Description of Changes Since Last Survey	Interpretation
17th September 2016	**Beach Profiles:** Holy Island is covered by eight beach profile lines for the Full Measures surveys (Appendix A). Profiles 1aBTBC21 and 1aBTBC23 were last surveyed during the Partial Measures spring survey, 2016. Profiles 1aBTBC22, 1aBTBC24 to 1aBTBC28 were last surveyed during the Full Measures autumn survey, 2015. **1aBTBC21** to **1aBTBC23** are located on the northwest side of the island, along The Snook. **1aBTBC24** to **1aBTBC28** are located on the south side of the island in the vicinity of the castle and priory. **1aBTBC27** extends out to and across the small island upon which the remains of a chapel stand. At all profiles on the north side of the island, the dunes have not changed in form or position since the last survey. On the whole, beach levels have also remained largely the same since the last survey with only minor increases/decreases in beach level observed (<0.1m). On the south of the island, profiles show very little change since the previous survey, with only minor increases/decreases in beach level observed (<0.1m).	The dunes, sandy foreshore and sand flats around The Snook on Holy Island have remained stable in both form and position since the last survey. On the south side of the island, the backshore and beach have remained stable since the last survey. **Longer term trends:** Generally, the trends observed in the present survey are a continuation of those observed in the past, with the dunes and beach retaining the same form and position. The exception to this is at profile 1aBTBC21, where the dune front and toe have advanced by c.20m through the accumulation of nearly 2m of sand since 2002, and 1aBTBC22 and 1aBTBC23, where the advance of the dune toe is similar but less pronounced.
4th November 2016	**Topographic Survey:** Holy Island causeway and the adjacent sand flats are covered by an annual topographic survey, which commenced in October 2004. The purpose of this survey was to determine whether raising the level of the causeway had any adverse impacts on the adjacent sand flats. Data from the most recent topographic survey (Full Measures, autumn 2016) have been used to create a DGM (Appendix B – Map 2) using a Geographical Information System (GIS). A difference plot has also been produced using the DGM (Appendix B – Map 6) produced from the last produced topographic survey (Full Measures, autumn 2015) and the present survey. The difference plot shows overall stability with pockets of elevation change in the order of +/-0.5m. The western end of the survey (between mainland and South Low channel) tends to show pockets of erosion, whilst the centre of the survey (to east of South Low channel) shows pockets of erosion.	The topographic survey shows that the causeway has remained stable since the last survey.

2.6 Bamburgh

Survey Date	Description of Changes Since Last Survey	Interpretation
1st October 2016	**Beach Profiles:** Bamburgh is covered by one beach profile line for the Full Measures survey (Appendix A). Profile 1aBTBC29 was last surveyed during the Full Measures autumn survey, 2015. Profile **1aBTBC29** is located approximately 750m south-east of the castle. There have been no changes to the dunes. There has been erosion across the upper beach (chainage 370m to 440m) of up to 0.6m, with the formation of a berm at chainage 445m. From 440m seawards there has been limited change of <0.1m. Beyond the limits of the previous survey, at chainage 545m there has been formation of another berm. Overall, the profile is at a medium-low level compared to the range recorded from previous surveys.	The dunes at Bamburgh have remained stable, and the beach shows drawdown of material forming a series of berms. **Longer term trends:** The 2016 profile shows that the seaward face of the dune is still near its most eroded position since 2004. The beach is at a low-medium level compared to earlier surveys.

2.7 Beadnell Village

Survey Date	Description of Changes Since Last Survey	Interpretation
18th September 2016	**Beach Profiles:** Beadnell Village is covered by two beach profile lines for the Full Measures survey (Appendix A). Profiles 1aBTBC31 was last surveyed during the Partial Measures spring survey, 2016. Profile 1aBTBC30 was last surveyed during the Full Measures autumn survey, 2015. **1aBTBC30** is around 300m to the north of the village. The dune has remained stable since the last survey. The small berm, which developed on the previous survey at HAT level, has increased in height by 0.2m. There has been little change along most of the beach profile, with erosion limited to <0.2m. From chainage, 180m a berm has developed on the lower beach, increasing beach levels by 0.2m. Overall, the profile is at a relatively low level compared to the range recorded from previous surveys, apart from the upper beach berm at chainage 55m, which is relatively high. **1aBTBC31** is in Nacker Hole and extends across the promenade and seawall. Since the last survey, there has been very little change in beach levels, restricted to <0.1m change. Overall, the profile is at a medium level compared to the range recorded from previous surveys.	The dunes and beach to the south of Beadnell Village have generally remained stable, although there is evidence for a small amount of sediment having been moved across the beach at profile 1aBTBC30 since the last survey. **Longer term trends:** The changes observed since the last survey are within the bounds of previous surveys albeit at relatively low levels

2.8 Beadnell Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
18th September 2016	**Beach Profiles:** Beadnell Bay is covered by nine beach profile lines for the Full Measures survey (Appendix A). Profiles 1aBTBC33 to 1aBTBC34, 1aBTBC37 and 1aADC01 to 1aDC02 were last surveyed during the Partial Measures spring survey, 2016. Profiles 1aBTBC32, 1aBTBC35 to 1aBTBC36 and 1aBTBC38 were last surveyed during the Full Measures autumn survey, 2015. **1aBTBC32** to **1aBTBC34** are located at the northern end of Beadnell Bay, in Beadnell Harbour. At profile **1aBTBC32**, the dune ridge has generally remained stable since the last survey. The dune toe and upper beach between HAT and chainage 40m have eroded by up to 0.2m since the last survey. Between 40m and 55m chainage there has been accretion of <0.2m, forming a small berm. Seaward of this point, beach levels have changed very little, <0.1m. Overall, the profile is at a low-medium level compared with the range recorded from previous surveys. At profile **1aBTBC33**, the back of the dunes has remained stable since the last survey. The survey report notes '*middle of dunes missing due to dense vegetation*', as it did in the previous survey, so the profile for the dune face has not been analysed any further. Between chainage 60m and 85m the beach level has dropped by up to 0.3m, with the formation of a corresponding berm between chainage 85m and 110m. Seawards of this point there has been very little change, <0.1m. Overall, the profile is at a medium-low level compared with the range recorded from previous surveys, except in the vicinity of the berm, which is relatively high. At profile **1aBTBC34**, the dune has remained stable since the previous survey. Across the beach profile there has generally been accretion of up to 0.3m. At the seawards end of the profile from chainage 160m the change is very small <0.1m of erosion. Overall, the profile is at a medium-high level compared with the range recorded from previous surveys, with the section between chainage 50m and 80m being the highest on record. **1aBTBC35** to **1aBTBC38** are located between Burn Carrs and the outfall of Brunton Burn/Long Nanny. The dunes along this northern section of coast have remained stable since the last survey. At profile **1aBTBC35**, there has been alternating areas of accretion and erosion of up to 0.3m creating	Along the length of Beadnell Bay, the dunes have remained stable; however, the dune face and dune toe has been subject to slight erosion in some locations and accretion in others. Beach levels generally remained stable throughout the bay with minor fluctuations indicating cross shore movement of sediment. In the north of the bay, there has generally been erosion on the lower beach but in the south, the lower beach has accreted. Beach levels are relatively high in the south decreasing to be more low-medium at the north of the bay. **Longer term trends:** Along the length of Beadnell Bay, the majority of the dune and beach form are similar to those observed in the past and the profile form and position is within the bounds of previous surveys. Exceptions include areas of accretion in profiles 1aBTBC34, 1aBTBC35, 1aBTBC37, and 1aADC01, which are the highest levels on record.

Survey Date	Description of Changes Since Last Survey	Interpretation
	a more undulating profile. There has been accretion between chainage 2m and 30m, 55m and 105m, and 155m and 205m. There has been erosion between 30m and 55m, 105m and 140m, and seawards from 205m. Overall, the profile is at a medium-high level compared with the range recorded from previous surveys, with the areas of accretion giving the highest levels on record, and the areas of erosion tending to be relatively low. At profile **1aBTBC36**, the profile has remained stable with alternating areas of accretion and erosion of <0.2m creating a more undulating profile. The berm at HAT on the previous survey has gone. Overall, the profile is at a medium-high level compared with the range recorded from previous surveys. At profile **1aBTBC37**, the dunes have remained stable since the last survey with very limited accretion of the seaward dune face. There has been accretion of up to 0.4m at the toe of the dune, with accretion also occurring between chainage 90m and 140m. Between chainage 45m and 90m and seawards of chainage 140m there has been either indiscernible change or erosion of up to 0.4m. Overall the profile is at a high-medium level compared with the range recorded from previous surveys, with the mid beach (chainage 80m to 190m) showing the highest levels on record. At profile **1aBTBC38**, there has been accretion from the dune toe to chainage 100m of up to 0.4m, creating a berm at chainage 70m. Between chainage 100m and 190m there has been erosion of up to 0.6m suggesting material has moved up the beach. From chainage 190m to 320m there has been accretion of up to 0.3m and the end of the profile shows erosion of up to 0.3m. Overall, the profile is at a high-medium level compared with the range recorded from previous surveys, except in the areas of erosion which are relatively low. **1aADC01** and **1aADC02** are located south of the outfall of Brunton Burn/Long Nanny. The dunes (other than at their toe) have not changed form or position. At profile **1aADC01**, there has been small amount of accretion on the lower dune face of up to 0.2m. Between chainage 280m to 310m there has been erosion of up to 0.4m with the corresponding formation of a berm 0.2m high between 310m and 340m. Between chainage 340m and 470m there has been little change <0.1m of either erosion or accretion. Seawards of 470m chainage the toe of the beach has accreted by up to 0.4m. Overall, the profile is at a high-medium level compared with the range recorded from previous surveys, particularly between 340 m and 420m which has the highest recorded levels.	

Survey Date	Description of Changes Since Last Survey	Interpretation
	At profile **1aADC02**, there has been up to 0.5m (but more generally 0.2m) of accretion from the dune toe to chainage 100m. From chainage 100m to 215m there has been indiscernible change in beach levels. Seawards of here there has been accretion of up to 0.2m. Overall, the profile is at a medium level compared with the range recorded from previous surveys.	

2.9 Embleton Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
1st October 2016	**Beach Profiles:** Embleton Bay is covered by two beach profile lines for the Full Measures survey (Appendix A). Profiles 1aADC03 and 1aADC04 were last surveyed during the Full Measures autumn survey, 2015. **1aADC03** is located towards the north of the bay, north of Embleton Burn mouth. **1aADC04** is located towards the south of the bay. At profile **1aADC03,** the dunes have remained stable. There has been accretion of up to 0.7m between the dune toe at 65m chainage and the middle foreshore at 100m chainage, forming a berm at chainage 90m. Between chainage 100m and 130m there has been erosion of up to 0.6m. Seawards of chainage 130m there has been minor accretion of <0.2m. This has resulted in a more undulating profile with a steeper upper beach. Overall, the profile is at a medium-high level compared with the range recorded from previous surveys, except in the area of erosion where the levels are the lowest on record. At profile **1aADC04**, the dune has remained stable since the previous survey. There has been accretion at the toe of the dune of up to 0.7m infilling the depression from the previous survey. Between chainage 175m and 220m there has been erosion of up to 0.6m exposing rock at chainage 185m. Between 220m and 280m there has been indiscernible change of <0.1m. Seaward of 280m the toe of the beach shows small amount of accretion <0.2m. Overall, the profile is at a medium level compared with the range recorded from previous surveys, except in the area of erosion where the levels are the lowest on record.	The dunes at Embleton Bay are generally stable, with small amount of accretion on the lower dune face. The upper beach levels have generally increased whilst the mid-beach shows erosion, possibly as a result of sediment being redistributed across the shoreline. **Longer term trends:** The dunes have remained stable over the longer term and beach levels are within the range of those surveyed since 2002. The beach levels have recovered towards more medium levels, except in the mid beach.

2.10 Boulmer

Survey Date	Description of Changes Since Last Survey	Interpretation
16th September 2016	**Beach Profiles:** Boulmer is covered by two beach profile lines for the Full Measures survey (Appendix A). These were added to the programme in October 2007. Profiles 1aADC04A to 1aADC04B were last surveyed during the Partial Measures spring survey, 2016. At profile **1aADC04A** rock armour has been placed on the backshore since the previous survey. There has been accretion of up to0.3m between the rock armour and chainage 44m. Between chainage 44m and the rock platform at chainage 60m there has been minor erosion of less than 0.2m. The profile is at its highest recorded level from the rock armour to chainage 44m, and remains at a relatively high level compared to the range recorded from previous surveys from 44m to the rock platform. At profile **1aADC04B** the changes are all less than 0.1m (generally accretion) and therefore not significant. Overall, the profile is at a high level compared to the range recorded from previous surveys.	The dune cliff backshore at Boulmer has undergone rock armouring since the last survey. The changes to beach profile are minimal. **Longer term trends:** Beach elevations are high in comparison to the long-term record of surveys.

2.11 Alnmouth Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
16th & 30th September 2016	**Beach Profiles:** Alnmouth Bay is covered by ten beach profile lines for the Full Measures survey (Appendix A). Profiles 1aADC07 to 1aADC09 were last surveyed during the Partial Measures spring survey, 2016. Profiles 1aADC05, 1aADC06 and 1aADC10 to 1aADC14 were last surveyed during the Full Measures autumn survey, 2015. **1aADC05** and **1aADC06** are located in the small pocket beach that is situated between the rock outcrops of Seaton Point and Marden Rocks. At profile **1aADC05**, the cliffs have remained stable since the last survey. There has been small amount of accretion on the upper beach of less than 0.2m. Between chainage 45m and 70m a runnel has formed on the beach, with levels dropping by up to 0.5m; a similar feature in the same location was observed on the 2014 survey. Between 70m and 120m chainage there has been small amount of accretion of less than 0.2m, forming a berm at 80m. From 120m seawards, there has been erosion of less than 0.2m. The height of the beach profile varies considerably along its length compared to the range recorded from previous surveys; the upper and mid beach are at their highest recorded level except for the runnel between chainage 45m and 70m which is the lowest recorded level, and the lower foreshore is at a low-medium level. At profile **1aADC06**, there has been a similar pattern of change. The upper foreshore has accreted by up to 0.5m between the cliff and chainage 38m. Between chainage 38m and 68m there has been erosion of up to 0.4m. Between chainage 68m and 125m there has been minor accretion of less than 0.2m, and seawards of 125m there has been erosion of up to 0.3m. Similarly to profile 1aADC05 the profile height varies considerably along its length compared to the range recorded from previous surveys; the upper and mid beach are at their highest recorded level except for the runnel which is the lowest recorded level, and the lower foreshore is at a low-medium level. **1aADC07**, **1aADC08** and **1aADC09** are located to the north of Alnmouth Bay between Marden Rocks and the mouth of the River Aln Estuary. At profile **1aADC07**, the dunes have remained stable since the last survey, and the beach level at the	To the north of Alnmouth Bay, the dune cliffs and beach levels have remained relatively stable with a limited amount of sediment redistributed across the beach. At the centre of bay, north of the mouth of the River Aln Estuary, the dunes have remained stable since the last survey. Since the last survey, the beach has shown some mobility with the movement of the bar in the lower foreshore at 1aADC07 and migration of the river channel at profile 1aADC09. Immediately south of the mouth of the River Aln, there has been recovery of the upper beach berm. Further south there has been a mixture of erosion and accretion with the upper and lower foreshore tending to show accretion whilst the mid-beach has undergone erosion. **Longer term trends:** The cliffs in the far north of the bay have retreated slowly since 2002, by around 1m in total. The dunes have generally demonstrated long-term stability. Changes in beach profile form and position observed since the last survey are generally within the bounds of previous surveys although the middle and lower foreshore is low in some profiles.

Survey Date	Description of Changes Since Last Survey	Interpretation
	toe of the dunes has increased by 0.2m. The upper beach has increased in level by up to 0.7m from the dunes to chainage 60m. Between chainage 60m and 160m there has been erosion of up to 0.7m as the slope of the mid-beach has moved landwards. The large bar at chainage 200m on the previous survey has moved landwards by c.20m and increased in height by 0.2m. The profile is at its highest recorded level on the upper beach and the bar on the lower foreshore, but at a medium-low level through the middle of the profile compared to the range recorded on previous surveys. At profile **1aADC08,** the dunes have remained stable since the previous survey and there has been erosion of up to 0.3m across the whole beach profile (which ends at chainage 160m, previous surveys extend to 380m). Overall, the profile is at a medium level compared to the range recorded from previous surveys. At profile **1aADC09**, the dunes have remained stable since the previous survey. Between the dunes and chainage 105m there has been accretion of up to 0.5m with the formation of a small berm at chainage 76m. Seaward of 90m chainage, the profile descends into the Aln channel which has migrated c.10-15m landward since the previous survey. Overall, the profile is at a medium level compared to the range recorded from previous surveys and the Aln channel is at a relatively landward position. **1aADC10** to **1aADC14** are located between the south bank of the River Aln Estuary and the north breakwater of Warkworth Harbour at the mouth of the estuary of the River Coquet. At profile **1aADC10**, the berm in the upper beach has extended in width from c.5m to c.20m through the accretion of up to 1.7m of sand, returning it to the same position recorded in the 2014 survey, however its crest level has dropped by 0.3m. A small secondary berm has formed at chainage 80m up to 0.4m above the previous beach level. Between chainage 115m and 220m there has been erosion of up to 0.7m, deepening the depression at chainage 190m before the lower beach berm. From chainage 220m seawards there has been accretion of up to 0.9m, resulting in a less steep face to the berm. Overall the profile is at a high-medium level compared to the range recorded from previous surveys, except for the lower foreshore from chainage 320m seawards which is relatively low. At profile **1aADC11**, there has been erosion at the toe of the dunes of up to 0.4m, though the dunes themselves have remained stable. Between chainage 60m and 110m there has been erosion of up to 0.8m, steepening the upper beach face. Between chainage 110m and 230m there has been very little change, limited to ±0.1m. From chainage 230m seawards there has been erosion of up to 0.4m steepening the toe of the beach, Overall the profile is at a medium-high level compared to the range	

Survey Date	Description of Changes Since Last Survey	Interpretation
	recorded from previous surveys except for the area of erosion at the upper beach face which is the lowest level on record between chainage 65m and 80m. At profile **1aADC12**, the dune face has remained stable since the previous survey; however, the crest of the dune has reduced by 0.3m. The berm at chainage 50m has reduced in height by 0.2m. Between the crest of the berm and chainage 70m there has been accretion of up to 0.4m, with erosion of up to 0.4m from 70m to 120m. The result of this is a steeper upper beach face. From chainage 120m seawards there has been accretion of up to 0.2m. Overall, the profile is at a relatively high level compared to the range recorded from previous surveys particularly between chainage 55m and 70m, and 135m and 195m which have the highest levels on record. At profile **1aADC13**, the dunes and dune face have remained stable since the last survey. From the dune toe (147m) to chainage 160 there has been accretion of up to 0.6m. Between chainage 160m and 210m there has been erosion of up to 0.7m, with the erosion reducing to less than 0.2m seawards of chainage 210m. The upper beach is at its highest recorded level between chainage 147m and 160m, however from chainage 160m seawards the profile is relatively low-medium compared to the range recorded from previous surveys.. At profile **1aADC14**, the dune toe has been eroded, causing it to recede by up to 2m since the last survey. A berm has formed on the upper beach at the toe of the dunes through accretion of up to 1.4m. Between chainage 130m and 180m there has been erosion of up to 0.8m. This has resulted in a much steeper upper beach and flatter mid beach. From chainage 180m seawards there has been accretion of up to 0.2m. The berm on the upper beach is the highest recorded level, whilst the erosion at chainage 140m is the lowest recorded level. Seawards of chainage 160m the profile is at a low-medium level compared with the range recorded from previous surveys.	
7th September 2016	**Topographic Survey:** The northern part of Alnmouth Bay (to the north of the River Aln Estuary) is covered by a bi-annual topographic survey, which commenced in April 2005. Data from the most recent topographic survey (Full Measures, autumn 2016) have been used to create a DGM (Appendix B – Map 3) using GIS. A difference plot has also been produced using the DGM (Appendix B – Map 7) comparing the last produced topographic survey (Partial Measures, Spring 2016) with the present survey. The difference plots shows clear zones of beach elevation increase and decrease; (i) largely shore	The findings of the topographic survey show cross beach movements of sediment related to seasonal effects in the northern part of the survey area and effects relating to migration of the Aln river channel in the southern part of the survey area.

Survey Date	Description of Changes Since Last Survey	Interpretation
	parallel areas of erosion and accretion in the northern part of the survey area indicating cross-beach movements; (ii) erosion across the whole beach in front of the car park in the centre of the survey area; (iii) accretion between the car park and the edge of the village, but erosion at the toe of the dunes and (iv) alternating areas of erosion and deposition along the northern edge of the Aln channel indicating possible minor variations in its course since the last survey.	

2.12 High Hauxley & Druridge Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
30th September & 2nd October 2016	**Beach Profiles:** High Hauxley to Druridge Bay is covered by nine beach profile lines for the Full Measures survey (Appendix A). Four of these (with 'A' or 'B' suffixes) were added to the programme in October 2007.All except 1aADC15 are resurveyed every 6-months. Profile **1aADC15** extends across the extensive dunes at Amble Links and foreshore. The dunes have remained stable since the last survey (Full Measures, autumn 2015). The two berms identified in the last survey have merged back together to form a storm berm similar to that shown in the 2014 survey, with changes in beach level of ±0.5m between chainage 100m and 130m. Between chainage 130m and 150m there has been accretion of less than 0.2m and seawards of 130m there has been erosion of up to 0.1m. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys. **1aADC15A**, **1aADC16** and **1aADC16A** are located around Hauxley Haven. At all locations, the dunes has remained stable since the last survey (Partial Measures, Spring 2016). At profile **1aADC15A**, there has been a small amount of accretion of less than 0.2m between the toe of the dune and chainage 60m. Seawards of chainage 60m there has been erosion of up to 0.4m. Overall, the profile is at a medium level compared to the range recorded from previous surveys. At profile **1aADC16**, two berms have formed on the upper beach at chainage 85m and 120m, with up to 0.5m of accretion. From chainage 120m seawards there has been very little change of ±0.1m. Overall, the profile is at a high-medium level compared to the range recorded from previous surveys, with the second berm at chainage 120m having the highest level on record. At profile **1aADC16A**, the pattern of accretion at the toe of the rock revetment evident in previous reports appears to have continued, with an increase in levels of 0.4m. a berm has formed at chainage 100m with accretion of up to 0.4m. From chainage 135m to 185m there has been erosion of less than 0.2m, with indiscernible change seawards of 185m. The profile is at a relatively high level from the dunes to chainage 140m but a relatively low level from 140m seawards, compared to the range recorded from previous surveys.	At High Hauxley (profile 1aADC15), the dune has remained stable. There has been some erosion of the beach toe, with sediment appearing to have been driven up the beach. At Hauxley Haven (profiles 1aADC15A to 1aADC16), the dunes have remained stable since the last survey. The upper beach has shown accretion. In Druridge Bay, there has been varying amounts of erosion and accretion across the profiles suggesting a redistribution of material across the beach, with a general trend of accretion on the upper beach. **Longer term trends:** At High Hauxley, Hauxley Haven and north and south Druridge Bay, the dunes have remained stable except for limited changes at the dune toe. The beach levels are mostly within the bounds of previous surveys.

Survey Date	Description of Changes Since Last Survey	Interpretation
	1aADC16B, **1aADC17** and **1aADC17A** are located to the north of Druridge Bay, between Bondi Carrs and Hadston Carrs and extend seawards from Togston Links. At all locations, the dunes have remained stable since the last survey (Partial Measures, spring 2016). At profile **1aADC16B**, there has been accretion of c.0.3m infilling some of the rock exposures. Overall, the profile is at a medium level compared to the range recorded from previous surveys. . At profile **1aADC17**, there has been accretion of up to 0.2m across the upper beach from the dunes to chainage 170m. A depression has formed in the profile between chainage 170m and 210m with erosion of 0.3m, with a corresponding increase of 0.2m between chainage 210m and 240m. Overall, the profile is at a high level compared to the range recorded from previous surveys. At profile **1aADC17A**, the berm at chainage 60m has been eroded by up to 0.6m and the runnel between 85m and 150m has been infilled by up to 0.4m burying the second berm crest at chainage 150m. Between chainage 150m and 230m there has been erosion of up to 0.4m exposing the rock platform c.10m landwards from the previous survey. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys. . **1aCMBC01** and **1aCMBC02** are located in the southern section of Druridge Bay. At profile **1aCMBC01**, the dunes appear to have experienced minor changes. Many of these appear to be due to survey error but the foredune has experienced an increase in crest height of up to 0.4m. The upper beach between the dunes and chainage 220m shows very little change, limited to ±0.1m. Between chainage 220m and 300m there has been erosion of up to 0.7m. Seawards of chainage 300m there has been accretion of up to 1m, pushing the toe of the beach seawards. The upper beach is relatively high compared to the range recorded from previous surveys, whilst the rest of the beach is at a medium-low level. At profile **1aCMBC02**, the dune has remained stable since the previous survey. A berm has formed at the toe of the dunes (chainage 200m), with accretion of up to 1.2m from the dunes to chainage 235m. Between chainage 235m and 265m there has been erosion of up to 0.4m. Seawards of 265m there has been accretion of c.0.4m pushing the toe of the beach seawards. Overall, the profile is at a high-medium level compared to the range recorded from previous surveys, except for the area of erosion which has the lowest recorded levels for that section.	

2.13 Lynemouth Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
28th September & 12th November 2016	**Beach Profiles:** Lynemouth Bay is covered by six beach profile lines for the Full Measures survey (Appendix A). Profiles CMBC03A and CMBC03B were added to the programme in October 2007. Profiles 1aCMBC03a to 1aWDC01were last surveyed during the Partial Measures spring survey, 2016. Profiles 1aCMBC01 and 1aWDC02 to 1aWDC05 were last surveyed during the Full Measures autumn survey, 2015. **1aCMBC03** is located just to the south of Snab Point. The profile extends across the cliff and the rock platform below. The profile has not changed since the last survey indicating a stable cliff and rocky foreshore. **1aCMBC03A** is located opposite Lynemouth and extends across the extensive slag banks before reaching the foreshore. The slag bank has not experienced any change since the last survey (Partial Measures, spring 2016) and changes to the upper beach level are minimal, with accretion of less than 0.2m up to chainage 115m. Between chainage 115m and 160m there has been erosion of up to 0.6m, exposing rock between 145m and 155m. The lower foreshore seawards of chainage 160m has accreted slightly by 0.2m. Overall, the profile is at a low-medium level compared to the range recorded from previous surveys, with the exposure of rock being the lowest recorded level for that section. **1aCMBC03B** is located to the north of Lynemouth Power Station and extends across the extensive slag banks before reaching the foreshore. The process of slag bank erosion has been progressively ongoing for some years. Since the last survey, the top of the slag bank has retreated by about 1m, which is the smallest recorded retreat since autumn 2009. There has been erosion at the toe of the slag bank of 0.4m. Between chainage -20m and 0m there has been accretion of up to 0.4m. Between chainage 0m and 60m there has been erosion of up to 0.7m exposing rock at 7m chainage. Seaward of 60m there has been accretion of up to 0.5m. Overall, the profile is at a relatively low level compared to the range recorded from previous surveys, particularly between chainage 0m and 30m where it has the lowest recorded level. Profile **1aWDC01** extends from seaward of the rock revetment down to low water across the extensive	To the south of Snab Point, the shoreline has not changed in form or position since the last survey. Opposite Lynemouth, the slag bank has remained stable, with erosion in the mid-beach dropping it to its lowest recorded level. To the north of the power station, the slag bank has continued to erode, retreating by approximately 1m. The mid-beach has also eroded with accretion on the upper and lower beach to create a steeper more concave profile. To the south of the power station, between Lyne Sands and Beacon Point, 1aWDC02 has eroded whilst 1aWDC03 has accreted indicating a possible southwards movement of sediment. There have been no major changes in form at these profiles. Between Beacon Point and Newbiggin Point there has been erosion of the upper beach with deposition further down the profile. **Longer term trends:** To the south of Snab Point, the changes observed from the present beach profiles are within the bounds of previous surveys. Opposite Lynemouth, the slag bank has demonstrated a long term trend of stability. The changes in beach profile form and position observed since the last survey are generally within the bounds of previous surveys, except for a short section mid-beach which is

Survey Date	Description of Changes Since Last Survey	Interpretation
	slag banks. This profile is no longer measured. **1aWDC02** is located to the south of the Power Station. The beach face has retreated landwards by c.20m though the crest has only retreated c.5m. The beach has undergone erosion of up to 2m compared to the levels of the previous survey. The erosion on the lower foreshore (seawards of chainage 200m) is less severe being less than 0.5m. The profile is at its lowest recorded level. **1aWDC03** is located to the south of the Power Station and to the north of Beacon Point. There has been accretion across the beach profile, with a small change of less than 0.1m on the landward side of the berm and up to 0.8m on the seaward face of the berm. The crest height of the prominent berm has increased by 0.3m=. The berm remains in roughly the same position as the previous three surveys, the last change in form being between the Full Measures 2012 and Full Measures 2013 survey. The landward face and crest of the berm are the highest recorded levels, whilst the seawards face is at a relatively landwards position compared to the range recorded from previous surveys. **1aWDC04** and **1aWDC05** are located between Beacon Point and Newbiggin Point. At profile **1aWDC04**, the dunes have remained stable. The profile shows the dune face remains steep and the accretion at the dune toe has continued since the previous survey, with an increase of up to 0.8m. The beach between chainage 40m and 70m has dropped in level by up to 0.5m. There has been minor accretion between chainage 70m and 95m of less than 0.2m. Between 95m and the boulders at chainage 125m there has been some erosion of up to 0.3m. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys. At **1aWDC05**, the cliffed section has remained stable. The upper beach between chainage 10m and 23m has eroded by up to 0.4m removing the berm formed on the previous survey. The lower beach between chainage 23m and 38m has accreted by up to 0.2m. Seaward of chainage 38m the rock platform remains unchanged. Overall, the profile is at a medium-low level compared to the range recorded from previous surveys.	the lowest on record exposing rock. To the north of the power station, the slag bank has continued to erode and the beach has level has also fallen, indicating that this section of shoreline has returned to its normal trend of progressive erosion of the slag bank cliff and beach. To the south of the power station, the prominent berm crest has increased a little in height, but has retained the same form since 2013. At the southern end of the bay, between Beacon Point and Newbiggin Point, the changes in beach profile form and position observed place the current beach levels at medium to high levels relative to earlier surveys dating back to 2002.
October 2016	**Cliff-top Survey:** Cliff top survey data collected for baseline survey (autumn, 2008), the previous Partial Measures survey (spring 2016) and the present Full Measures survey (autumn, 2016) is presented in this report. The cliff top survey is carried out as a continuous cliff edge line survey at the Newbiggin Caravan Park	Since the last survey there has been no significant movement recorded. **Longer term trends:** Since surveys began in October 2008, cliff movement has been greatest in the north of

Survey Date	Description of Changes Since Last Survey	Interpretation
	at Newbiggin Point. The results from the cliff top monitoring are anticipated to have an accuracy of ±0.2m due to the technique used. Furthermore, problems in precisely locating the cliff top, due to vegetation growth or the indistinct form of the cliff top, have also affected the data quality. There has been very little change in the position of the cliff top since the previous survey in Spring 2016 and the previous Full Measures survey in Autumn 2015.	the survey area with up to 2.7m of cliff top retreat, whilst the central and southern parts of the survey area have shown less movement with retreat of less than 1m.

2.14 Newbiggin-by-the-Sea

Survey Date	Description of Changes Since Last Survey	Interpretation
12th November 2016	**Beach Profiles:** Newbiggin-by-the-Sea is covered by four beach profile lines for the Full Measures survey (Appendix A). Two of these, profiles WDC05A and WDC06A, were added to the programme in October 2007 specifically to help assess the performance of the capital scheme involving beach replenishment and construction of an offshore breakwater. Profiles 1aWDC05A and 1aWDC06A were last surveyed during the Partial Measures spring survey, 2016. Profiles 1aWDC06 and 1aWDC07 were last surveyed during the Full Measures autumn survey, 2015. In addition a further 26 profiles (1aNWB1 to 1aNWB26) have been surveyed since September 2010 as part of a topographic survey of Newbiggin Bay. These profiles are not individually described. Beach profiling works were completed here in September 2012. Four areas were re-profiled; 2 sections to the east of profile **1aWDC05A**, one section at **1aWDC06A** and a narrow section at the top of **1aWDC07.** **1aWDC05A** is in the north of Newbiggin Bay. Between the seawall and 50m chainage there has been very little change of ±0.1m. Between chainage 50m and 65m there has been erosion of up to 0.4m creating a more concave profile. Seaward of chainage 65m there has only been minimal changes of ±0.1m. Overall, the profile is at a medium level compared to the range recorded from previous surveys. **1aWDC06** is located in the centre of the northern part of Newbiggin Bay, between the two breakwaters. There has been varying amounts of accretion across the beach profile of up to 0.6m. A berm has formed on the upper beach at chainage 20m. The lower foreshore shows the smallest change. Overall, the profile is at a medium level compared to the range recorded from the previous surveys except on the upper beach where the berm shows the highest recorded levels. **1aWDC06A** is located in the centre of Newbiggin Bay, behind the offshore breakwater. Beach levels have dropped by 1m immediately at the toe of the seawall with a small berm forming at chainage 30m. The landward face and crest of the main upper beach berm have undergone little change, ±0.1m. The seaward face of the berm (chainage 75m to 125m) has been eroded, moving landwards by c.5-10m, through a drop in levels of up to 0.9m. Seaward of chainage 170m the foreshore has eroded by up to	Since the last survey, the beach at Newbiggin-by-the-Sea has remained stable. **Longer term trends:** Data since monitoring began in May 2002 reflects the change in beach width resulting from the beach nourishment scheme implemented at Newbiggin-by-the-Sea. This change is also reflected in the beach profile plot in Appendix A. The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys. Compared to the record of earlier surveys, the beaches are at medium/high levels, with the upper beach being particularly high, indicating that there is a net transfer of sediment towards the back of the beach.

Survey Date	Description of Changes Since Last Survey	Interpretation
	0.4m Overall the profile is at a medium-high level compared to the range recorded from previous surveys. **1aWDC07** is located in towards the south of Newbiggin Bay. There has been accretion across the profile varying from little change of less than 0.1m in the upper beach, to a greater change of up to 0.4m from chainage 35m seawards. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys in the upper beach, but a medium-low level in the lower beach.	
22nd August 2016	**Topographic Survey:** Newbiggin-by-the-Sea is covered by bi-annual topographic survey, which commenced in September 2010. The surveys are planned to help assess the performance of a capital scheme constructed in 2007, which involved beach replenishment and construction of an offshore breakwater. Prior to incorporation in the programme, these surveys were undertaken on occasions between 2007 and 2010 as part of the scheme development. Data from the most recent topographic survey (Full Measures, autumn 2016) have been used to create a DGM (Appendix B – Map 4) using a GIS. A difference plot has also been produced using the DGM (Appendix B – Map 8) produced from the last produced topographic survey (Partial Measures, spring 2016) and the present survey. The topographic survey shows areas of both gain and loss across the beach; however, the magnitude of the changes is generally low. The northern half of the bay generally shows very little change, with the exceptions being a band of accretion at the back of the beach and a patch of erosion at the landward end of the northern breakwater. In the lee of the central breakwater, the changes are dominated by erosion, with some patches of accretion on the southern edge of the tombolo. In the south of the bay, there is a large area of accretion in front of Beach Terrace, whilst the most southerly extent of the bay is a mixture of patchy erosion and accretion.	The topographic survey shows areas of both gain and loss across the beach. The general trend is for erosion at the northern and southern margins of the bay and behind the central breakwater, with accumulation of sediment either side of and on the southern edge of the tombolo in the lee of the offshore breakwater.
August 2016	**Sand Extent Survey**: Spital Carrs is located to the south of Newbiggin Bay and is covered by a bi-annual sand extent survey, which commenced in 2012. The survey was designed to address concerns that the beach recharge	Since the last survey, there has been some movement of the sand extent. Since 2014, there has been a trend in the south of the survey area for advance in the summer as shown in the autumn survey, which is then

Survey Date	Description of Changes Since Last Survey	Interpretation
	scheme undertaken in the Newbiggin Bay may have impacts on the Spital Carrs SSSI and SPA if sand from the recharge scheme moves to the south. The sand extent survey therefore identifies the boundary of the sand beach on the rock platform. Data from the most recent sand extent survey (Full Measures, autumn 2016) has been plotted onto aerial imagery (refer to Appendix D – Map 1). The plot shows that there is variable advance and retreat of the limit of sand cover between the spring 2016 and the autumn 2016 survey. There has been no change in the north, very limited advance in the centre and more pronounced advance in the south relative to the spring 2016 survey. However, this advance only takes the limit of the sand cover to the same extent as in autumn 2014 and autumn 2015.	removed by winter storms, as shown by the spring surveys. **Longer term trends:** Review of the sand extent surveys shows the sand front has oscillated by a small amount with no net trend.

2.15 Cambois Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
29th September 2016	**Beach Profiles:** Cambois Bay is covered by seven beach profile lines for the Full Measures survey (Appendix A). Profiles. All profiles are resurveyed every 12-months. **1aWDC08** and **1aWDC09** are located to the north of the River Wansbeck estuary in front of Sandy Bay Caravan Park. **1aWDC08** extends from the cliff across the rock revetment onto the foreshore. Beach levels have increased at the toe of the revetment by 0.5m, with the accretion tailing off by chainage 75m. Between chainage 75m and 145m there has only been minor changes of ±0.1m. The lower foreshore seawards of chainage 145m has eroded by up to 0.5m. Overall, the profile is at its highest recorded level compared to the previous surveys. **1aWDC09** extends from the cliffs at the very southern end of the Caravan Park. The cliff remains unchanged since the previous survey. The berm at chainage 60m on the previous survey has moved seawards by c.20m and decreased in height by 0.2m, exposing more of the rock between chainage 30m and 60m. The channel of the River Wansbeck has moved seawards by c.50m, with the accumulation of up to 0.8m of sand on the seaward face of the berm. Overall, the profile is at a relatively high level compared to the range recorded from previous surveys, with the edge of the River Wansbeck channel being at its most seawards position recorded. Profiles **1aWDC10** to **1aWDC14** are all located along Cambois Bay, between the River Wansbeck and River Blyth estuaries. **1aWDC10** is located on the southern side of the Wansbeck Estuary, just to the south of Cambois House. The narrow block which had detached from the upper cliff face in the previous surveys has gone resulting in the upper cliff face retreating by c.1m. . Beach levels have dropped by up to 1m from the cliff toe to chainage 140m. The berm identified at HAT on the previous survey has moved landwards by c.5m with its crest at a level 0.5m lower. Seawards of chainage 140m the toe of the beach has accreted slightly by 0.2m. Overall, the profile is at a low-medium level compared to the range recorded from previous surveys.	To the north of the River Wansbeck, the cliffs remain unchanged since the previous survey and there has been variable erosion and deposition throughout the beach profiles, but they remain relatively high compared to earlier surveys. To the south of the Wansbeck Estuary as far as profile 1aWDC12, the face of the dune cliffs have remained stable. Upper beach levels have generally increased, and there has been berm formation in both the upper and lower beach. At the southernmost extent of Cambois Bay, beach levels have generally increased. **Longer term trends:** Beach profiles in the north of the survey area are at higher levels compared to those in the south, suggesting a north-south movement of sediment or a greater input of sediment (possibly from the River Wansbeck) in the north of the survey area. The till and dune cliffs have eroded little over the last 12 months compared to previous periods.

Survey Date	Description of Changes Since Last Survey	Interpretation
	1aWDC11 extends across the rock revetment fronting the now disused foundry. Beach levels have increased by up to 0.5m from the toe of the revetment seaward to 80m chainage. The bar in the lower foreshore has moved landwards by c.20m and increased in height by 0.5m. This has resulted in MLWS moving landwards by c.15m. The profile is at its highest recorded level over much of its length compared to the previous surveys. **1aWDC12** is situated approximately mid-way along Cambois Bay. Since the last survey (Full Measures, autumn 2015), the face of the dune cliffs has remained stable with a berm forming at the cliff toe through the accretion of up to 0.6m of gravelly-sand. Between chainage 70m and 110m there has been erosion of up to 0.5m. A second wider berm has formed on the lower beach between chainage 110m and 180m, up to 0.7m above the previous surveyed beach level. The profile is at its highest recorded level across most of its length except for the area of erosion in the mid beach. At **1aWDC13** is located to the centre-south of Cambois Bay. There has been no change to the dune cliff face and the narrow berm at the toe of the dune cliff down by 0.2m. A second berm has formed at chainage 40m 0.4m above the level of the previous survey. Between chainage 70m and 120m there has been erosion of up to 0.4m. The low bar recorded on the previous survey has moved landward by c.30m and increased in height by 0.2m. Overall, the profile is at a low-medium level compared to the range recorded from previous surveys, with the area of erosion in the mid-beach having the lowest recorded levels. **1aWDC14** is located to the south of Cambois Bay, at North Blyth. There has been accretion of up to 0.6m of sand covering the rock platform between chainage 10m and 90m. There has been some erosion of the sand between chainage 90m and 115m revealing the rock platform beneath. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys, in particular, the section between chainage 30m and 60m is at its highest recorded level.	
October 2016	**Cliff-top Survey:** Cliff top survey data collected for baseline survey (spring, 2009), the previous Partial Measures survey (Spring 2016) and the present Full Measures survey (autumn, 2016) is presented in this report. The cliff top survey is carried out as a continuous cliff edge line survey in two locations within Cambois Bay; at Sandy Bay Caravan Park to the north of the River Wansbeck estuary, and Cambois Bay from south of the River Wansbeck to the breakwater at the southern end of the bay . The results from the	Since the last survey in April 2016, there has been very little change in cliff top position recorded for both Sandy Bay Caravan Park and Cambois Bay. **Longer term trends:** At Sandy Bay Caravan Park the cliff top retreat has been more significant in the southern part of the survey area with up to 8m of

Survey Date	Description of Changes Since Last Survey	Interpretation
	cliff top monitoring are anticipated to have an accuracy of ±0.2m due to the technique used. Furthermore, problems in precisely locating the cliff top, due to vegetation growth or the indistinct form of the cliff top, have also affected the data quality. There has been very little change in the position of the cliff top at Sandy Bay Caravan Park since the previous survey in Spring 2016 along the majority of the survey length. The exception is a c.10m length of cliff in the centre of the survey area (immediately to the north of the most southerly perpendicular access road within the caravan park) which appears to have retreated by up to 4.5m, however this appears to be a survey error when compared to earlier surveys which show the cliff top in the same position as the autumn 2016 survey. The dunes on the southern bank of the River Wansbeck show very little change on most of the dunes, except for the most landward dune which has grown riverwards by c.1m. There has been very little change along the majority of the survey length in Cambois Bay, with numerous small areas of retreat of up to 0.2m however this is within the survey error. There is an area (c.8.5m long) of retreat of up to 0.5m opposite the disused foundry.	erosion since 2007, whilst the northern part has eroded by c.1-2m. In Cambois Bay, the area of greatest cliff top retreat since the surveys began in 2009 is the centre of the bay opposite Ridley Terrace, Cambois, where up to 10m of erosion has occurred. The north and south of the bay have retreat more typically c.1-3m.

2.16 Blyth South Beach

Survey Date	Description of Changes Since Last Survey	Interpretation
19th September 2016	**Beach Profiles:** Blyth South Beach is covered by six beach profile lines for the Full Measures survey (Appendix A). All profiles are resurveyed every 6-months. **1aBVBC01** is located towards the north of South Beach, in front of the area of land owned by Port of Blyth. There have been no significant changes to the position and form of the dunes since the last survey (Partial Measures, spring 2016). A berm has formed on the upper beach with a runnel running through the middle of its crest at chainage 50m. Accretion of up to 1m between chainage 40m and 70m, and erosion of up to 0.6m between chainage 70m and 110m has led to the upper beach profile steepening. A second berm has formed on the lower beach at chainage 115m through accretion of up to 0.4m. Overall, the profile is at a high-medium level compared to the range recorded from previous surveys. There has been varying amounts of erosion and accretion across the profile at **1aBVBC02.** The upper beach has steepened with accretion of up to 0.4m between the seawall and chainage 30m, and erosion of up to 0.5m between 30m and 45m forming a depression. Between chainage 70m and 160m there has been erosion of up to 0.5m. Seawards of 160m there has been accretion, extending the position of MLWS seawards by c.15m. Overall, the profile is at a medium level compared to the range recorded from previous surveys. At **1aBVBC03** there have been no significant changes to the position and form of the dunes since the last survey (Partial Measures, spring 2016), which remain at their most landward extent since 2002. A berm has formed on the upper beach at chainage 110m, through accretion of 1m of sand. Between chainage 120m and 290m there has been only minor changes of less than ±0.2m. A bar has formed on the lower foreshore at chainage 300m, extending MLWS seawards by c.25m. Overall, the profile is at a medium-high level compared to the range recorded from previous surveys, with the two berms showing the highest recorded levels at those locations. At **1aBVBC04,** there have been no significant changes to the position and form of the dunes since the	Since the last survey, the dunes and dune face at Blyth South Beach have remained stable, retaining the same form and position. Beach profiles have changed, with a general trend of steepening of the upper beach and accretion on the lower beach, with berm formation being common on both upper and lower beach. However, profile 1aBVBC04 in the centre of the bay differs showing erosion of the lower beach. The profiles are all generally at a relatively medium to high level. **Longer term trends:** At Blyth South Beach, the dunes have generally demonstrated a long-term trend of stability. The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys, however in the central and southern parts of the bay, the upper beach is relatively high and the lower beach relatively low, leaving a steeper beach in the middle foreshore.

Survey Date	Description of Changes Since Last Survey	Interpretation
	last survey (Partial Measures, spring 2016). The crest of the berm in the upper beach has increased by 0.2m but the seaward face has receded landward by c.10-15m, with the loss of up to 1m of sand. A secondary bar has formed between at the base of the berm face chainage 115m and 175m, with accretion of up to 1m. The lower beach has eroded by up to 1m, resulting in MLWS moving landwards by c.45m. Overall, the profile is at high-medium level compared to the range recorded from previous surveys across most of its length, with the crests of both berms showing the highest recorded levels in those locations. The lower foreshore however shows relatively low levels. At **1aBVBC05,** there have been no significant changes to the position and form of the dunes since the last survey (Partial Measures, spring 2016). There has been erosion between chainage 90m and 165m of up to 1.4m resulting in a steeper upper beach profile. A lower beach bar has formed between chainage 165m and the end of the profile at 260m through the accretion of up to 1.4m of material; this has pushed MLWS seawards by c.60m. The profile is the lowest on record through the mid-beach (chainage 105m to 165m), but is at a more relatively medium level compared to the range recorded from previous surveys for the upper and lower beach. At profile **1aBVBC06,** there have been no significant changes to the position and form of the dunes since the last survey (Partial Measures, Spring 2016). There has been accretion across all of the beach profile, with up to 1.7m of accretion in the upper beach (chainage 100m to 140m) and 0.6m in the lower beach (chainage 165m seawards). The upper beach has steepened compared with the previous survey. MLWS has moved seawards by c.20m. Overall, the profile is at a relatively medium level compared to the range recorded from previous surveys.	

4. Problems Encountered and Uncertainty in Analysis

Individual Profiles

- At profile BTBC07 and BTBC08, the offshore extent the survey report indicates that the profiles end at a lagoon, but the survey photographs indicate they end at open sea. This is possibly a note retained from earlier reports.
- At profiles BTBC18 to BTBC23, the survey report states that the offshore extent of the survey is limited by a drain. This drain is likely a runnel which separates the barrier feature in the lower foreshore from the rest of the beach, but is only visibly in the survey photographs from BTBC23
-
- At profile BTBC33, there are gaps in the section (at the location of the middle of dunes) due to dense vegetation. This needs to be taken into account when assessing the profile data as the levels in these measurement gaps will not be reliable.
- At profiles ADC05 and ADC06 there was unsafe loose material prevented the survey of the cliff face.
- At profile ADC09, the profile ends at the river.
- At profile ADC16, the surveyors noted that they were unable to survey the start of the section as access was denied by the homeowner.
- At profile ADC16A, there are gaps in section due to vegetation cover. This needs to be taken into account when assessing the profile data as the levels in these measurement gaps will not be reliable.
- At profile ADC16B, the section starts at new fence.
- Profile WDC01 is no longer measured.
- At profile WDC09 and WDC10, the profile ends at the river, although the profile and survey photographs indicate that the profile extends at least partially across the bed of the river mouth.

At Berwick the surveyors noted that the quicksand near the waters edge was more noticeable on this survey

Topographic Survey

No issues reported.

Cliff Top Surveys

Cambois, Newbiggin, and Sandy Bay cliff tops have now been combined into one survey area.

At Cambois Bay, the surveyors noted that undergrowth at north end of the cliffs hindered surveying. This was also noted in previous reports (Full Measures, autumn 2011, Partial Measures, spring 2012, Partial Measures spring 2014, Full Measures autumn 2014, Partial Measures spring 2015, Full Measures autumn 2015, and Partial Measures spring 2016).

The surveyors also reported that there was a visible collapse of the cliff edge in the north of the survey area.

5. Recommendations for ‘Fine-tuning’ the Monitoring Programme

No changes are recommended at the present time.

6. Conclusions and Areas of Concern

- At Sandstell Point (Spittal A), the recorded profiles and topographic survey present no causes for concern.
- At Spittal (Spittal B), the recorded profiles present no causes for concern.
- At Goswick Sands, the recorded profiles present no causes for concern. However, a barrier feature has appeared in the seaward end of profile 1aBTBC18, which may be a cyclical feature.
- At Holy Island, the recorded profiles and topographic survey present no causes for concern.
- At Bamburgh, the recorded profiles present no causes for concern.
- At Beadnell Village, the recorded profiles present no causes for concern.
- At Beadnell Bay, despite evidence of some erosion in the uppermost part of the beach at profile 1aBTBC32 there are no causes for concern.
- At Embleton Bay, the dune toe and beach levels are still low but are continuing to recover on the upper beach, whilst the mid beach remains somewhat low, but there is no cause for concern
- At Boulmer, the recorded profiles present no cause for concern.
- At Alnmouth Bay, the upper beach is showing signs of recovery and this is likely part of natural cycle of erosion and accretion. As such, there is no cause for concern but this issue should be reviewed in the 2017 Full Measures report.
- At High Hauxley & Druridge Bay, the Hauxley Haven profiles are at their lowest levels on record in their most seaward extents, with some accretion on the upper beach. These do not necessarily indicate a cause for concern but further surveys should be monitored specifically for any indications of accelerated recession of the cliff/dune toe.
- Lynemouth Bay, to the north and south of the Power Station, has continued to erode but at a slower rate to those seen previously.
- Elsewhere along Lynemouth Bay, the recorded profiles and cliff top survey present no causes for concern.
- At Newbiggin-by-the-Sea, little change has occurred since the previous survey and there have been no adverse impacts on the SSSI at Spital Carrs.
-
- At Cambois Bay, the recorded profiles, cliff top survey and cliff/dune top survey present no causes for concern.
- At Blyth South Beach, the upper beach has steepened in the central and southern parts of the bay, but the beach remains at medium to high levels and the recorded profiles therefore present no causes for concern.

Appendices

Appendix A

Beach Profiles

Beach Profile

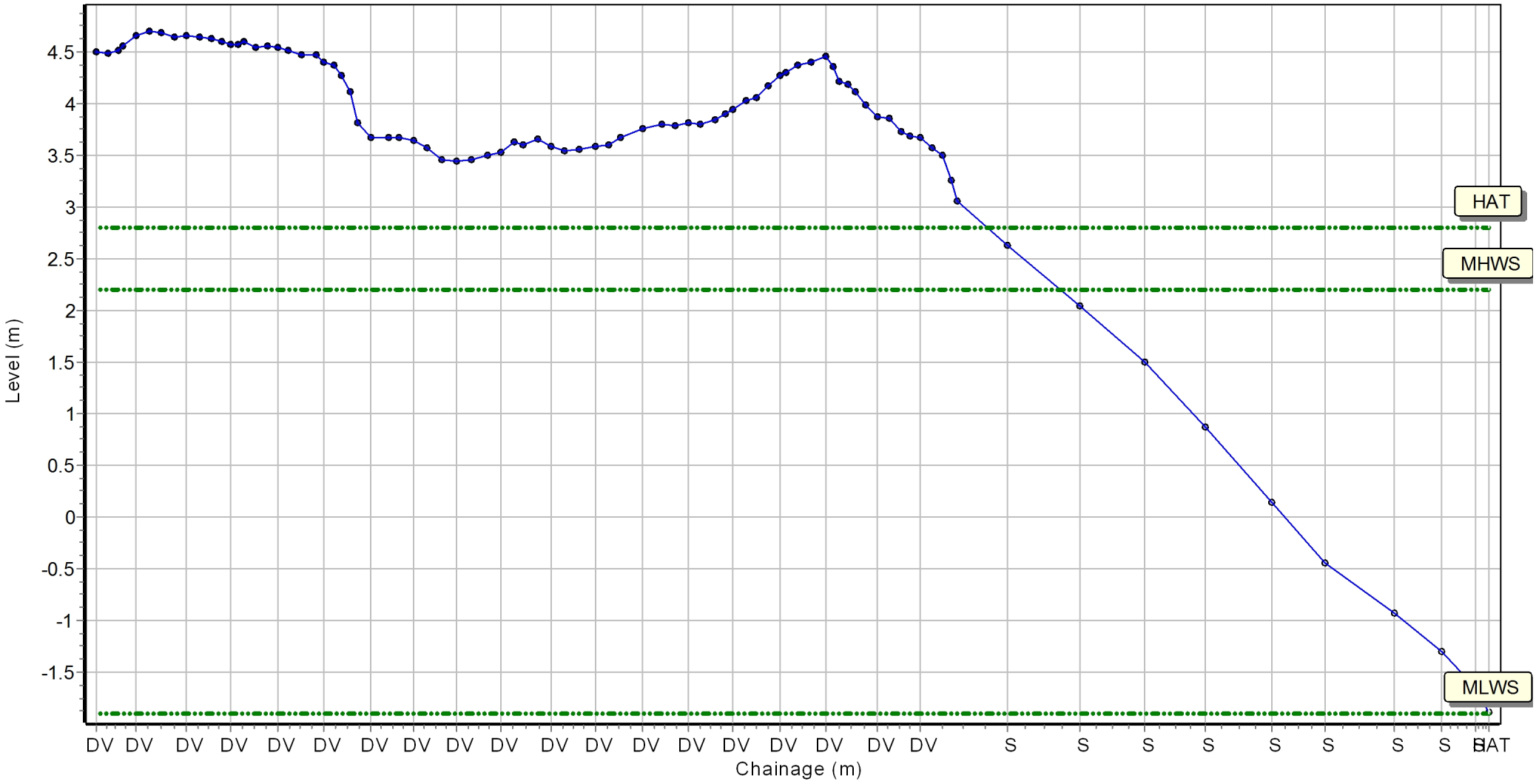
Location: **1aBTBC01**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400275.192 **Northing:** 651875.262 **Profile Bearing:** 347 ° from North



Beach Profile

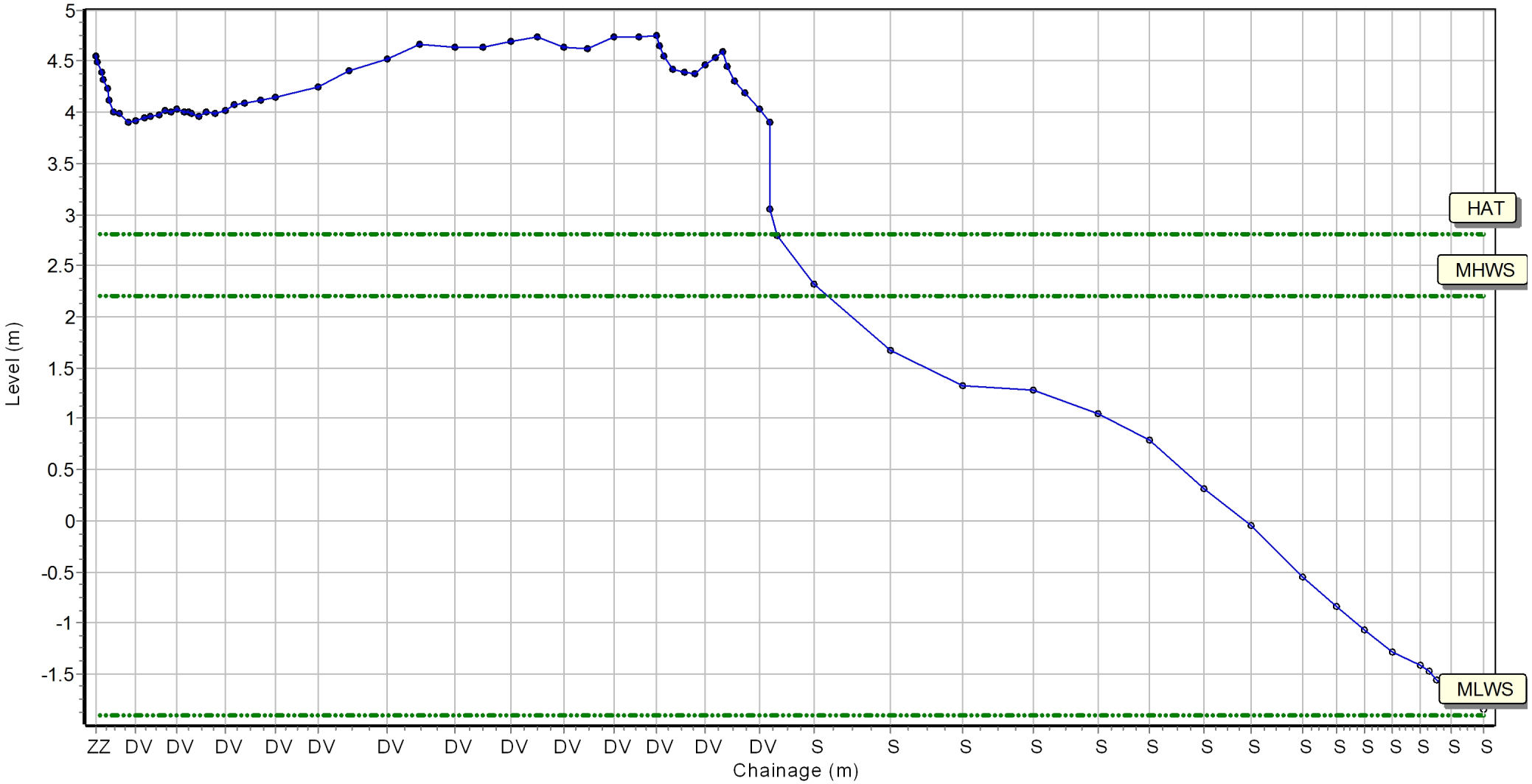
Location: **1aBTBC02**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400388.132 **Northing:** 651916.302 **Profile Bearing:** 334 ° from North



Beach Profile

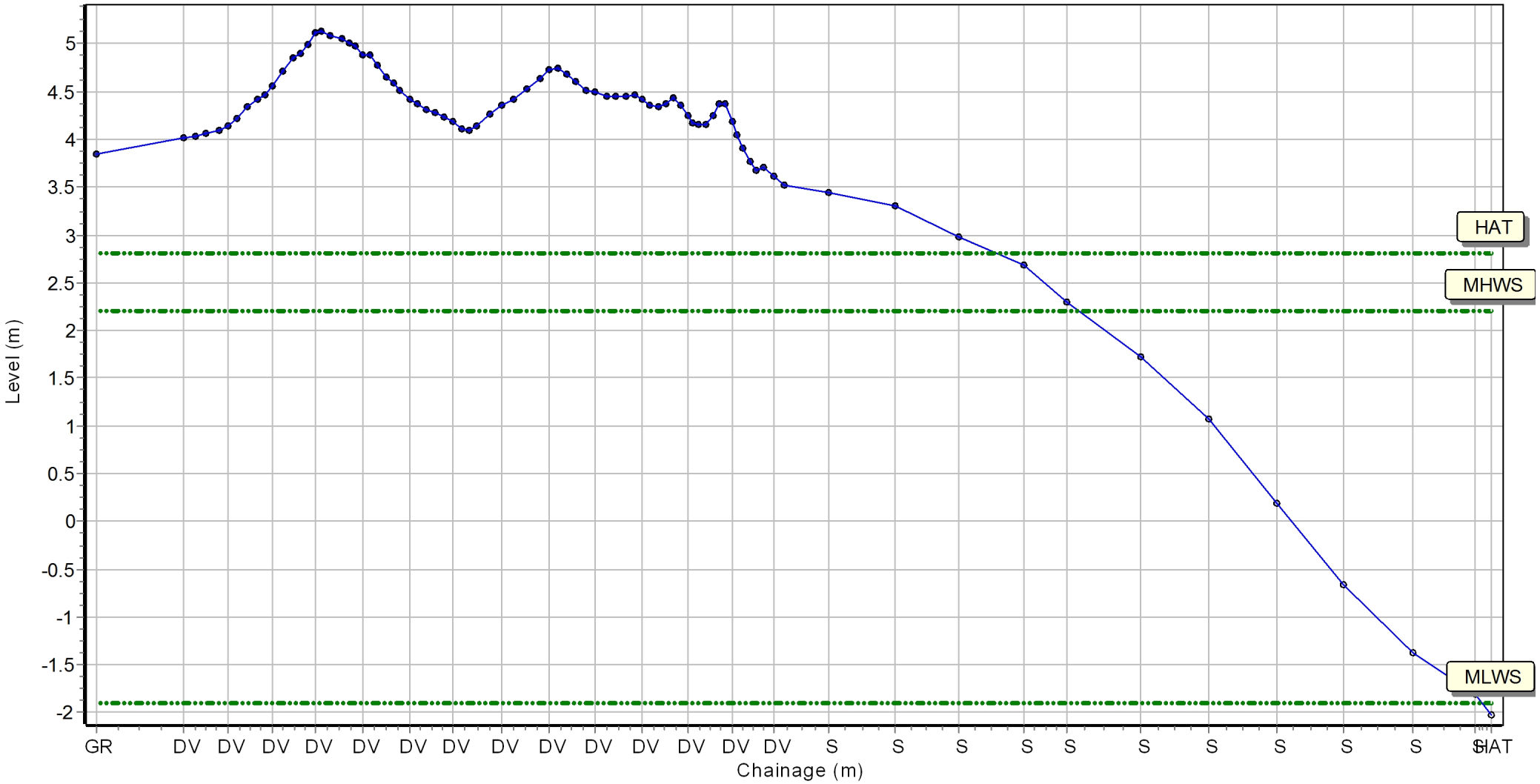
Location: **1aBTBC03**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400455.187 **Northing:** 651937.742 **Profile Bearing:** 330 ° from North



Beach Profile

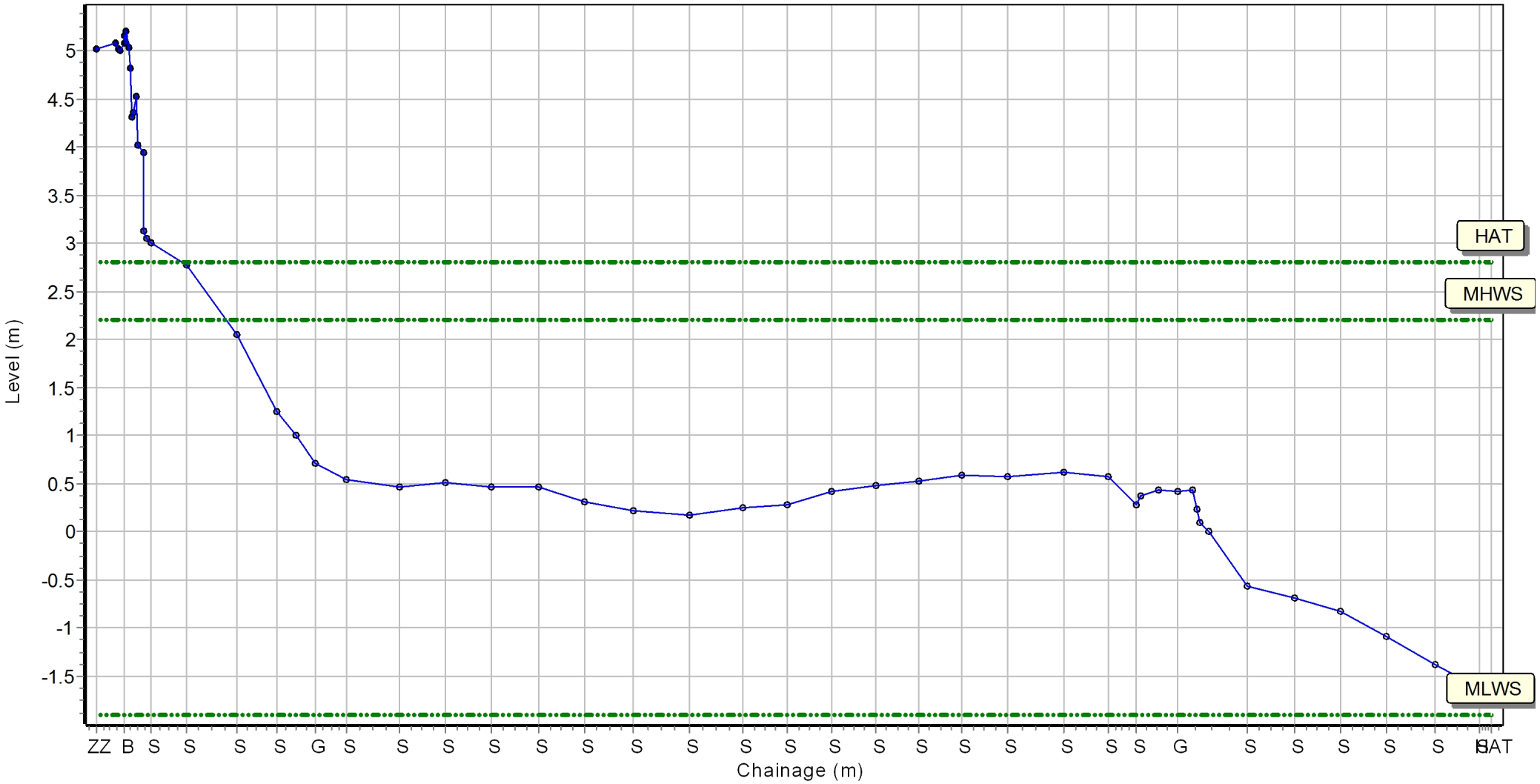
Location: **1aBTBC04**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400531.615 **Northing:** 652001.966 **Profile Bearing:** 27 ° from North



Beach Profile

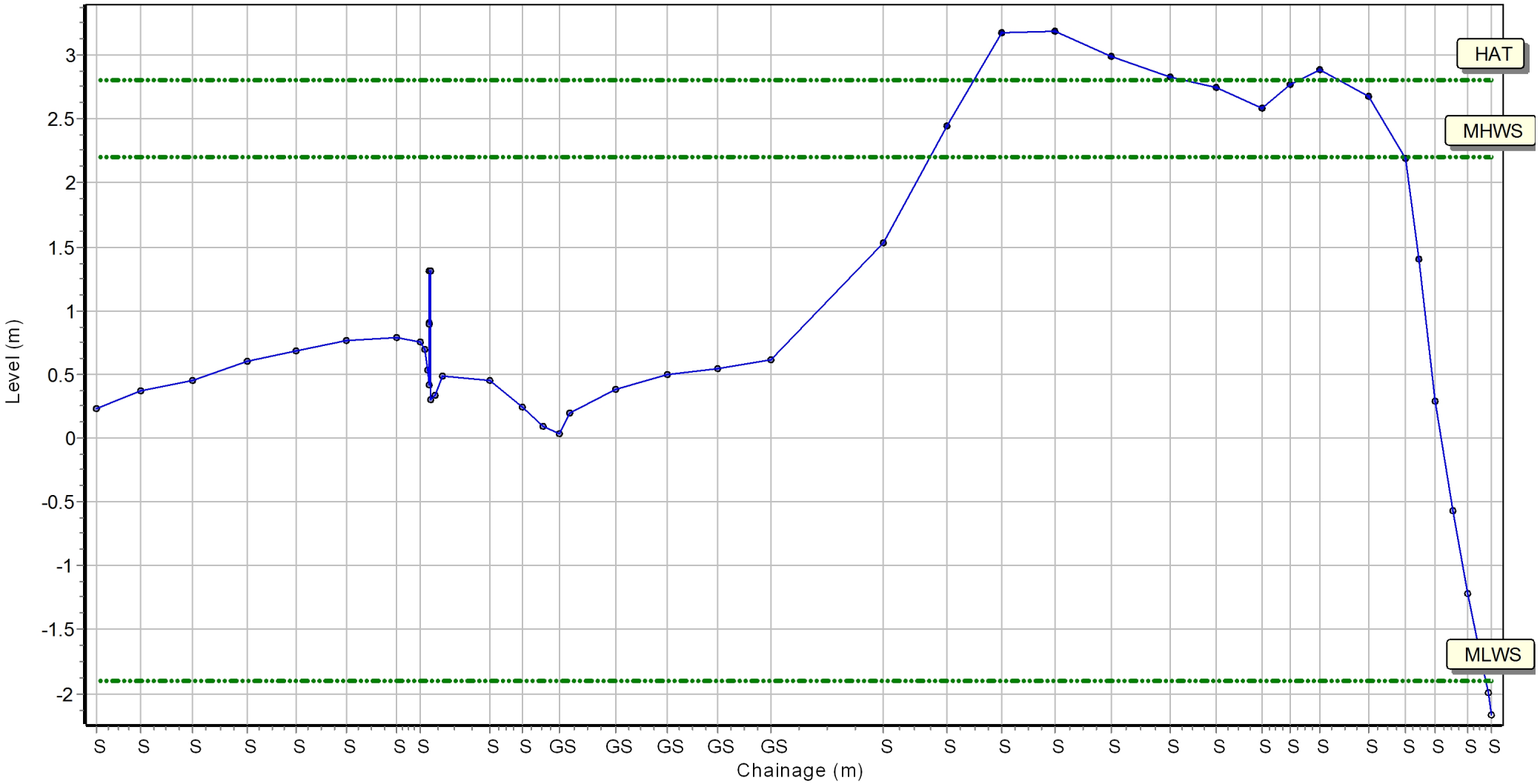
Location: **1aBTBC05**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400678.665 **Northing:** 651969.27 **Profile Bearing:** 298 ° from North



Beach Profile

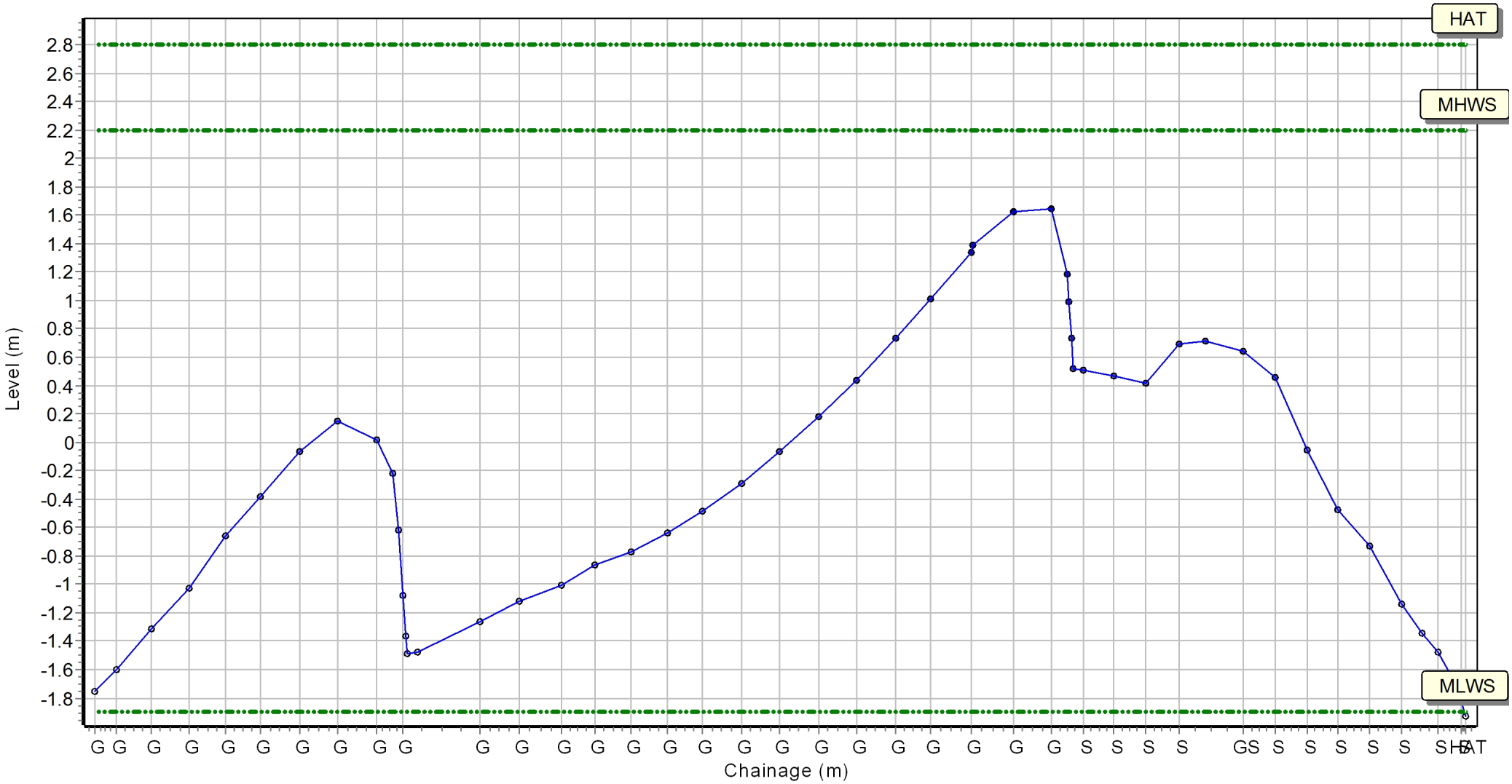
Location: **1aBTBC06**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400825.582 **Northing:** 652135.224 **Profile Bearing:** 295 ° from North



Beach Profile

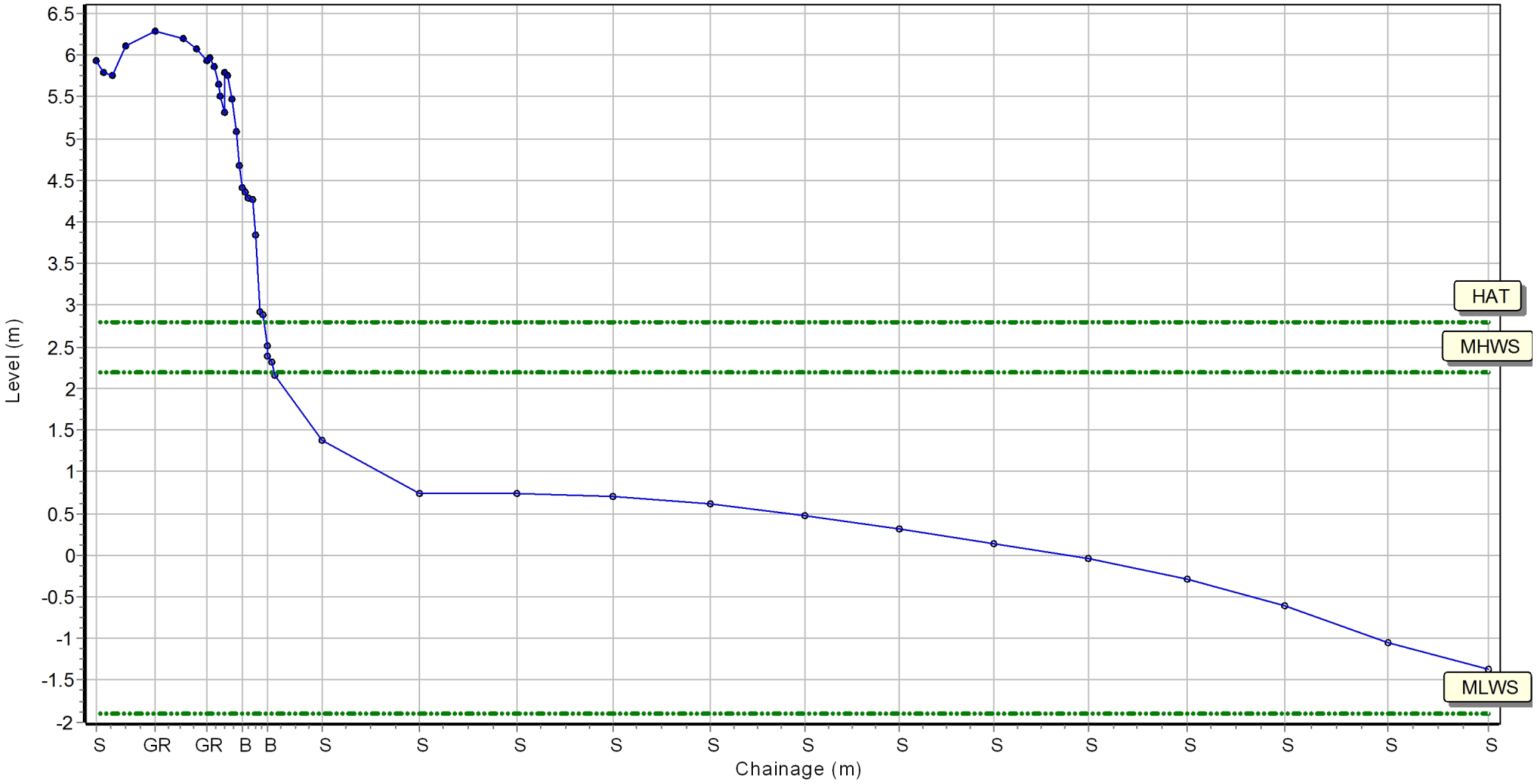
Location: **1aBTBC07**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400559.428 **Northing:** 651953.804 **Profile Bearing:** 67 ° from North



Beach Profile

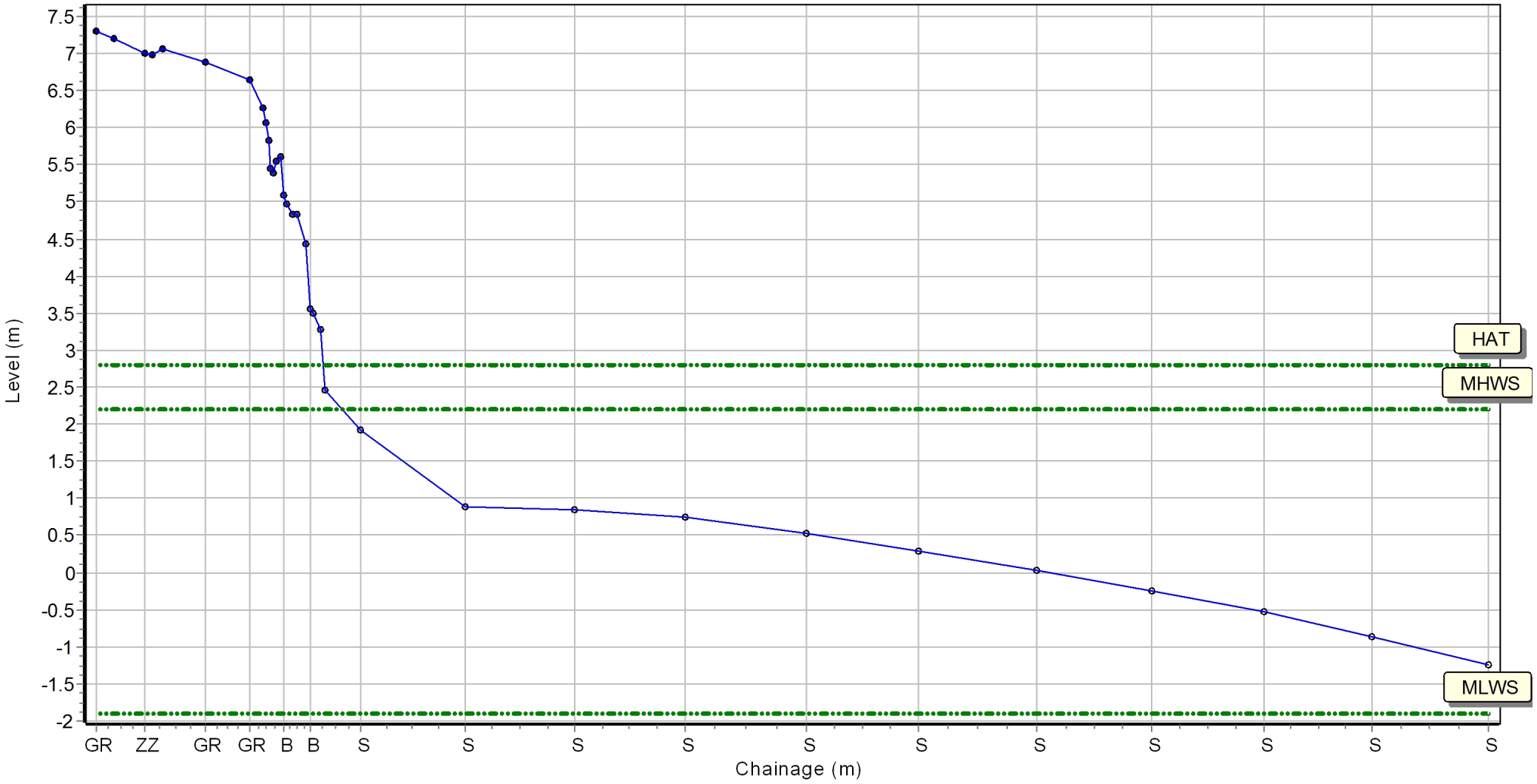
Location: **1aBTBC08**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400568.995 **Northing:** 651908.786 **Profile Bearing:** 68 ° from North



Beach Profile

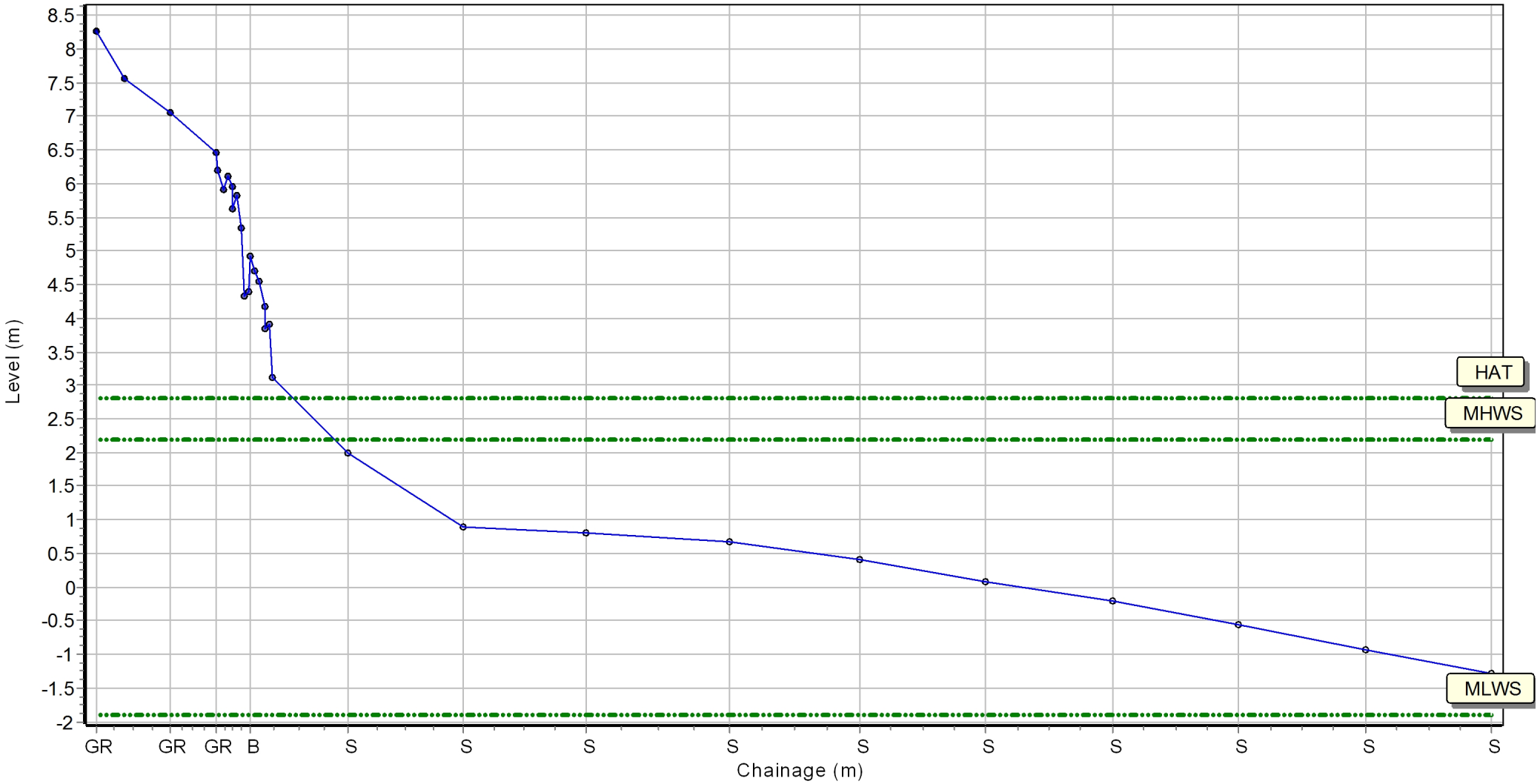
Location: **1aBTBC09**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400587.135 **Northing:** 651868.576 **Profile Bearing:** 70 ° from North



Beach Profile

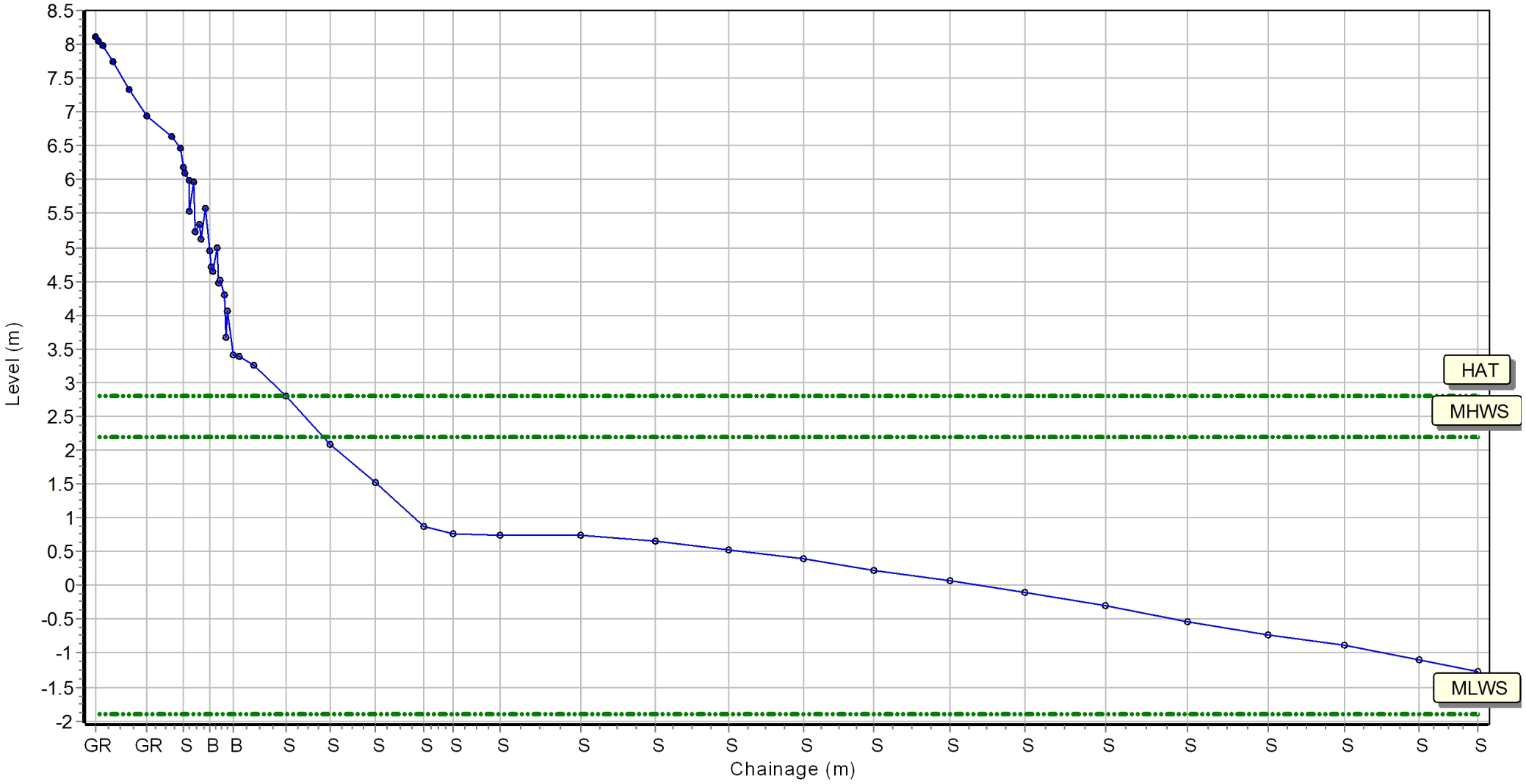
Location: **1aBTBC10**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400603.233 **Northing:** 651816.609 **Profile Bearing:** 69 ° from North



Beach Profile

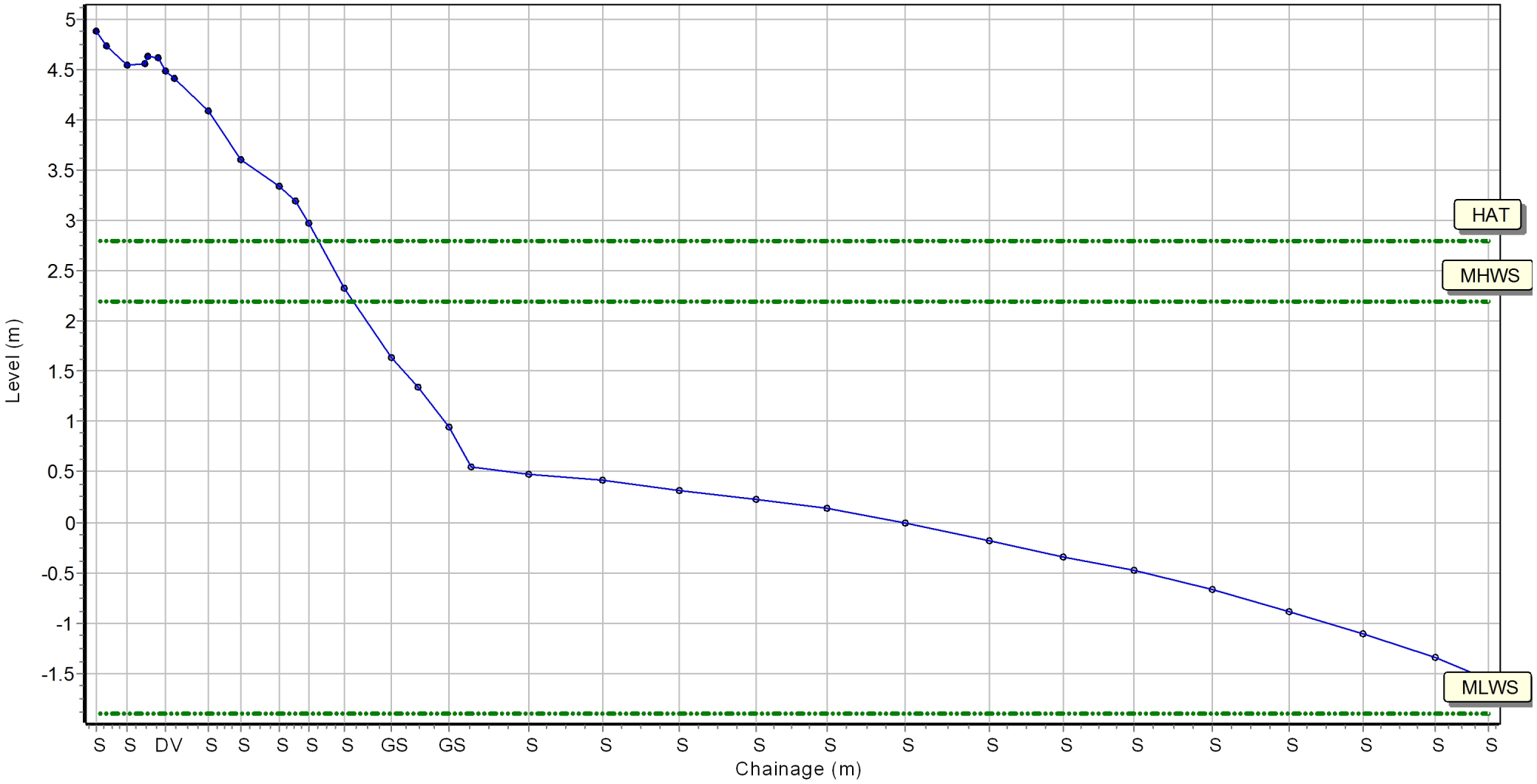
Location: **1aBTBC11**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400638.037 **Northing:** 651699.812 **Profile Bearing:** 66 ° from North



Beach Profile

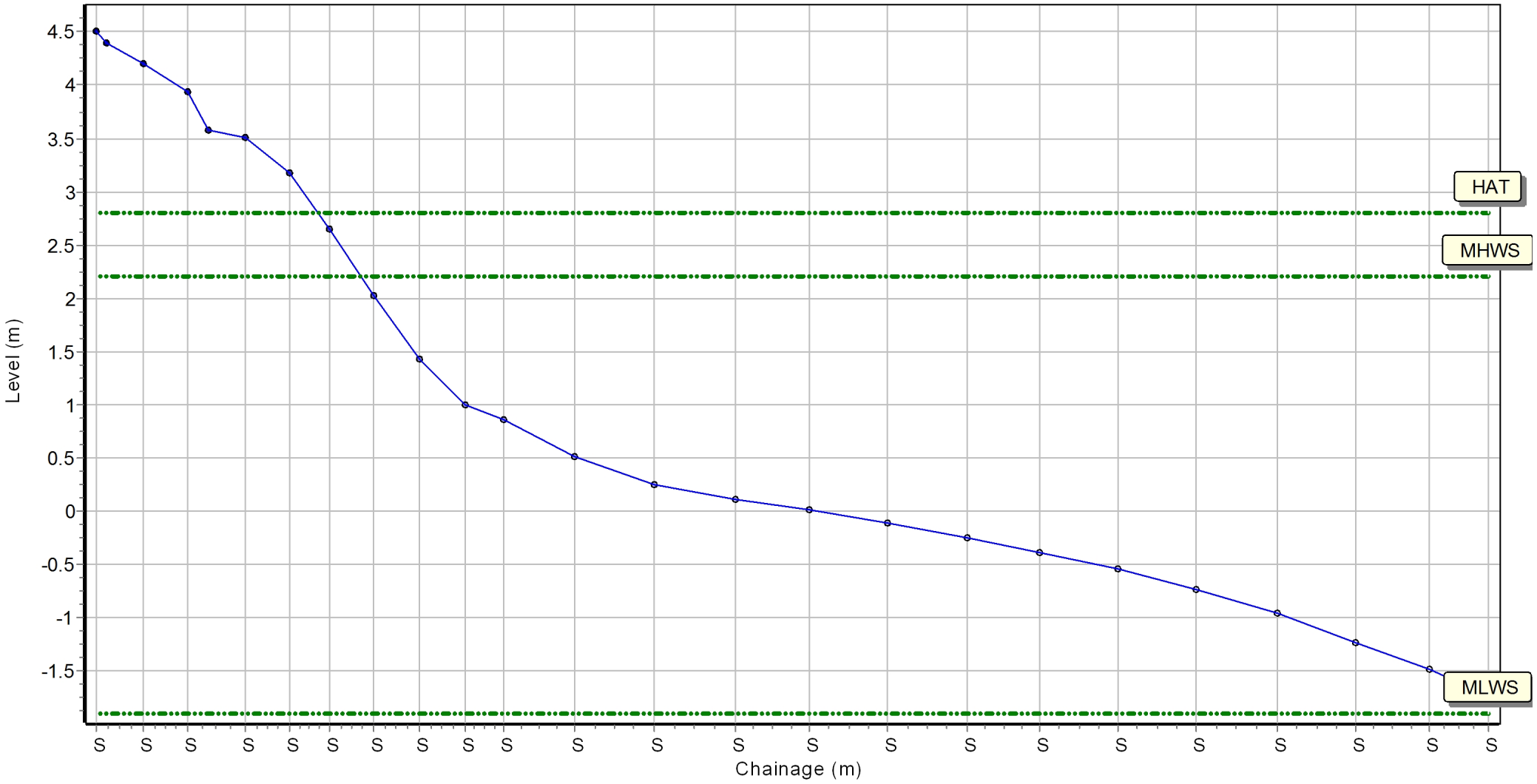
Location: **1aBTBC12**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400693.518 **Northing:** 651579.795 **Profile Bearing:** 63 ° from North



Beach Profile

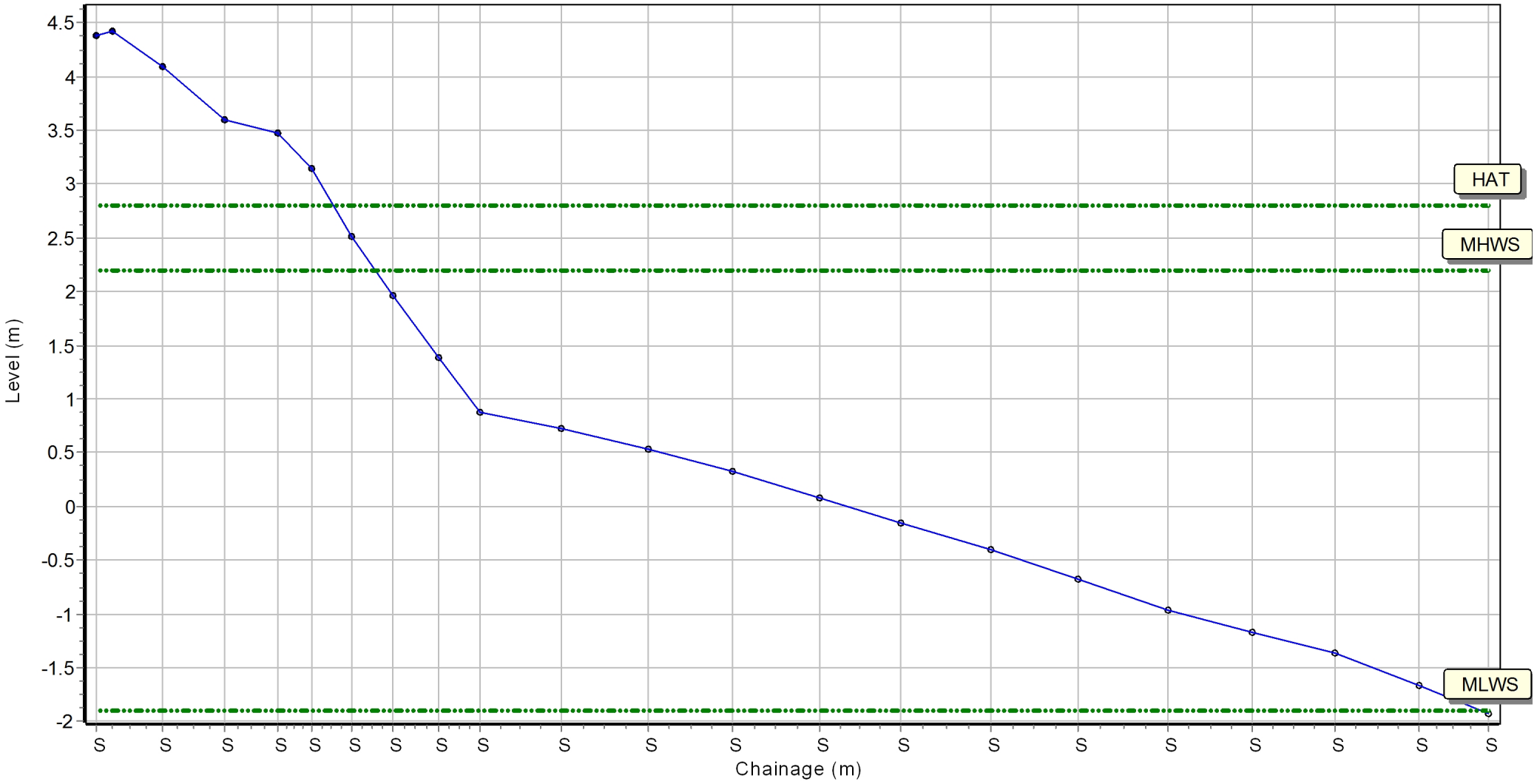
Location: **1aBTBC13**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 400820.787 **Northing:** 651312.459 **Profile Bearing:** 65 ° from North



Beach Profile

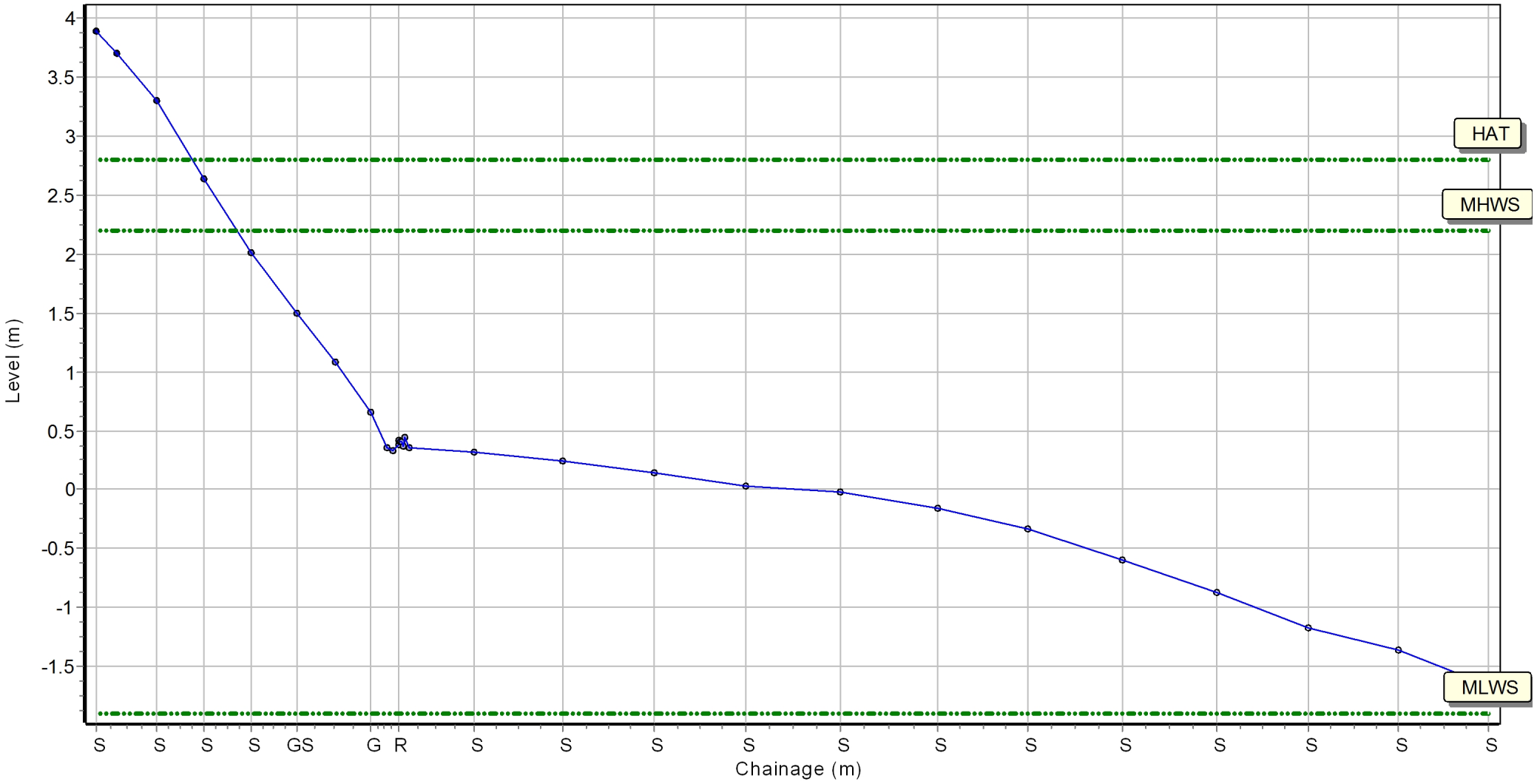
Location: **1aBTBC14**

Date: 03/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 401030.513 **Northing:** 651003.409 **Profile Bearing:** 60 ° from North



Beach Profile

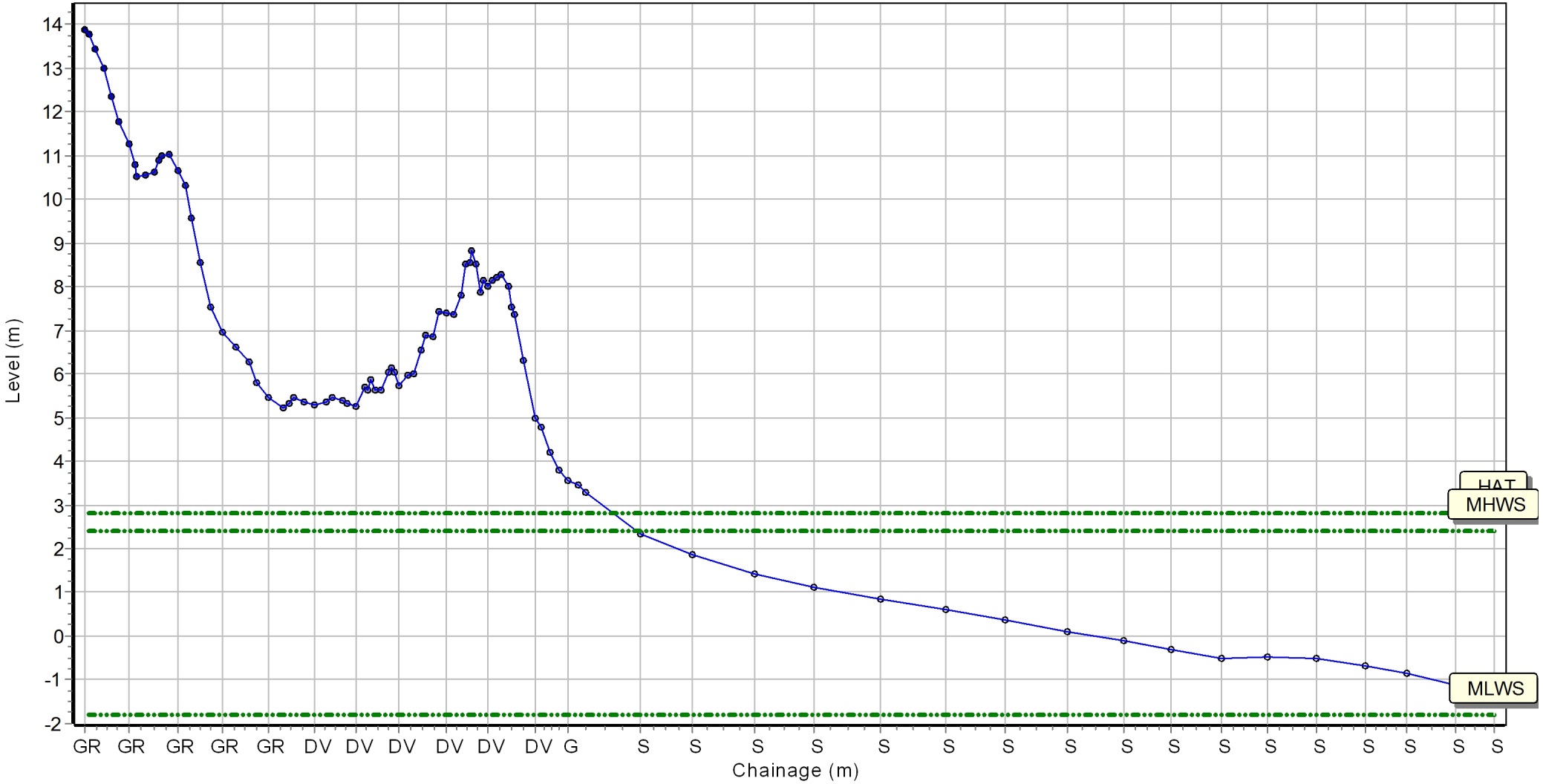
Location: **1aBTBC15**

Date: 17/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 402663.736 **Northing:** 648593.739 **Profile Bearing:** 40 ° from North



Beach Profile

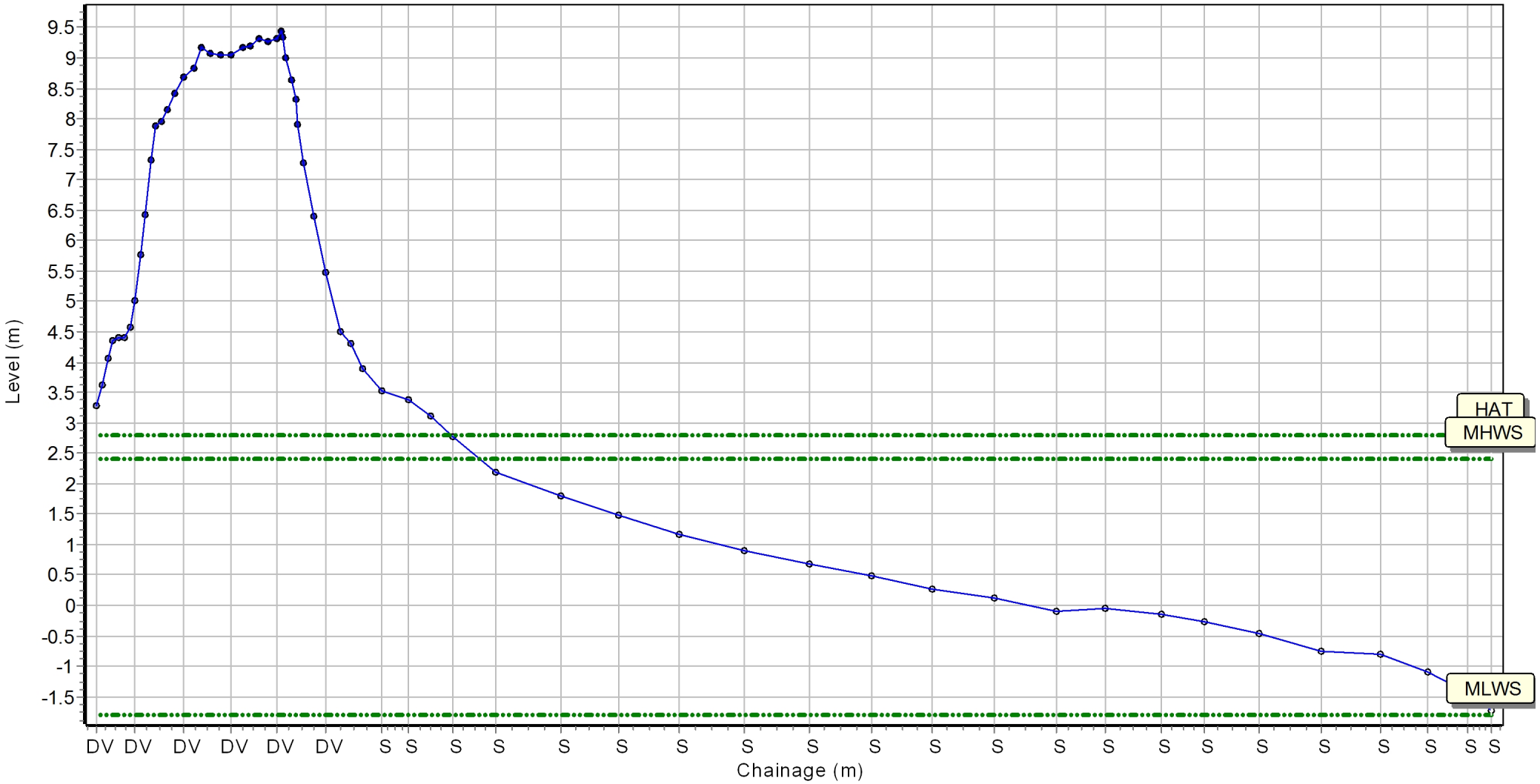
Location: **1aBTBC16**

Date: 17/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 403565.671 **Northing:** 647735.833 **Profile Bearing:** 53 ° from North



Beach Profile

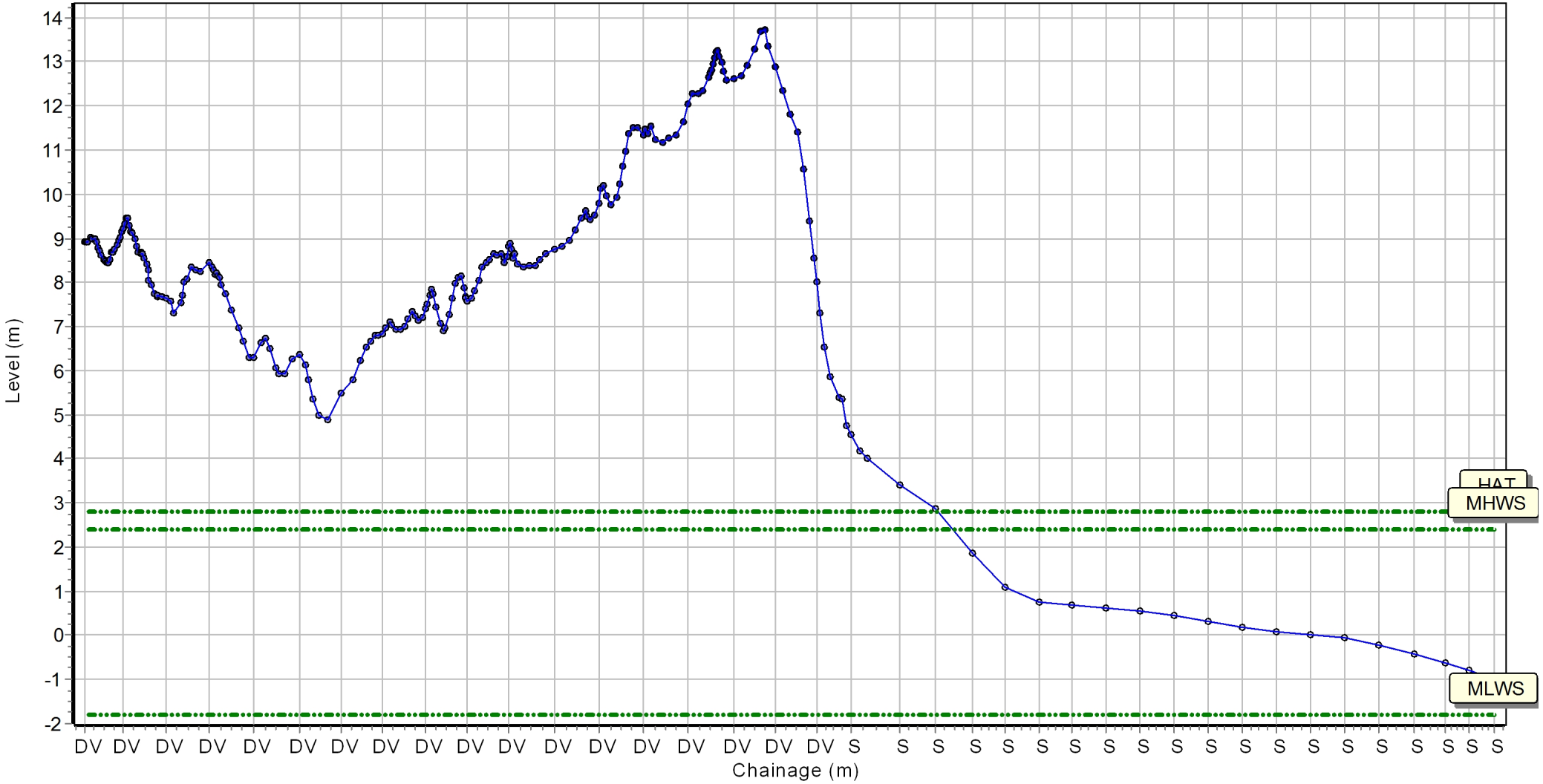
Location: **1aBTBC17**

Date: 17/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 404433.939 **Northing:** 646713.965 **Profile Bearing:** 51 ° from North



Beach Profile

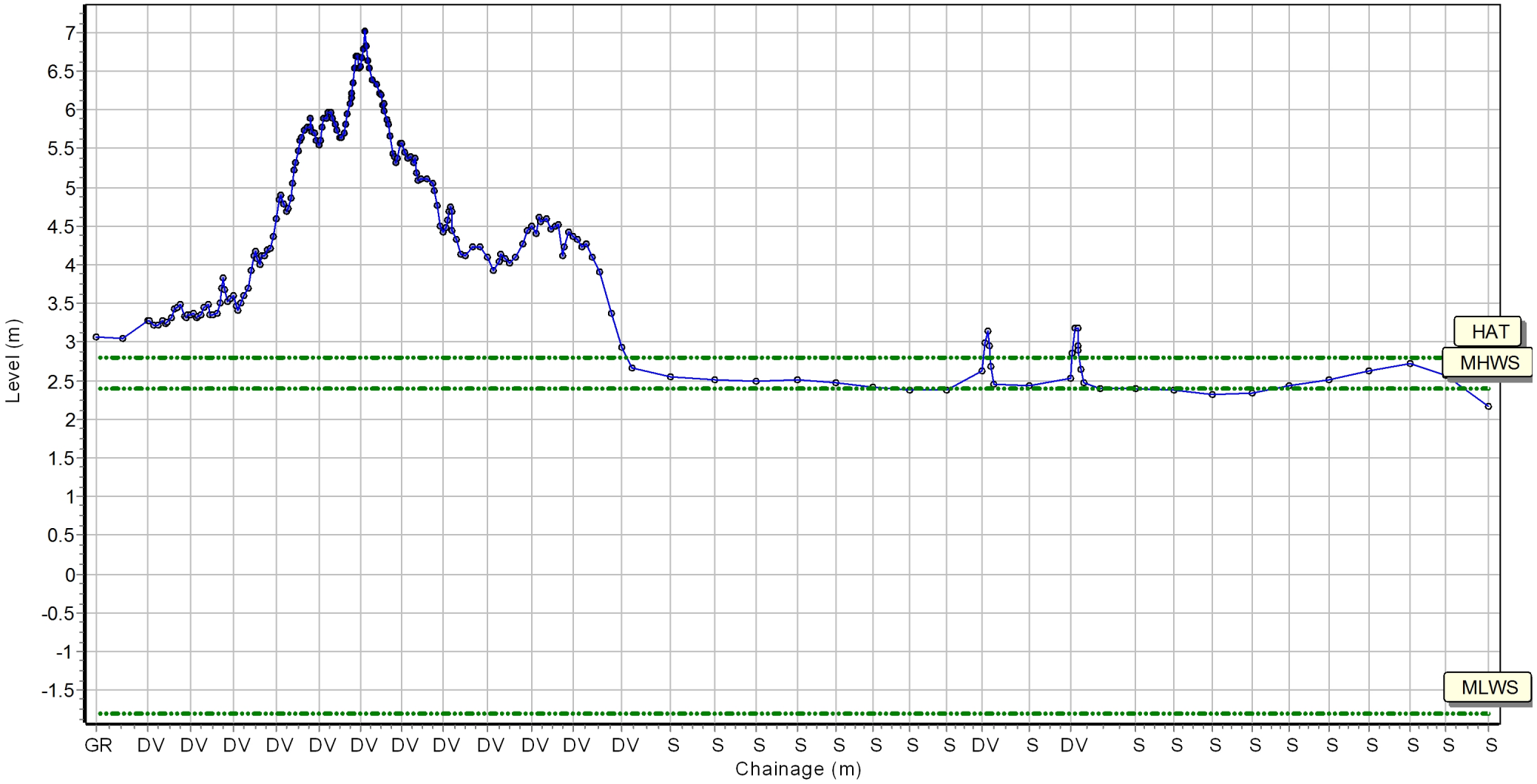
Location: **1aBTBC18**

Date: 17/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 405985.759 **Northing:** 645466.297 **Profile Bearing:** 38 ° from North



Beach Profile

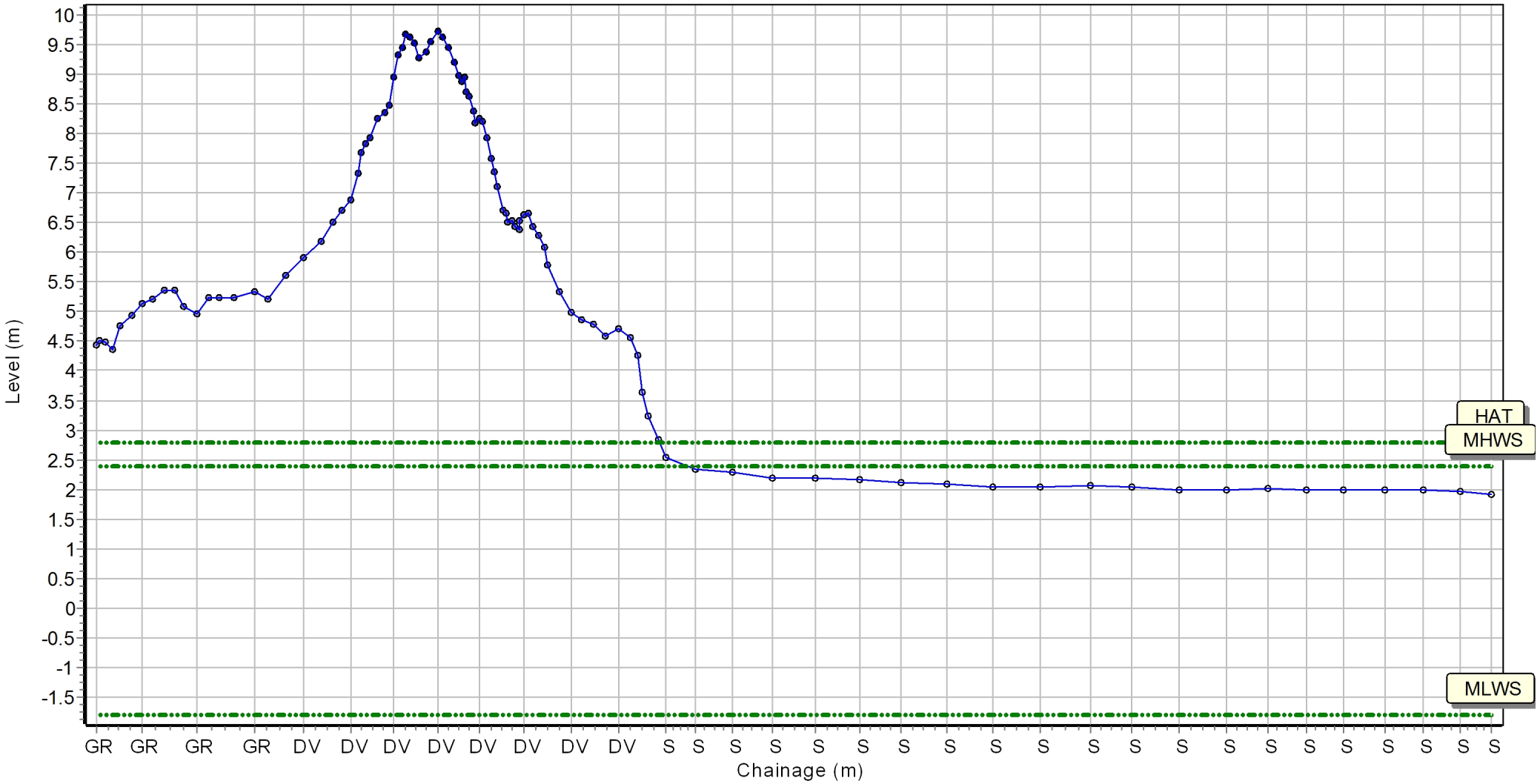
Location: **1aBTBC19**

Date: 17/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 407091.566 **Northing:** 644616.133 **Profile Bearing:** 34 ° from North



Beach Profile

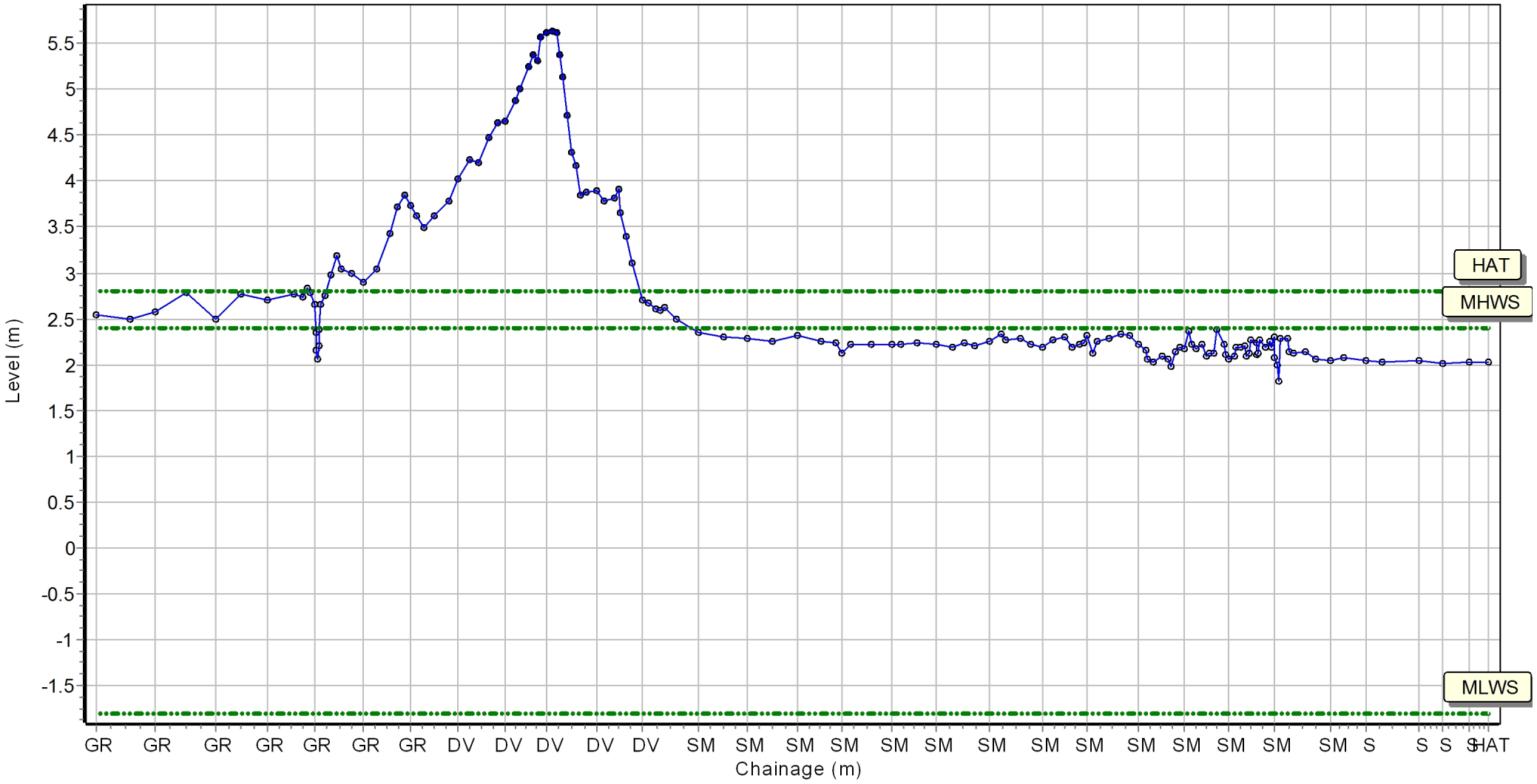
Location: **1aBTBC20**

Date: 17/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 407390.255 **Northing:** 643841.768 **Profile Bearing:** 45 ° from North



Beach Profile

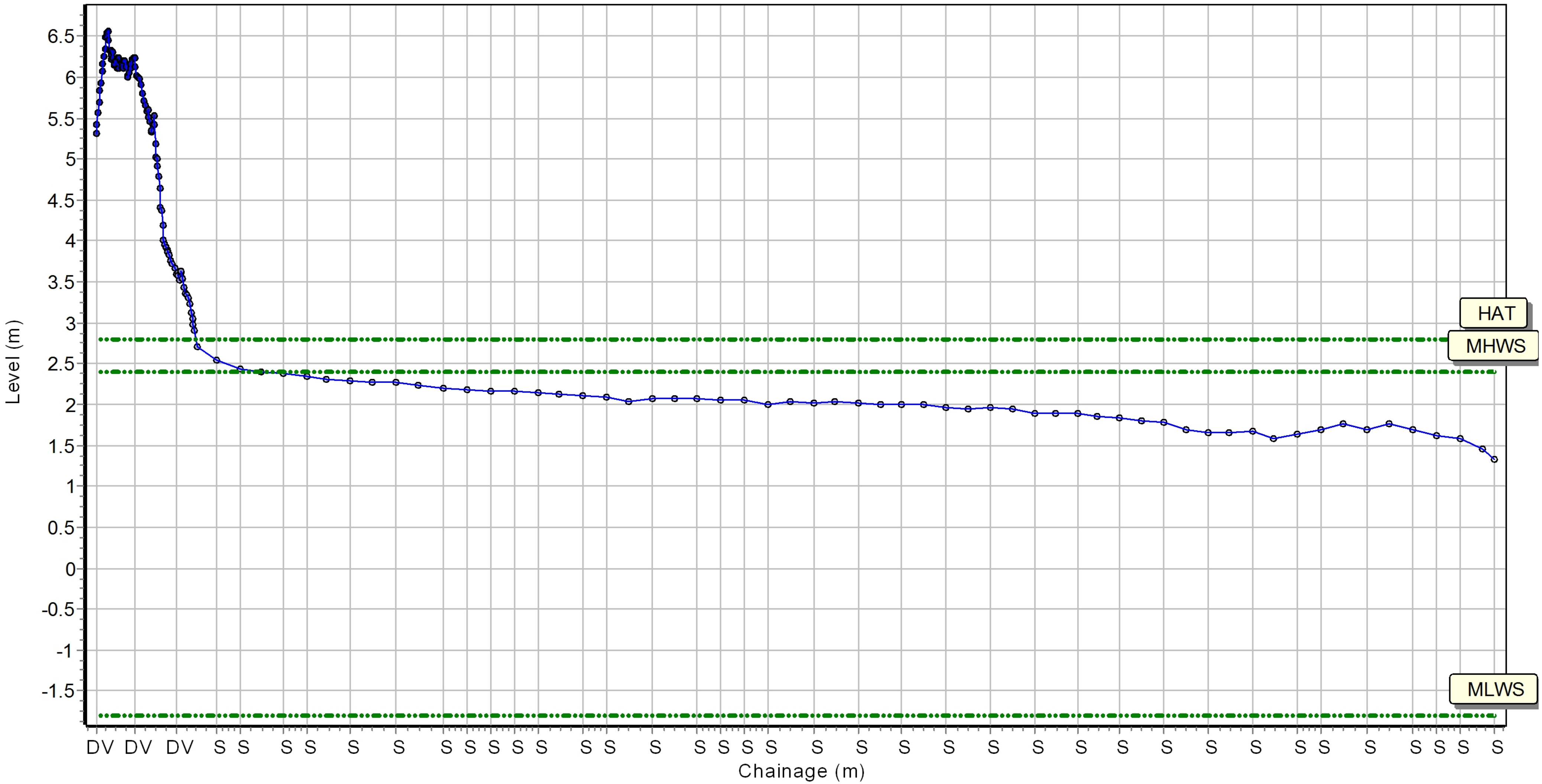
Location: 1aBTBC21

Date: 17/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 409501.341 **Northing:** 643847.61 **Profile Bearing:** 33 ° from North



Beach Profile

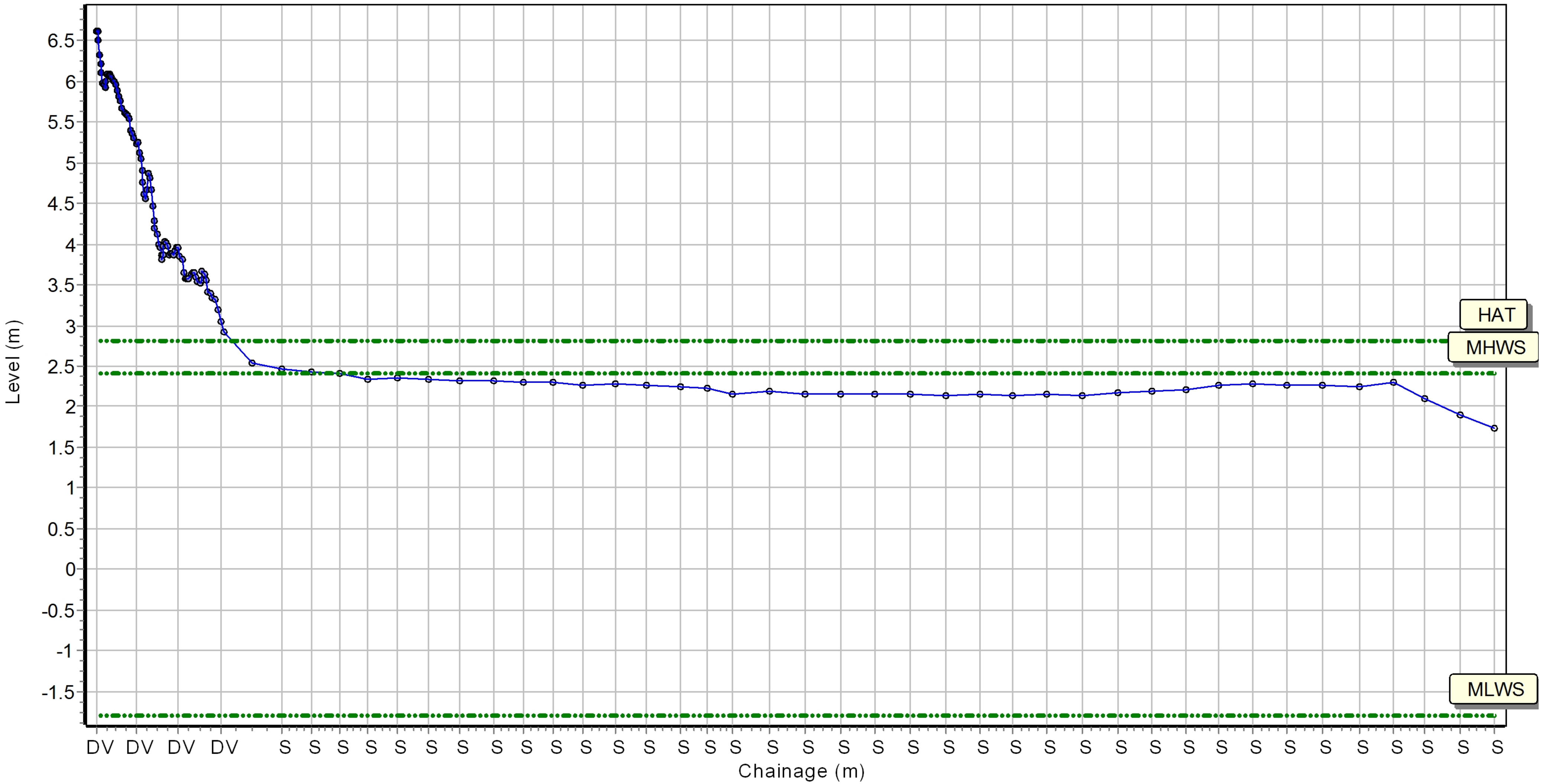
Location: 1aBTBC22

Date: 17/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 410213.981 **Northing:** 643697.867 **Profile Bearing:** 27 ° from North



http://www.sandsuser.com **SANDS**

Beach Profile

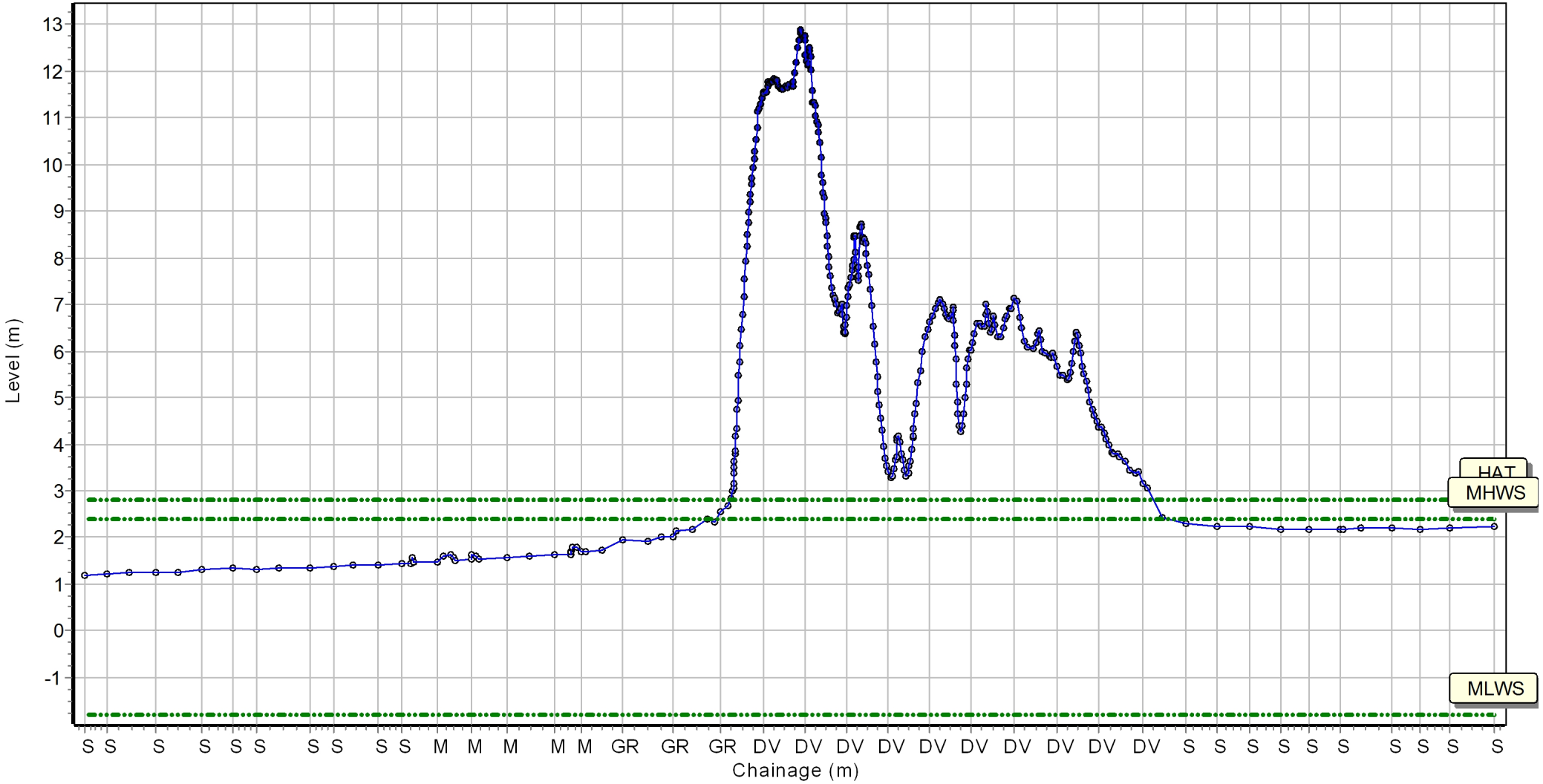
Location: **1aBTBC23**

Date: 17/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 411084.123 **Northing:** 643008.731 **Profile Bearing:** 0 ° from North



Beach Profile

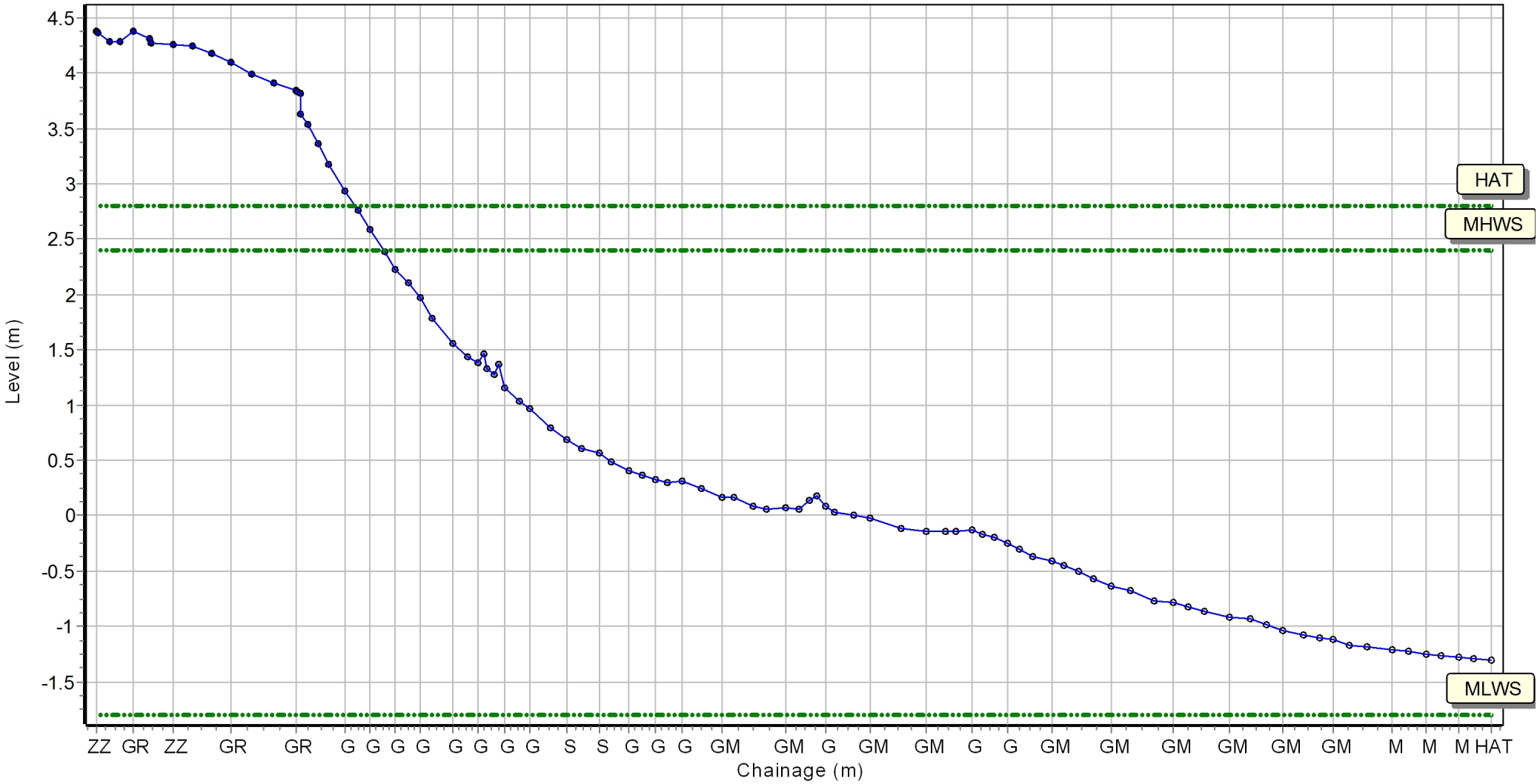
Location: **1aBTBC24**

Date: 17/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 413330.108 **Northing:** 641794.909 **Profile Bearing:** 227 ° from North



Beach Profile

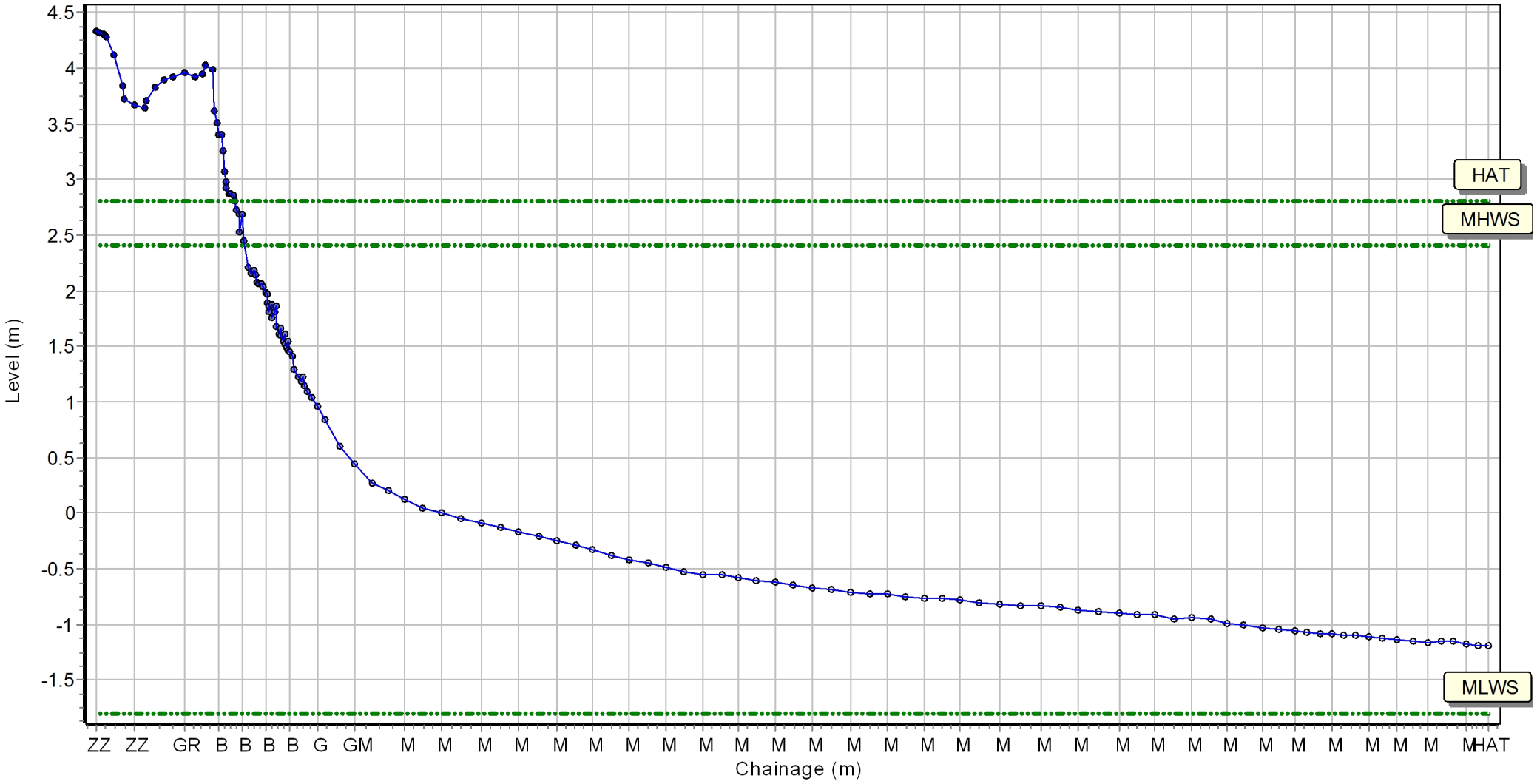
Location: **1aBTBC25**

Date: 17/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 413102.684 **Northing:** 641936.754 **Profile Bearing:** 173 ° from North



Beach Profile

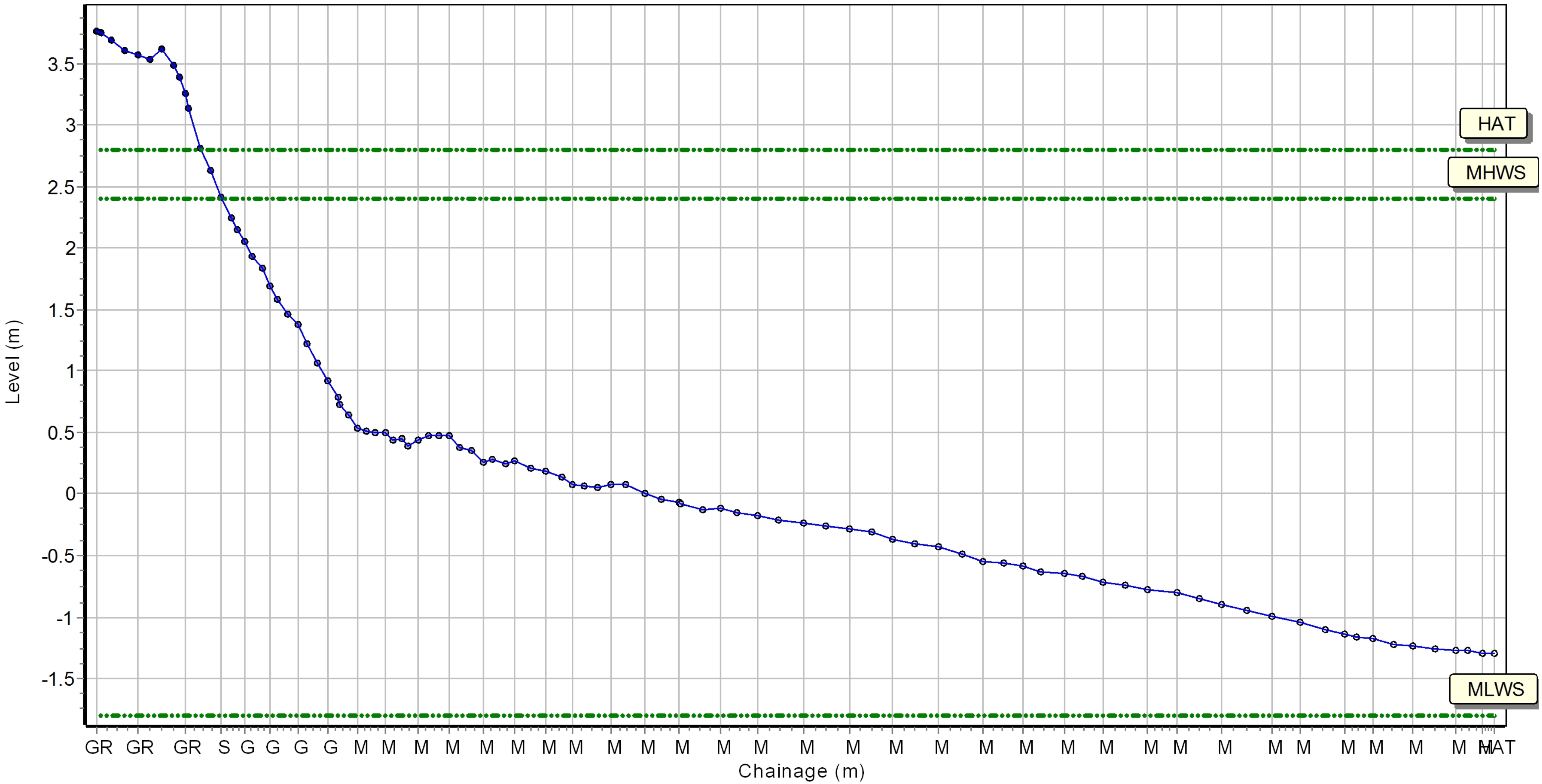
Location: 1aBTBC26

Date: 17/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 412895.322 **Northing:** 641784.343 **Profile Bearing:** 122 ° from North



http://www.sandsuser.com **SANDS**

Beach Profile

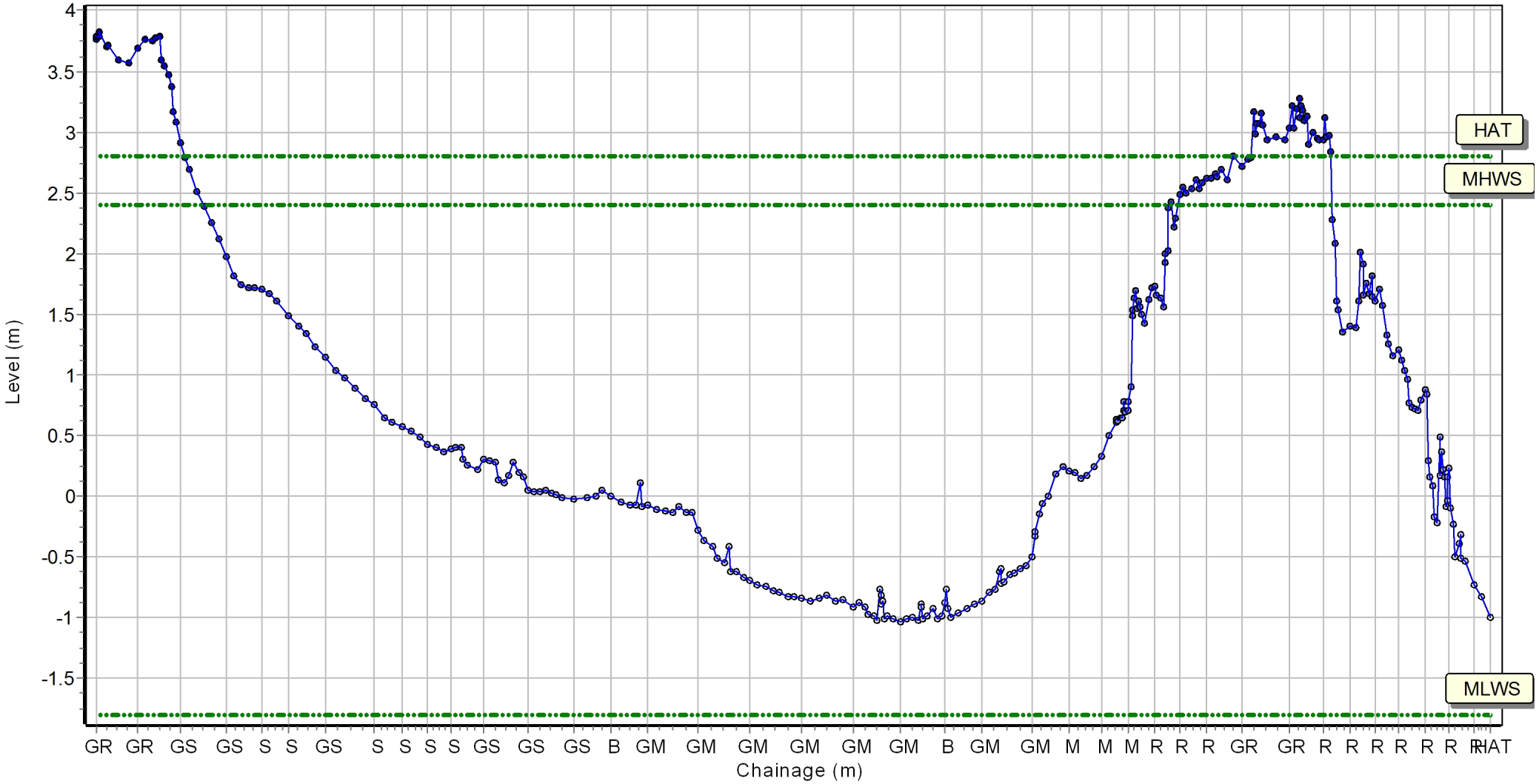
Location: **1aBTBC27**

Date: 17/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 412475.398 **Northing:** 641733.834 **Profile Bearing:** 227 ° from North



Beach Profile

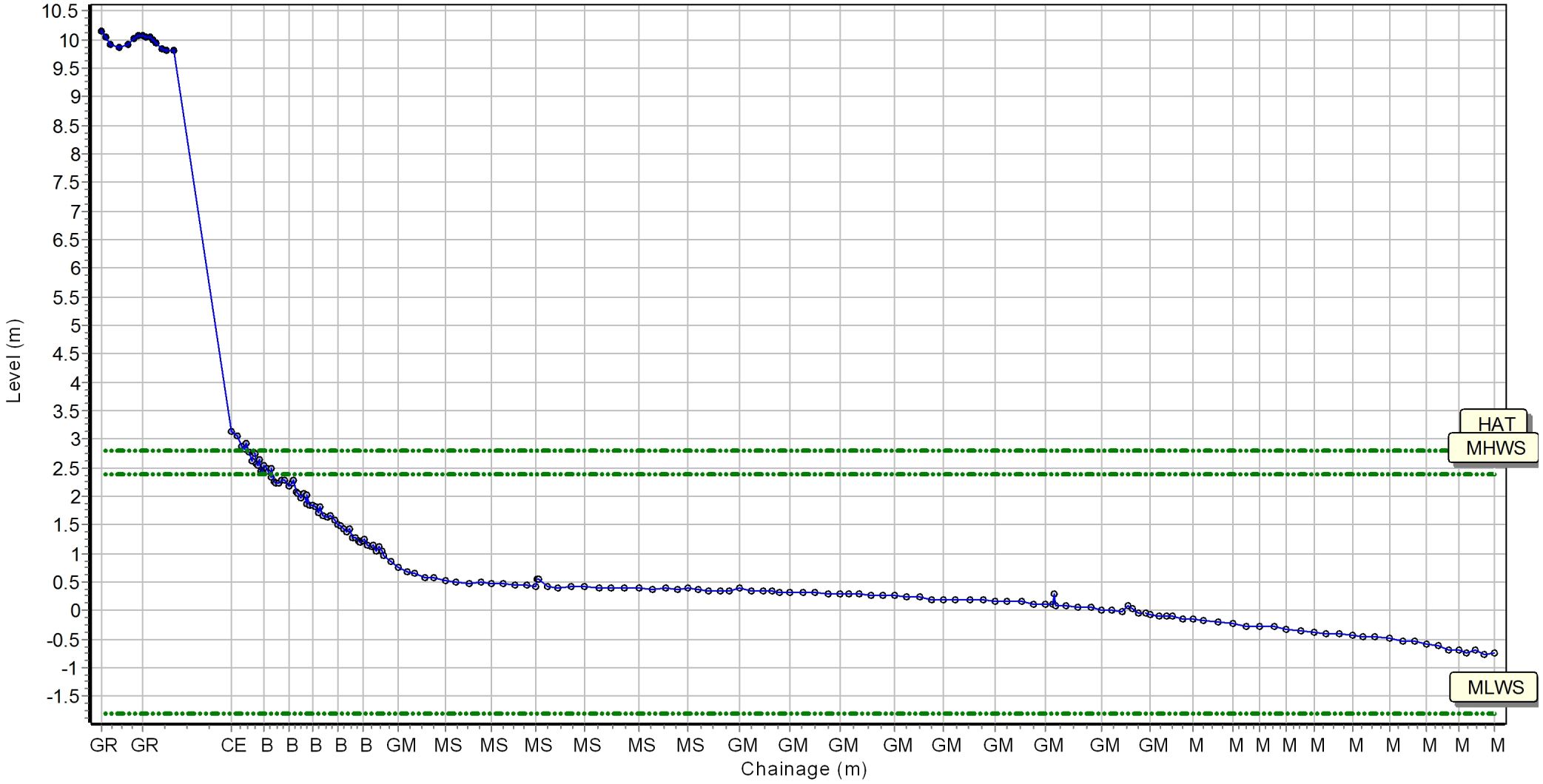
Location: **1aBTBC28**

Date: 17/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 412324.036 **Northing:** 641984.353 **Profile Bearing:** 245 ° from North



Beach Profile

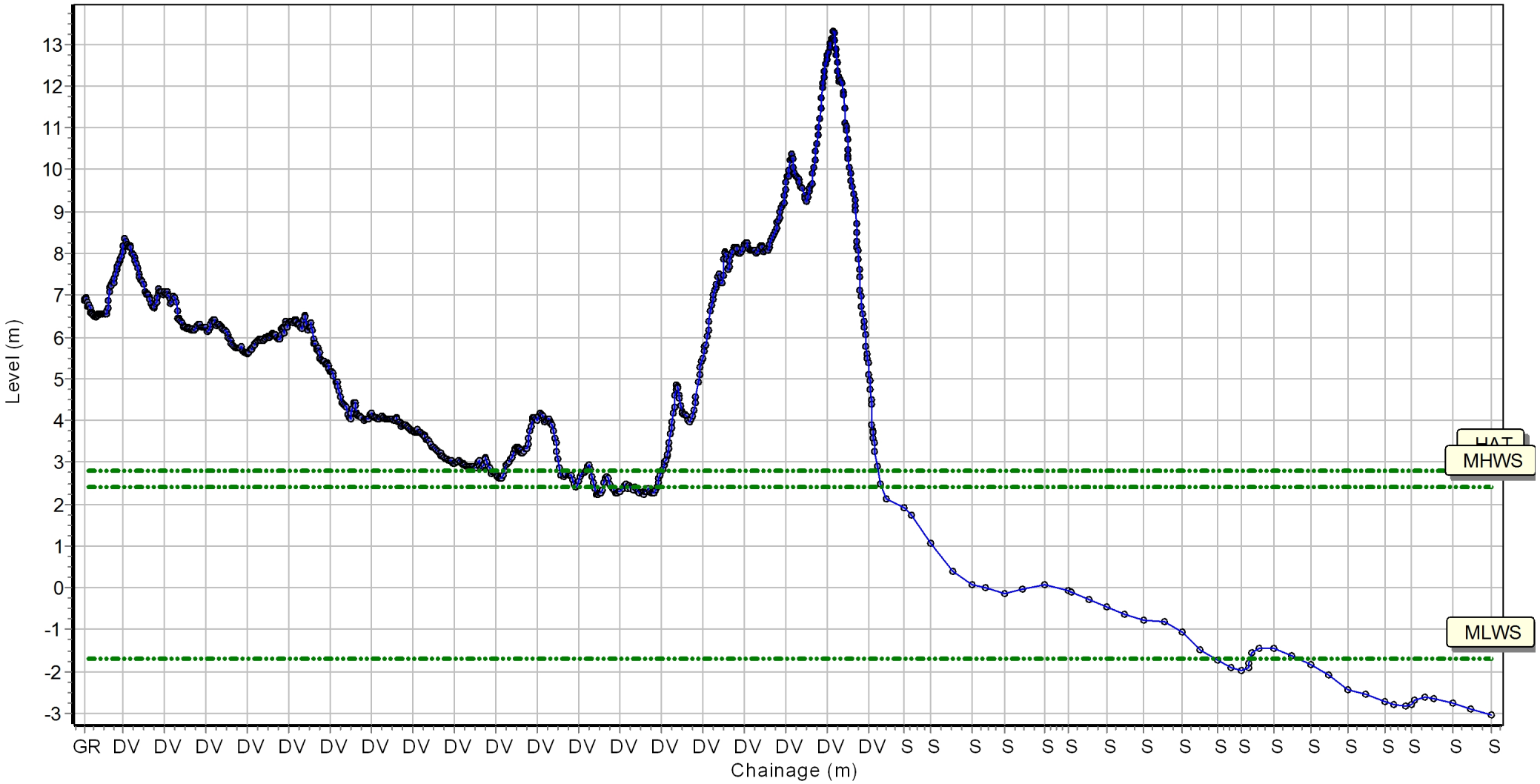
Location: **1aBTBC29**

Date: 01/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 418972.296 **Northing:** 634628.46 **Profile Bearing:** 31 ° from North



Beach Profile

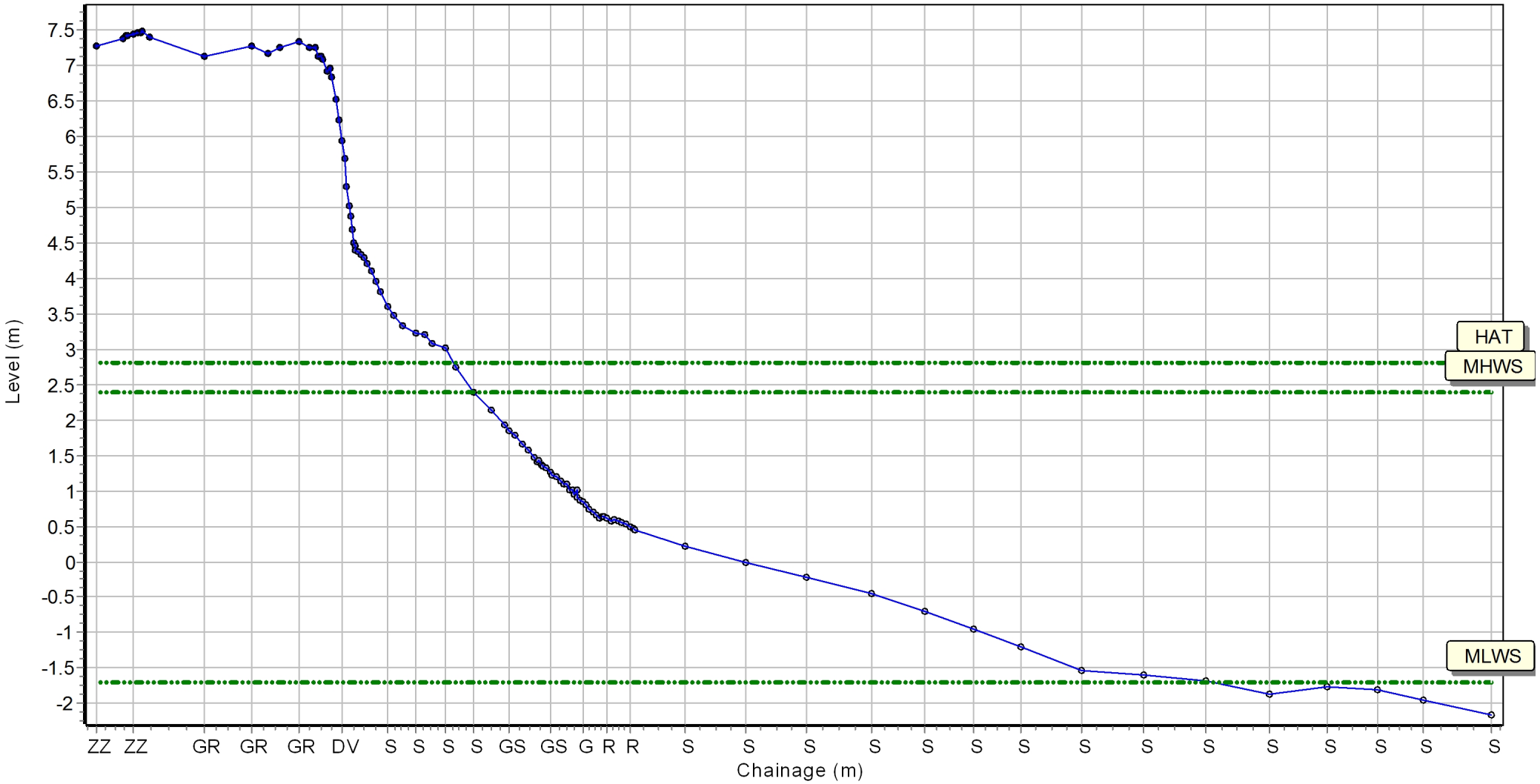
Location: **1aBTBC30**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423056.791 **Northing:** 629887.437 **Profile Bearing:** 71 ° from North



Beach Profile

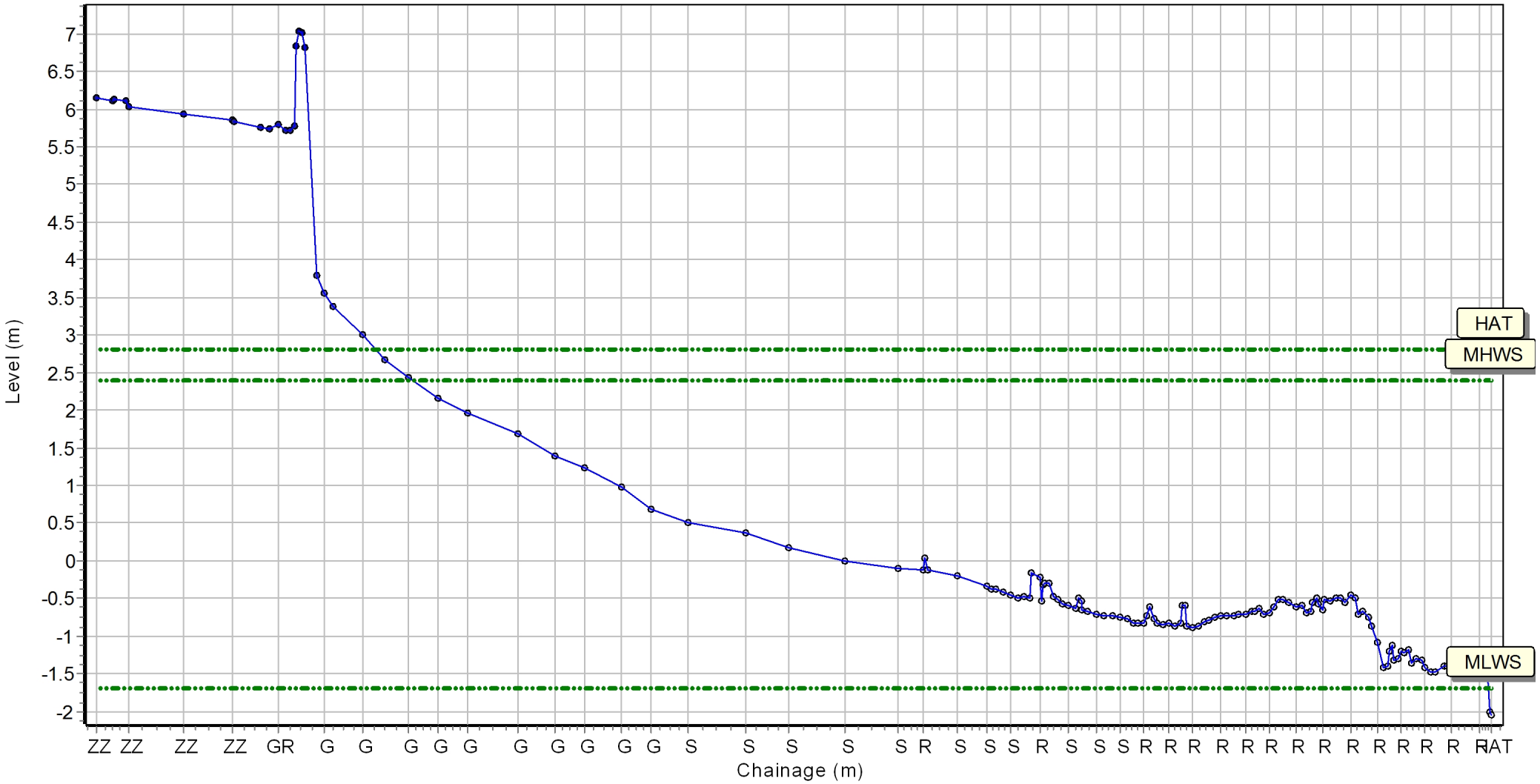
Location: **1aBTBC31**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423579.204 **Northing:** 628973.295 **Profile Bearing:** 56 ° from North



Beach Profile

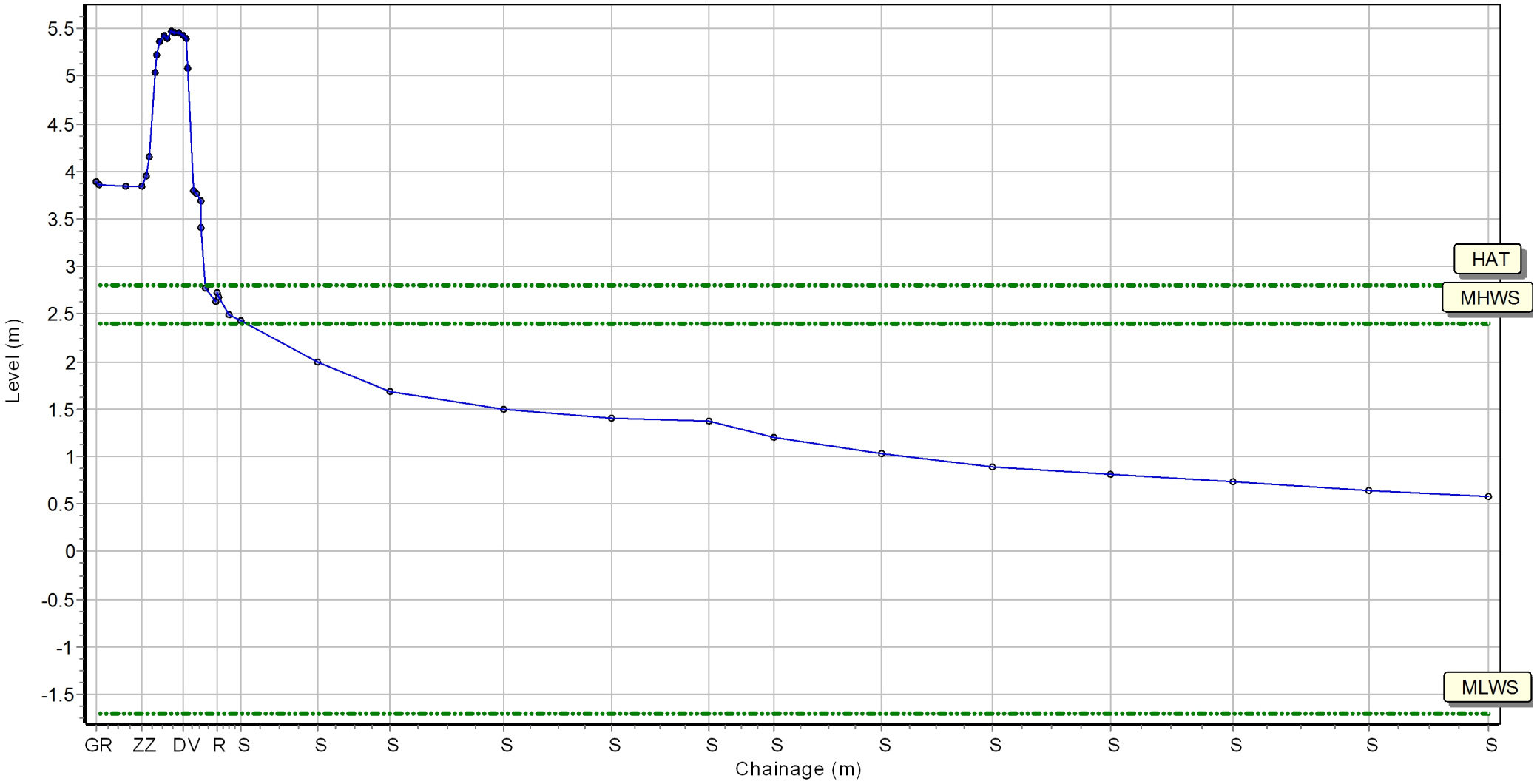
Location: **1aBTBC32**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423738.386 **Northing:** 628624.99 **Profile Bearing:** 279 ° from North



Beach Profile

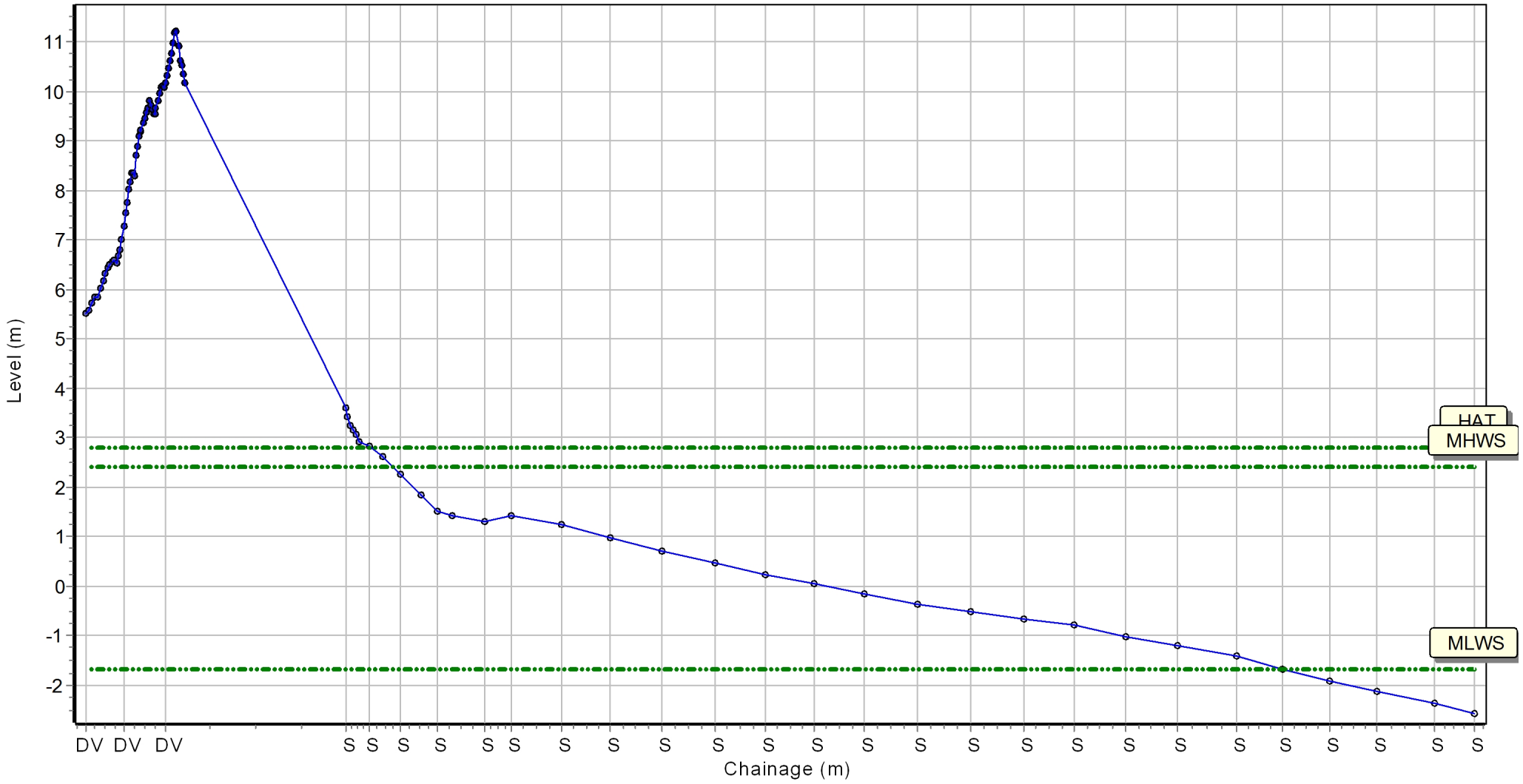
Location: **1aBTBC33**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423672.571 **Northing:** 628761.646 **Profile Bearing:** 204 ° from North



Beach Profile

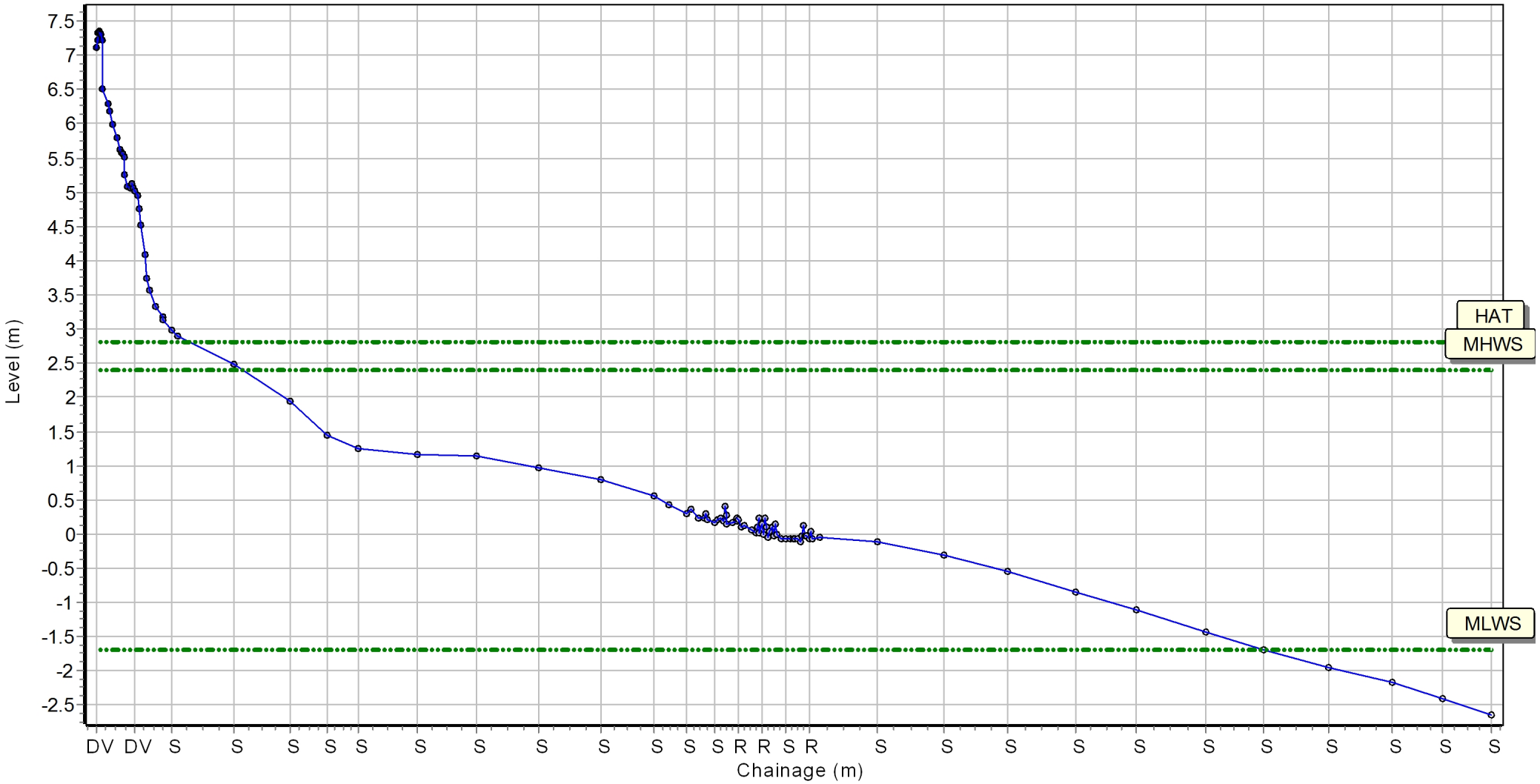
Location: **1aBTBC34**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423434.960 **Northing:** 628693.15 **Profile Bearing:** 160 ° from North



Beach Profile

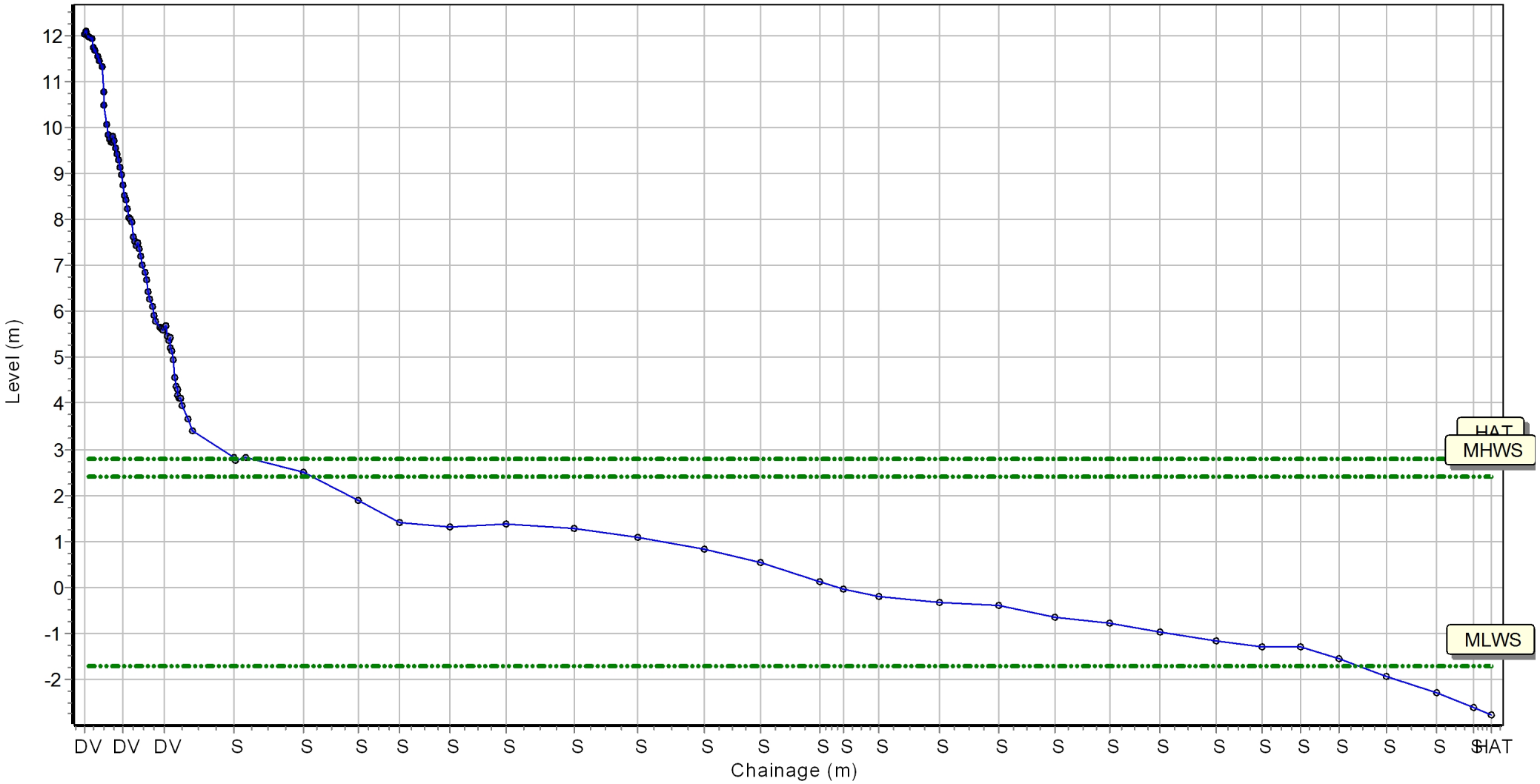
Location: **1aBTBC35**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423171.083 **Northing:** 628414.273 **Profile Bearing:** 105 ° from North



Beach Profile

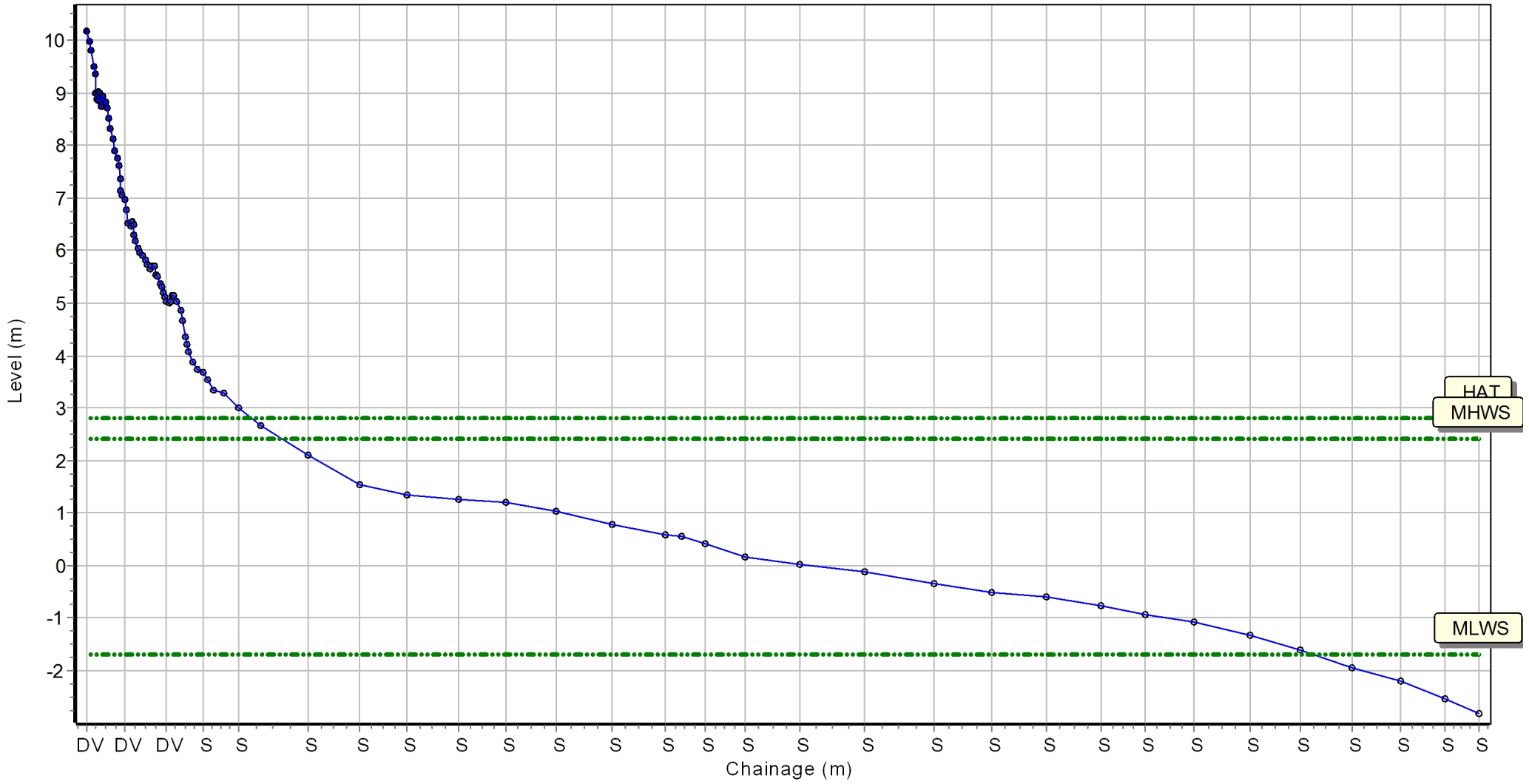
Location: **1aBTBC36**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423094.516 **Northing:** 628204.644 **Profile Bearing:** 106 ° from North



Beach Profile

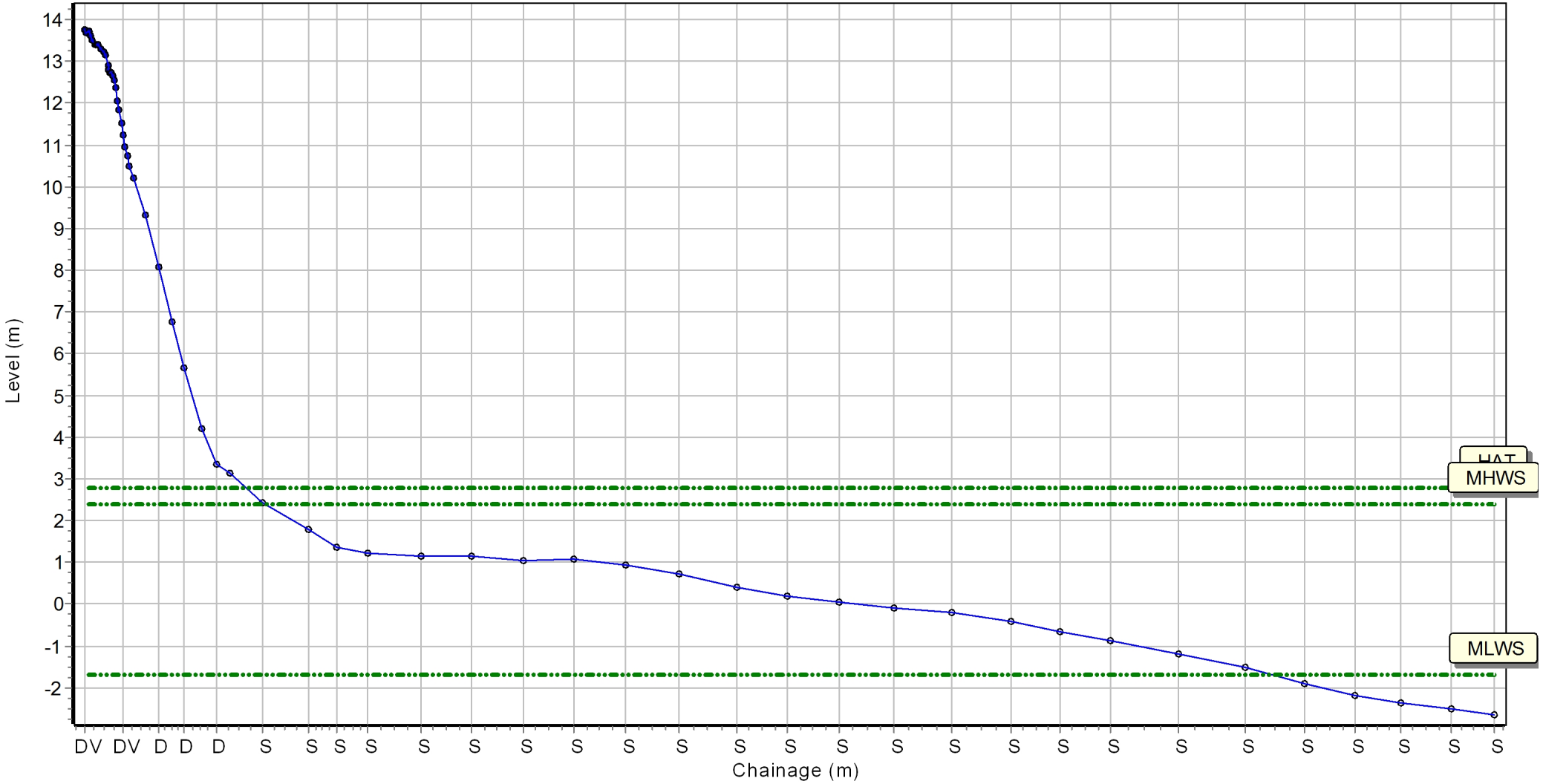
Location: **1aBTBC37**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423060.156 **Northing:** 628006.169 **Profile Bearing:** 96 ° from North



Beach Profile

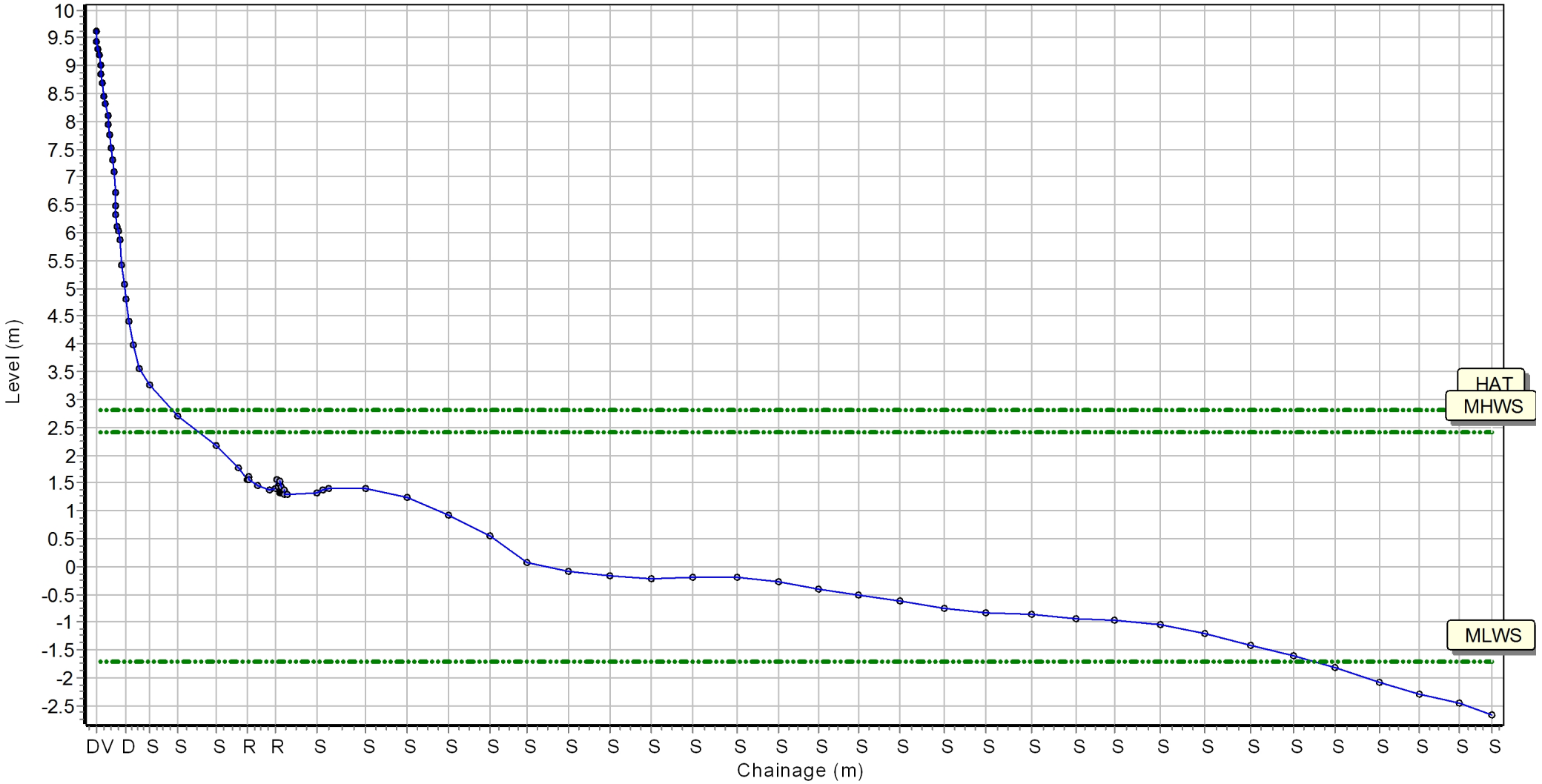
Location: **1aBTBC38**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423022.073 **Northing:** 627769.195 **Profile Bearing:** 92 ° from North



Beach Profile

Location: 1aADC01

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 422824.294 **Northing:** 627077.805 **Profile Bearing:** 77 ° from North

Beach Profile

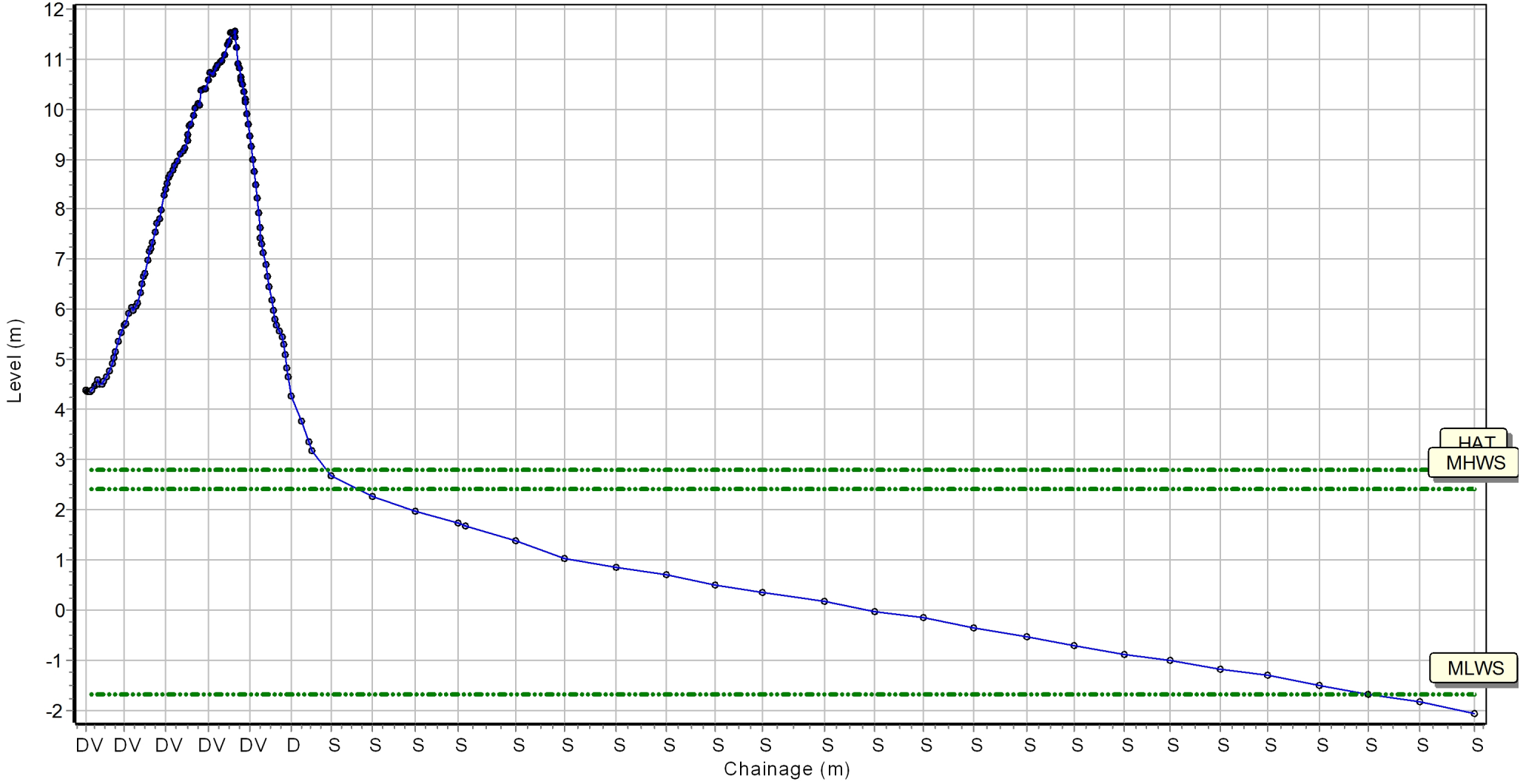
Location: **1aADC02**

Date: 18/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 423387.925 **Northing:** 626385.049 **Profile Bearing:** 56 ° from North



Beach Profile

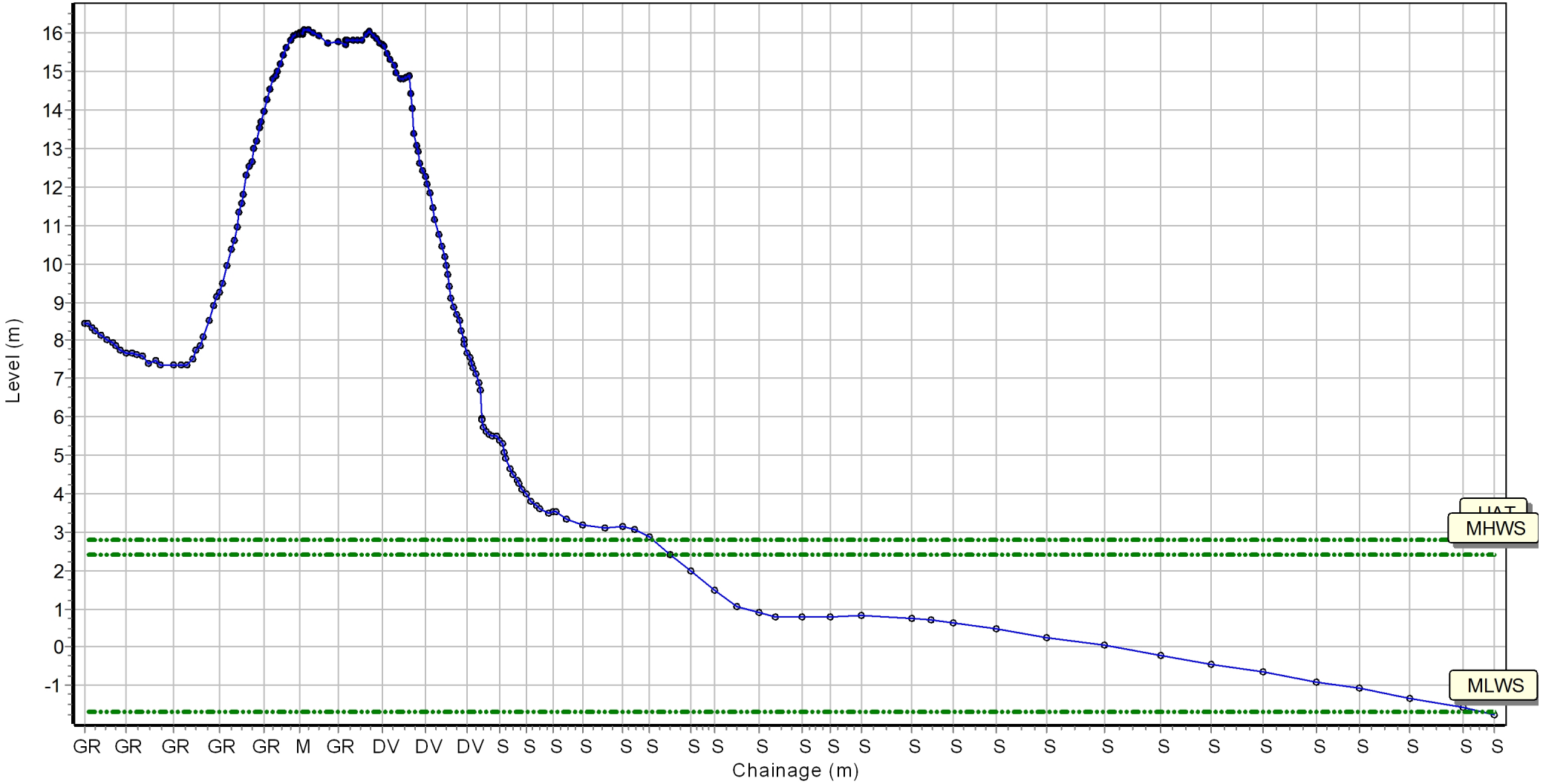
Location: **1aADC03**

Date: 01/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 424282.669 **Northing:** 623628.714 **Profile Bearing:** 112 ° from North



Beach Profile

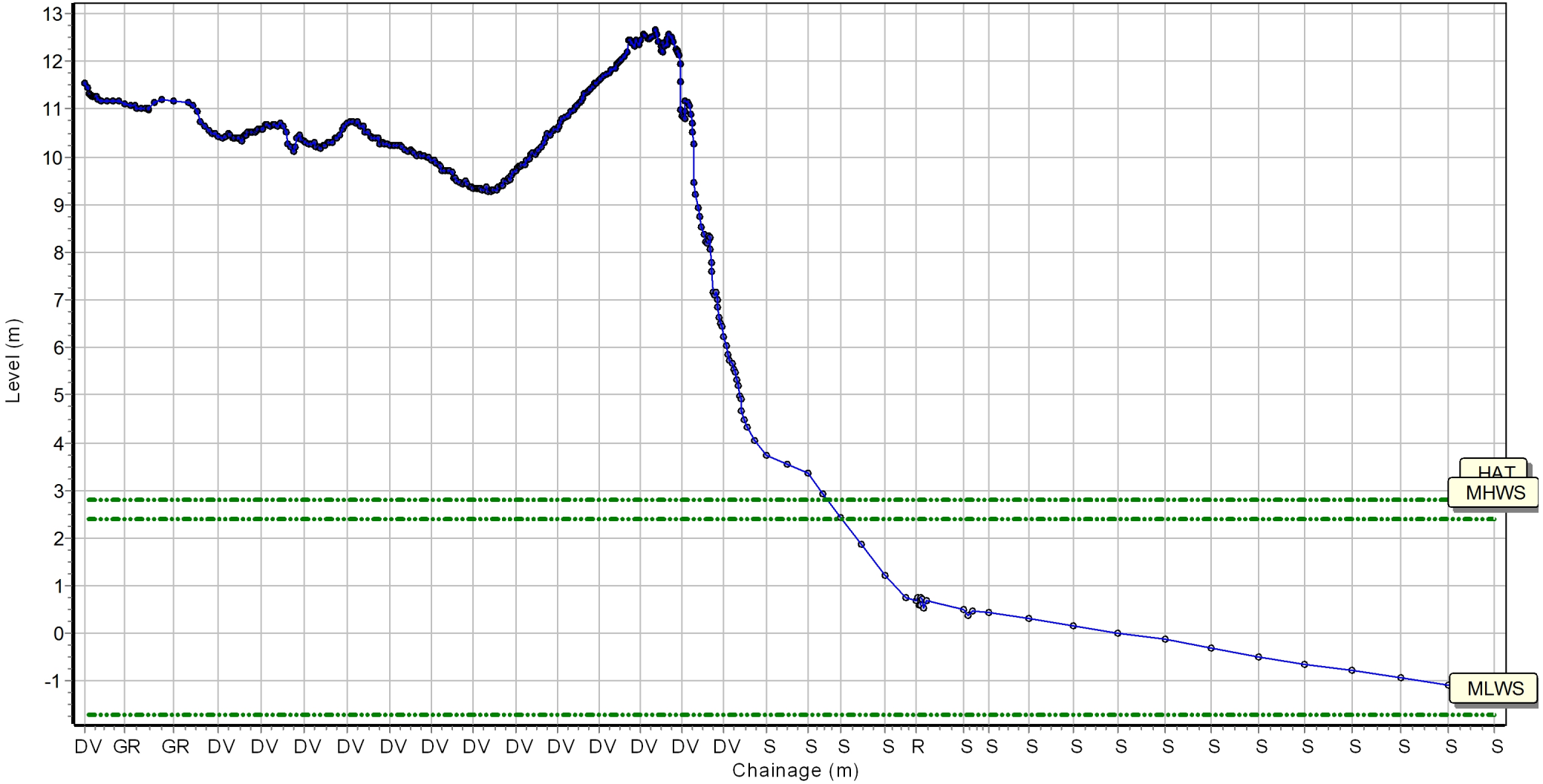
Location: **1aADC04**

Date: 01/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 424479.626 **Northing:** 622434.173 **Profile Bearing:** 50 ° from North



Beach Profile

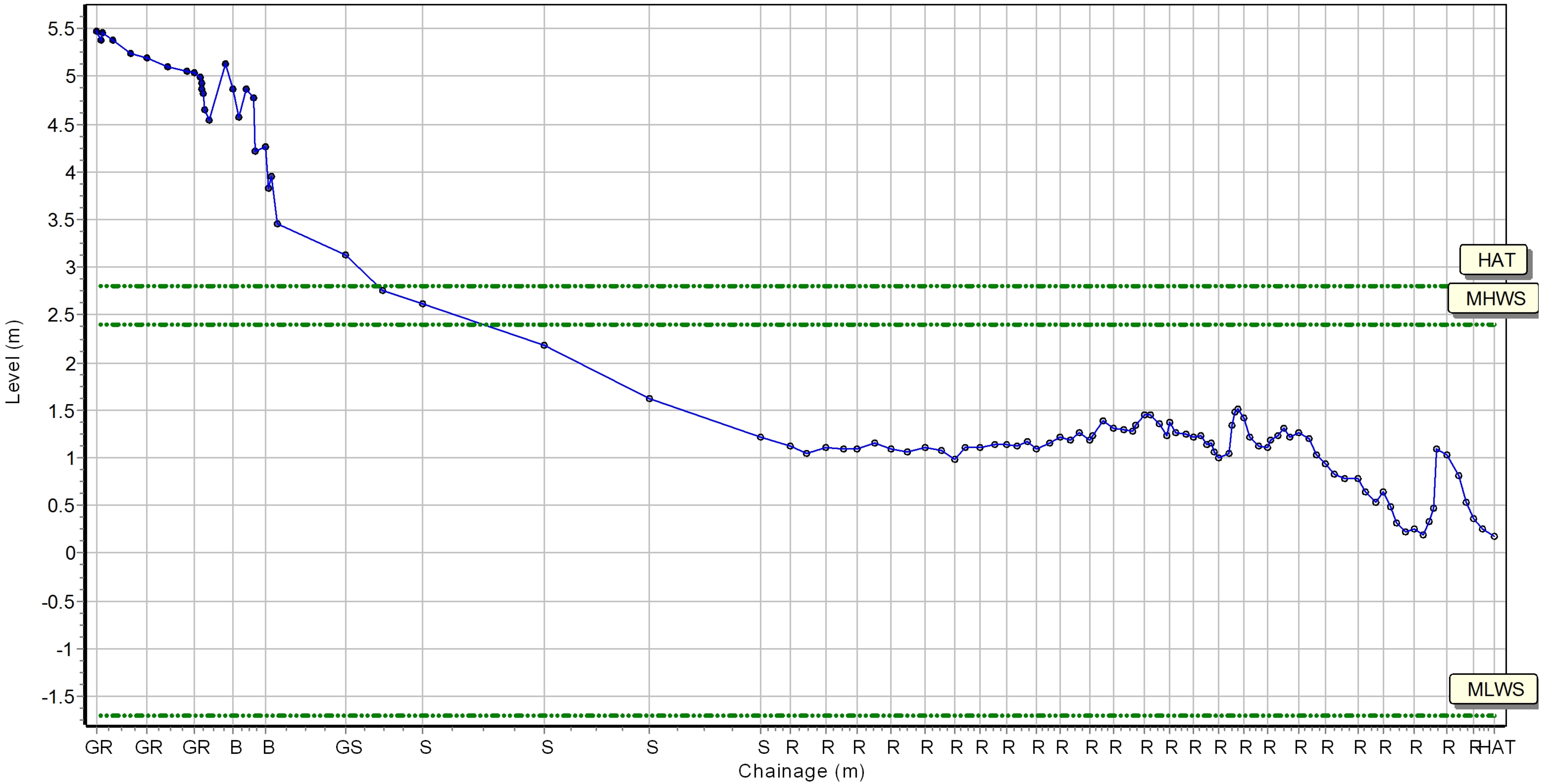
Location: 1aADC04A

Date: 16/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 426649.592 **Northing:** 614336.9 **Profile Bearing:** 93 ° from North



Beach Profile

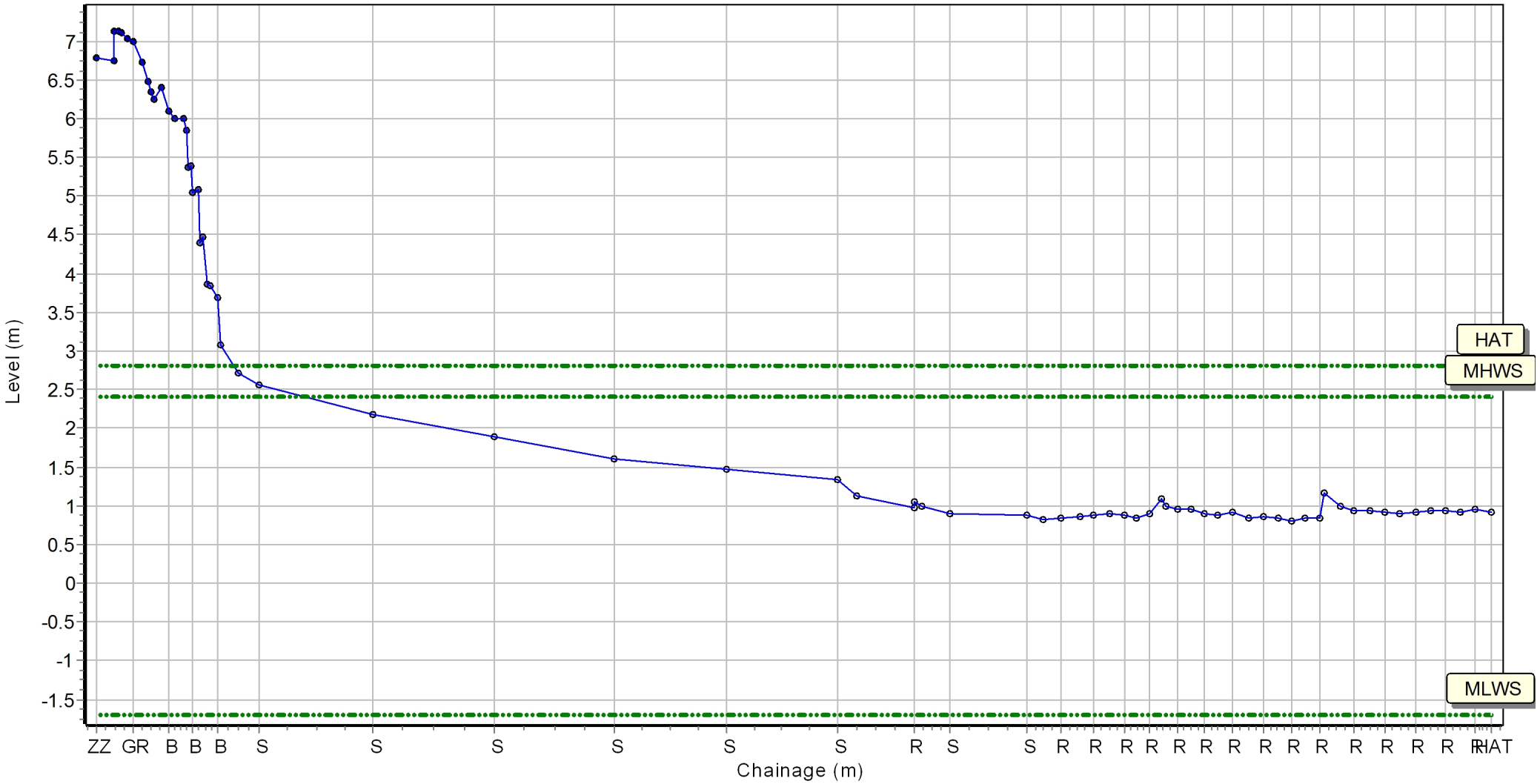
Location: **1aADC04B**

Date: 16/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 426641.642 **Northing:** 614193.793 **Profile Bearing:** 91 ° from North



Beach Profile

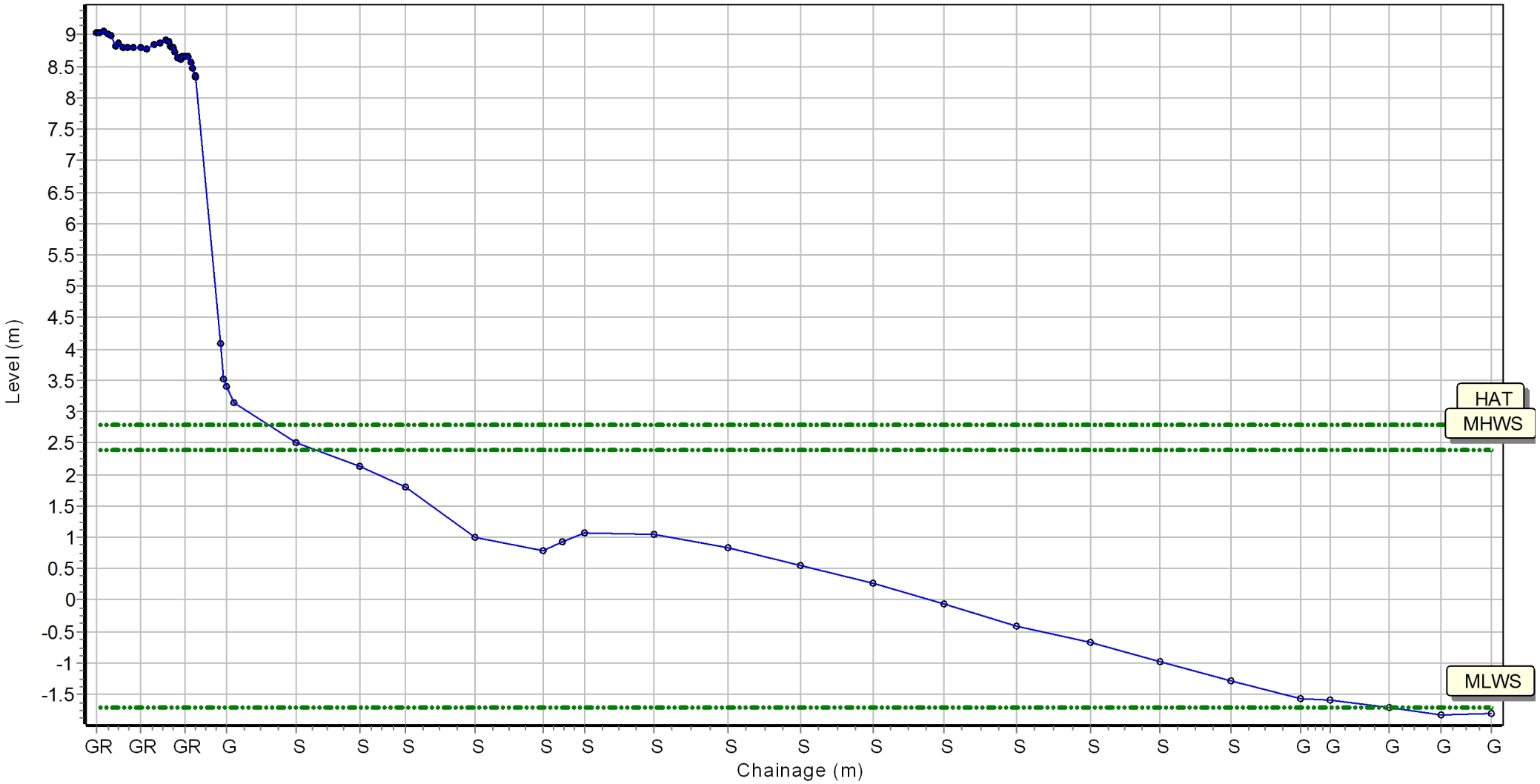
Location: **1aADC05**

Date: 16/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 426185.186 **Northing:** 612543.216 **Profile Bearing:** 142 ° from North



Beach Profile

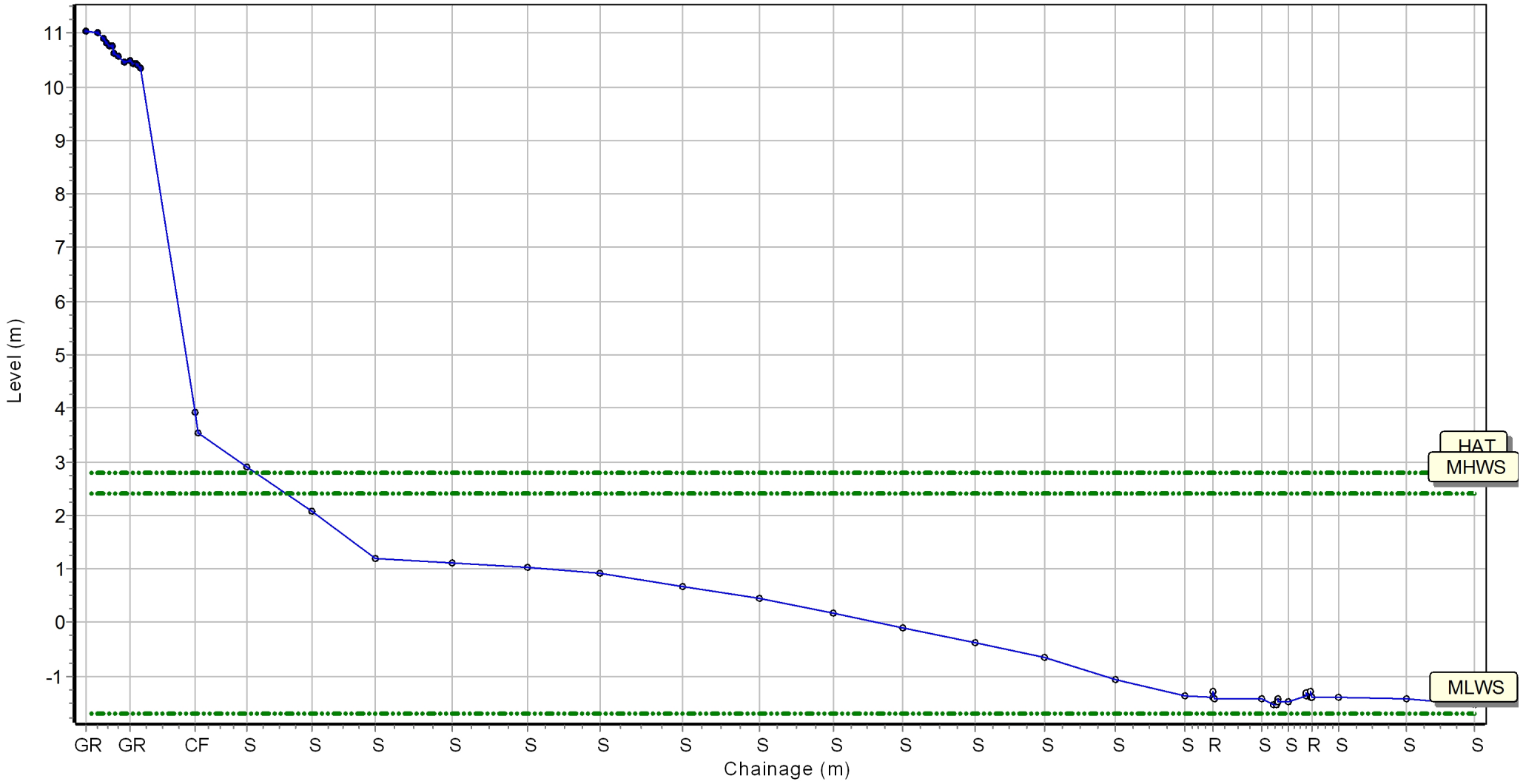
Location: **1aADC06**

Date: 16/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 425950.4 **Northing:** 612302.499 **Profile Bearing:** 122 ° from North



Beach Profile

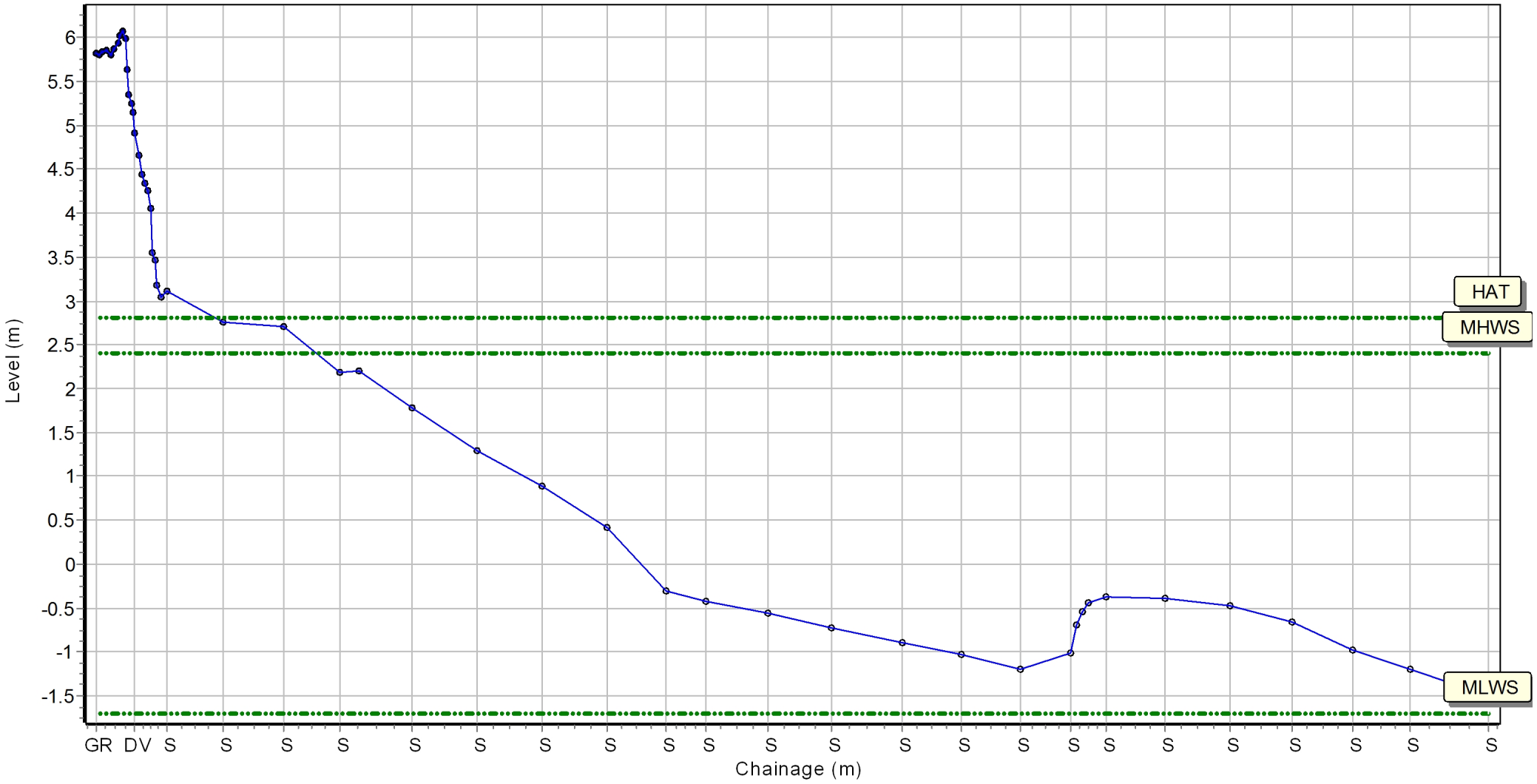
Location: **1aADC07**

Date: 30/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 425324.445 **Northing:** 611018.794 **Profile Bearing:** 134 ° from North



Beach Profile

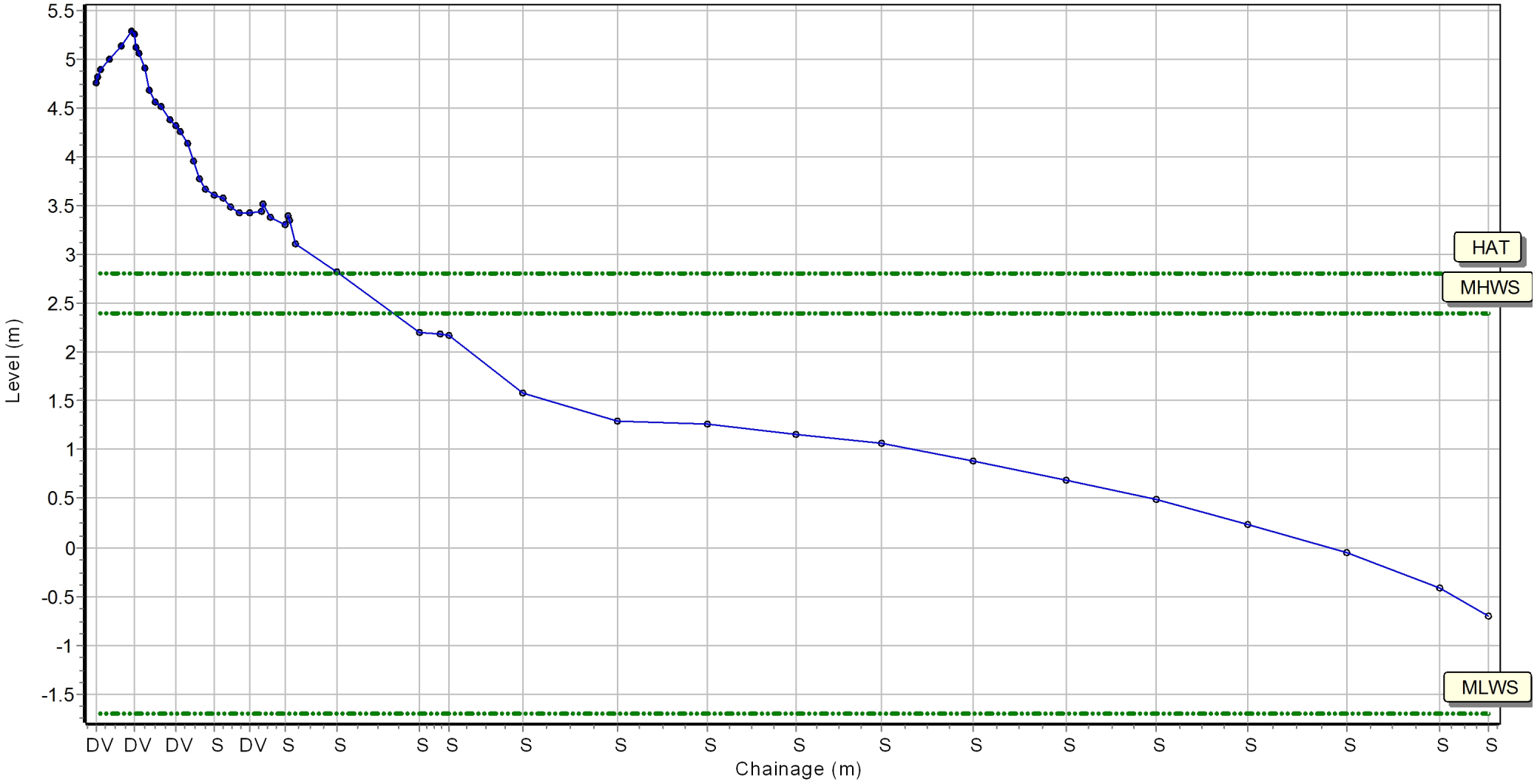
Location: **1aADC08**

Date: 30/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 425031.727 **Northing:** 610632.355 **Profile Bearing:** 112 ° from North



Beach Profile

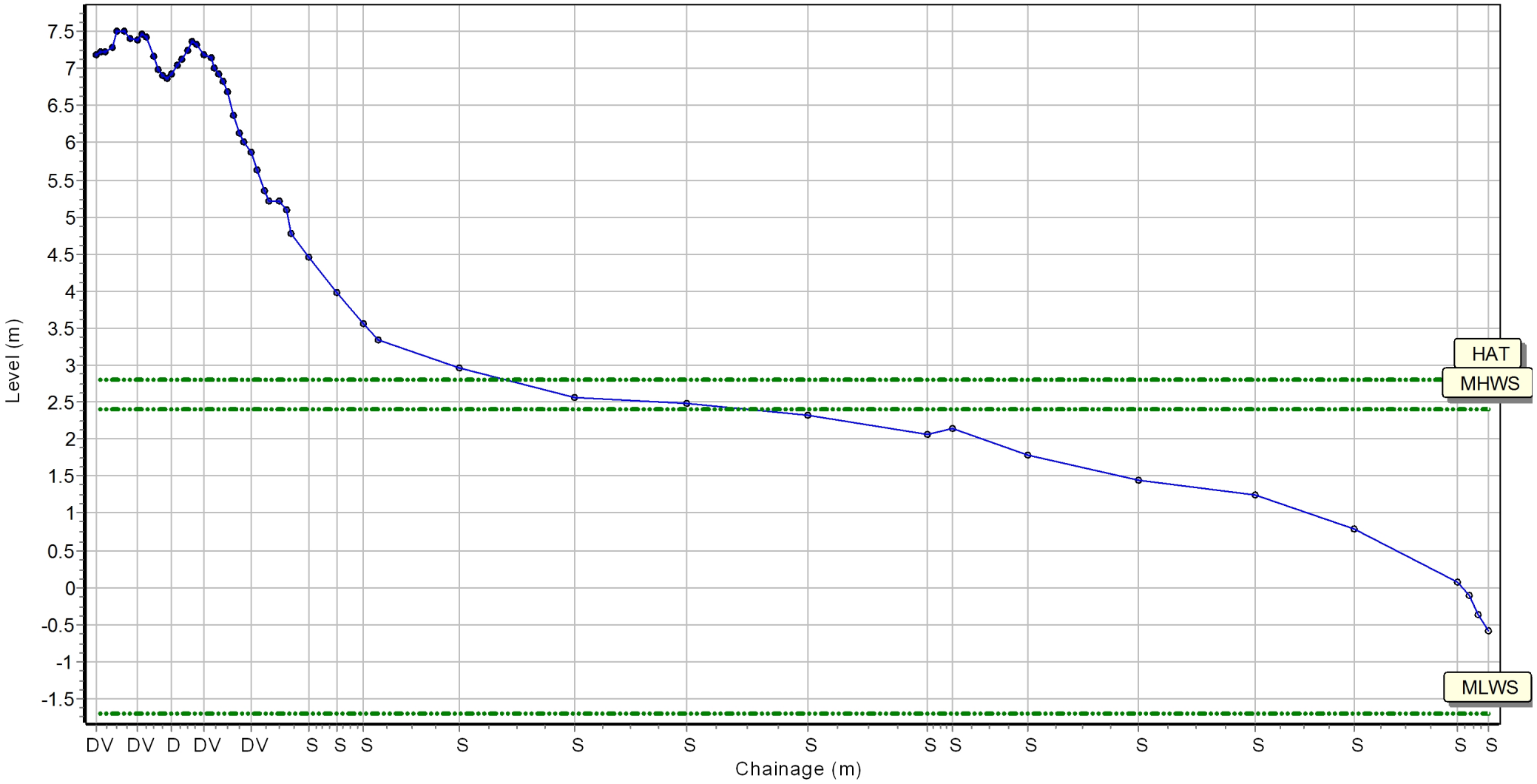
Location: **1aADC09**

Date: 30/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 424802.33 **Northing:** 610353.259 **Profile Bearing:** 120 ° from North



Beach Profile

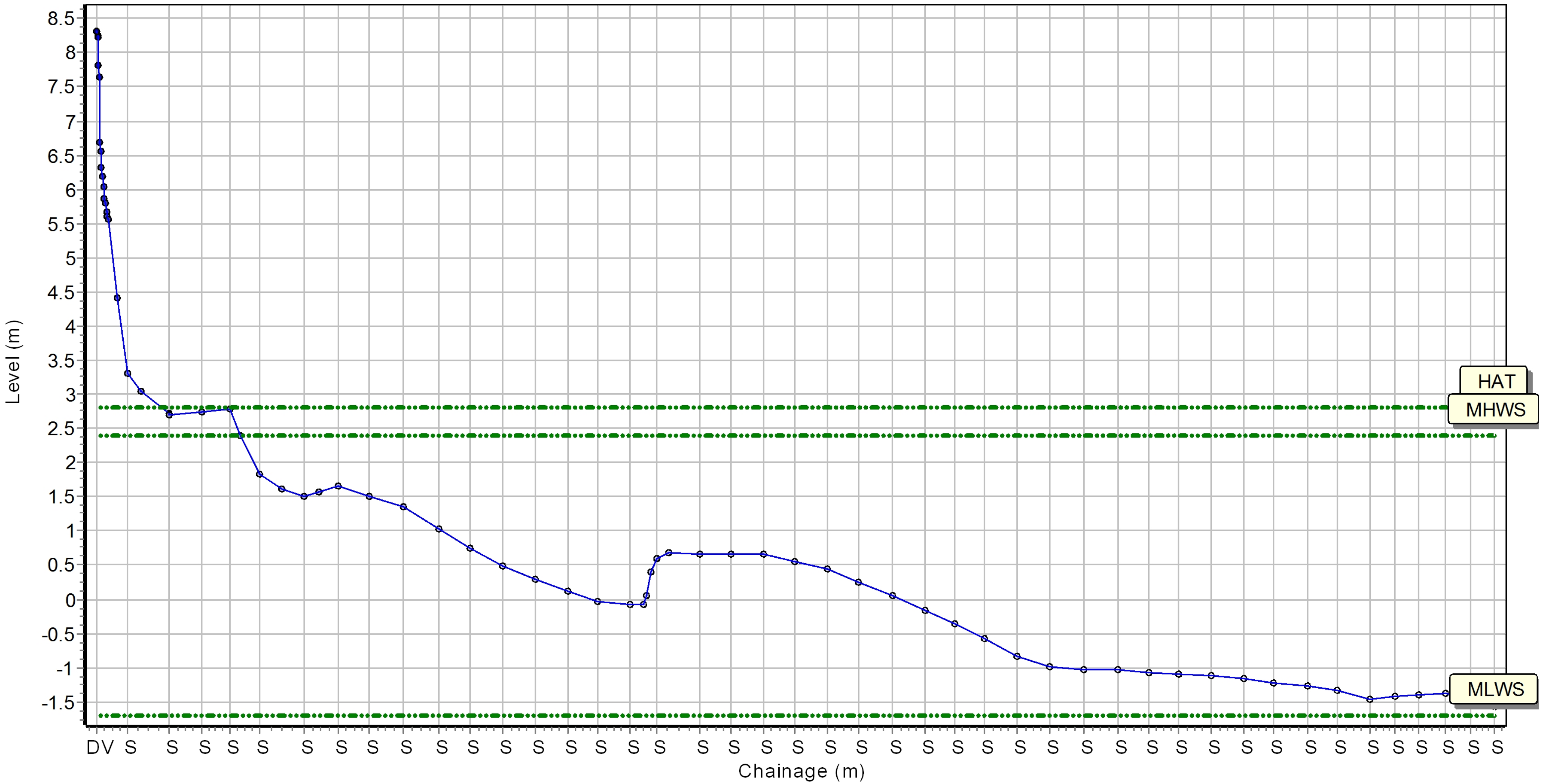
Location: 1aADC10

Date: 30/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 424845.495 **Northing:** 610035.618 **Profile Bearing:** 70 ° from North



Beach Profile

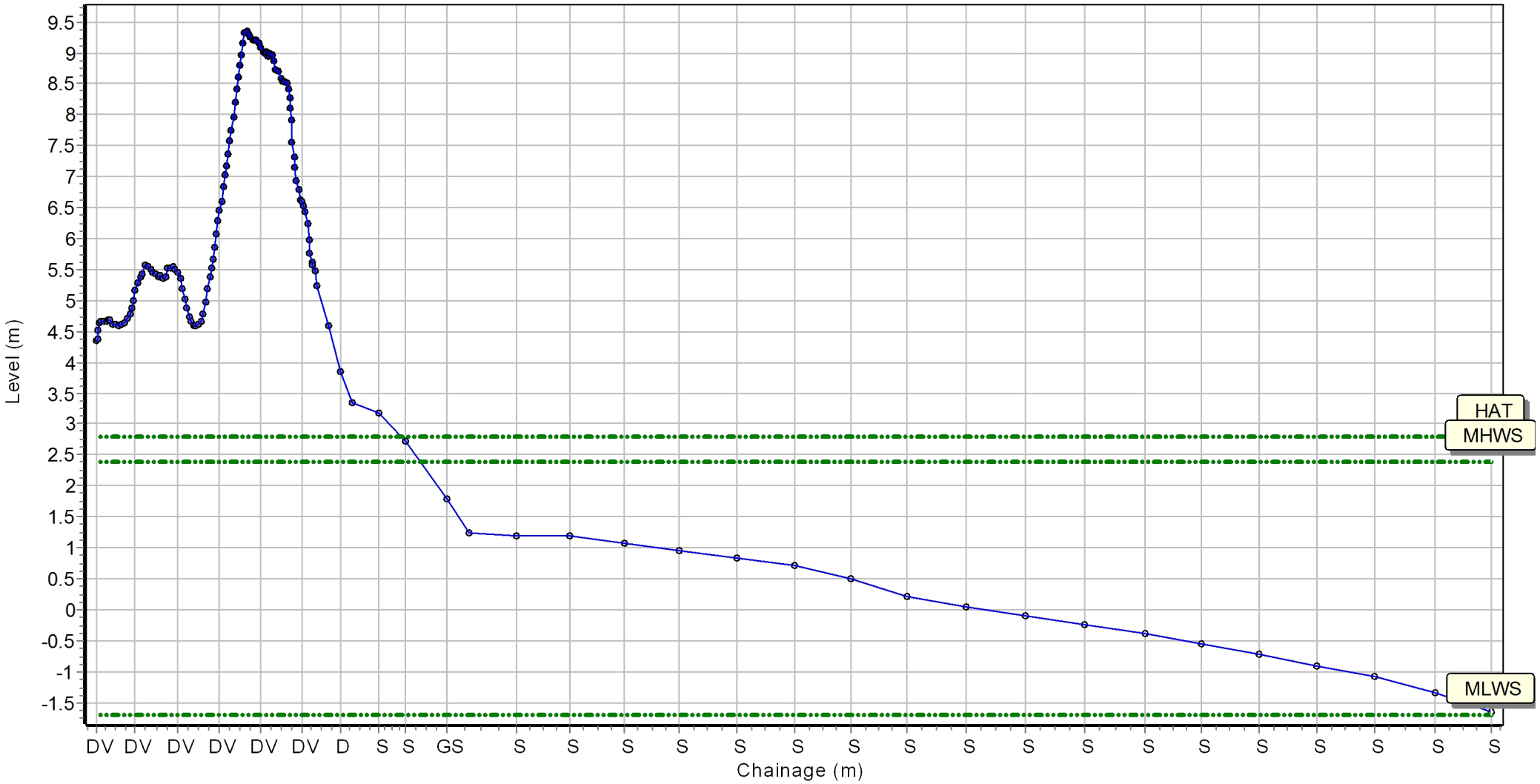
Location: **1aADC11**

Date: 30/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 424966.878 **Northing:** 609097.685 **Profile Bearing:** 71 ° from North



Beach Profile

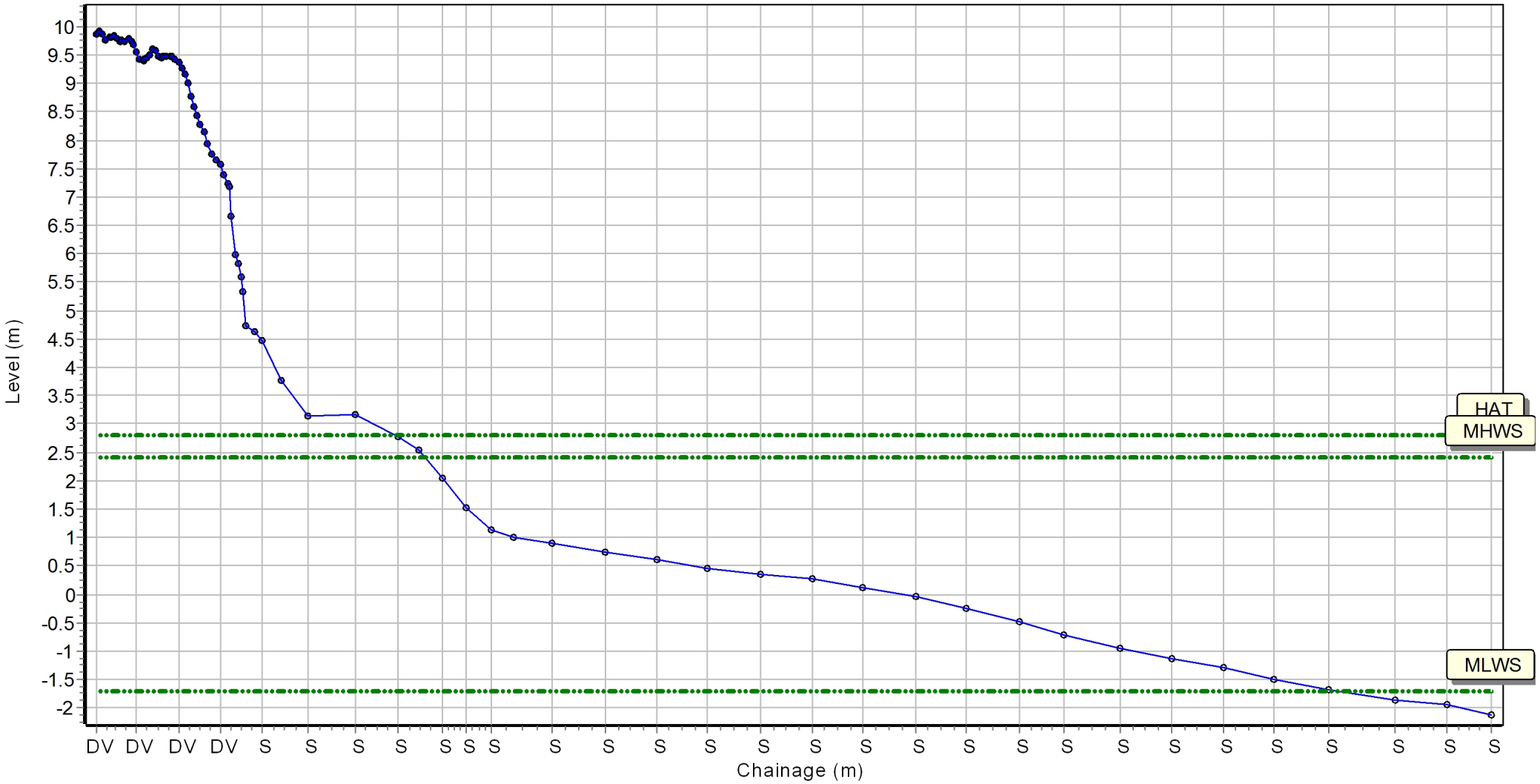
Location: **1aADC12**

Date: 16/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 425376.479 **Northing:** 607303.998 **Profile Bearing:** 67 ° from North



Beach Profile

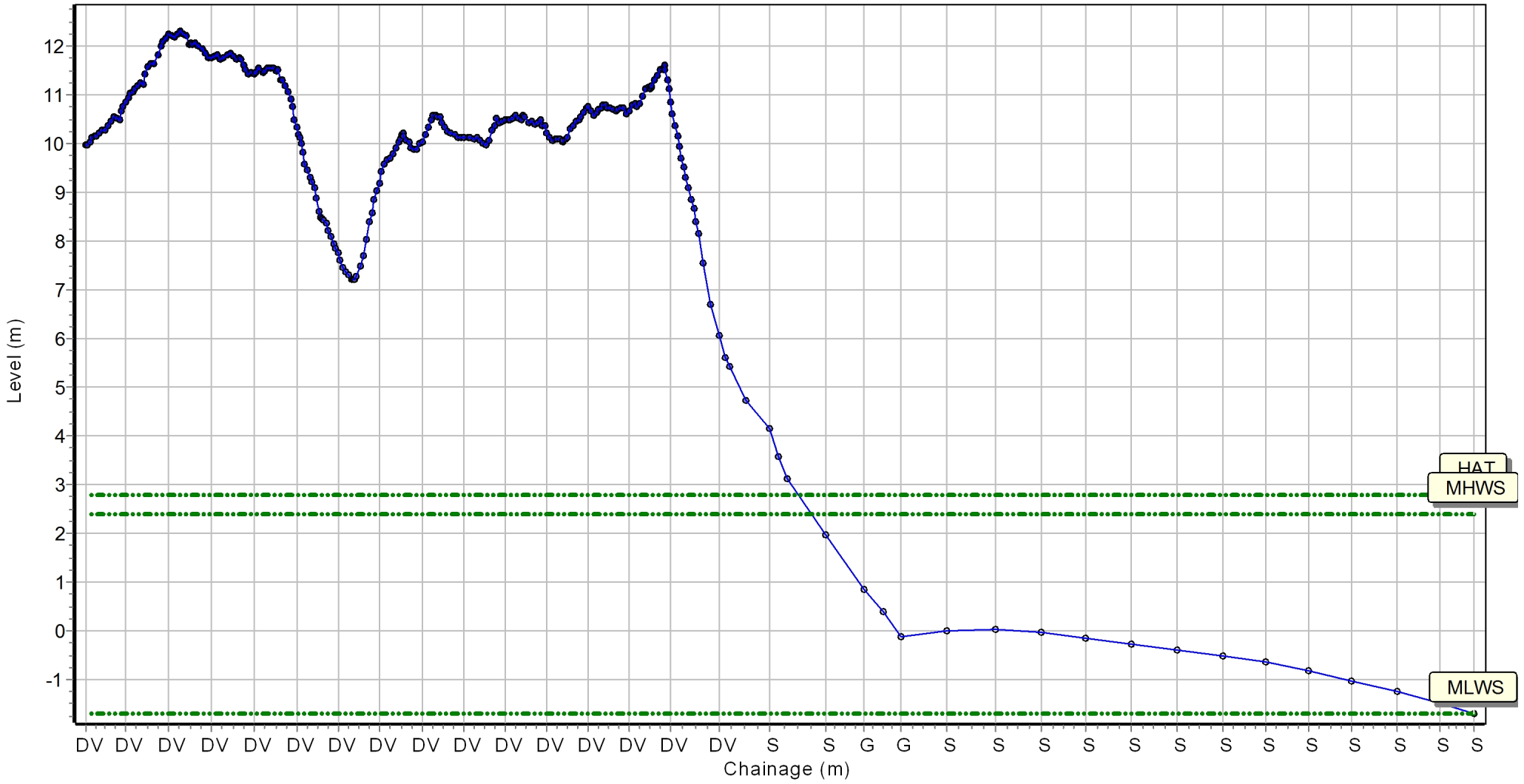
Location: **1aADC13**

Date: 16/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 425859.769 **Northing:** 606033.935 **Profile Bearing:** 63 ° from North



Beach Profile

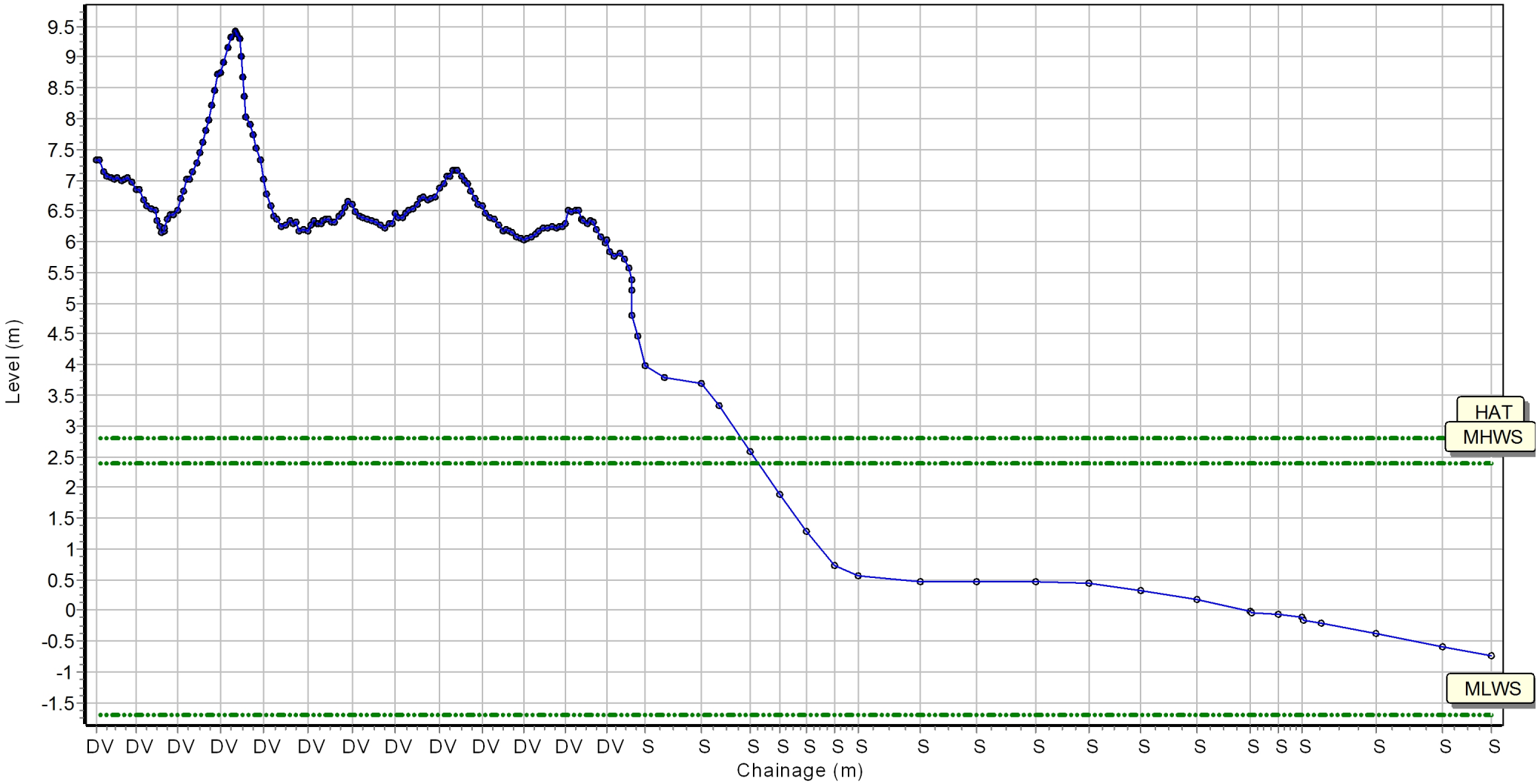
Location: **1aADC14**

Date: 16/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 426469.136 **Northing:** 605263.954 **Profile Bearing:** 59 ° from North



Beach Profile

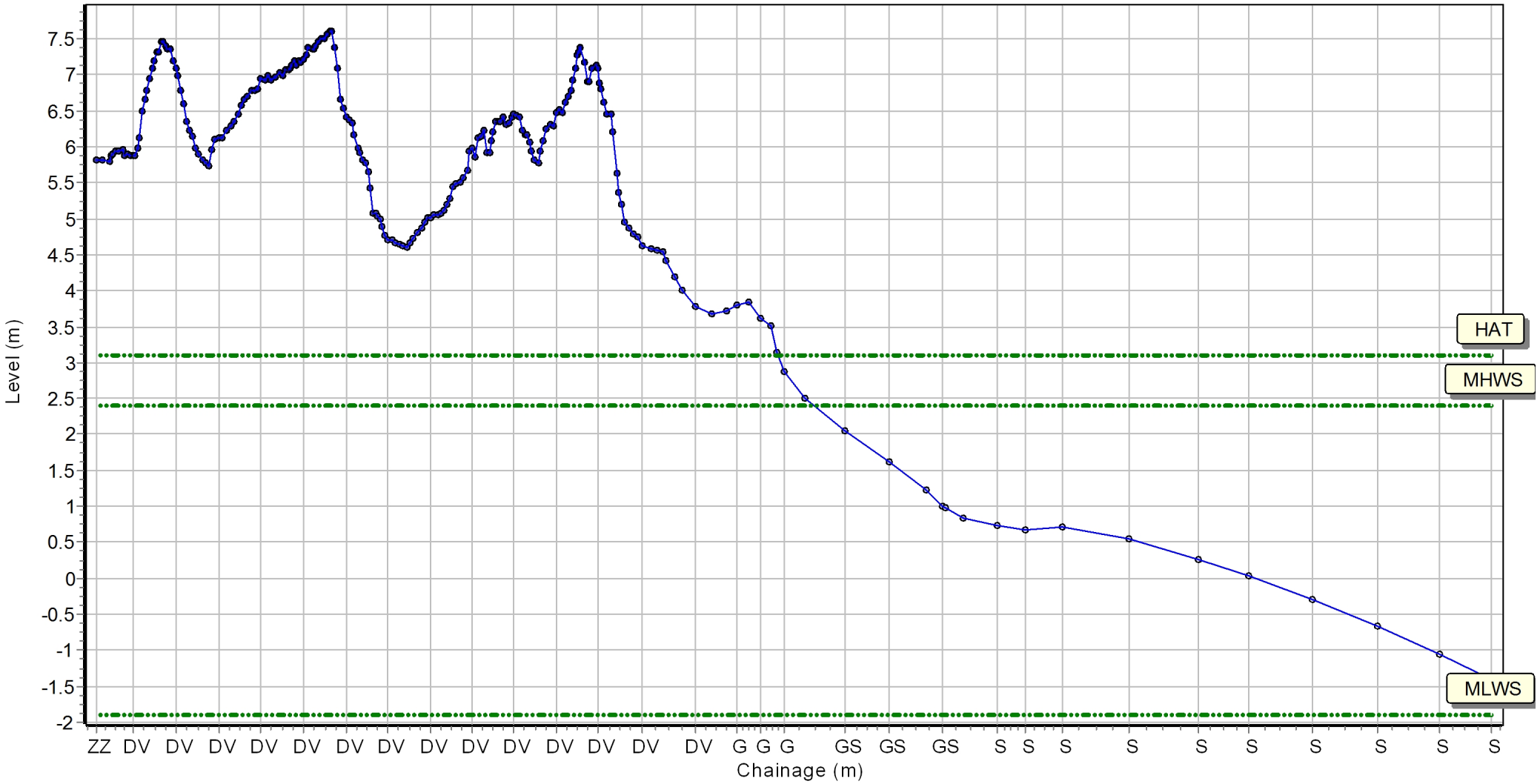
Location: **1aADC15**

Date: 02/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 427956.742 **Northing:** 603743.758 **Profile Bearing:** 46 ° from North



Beach Profile

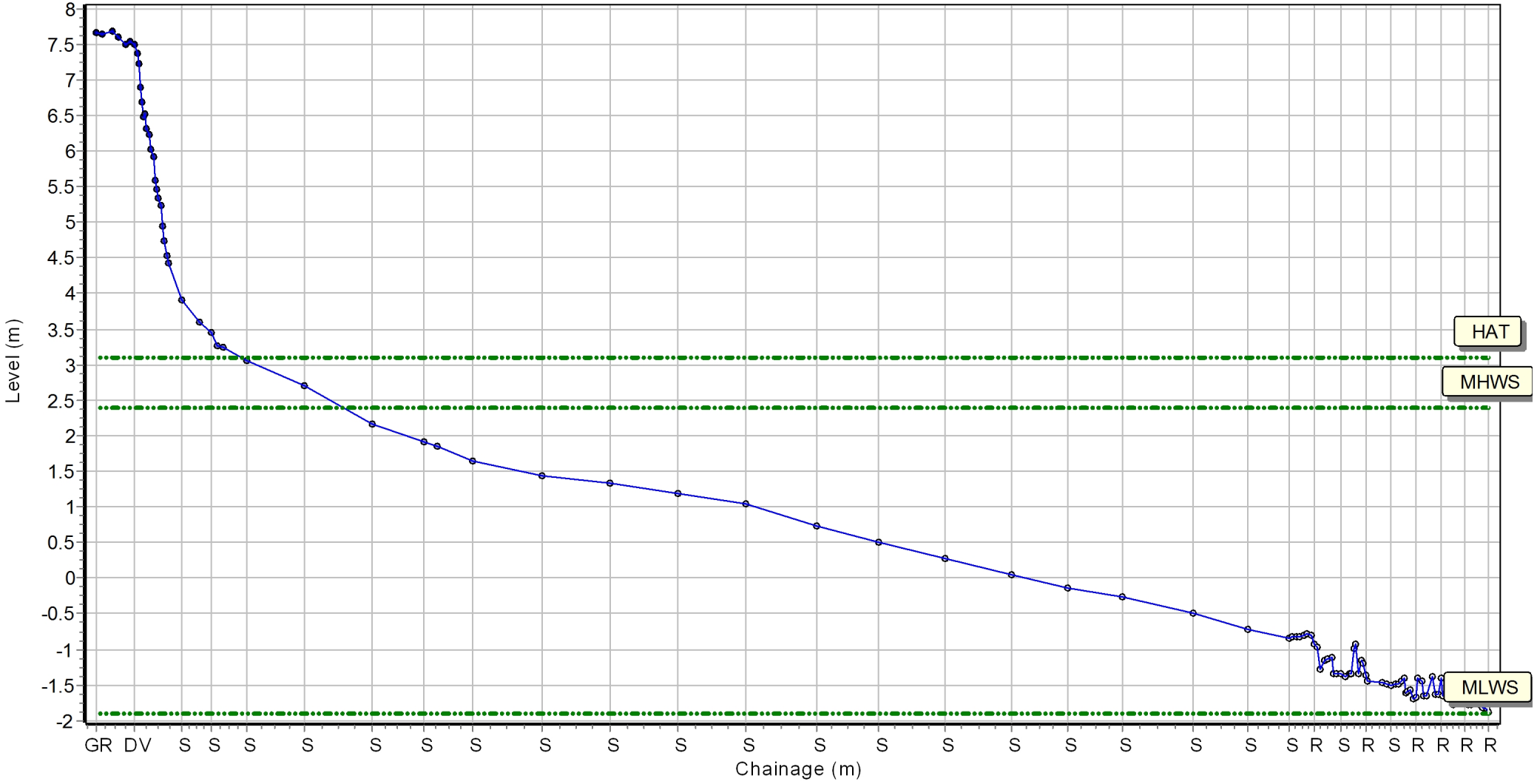
Location: **1aADC15A**

Date: 02/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 428642.365 **Northing:** 603069.145 **Profile Bearing:** 90 ° from North



Beach Profile

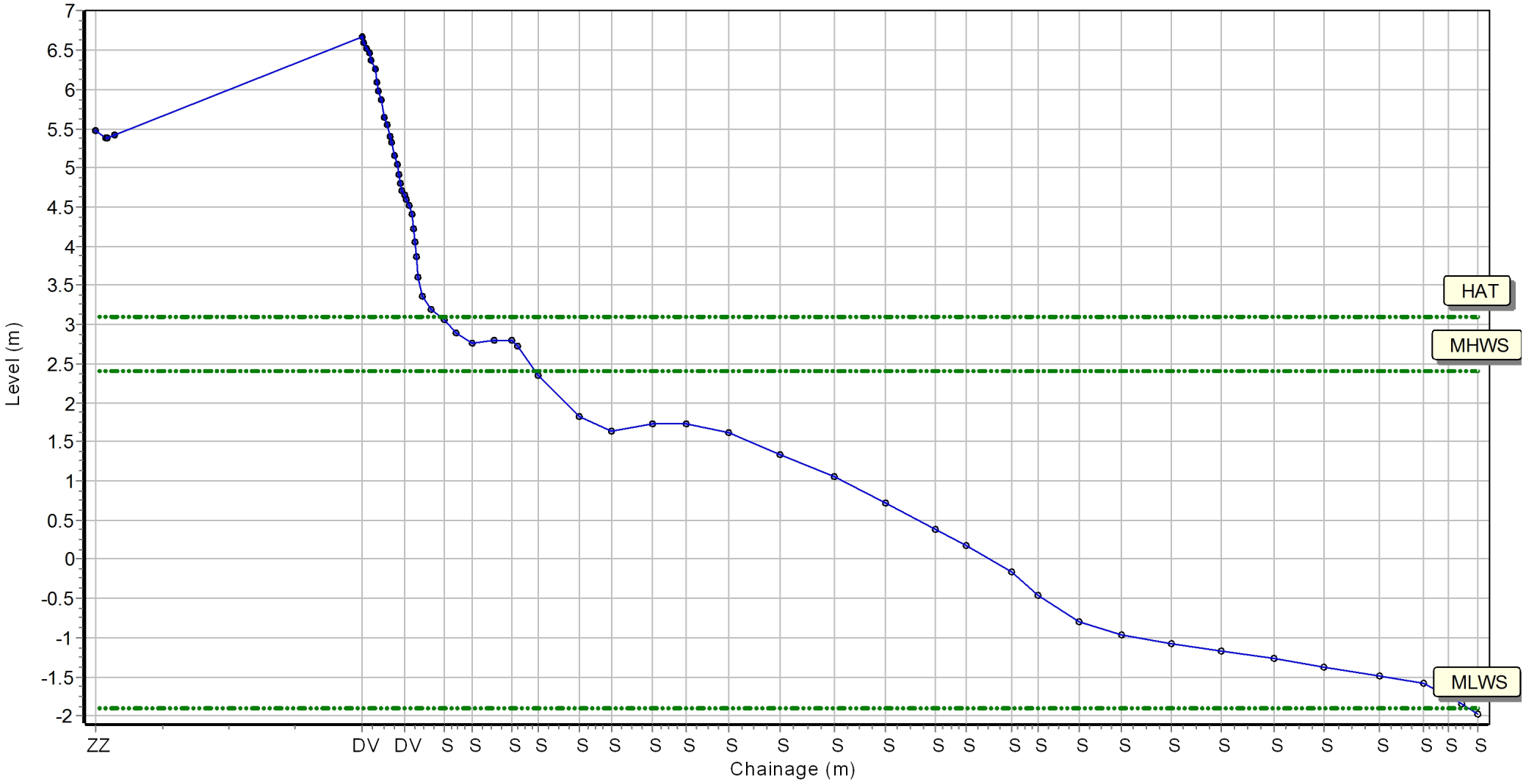
Location: **1aADC16**

Date: 02/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 428575.092 **Northing:** 602921.577 **Profile Bearing:** 93 ° from North



Beach Profile

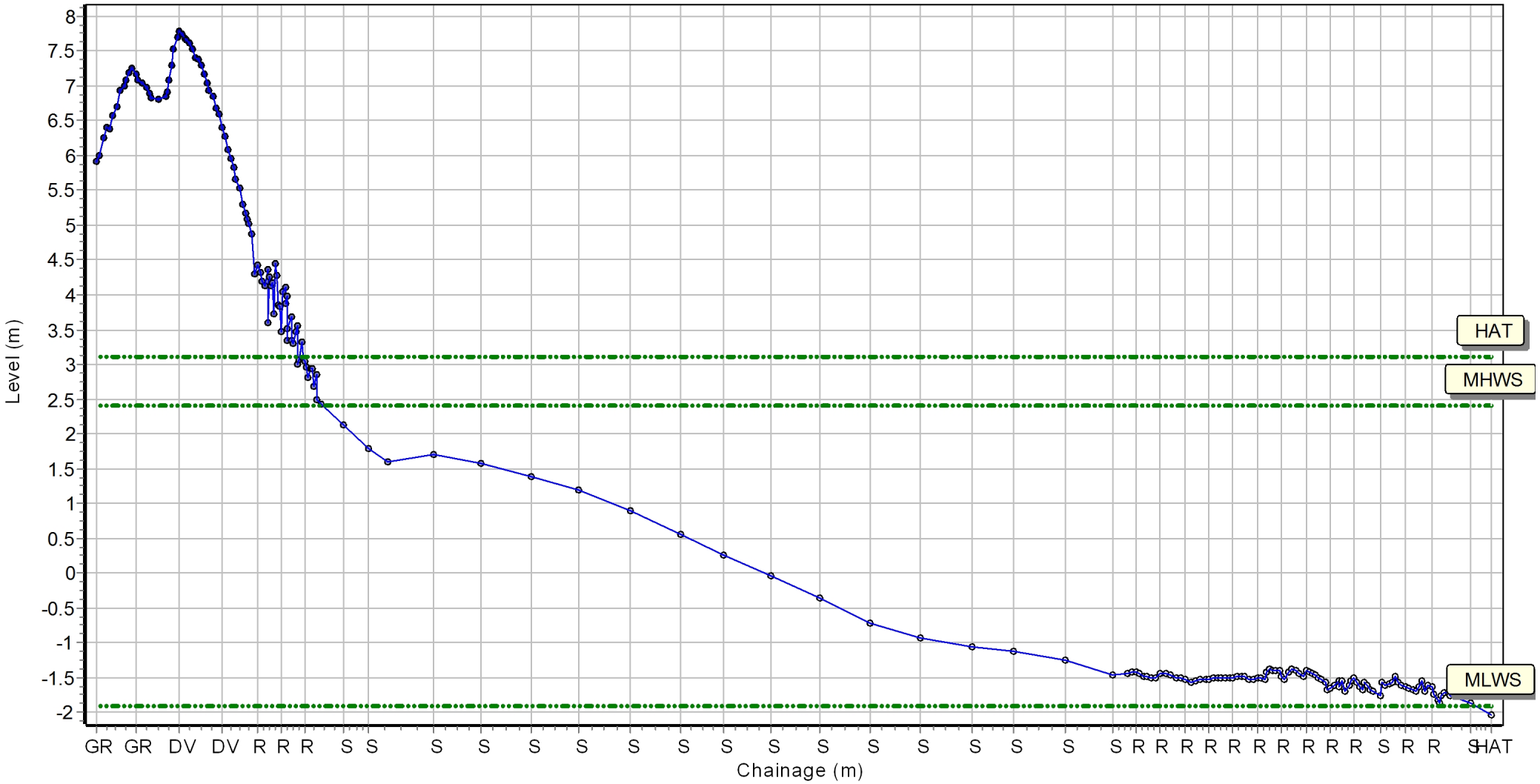
Location: **1aADC16A**

Date: 02/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 428543.525 **Northing:** 602704.175 **Profile Bearing:** 92 ° from North



Beach Profile

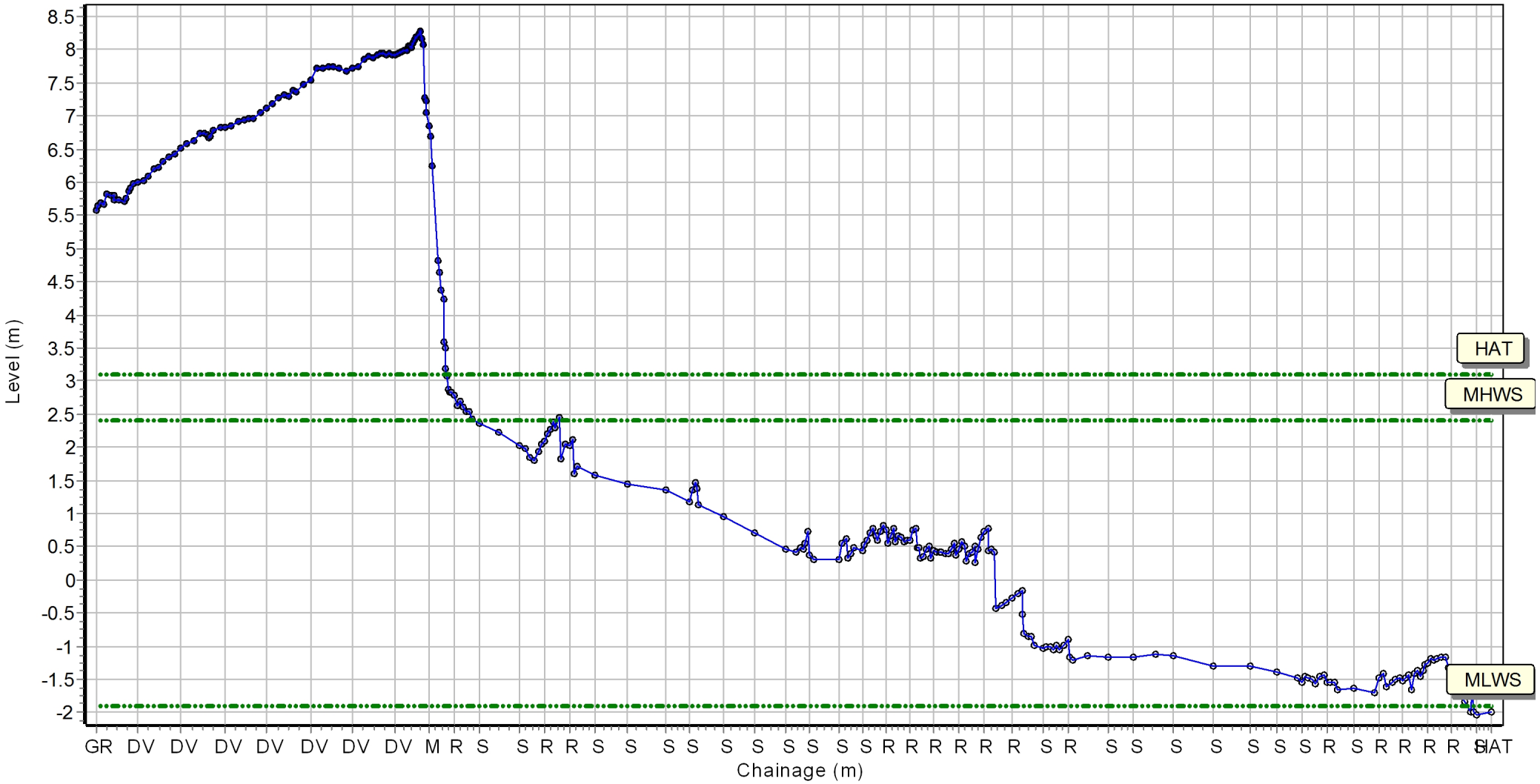
Location: **1aADC16B**

Date: 02/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 428440.457 **Northing:** 601948.341 **Profile Bearing:** 144 ° from North



Beach Profile

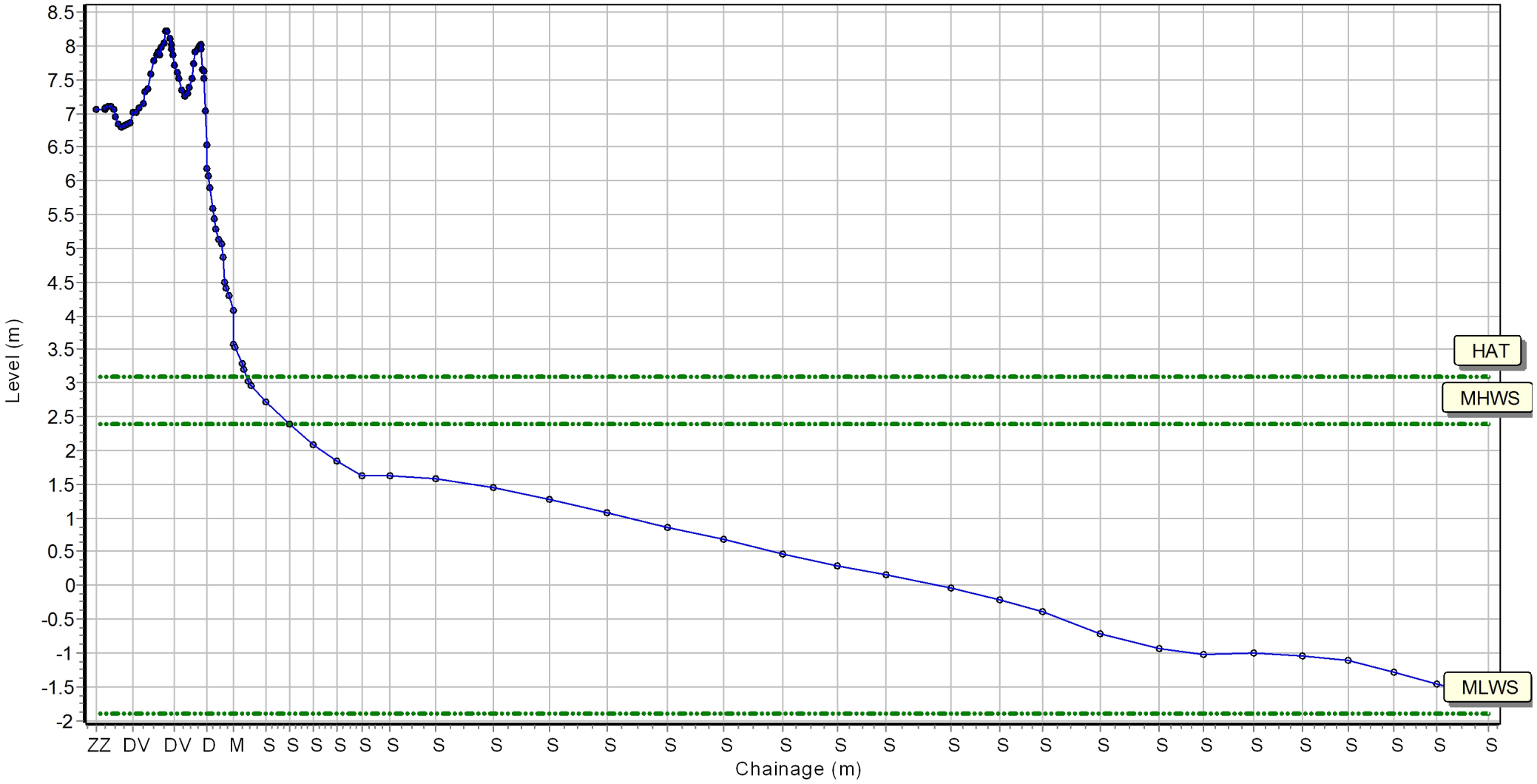
Location: **1aADC17**

Date: 02/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 428116.847 **Northing:** 601565.465 **Profile Bearing:** 114 ° from North



Beach Profile

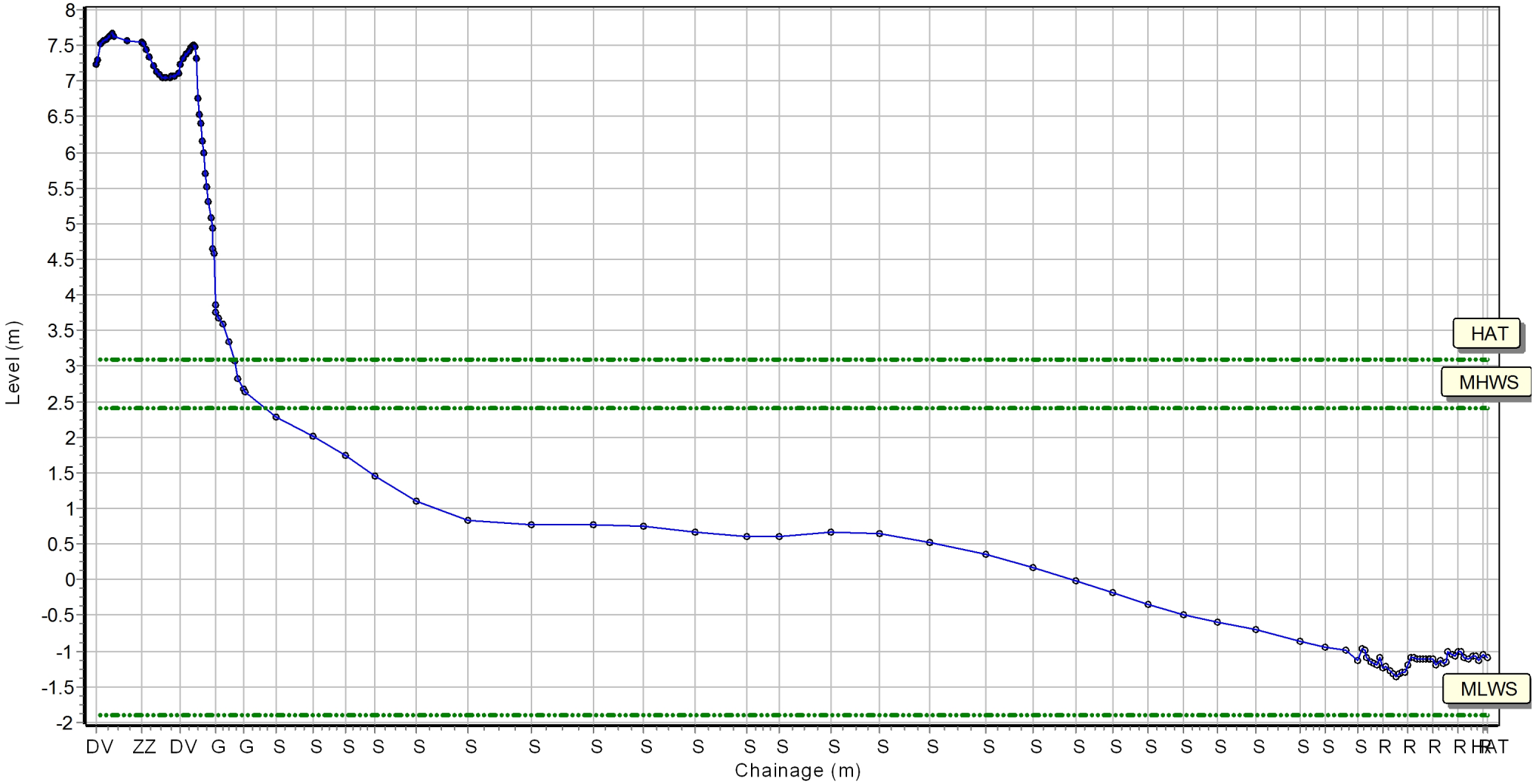
Location: **1aADC17A**

Date: 02/10/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 427947.662 **Northing:** 601040.259 **Profile Bearing:** 109 ° from North



Beach Profile

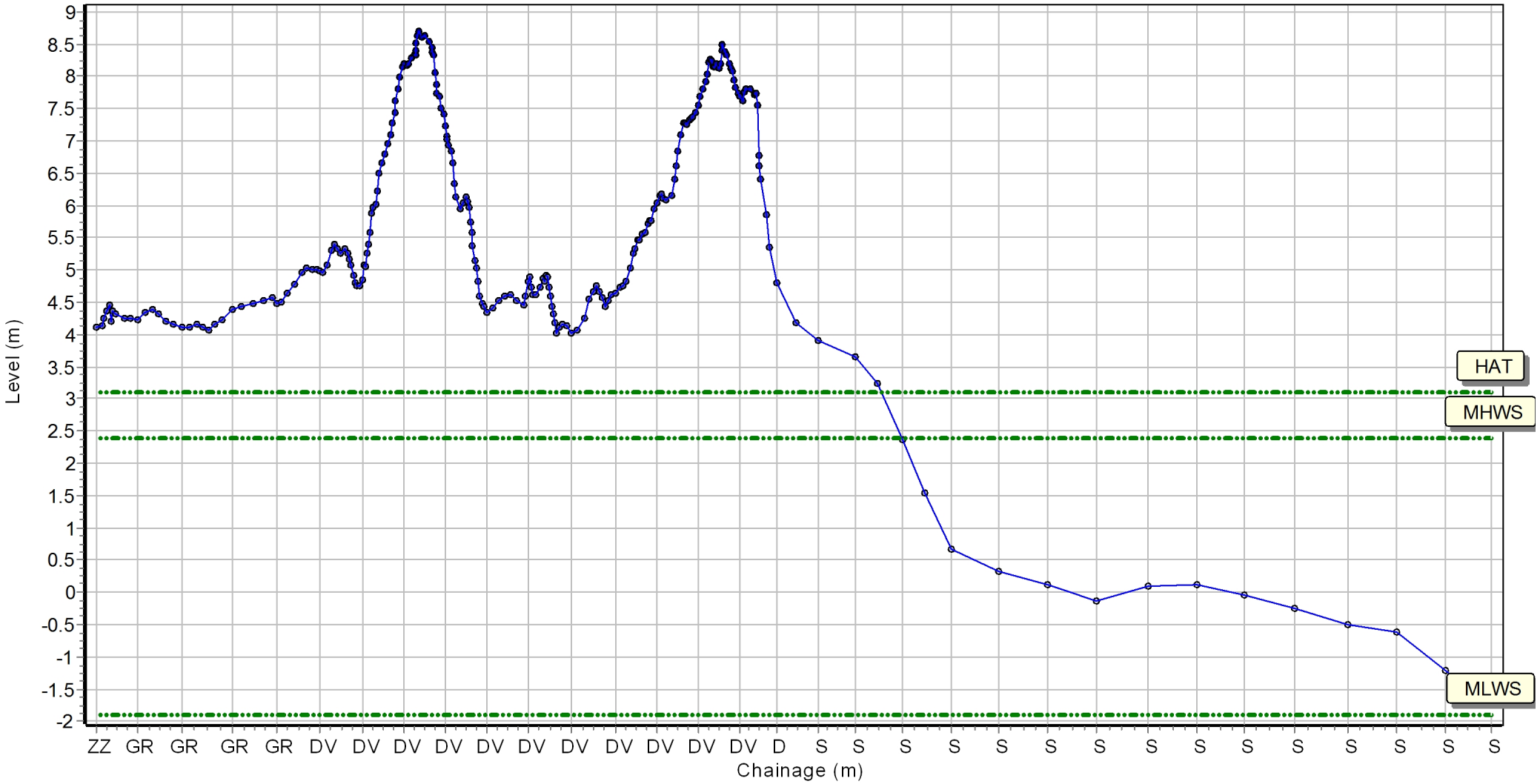
Location: **1aCMBC01**

Date: 30/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 427552.578 **Northing:** 596402.769 **Profile Bearing:** 59 ° from North



Beach Profile

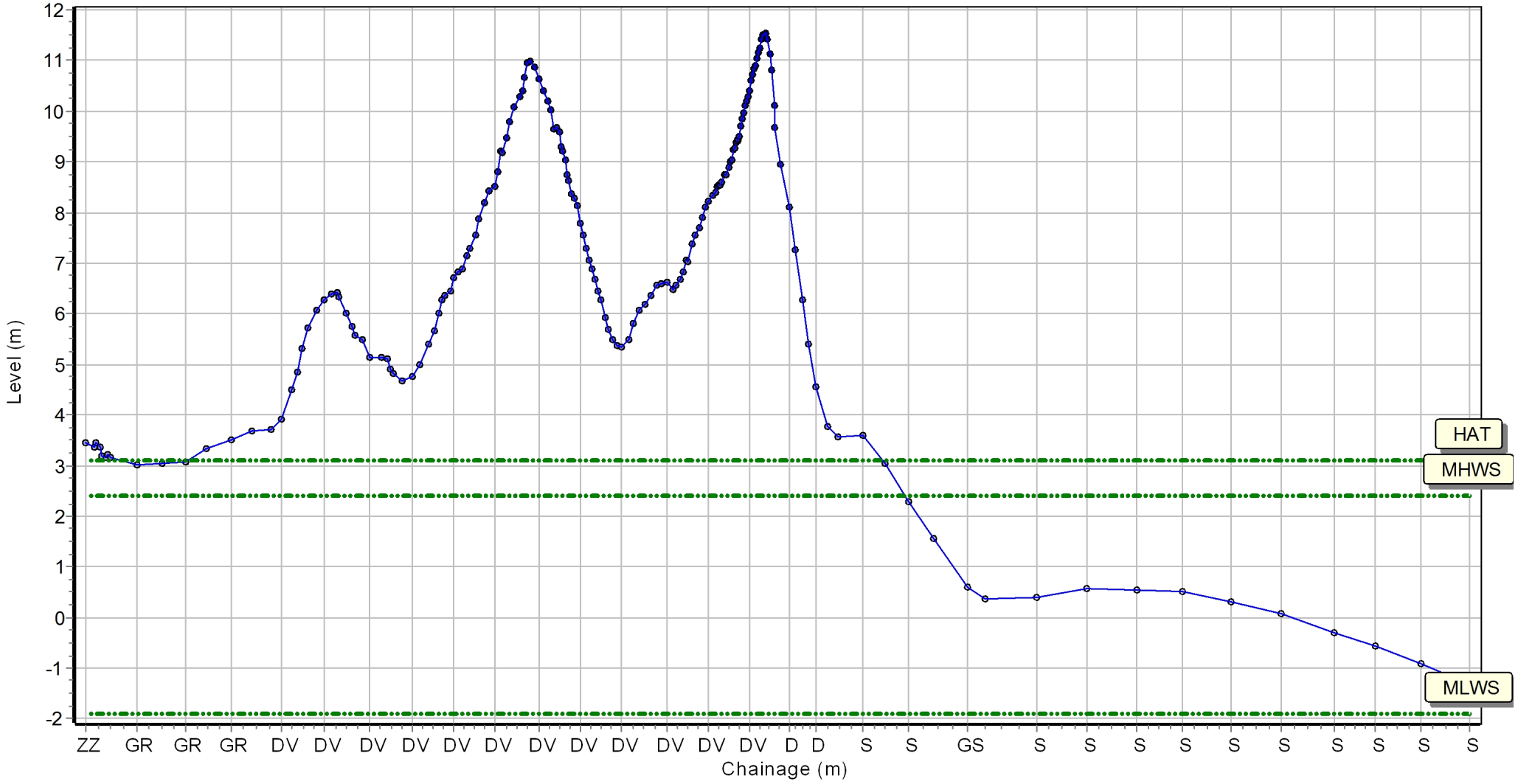
Location: **1aCMBC02**

Date: 30/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 428355.916 **Northing:** 594532.141 **Profile Bearing:** 56 ° from North



Beach Profile

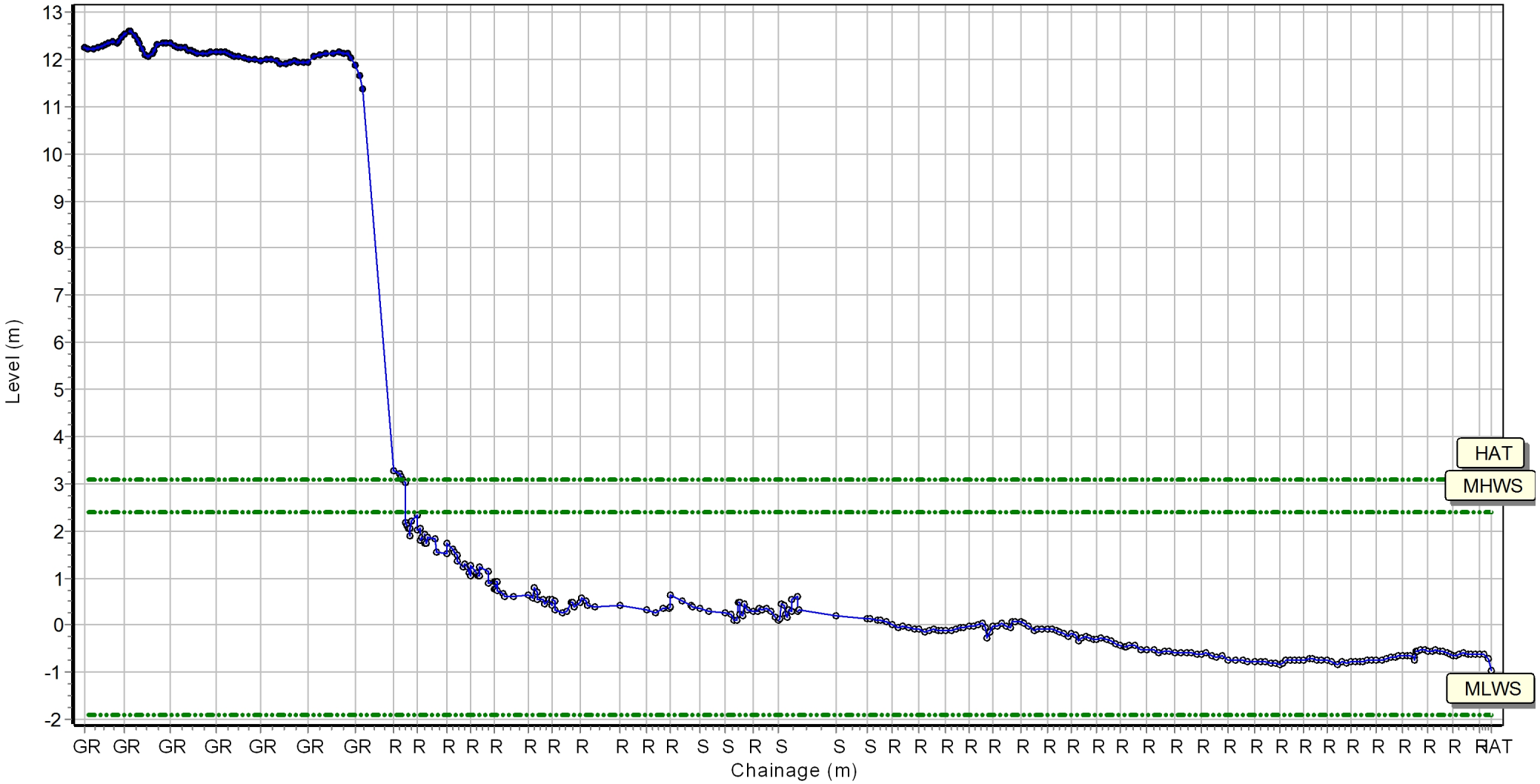
Location: **1aCMBC03**

Date: 28/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430118.859 **Northing:** 592587.445 **Profile Bearing:** 115 ° from North



Beach Profile

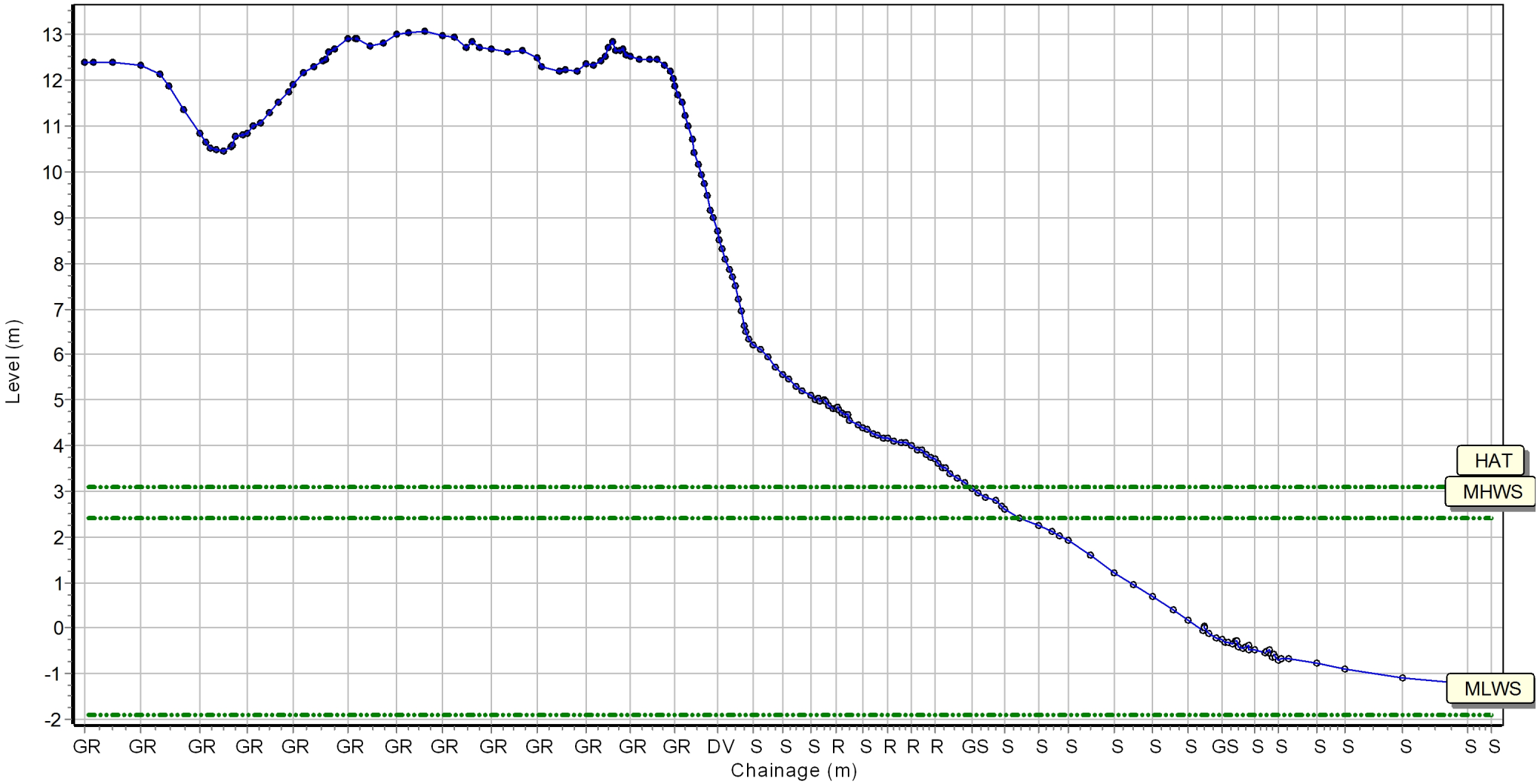
Location: **1aCMBC03A**

Date: 28/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430128.317 **Northing:** 591148.463 **Profile Bearing:** 70 ° from North



Beach Profile

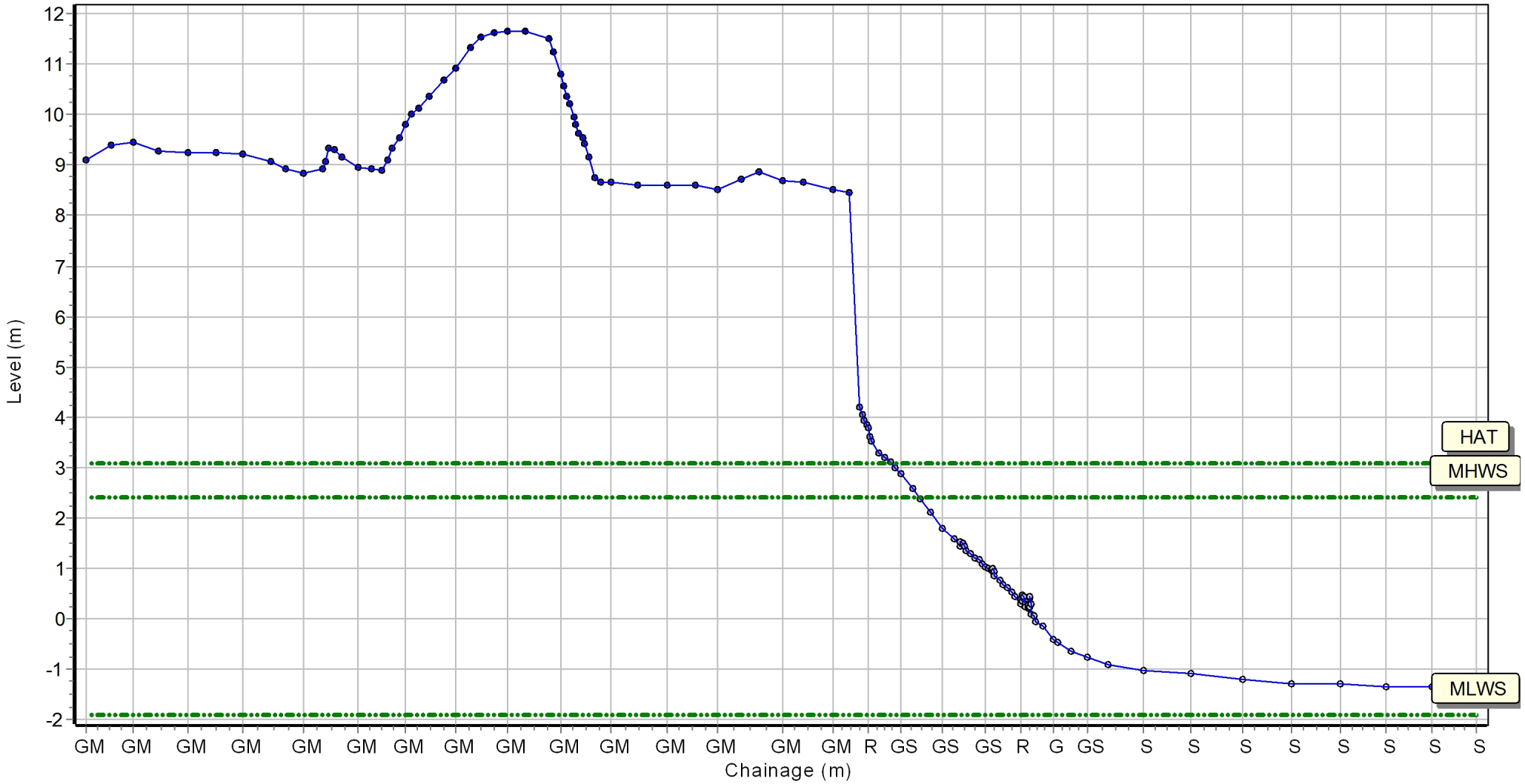
Location: **1aCMBC03B**

Date: 28/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430478.518 **Northing:** 590661.474 **Profile Bearing:** 58 ° from North



Beach Profile

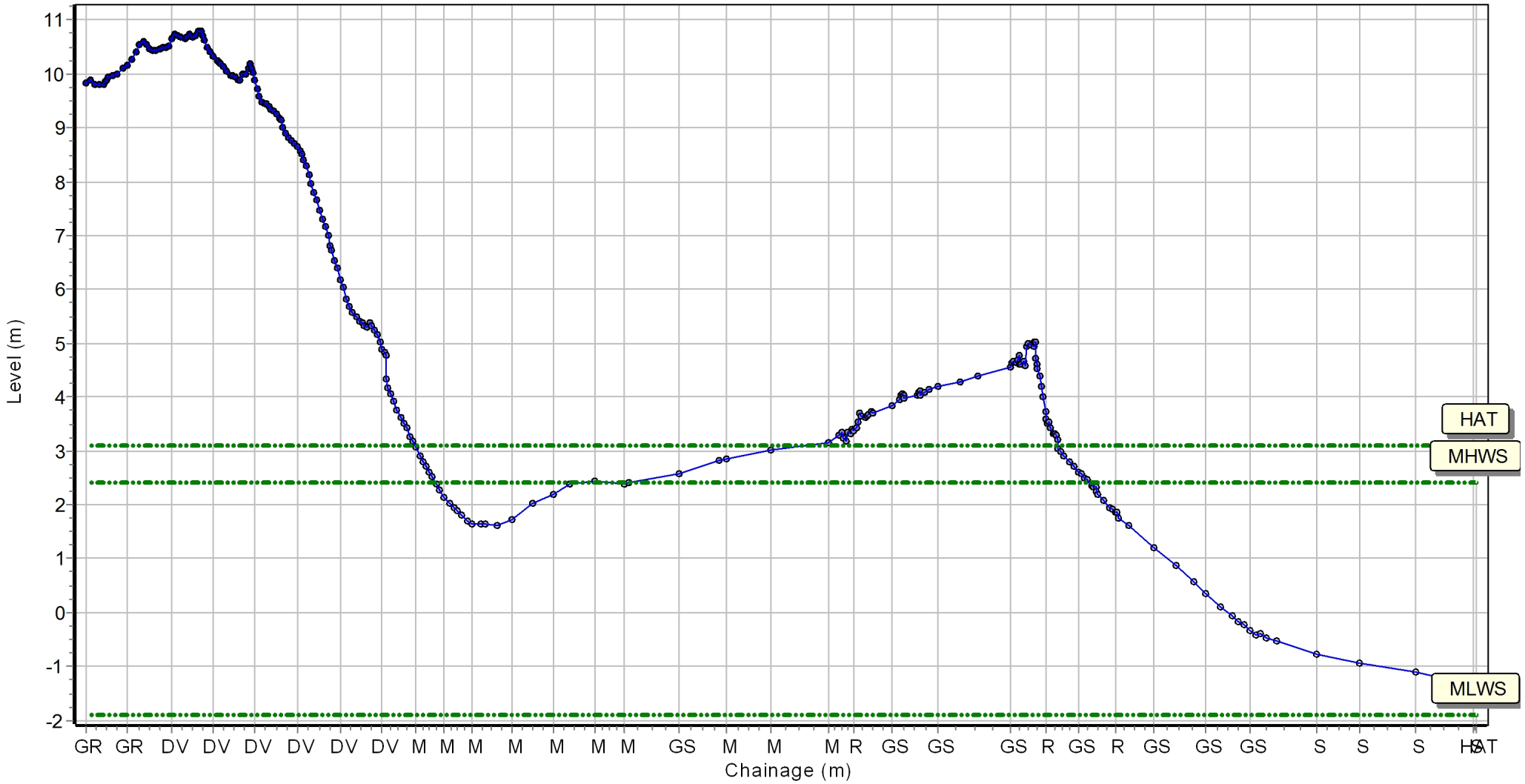
Location: **1aWDC02**

Date: 28/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430807.97 **Northing:** 589773.192 **Profile Bearing:** 59 ° from North



Beach Profile

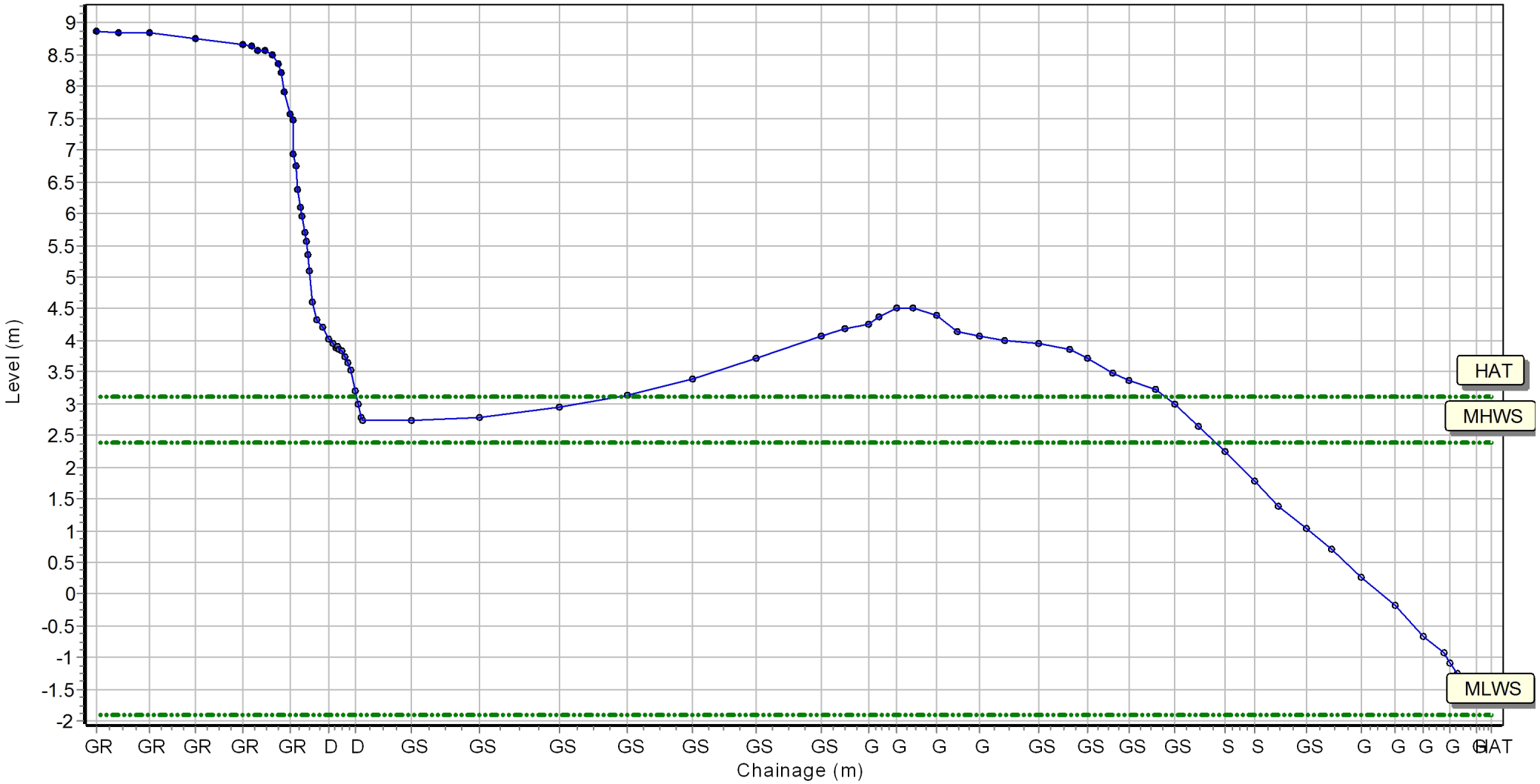
Location: **1aWDC03**

Date: 28/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430998.77 **Northing:** 589548.265 **Profile Bearing:** 58 ° from North



Beach Profile

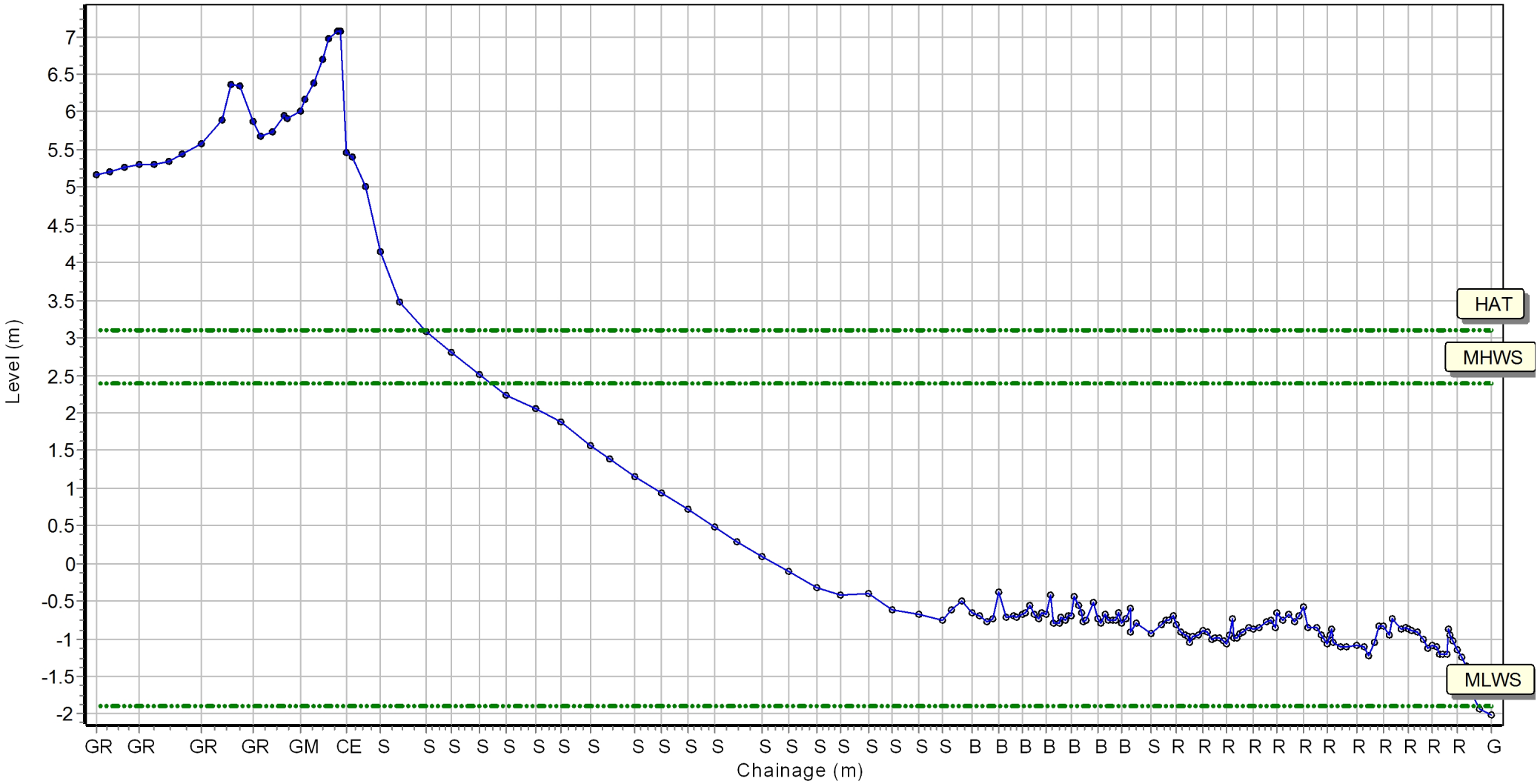
Location: **1aWDC04**

Date: 12/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431518.807 **Northing:** 588823.532 **Profile Bearing:** 92 ° from North



Beach Profile

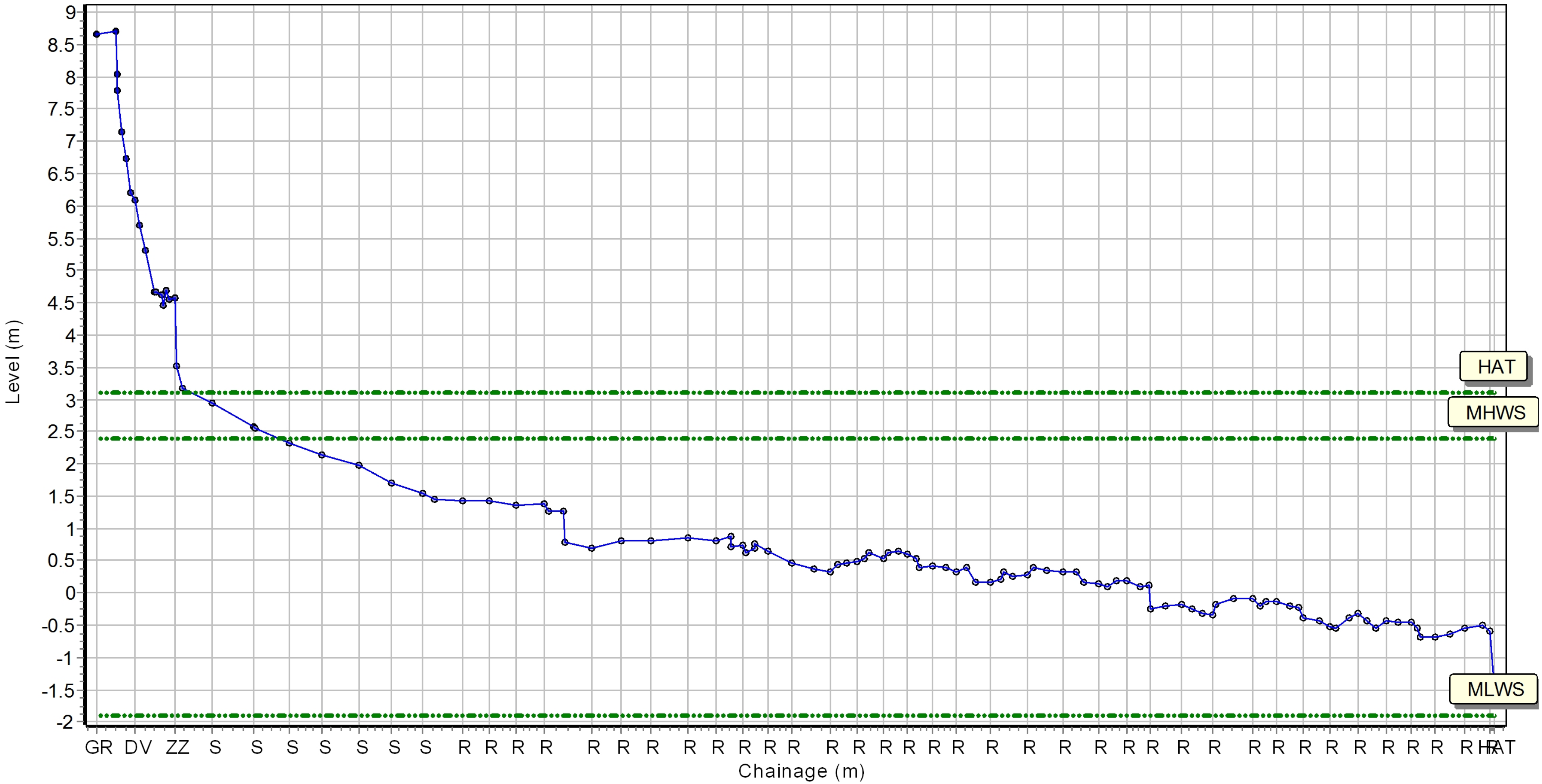
Location: **1aWDC05**

Date: 12/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431750.615 **Northing:** 588299.035 **Profile Bearing:** 56 ° from North



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Beach Profile

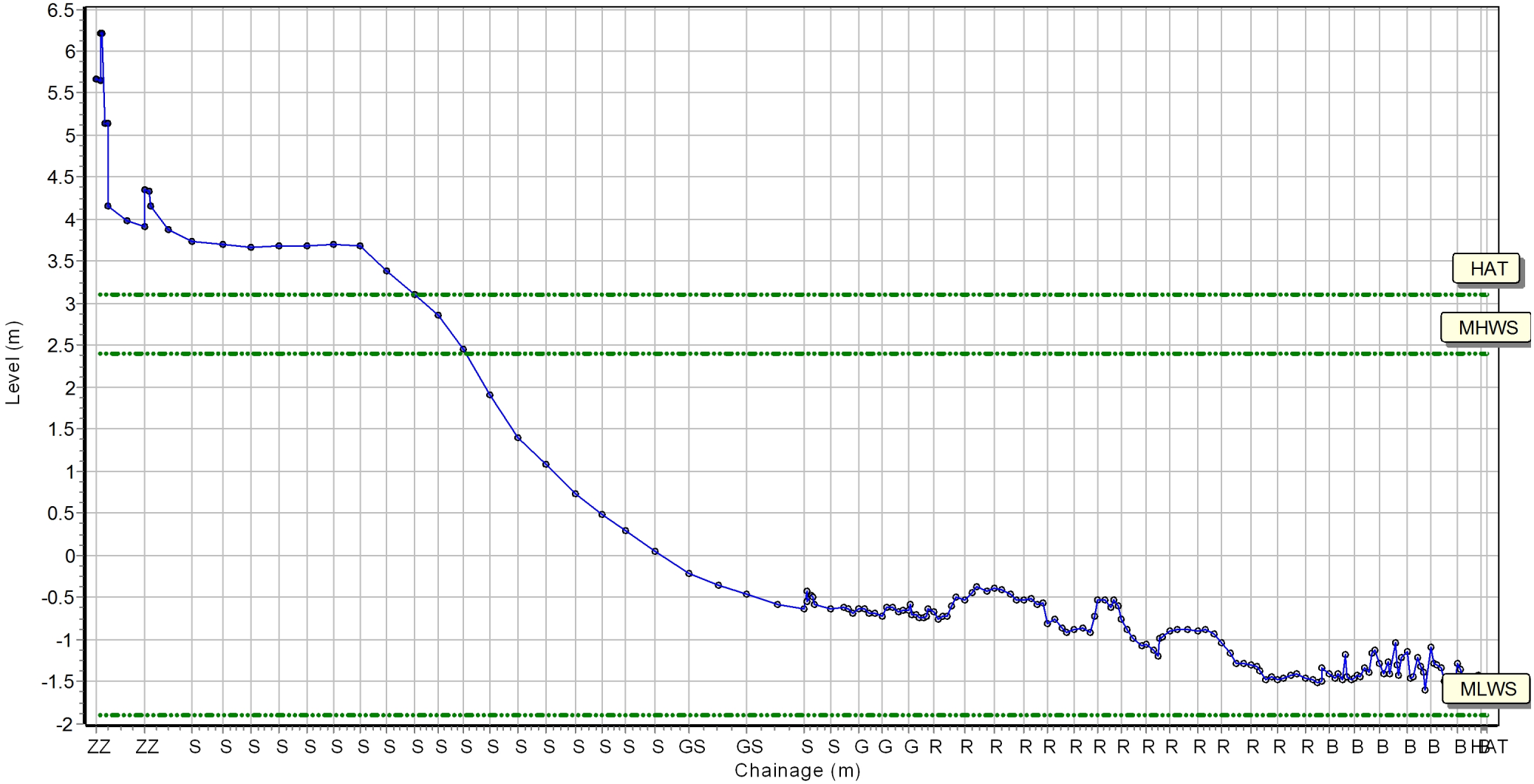
Location: **1aWDC05A**

Date: 12/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431490.829 **Northing:** 588054.668 **Profile Bearing:** 181 ° from North



Beach Profile

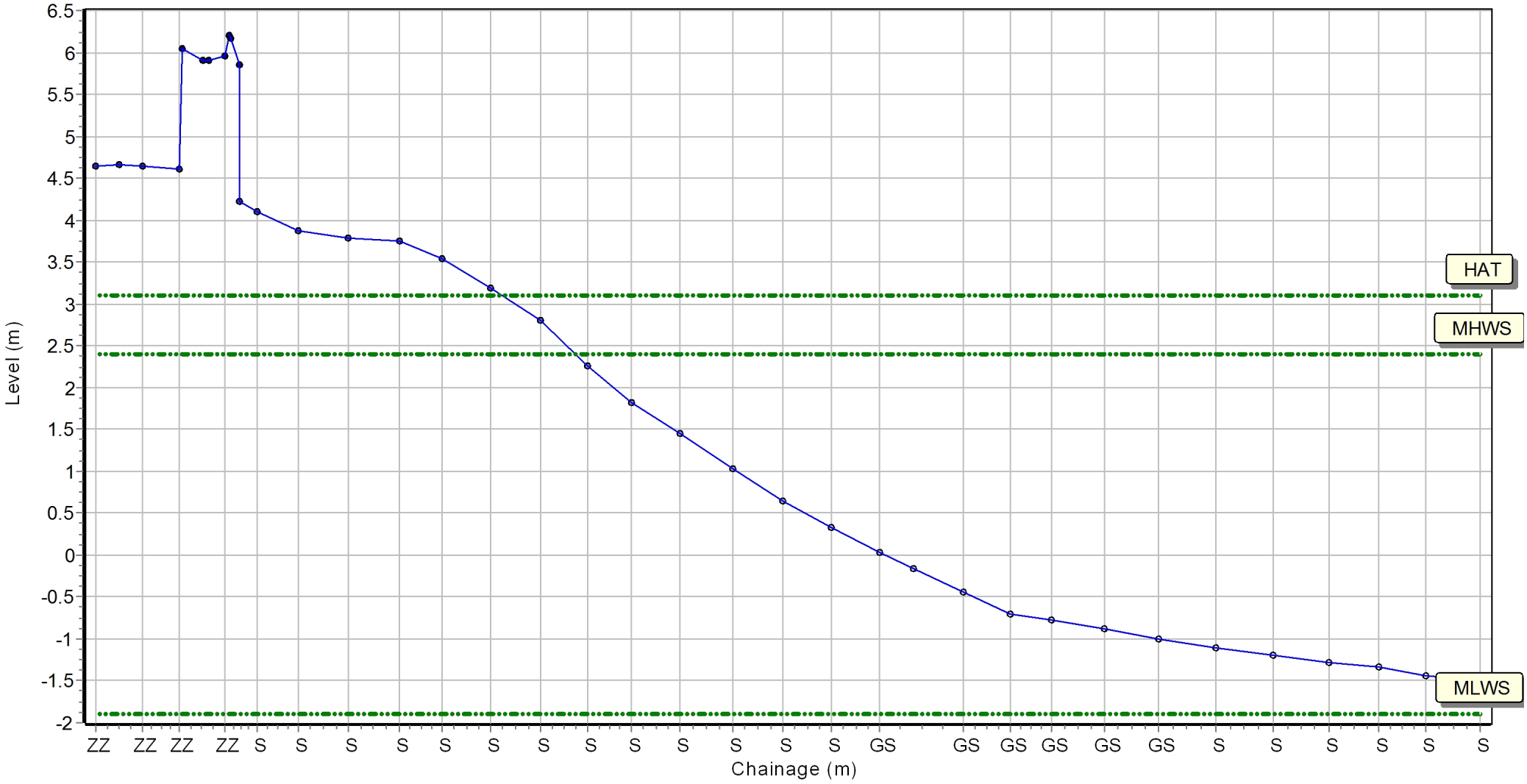
Location: **1aWDC06**

Date: 12/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431176.409 **Northing:** 587860.146 **Profile Bearing:** 125 ° from North



Beach Profile

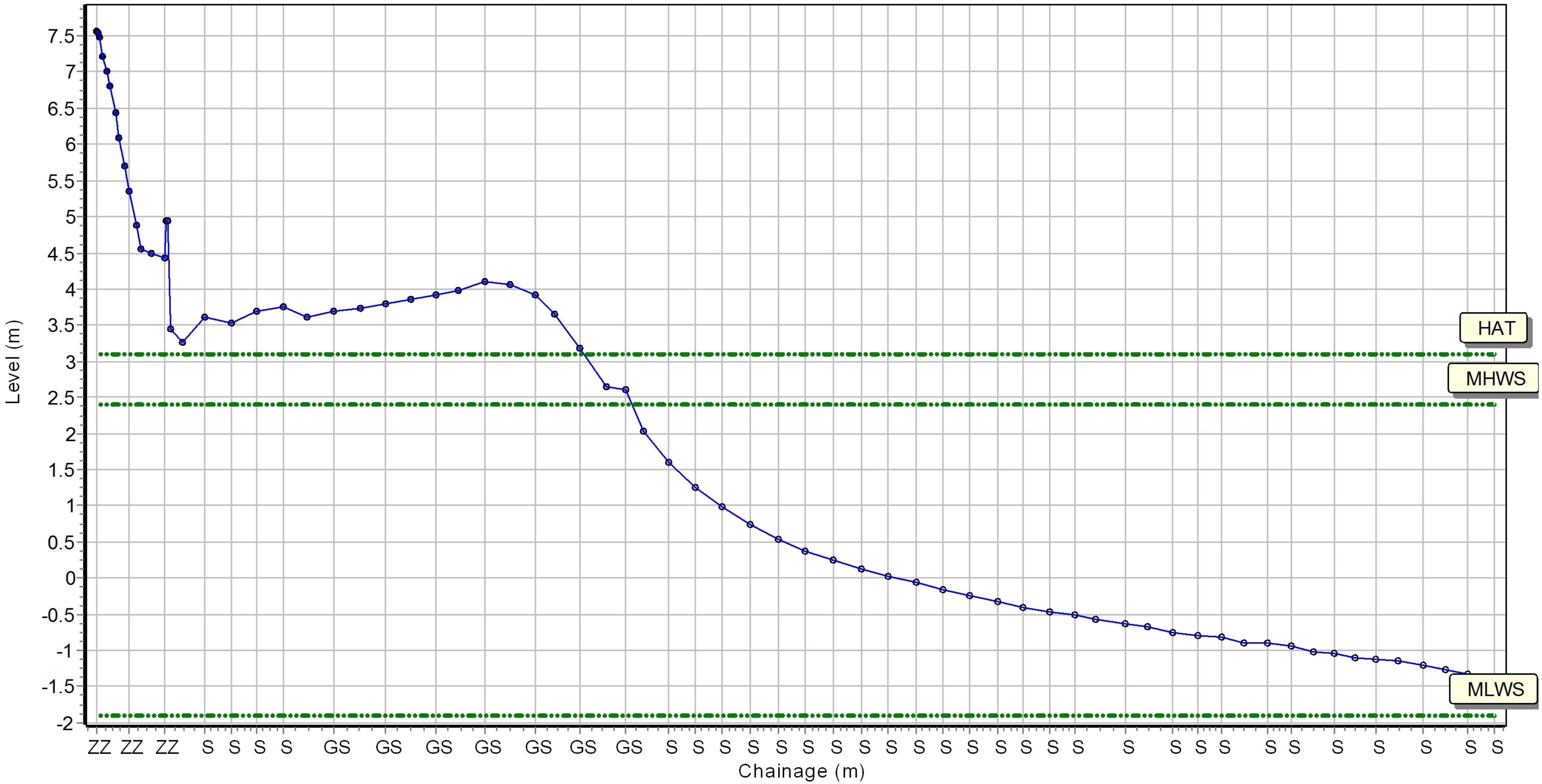
Location: **1aWDC06A**

Date: 12/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431040.809 **Northing:** 587666.014 **Profile Bearing:** 114 ° from North



http://www.sandsuser.com **SANDS**

Beach Profile

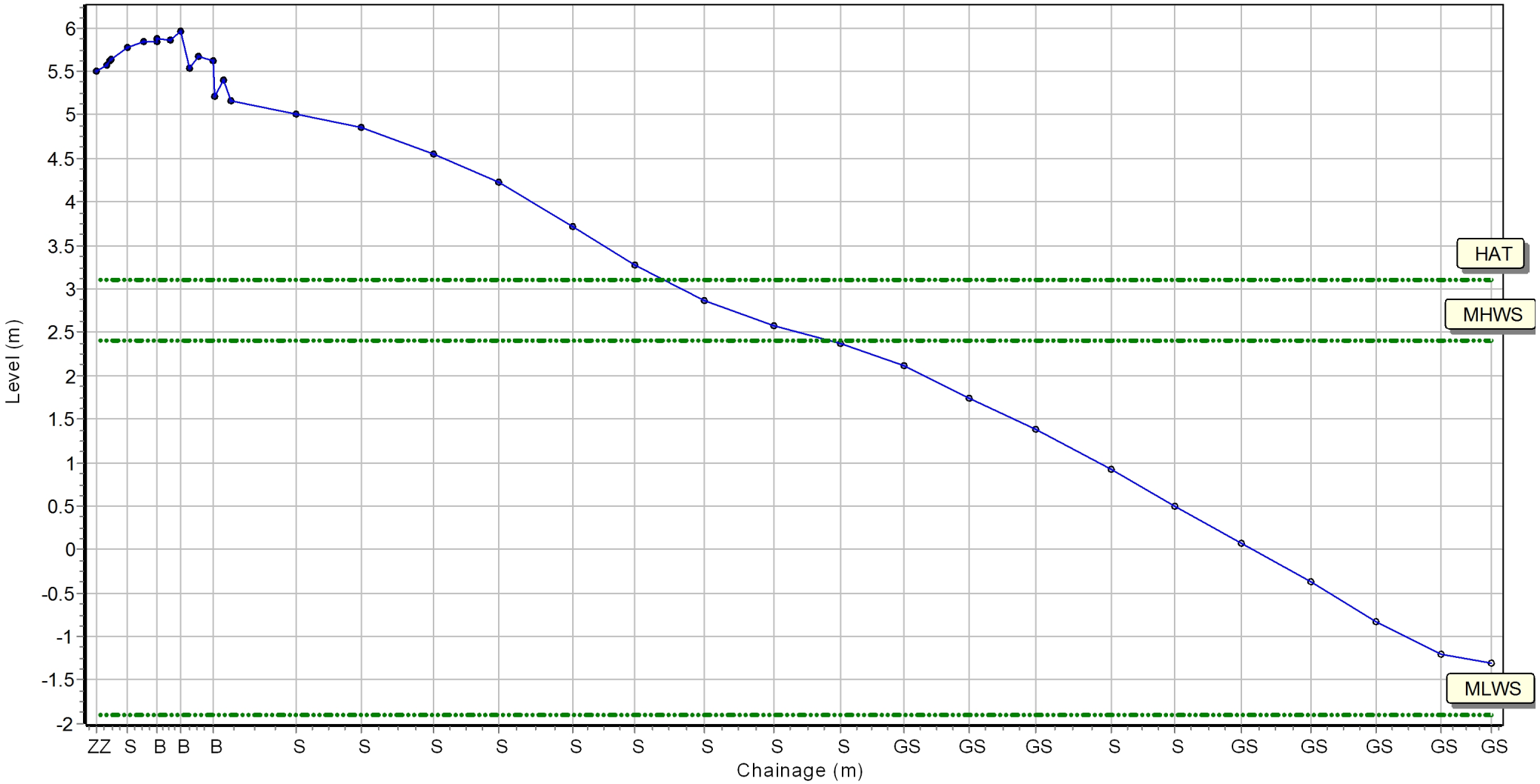
Location: **1aWDC07**

Date: 12/11/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430972.923 **Northing:** 587417.667 **Profile Bearing:** 103 ° from North



Beach Profile

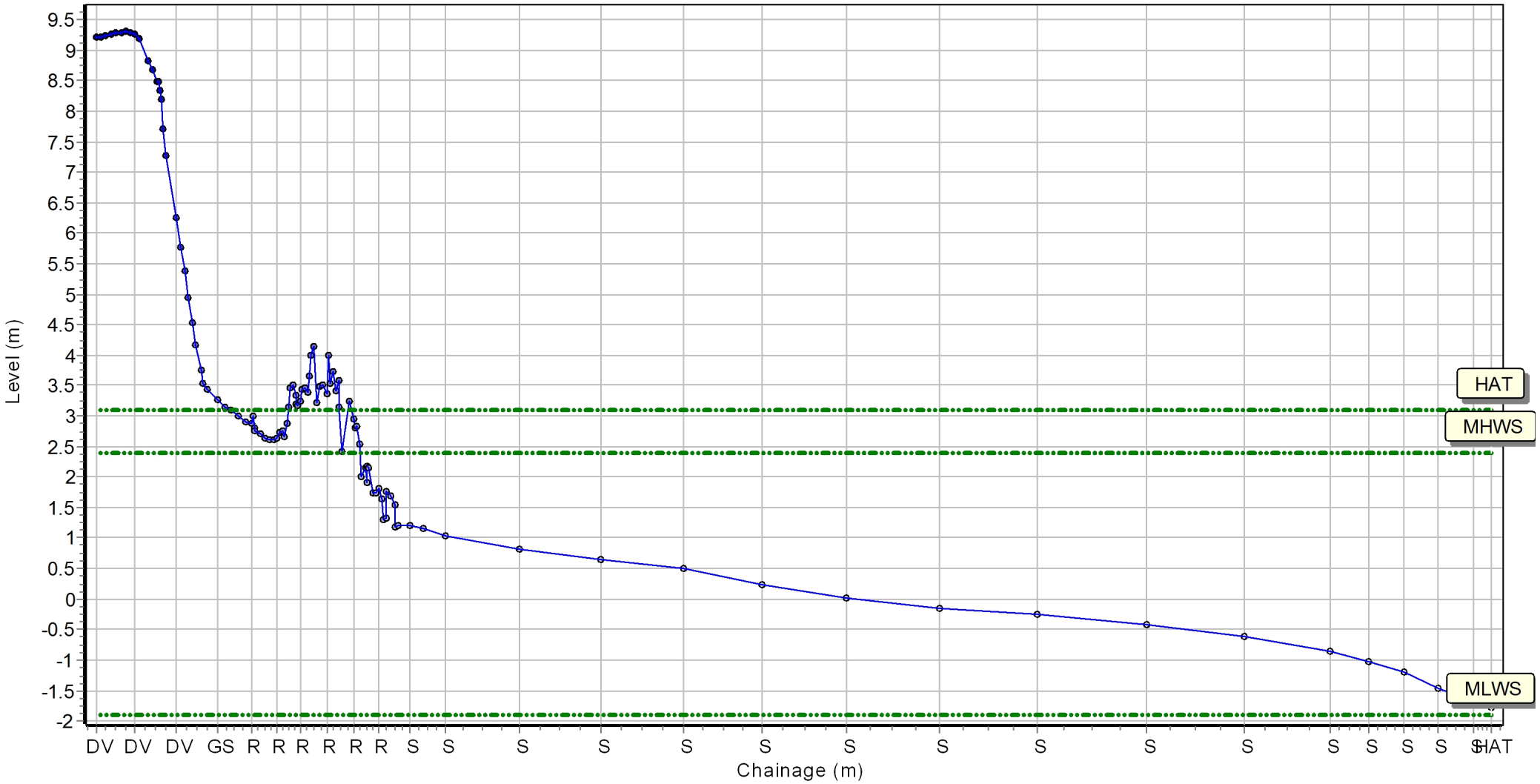
Location: **1aWDC08**

Date: 29/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430440.056 **Northing:** 585865.943 **Profile Bearing:** 105 ° from North



Beach Profile

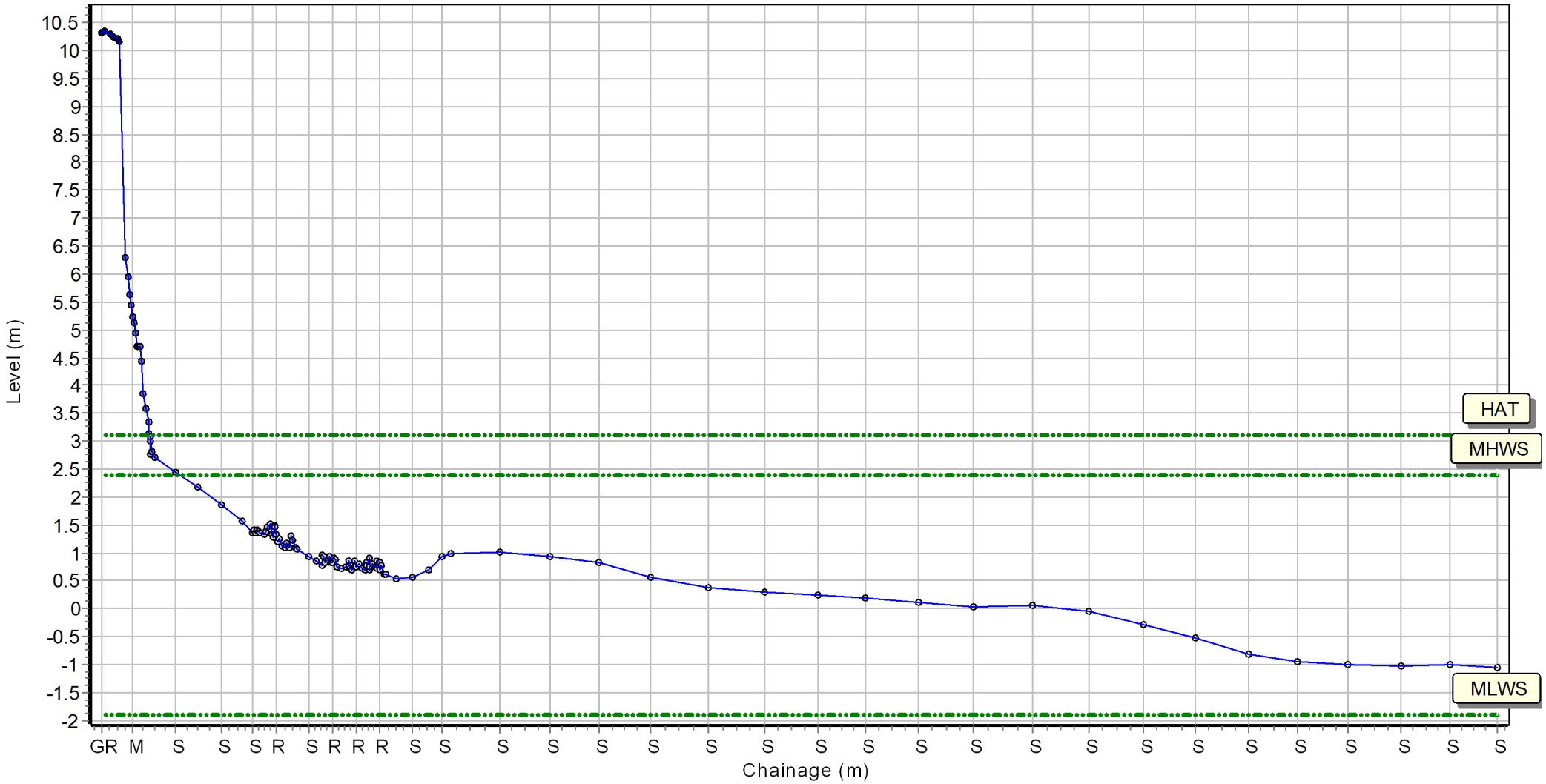
Location: **1aWDC09**

Date: 29/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430361.278 **Northing:** 585559.12 **Profile Bearing:** 130 ° from North



Beach Profile

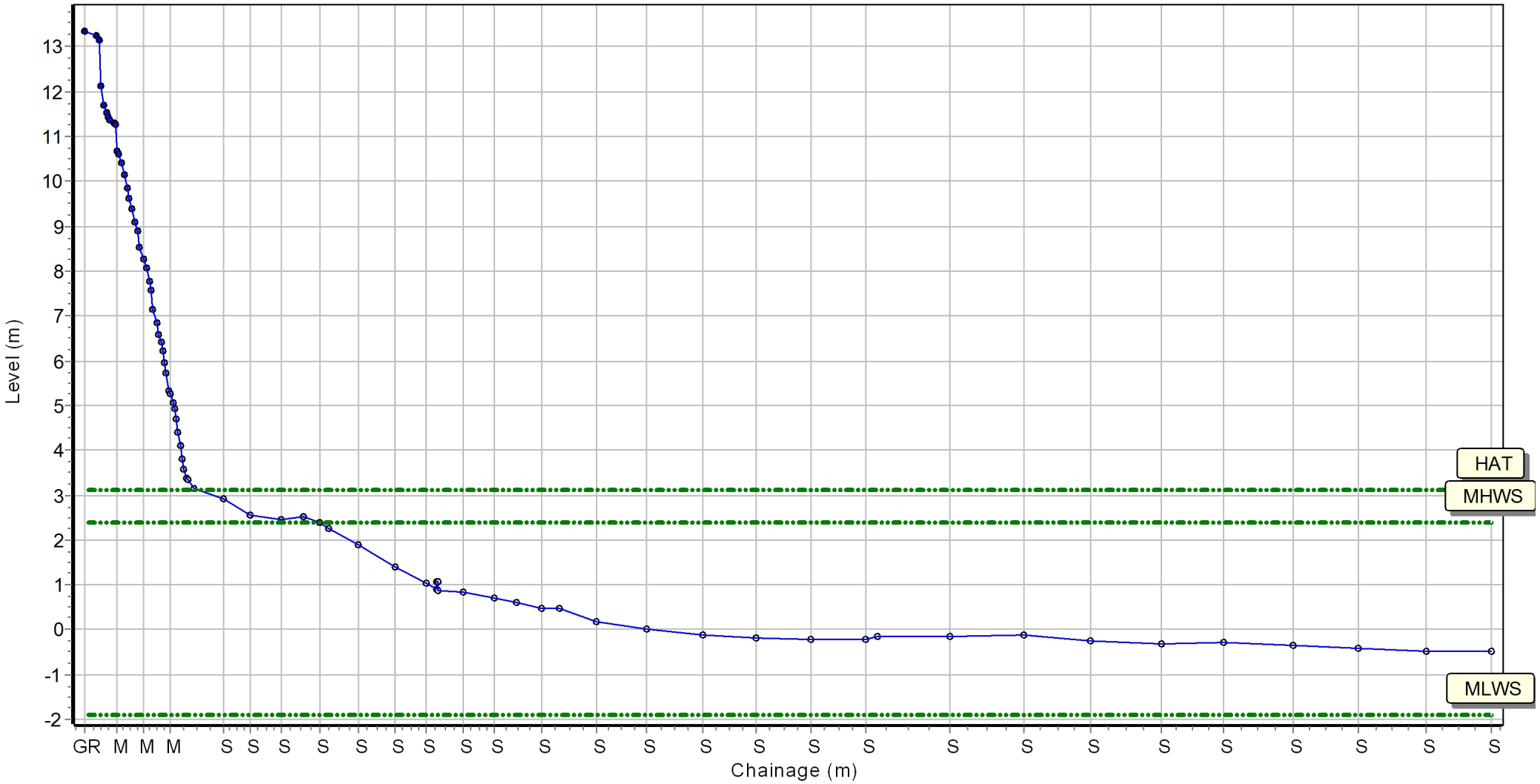
Location: **1aWDC10**

Date: 29/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430247.175 **Northing:** 585191.003 **Profile Bearing:** 71 ° from North



Beach Profile

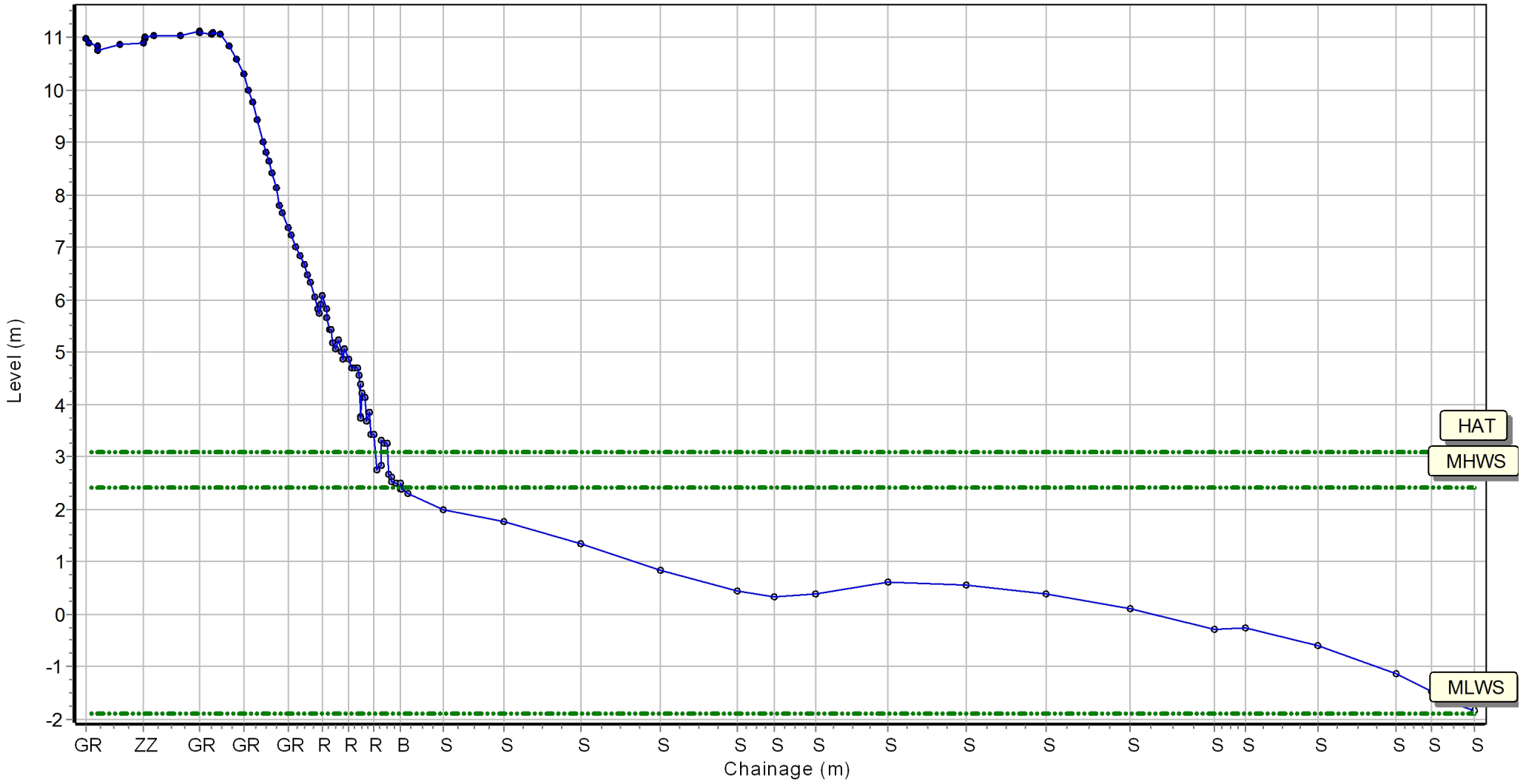
Location: **1aWDC11**

Date: 29/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430397.4 **Northing:** 584739.609 **Profile Bearing:** 74 ° from North



Beach Profile

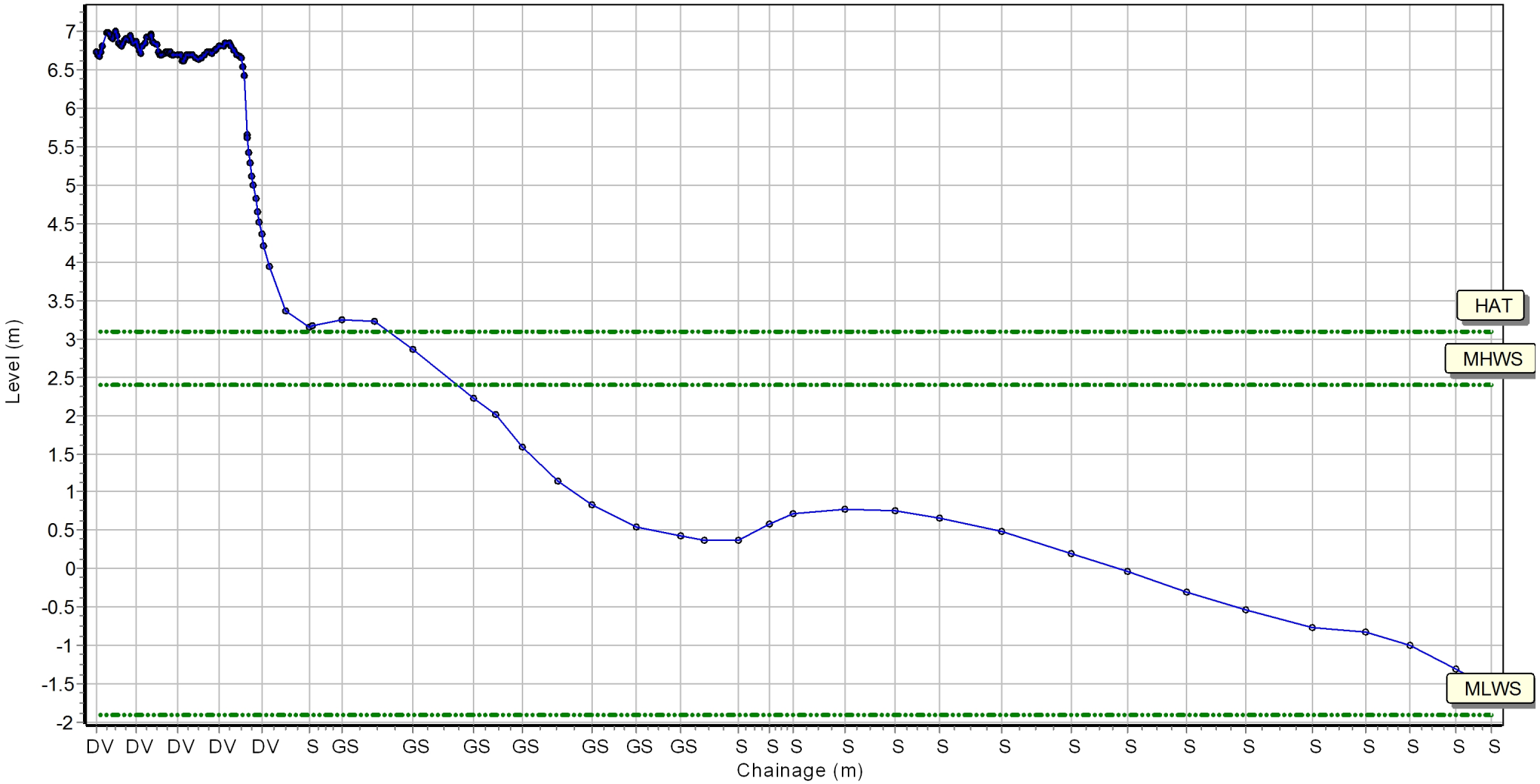
Location: **1aWDC12**

Date: 29/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430549.164 **Northing:** 584058.468 **Profile Bearing:** 73 ° from North



Beach Profile

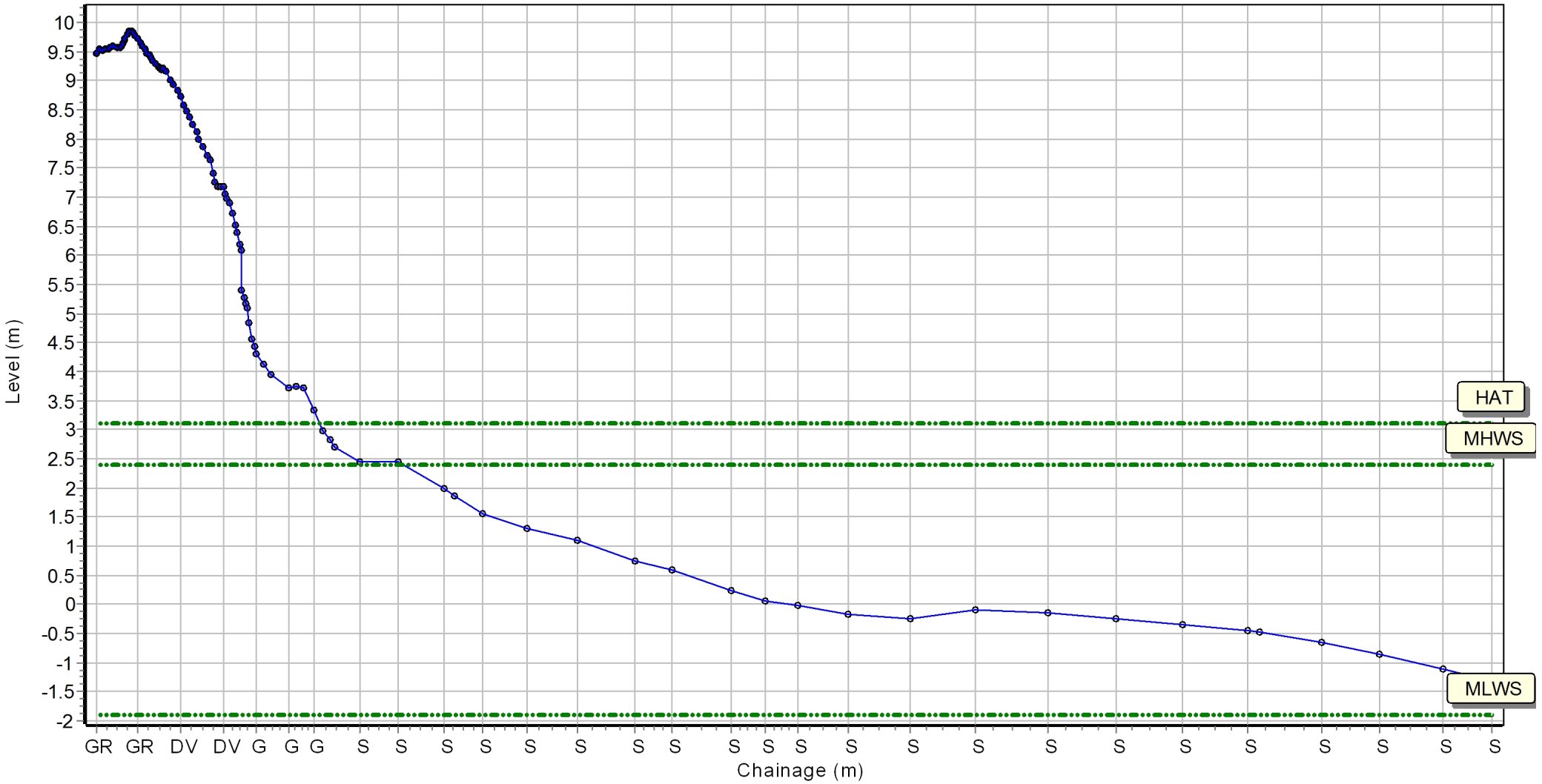
Location: **1aWDC13**

Date: 29/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430983.324 **Northing:** 583146.489 **Profile Bearing:** 62 ° from North



Beach Profile

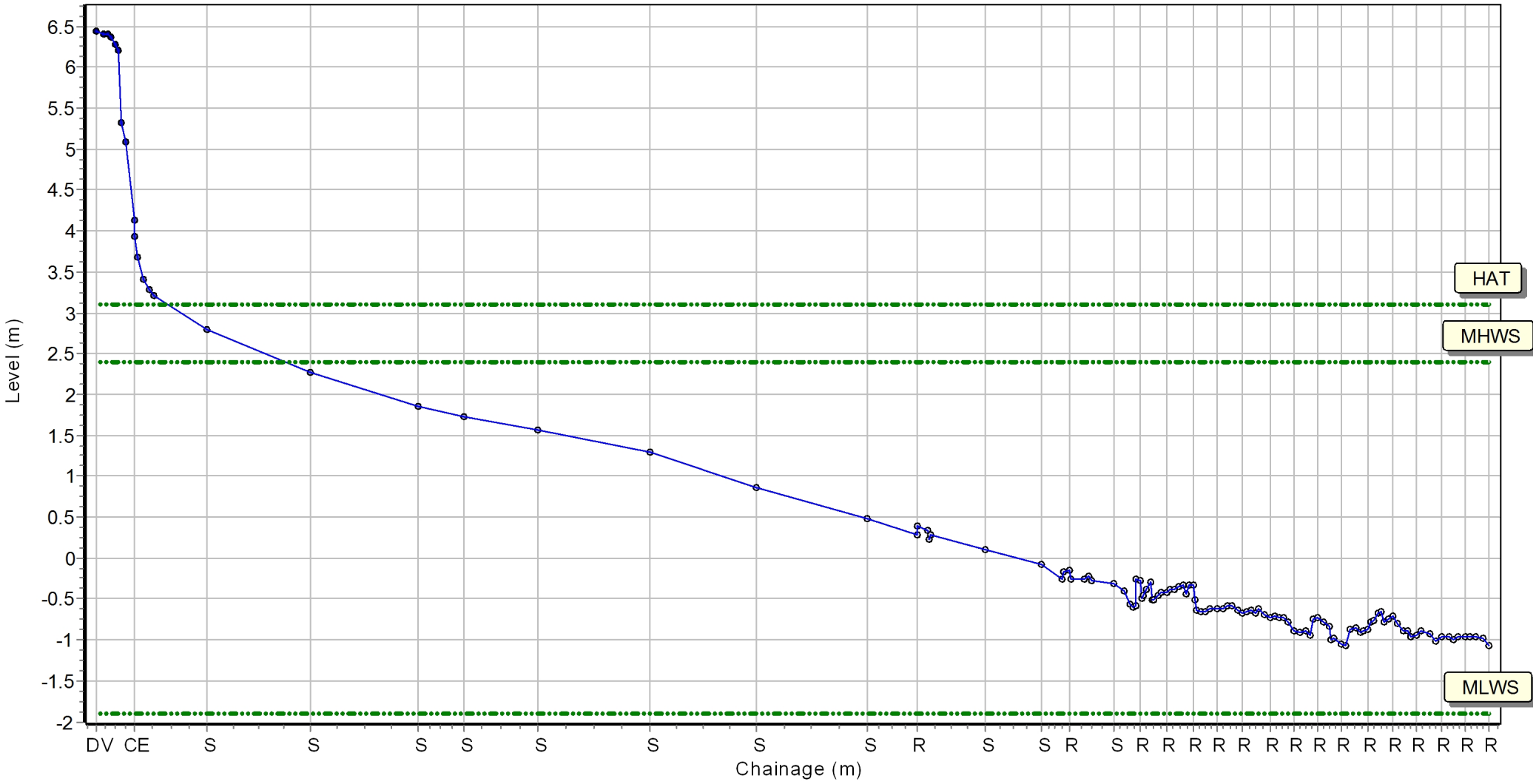
Location: **1aWDC14**

Date: 29/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431317.646 **Northing:** 582642.372 **Profile Bearing:** 62 ° from North



Beach Profile

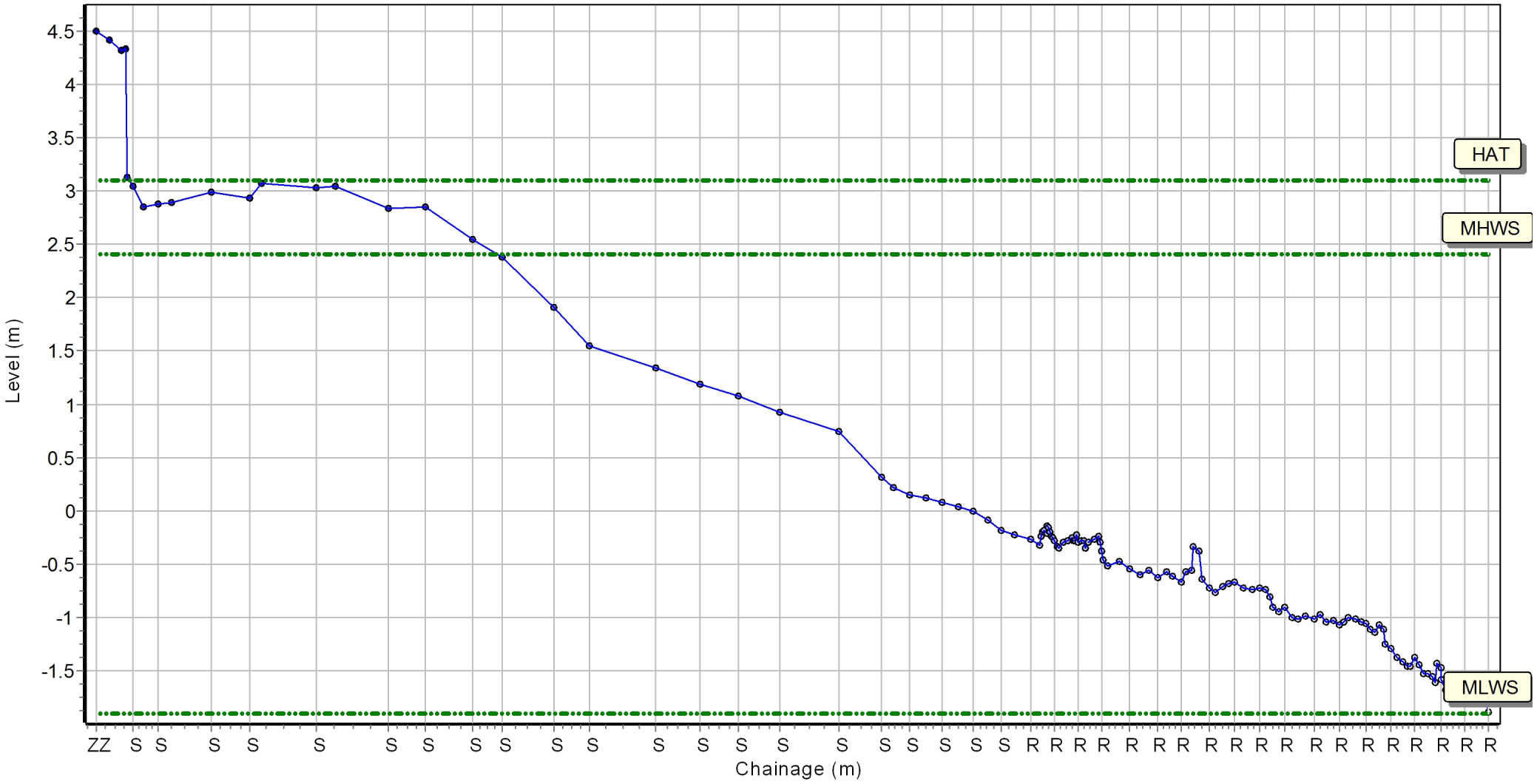
Location: **1aNWB1**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431665.429 **Northing:** 588007.636 **Profile Bearing:** 212 ° from North



Beach Profile

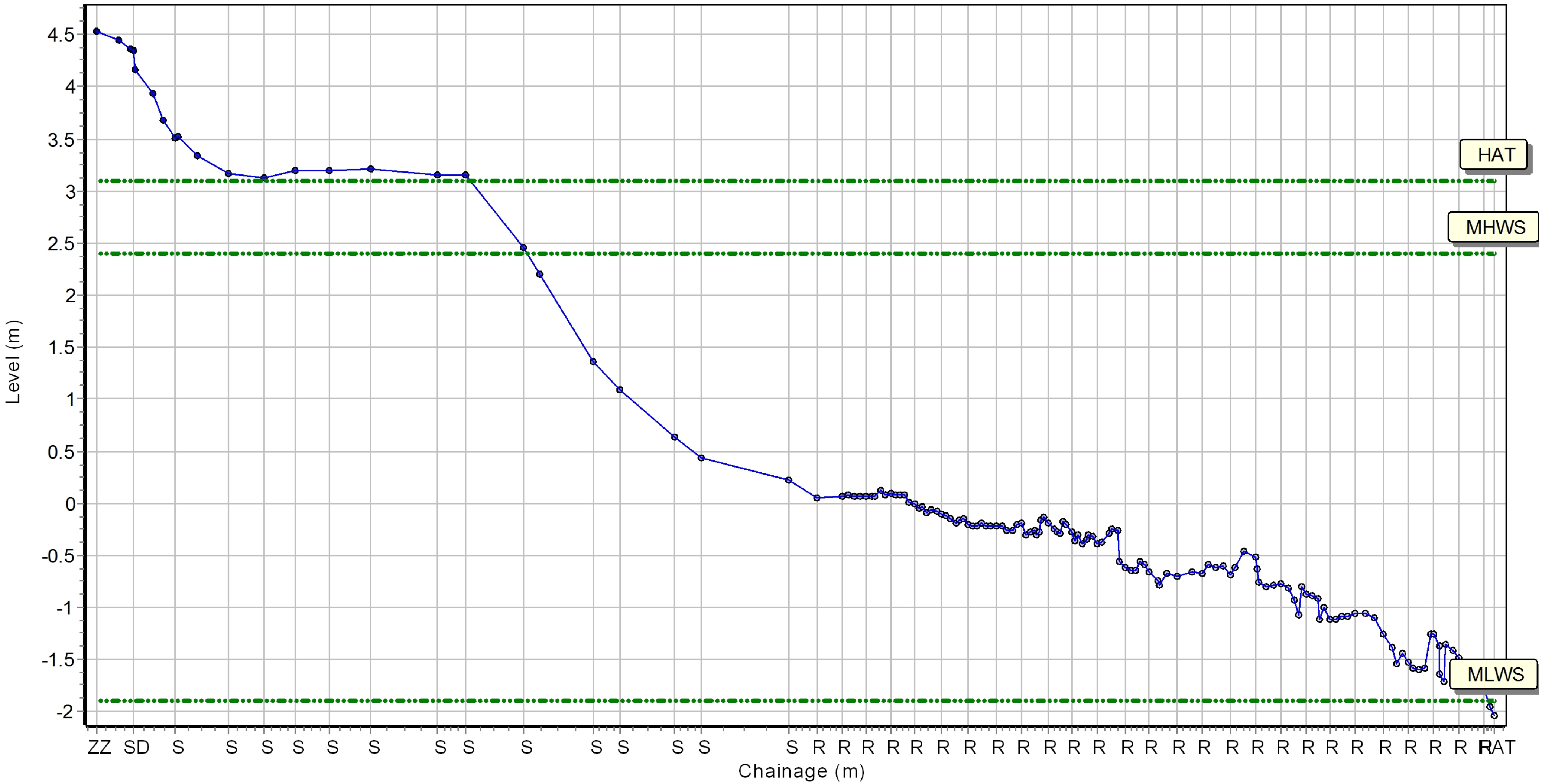
Location: 1aNWB2

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431618.236 **Northing:** 588035.356 **Profile Bearing:** 202 ° from North



Beach Profile

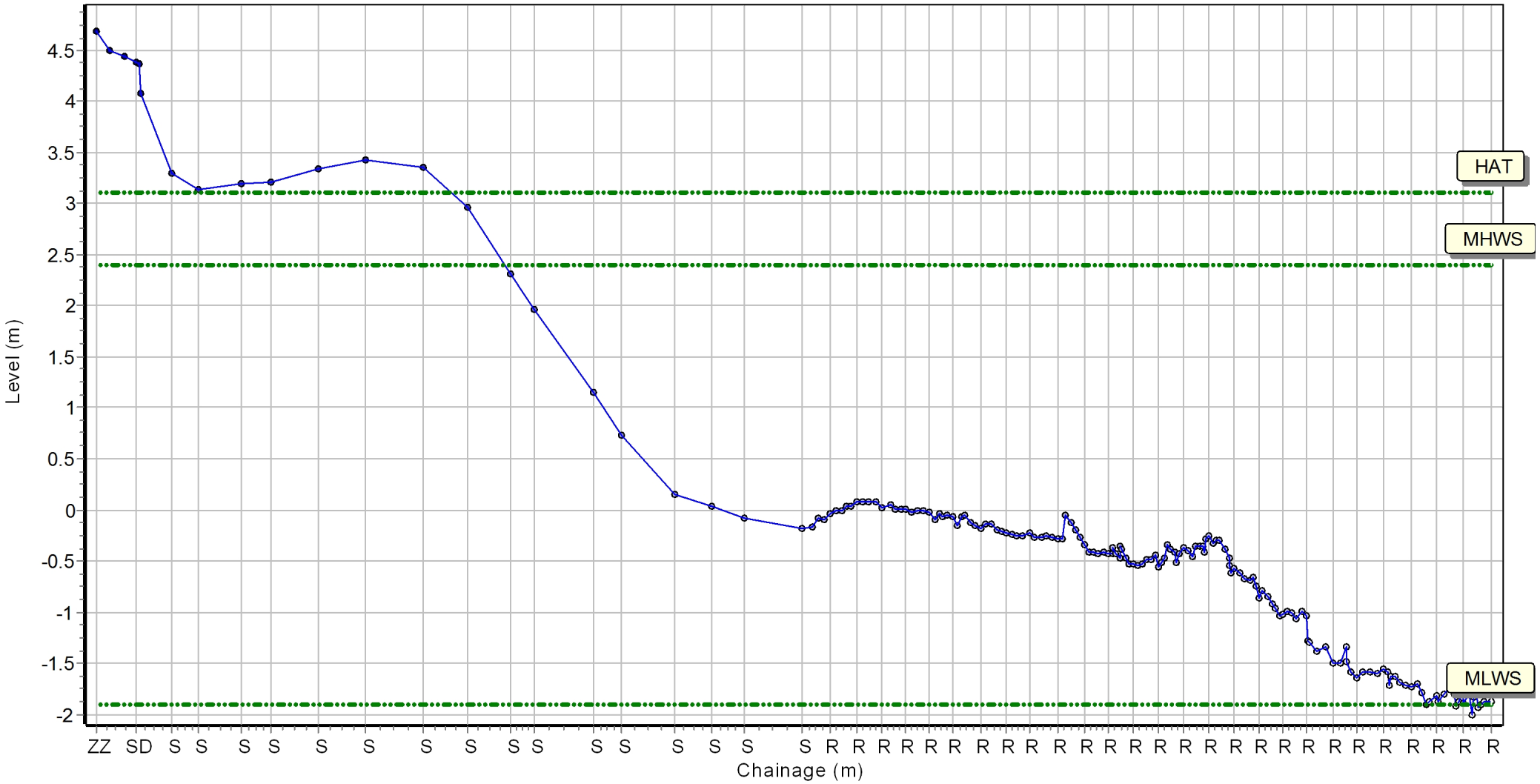
Location: **1aNWB3**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431573.455 **Northing:** 588049.149 **Profile Bearing:** 193 ° from North



Beach Profile

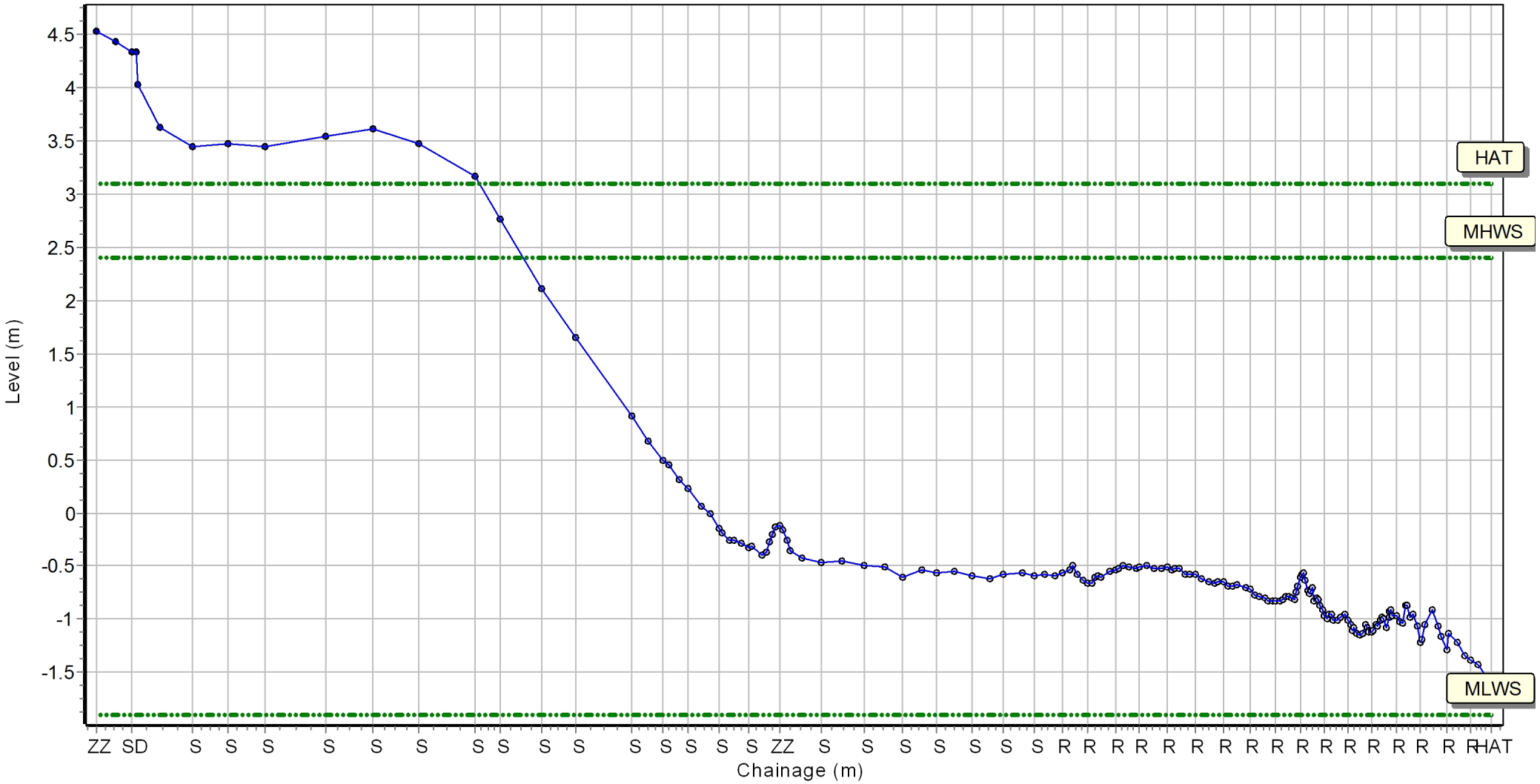
Location: **1aNWB4**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431523.116 **Northing:** 588054.727 **Profile Bearing:** 184 ° from North



Beach Profile

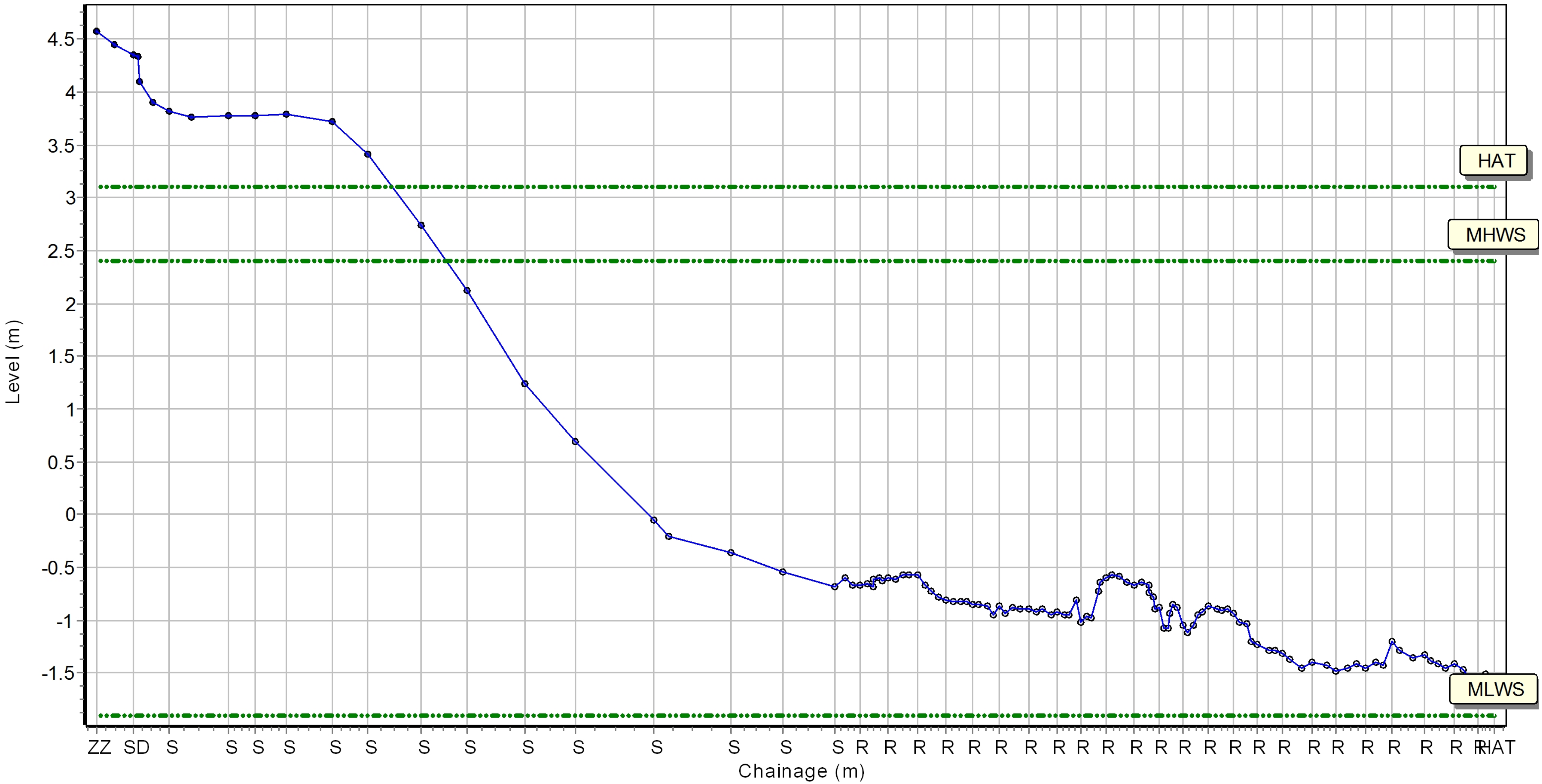
Location: **1aNWB5**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431473.586 **Northing:** 588048.504 **Profile Bearing:** 174 ° from North



http://www.sandsuser.com **SANDS**

Beach Profile

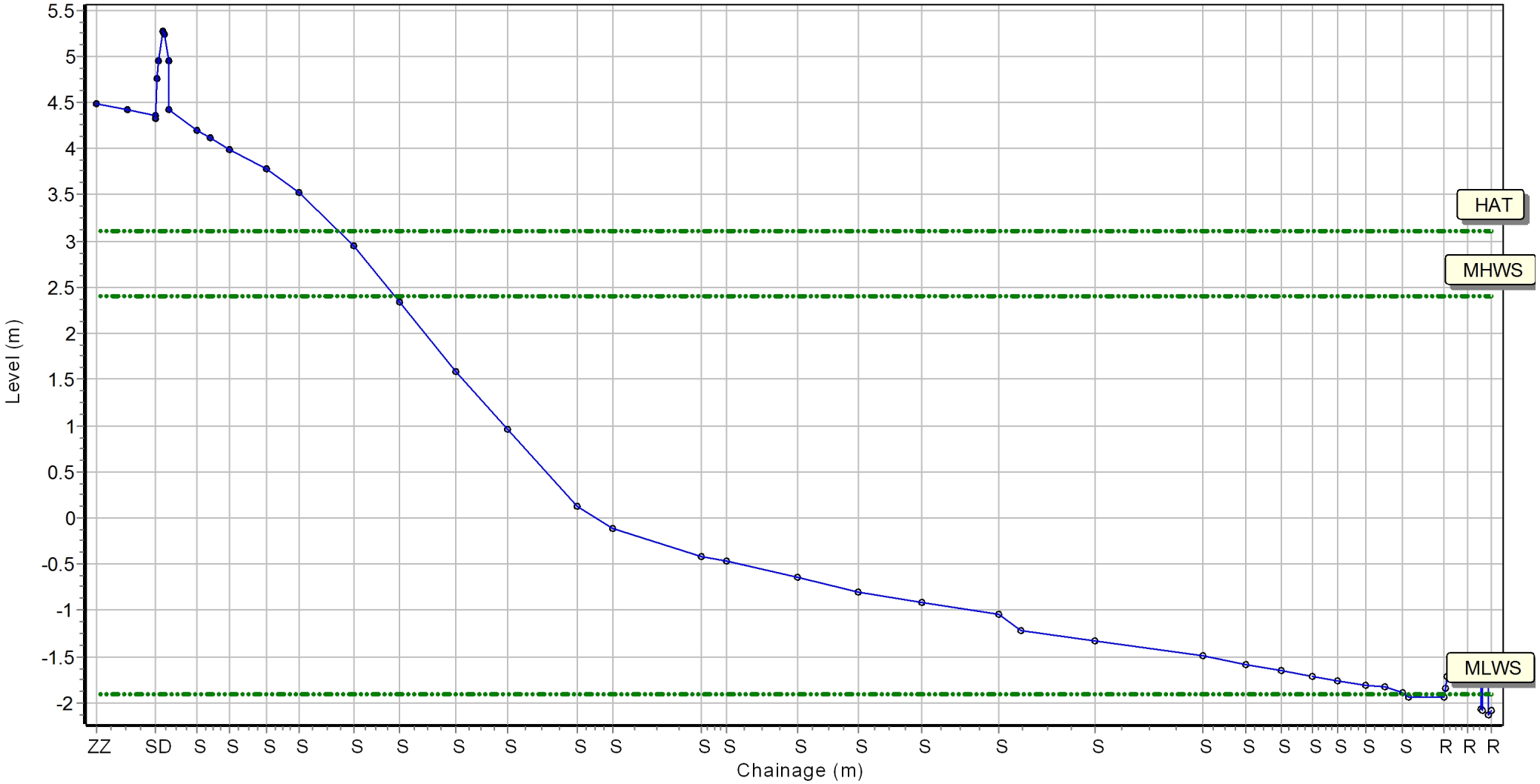
Location: **1aNWB6**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431424.56 **Northing:** 588032.268 **Profile Bearing:** 164 ° from North



Beach Profile

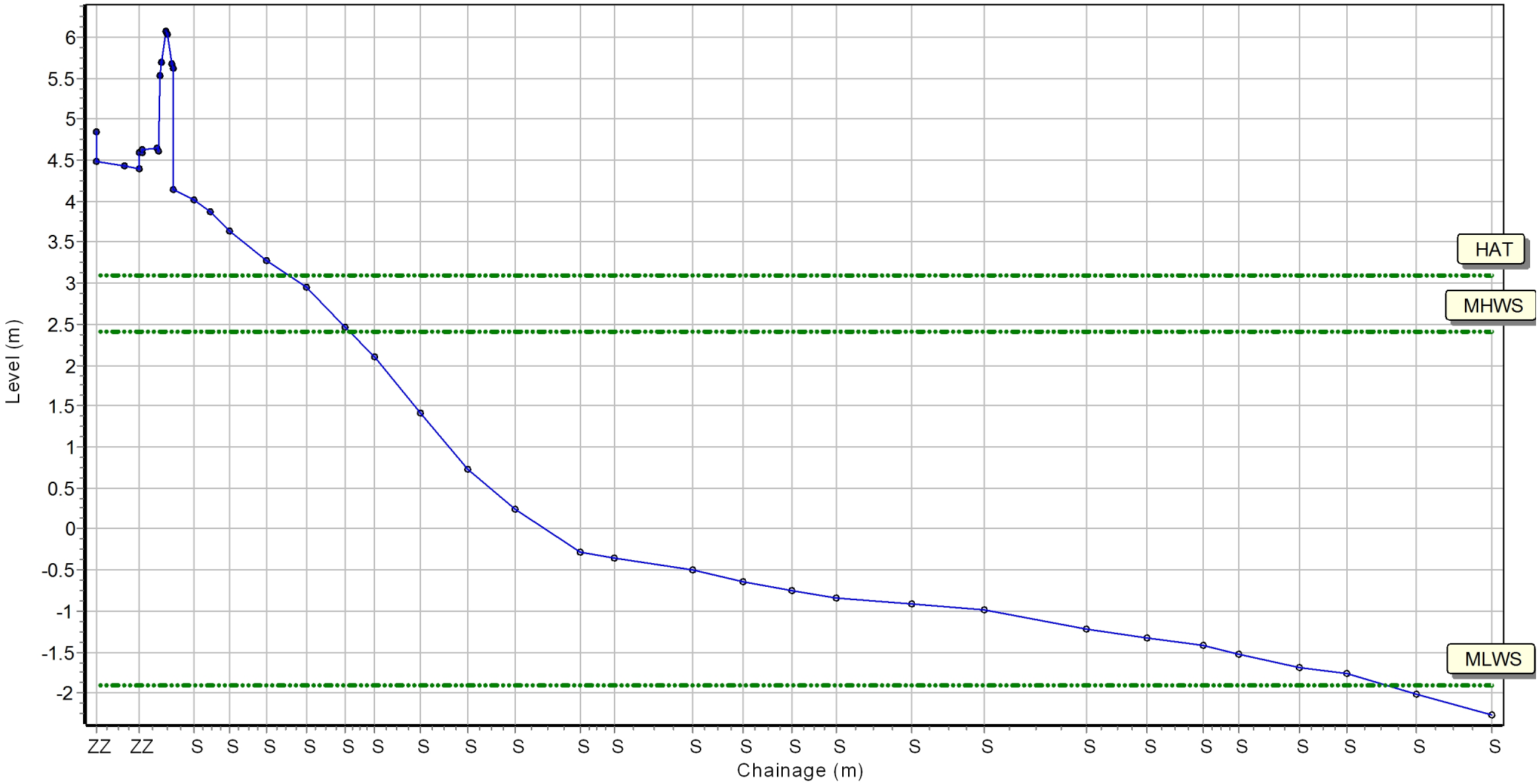
Location: **1aNWB7**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431379.622 **Northing:** 588011.712 **Profile Bearing:** 165 ° from North



Beach Profile

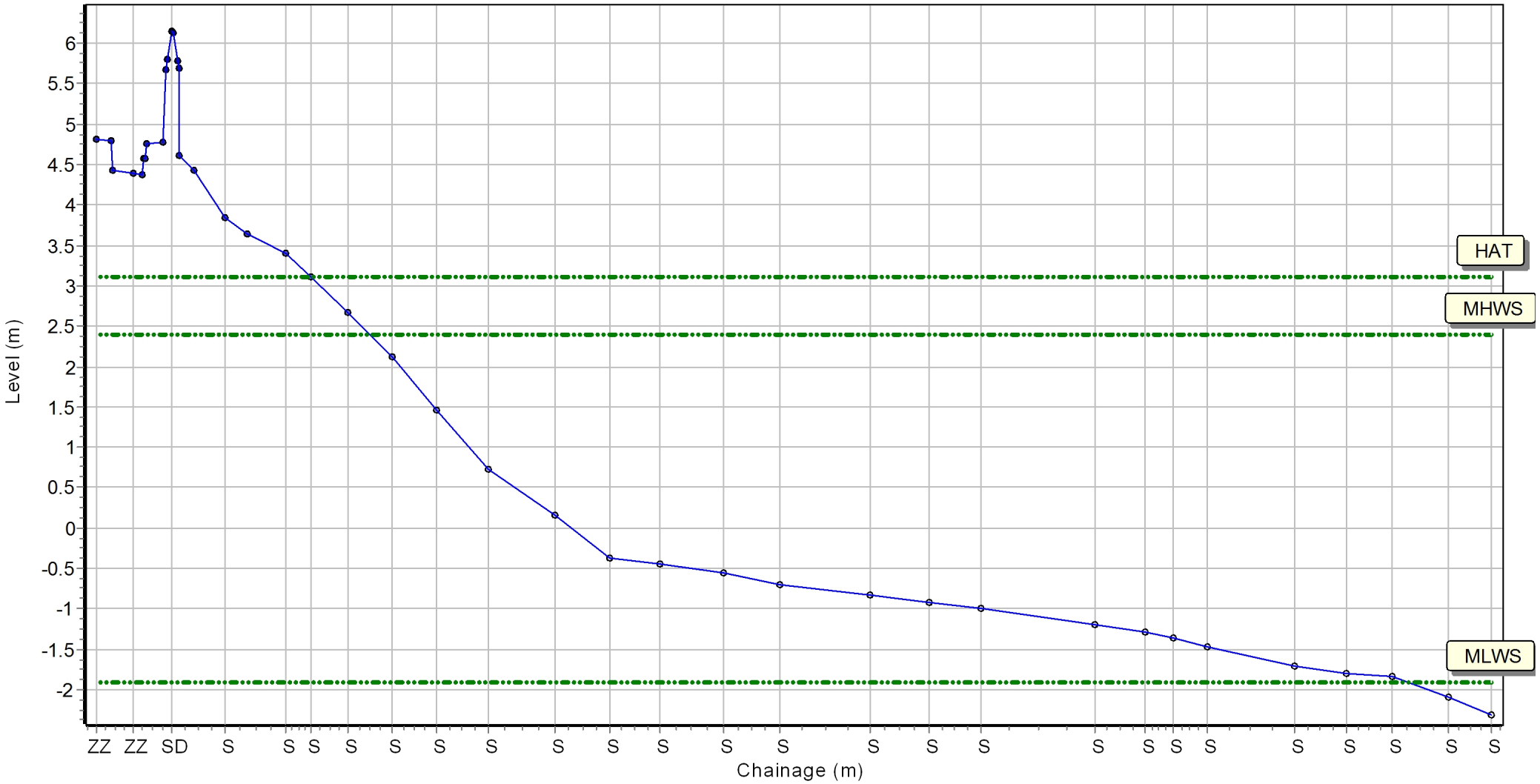
Location: **1aNWB8**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431332.62 **Northing:** 587988.039 **Profile Bearing:** 144 ° from North



Beach Profile

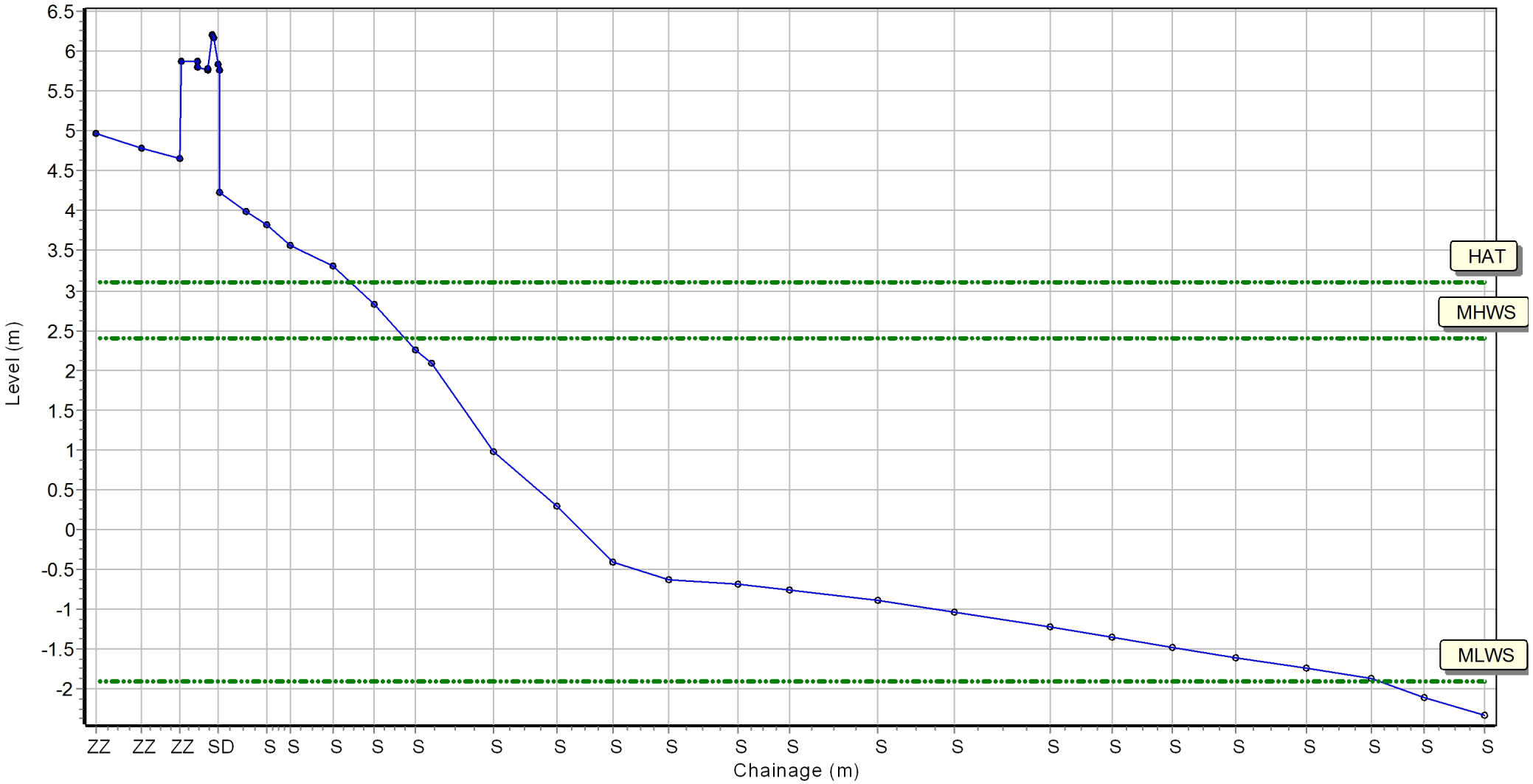
Location: **1aNWB9**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431288.421 **Northing:** 587963.979 **Profile Bearing:** 142 ° from North



Beach Profile

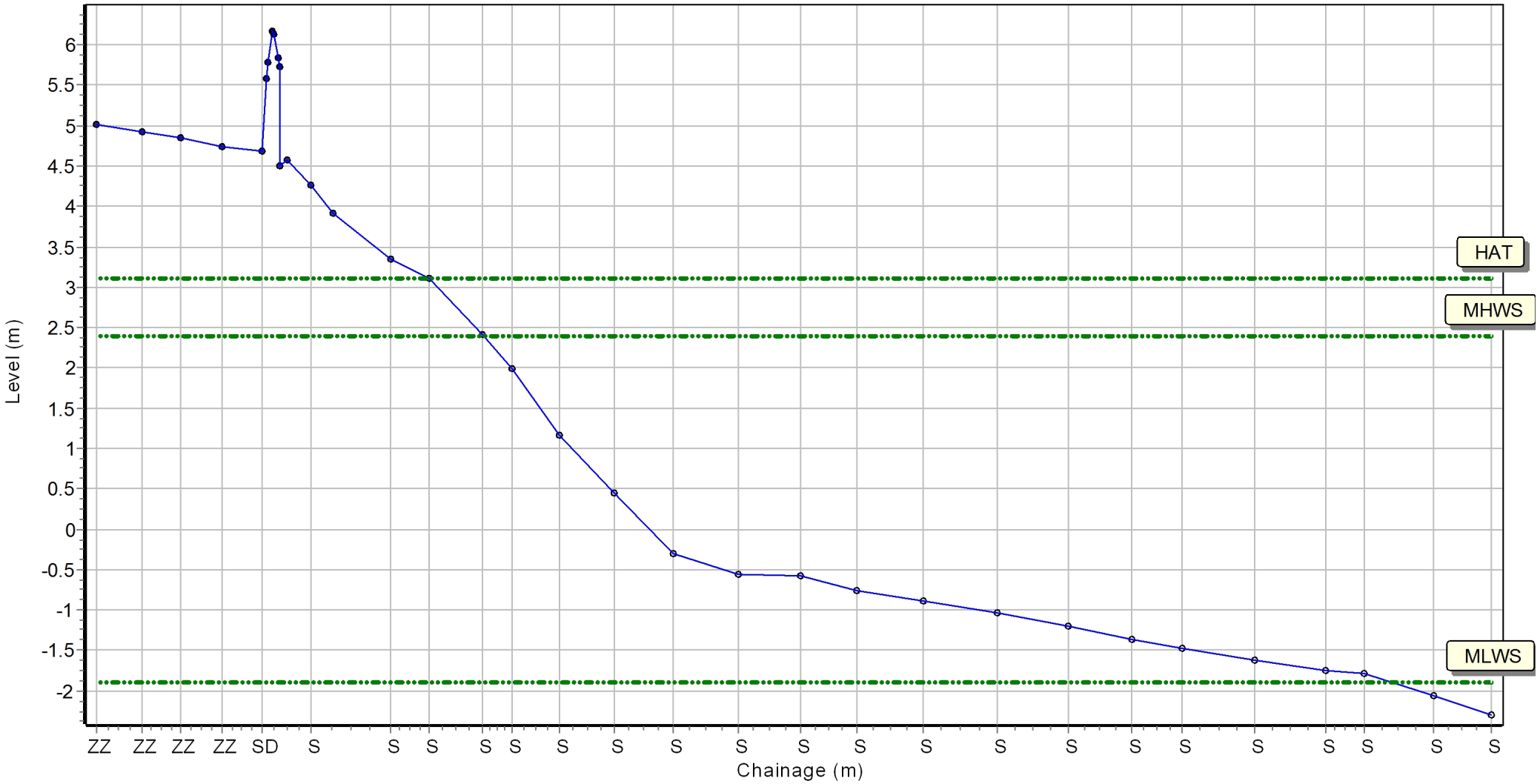
Location: **1aNWB10**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431244.074 **Northing:** 587936.575 **Profile Bearing:** 139 ° from North



Beach Profile

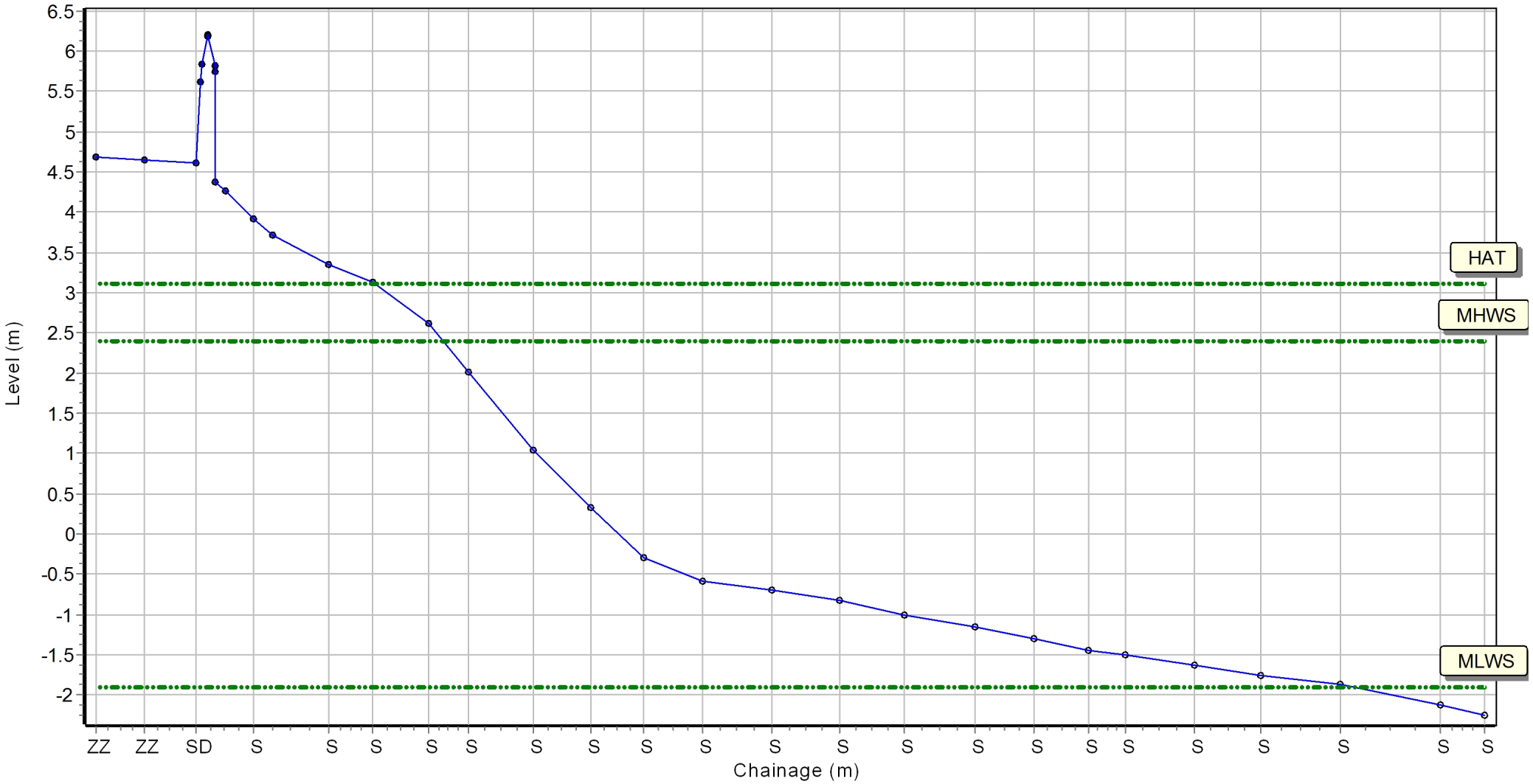
Location: **1aNWB11**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431211.343 **Northing:** 587896.891 **Profile Bearing:** 135 ° from North



Beach Profile

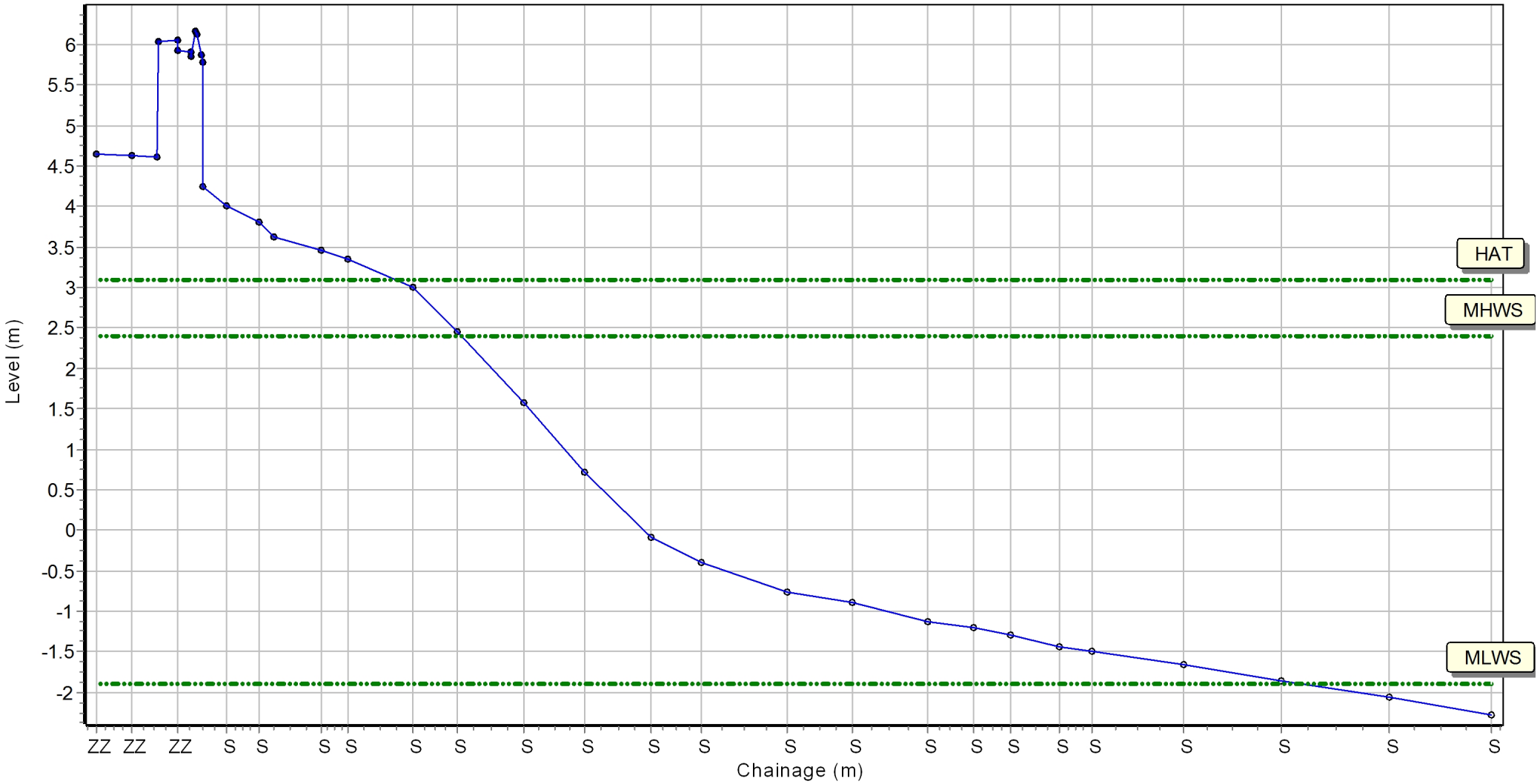
Location: **1aNWB12**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431176.844 **Northing:** 587860.651 **Profile Bearing:** 132 ° from North



Beach Profile

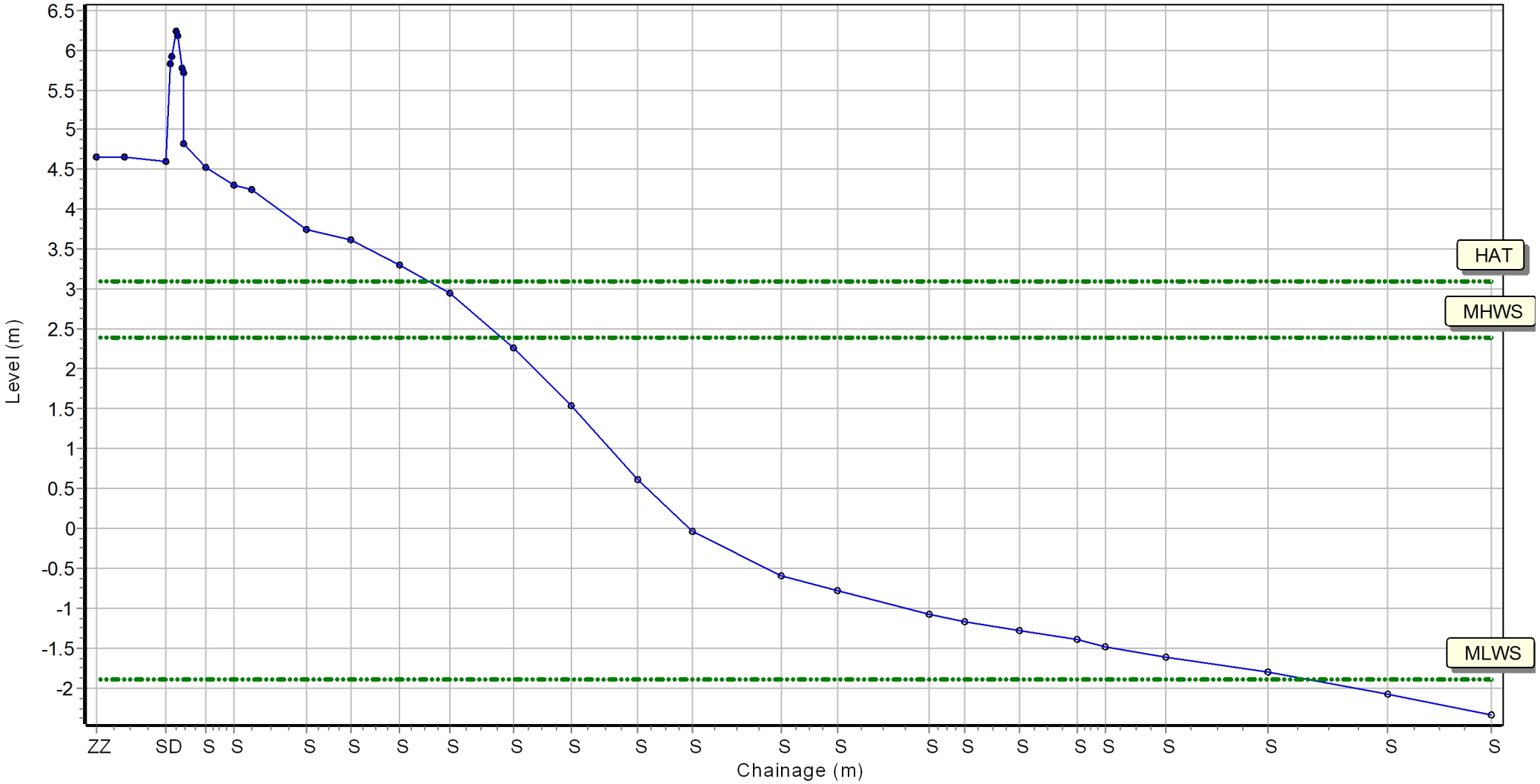
Location: **1aNWB13**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431143.784 **Northing:** 587821.594 **Profile Bearing:** 129 ° from North



Beach Profile

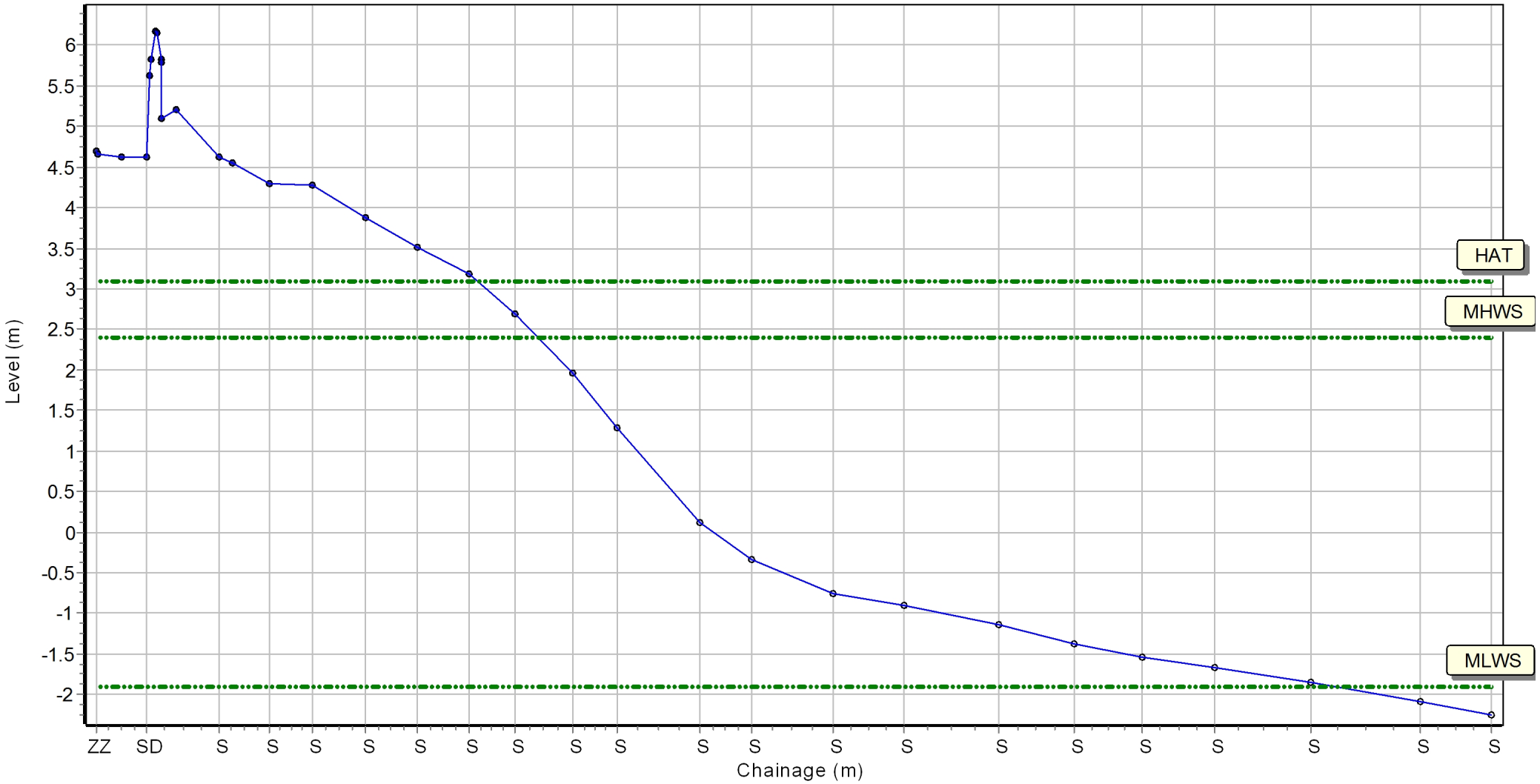
Location: **1aNWB14**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431113.86 **Northing:** 587780.727 **Profile Bearing:** 115 ° from North



Beach Profile

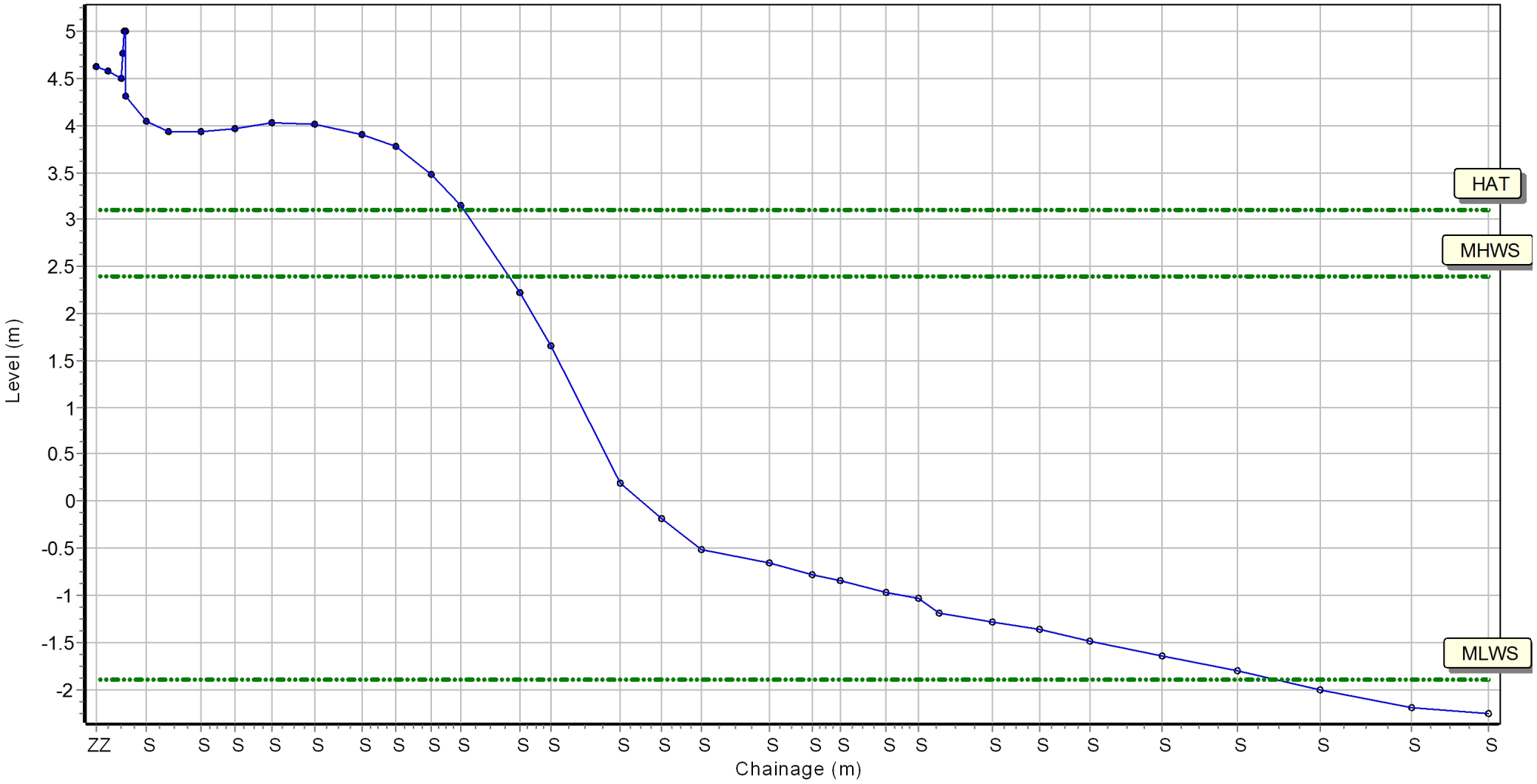
Location: **1aNWB15**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431088.458 **Northing:** 587739.577 **Profile Bearing:** 125 ° from North



Beach Profile

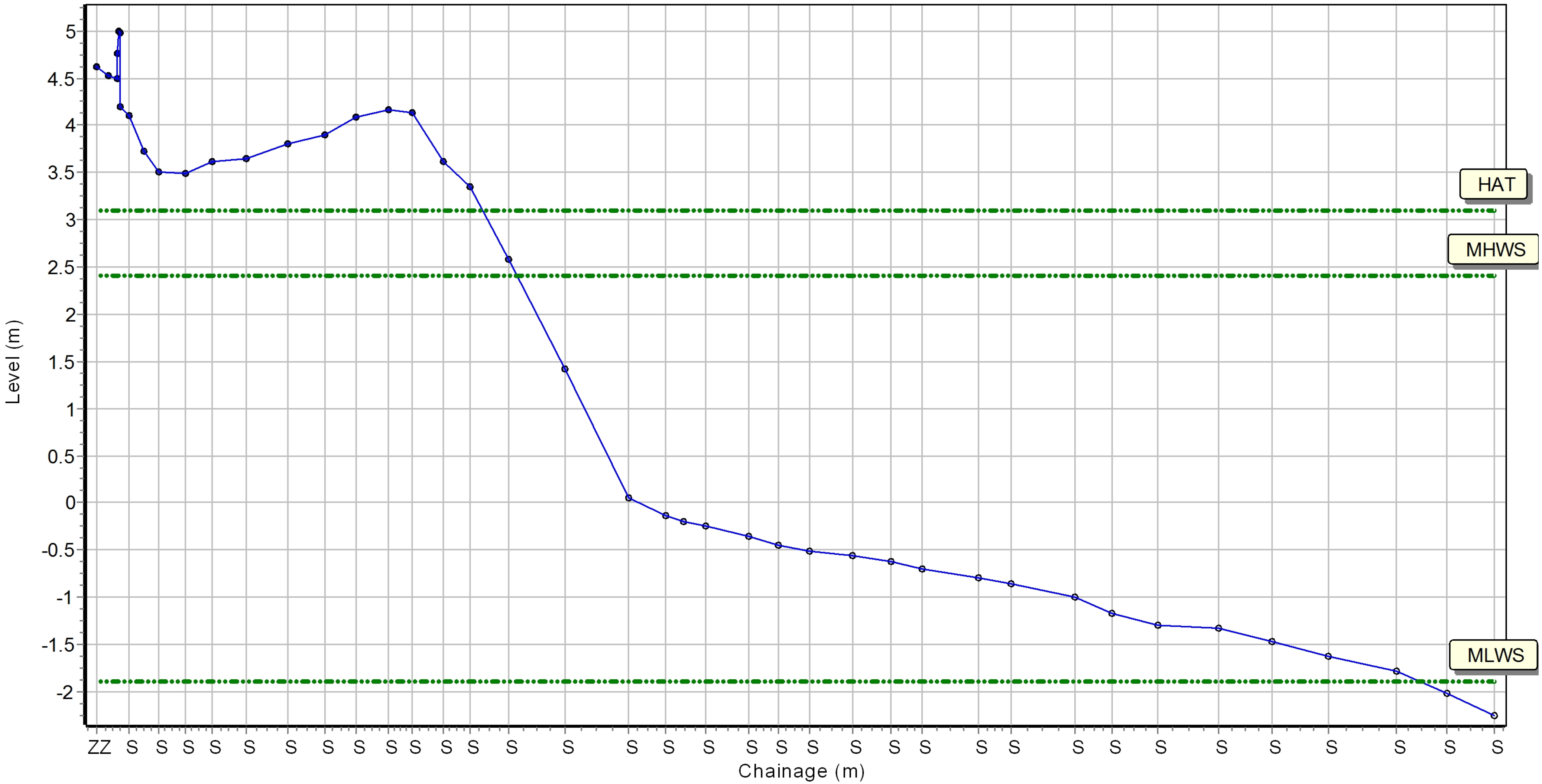
Location: 1aNWB16

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431063.789 **Northing:** 587695.893 **Profile Bearing:** 119 ° from North



Beach Profile

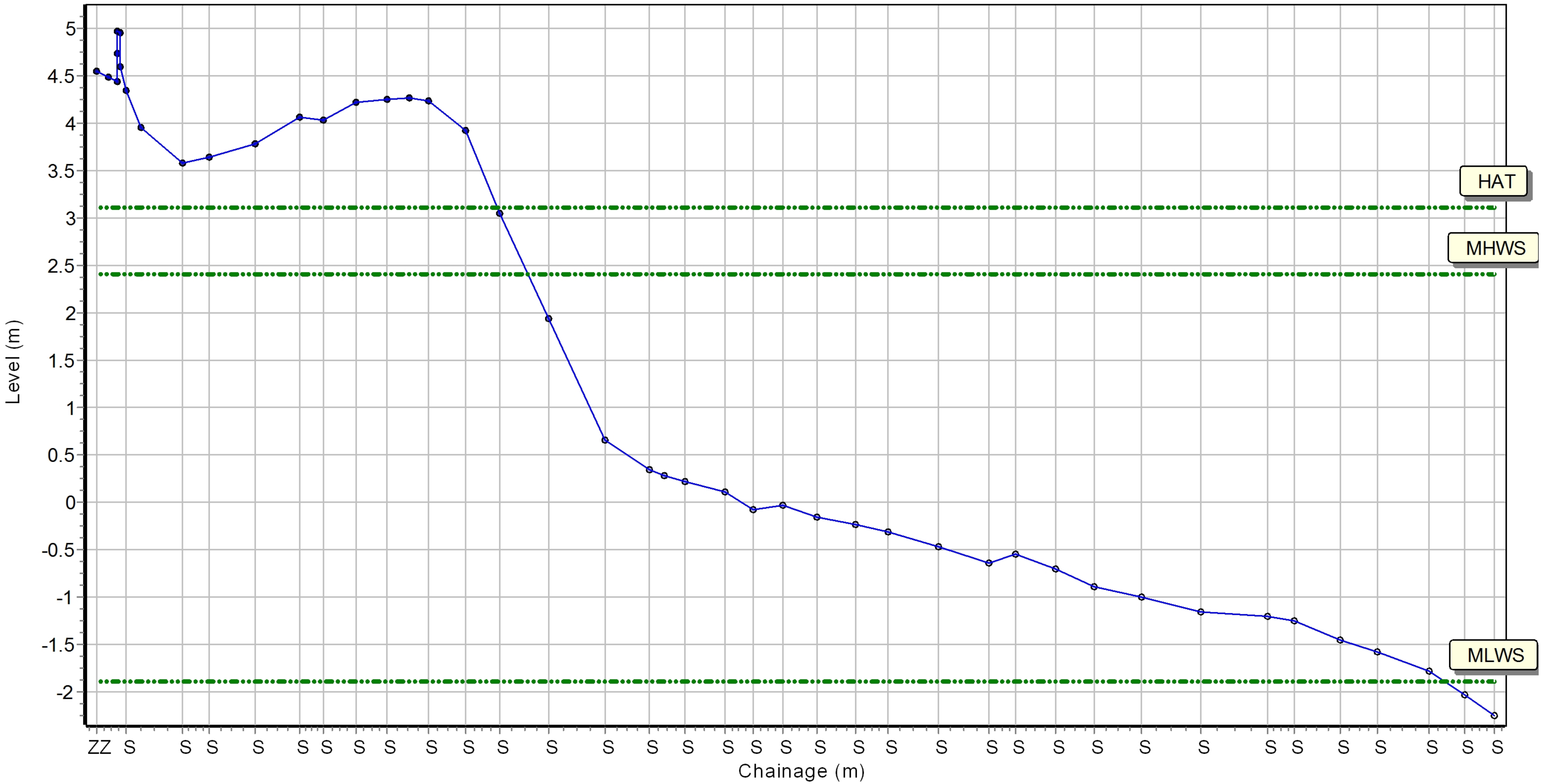
Location: **1aNWB17**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431042.191 **Northing:** 587650.627 **Profile Bearing:** 116 ° from North



Beach Profile

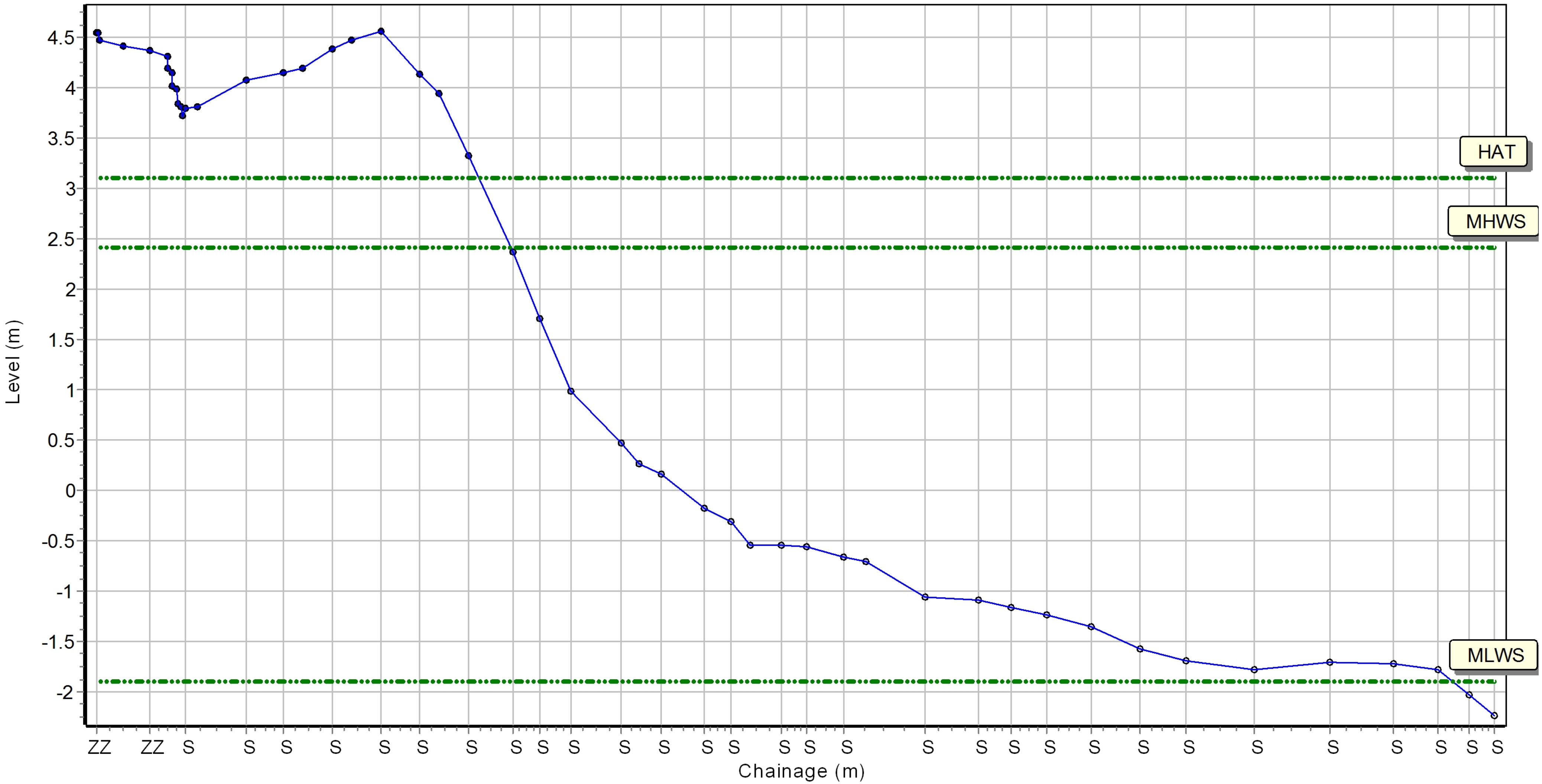
Location: 1aNWB18

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431024.999 **Northing:** 587608.929 **Profile Bearing:** 113 ° from North



Beach Profile

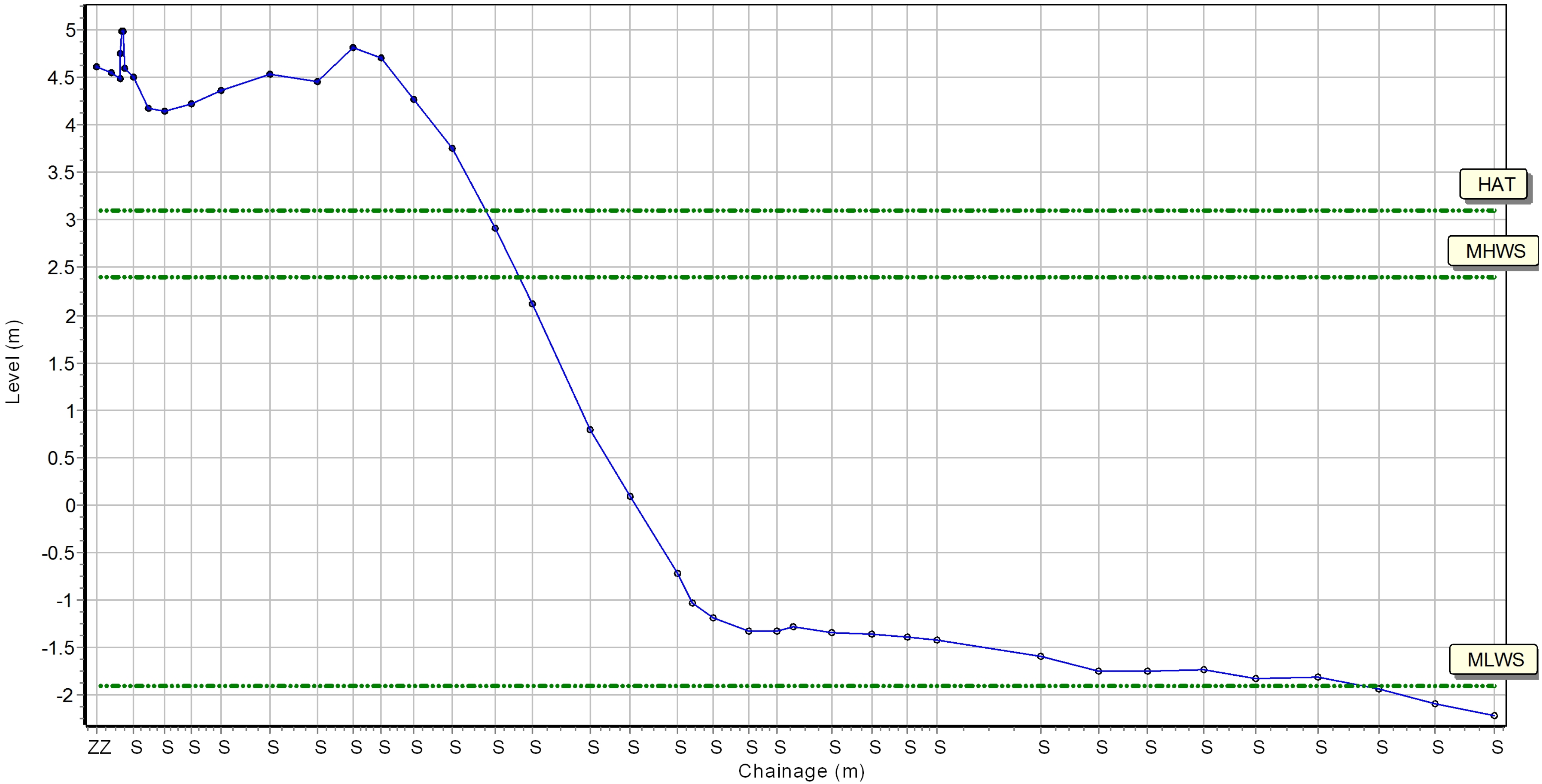
Location: 1aNWB19

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 431007.485 **Northing:** 587556.656 **Profile Bearing:** 109 ° from North



Beach Profile

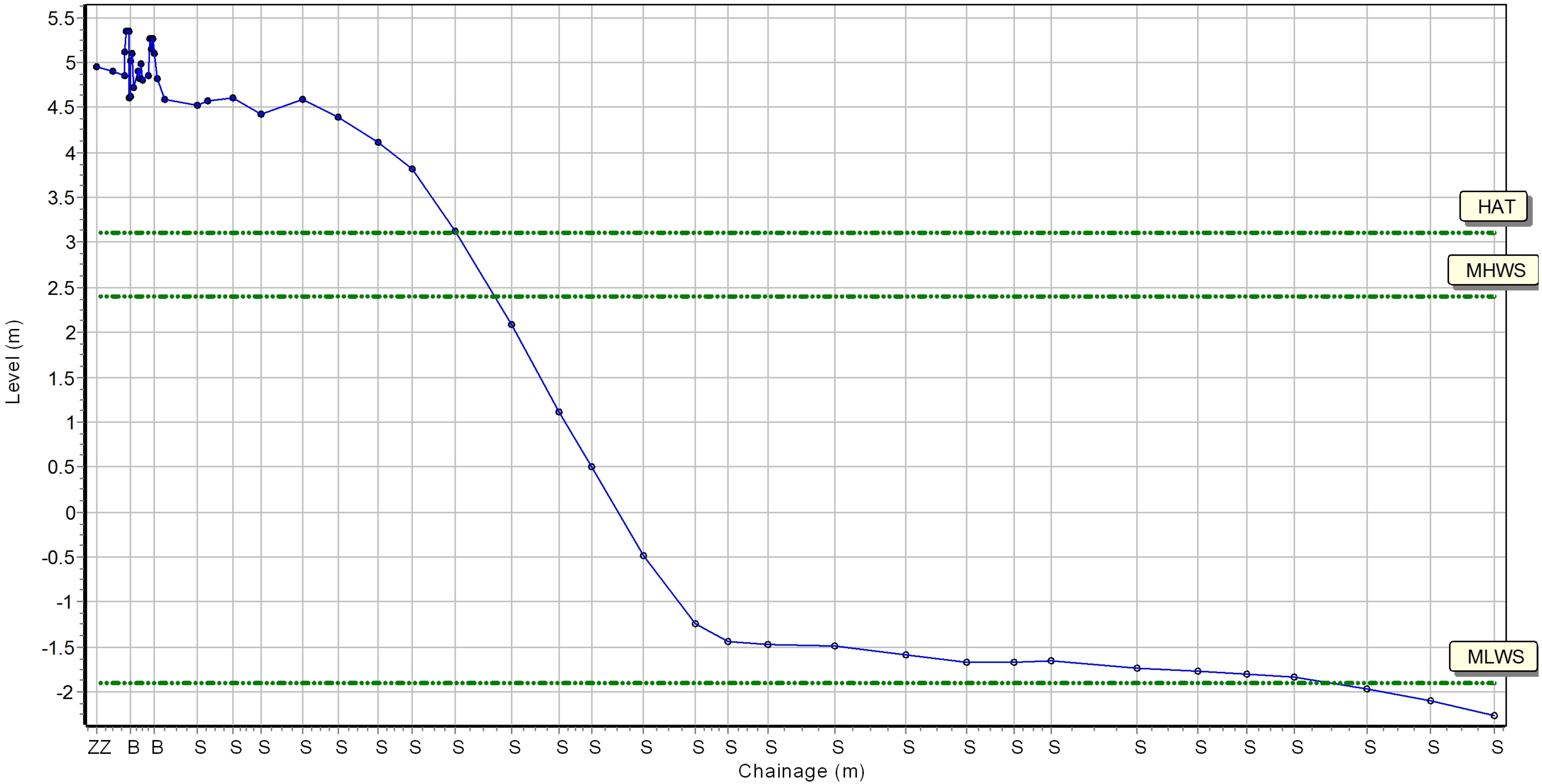
Location: 1aNWB20

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430992.437 **Northing:** 587508.87 **Profile Bearing:** 102 ° from North



http://www.sandsuser.com

SANDS

Beach Profile

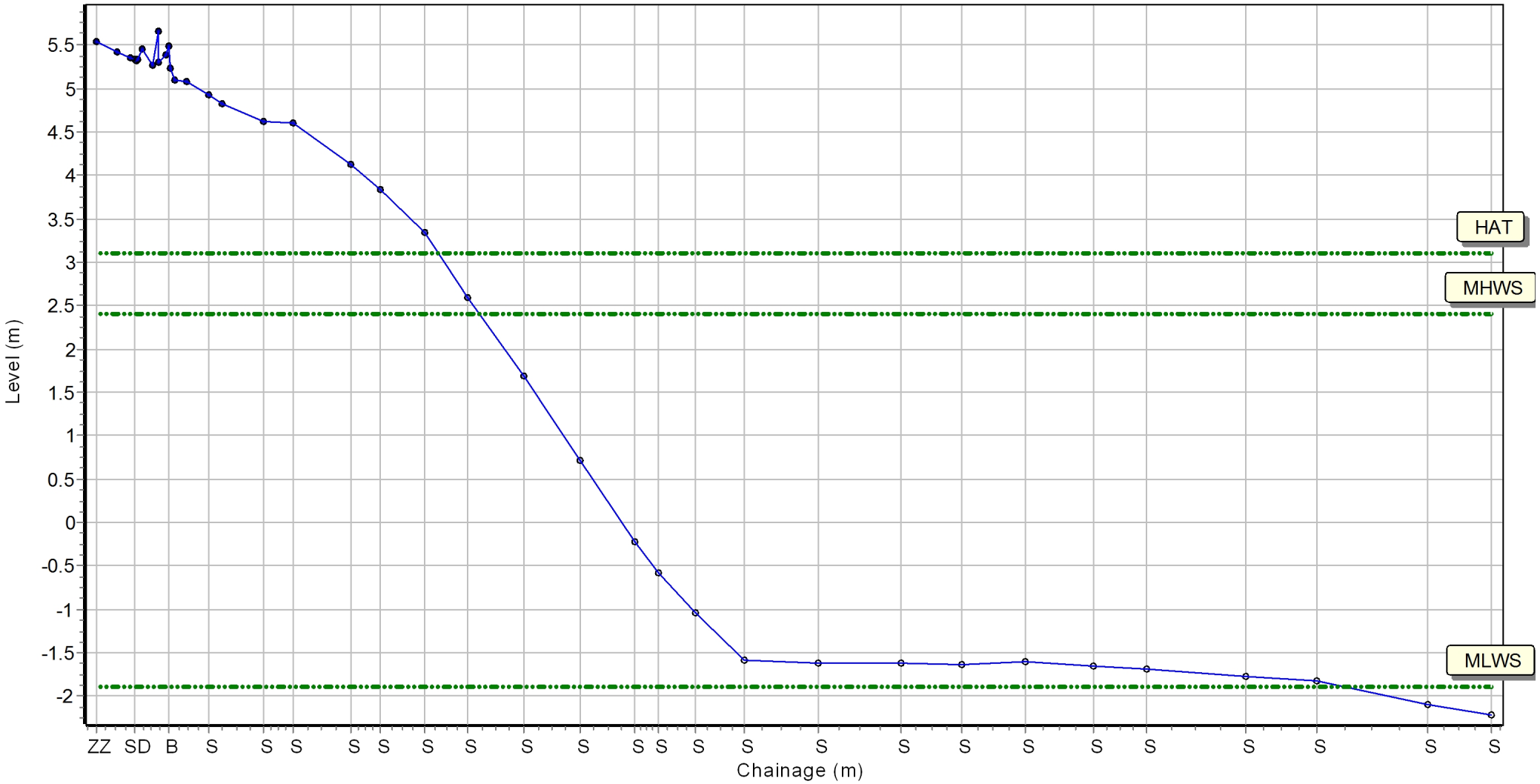
Location: **1aNWB21**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430978.85 **Northing:** 587460.577 **Profile Bearing:** 102 ° from North



Beach Profile

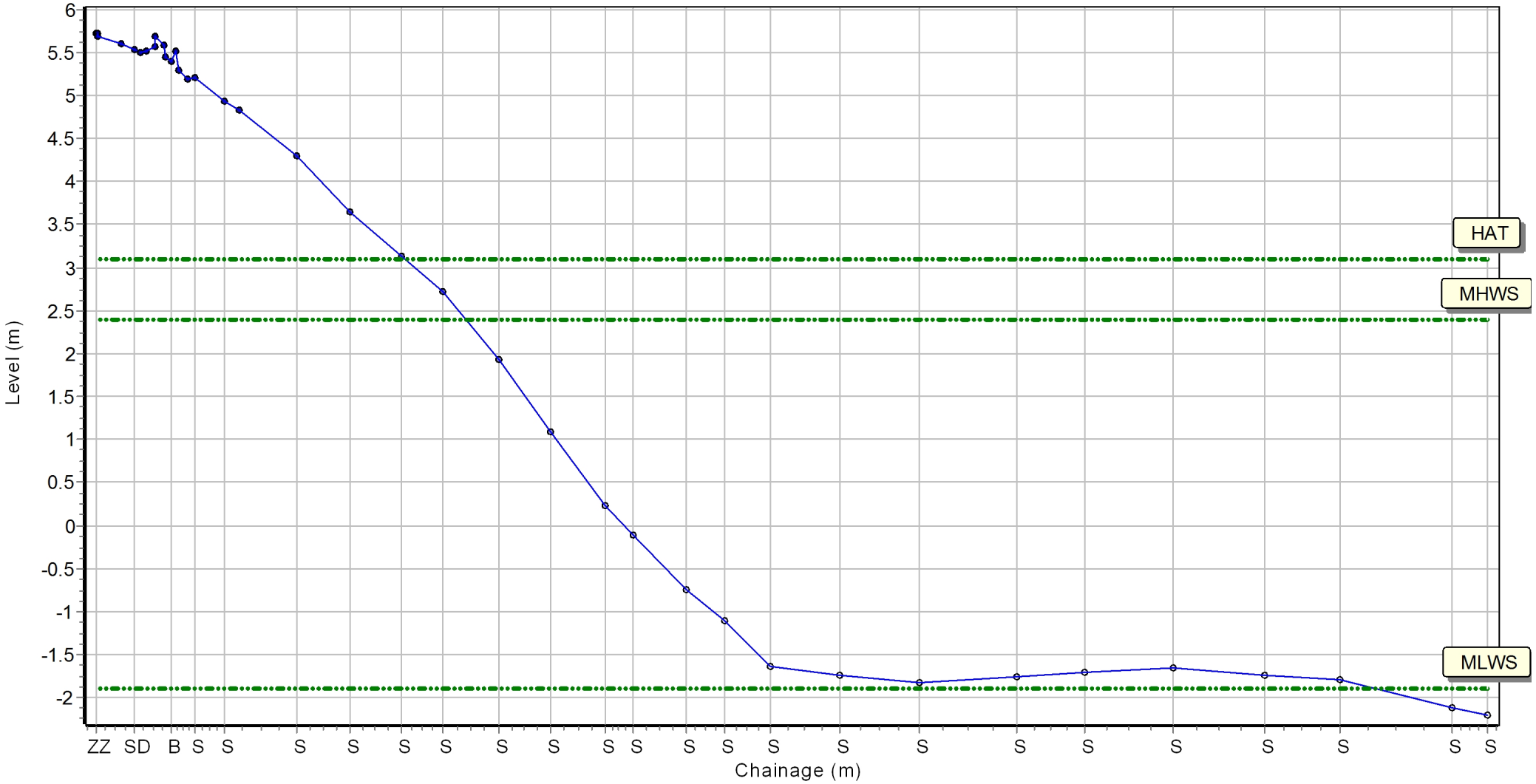
Location: **1aNWB22**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430967.686 **Northing:** 587411.684 **Profile Bearing:** 99 ° from North



Beach Profile

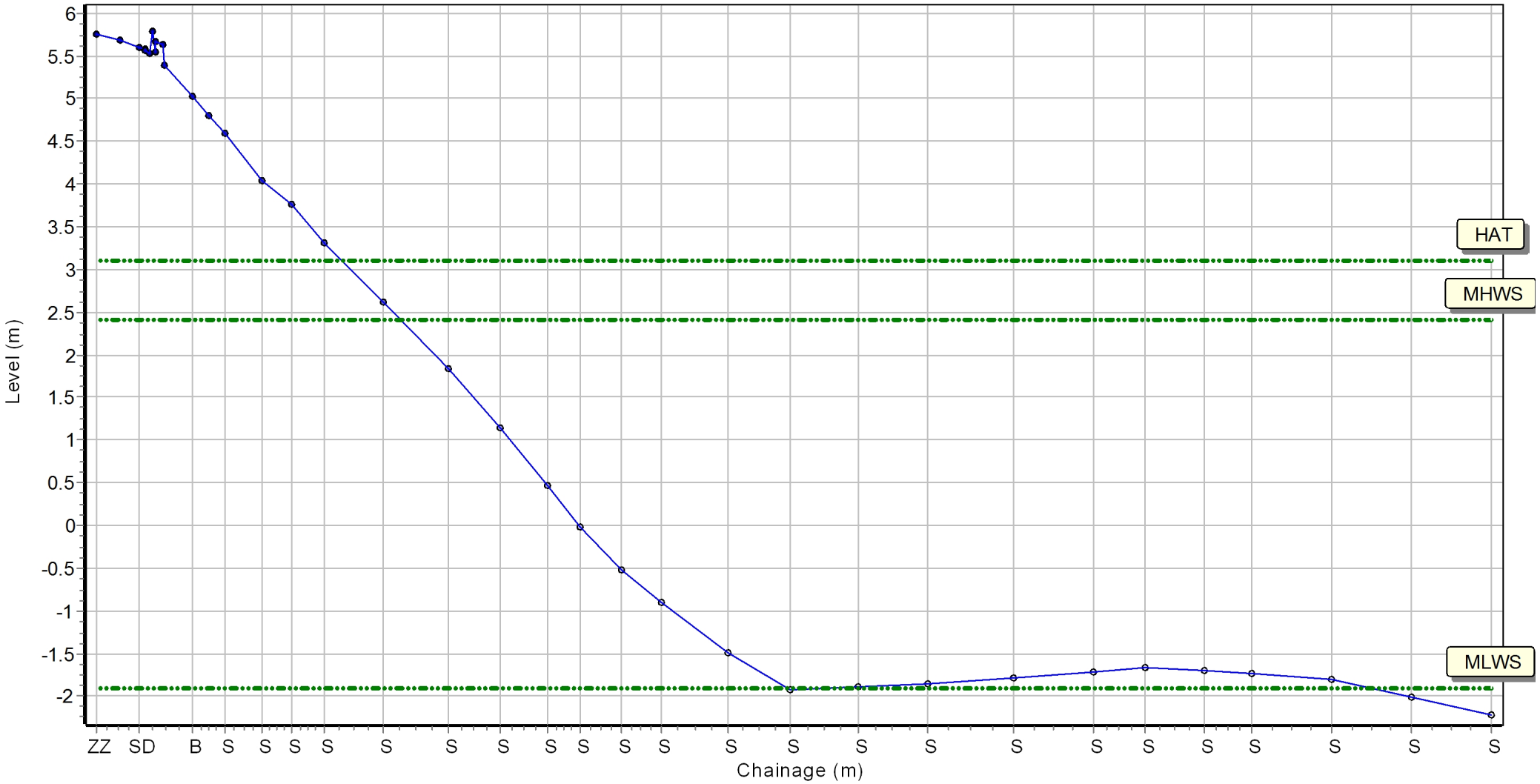
Location: **1aNWB23**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430959.877 **Northing:** 587362.168 **Profile Bearing:** 96 ° from North



Beach Profile

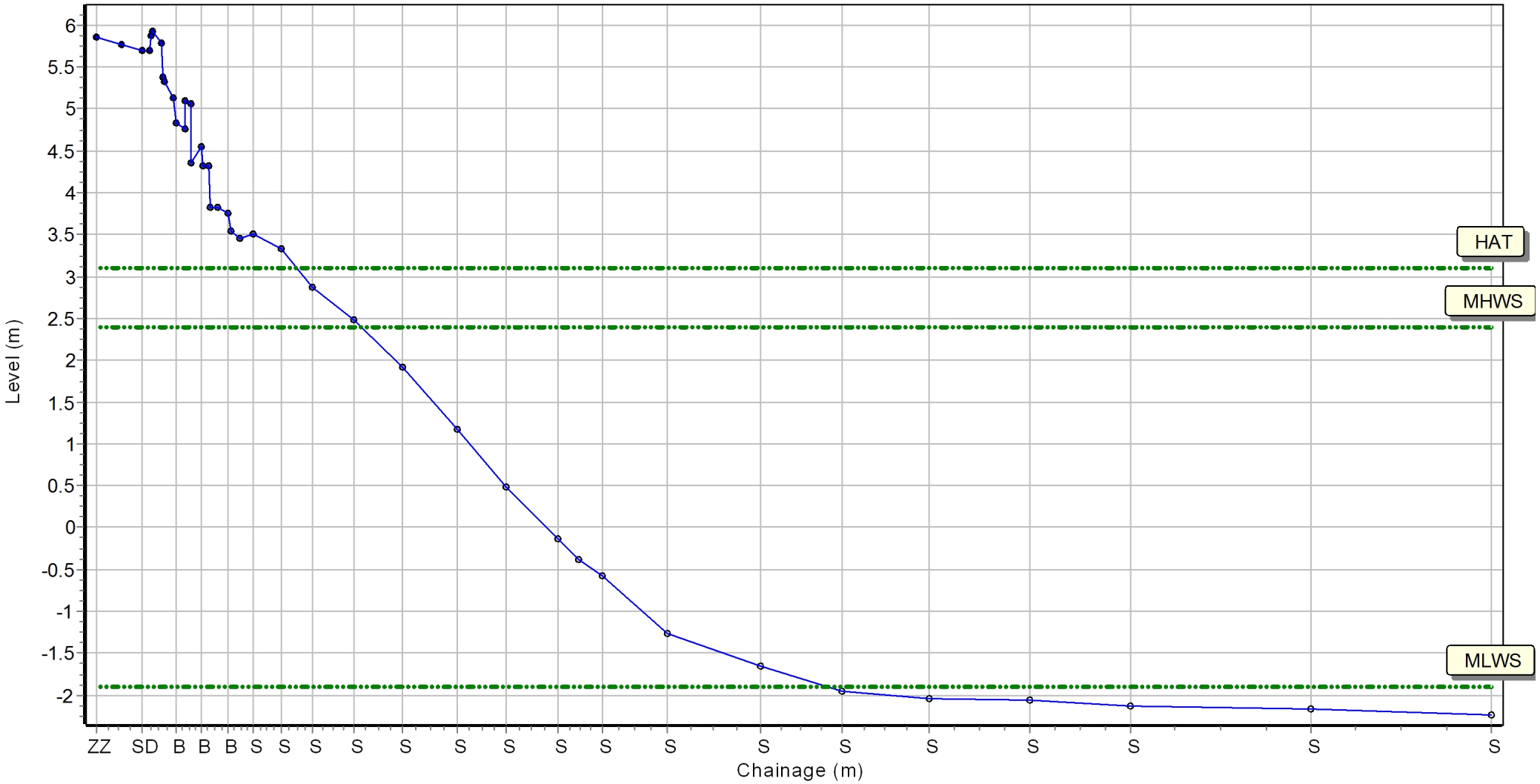
Location: **1aNWB24**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430956.511 **Northing:** 587312.153 **Profile Bearing:** 92 ° from North



Beach Profile

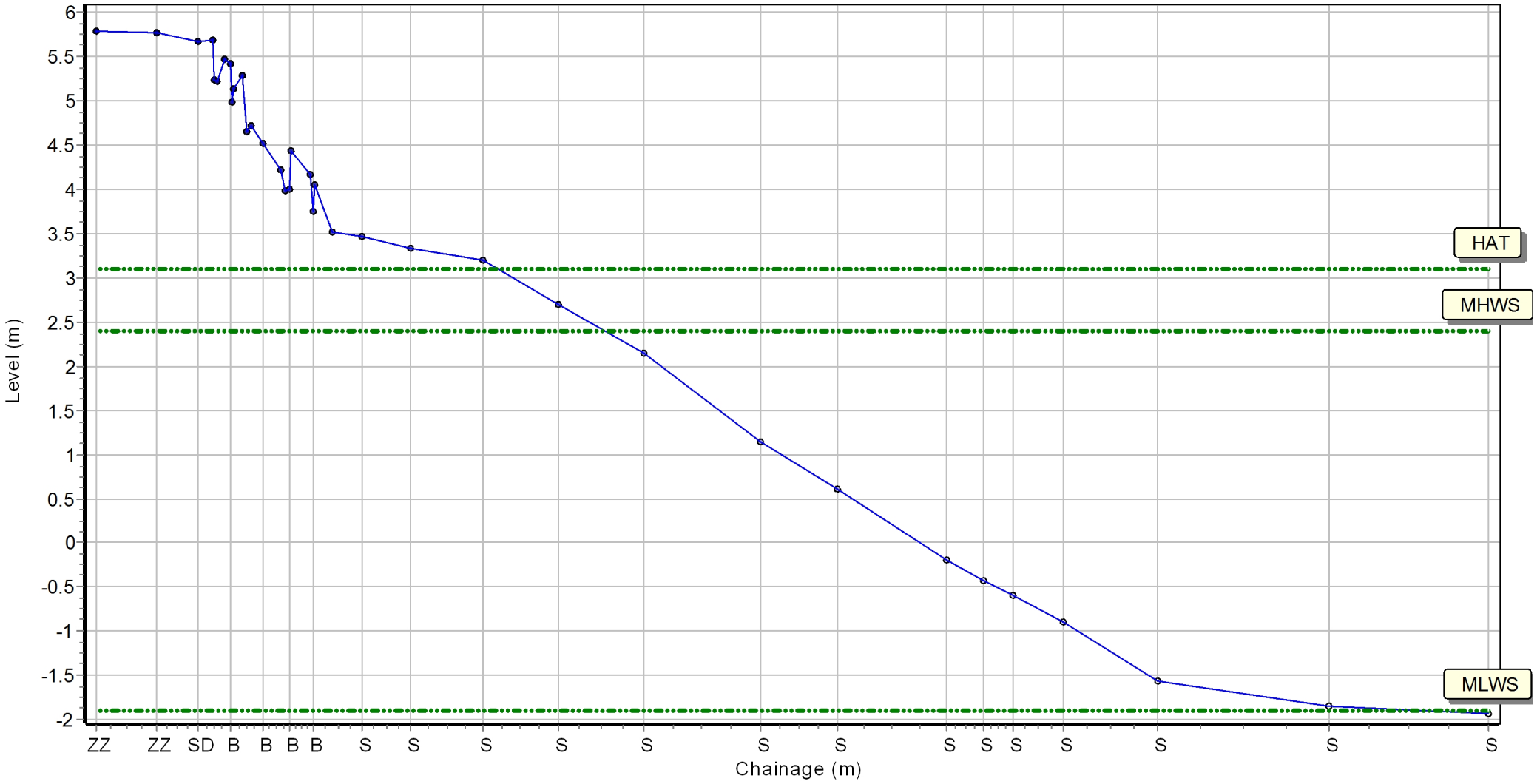
Location: **1aNWB25**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430953.984 **Northing:** 587261.982 **Profile Bearing:** 89 ° from North



Beach Profile

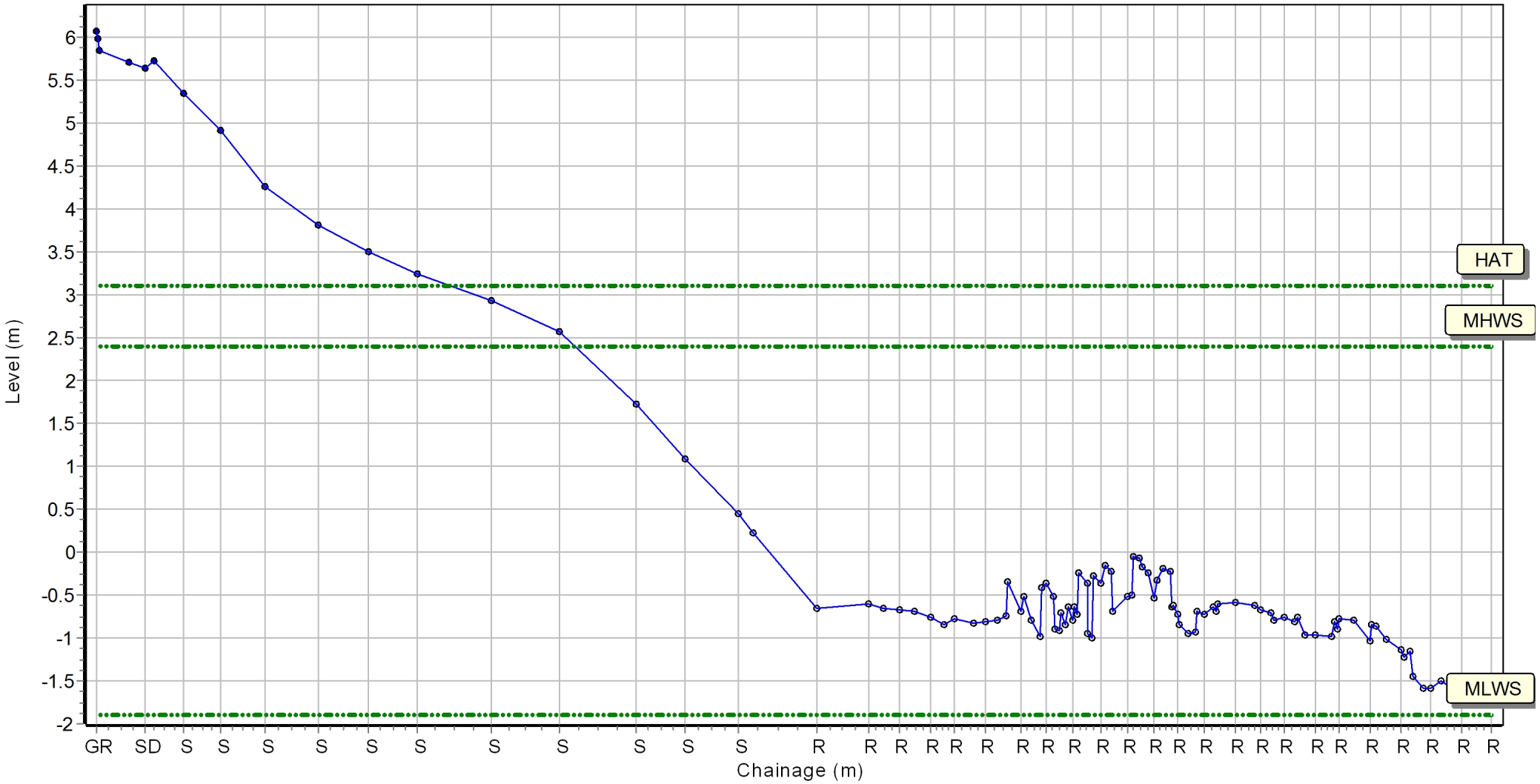
Location: **1aNWB26**

Date: 22/08/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 430960.828 **Northing:** 587212.152 **Profile Bearing:** 86 ° from North



Beach Profile

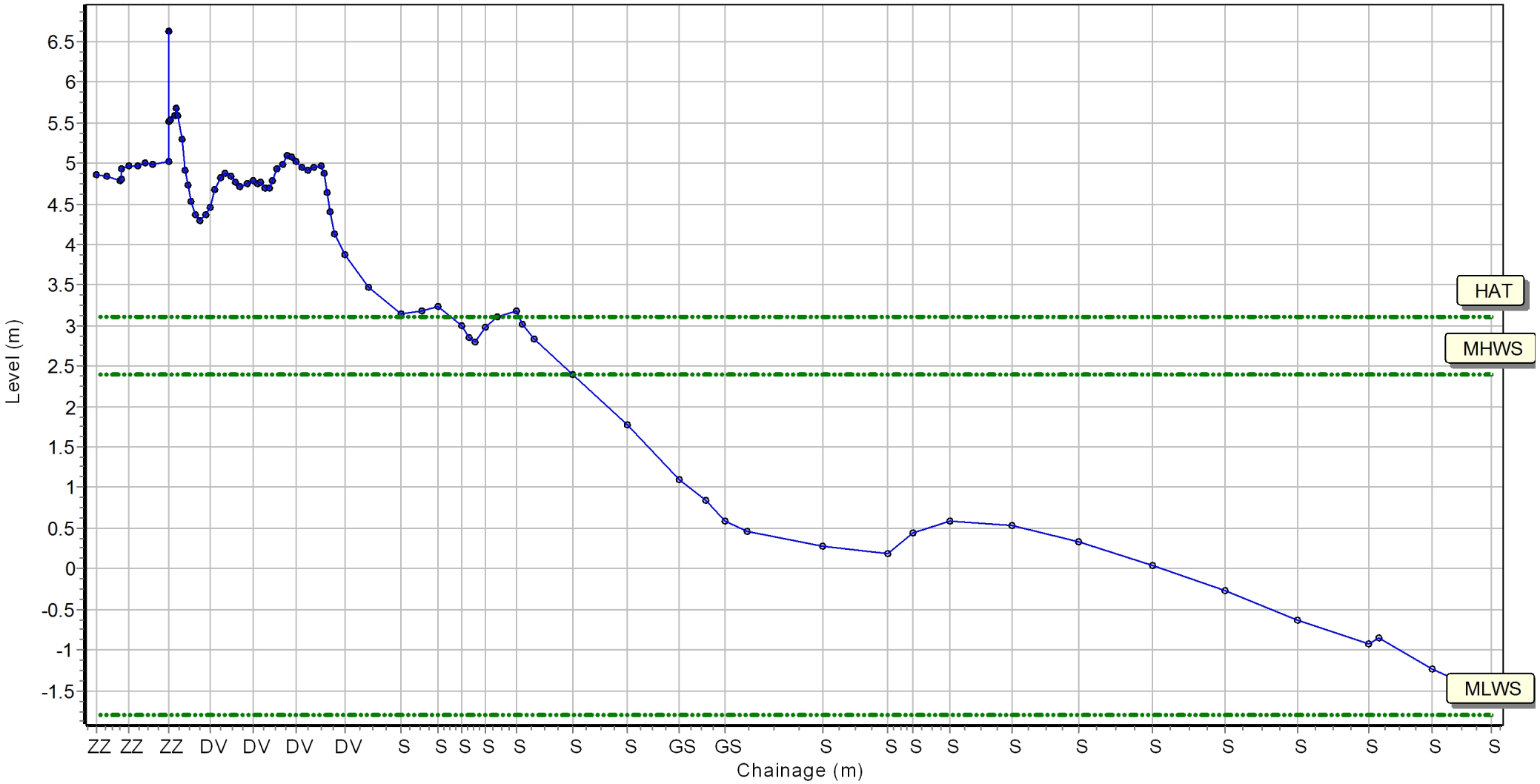
Location: **1aBVBC01**

Date: 19/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 432171.107 **Northing:** 580411.515 **Profile Bearing:** 113 ° from North



Beach Profile

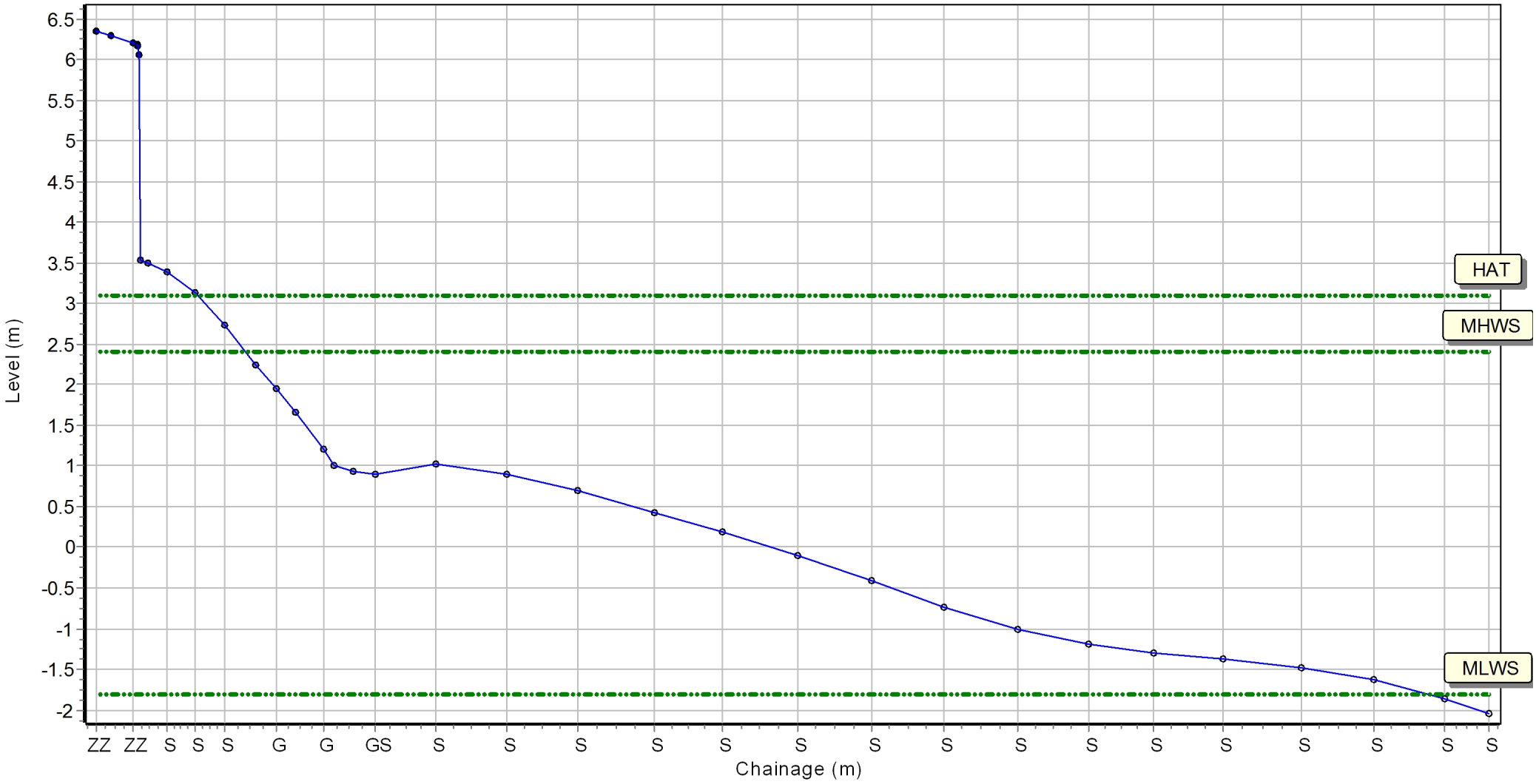
Location: **1aBVBC02**

Date: 19/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 432072.788 **Northing:** 579668.162 **Profile Bearing:** 77 ° from North



Beach Profile

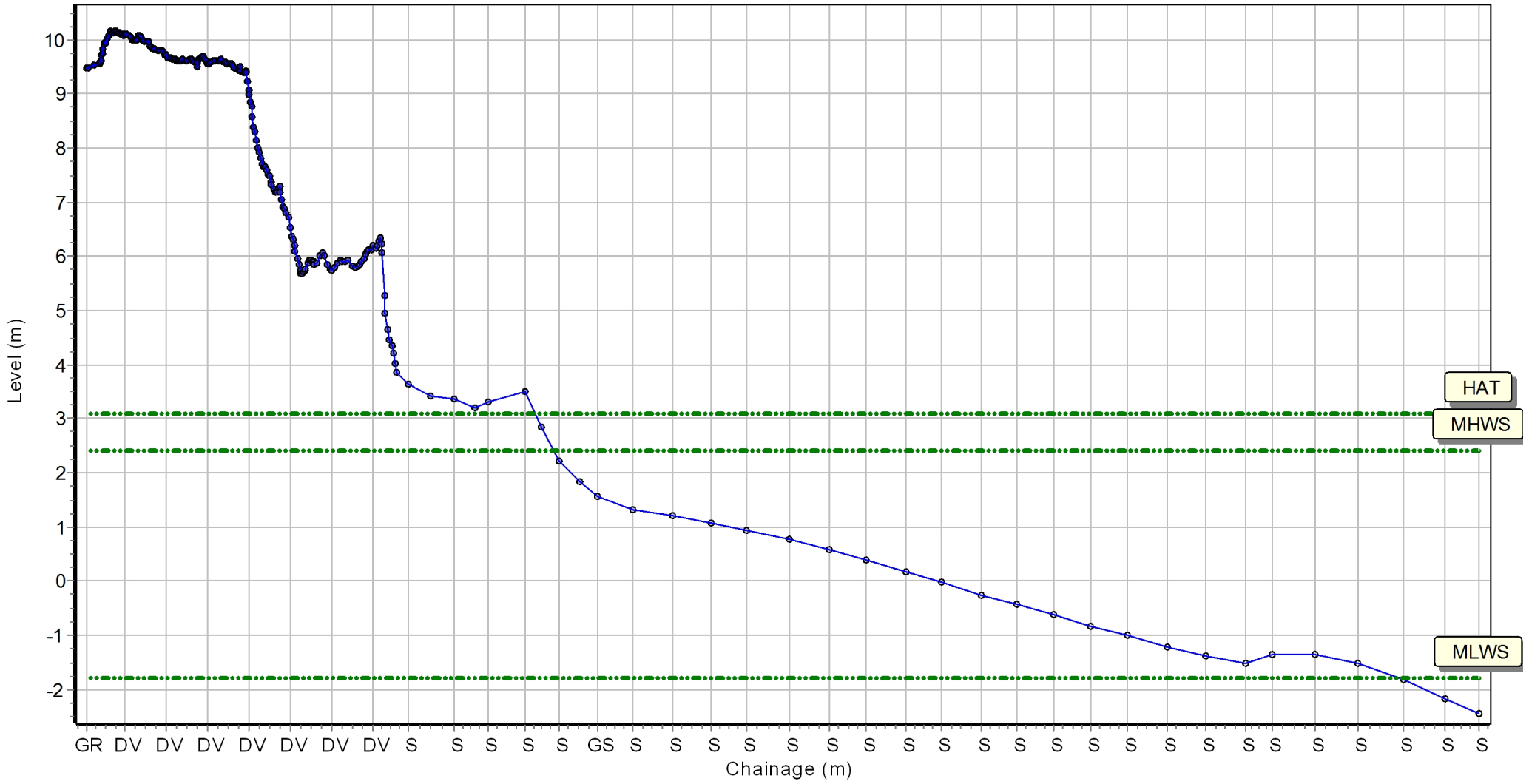
Location: **1aBVBC03**

Date: 19/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 432120.659 **Northing:** 578982.375 **Profile Bearing:** 71 ° from North



Beach Profile

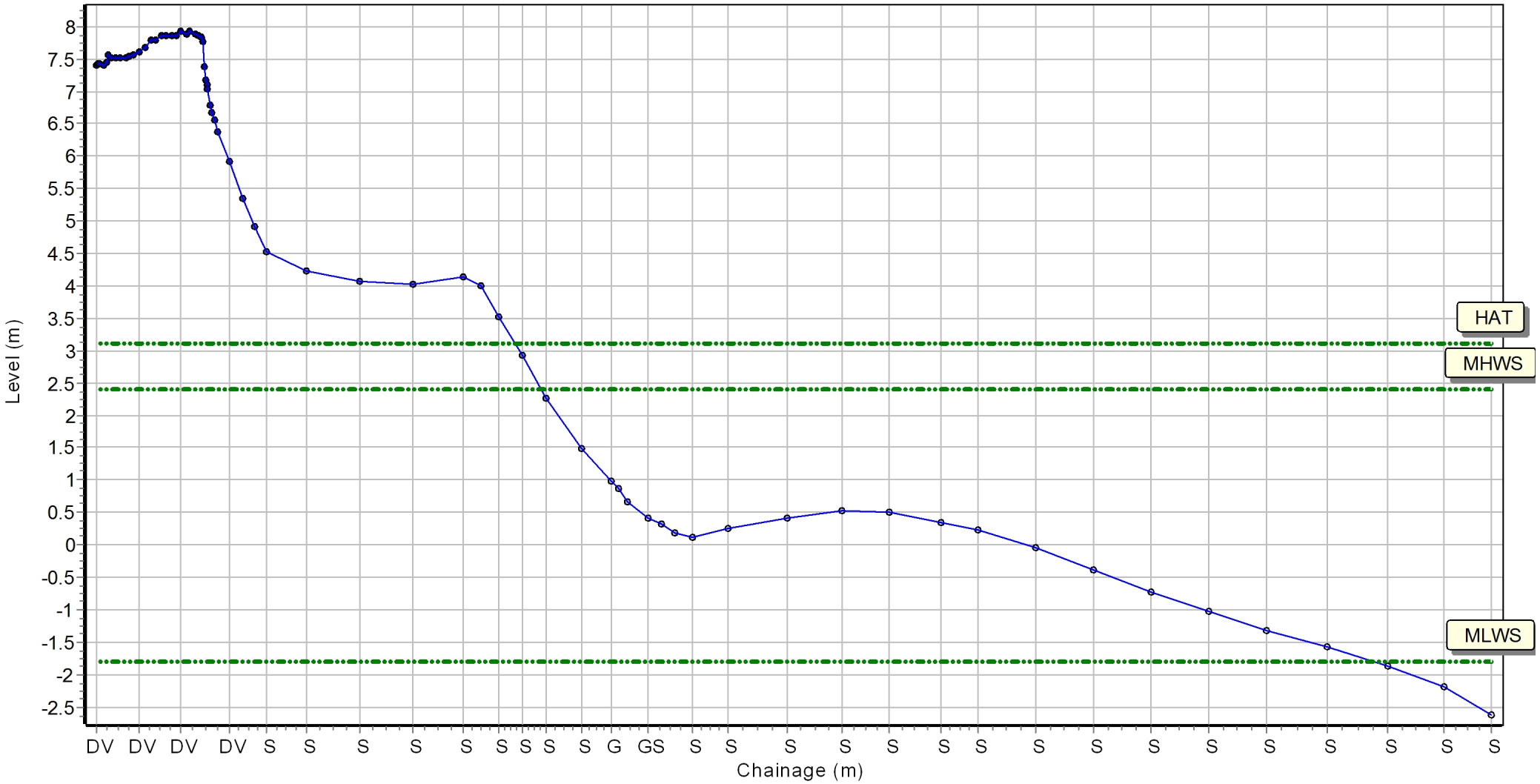
Location: **1aBVBC04**

Date: 19/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 432398.19 **Northing:** 578463.878 **Profile Bearing:** 60 ° from North



Beach Profile

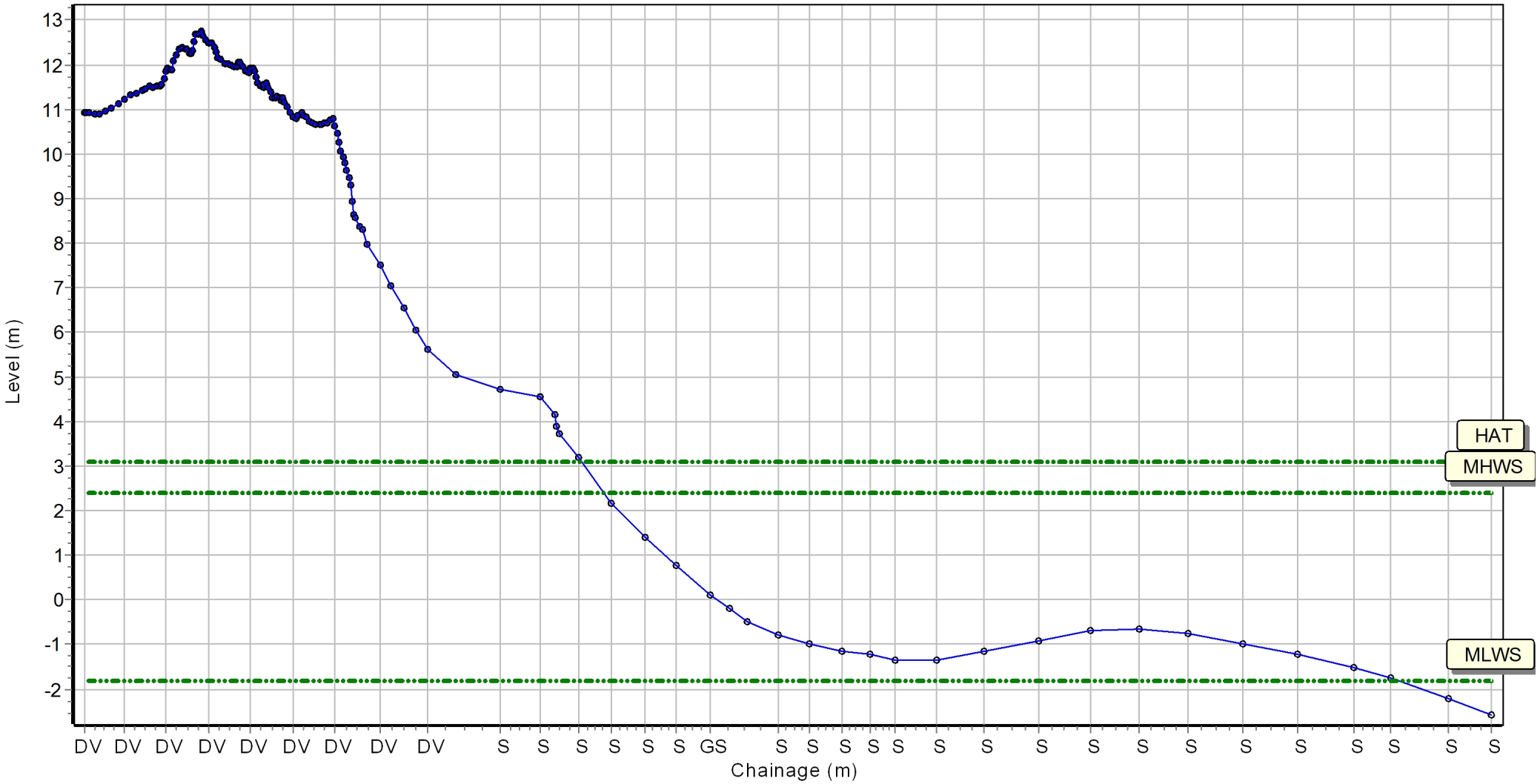
Location: **1aBVBC05**

Date: 19/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 432667.046 **Northing:** 577891.873 **Profile Bearing:** 60 ° from North



Beach Profile

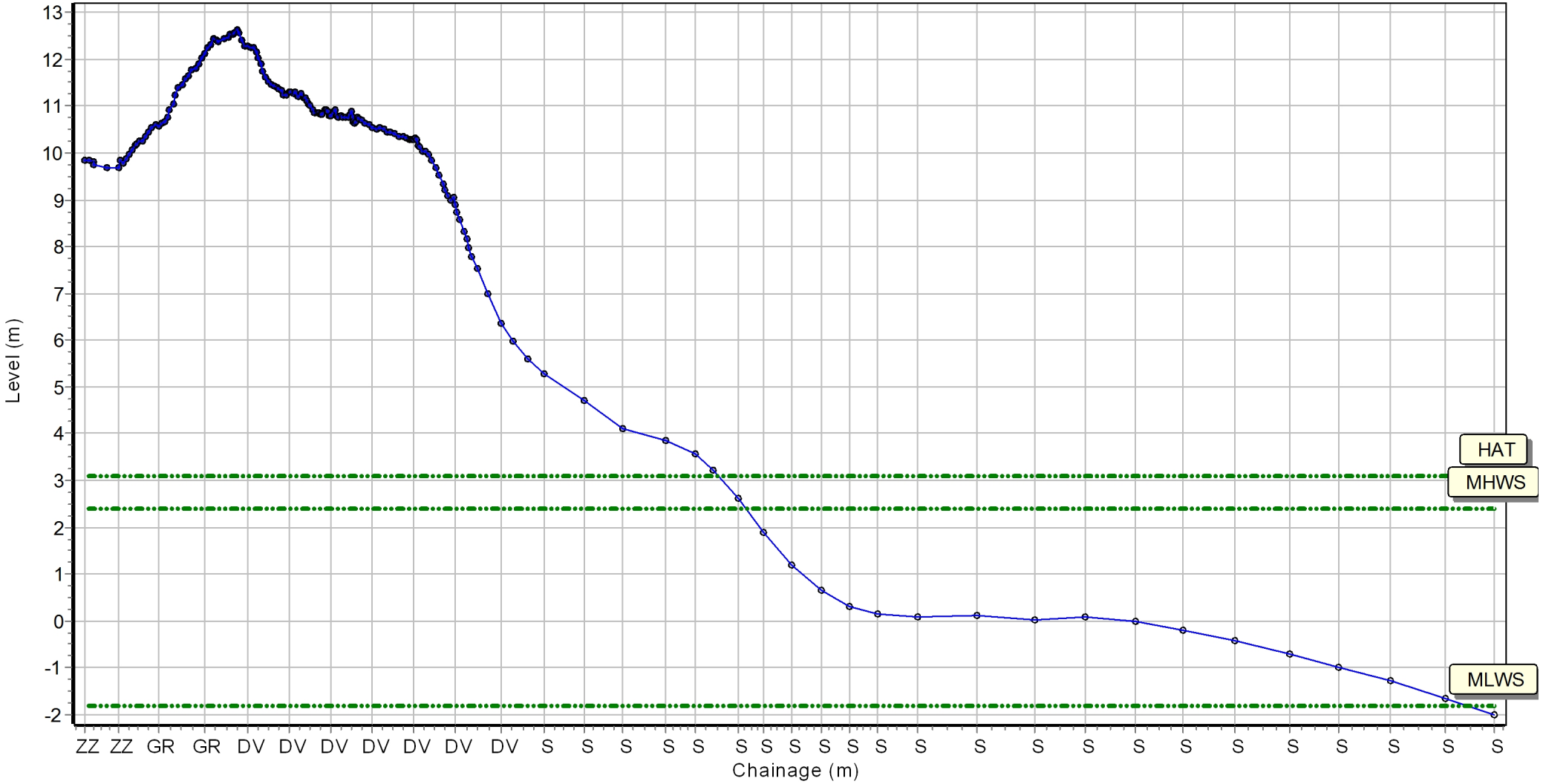
Location: **1aBVBC06**

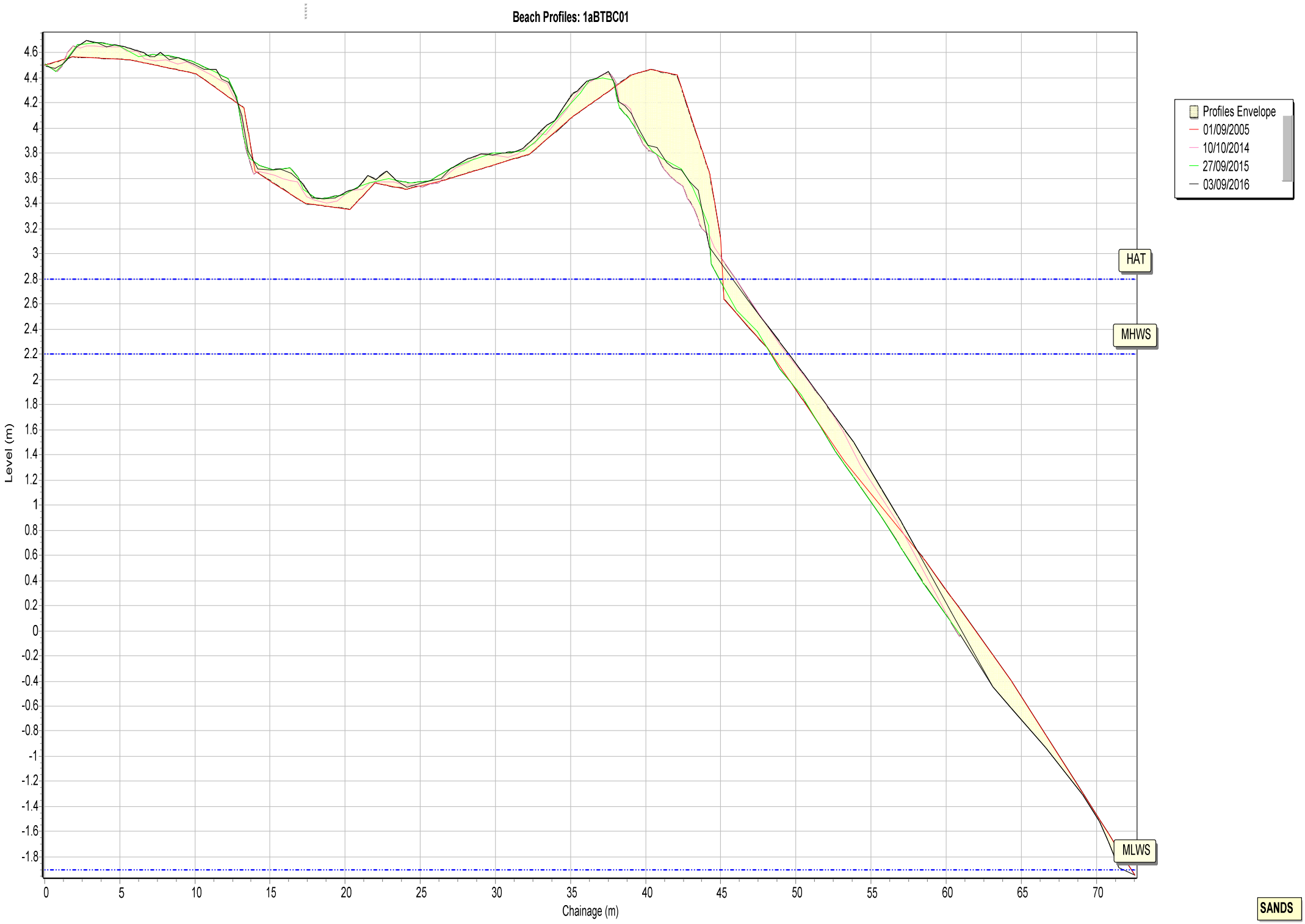
Date: 19/09/2016 **Inspector:** AG **Low Tide:** **Low Tide Time:**

Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2016 Full Measures Topo Survey

Easting: 433247.516 **Northing:** 577032.054 **Profile Bearing:** 53 ° from North

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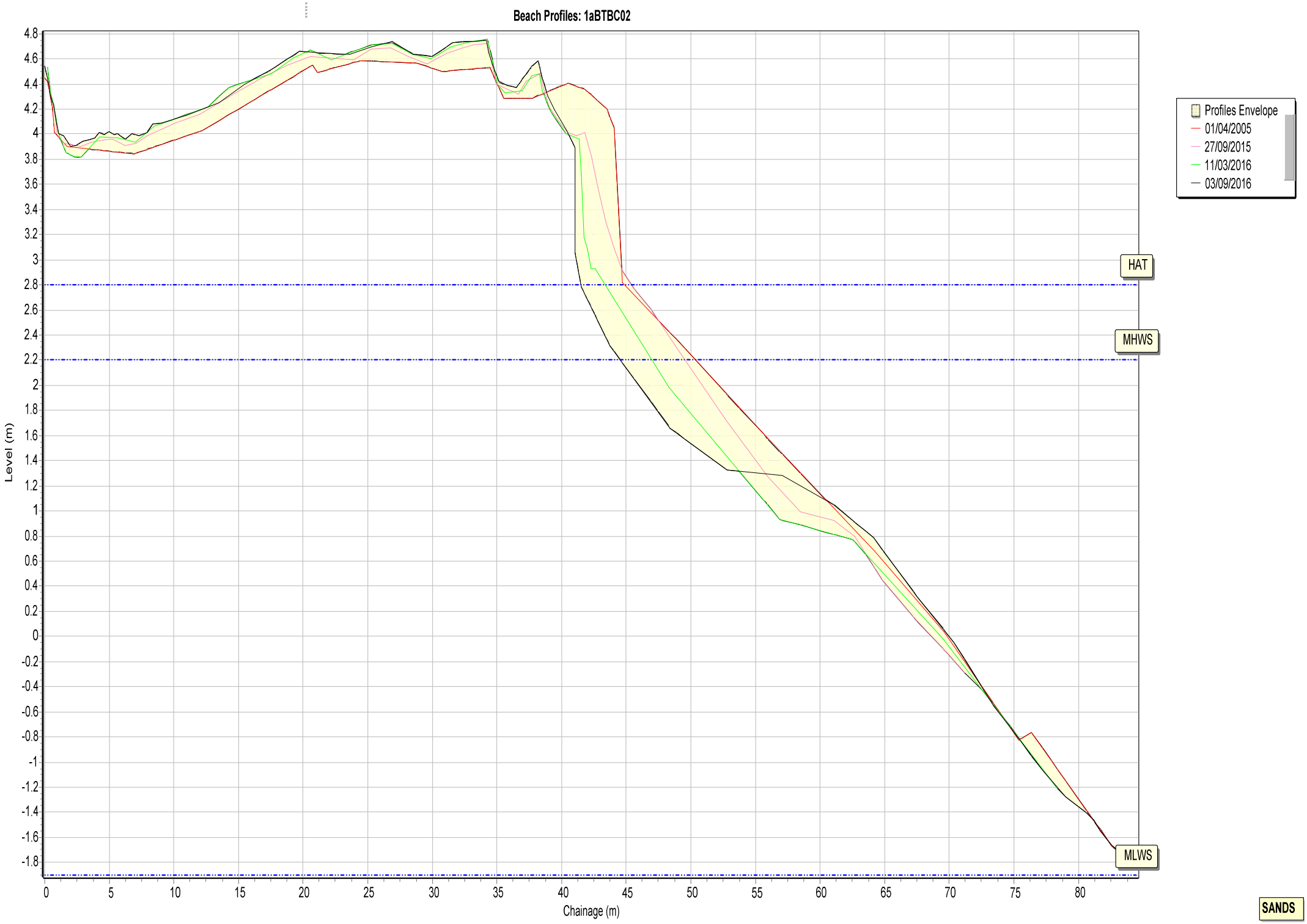
Level (m)
Chainage (m)
SANDS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Chainage (m)
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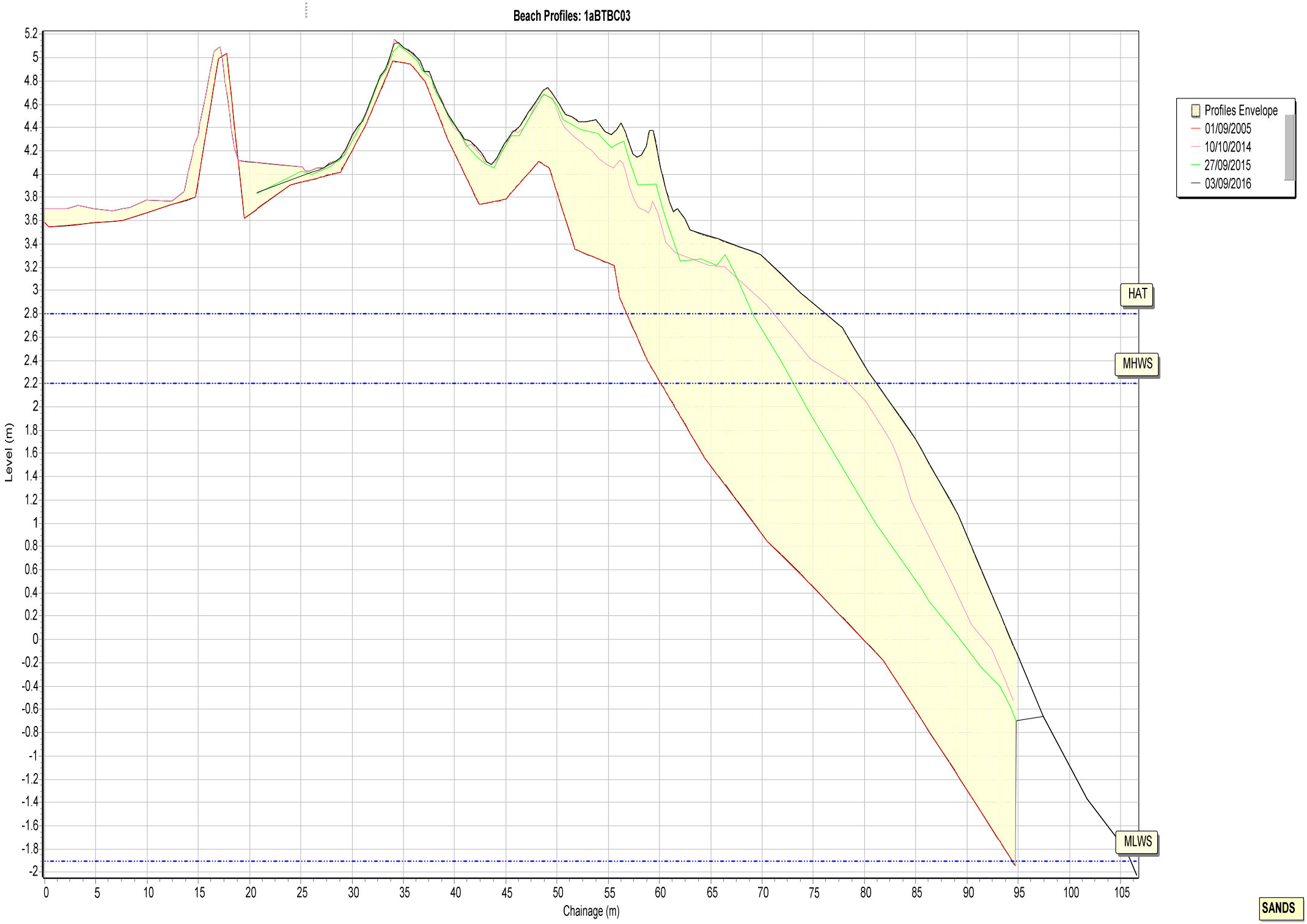
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Chainage (m)
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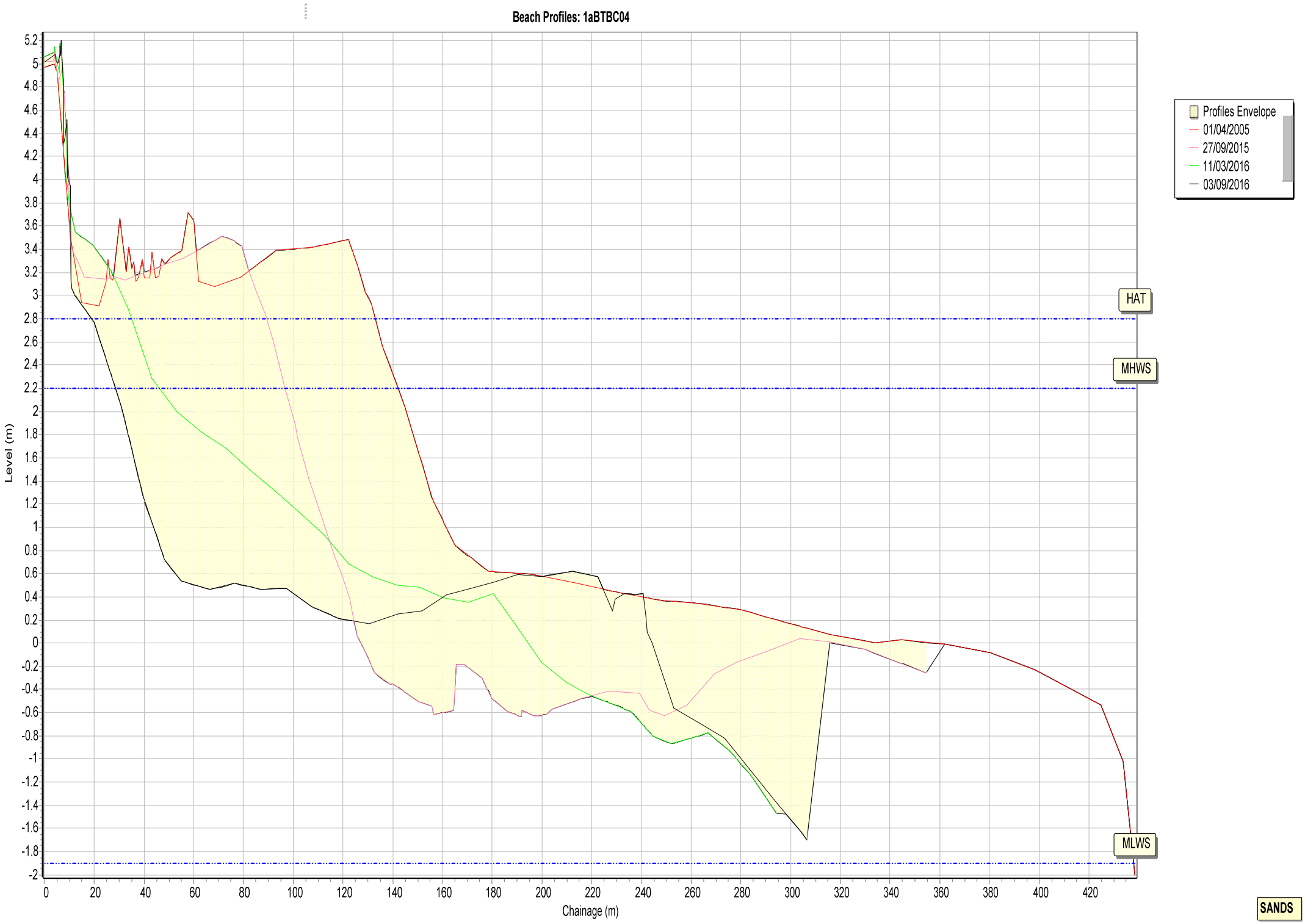
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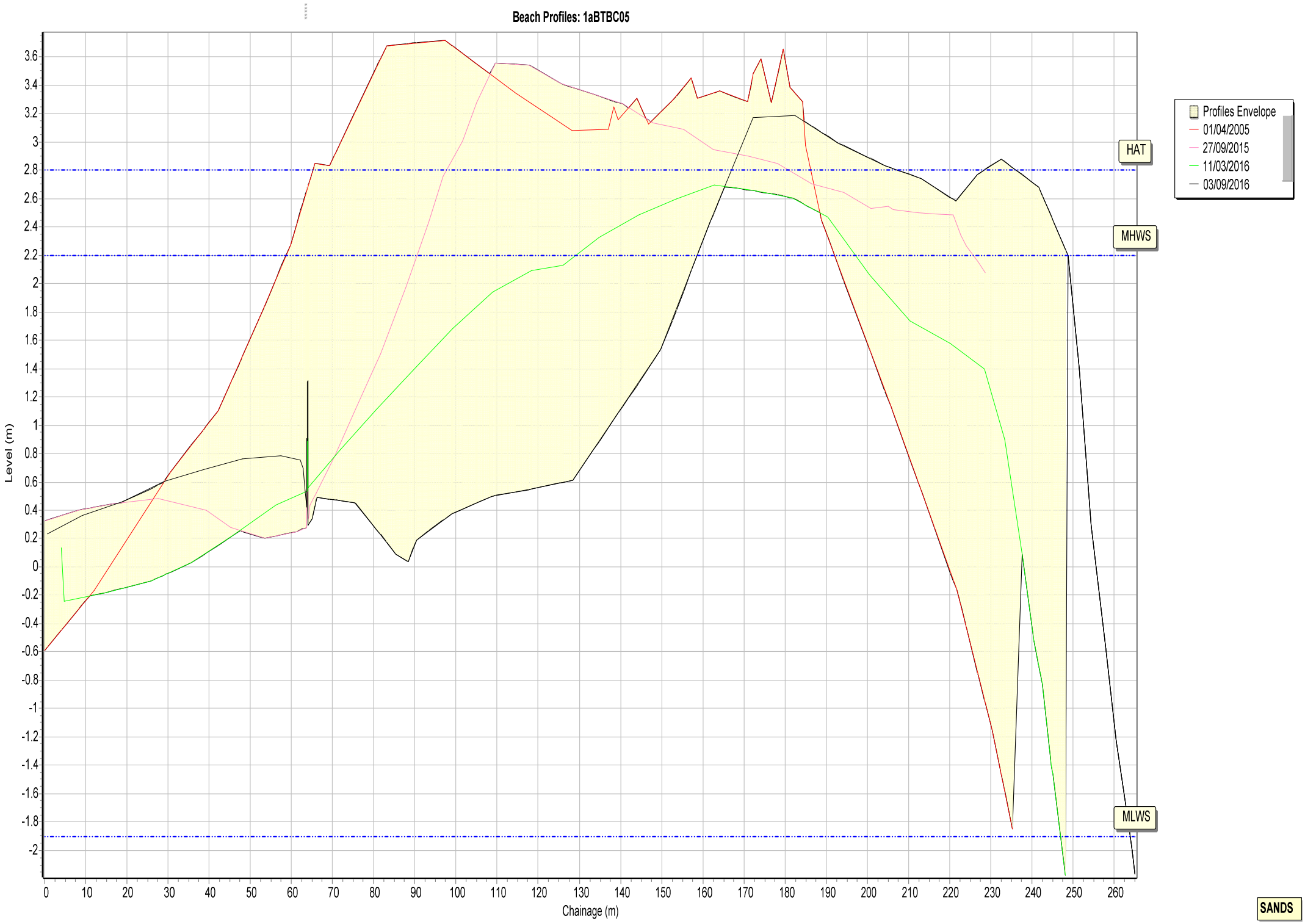
Chainage (m)
SANDS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Chainage (m)
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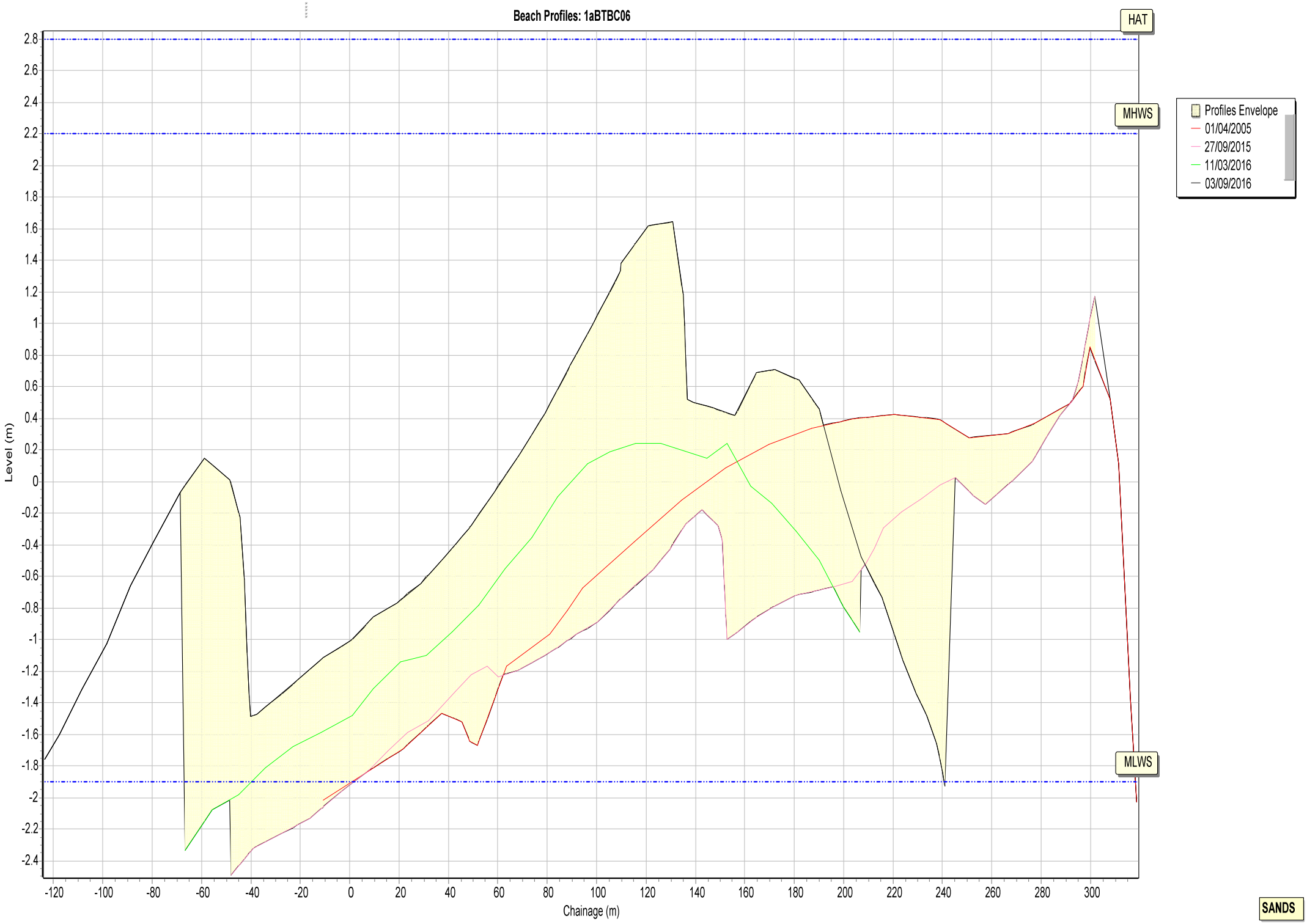
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Level (m)
Chainage (m)
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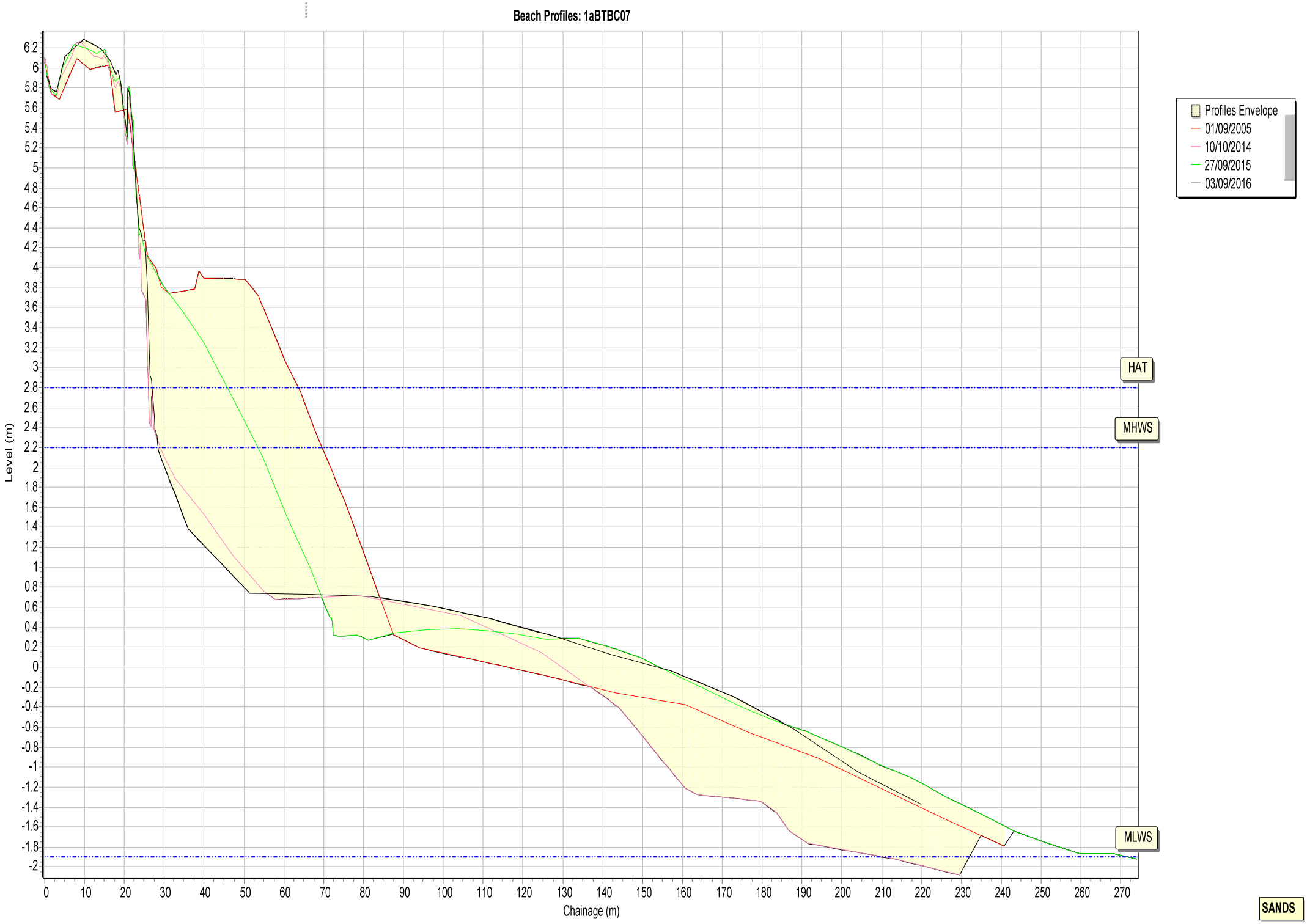
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MHWS
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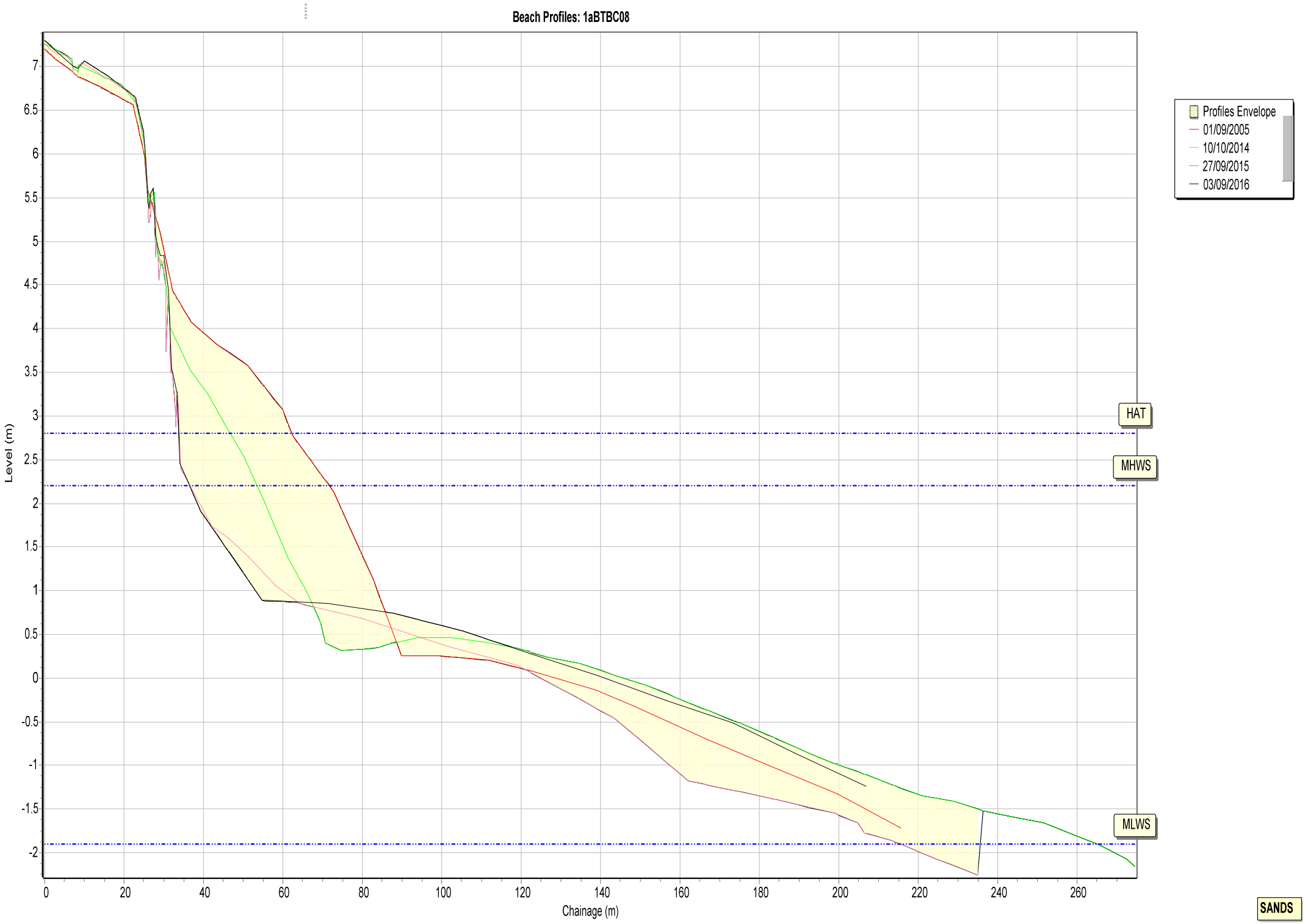
Chainage (m)
SANDS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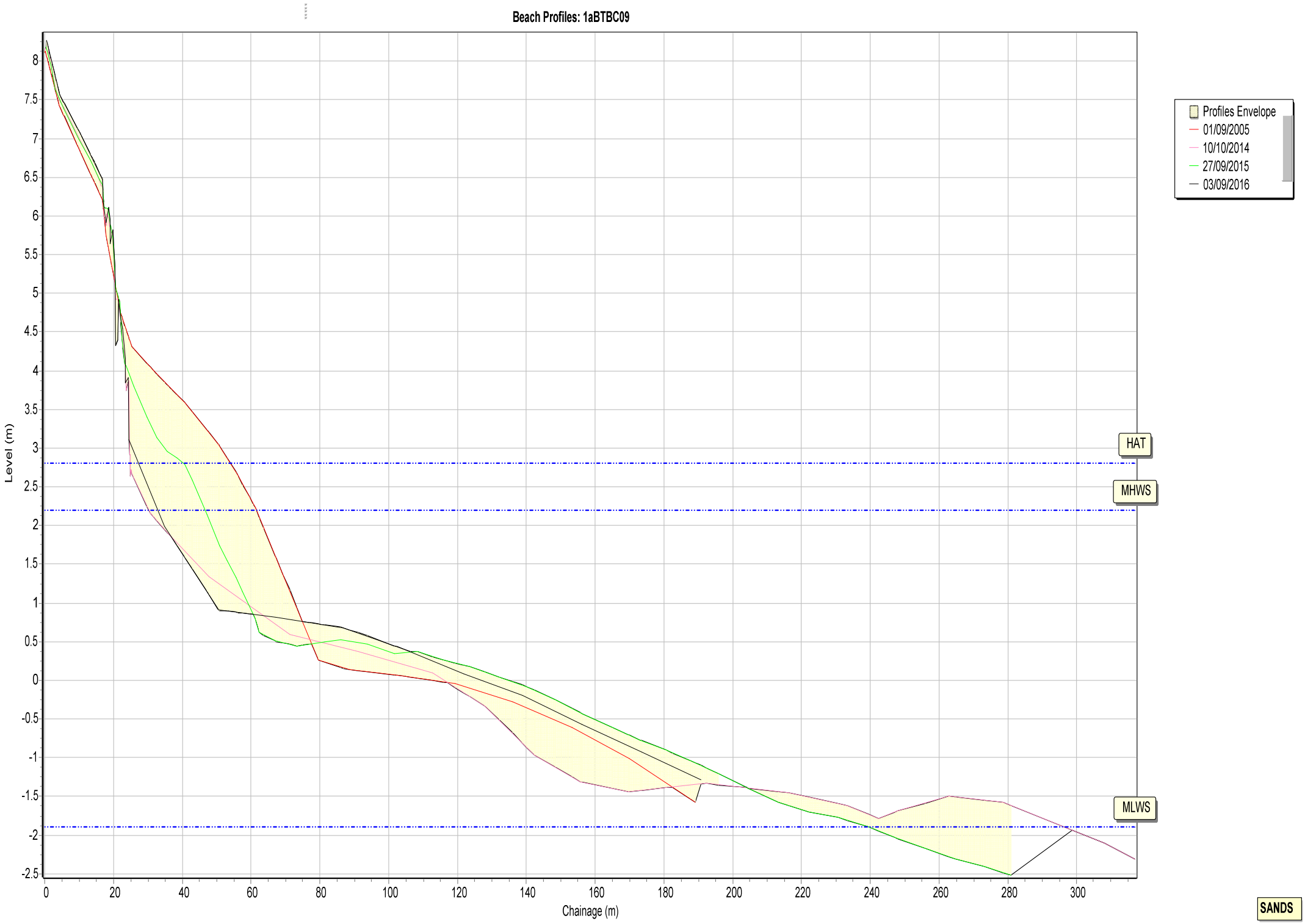
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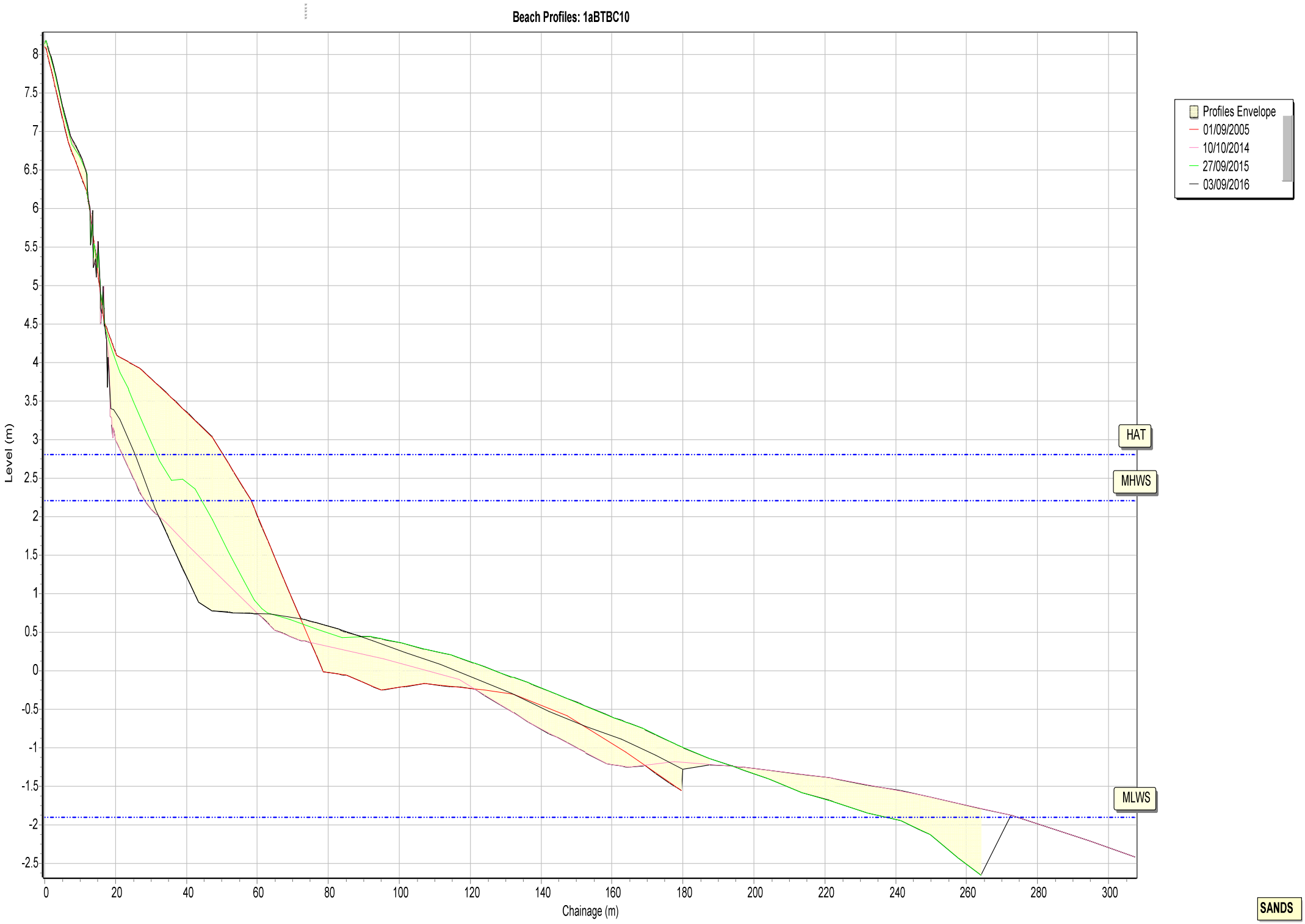
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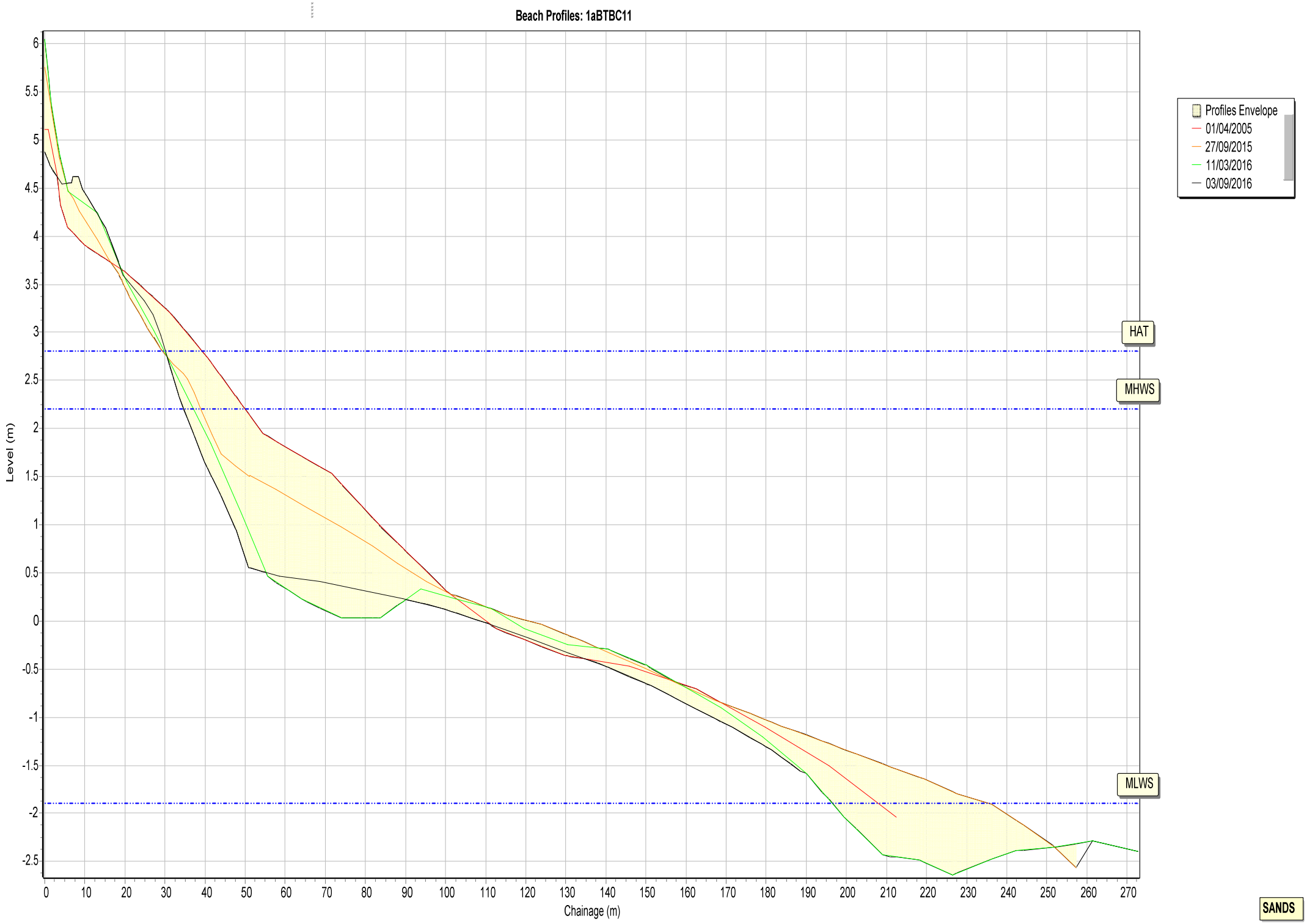
Chainage (m)
SANDS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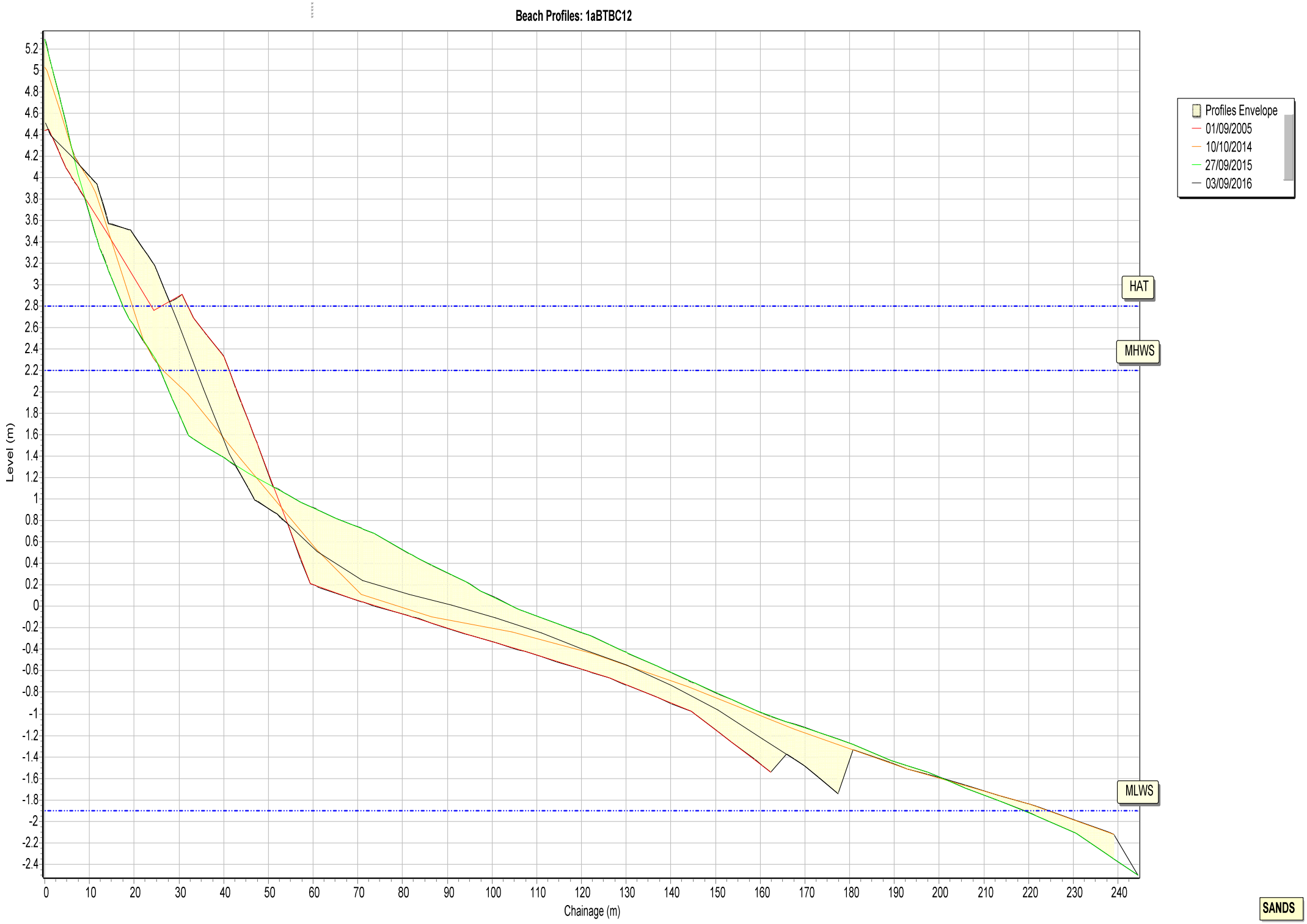
Chainage (m)
SANDS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Chainage (m)
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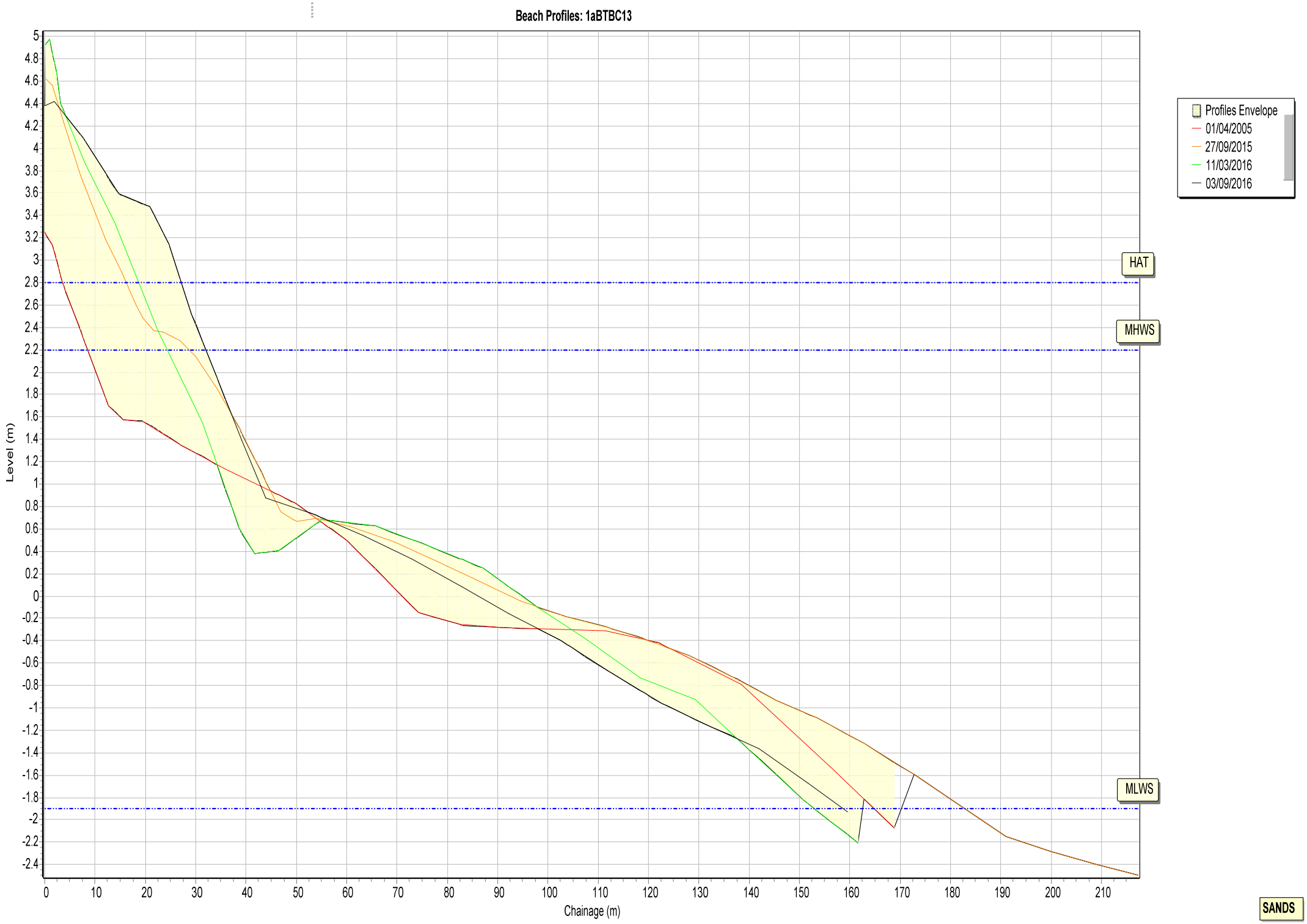
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Level (m)
Chainage (m)
SANDS


Beach Profiles: 1aBTBC14
Profiles Envelope
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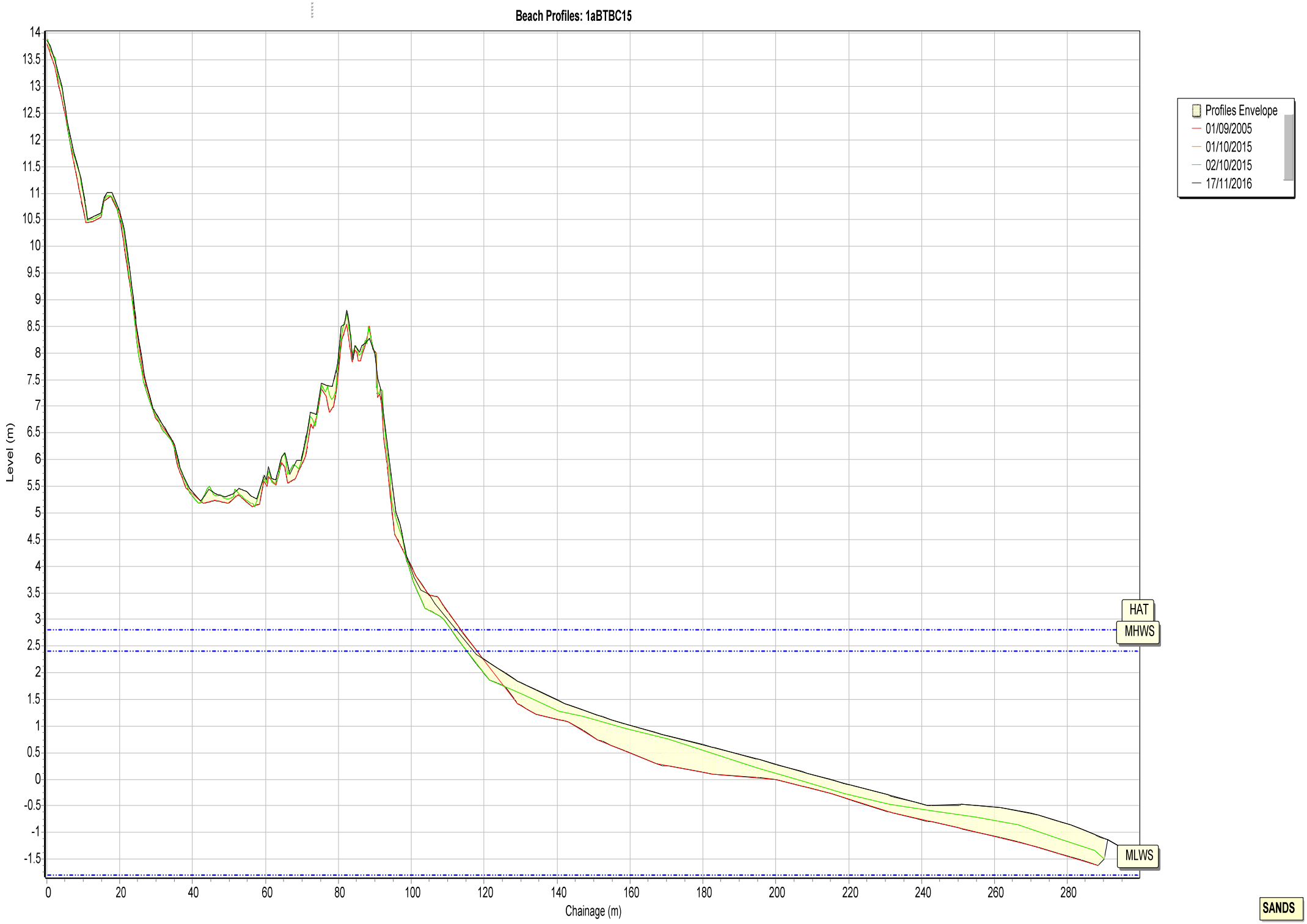
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Level (m)
Chainage (m)
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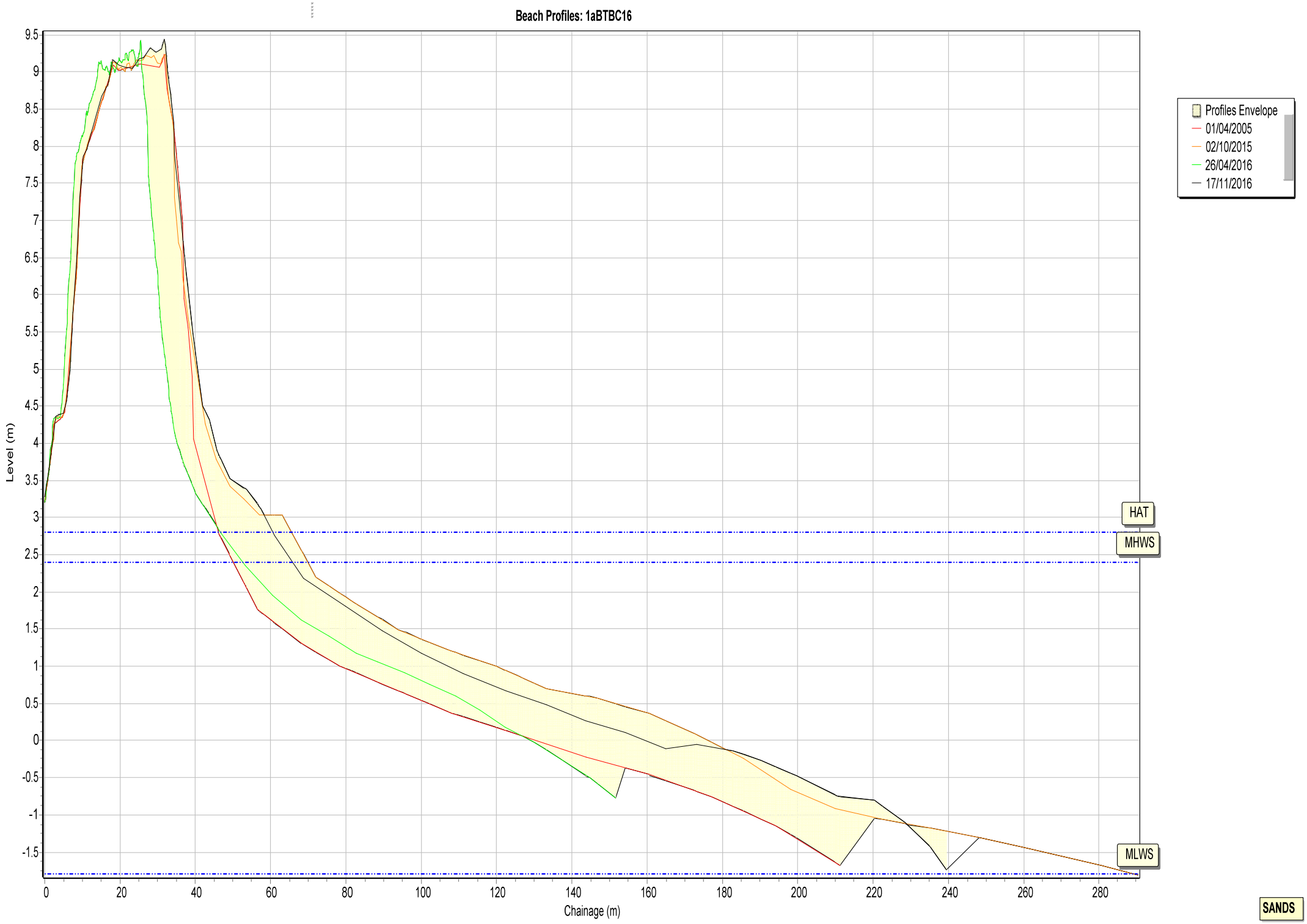
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100
120
140
160
180
200
220
240
260
280
SANDS


Beach Profiles: 1aBTBC17
Profiles Envelope
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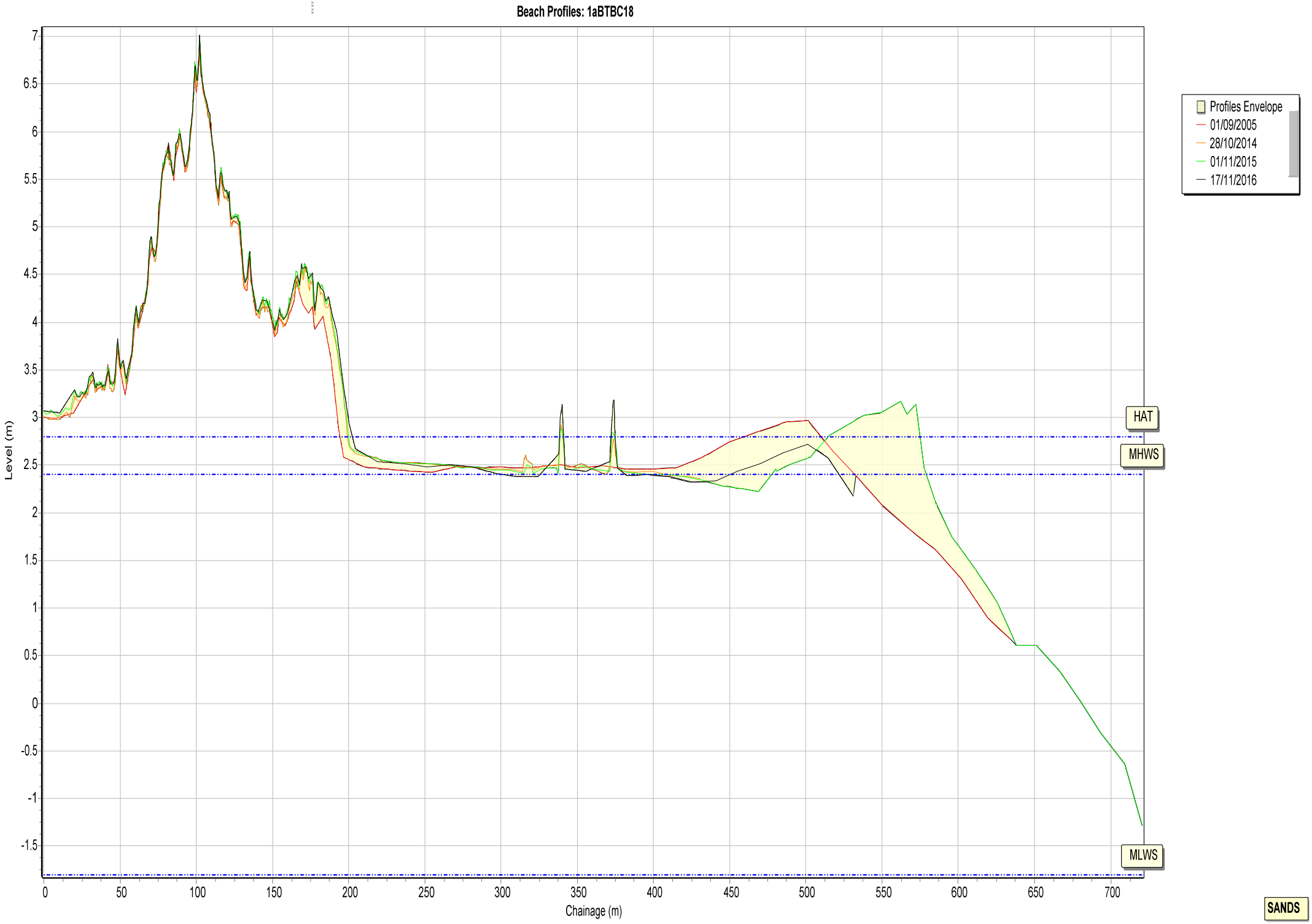
01/10/2015
02/10/2015
17/11/2016
Level (m)
Chainage (m)
HAT
MHWS
MLWS
SANDS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01/09/2005
28/10/2014
01/11/2015
17/11/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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-1
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550
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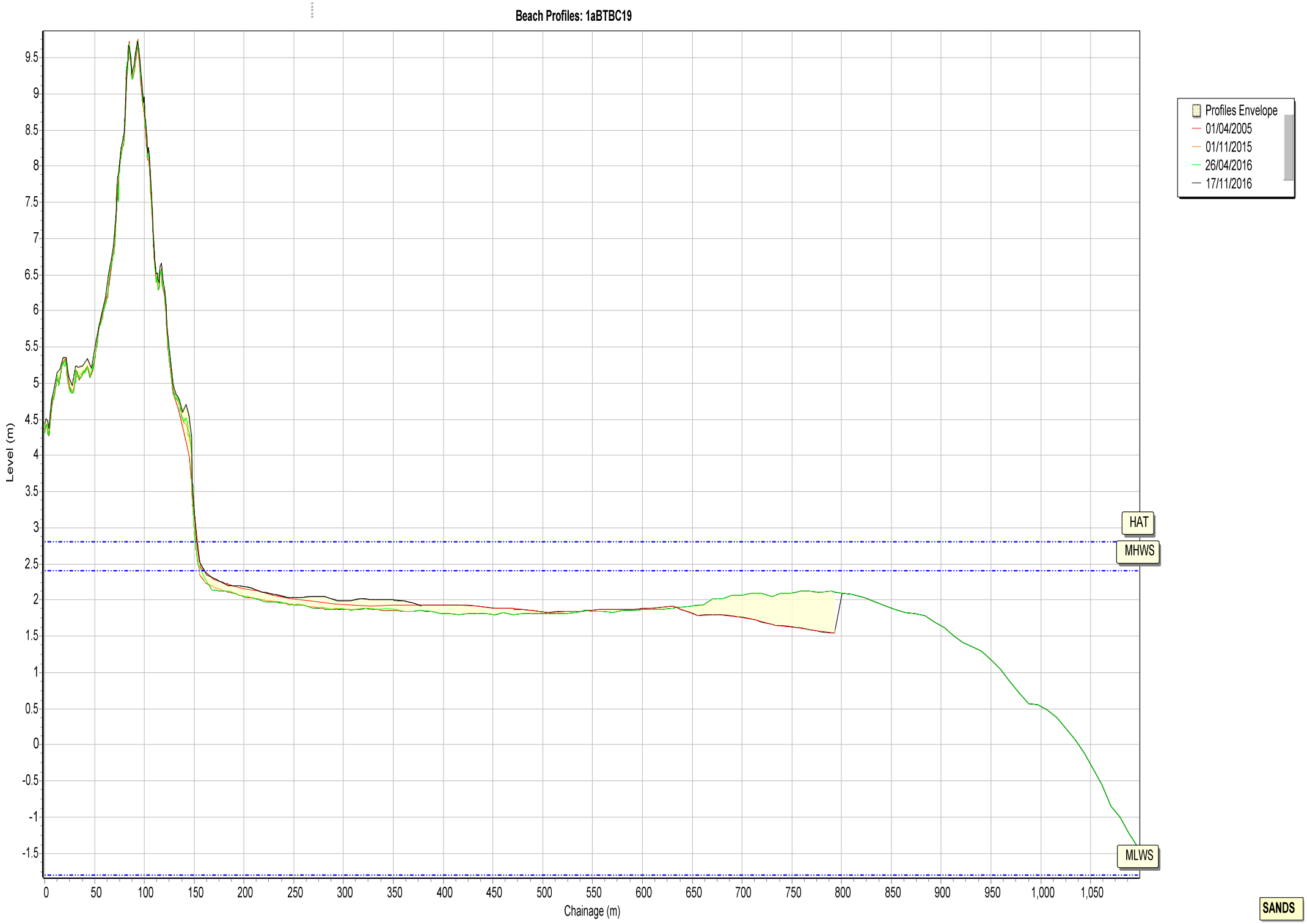
650
700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Profiles Envelope
01/04/2005
01/11/2015
26/04/2016
17/11/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
50
100
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350
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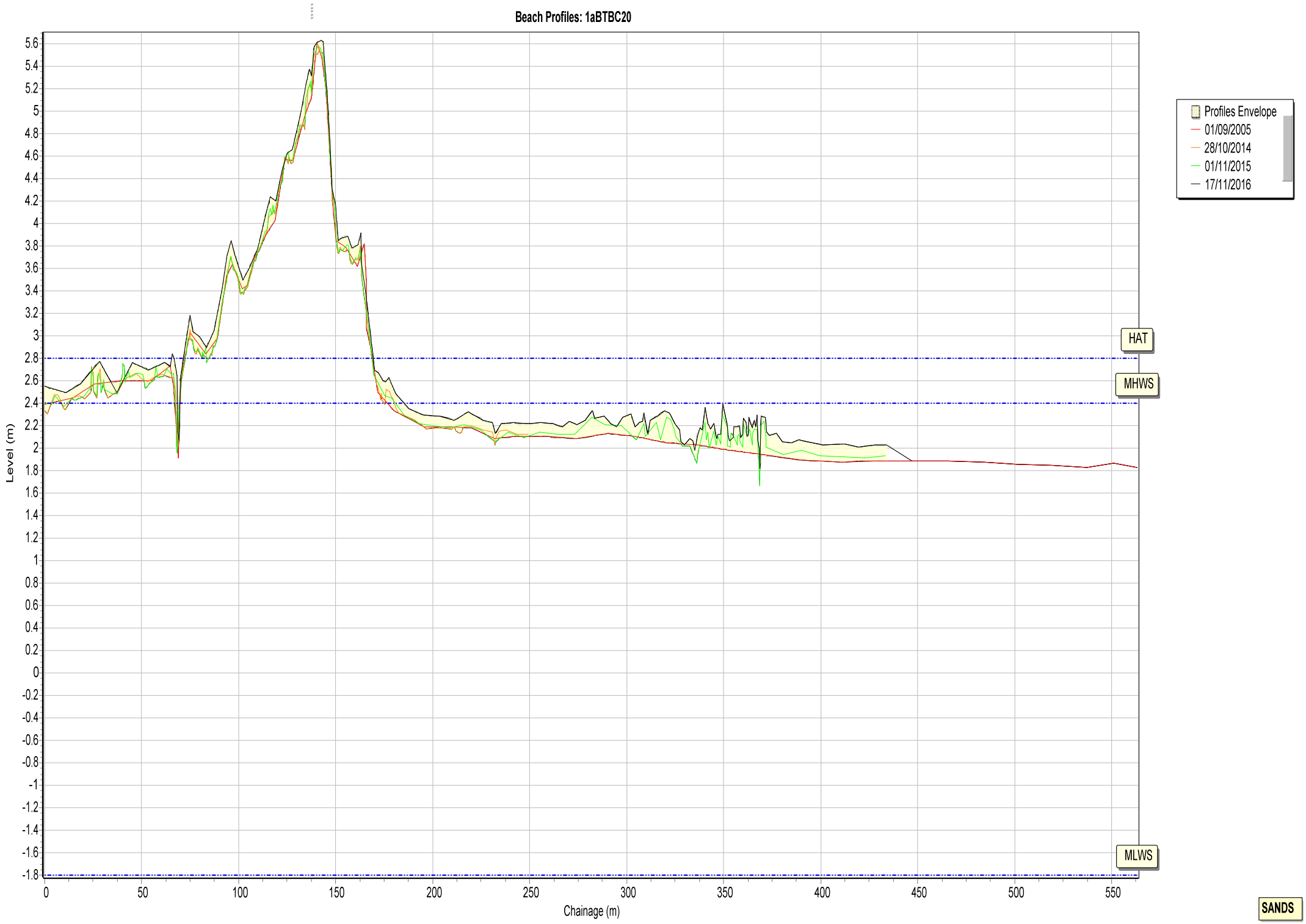
450
500
550
600
650
700
750
800
850
900
950
1,000
1,050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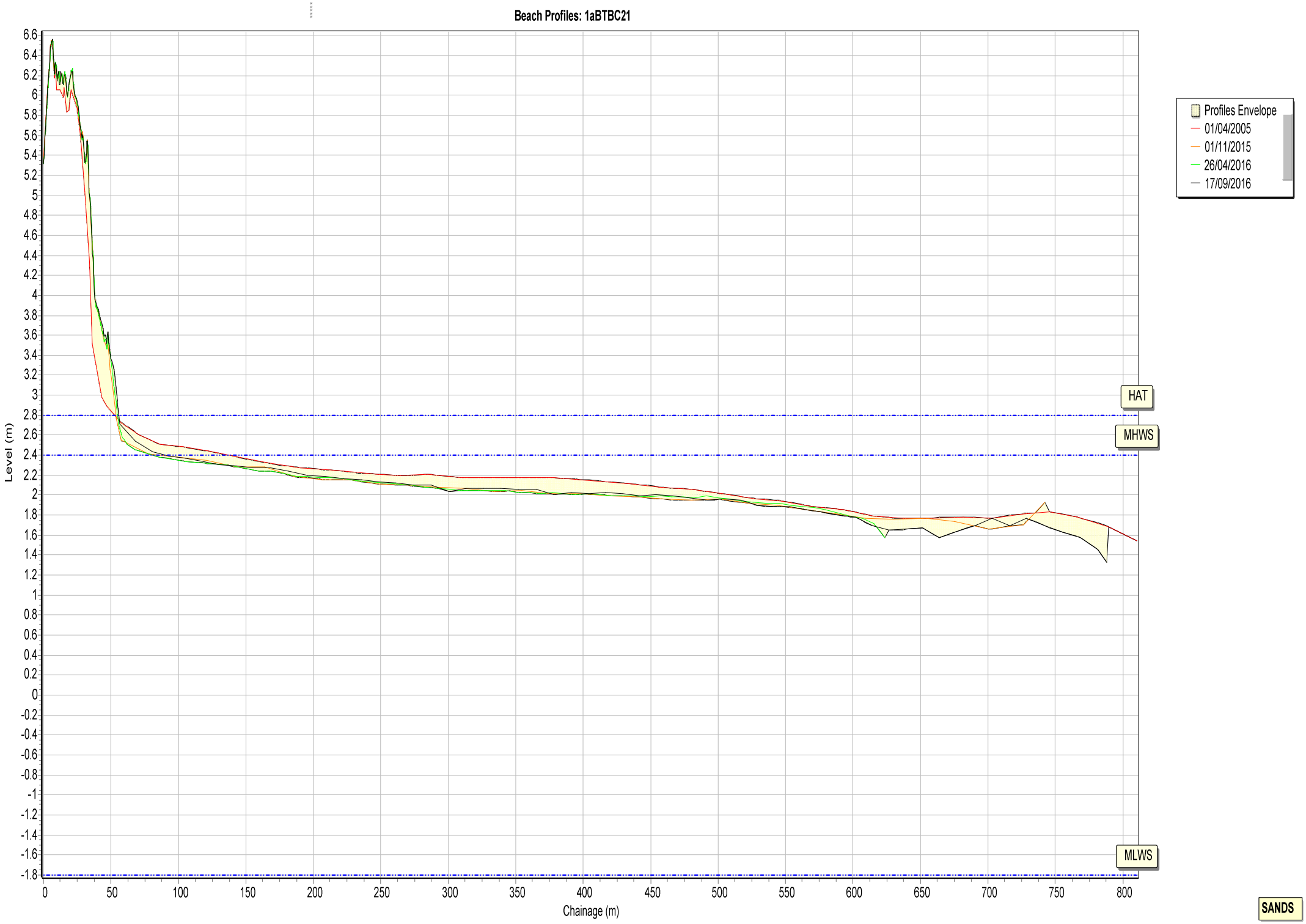
Profiles Envelope
01/09/2005
28/10/2014
01/11/2015
17/11/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
0
50
100
150
200
250
300
350
400
450
500
550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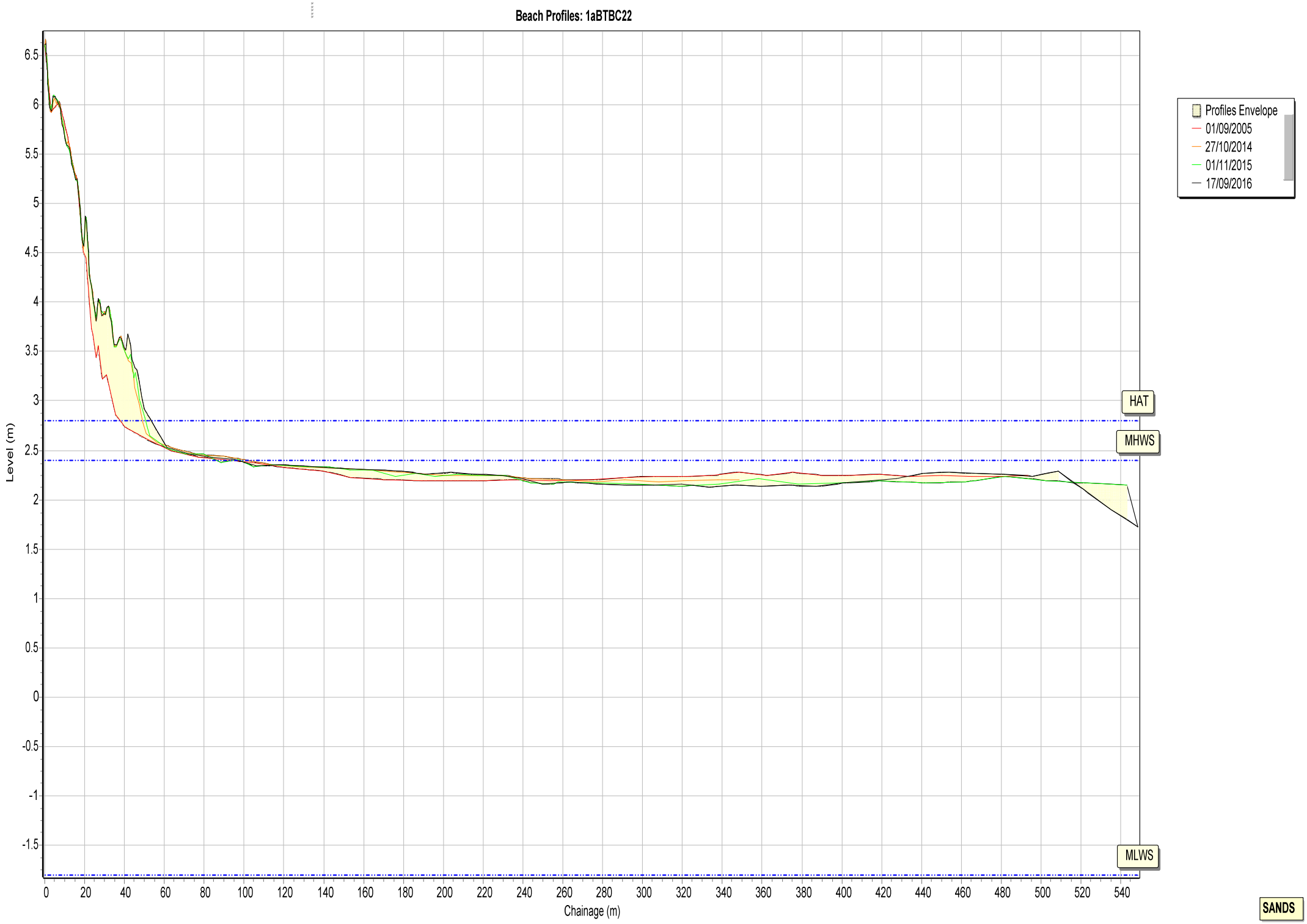
01/04/2005
01/11/2015
26/04/2016
17/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800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Profiles Envelope
01/09/2005
27/10/2014
01/11/2015
17/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
20
40
60
80
100
120
140
160
180
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220
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280
300
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340
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380
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420
440
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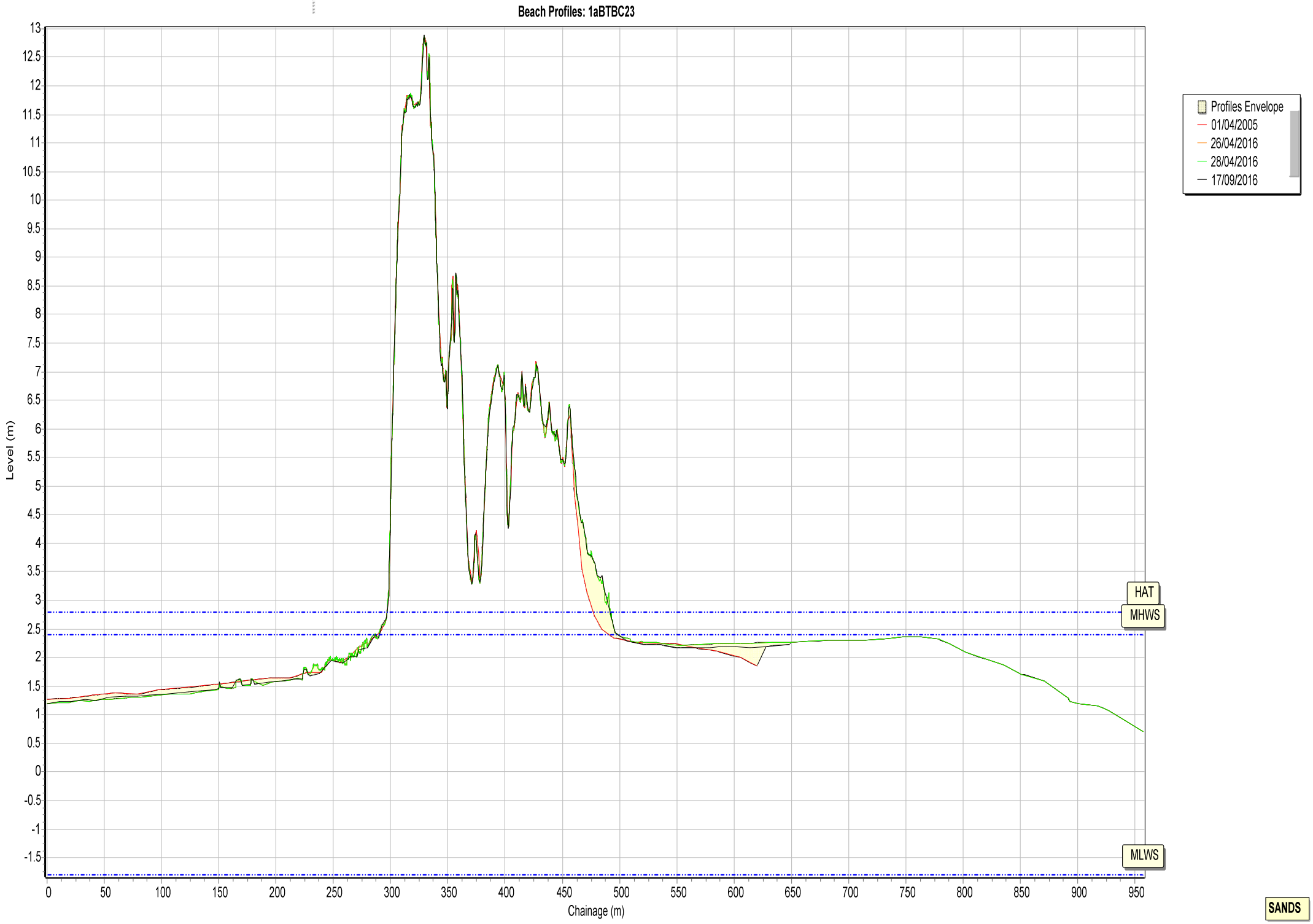
520
540
SANDS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Profiles Envelope
01/04/2005
26/04/2016
28/04/2016
17/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
50
100
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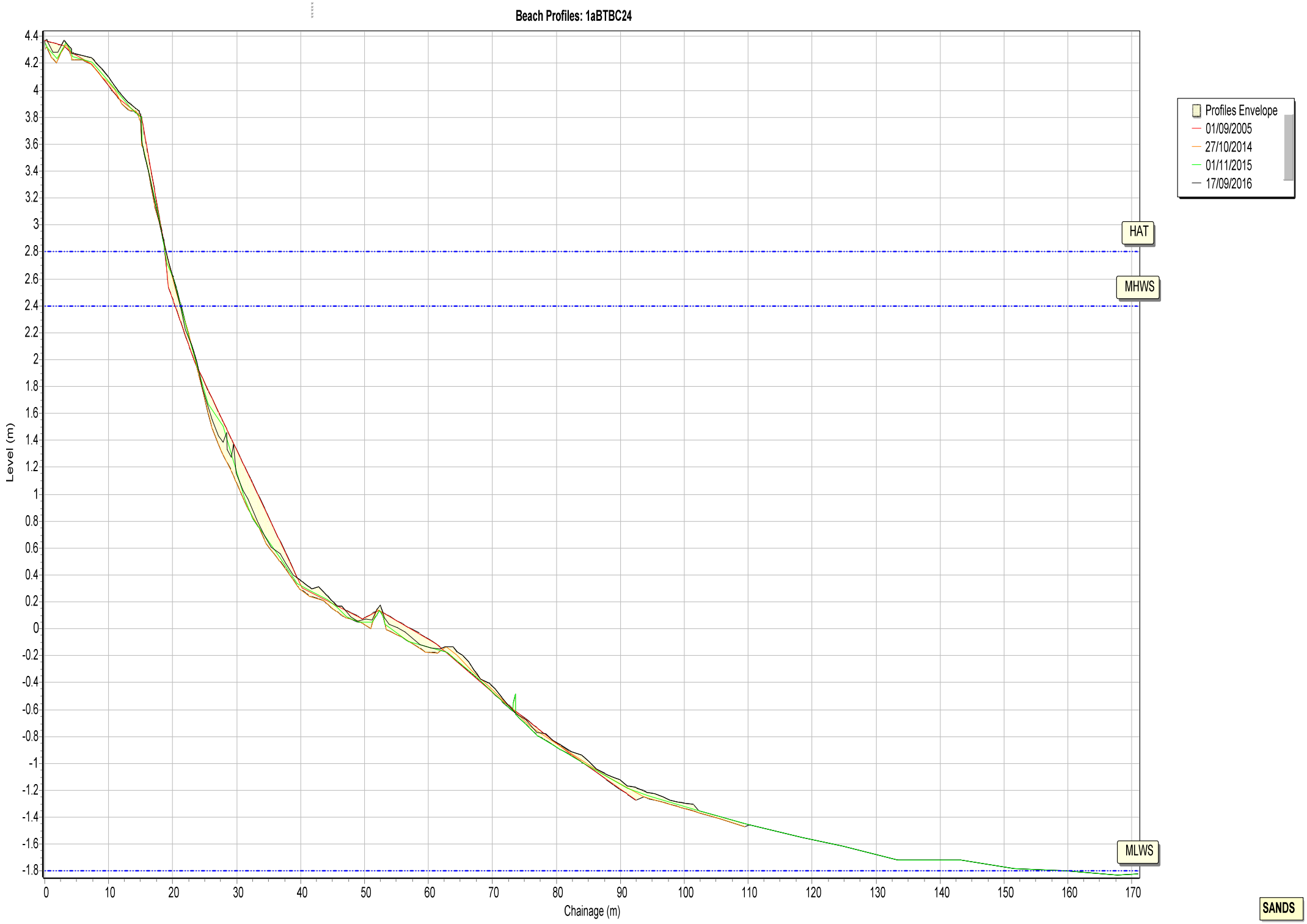
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950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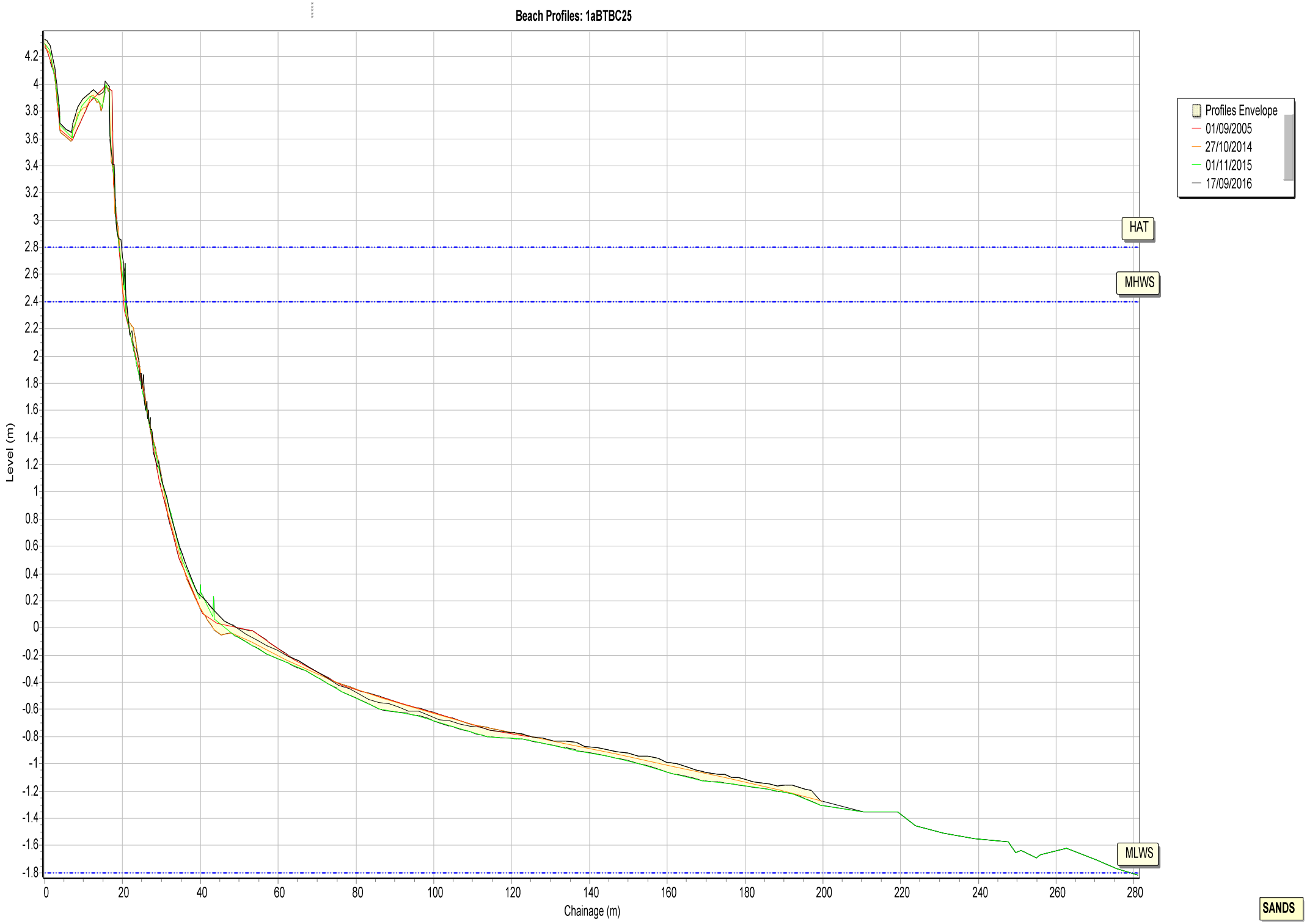
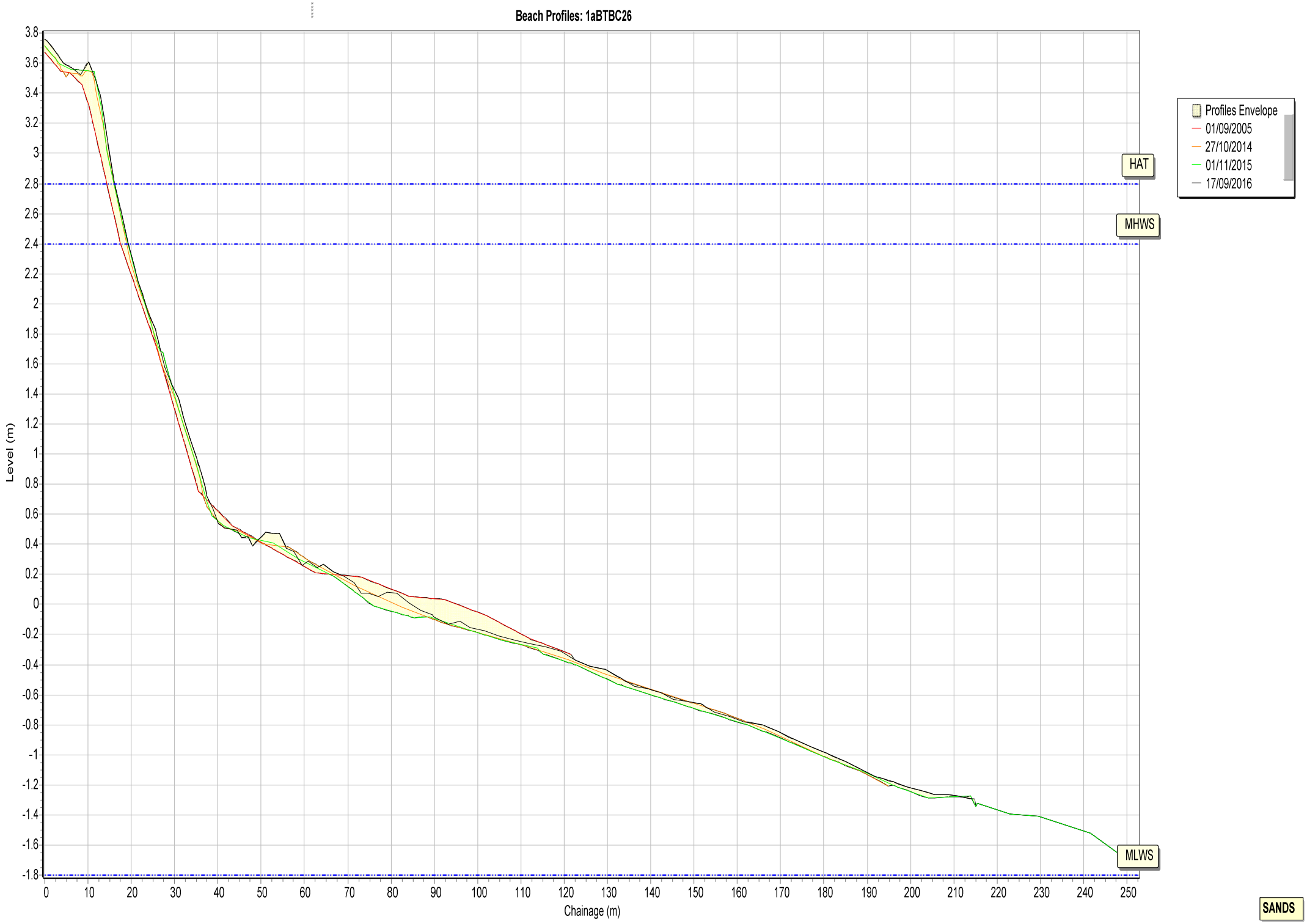
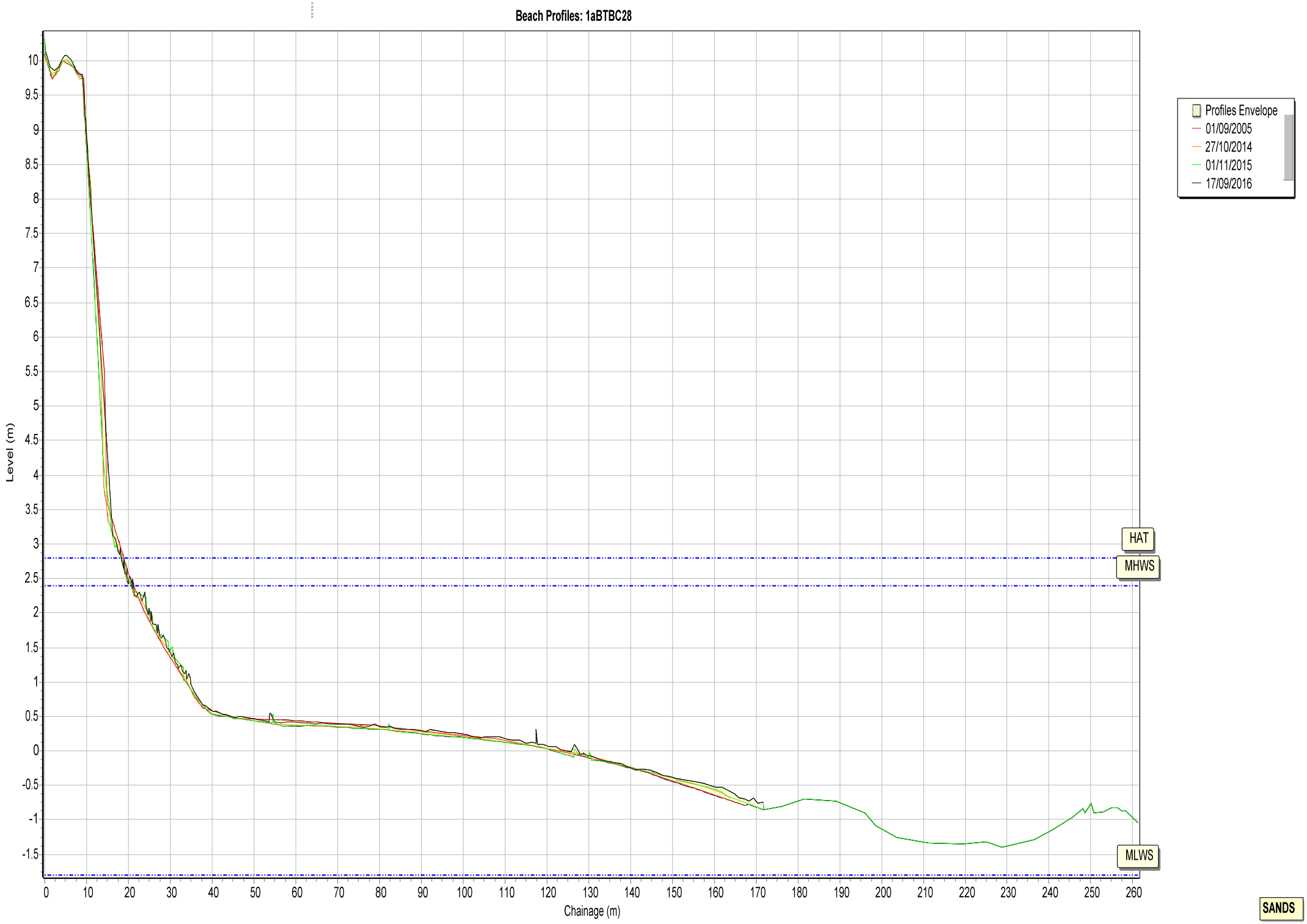
01/09/2005
27/10/2014
01/11/2015
17/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS


Beach Profiles: 1aBTBC25
Profiles Envelope
01/09/2005
27/10/2014
01/11/2015
17/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
SANDS


Beach Profiles: 1aBTBC26
Profiles Envelope
01/09/2005
27/10/2014
01/11/2015
17/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS


Beach Profiles: 1aBTBC27
Profiles Envelope
01/09/2005
27/10/2014
01/11/2015
17/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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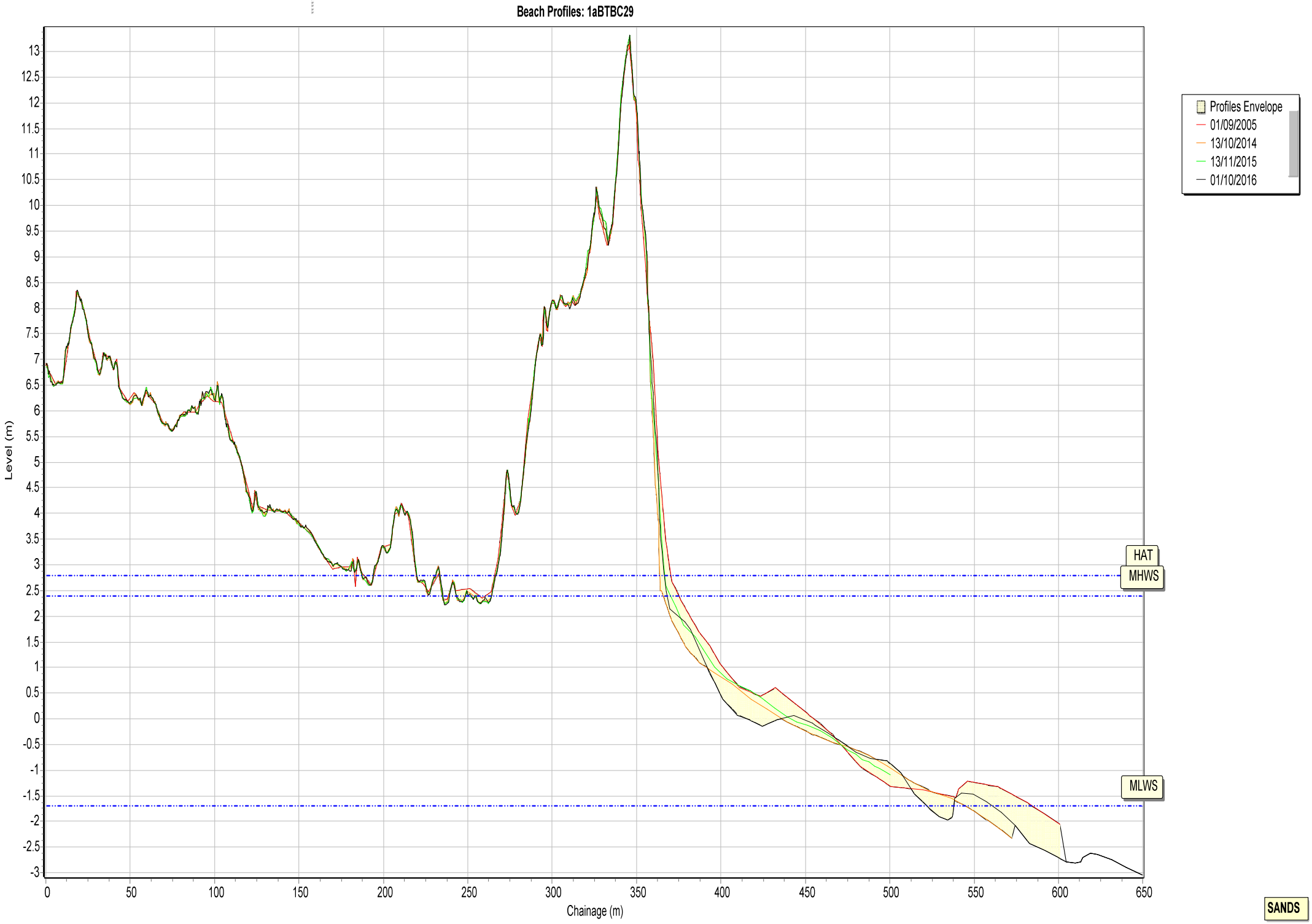
Profiles Envelope
01/09/2005
27/10/2014
01/11/2015
17/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260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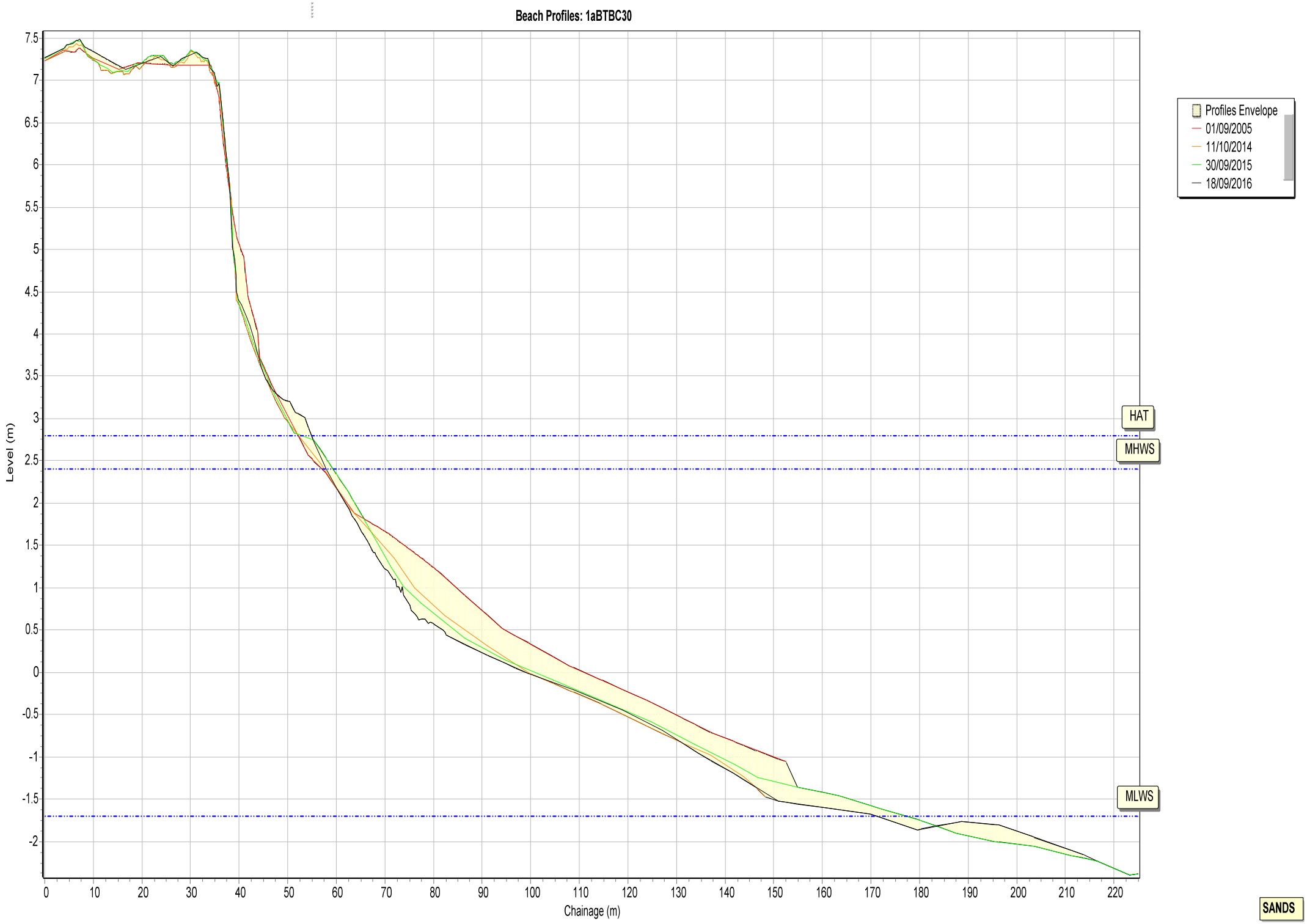
Profiles Envelope
01/09/2005
13/10/2014
13/11/2015
01/10/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0
50
100
150
200
250
300
350
400
450
500
550
600
650
SANDS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01/09/2005
11/10/2014
30/09/2015
18/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
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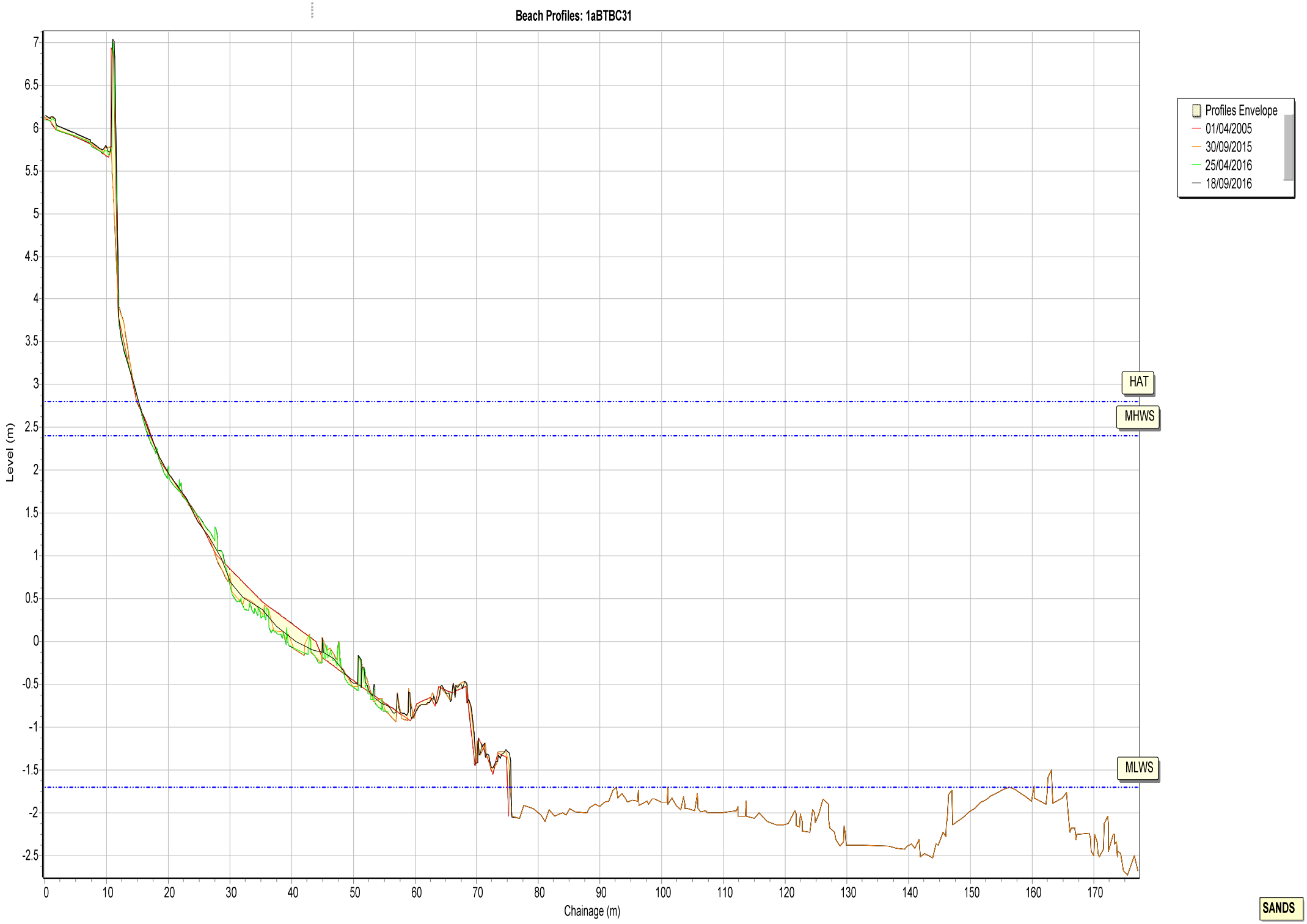
190
200
210
220
SANDS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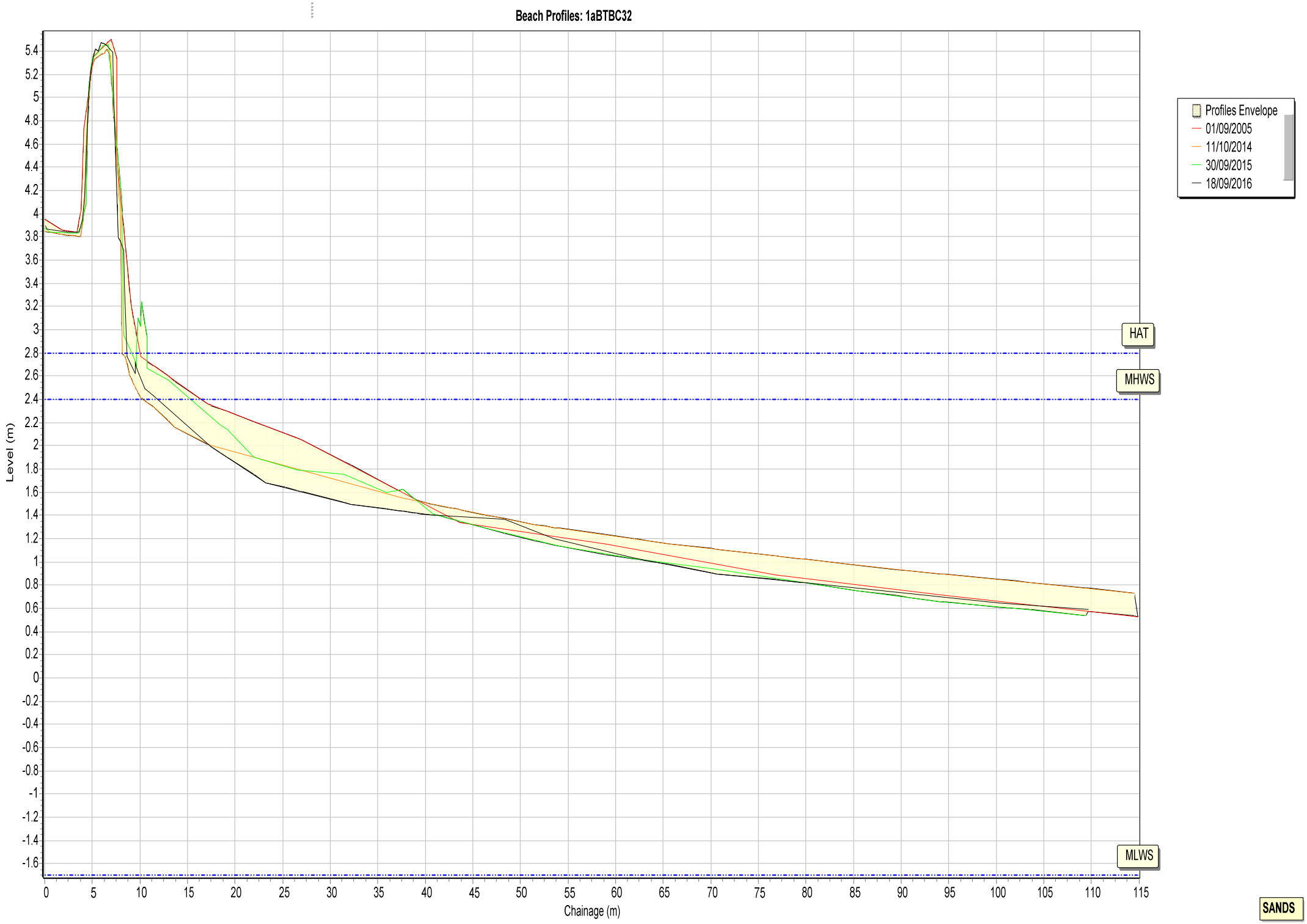
30/09/2015
25/04/2016
18/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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11/10/2014
30/09/2015
18/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
0
5
10
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45
50
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100
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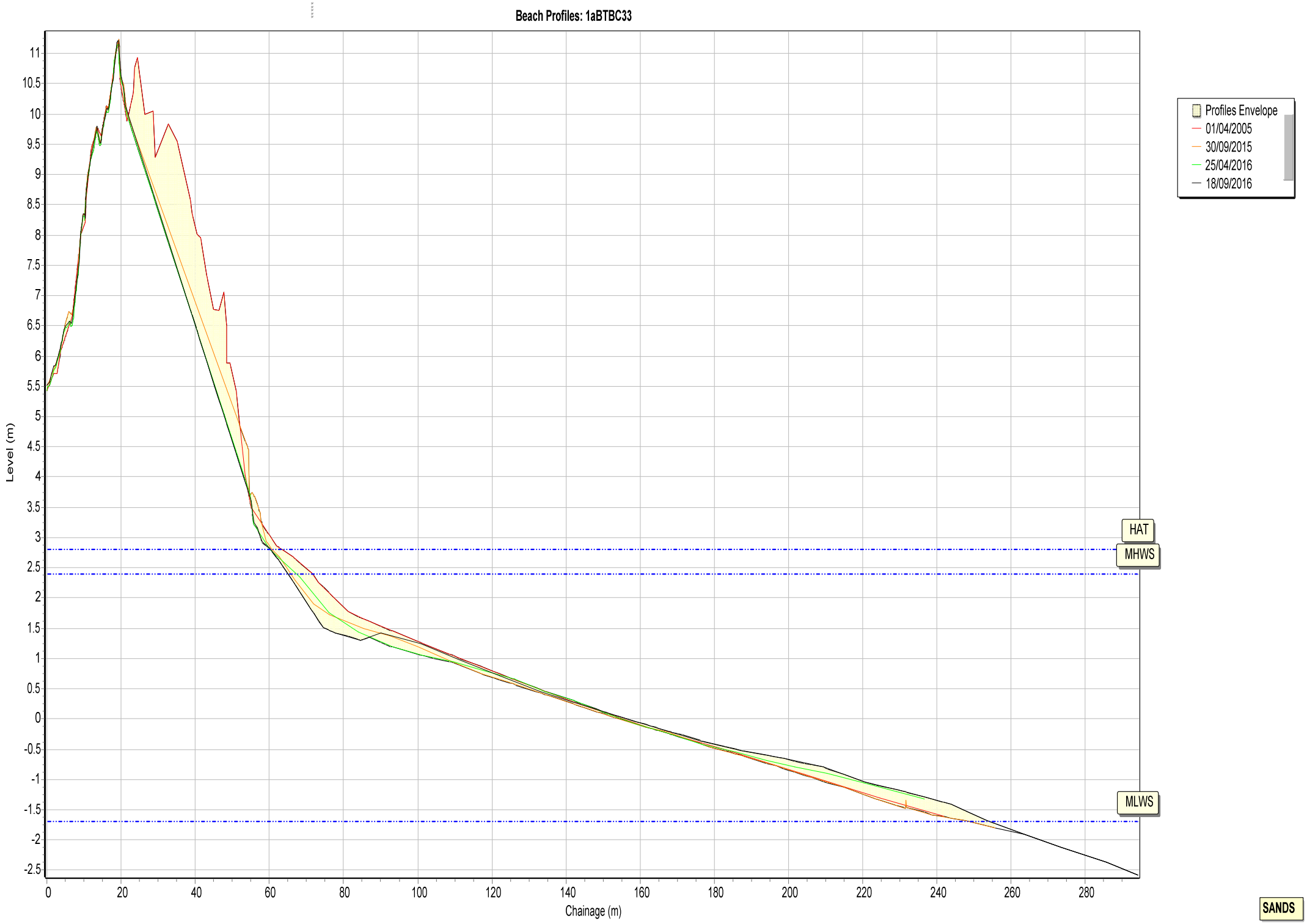
110
115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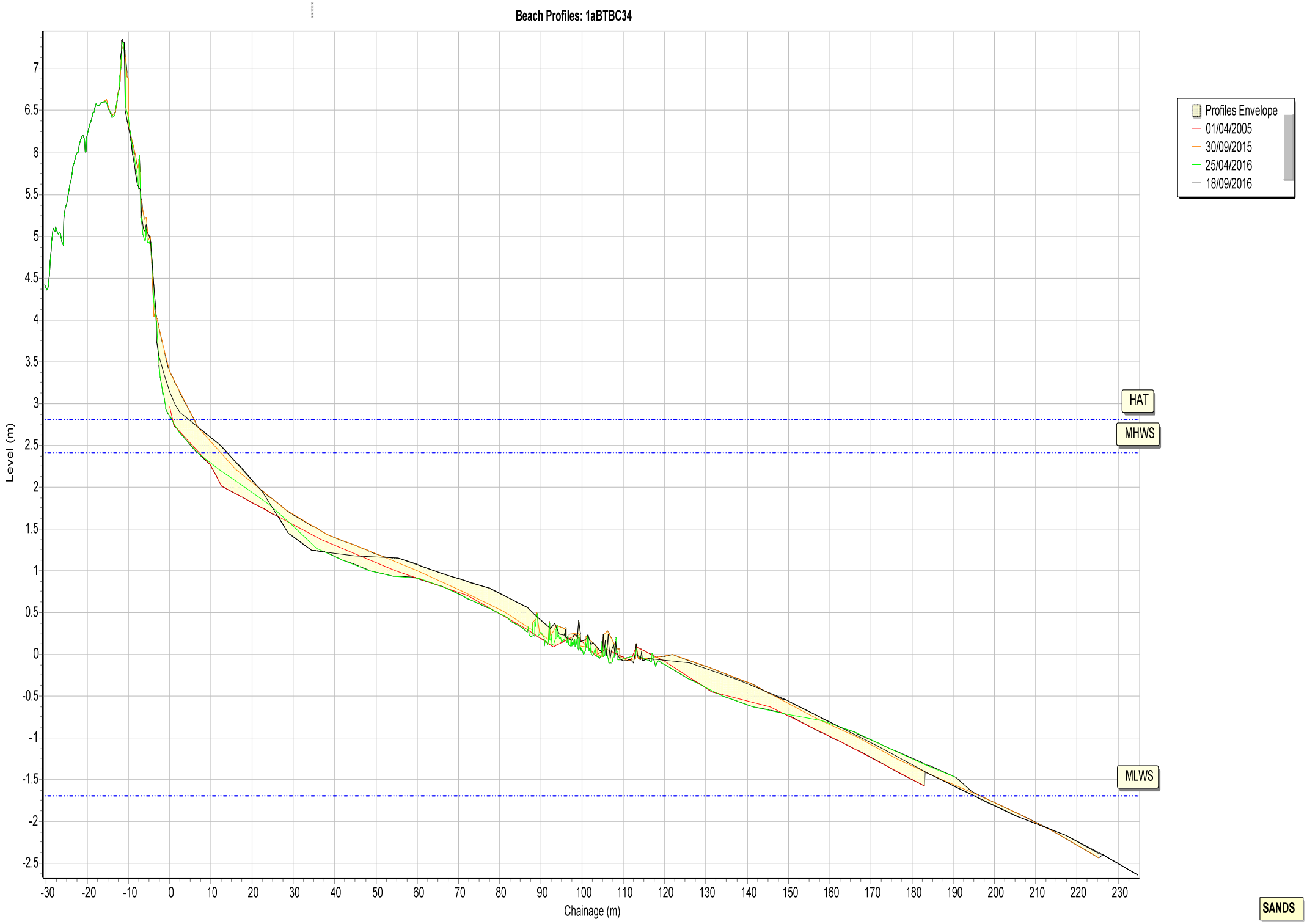
30/09/2015
25/04/2016
18/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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30/09/2015
25/04/2016
18/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-30
-20
-10
0
10
20
30
40
50
60
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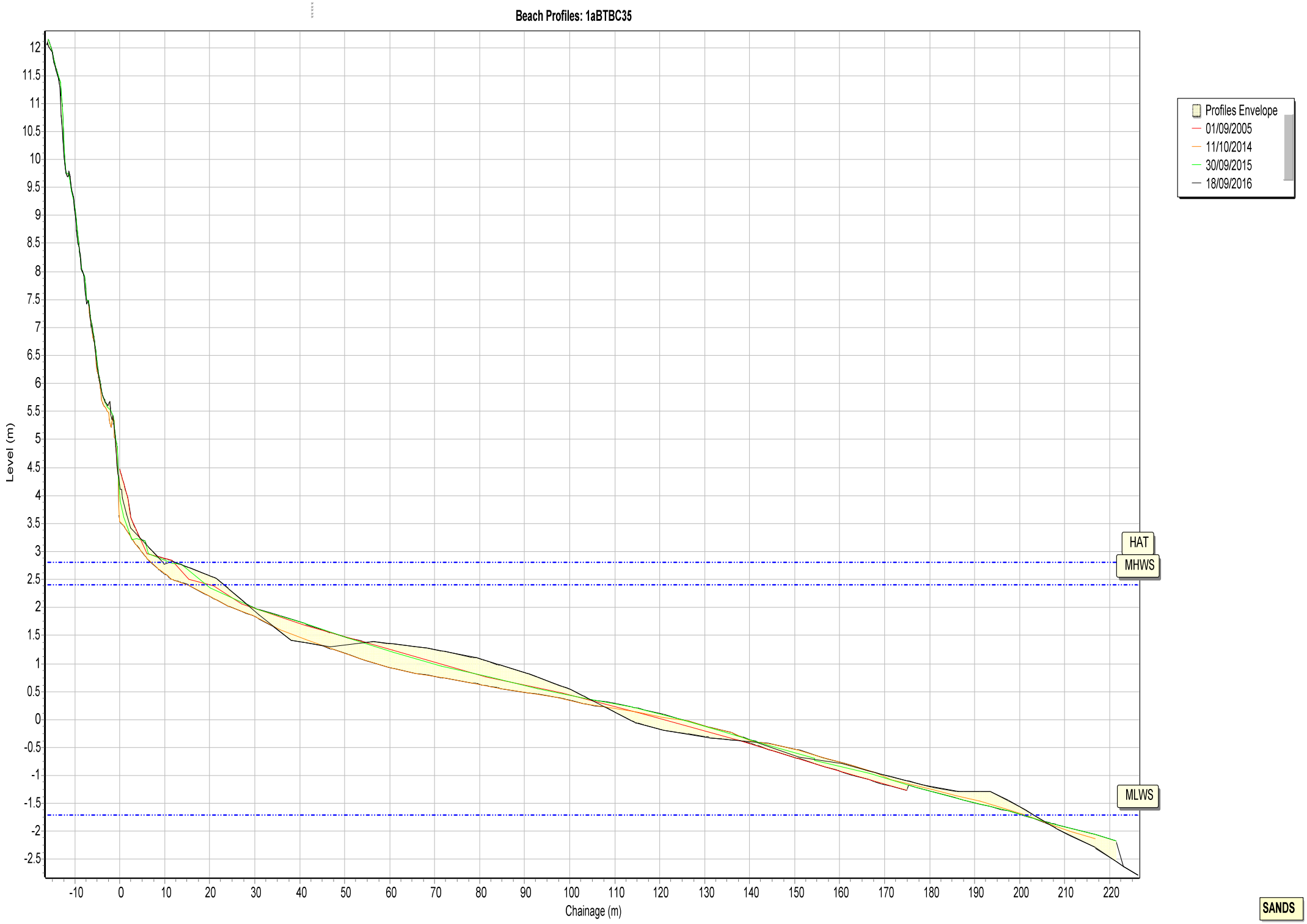
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230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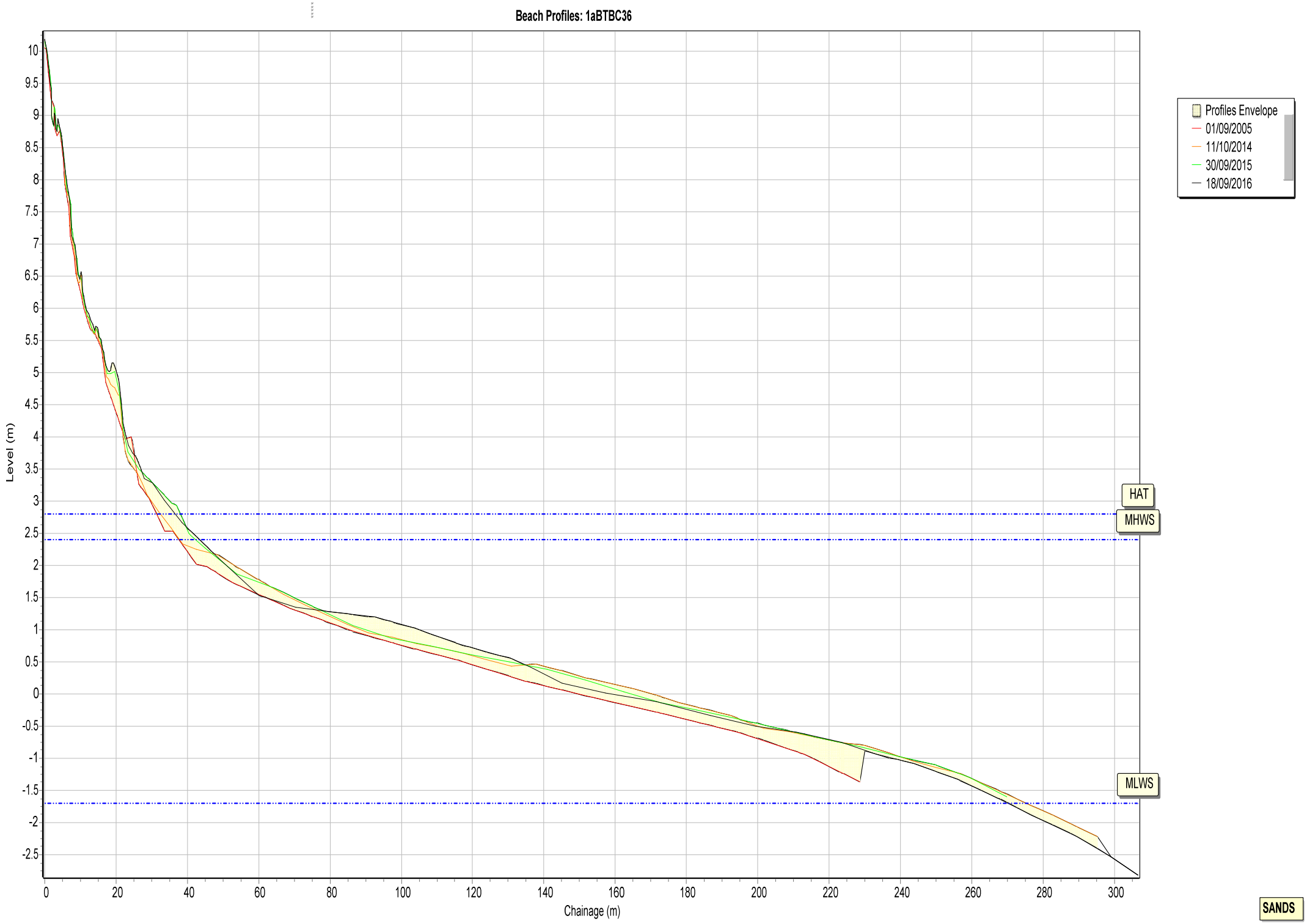
11/10/2014
30/09/2015
18/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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01/09/2005
11/10/2014
30/09/2015
18/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
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40
60
80
100
120
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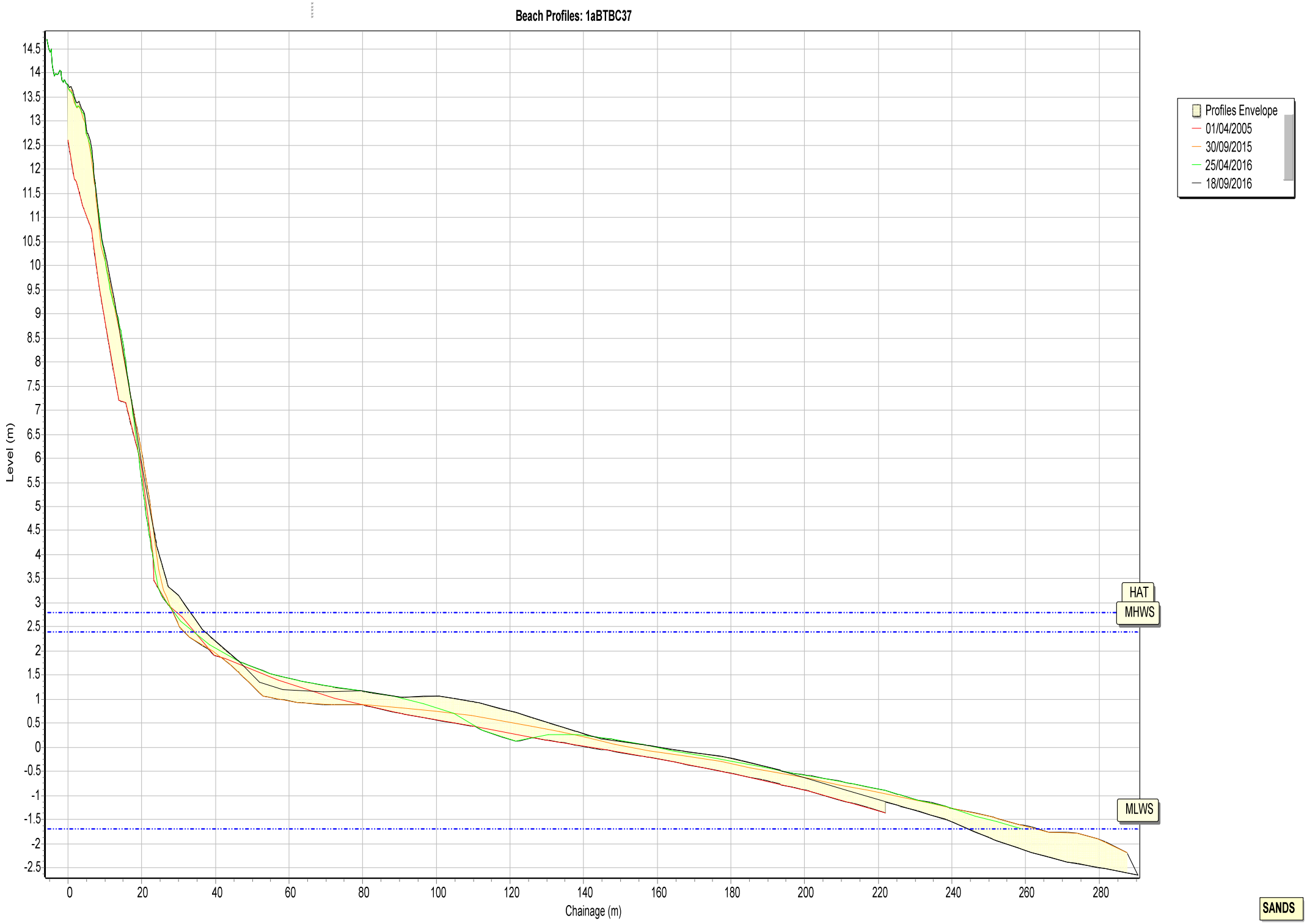
160
180
200
220
240
260
280
300
SANDS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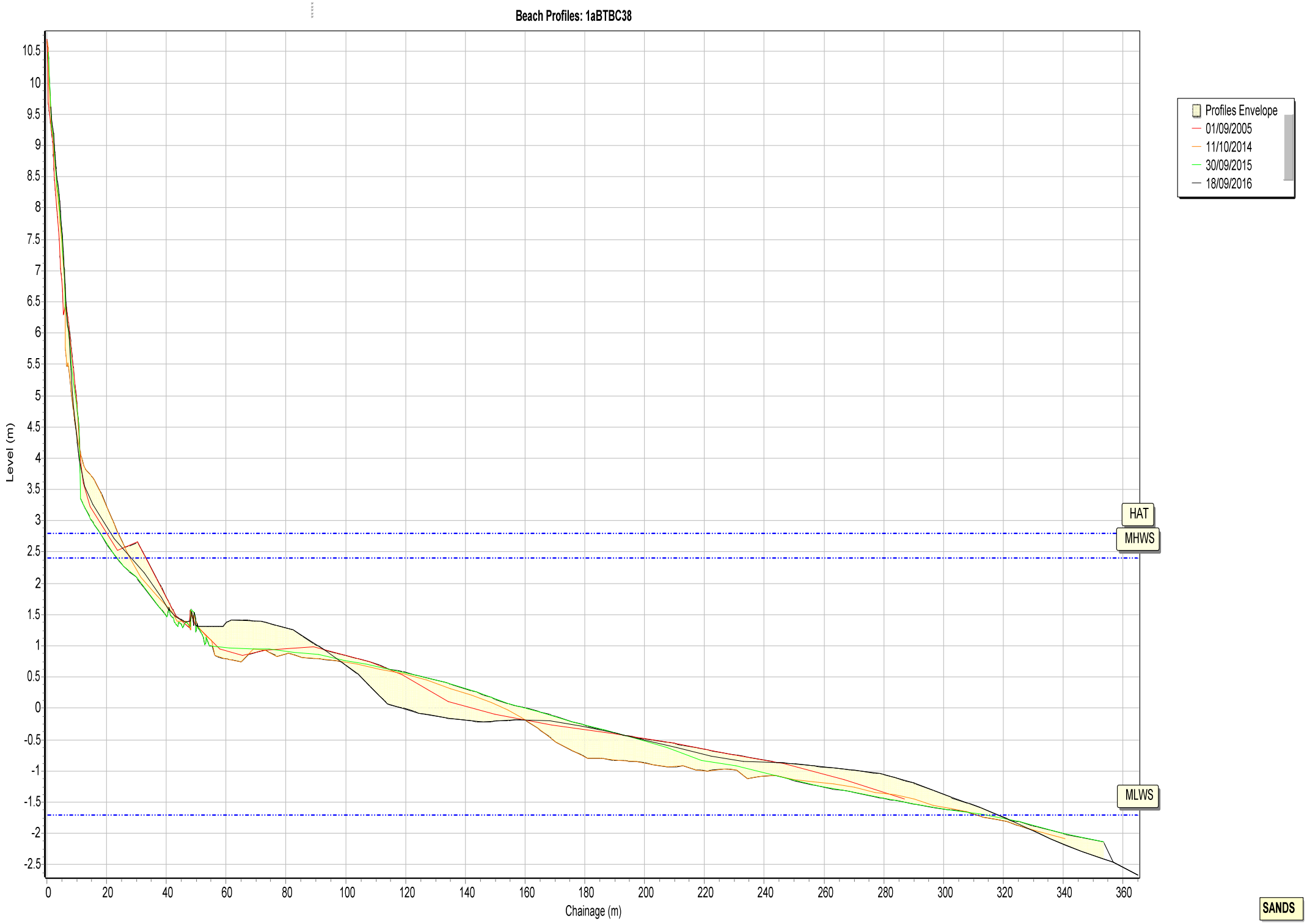
30/09/2015
25/04/2016
18/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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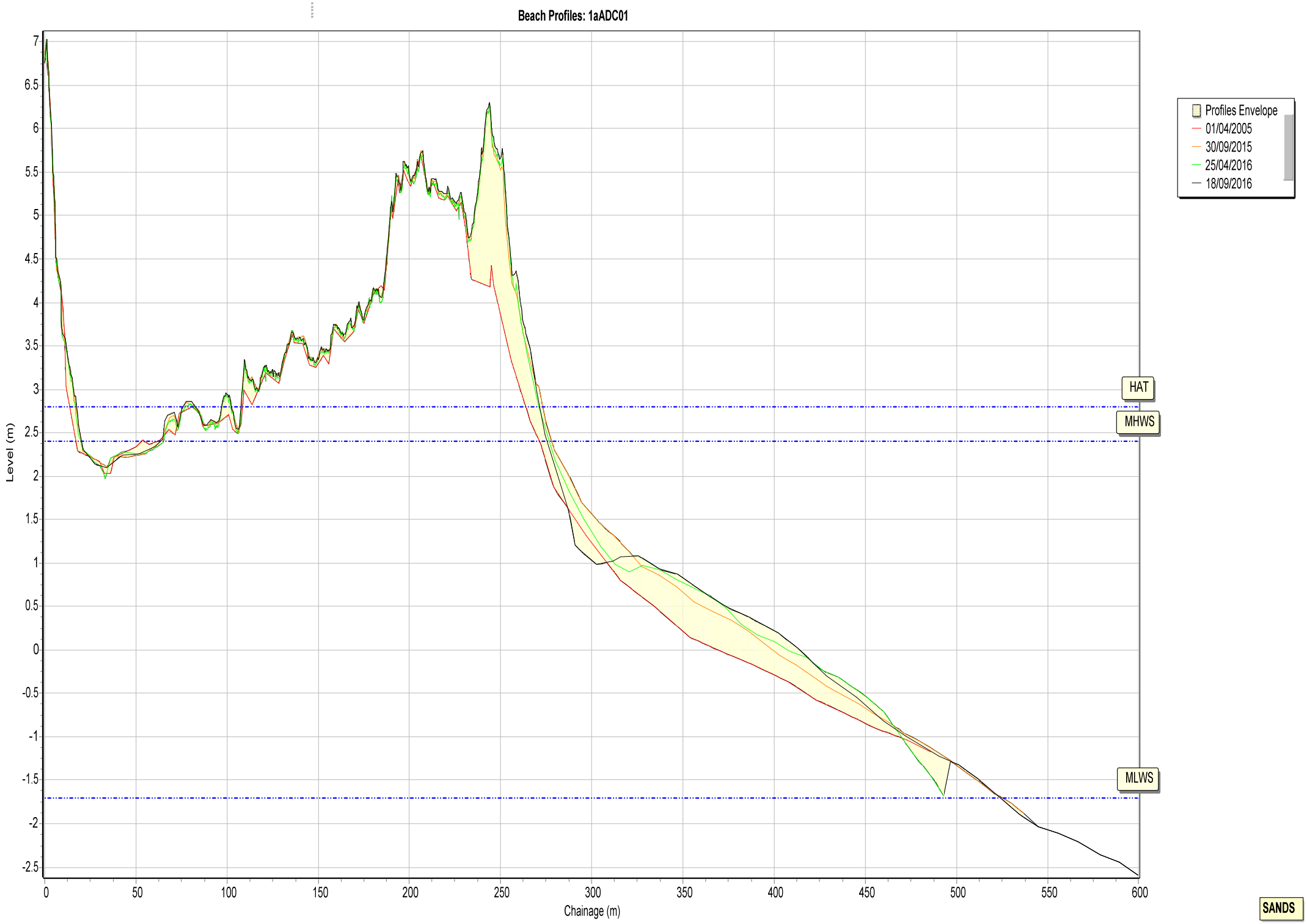
01/09/2005
11/10/2014
30/09/2015
18/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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01/04/2005
30/09/2015
25/04/2016
18/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
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100
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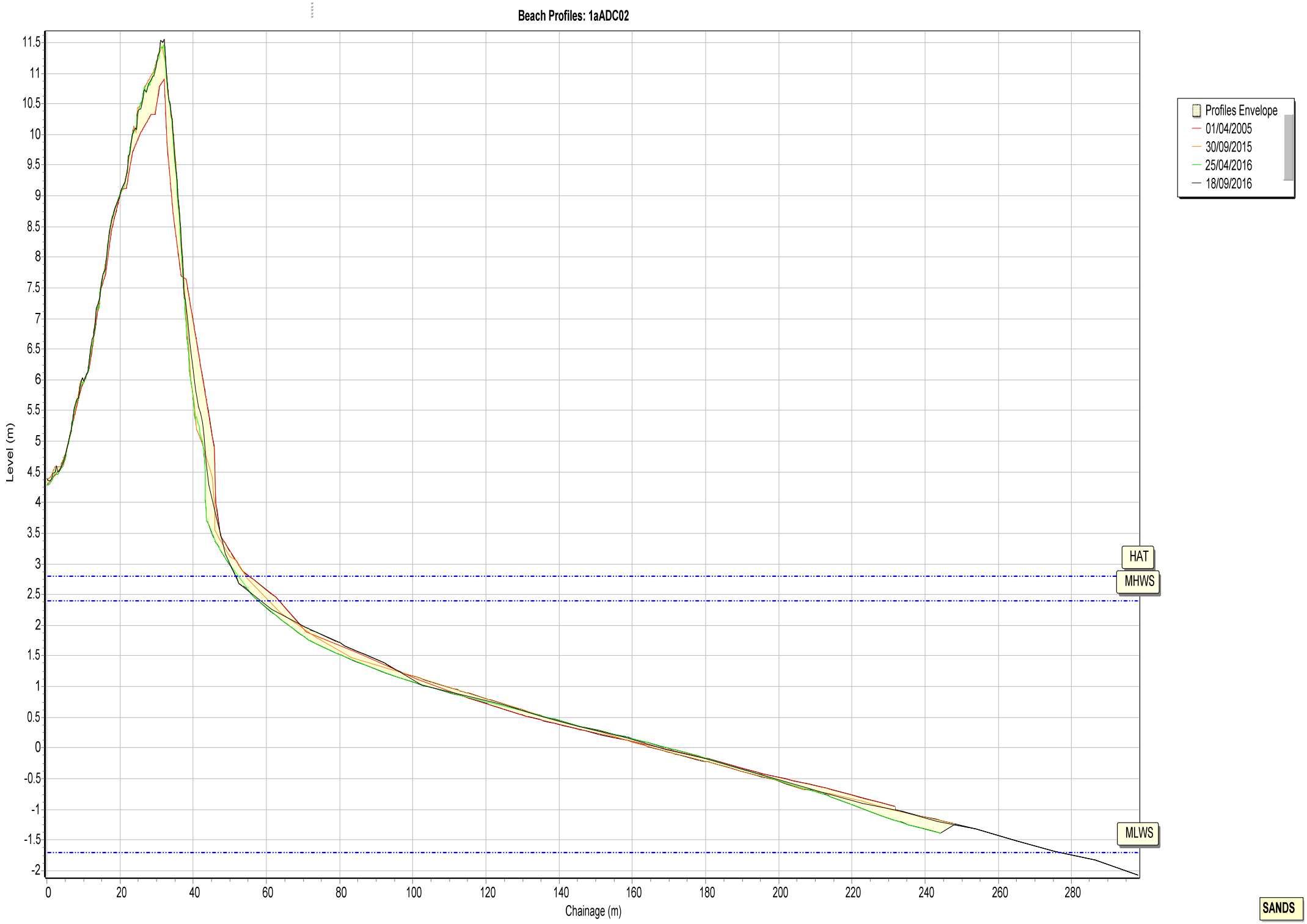
250
300
350
400
450
500
550
600


Beach Profiles: 1aADC02
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01/04/2005
30/09/2015
25/04/2016
18/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
20
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60
80
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140
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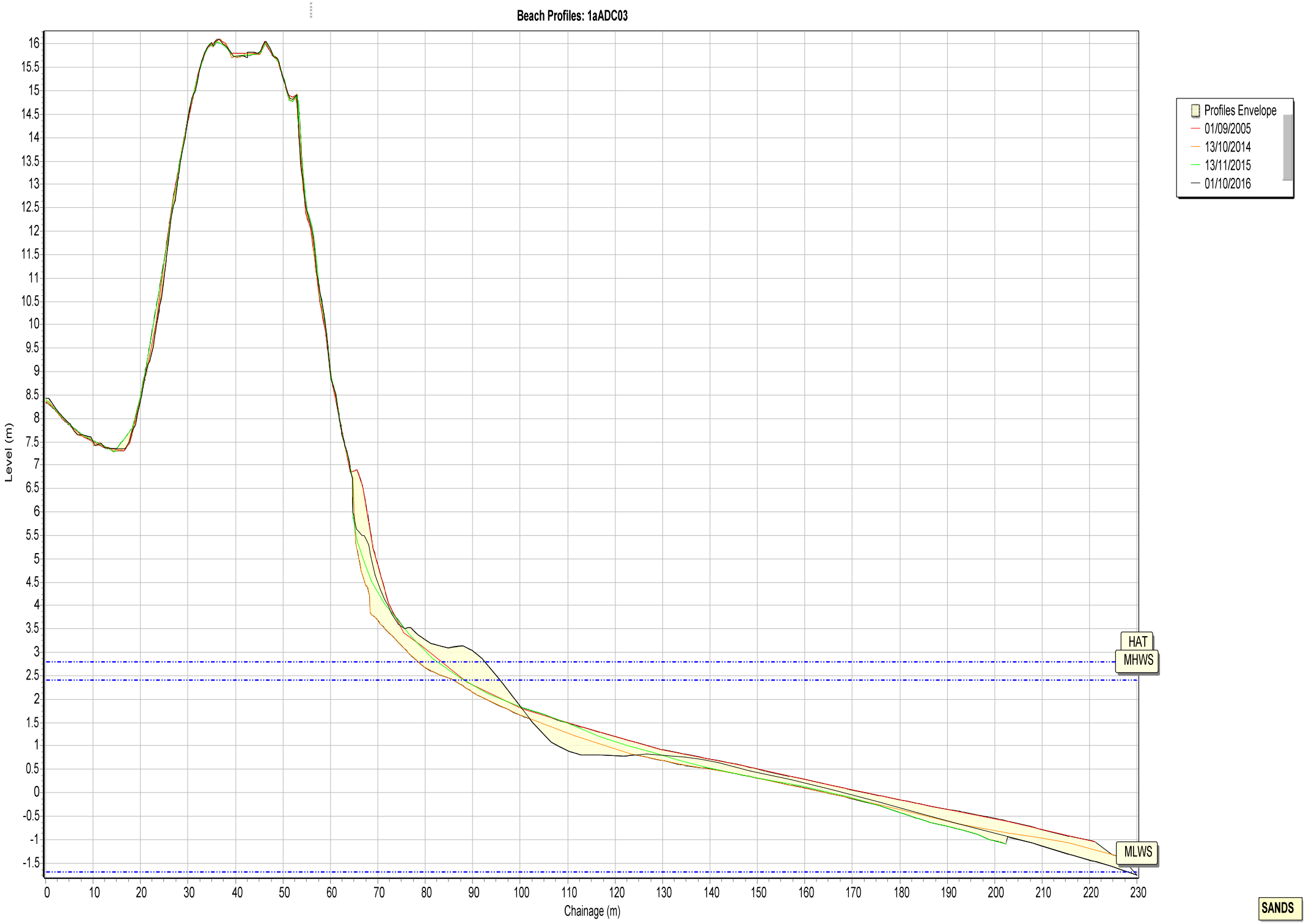
220
240
260
280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Profiles Envelope
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13/10/2014
13/11/2015
01/10/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
16
15.5
15
14.5
14
13.5
13
12.5
12
11.5
11
10.5
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9.5
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8.5
8
7.5
7
6.5
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5.5
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4.5
4
3.5
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2.5
2
1.5
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0.5
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80
90
100
110
120
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140
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160
170
180
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200
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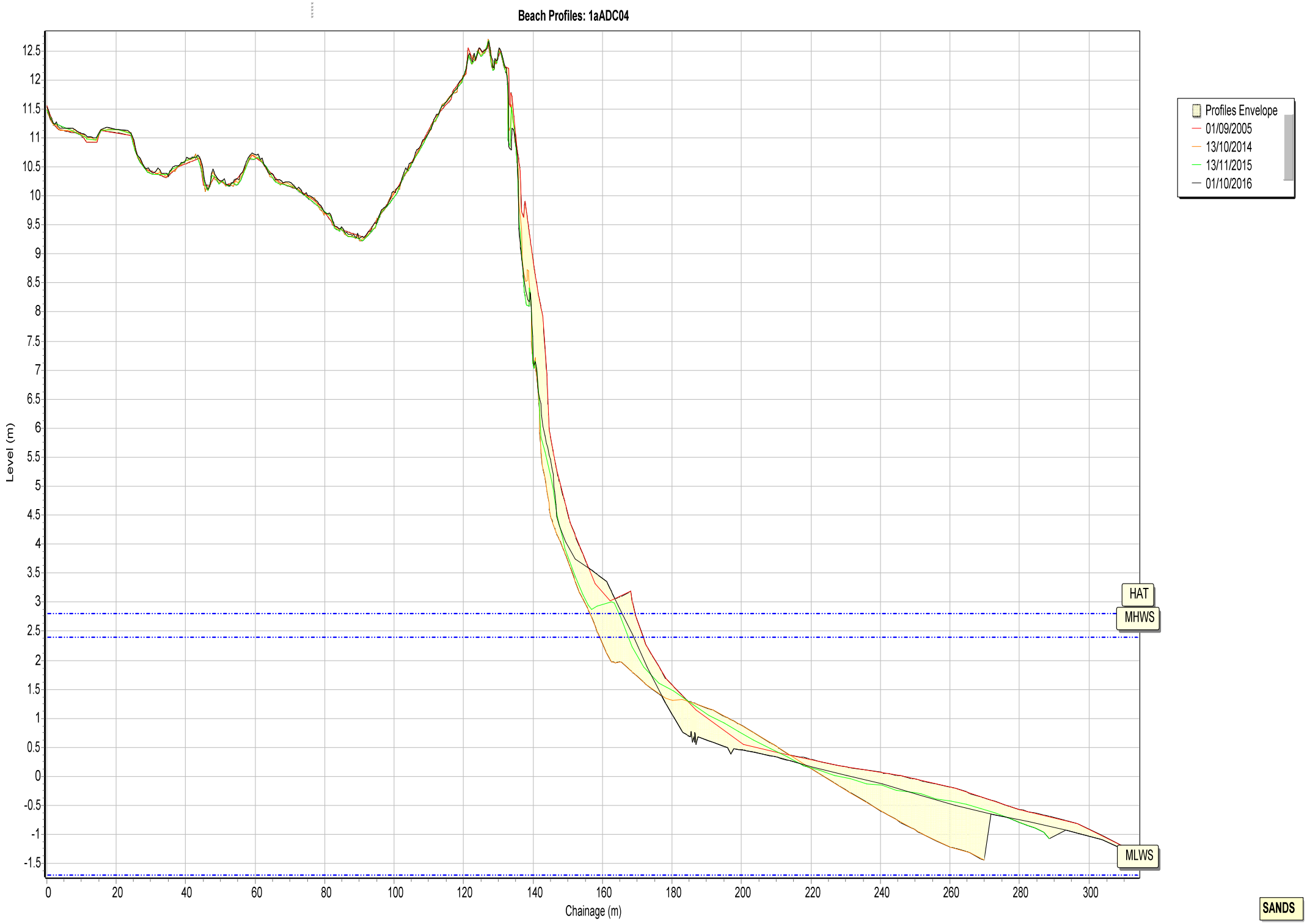
220
230


Beach Profiles: 1aADC04
Profiles Envelope
01/09/2005
13/10/2014
13/11/2015
01/10/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
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3.5
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2.5
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60
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100
120
140
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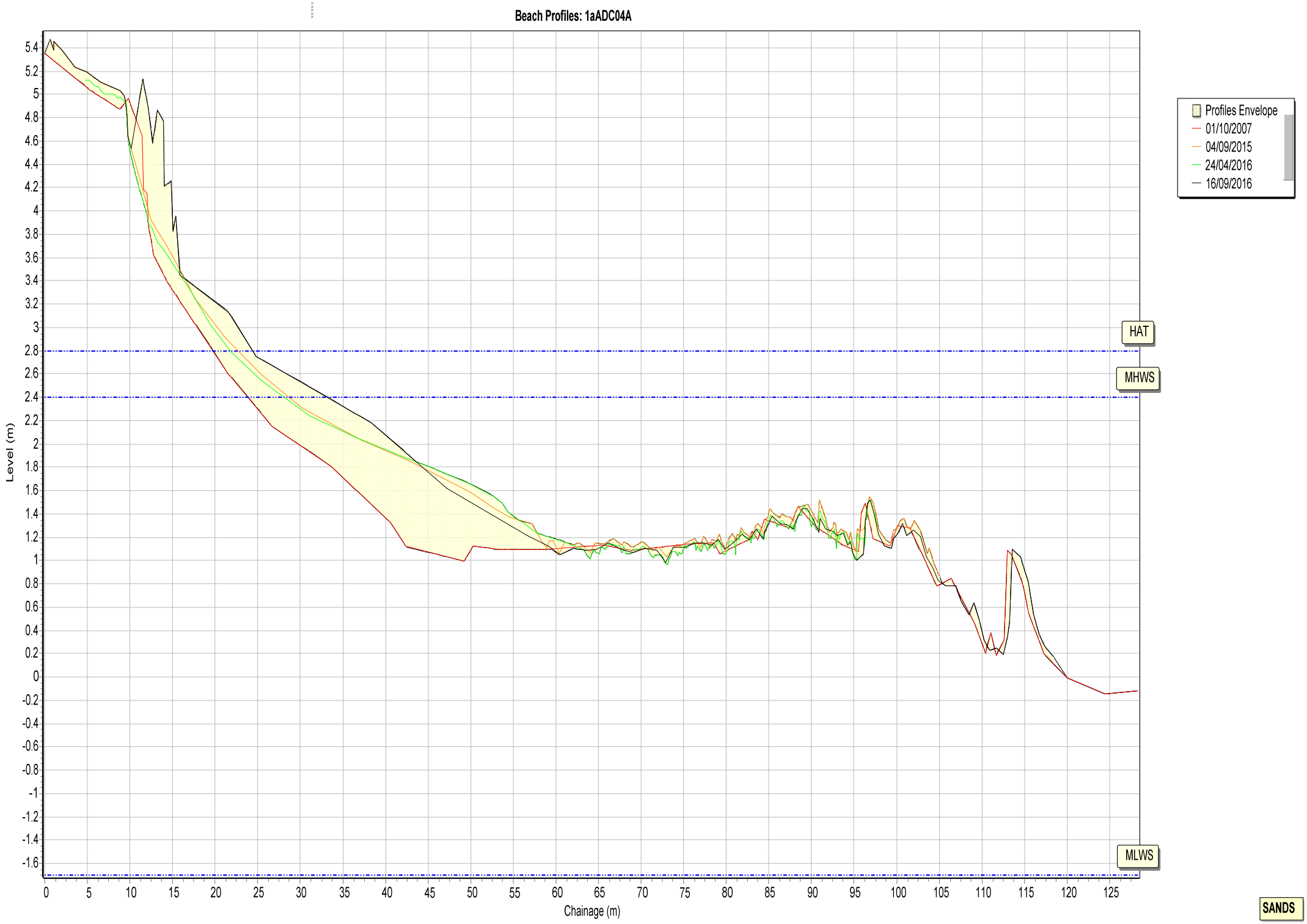
180
200
220
240
260
280
300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16/09/2016
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MLWS
SANDS
Level (m)
Chainage (m)
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
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-0.6
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-1
-1.2
-1.4
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5
10
15
20
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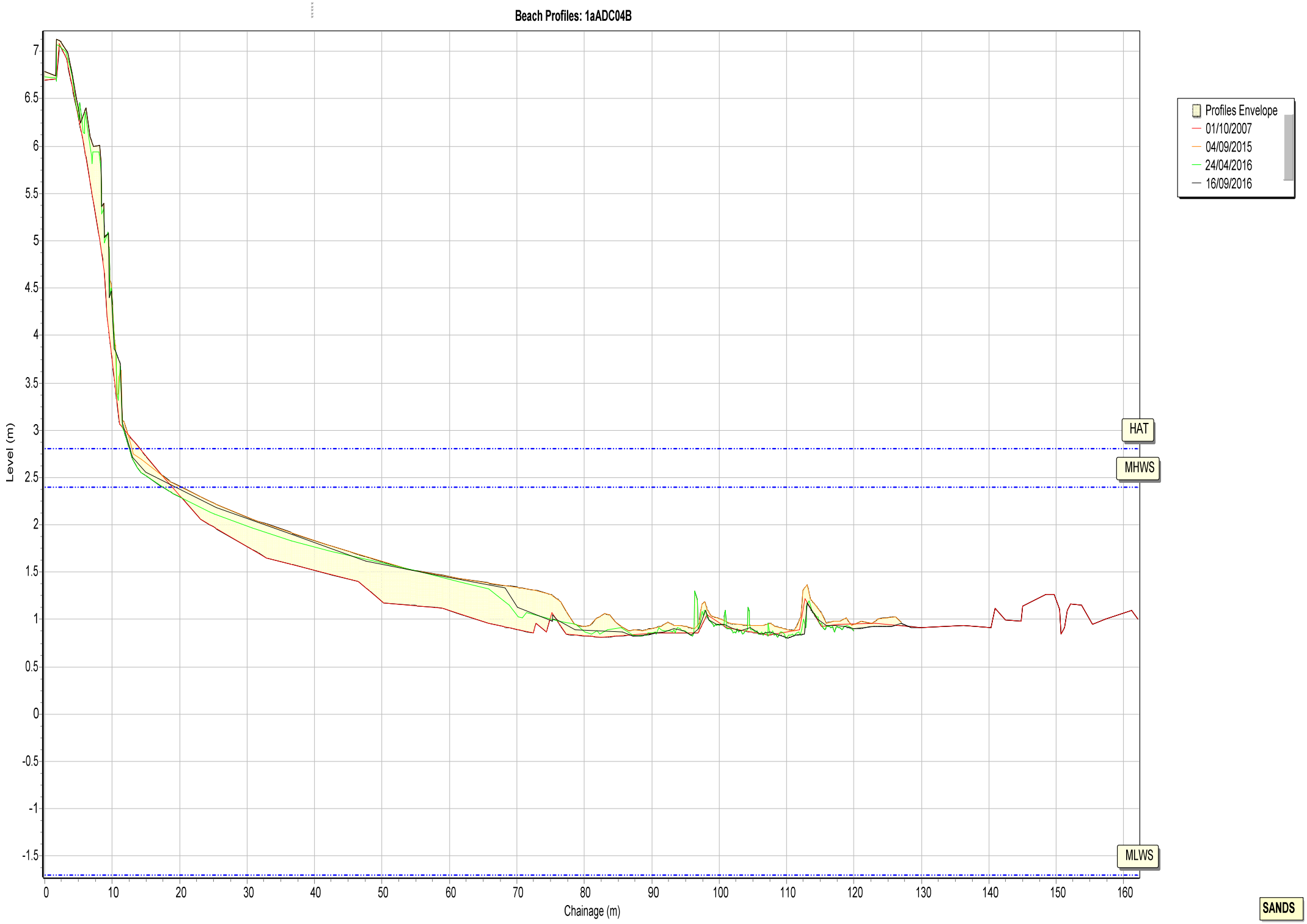
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04/09/2015
24/04/2016
16/09/2016
HAT
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MLWS
SANDS
Level (m)
Chainage (m)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
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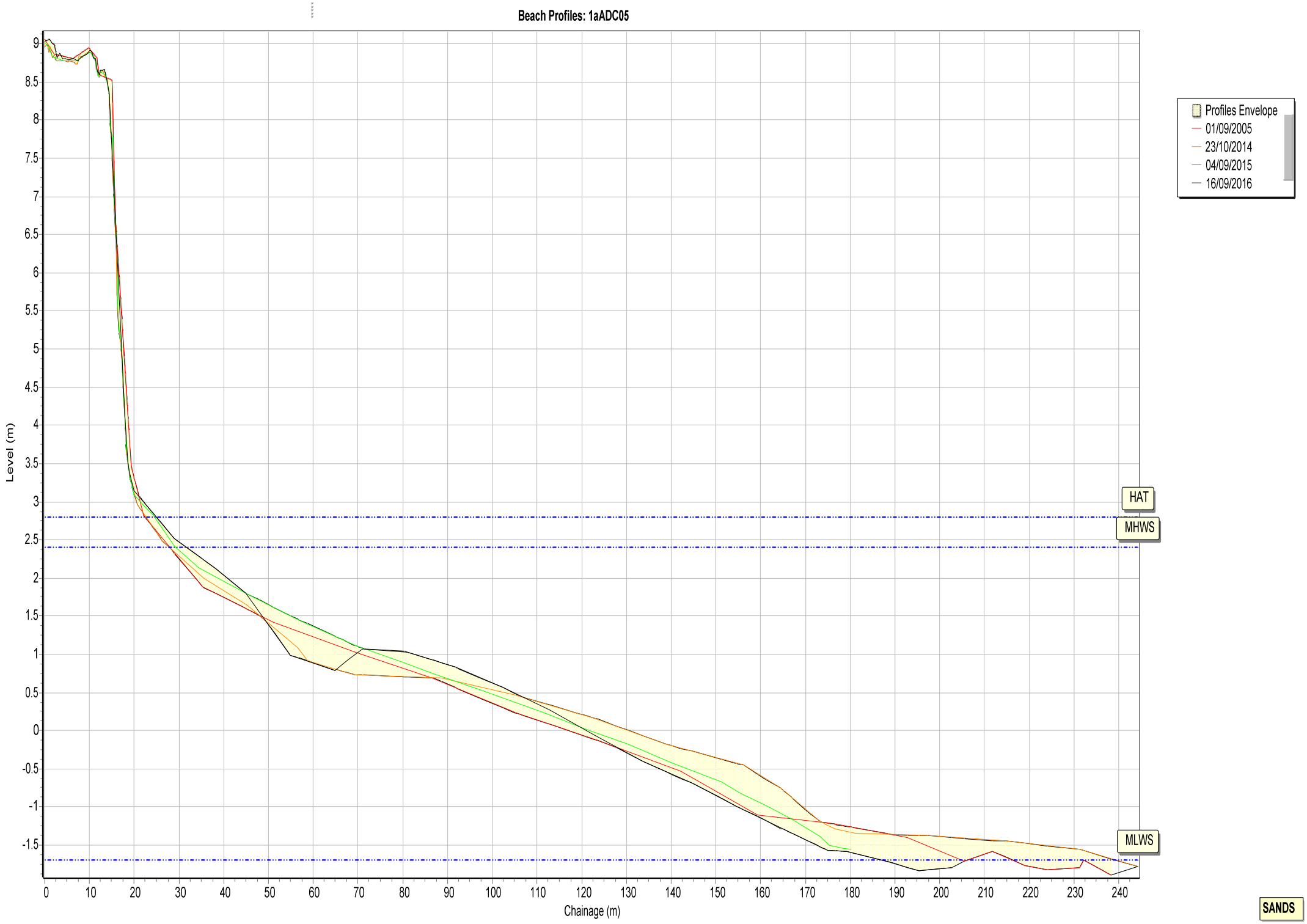
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04/09/2015
16/09/2016
HAT
MHWS
MLWS
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Level (m)
Chainage (m)
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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-1
-1.5
0
10
20
30
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130
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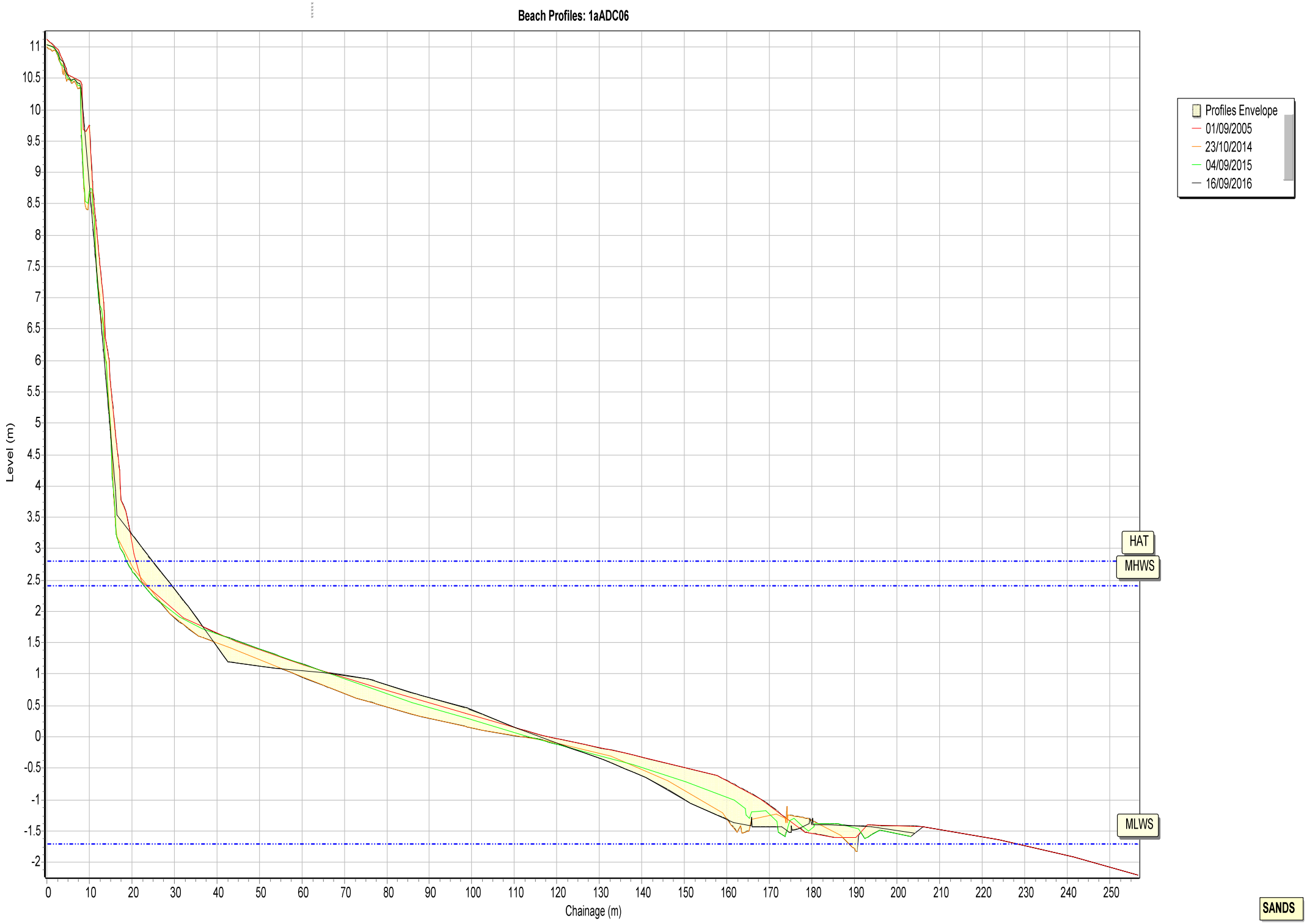
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04/09/2015
16/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
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20
30
40
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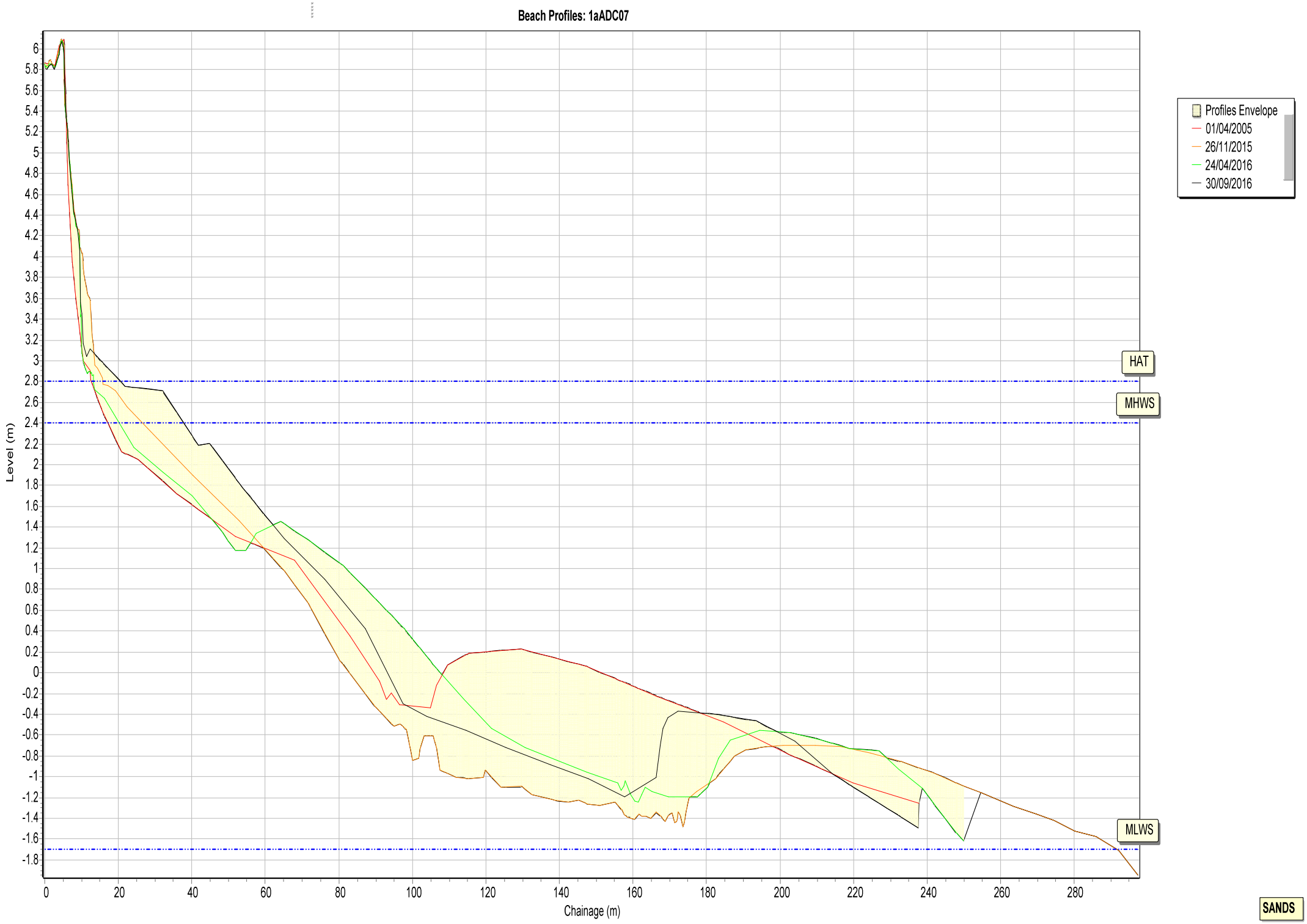
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24/04/2016
30/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
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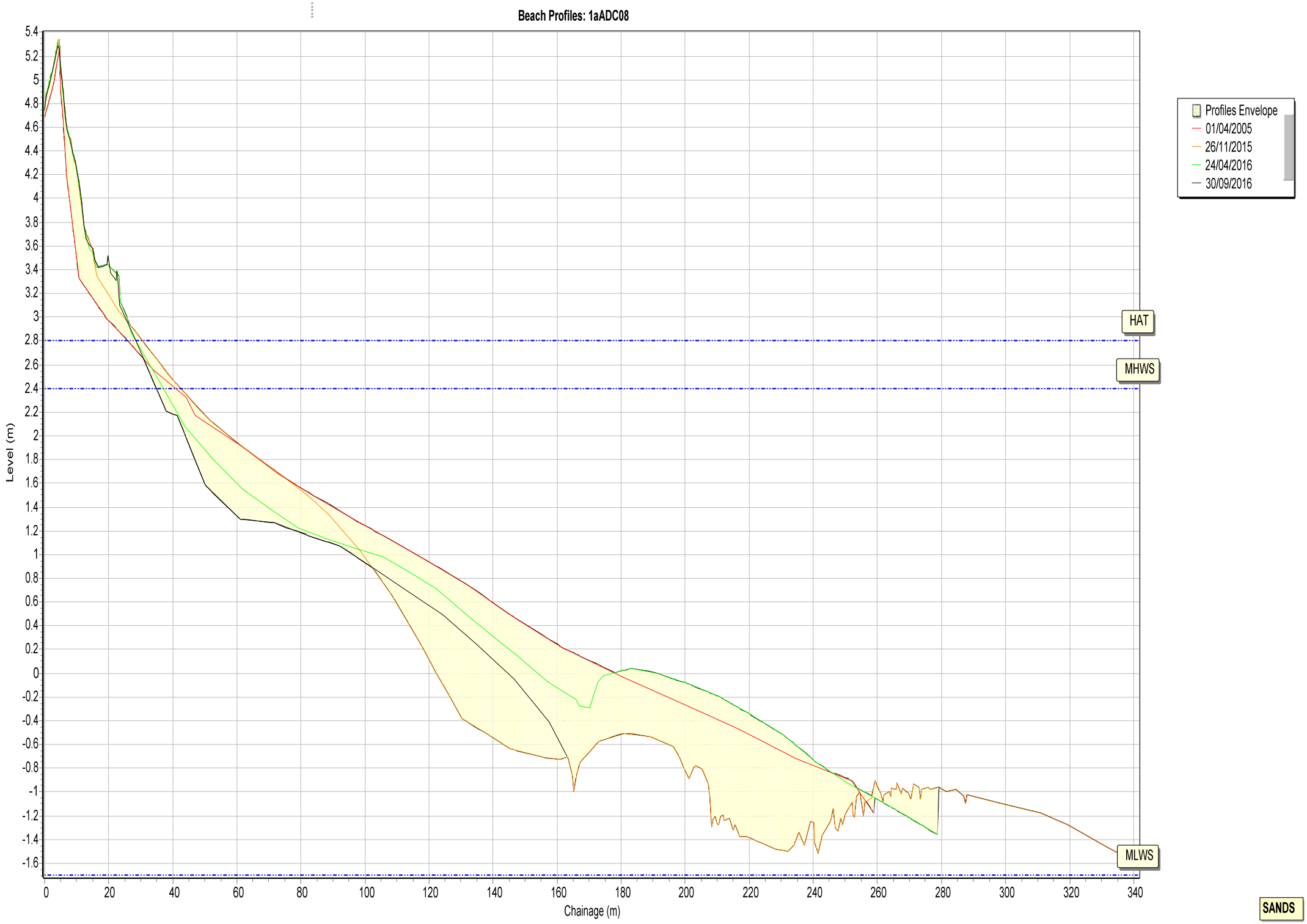
240
260
280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24/04/2016
30/09/2016
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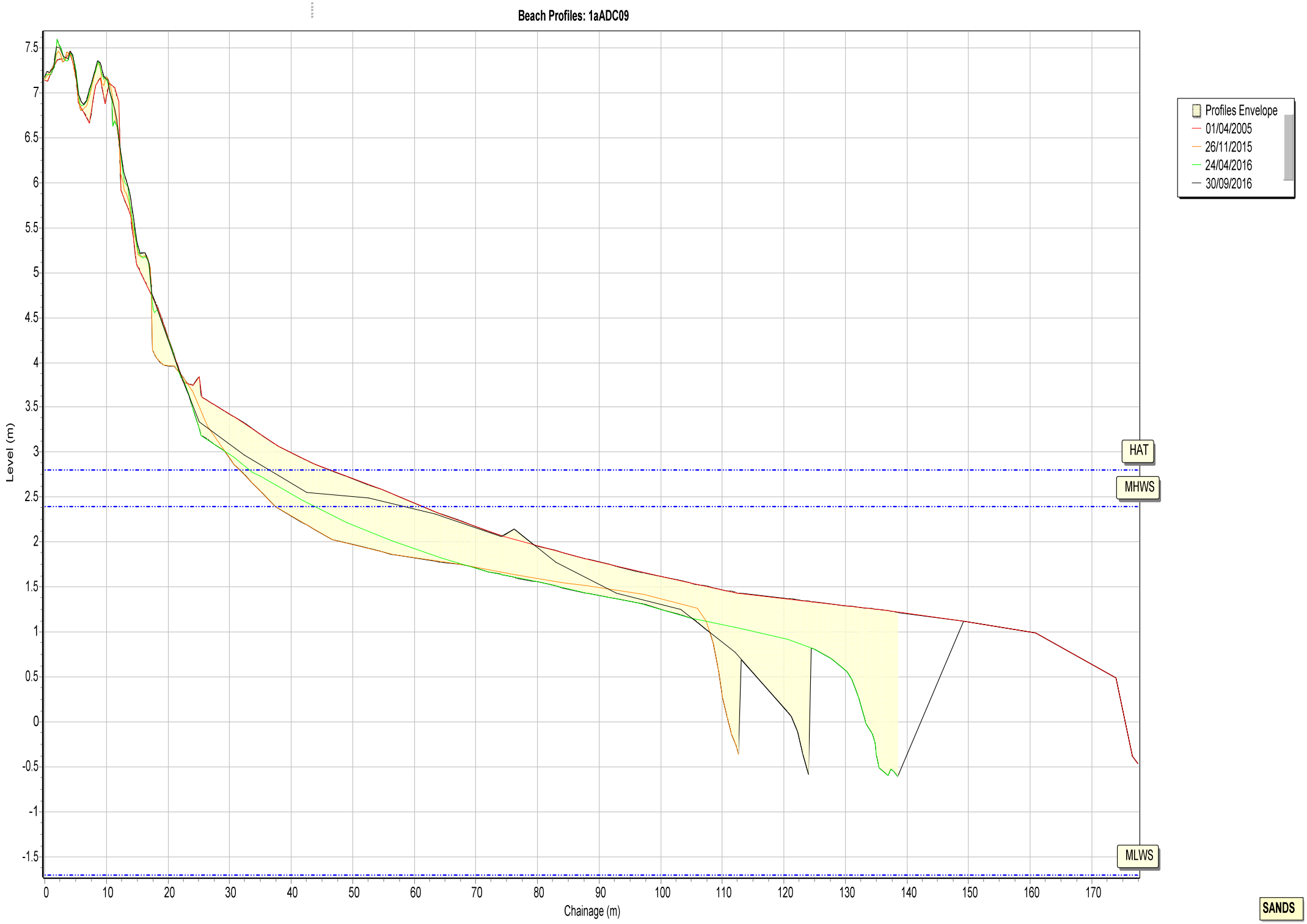
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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24/04/2016
30/09/2016
HAT
MHWS
MLWS
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Chainage (m)
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
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-1
-1.5
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50
60
70
80
90
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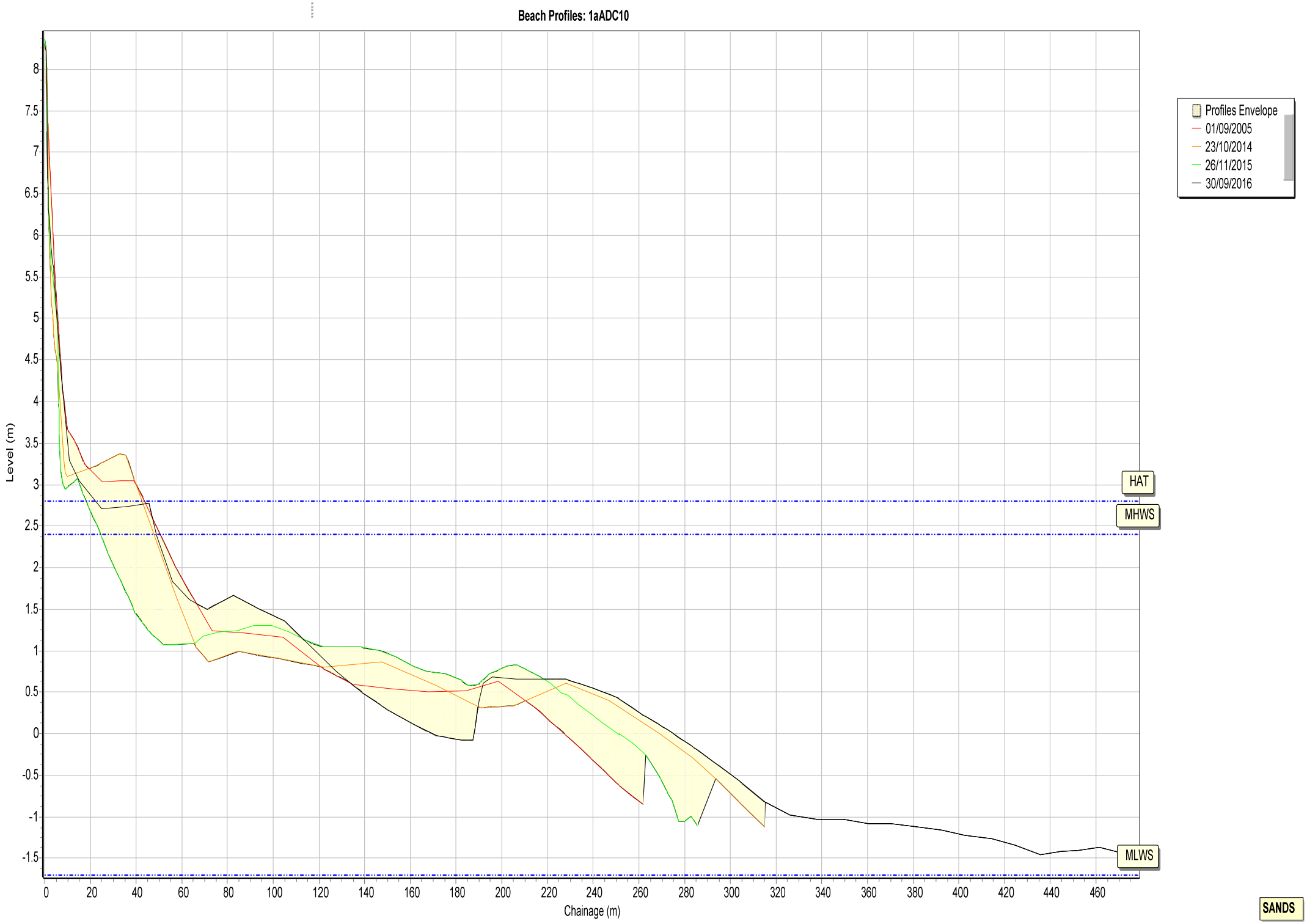
110
120
130
140
150
160
170
SANDS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26/11/2015
30/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
20
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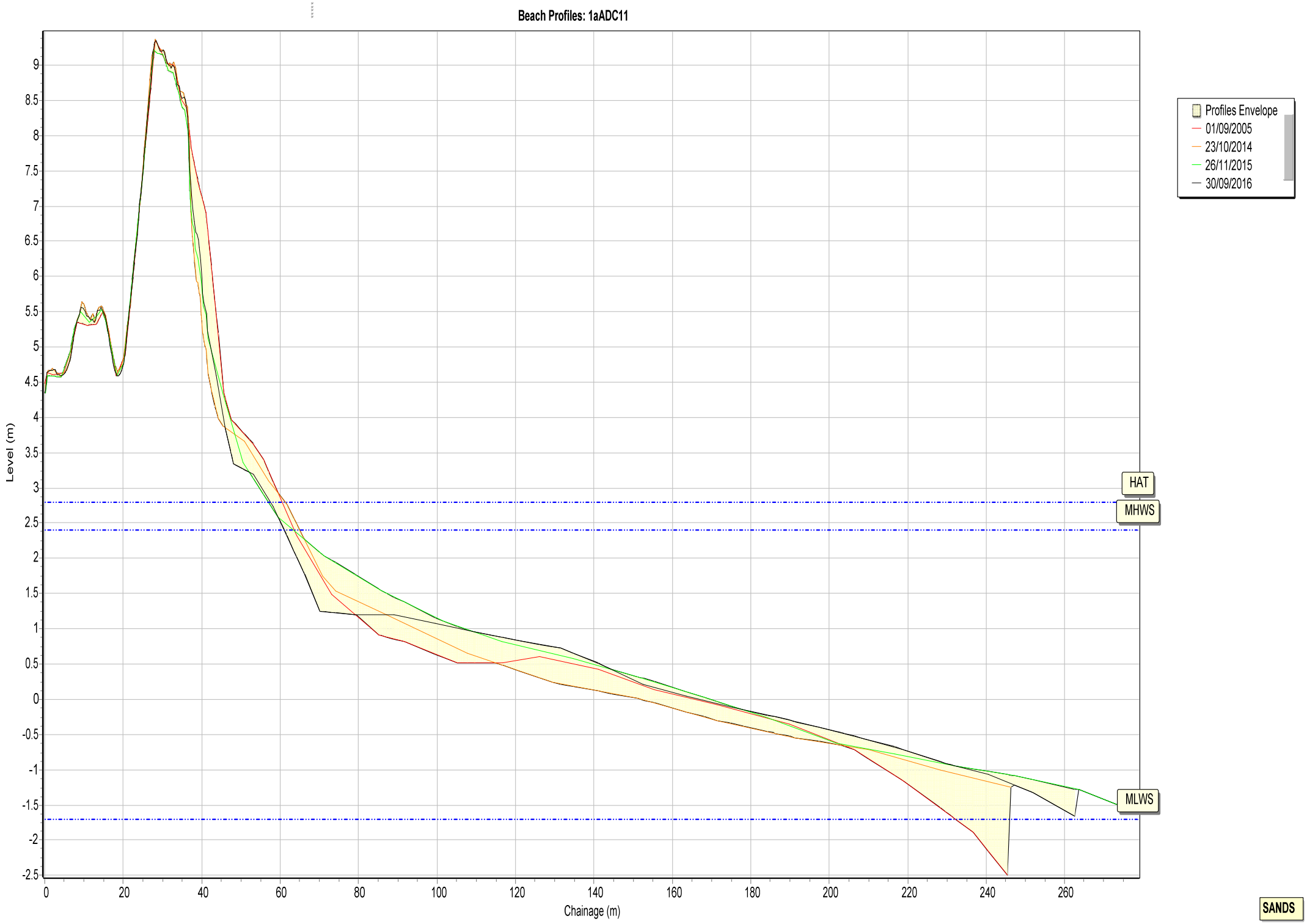
460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26/11/2015
30/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
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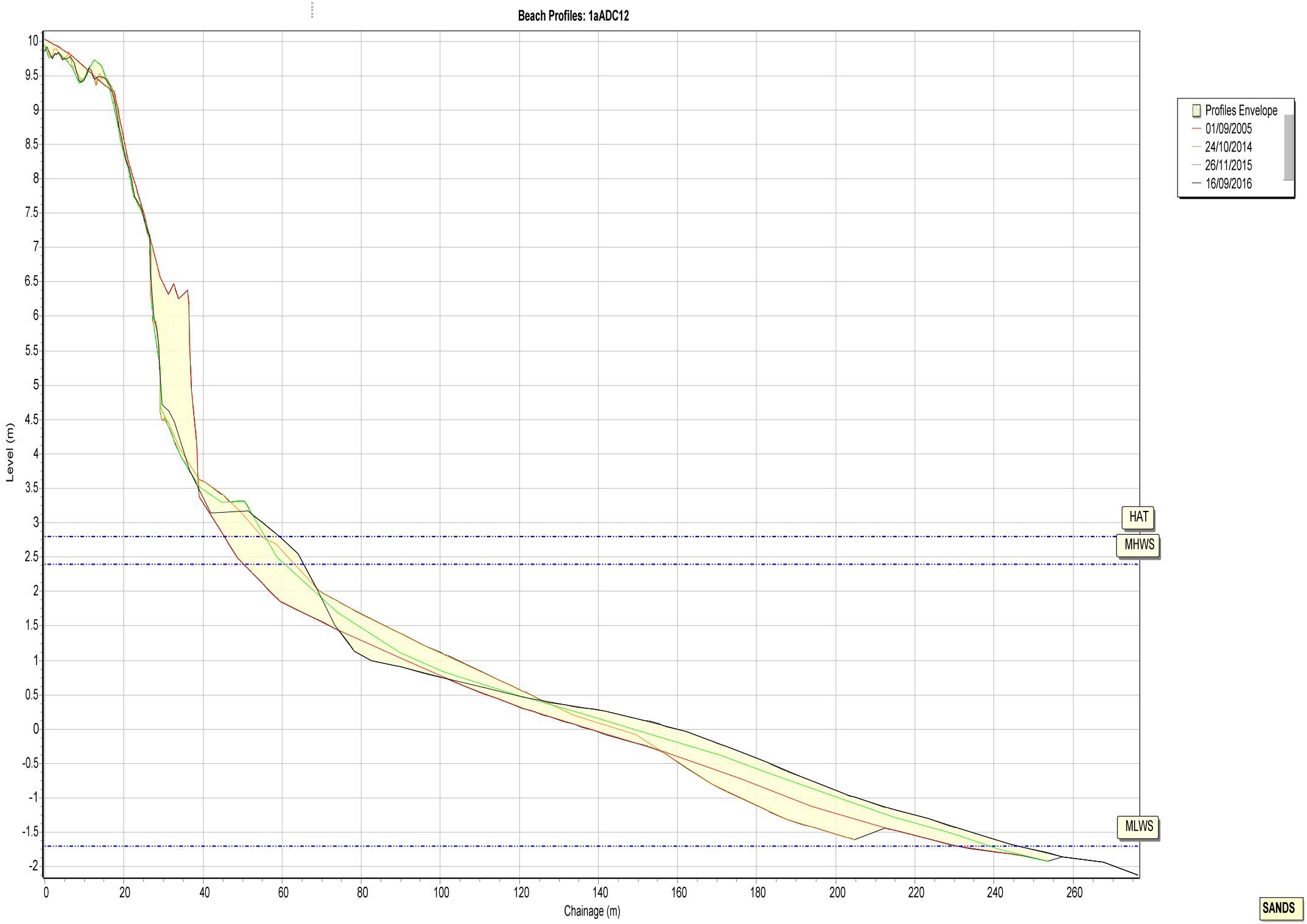
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26/11/2015
16/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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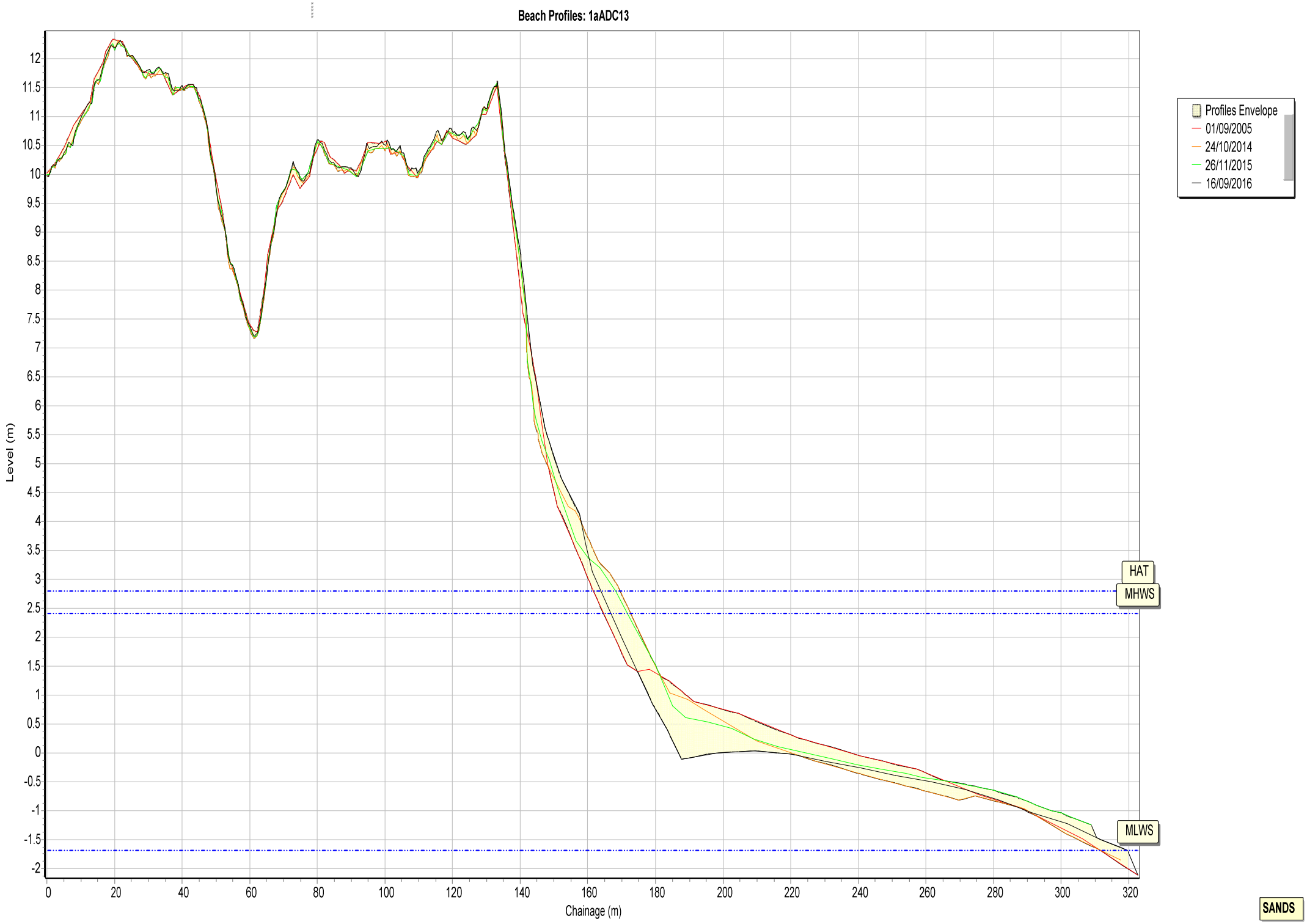
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26/11/2015
16/09/2016
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MHWS
MLWS
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11.5
11
10.5
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9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
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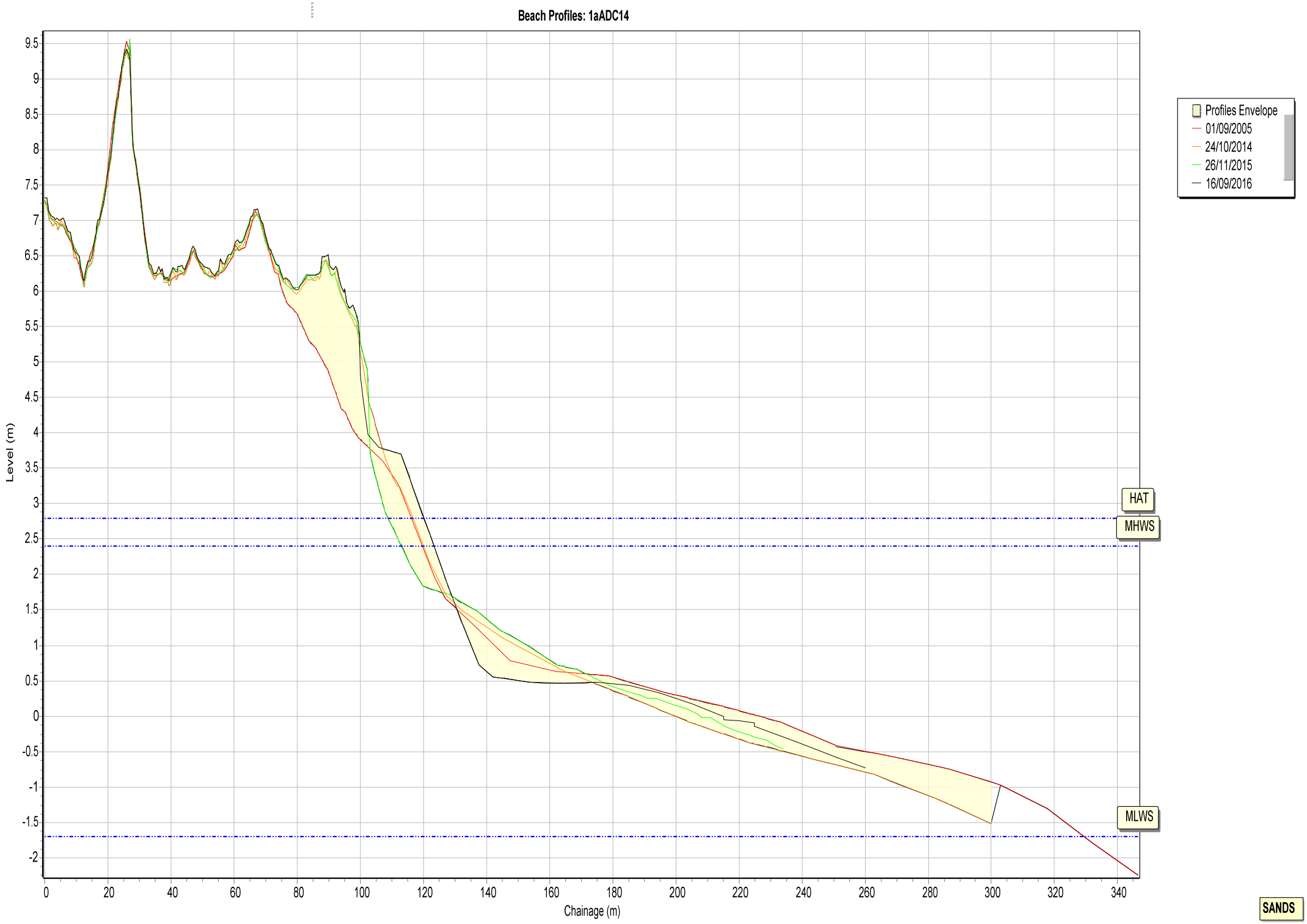
300
320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26/11/2015
16/09/2016
HAT
MHWS
MLWS
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8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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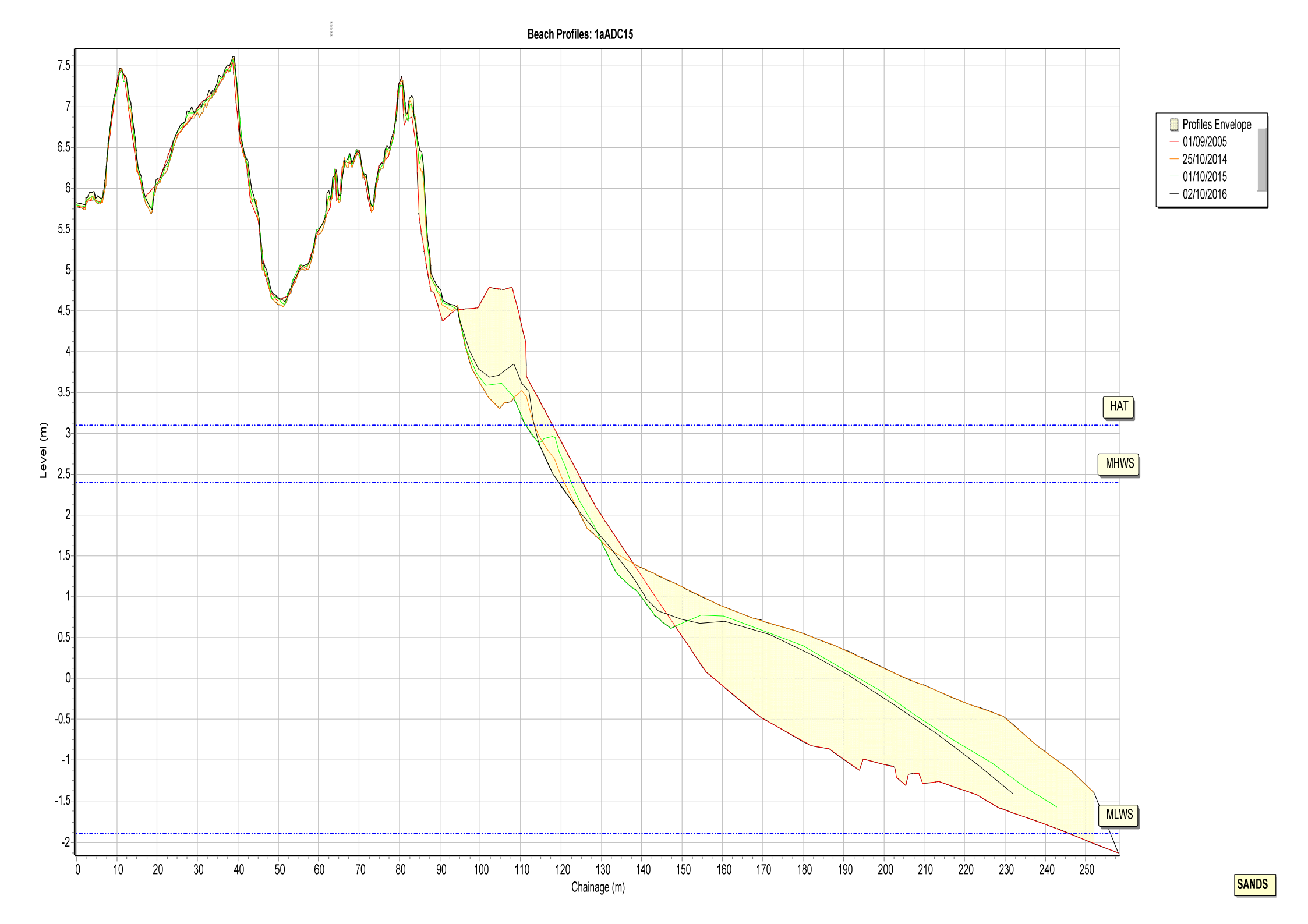
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02/10/2016
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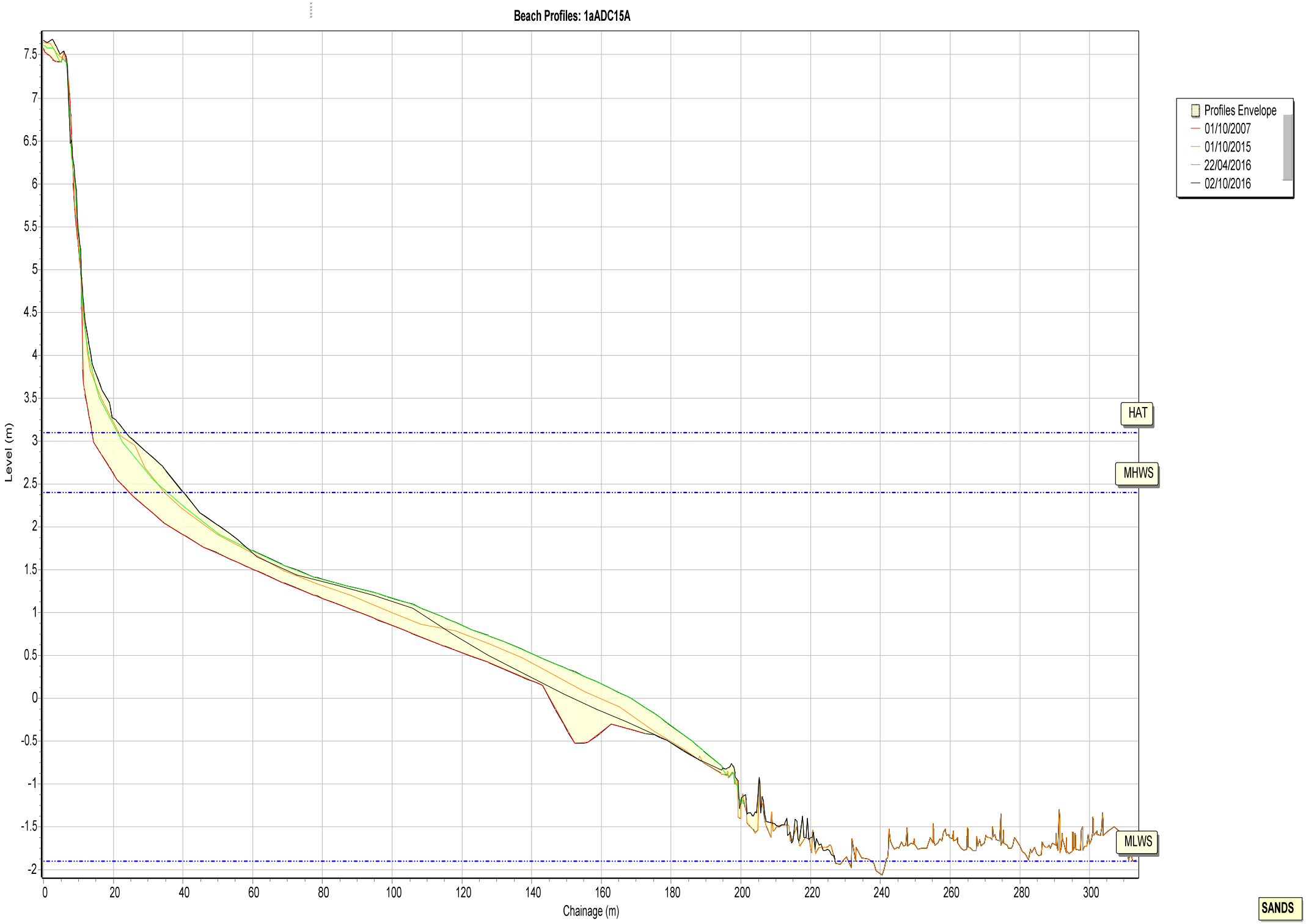
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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02/10/2016
HAT
MHWS
MLWS
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7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
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0.5
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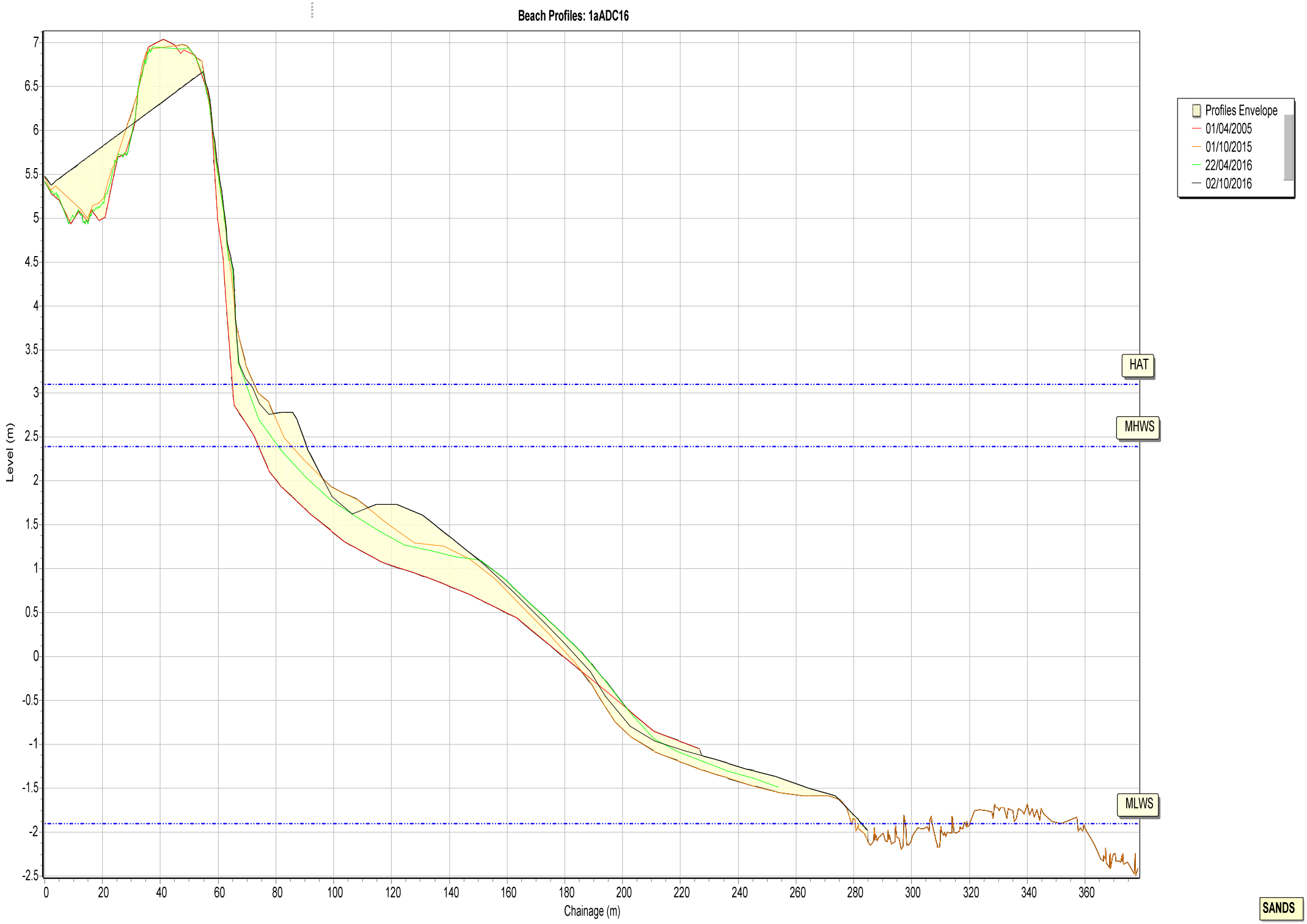
300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6.5
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5.5
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4.5
4
3.5
3
2.5
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1.5
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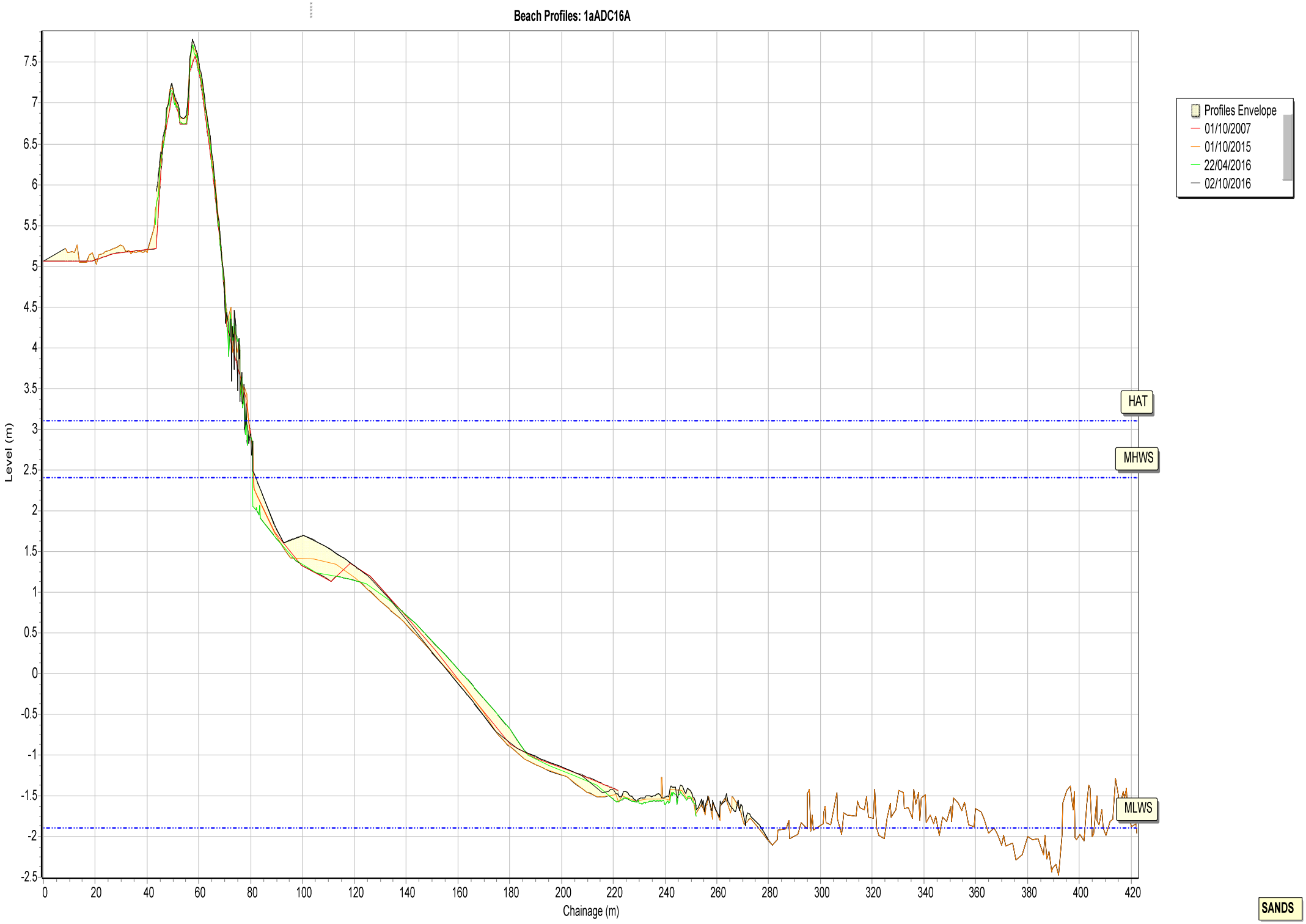
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MHWS
MLWS
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7.5
7
6.5
6
5.5
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4.5
4
3.5
3
2.5
2
1.5
1
0.5
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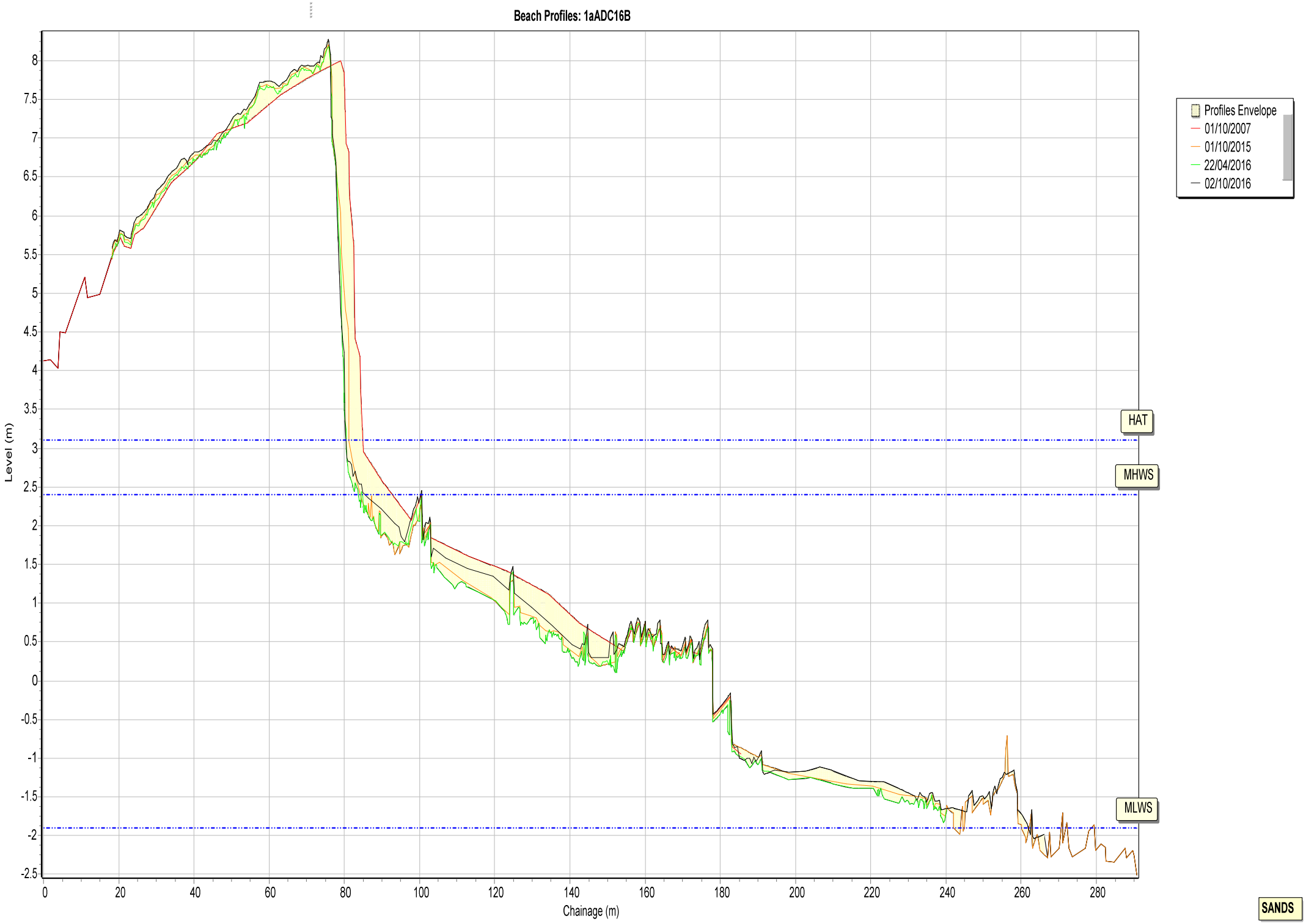
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02/10/2016
HAT
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MLWS
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8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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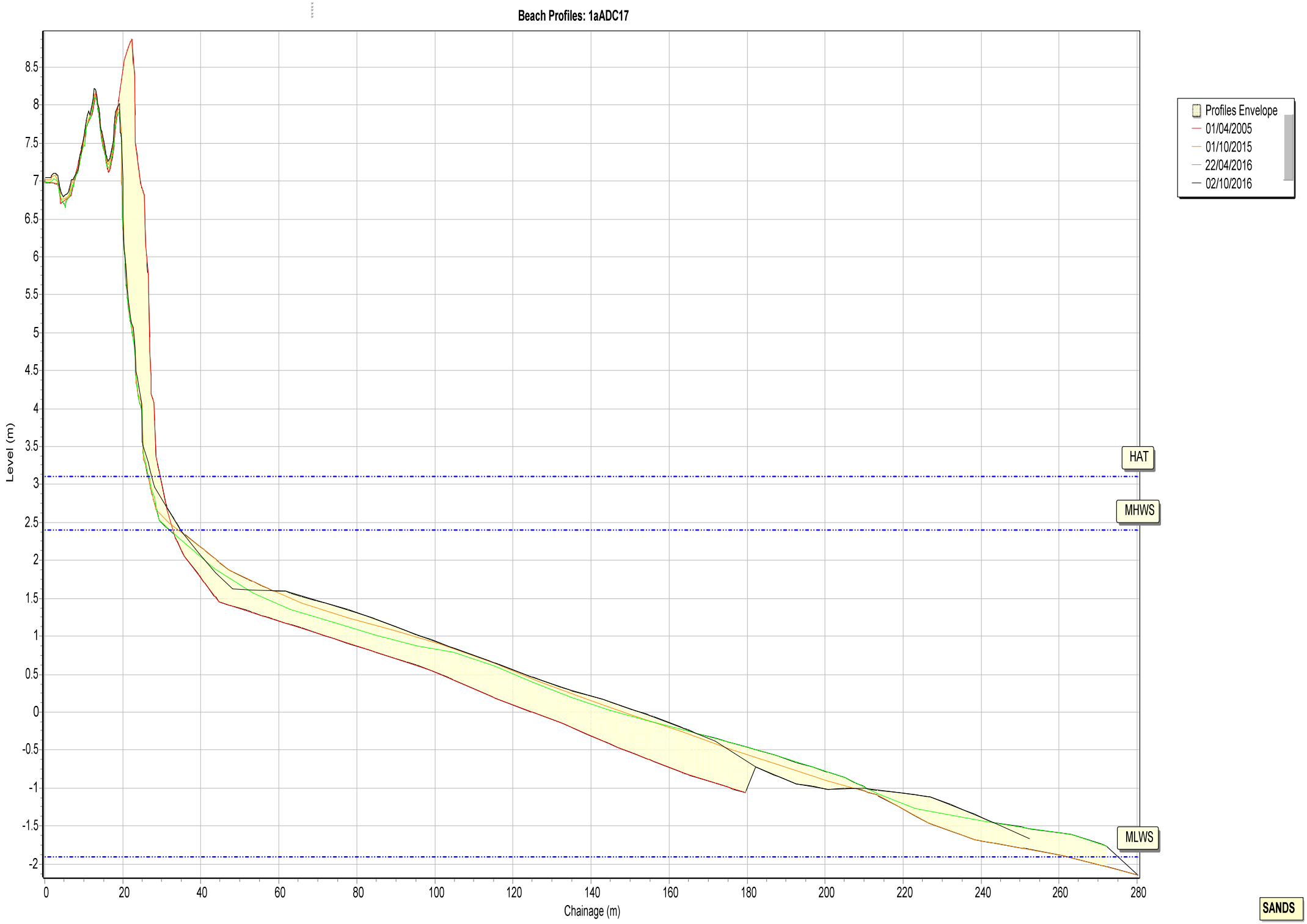
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22/04/2016
02/10/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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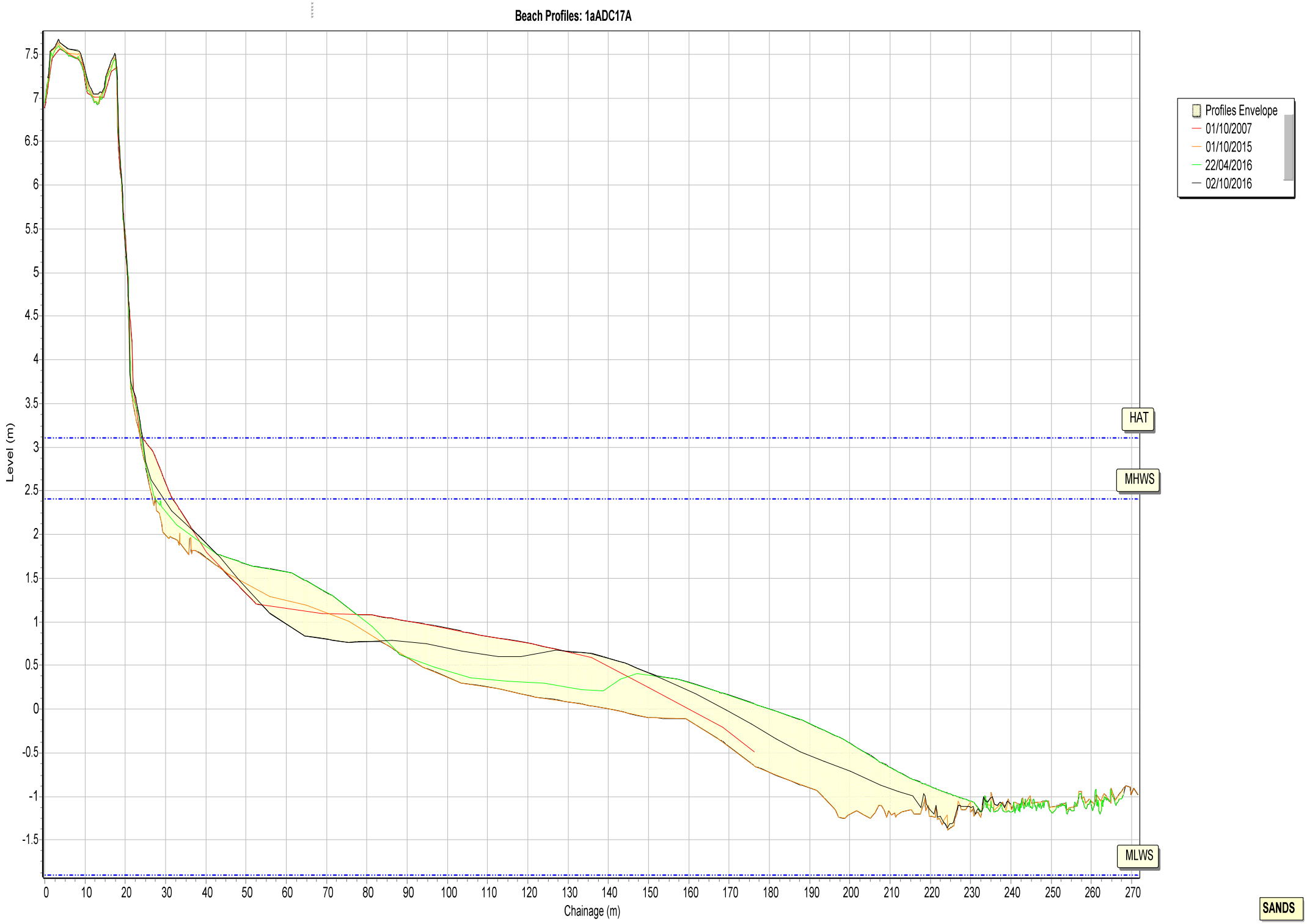
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22/04/2016
02/10/2016
HAT
MHWS
MLWS
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Level (m)
Chainage (m)
7.5
7
6.5
6
5.5
5
4.5
4
3.5
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2.5
2
1.5
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0.5
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-0.5
-1
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260
270


Beach Profiles: 1aCMBC01
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01/10/2015
22/04/2016
30/09/2016
HAT
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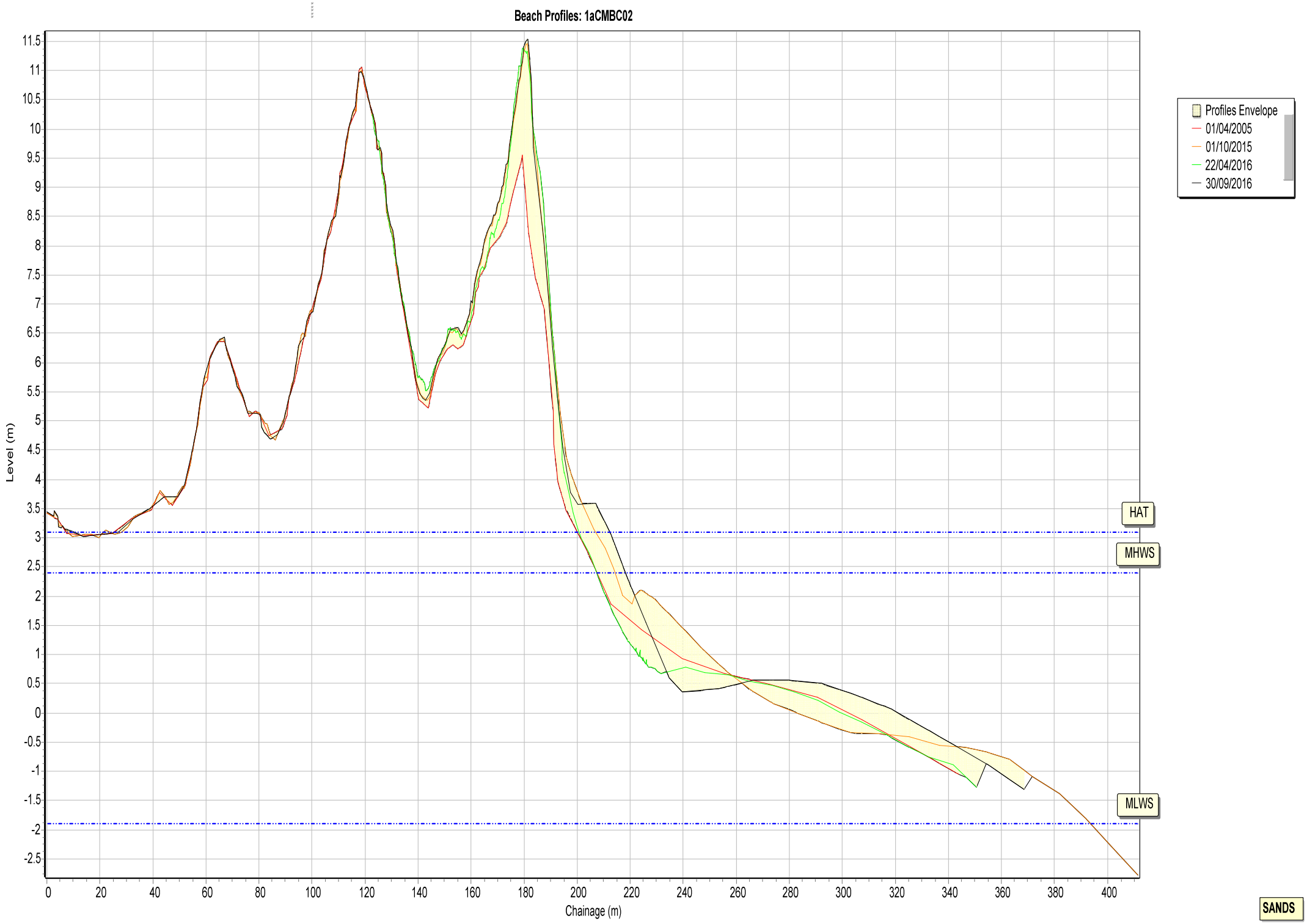
MLWS
Level (m)
Chainage (m)
SANDS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01/10/2015
22/04/2016
30/09/2016
HAT
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MLWS
SANDS
Level (m)
Chainage (m)
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
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0.5
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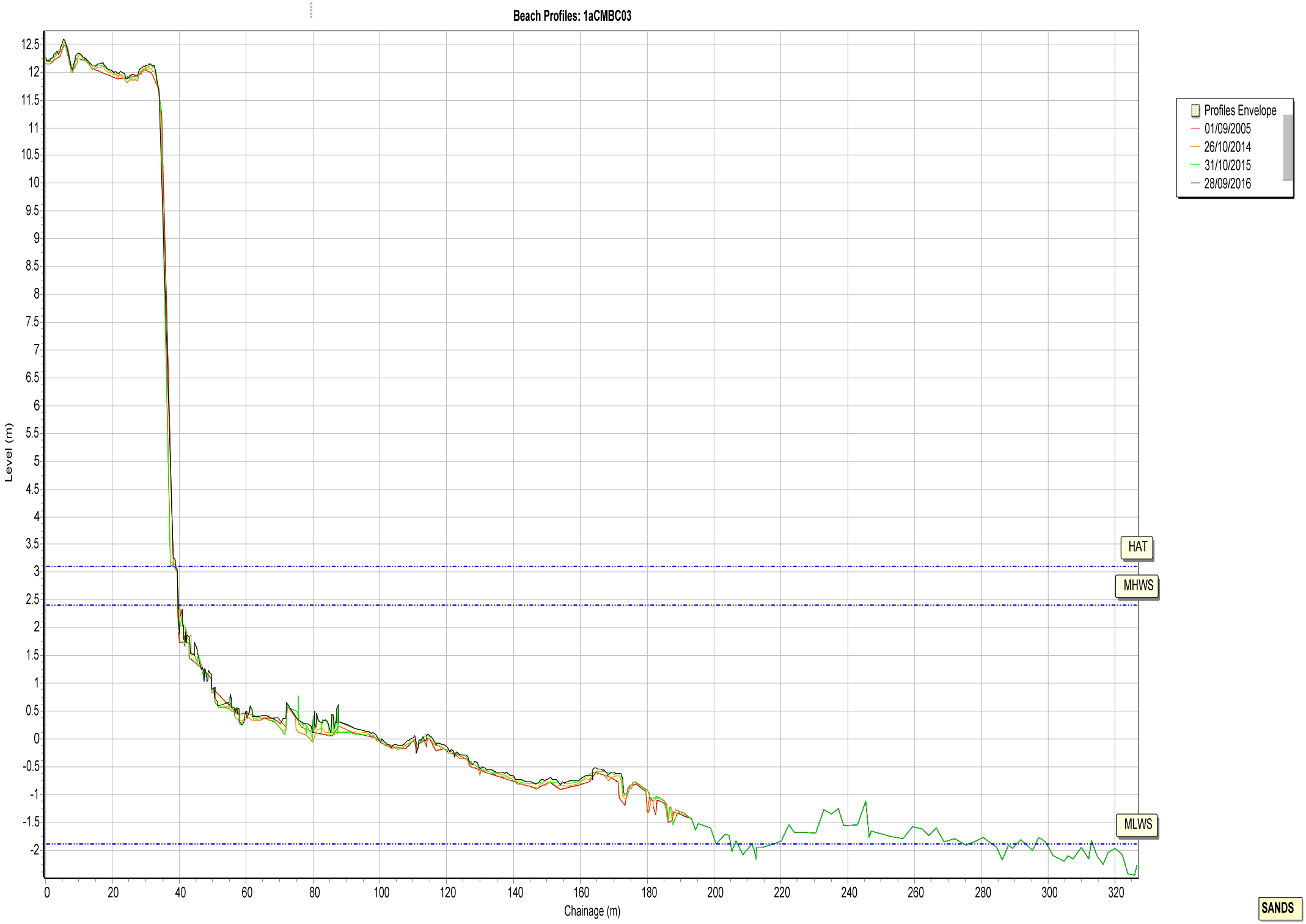
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26/10/2014
31/10/2015
28/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
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3.5
3
2.5
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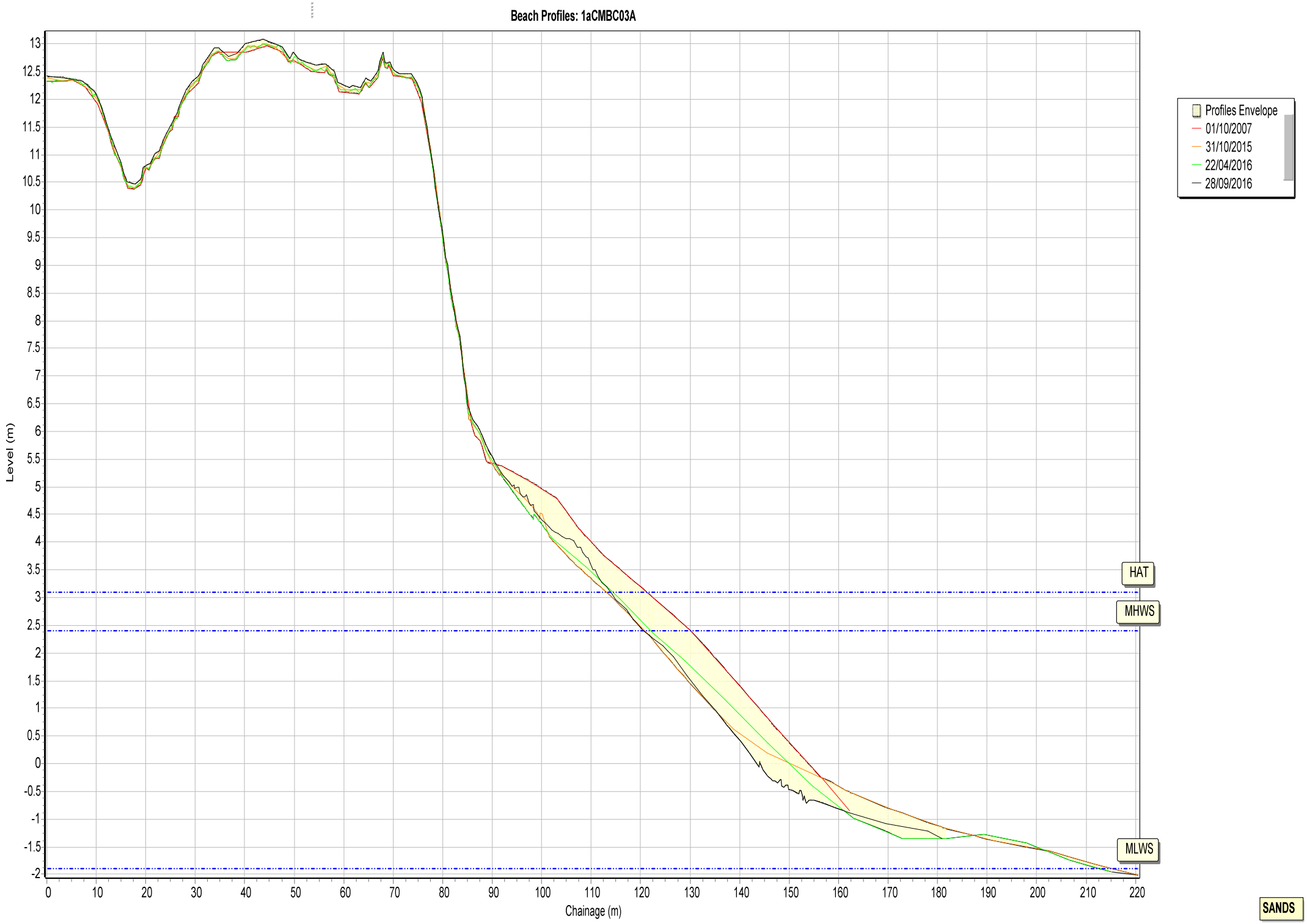
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01/10/2007
31/10/2015
22/04/2016
28/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
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2.5
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1.5
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0.5
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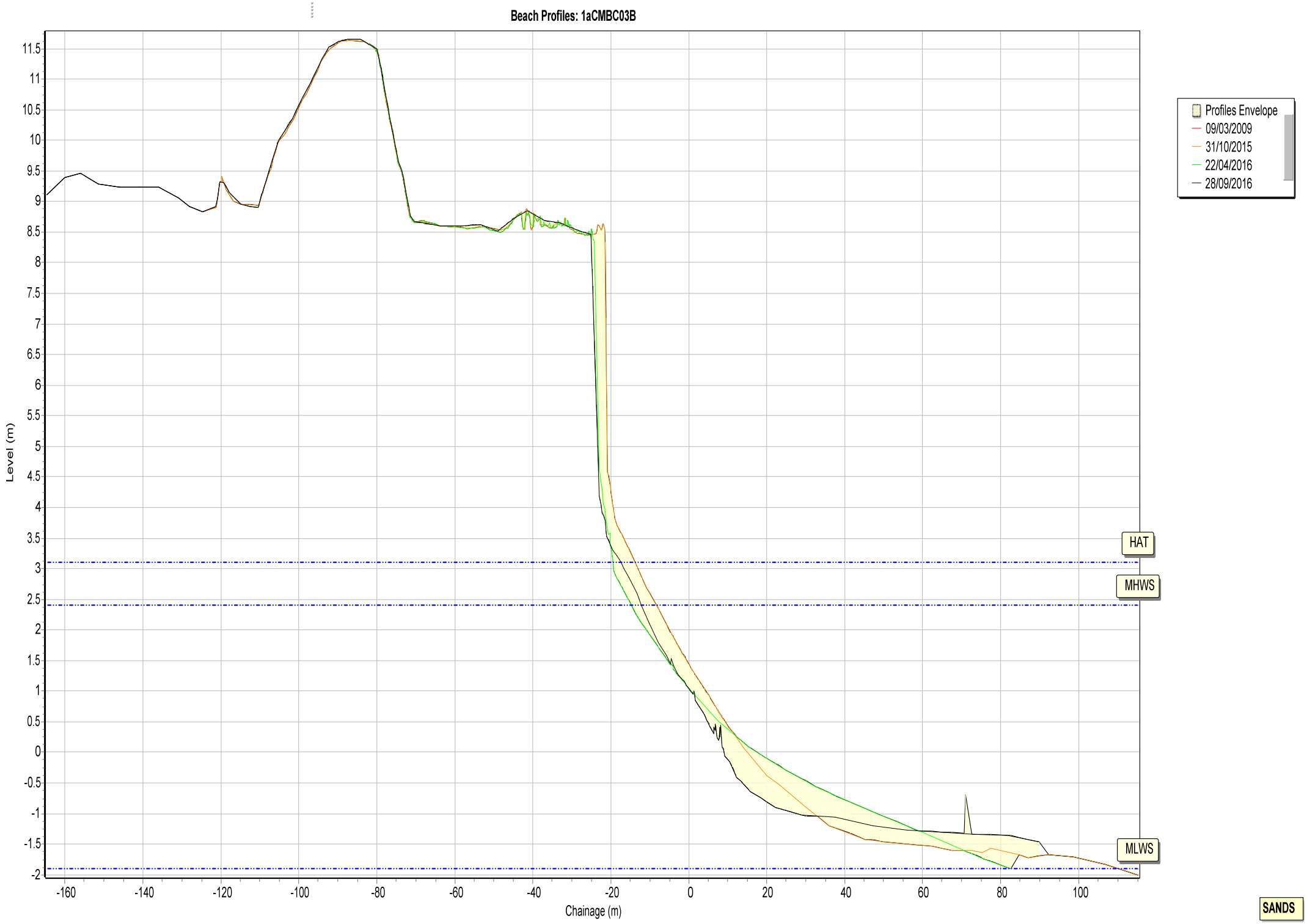
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09/03/2009
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28/09/2016
HAT
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MLWS
SANDS
Level (m)
Chainage (m)
11.5
11
10.5
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9.5
9
8.5
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7.5
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6.5
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5.5
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4.5
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3.5
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2.5
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1.5
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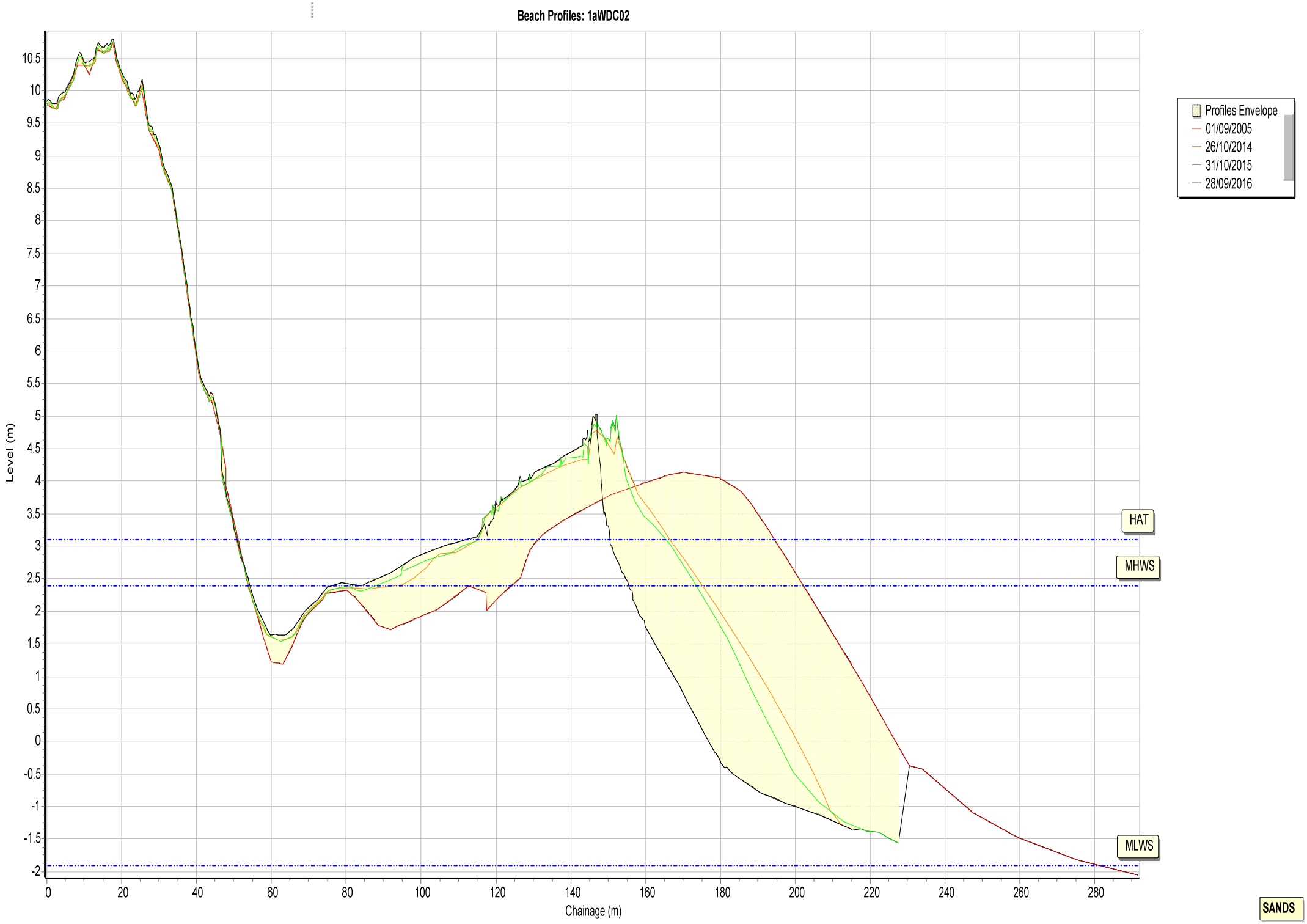
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26/10/2014
31/10/2015
28/09/2016
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MHWS
MLWS
SANDS
Level (m)
Chainage (m)
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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-2
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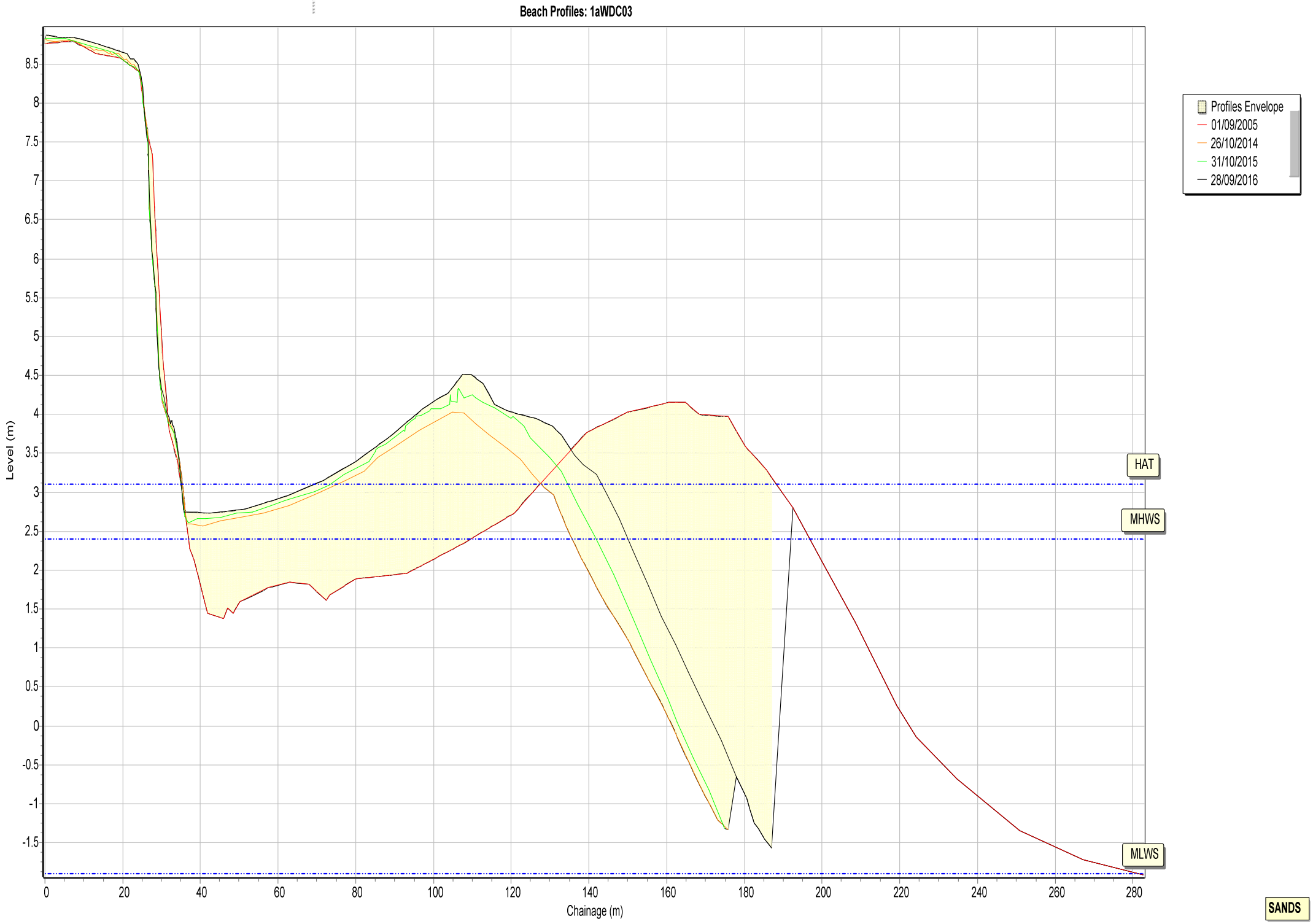
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31/10/2015
28/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
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-1
-1.5
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180
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260
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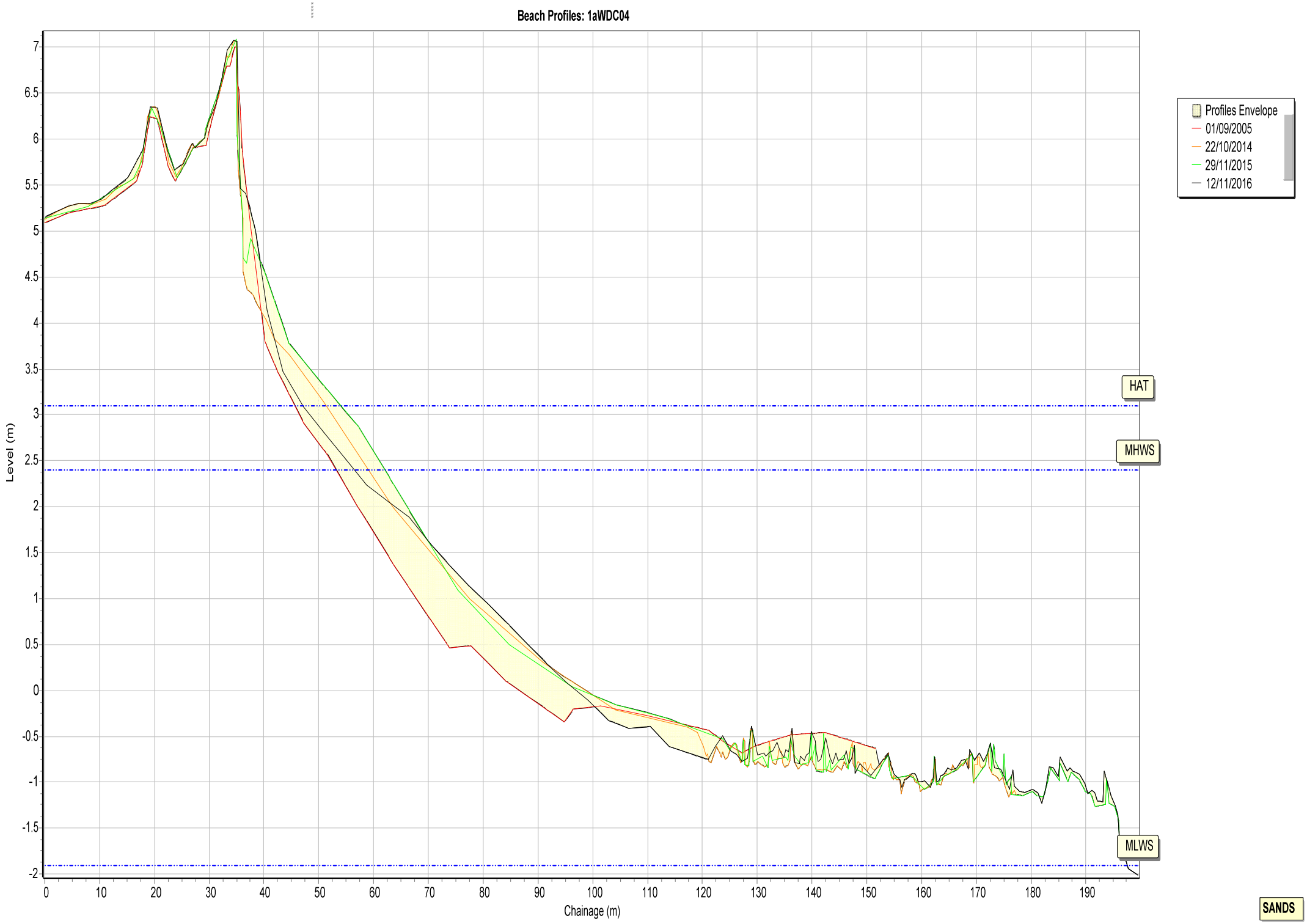
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22/10/2014
29/11/2015
12/11/2016
HAT
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MLWS
SANDS
Level (m)
Chainage (m)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
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50
60
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80
90
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120
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180
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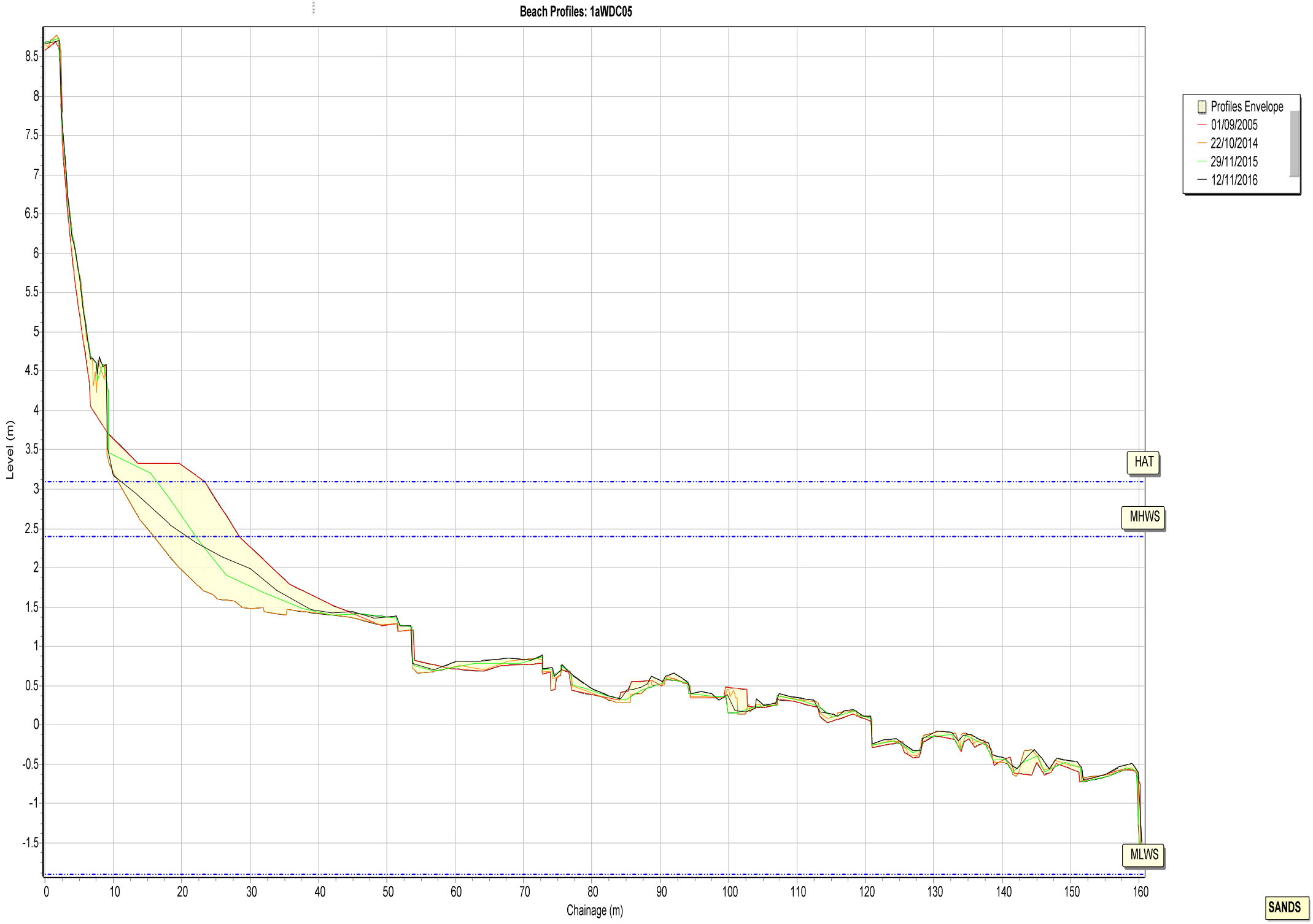
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01/09/2005
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29/11/2015
12/11/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
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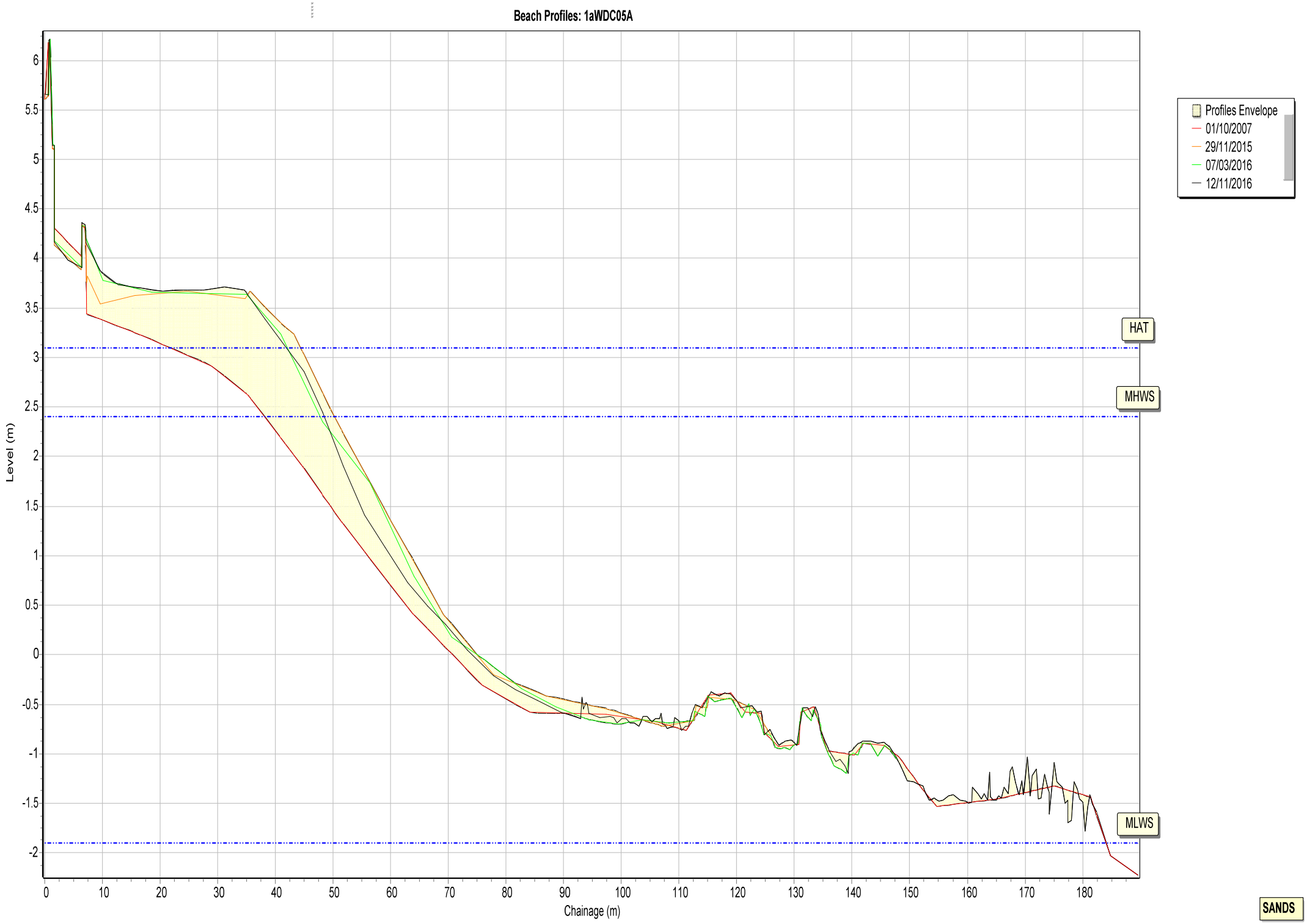
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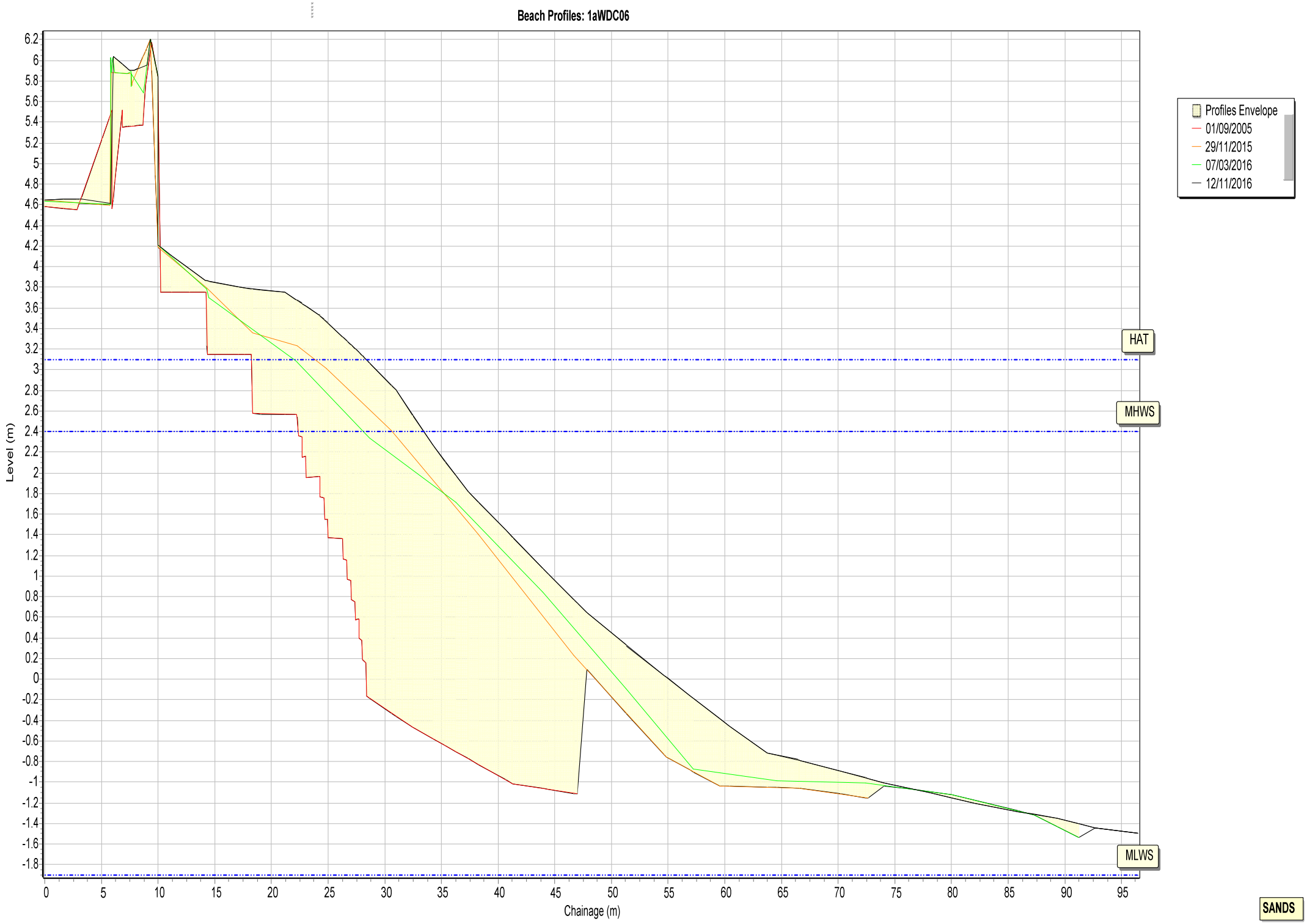
07/03/2016
12/11/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS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Profiles Envelope
01/09/2005
29/11/2015
07/03/2016
12/11/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
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25
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35
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60
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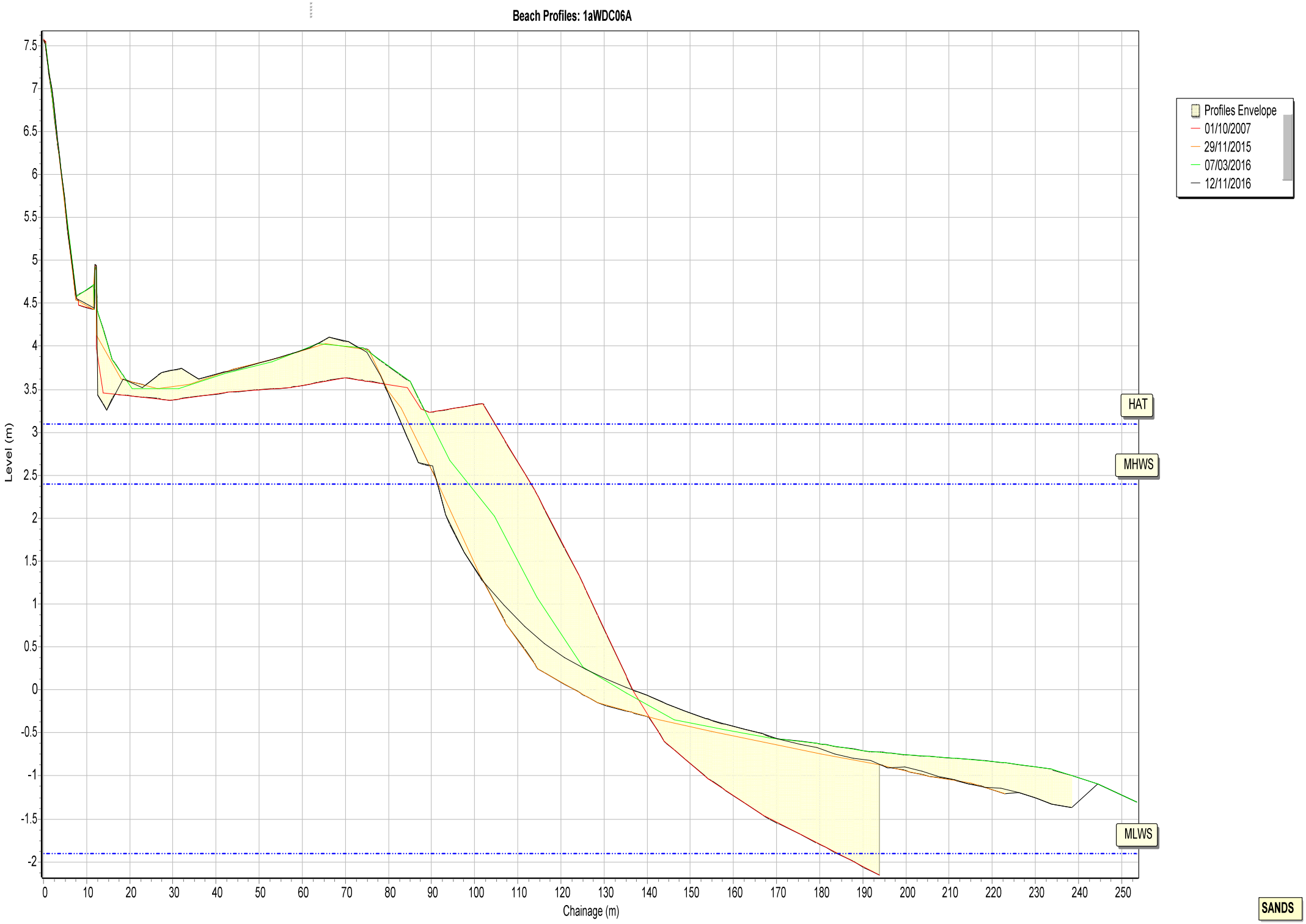
75
80
85
90
95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Profiles Envelope
01/10/2007
29/11/2015
07/03/2016
12/11/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
70
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100
110
120
130
140
150
160
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180
190
200
210
220
230
240
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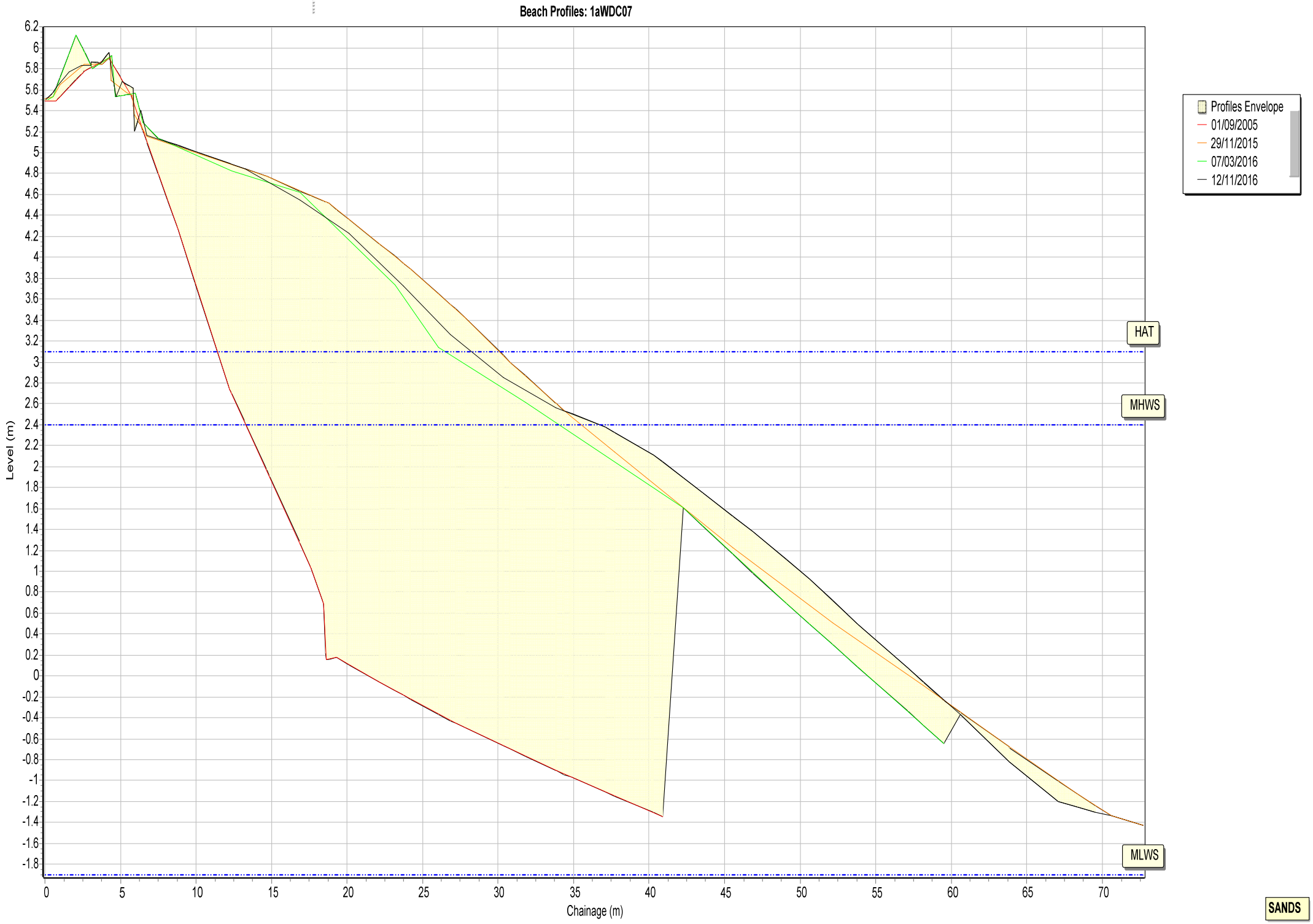
Beach Profiles: 1aWDC07
Profiles Envelope
01/09/2005
29/11/2015
07/03/2016
12/11/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
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5
10
15
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35
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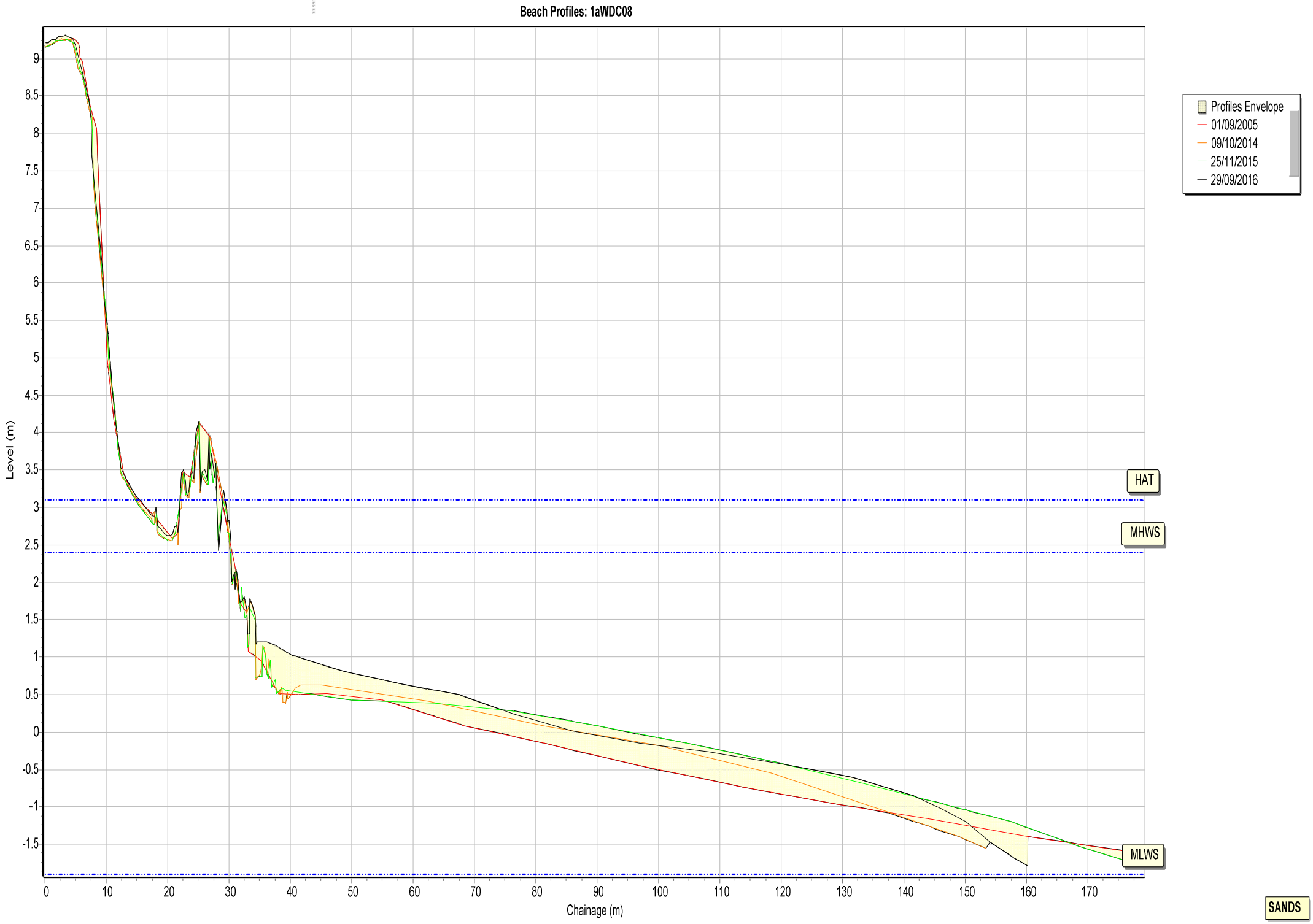
55
60
65
70


Beach Profiles: 1aWDC08
Profiles Envelope
01/09/2005
09/10/2014
25/11/2015
29/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
10
20
30
40
50
60
70
80
90
100
110
120
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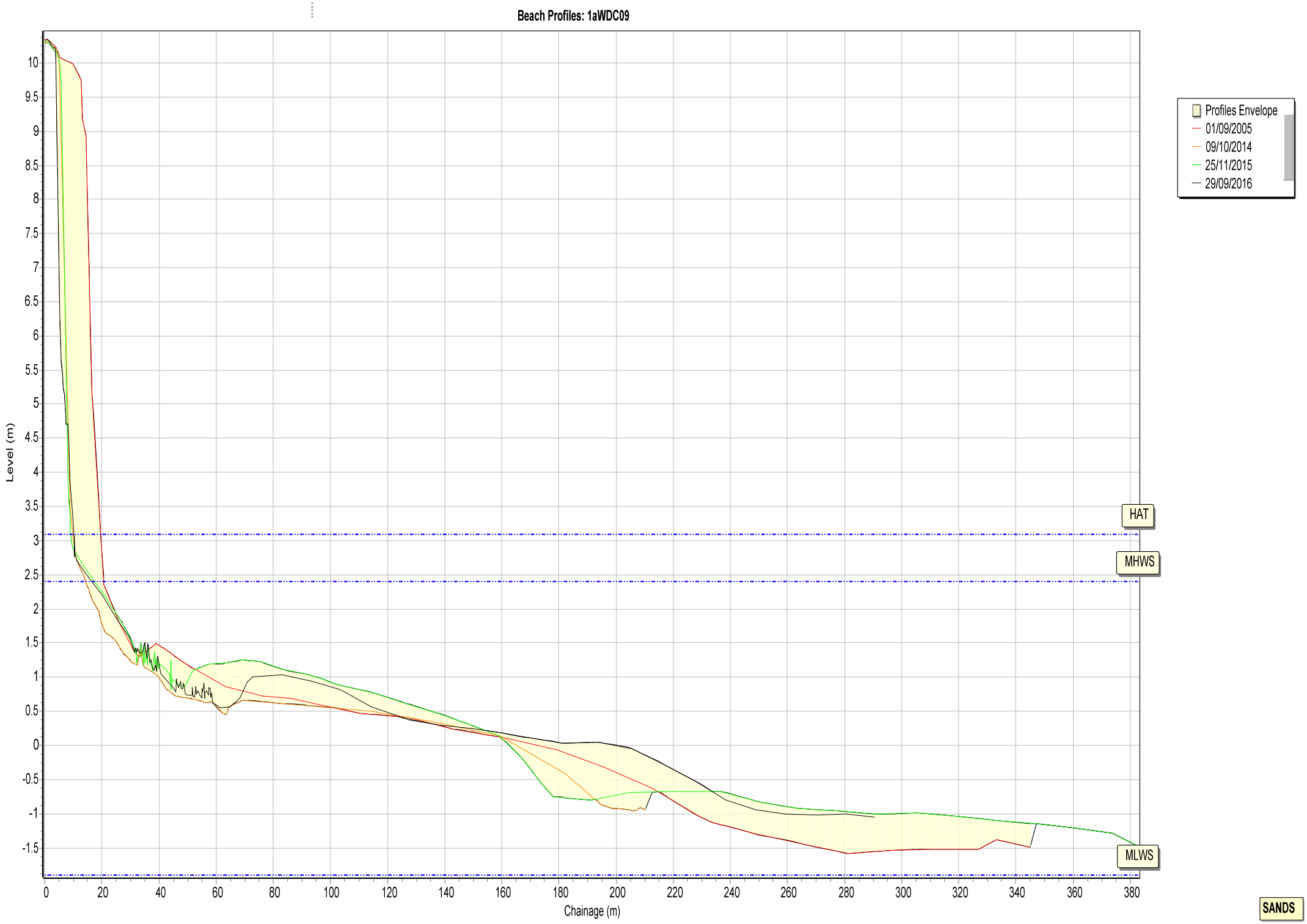
140
150
160
170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Profiles Envelope
01/09/2005
09/10/2014
25/11/2015
29/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
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80
100
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140
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200
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320
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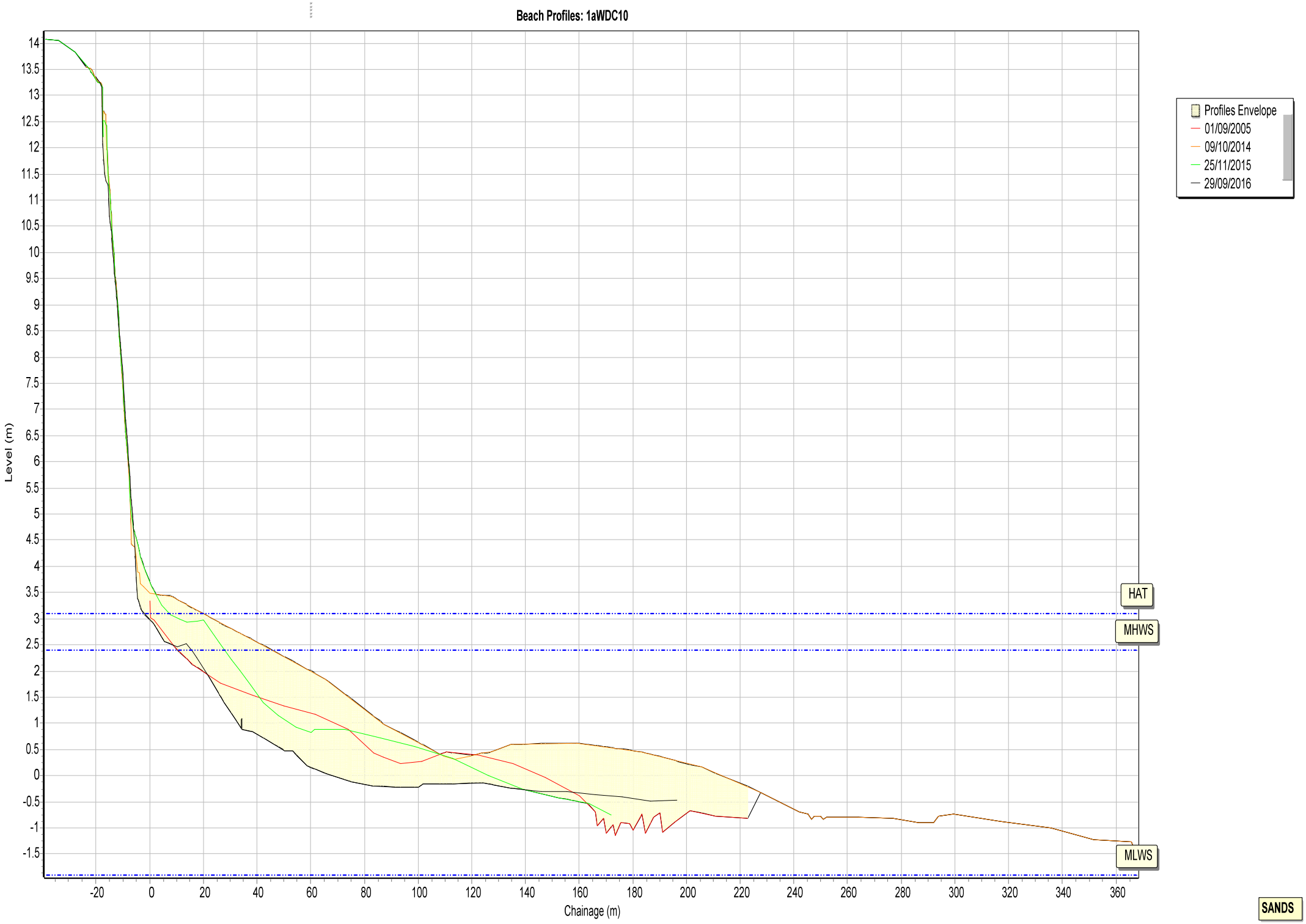
380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Profiles Envelope
01/09/2005
09/10/2014
25/11/2015
29/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
14
13.5
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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-1
-1.5
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340
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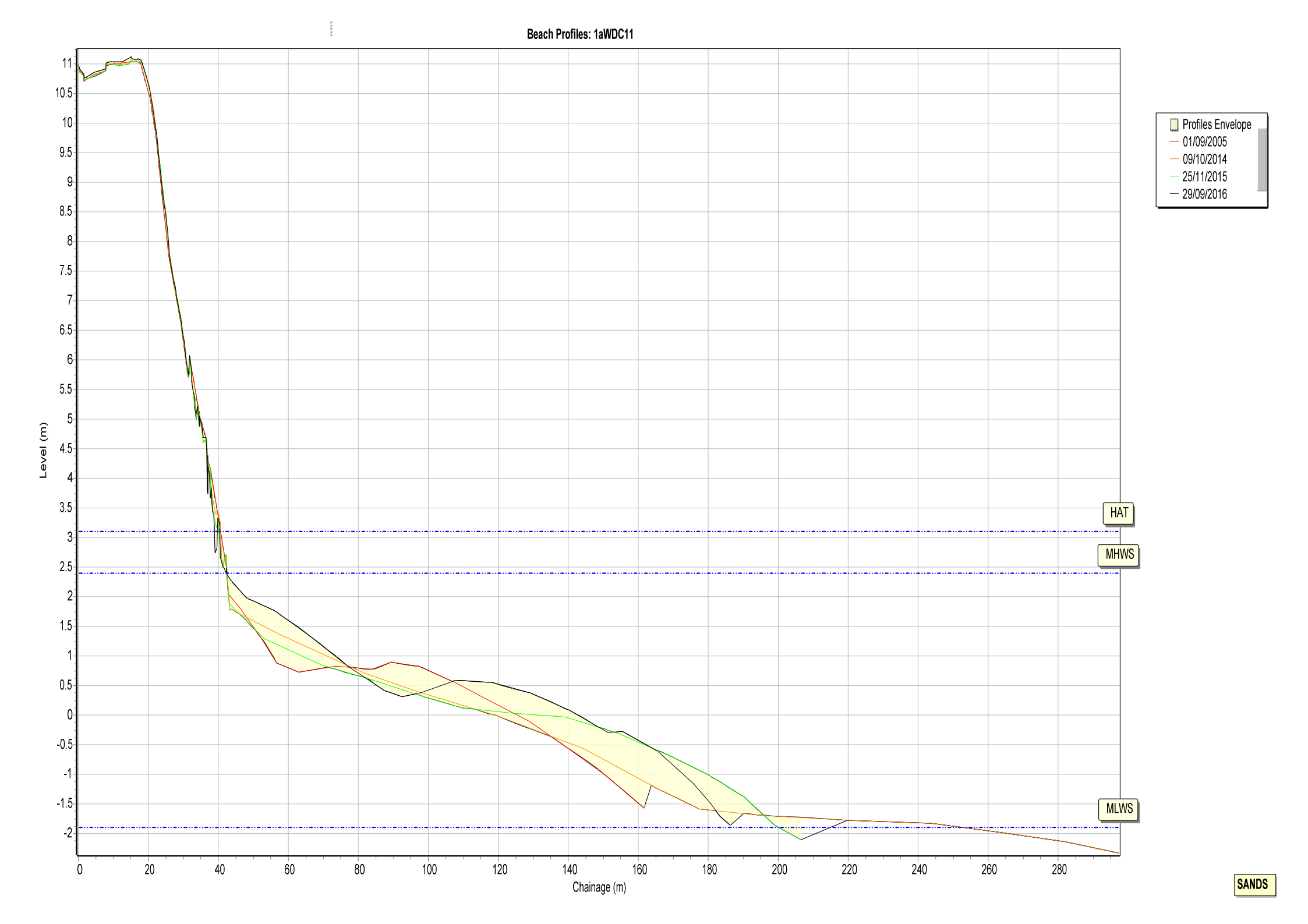
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09/10/2014
25/11/2015
29/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
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-2
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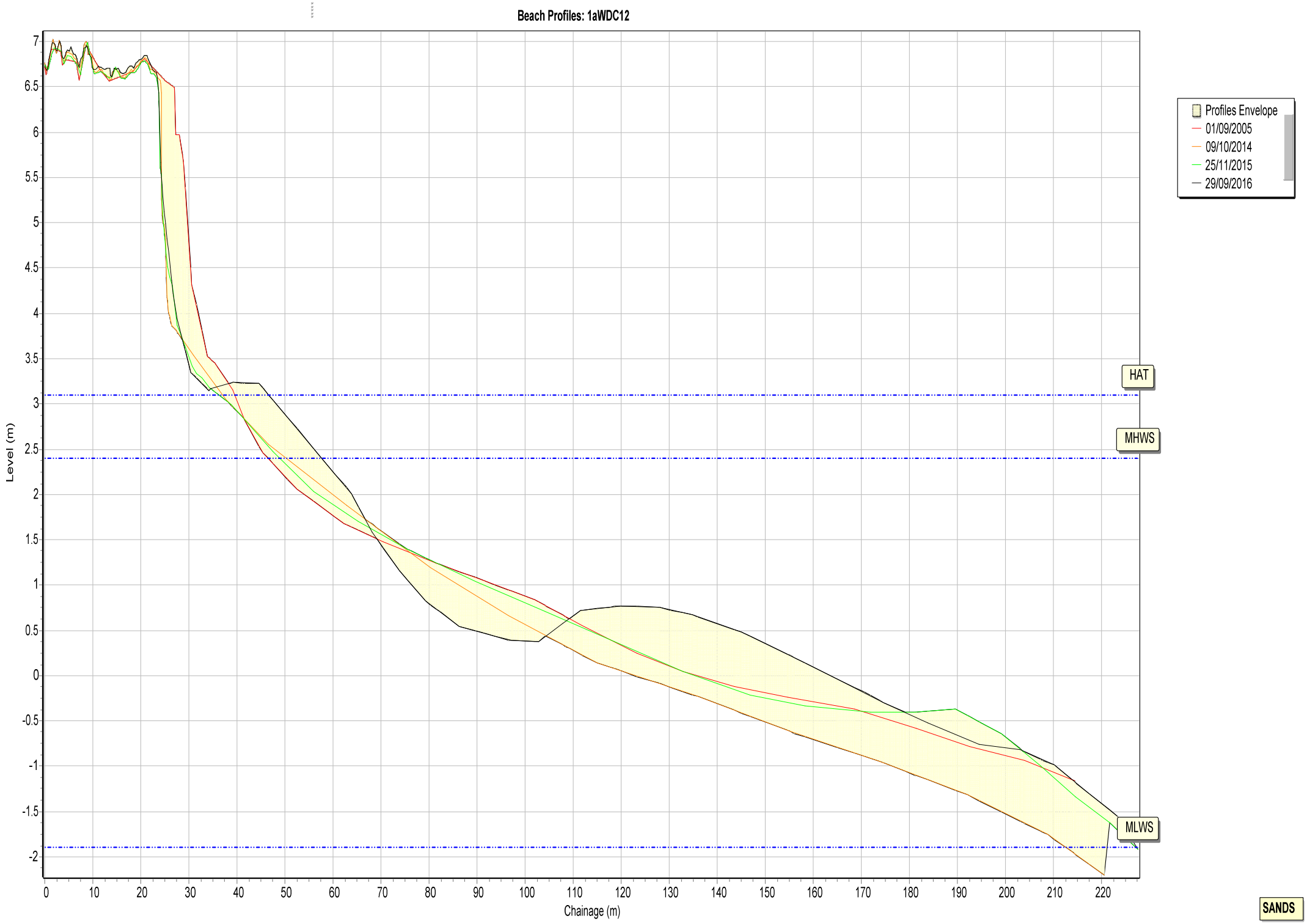
280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09/10/2014
25/11/2015
29/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
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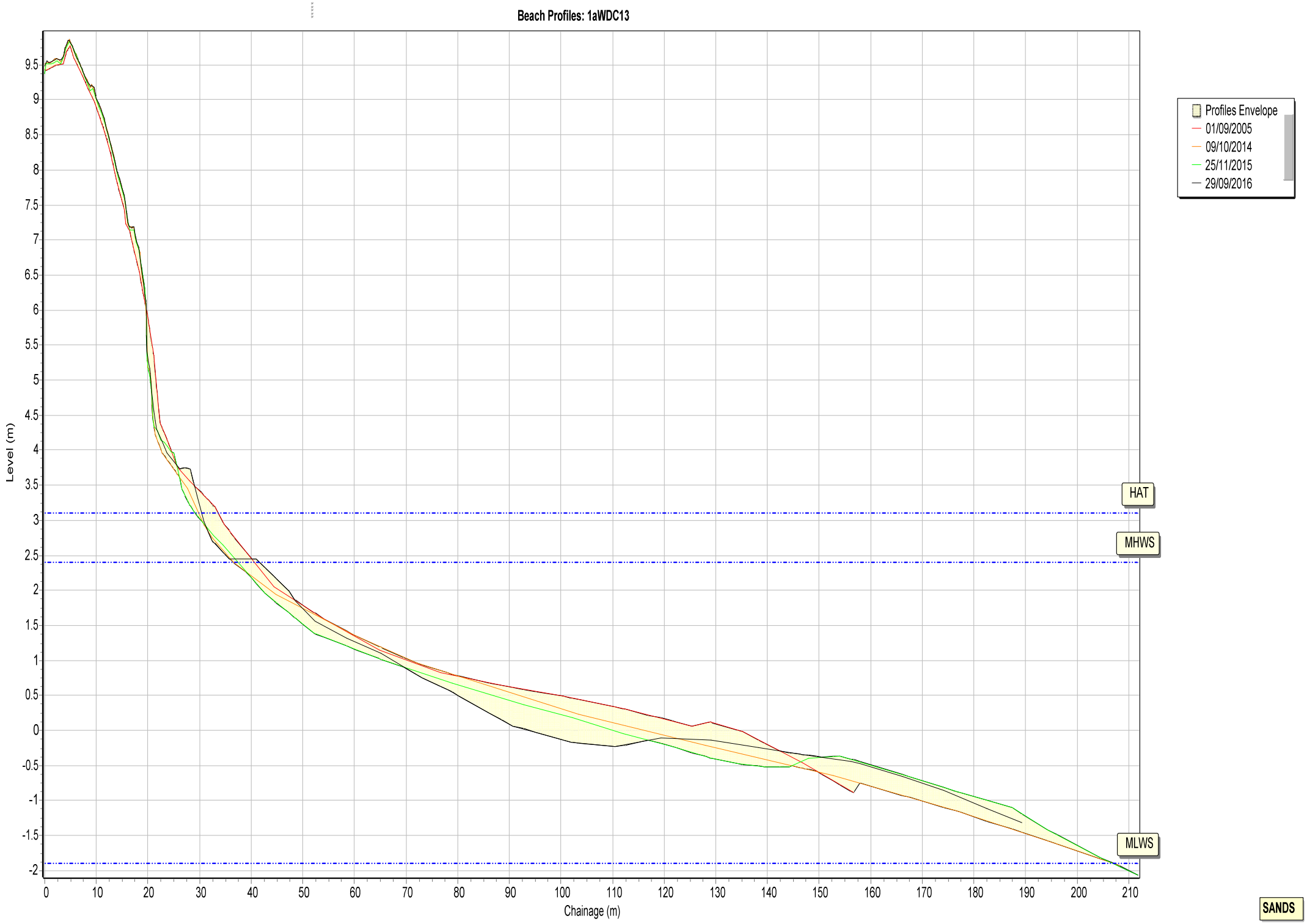
220
SANDS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25/11/2015
29/09/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
70
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100
110
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130
140
150
160
170
180
190
200
210
SANDS


Beach Profiles: 1aWDC14
Profiles Envelope
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09/10/2014
25/11/2015
29/09/2016
HAT
MHWS
MLWS
SANDS
Level (m)
Chainage (m)
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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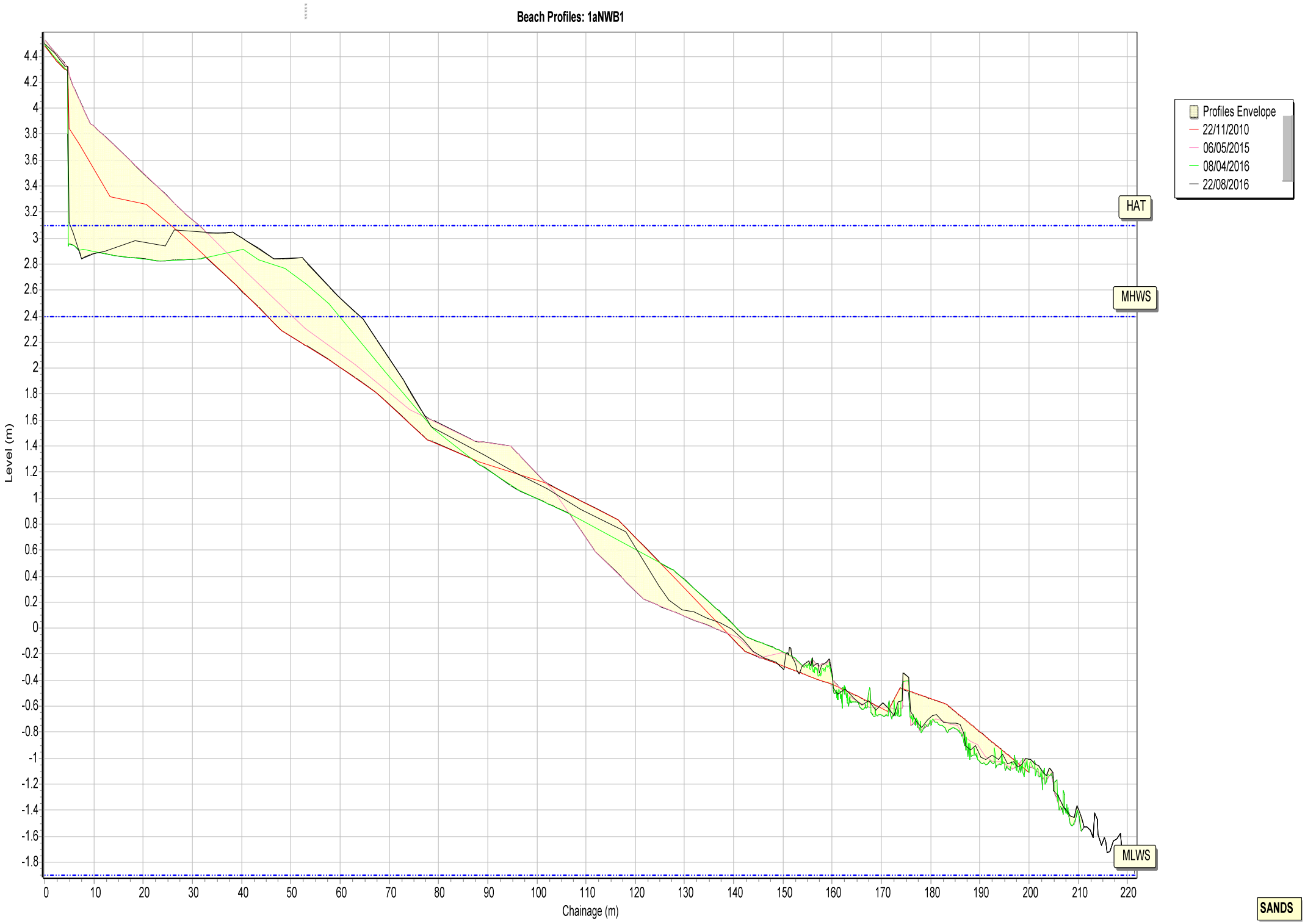
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06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
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20
30
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100
110
120
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170
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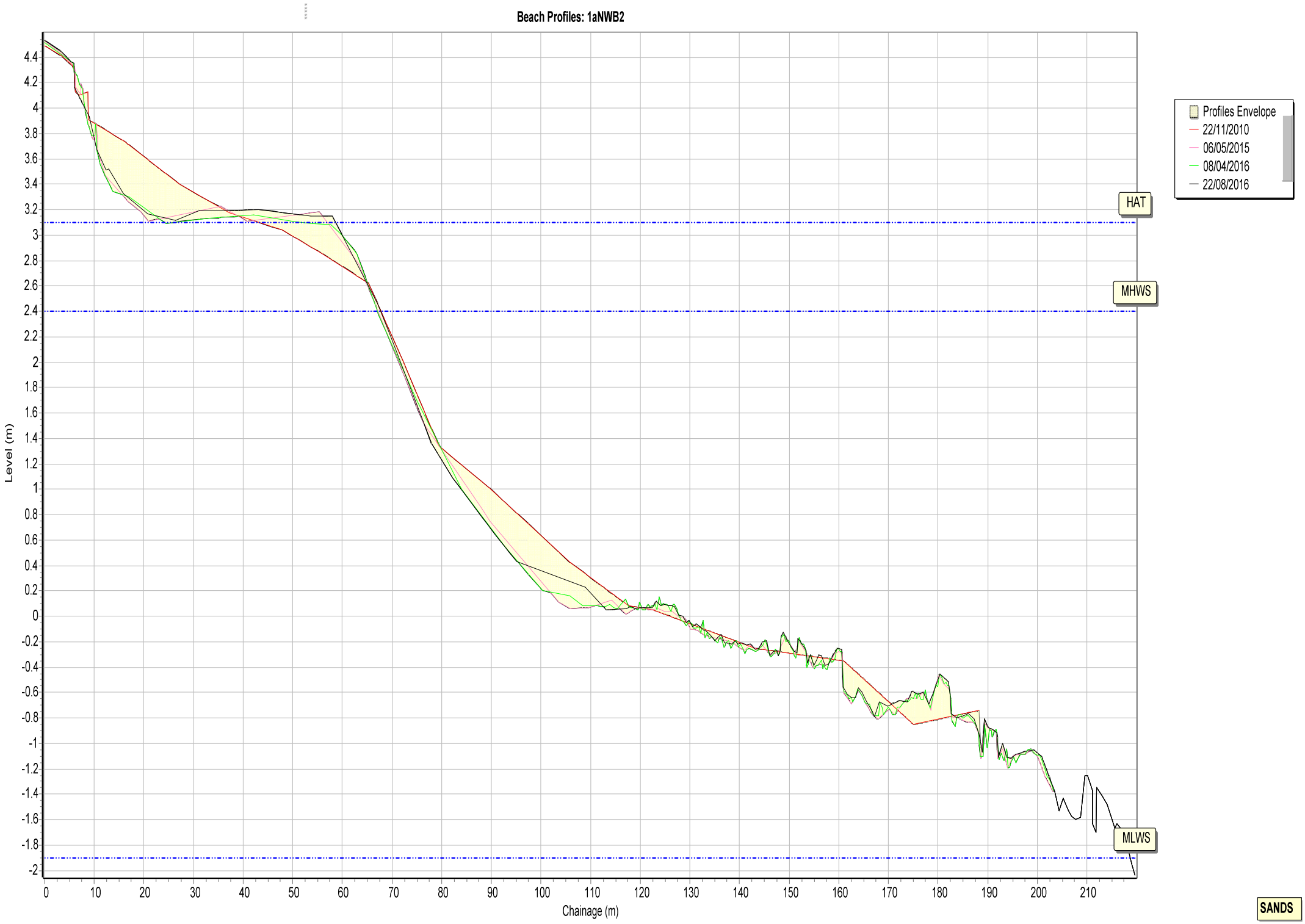
210
220
SANDS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06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2
0
10
20
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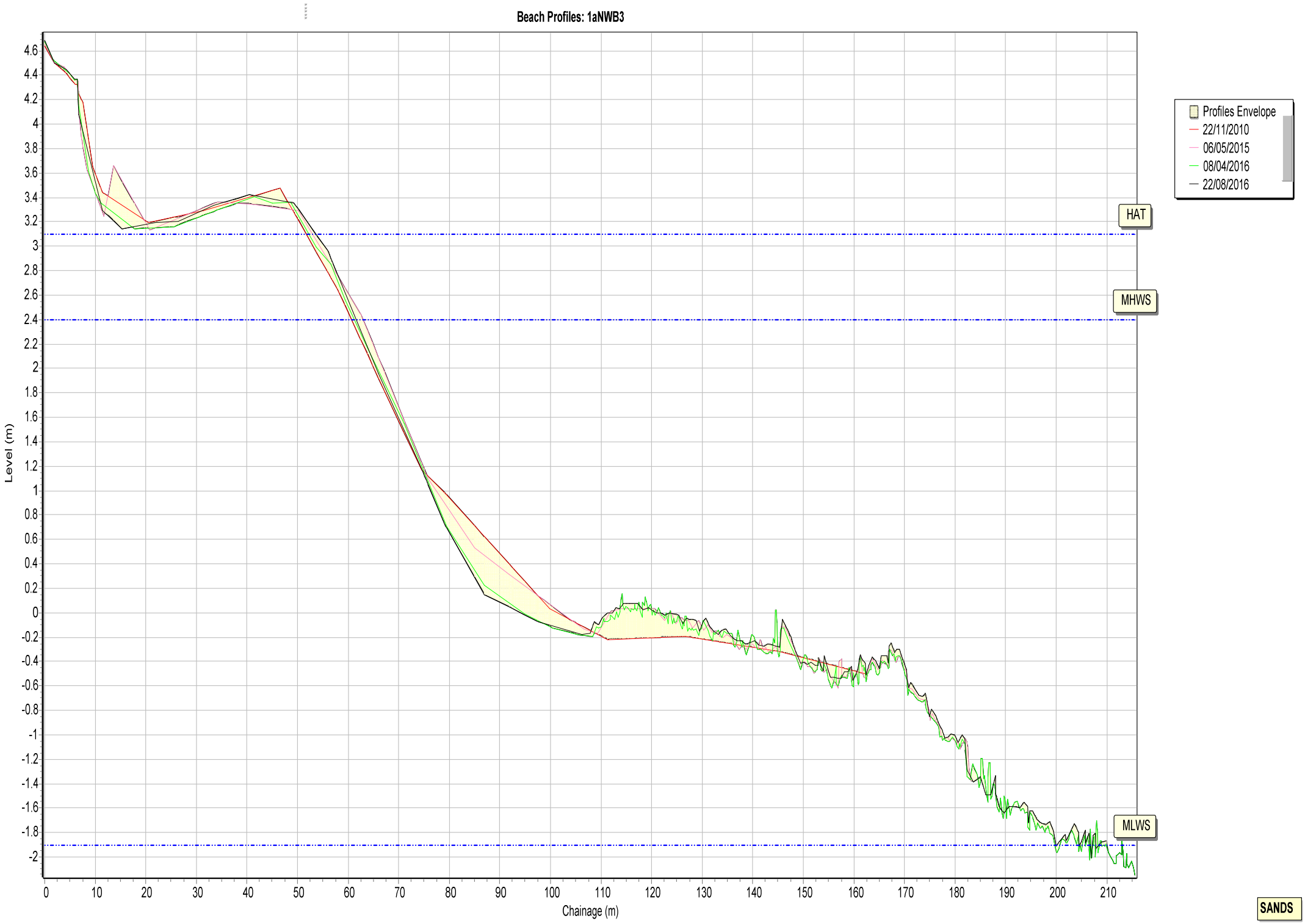
200
210
SANDS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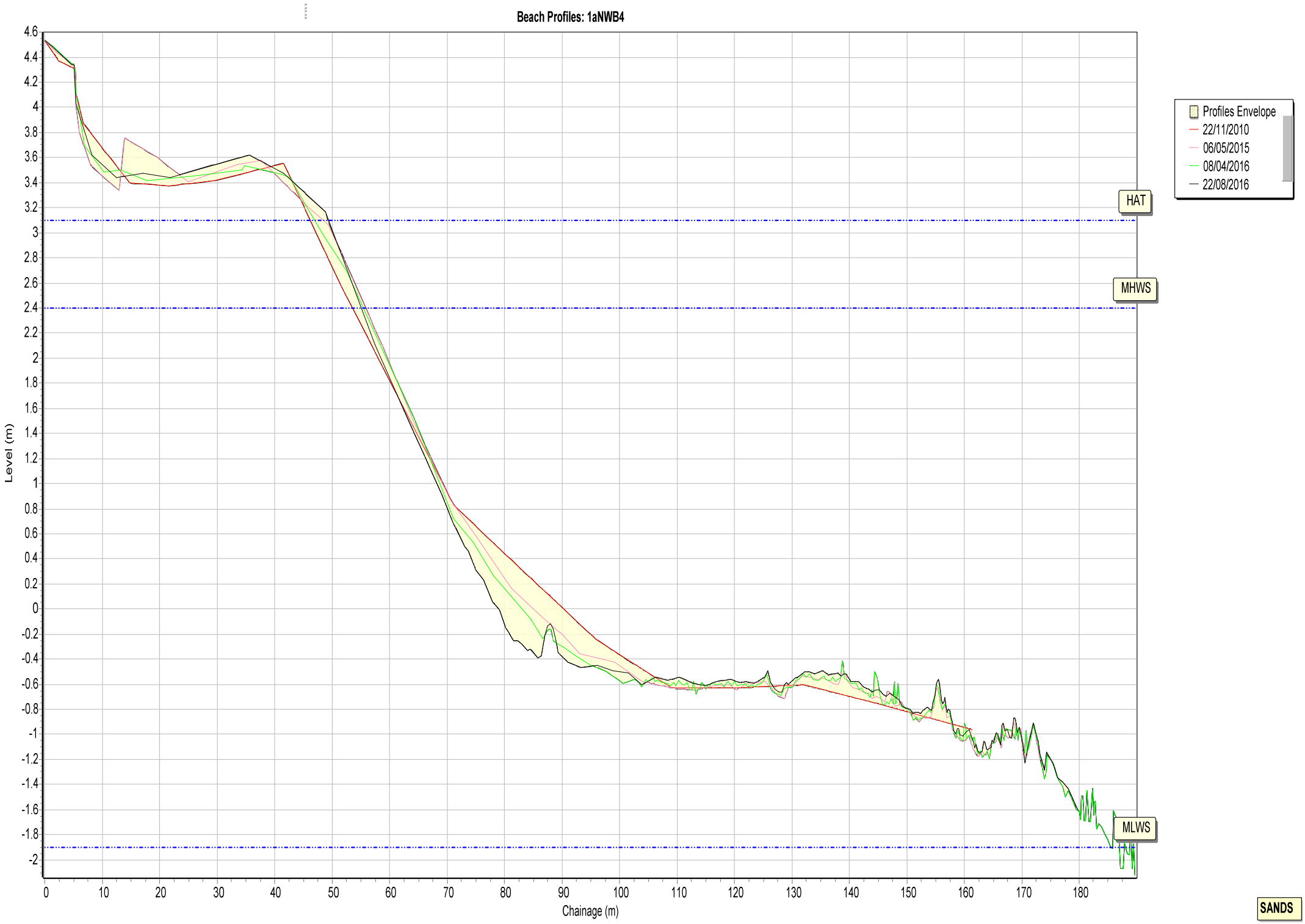
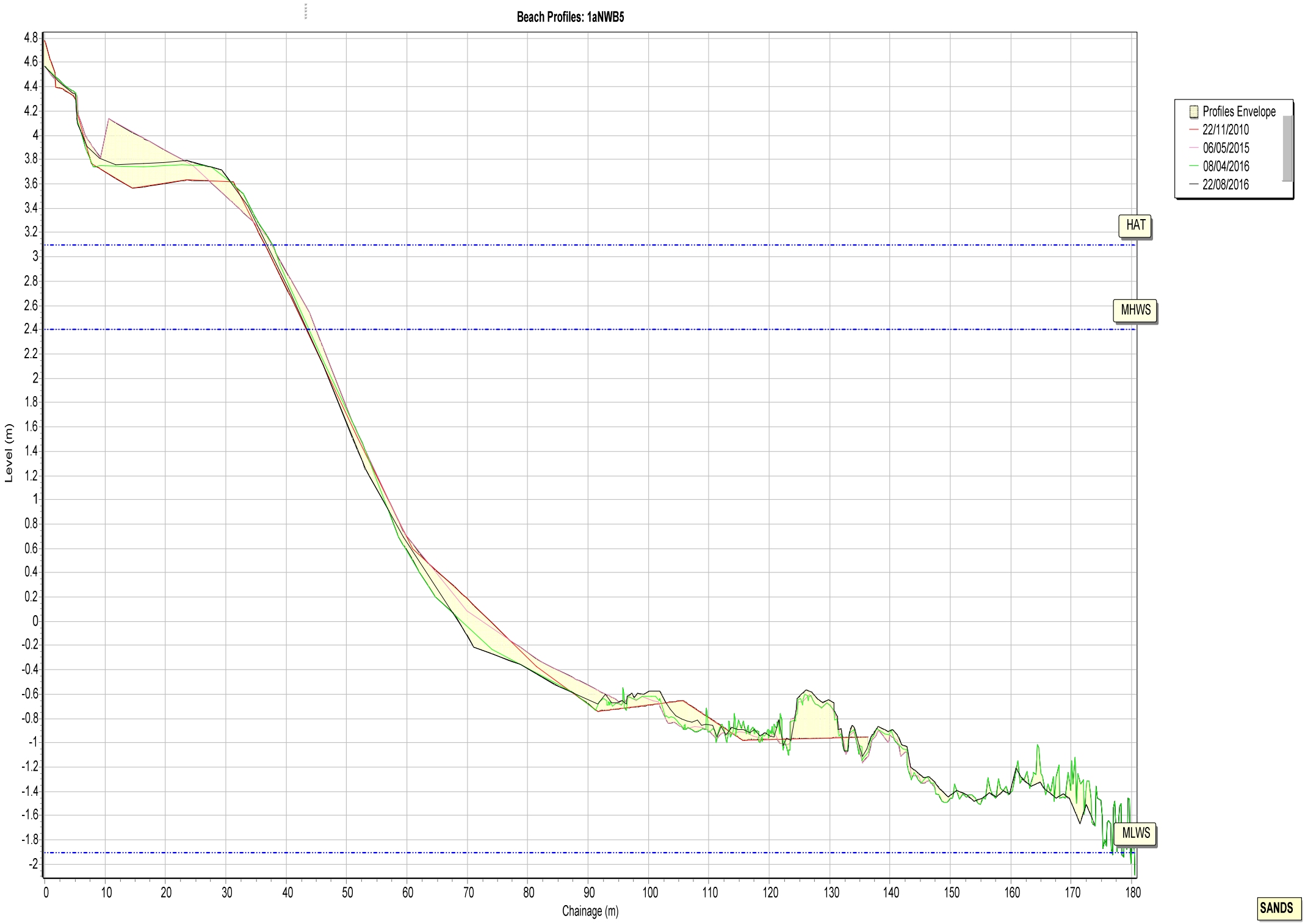
06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS


Beach Profiles: 1aNWB4
Level (m)
Chainage (m)
Profiles Envelope
22/11/2010
06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
SANDS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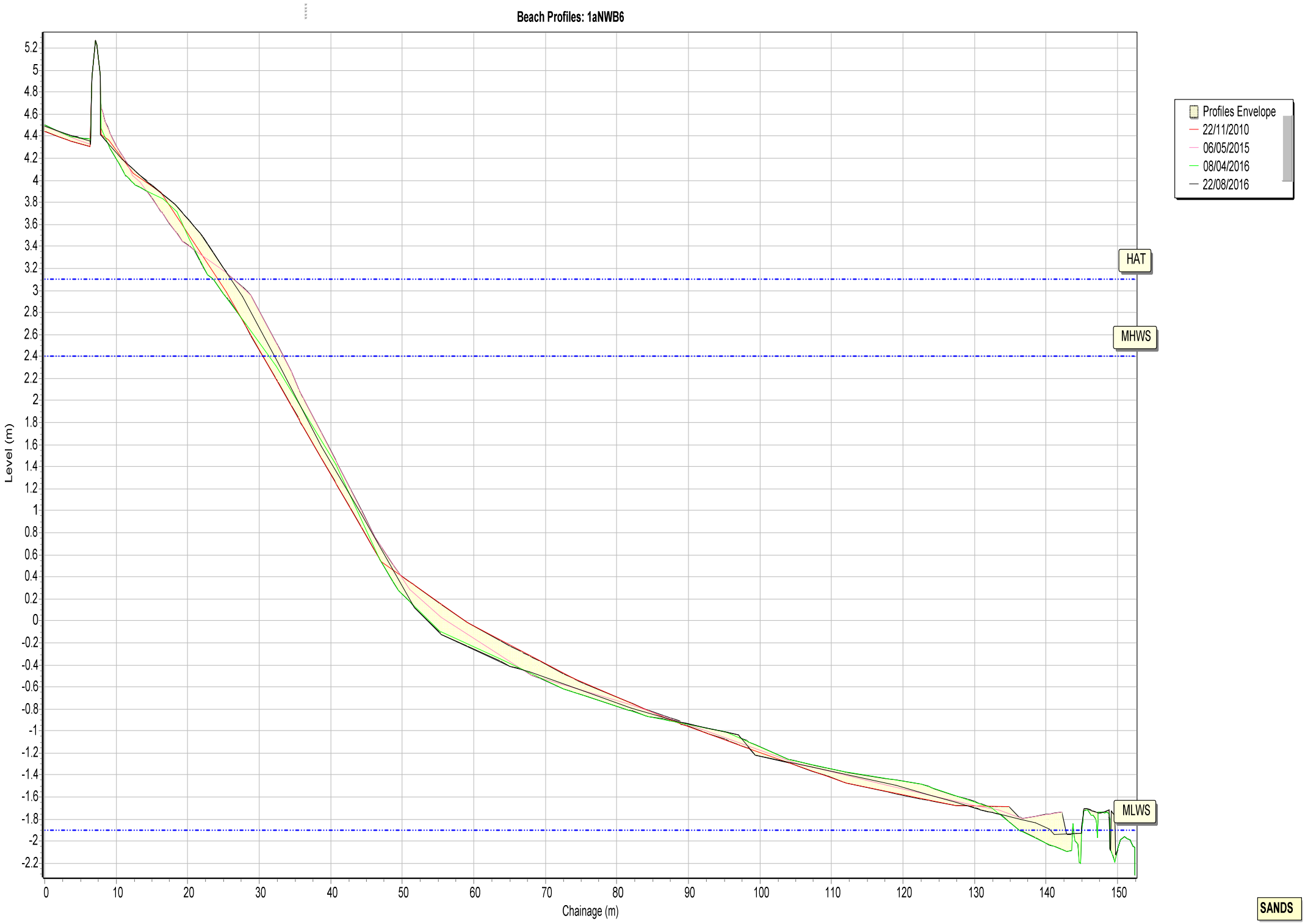
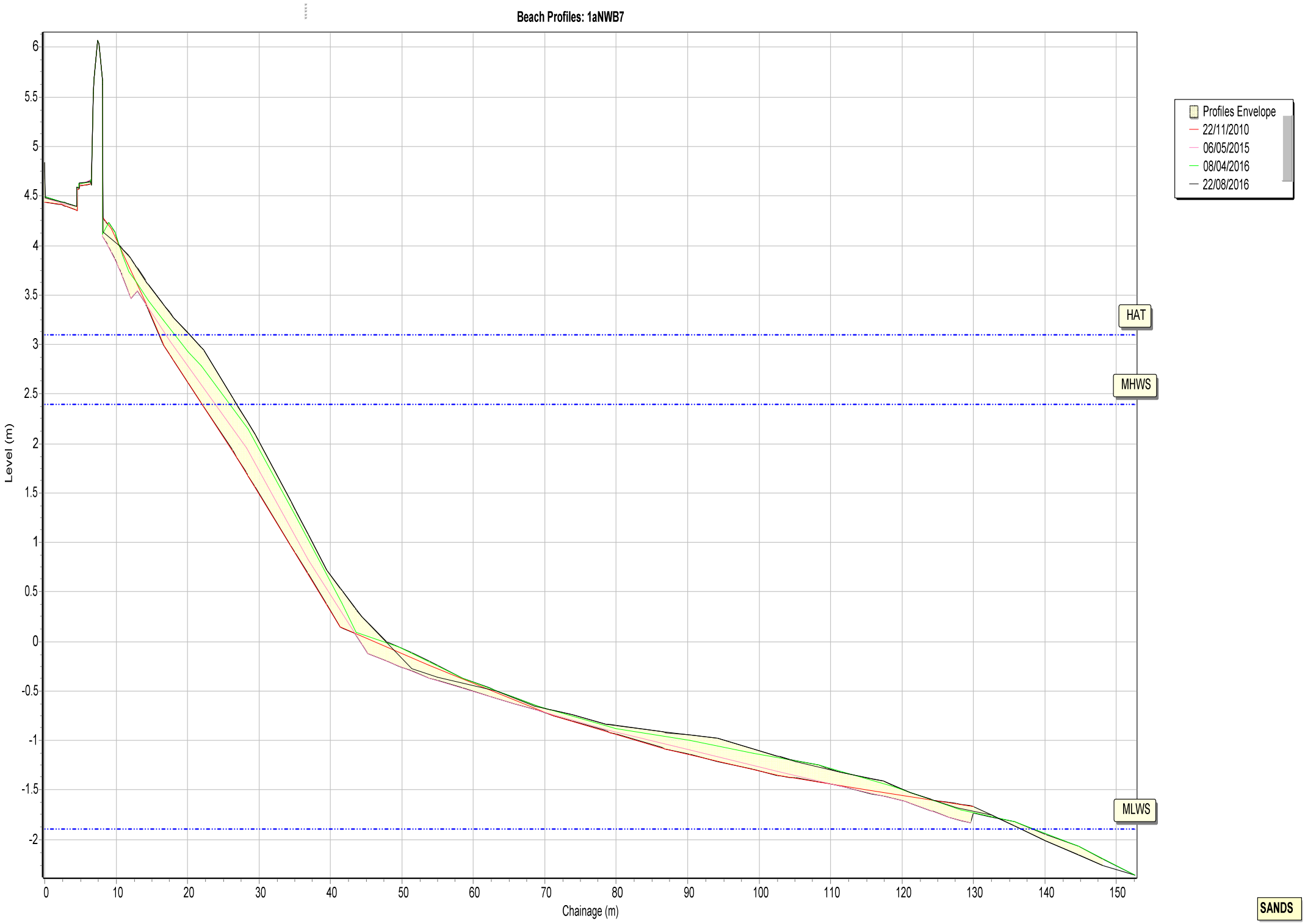
Profiles Envelope
22/11/2010
06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS


Beach Profiles: 1aNWB6
Profiles Envelope
22/11/2010
06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
SANDS


Beach Profiles: 1aNWB7
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22/11/2010
06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
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10
20
30
40
50
60
70
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90
100
110
120
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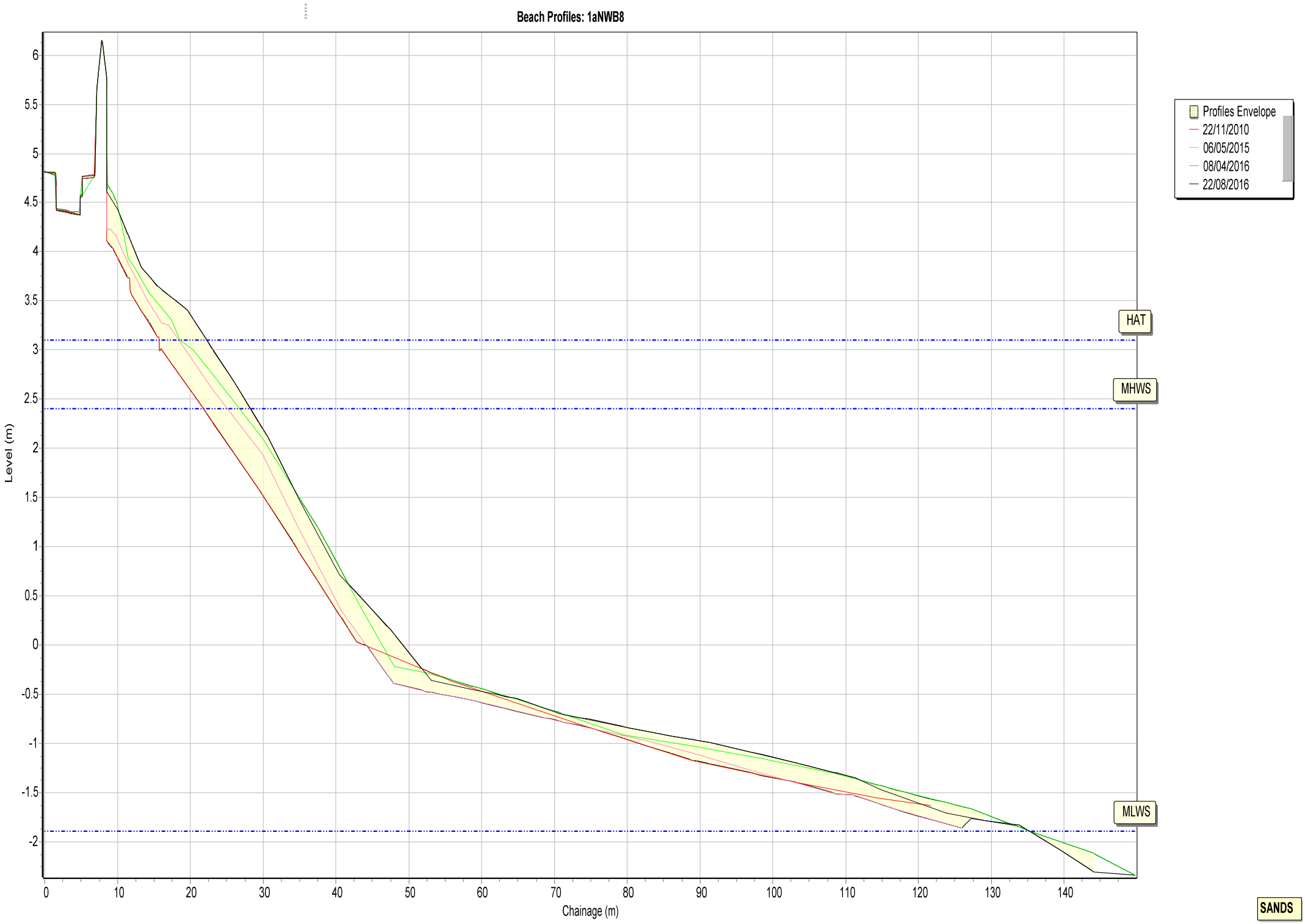
140
150
SANDS


Beach Profiles: 1aNWB8
Profiles Envelope
22/11/2010
06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
10
20
30
40
50
60
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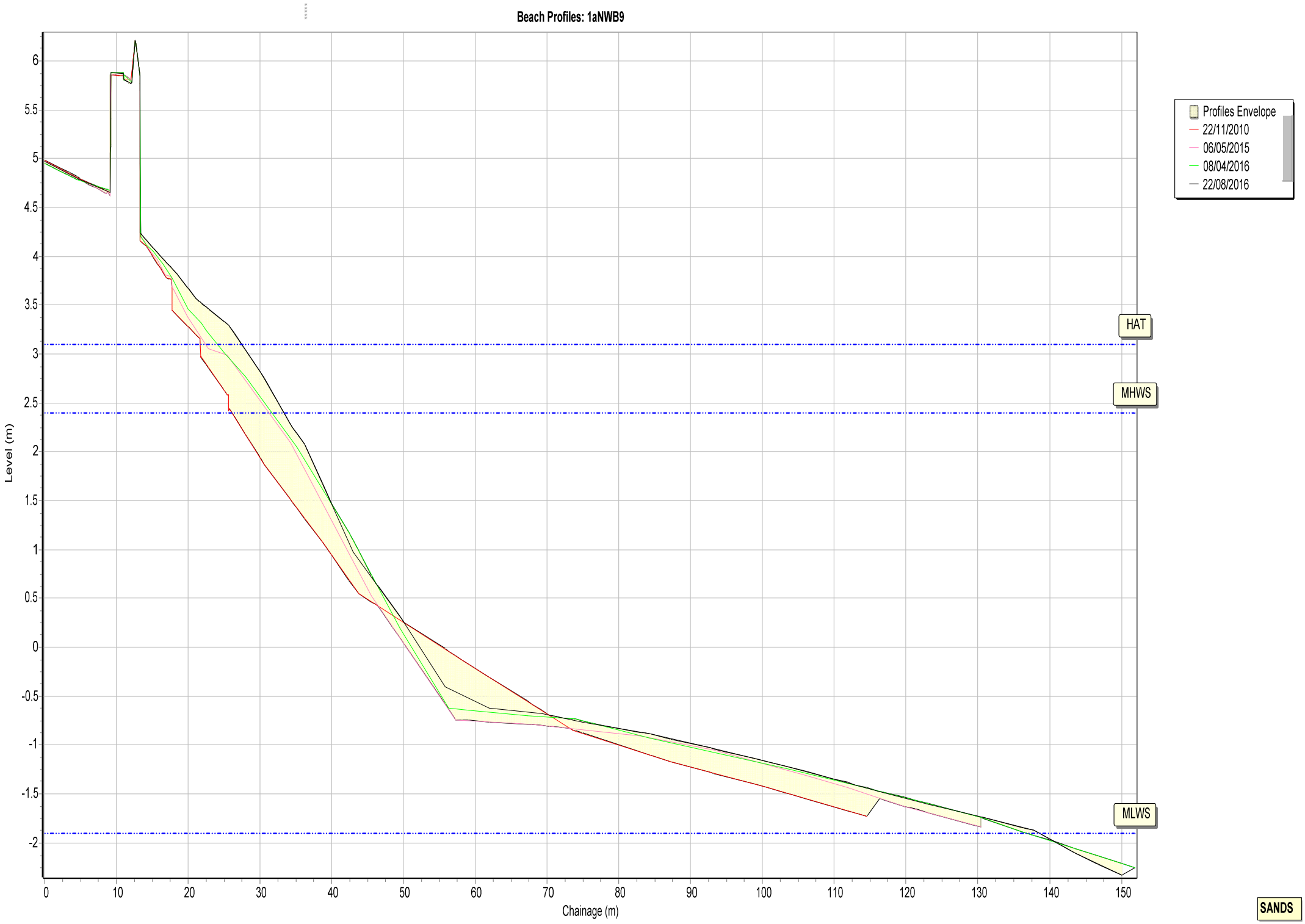
80
90
100
110
120
130
140
SANDS


Beach Profiles: 1aNWB9
Profiles Envelope
22/11/2010
06/05/2015
08/04/2016
22/08/2016
HAT
MHWS
MLWS
Level (m)
Chainage (m)
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
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20
30
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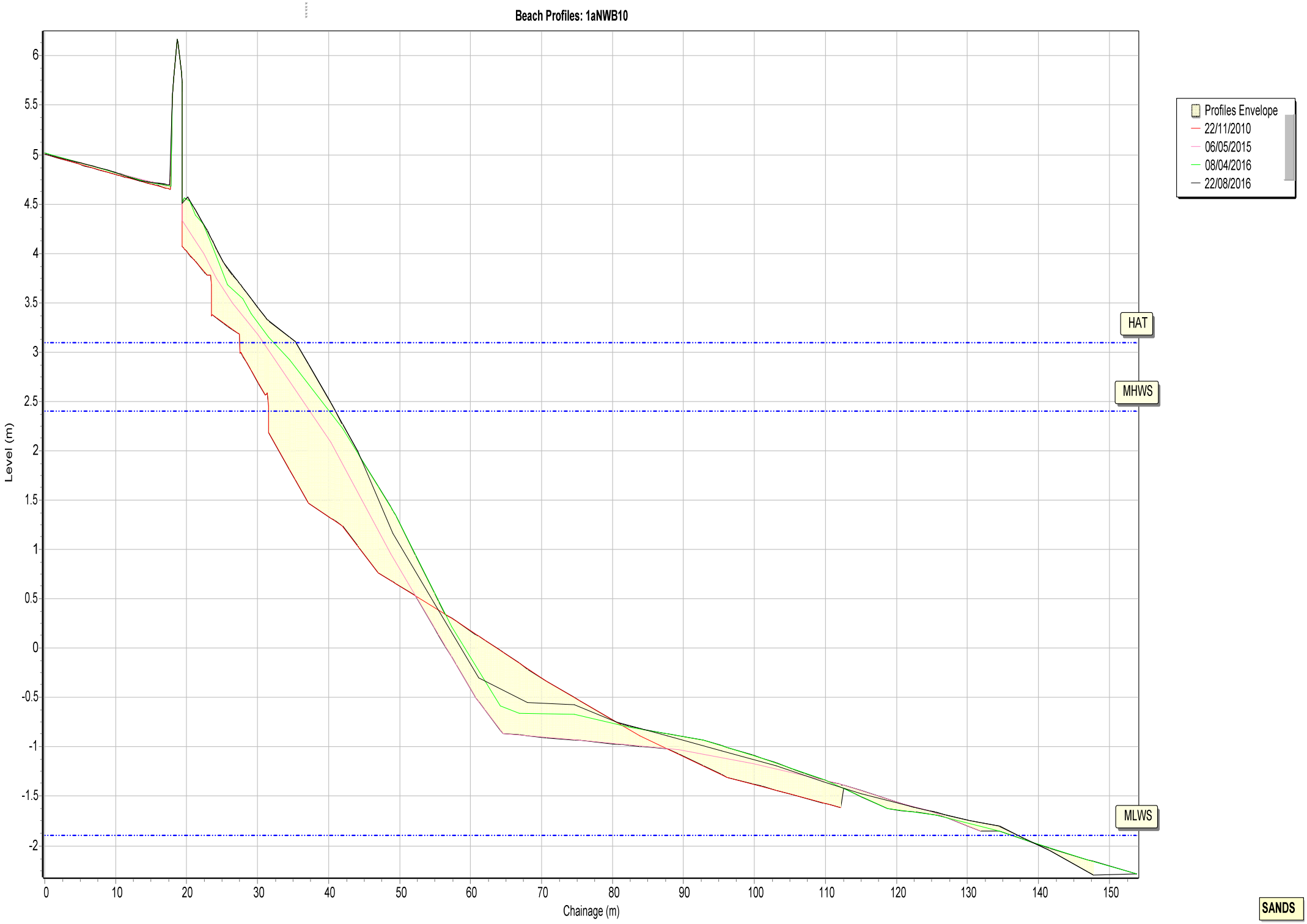
50
60
70
80
90
100
110
120
130
140
150
SANDS


Beach Profiles: 1aNWB10
Profiles Envelope
22/11/2010
06/05/2015
08/04/2016
22/08/2016
HAT
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MLWS
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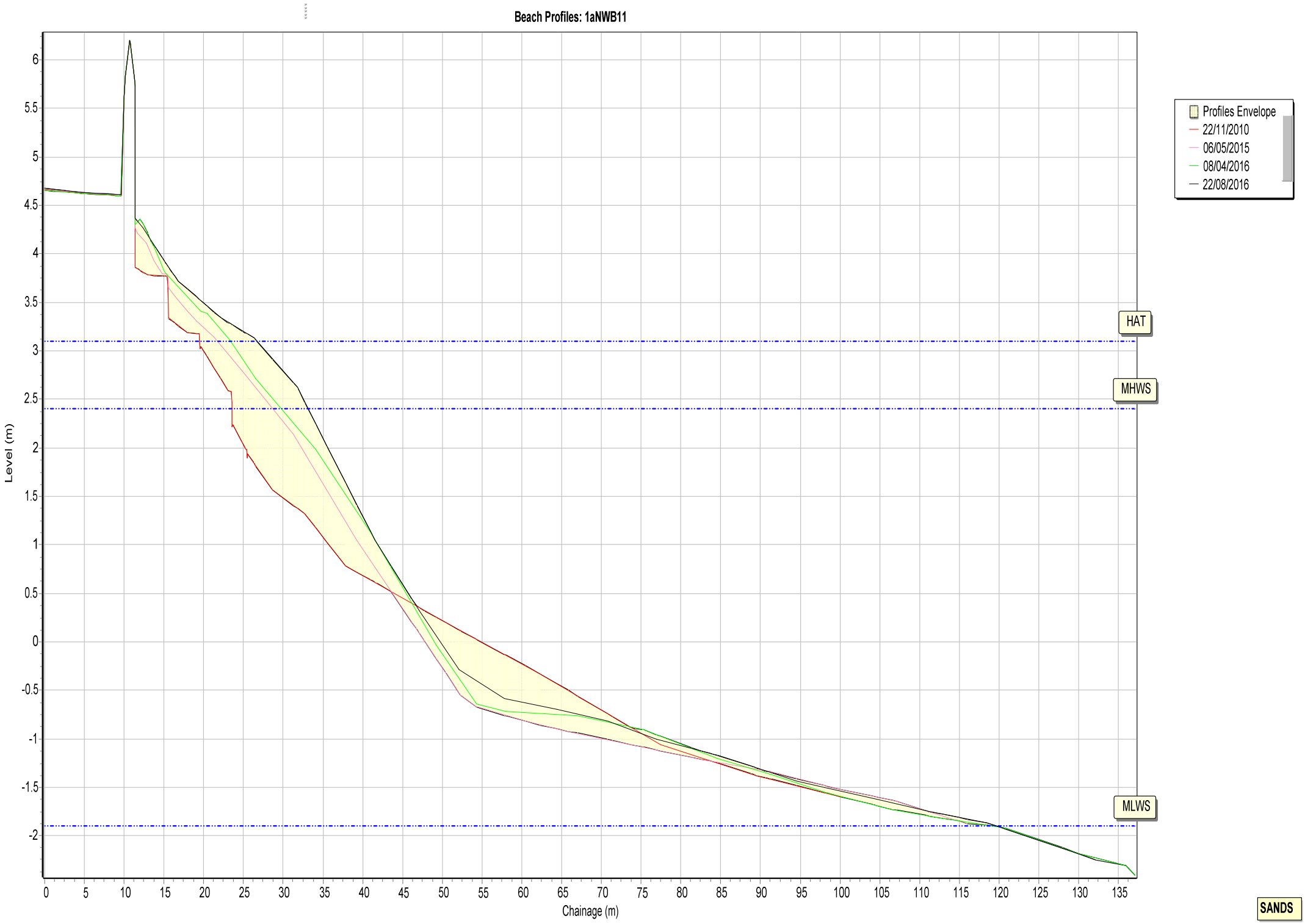
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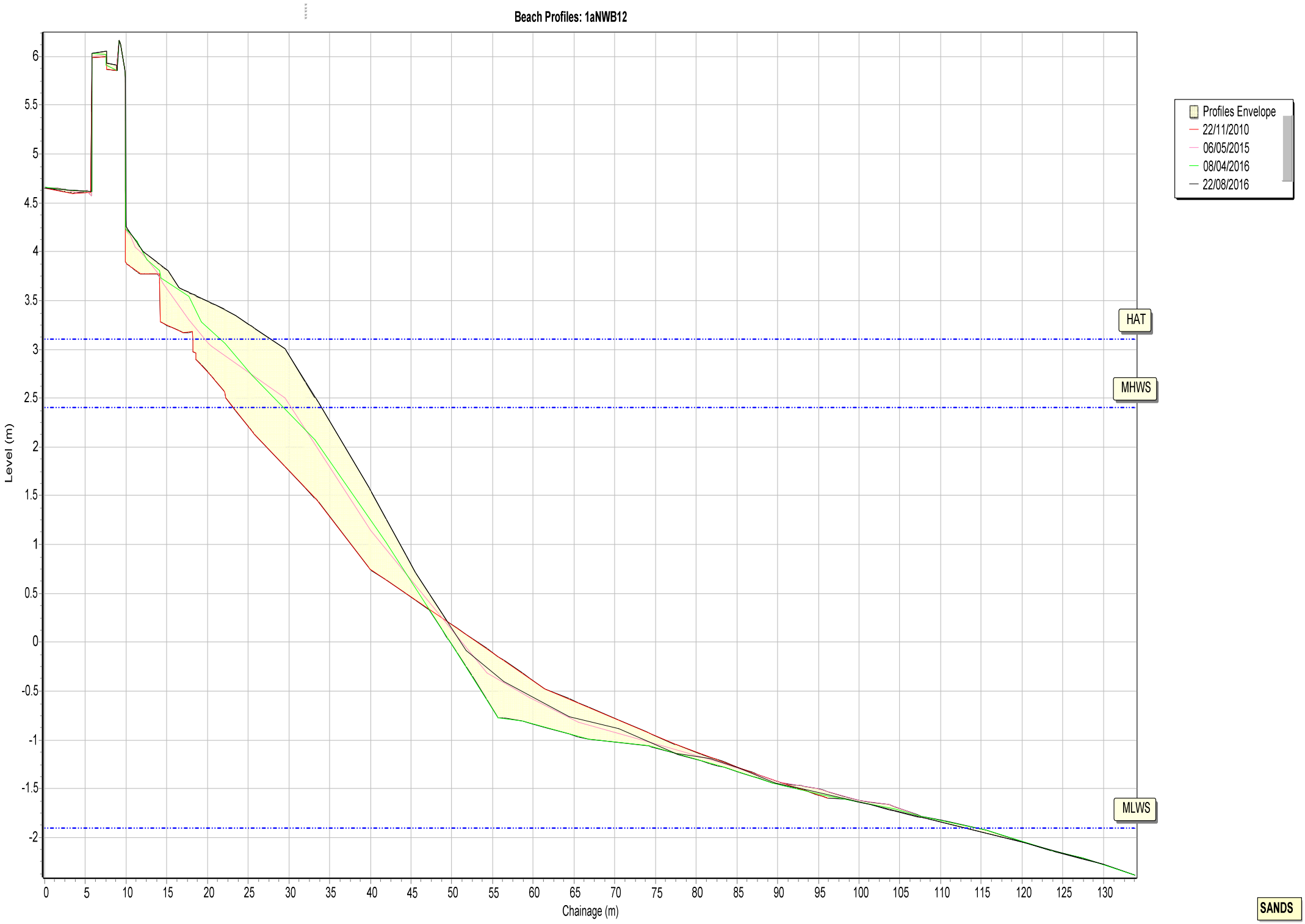
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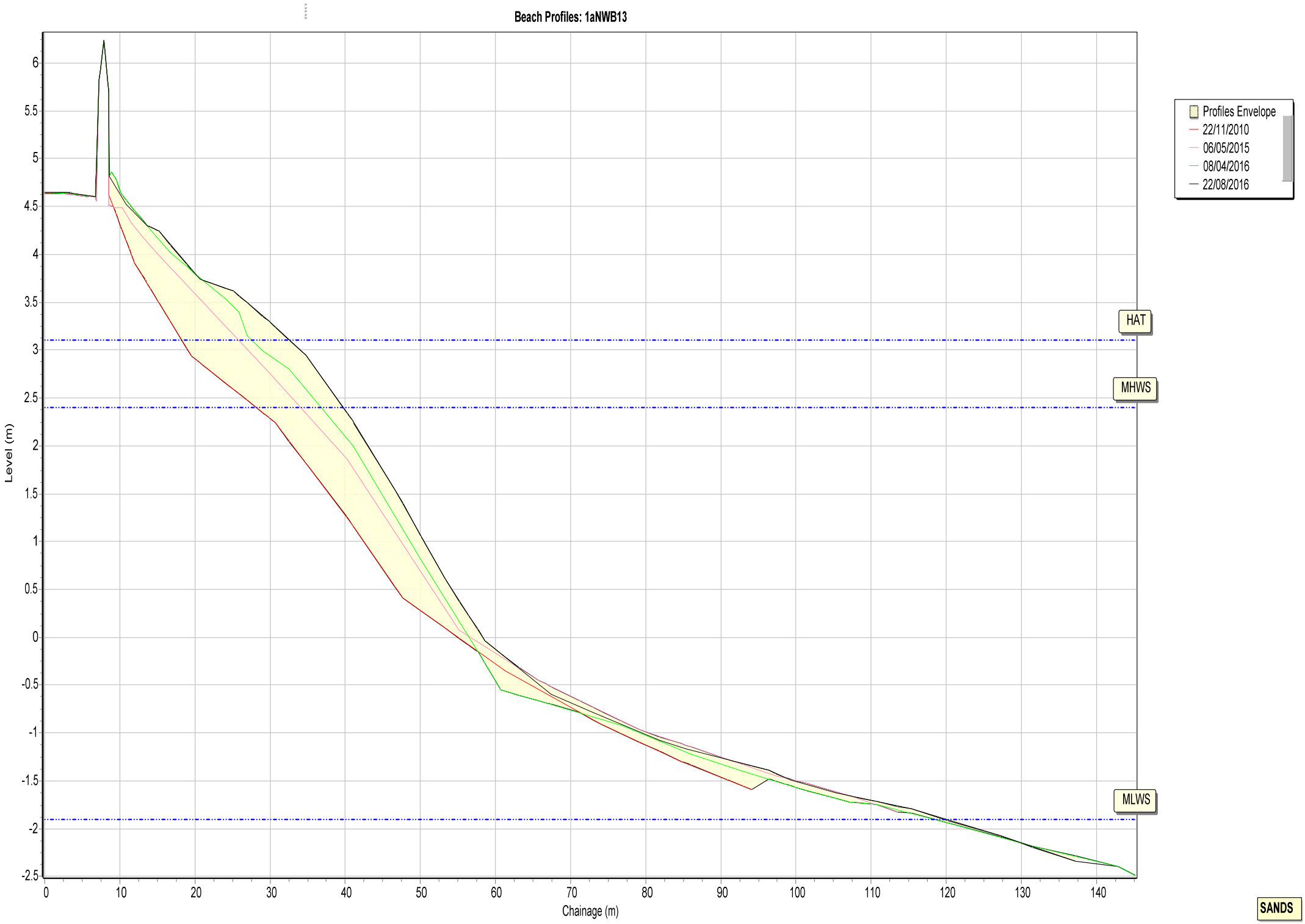
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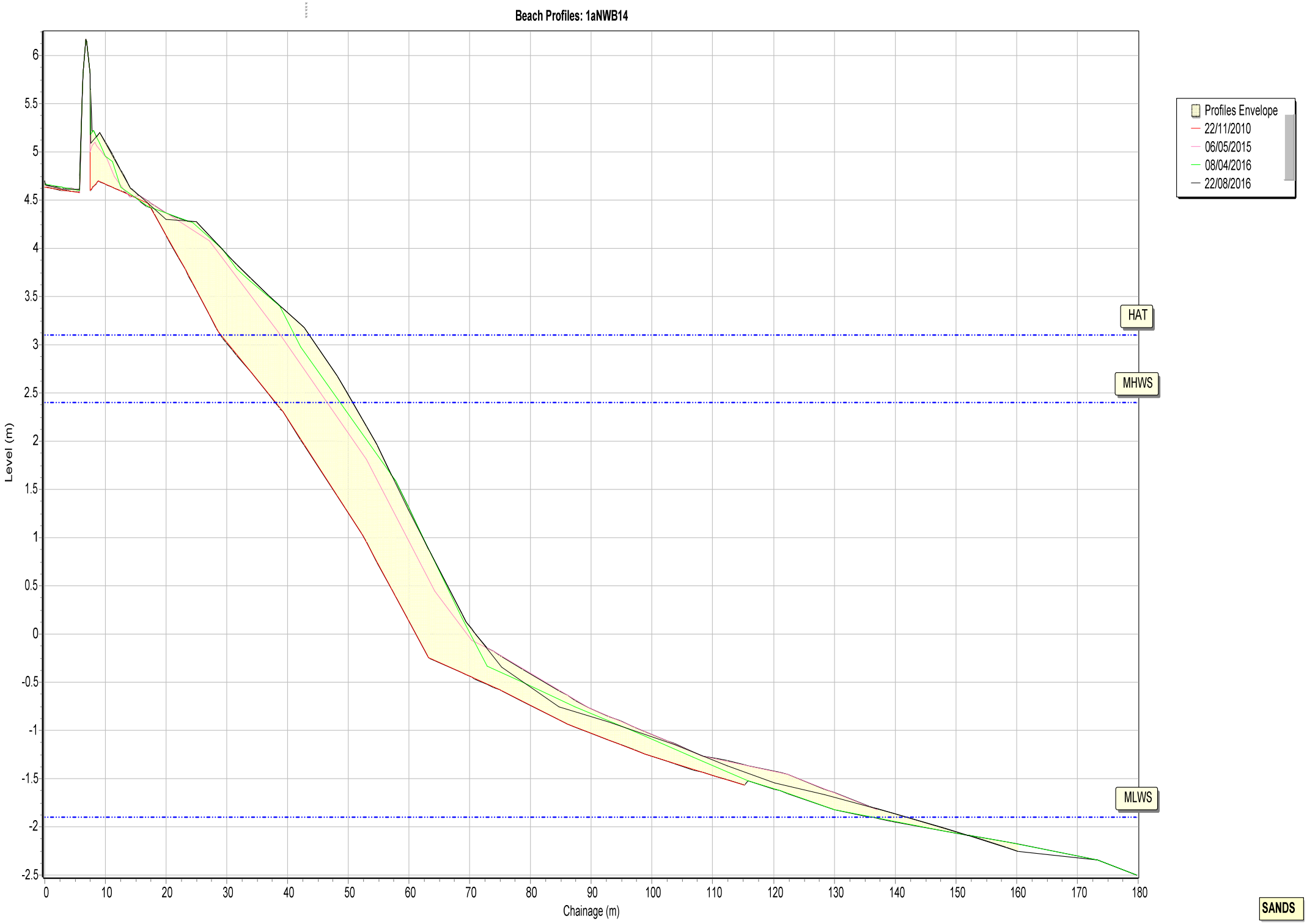
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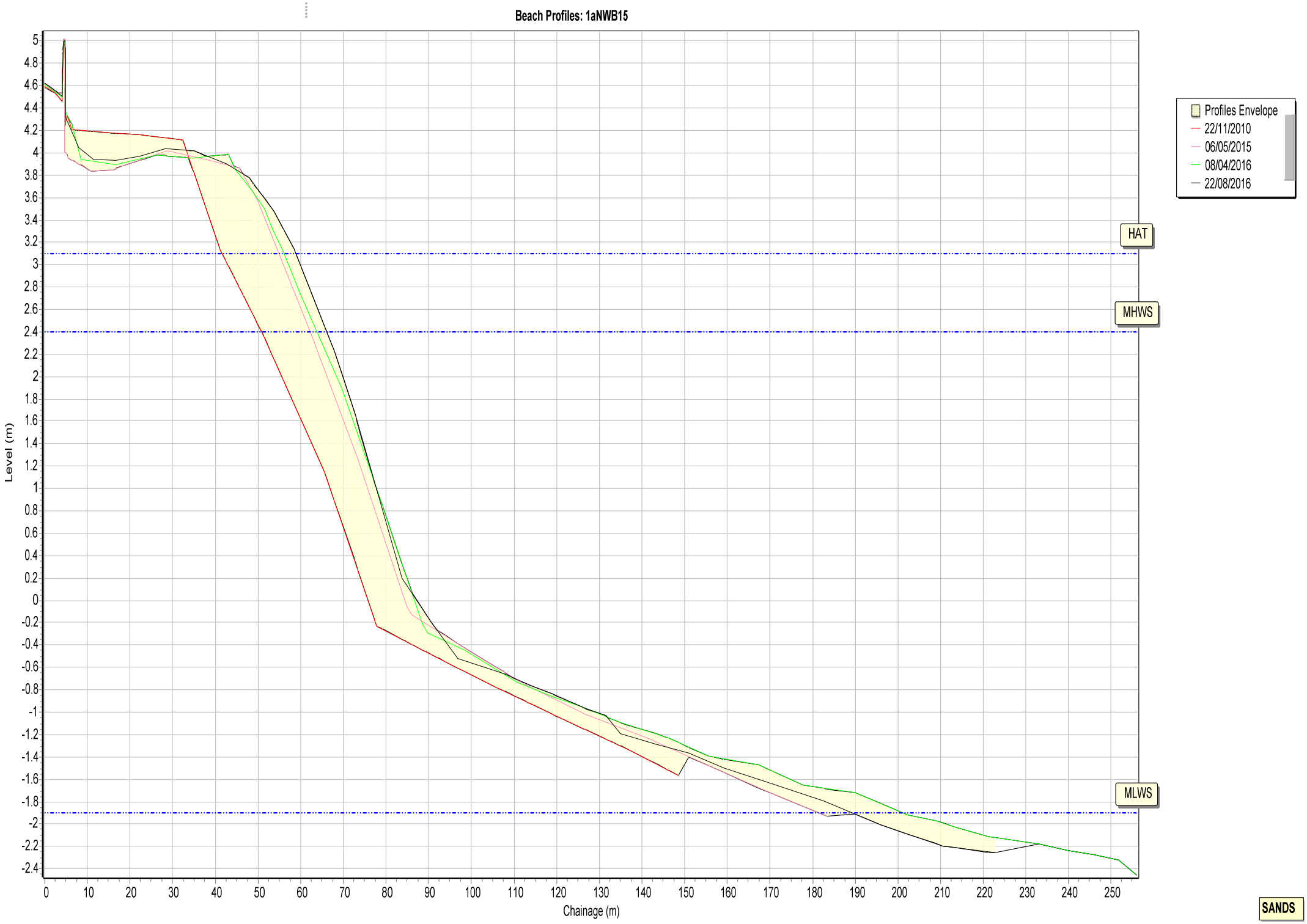
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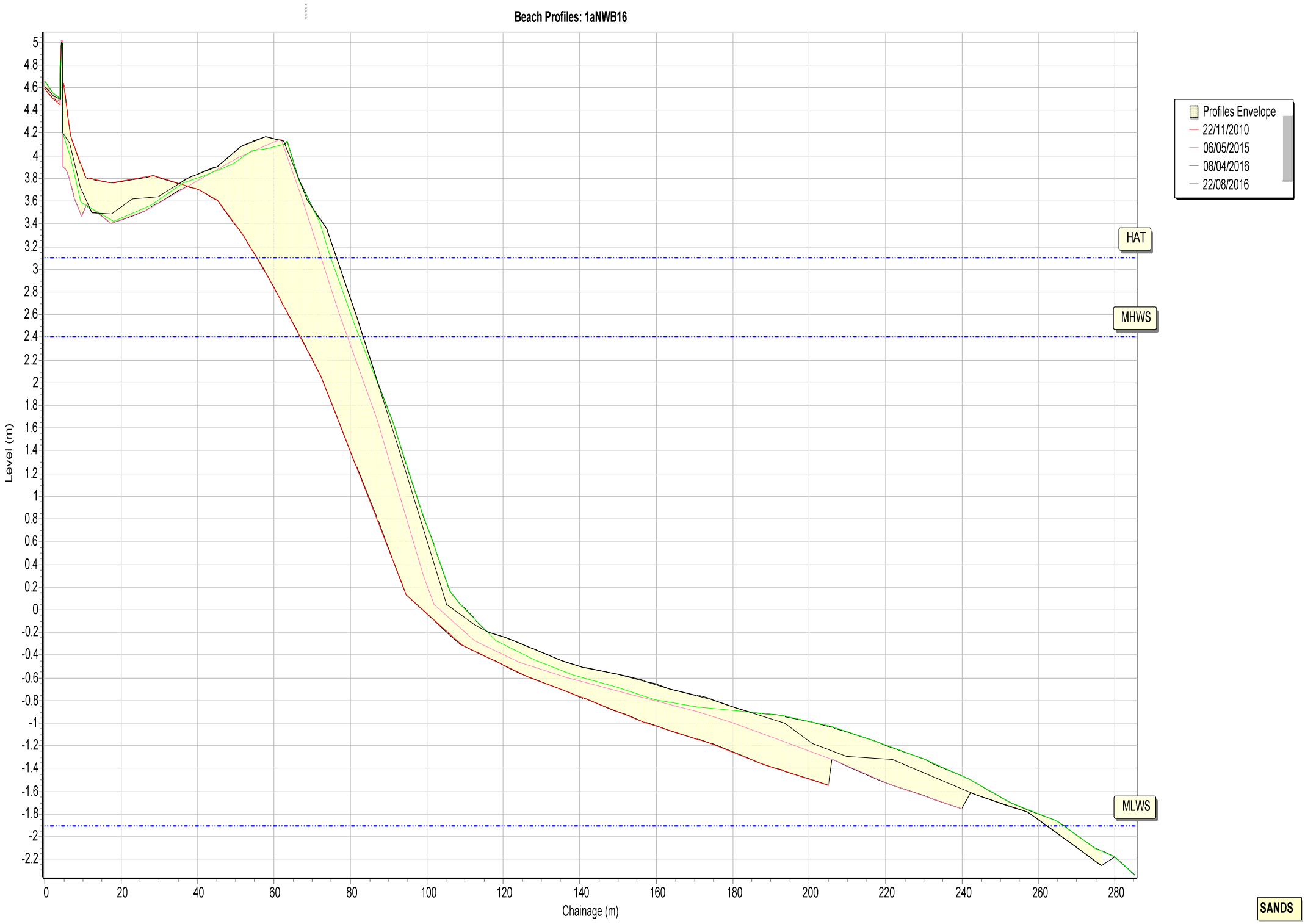
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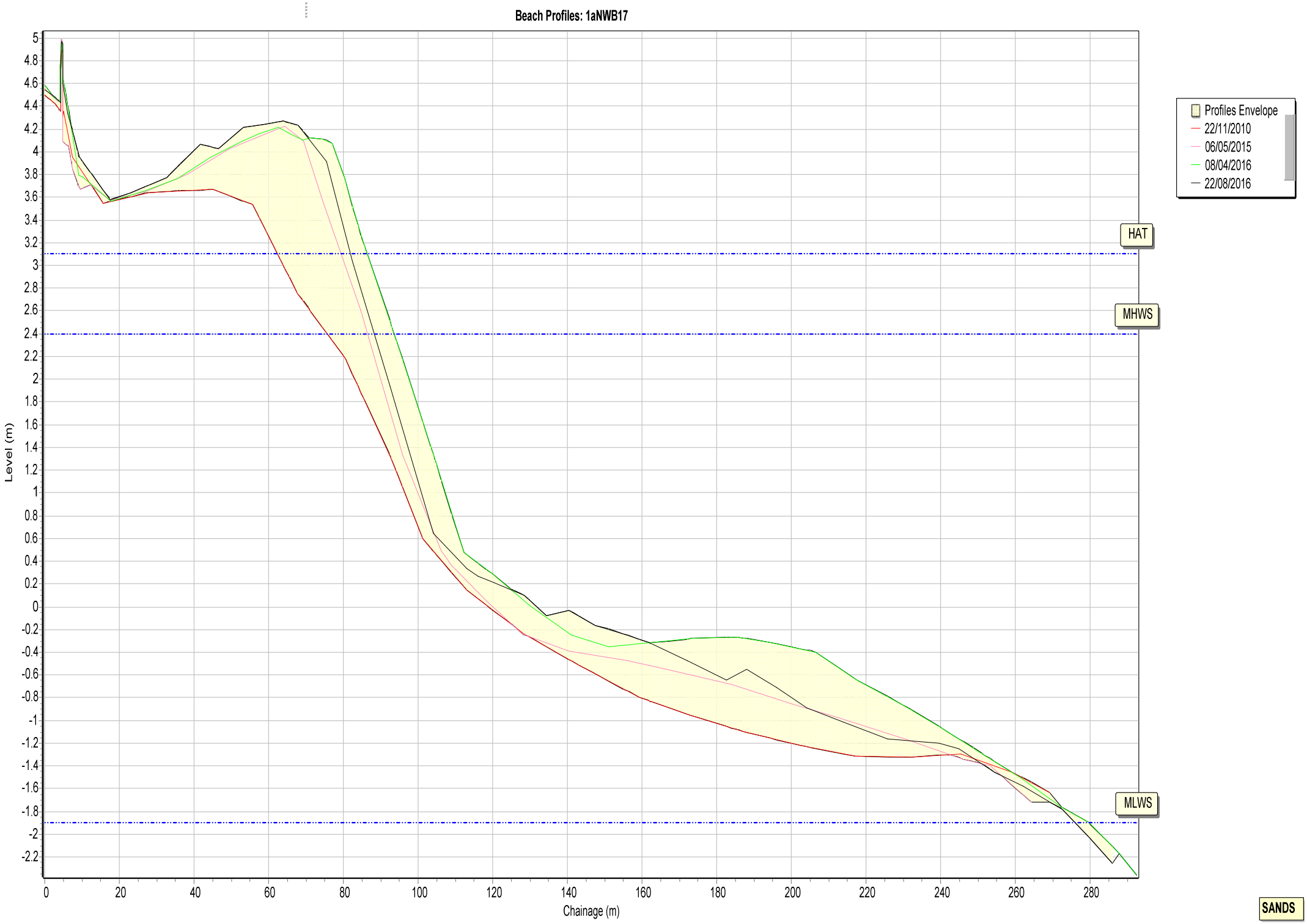
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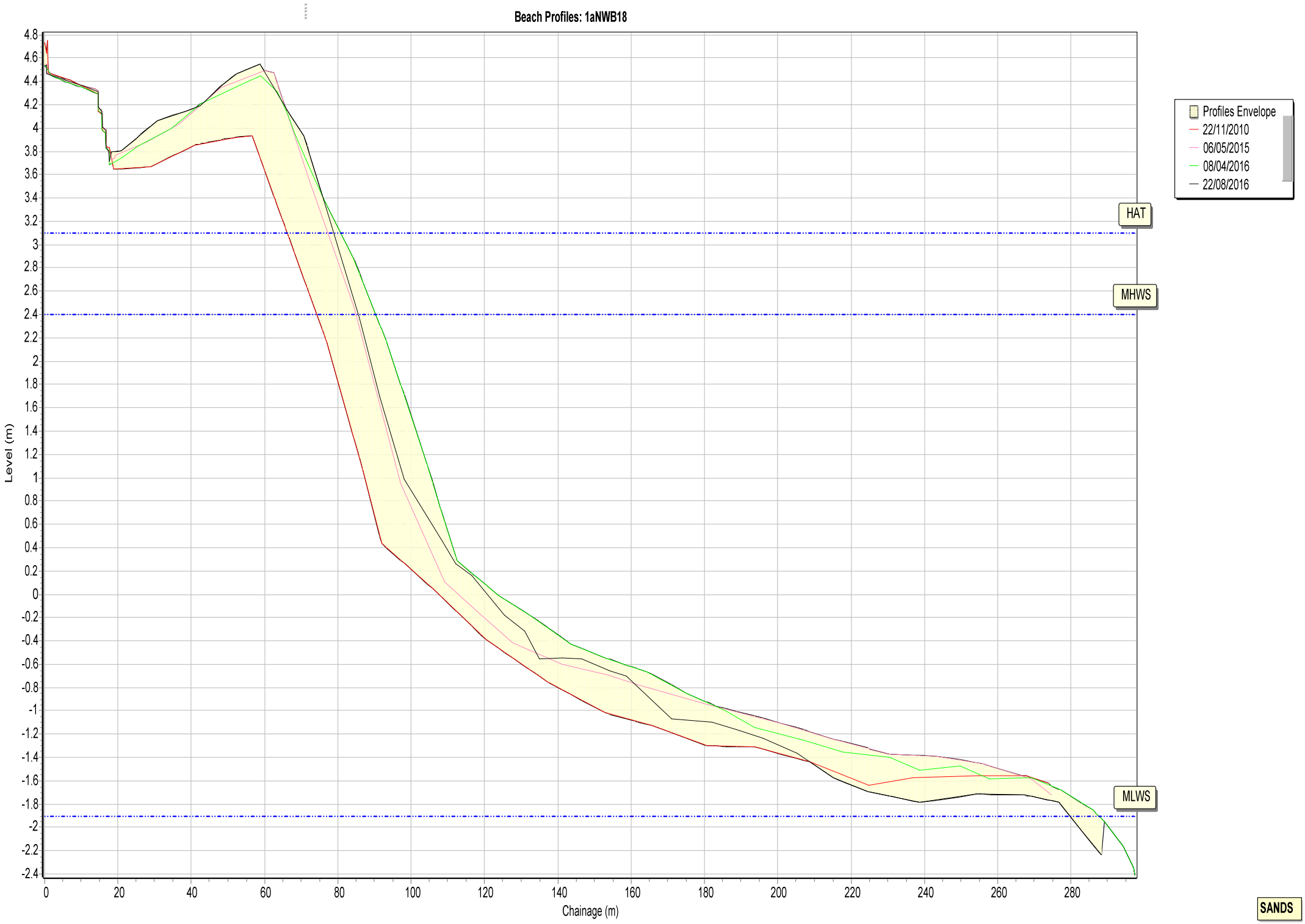
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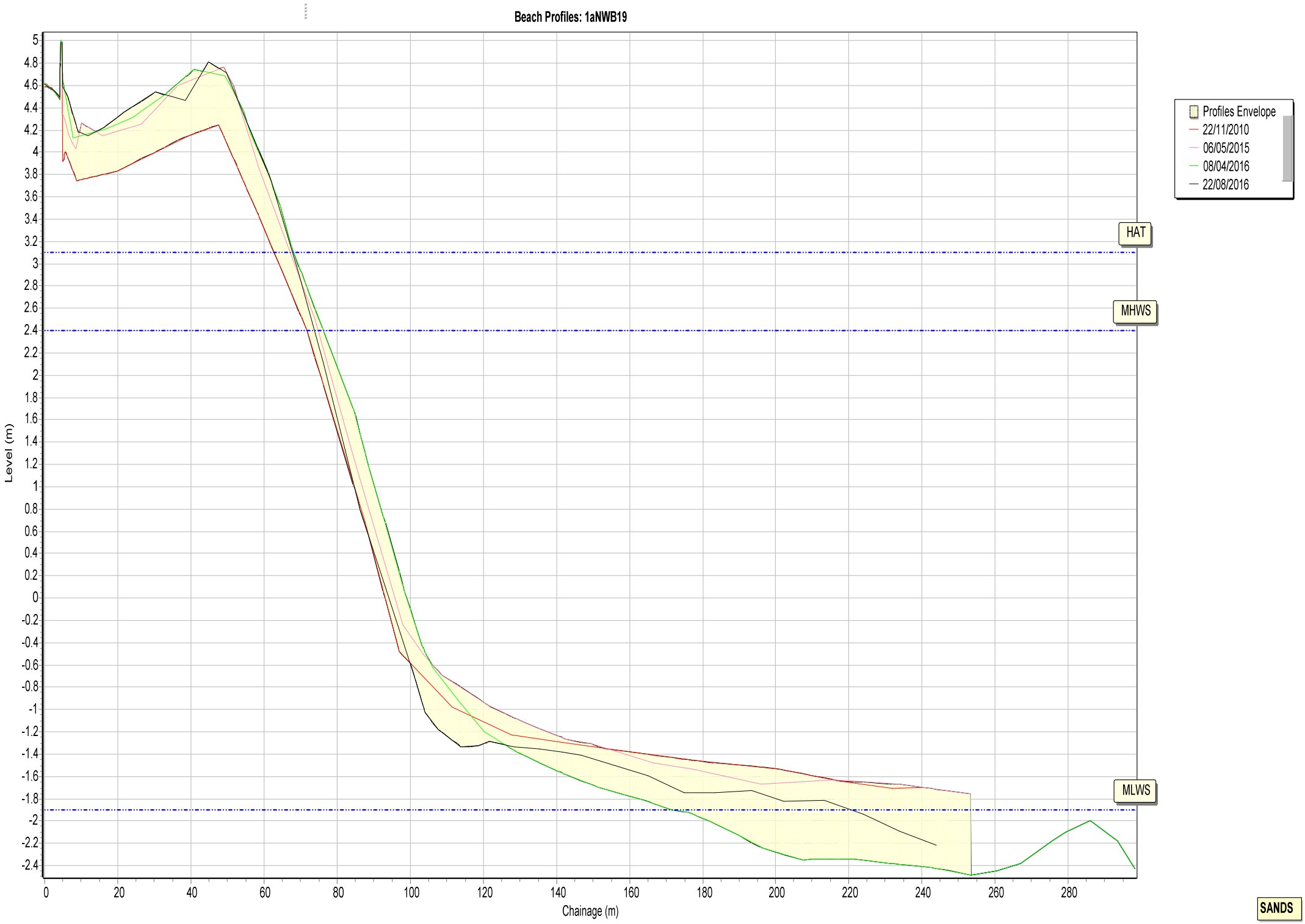
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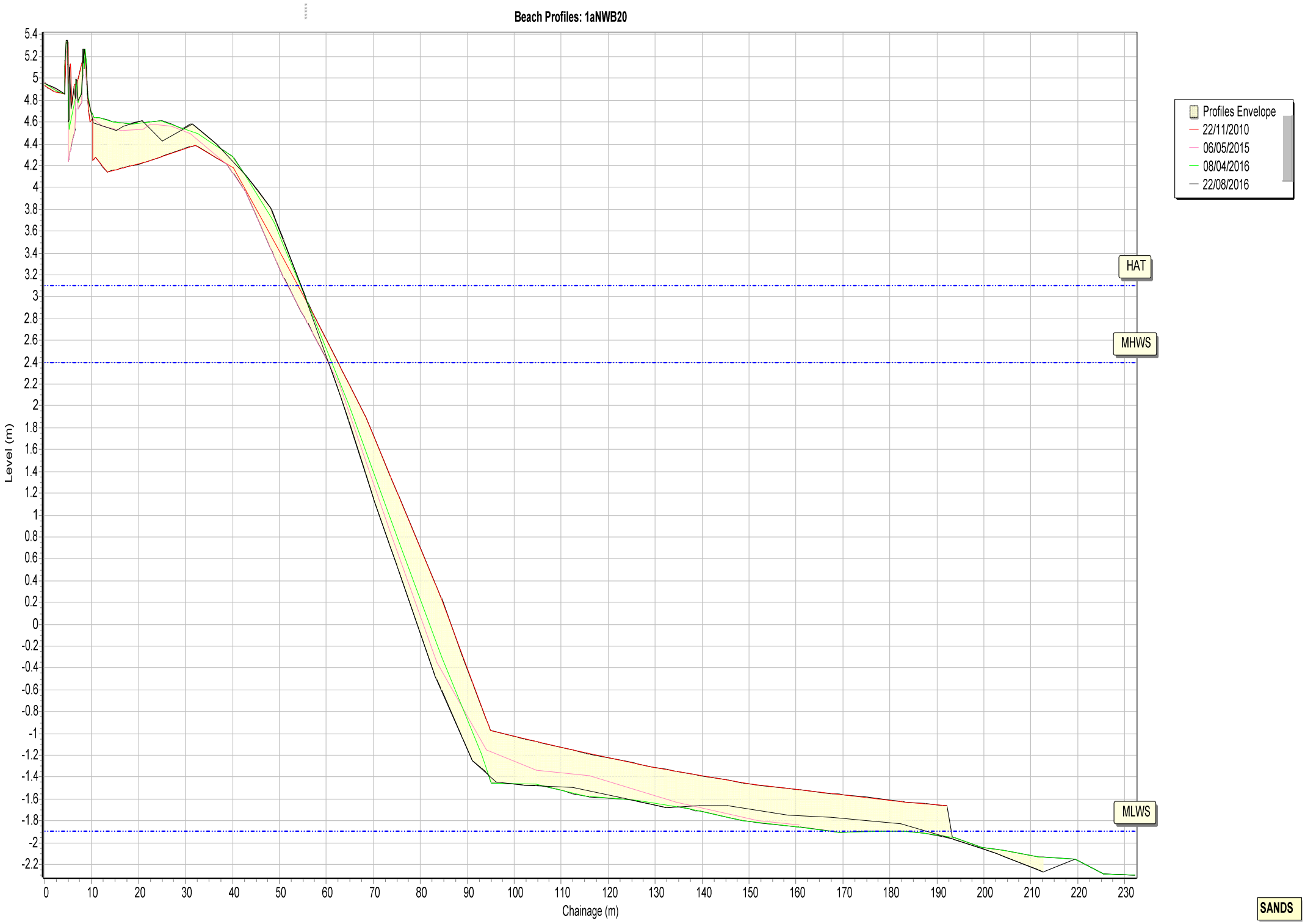
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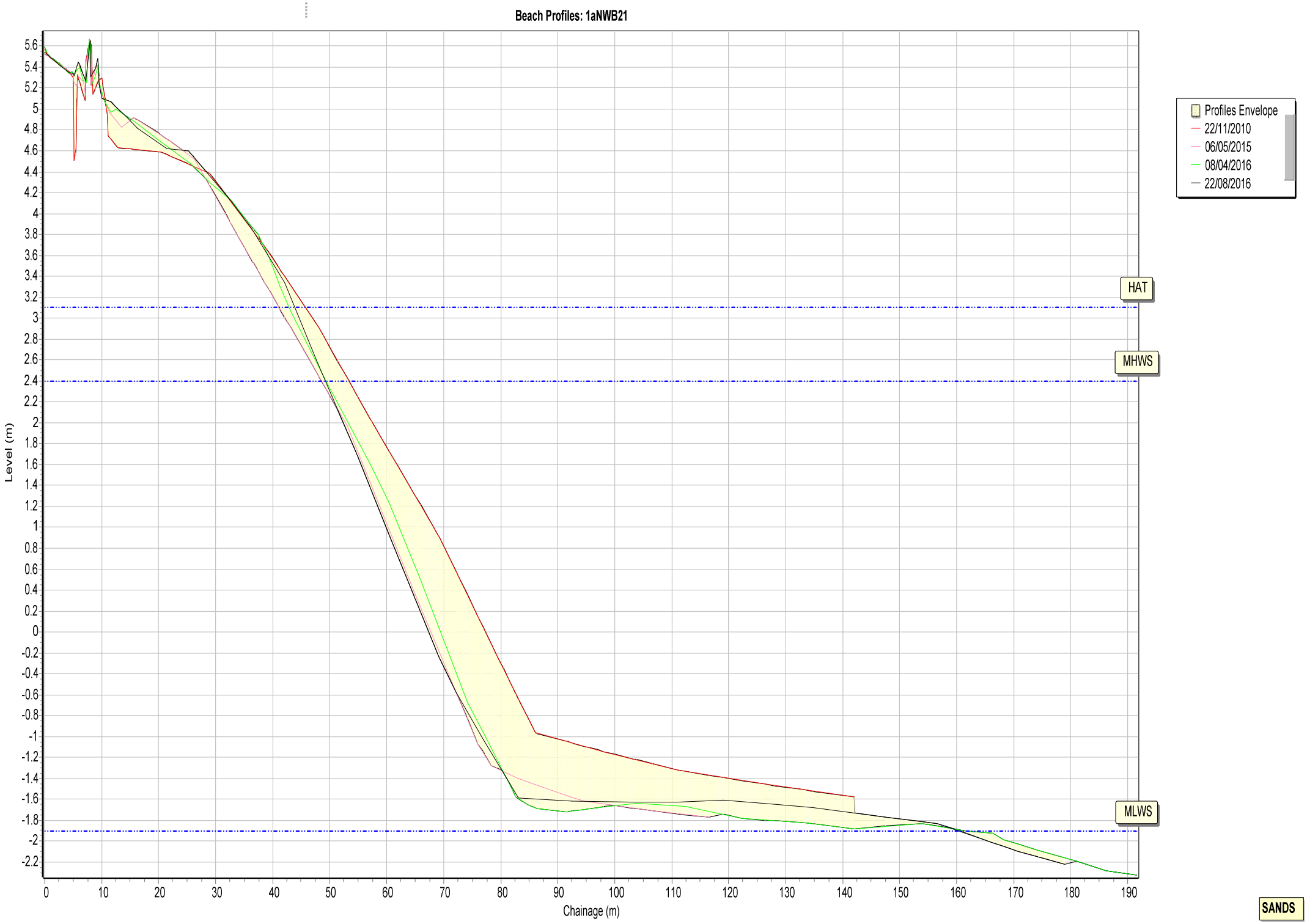
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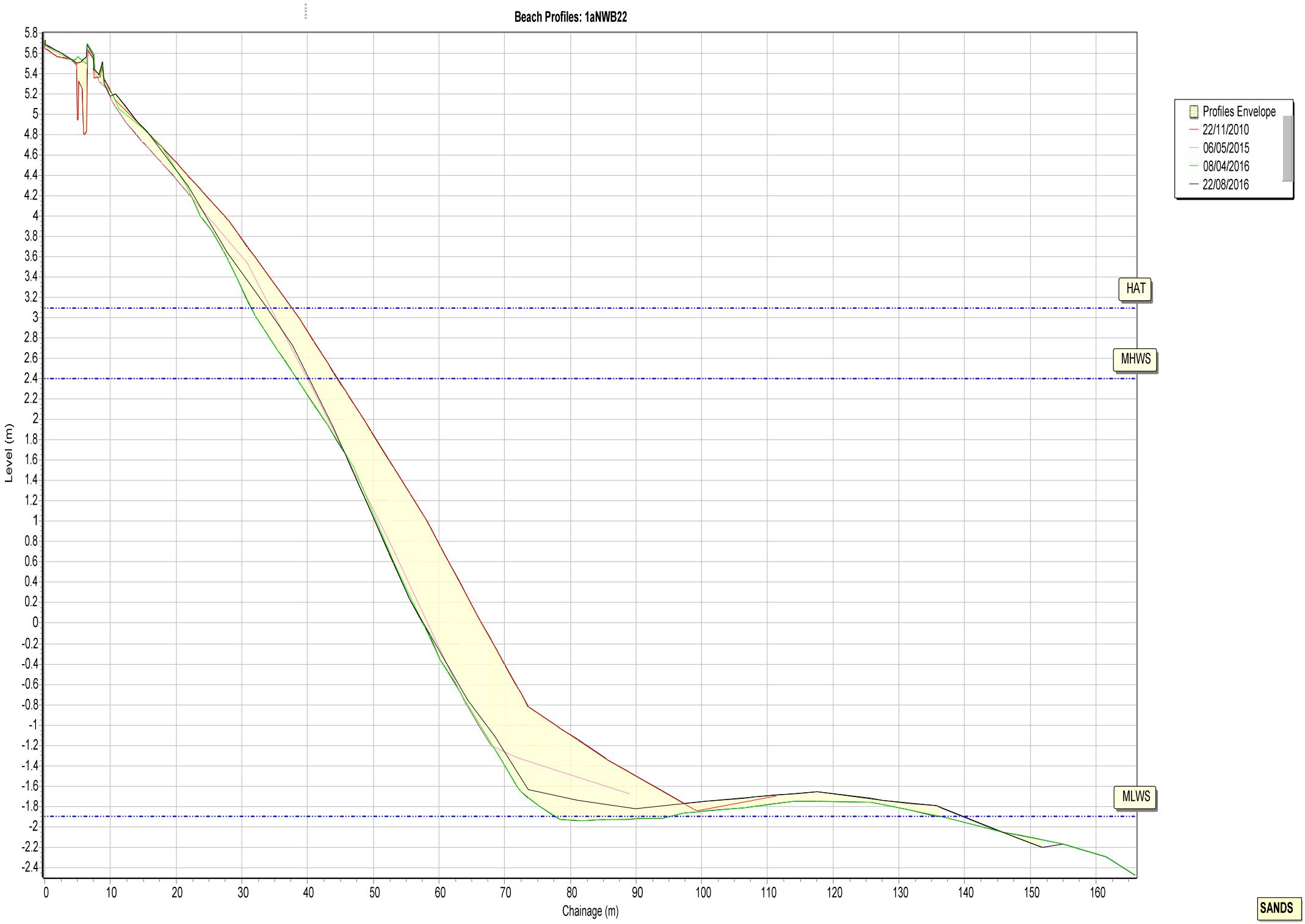
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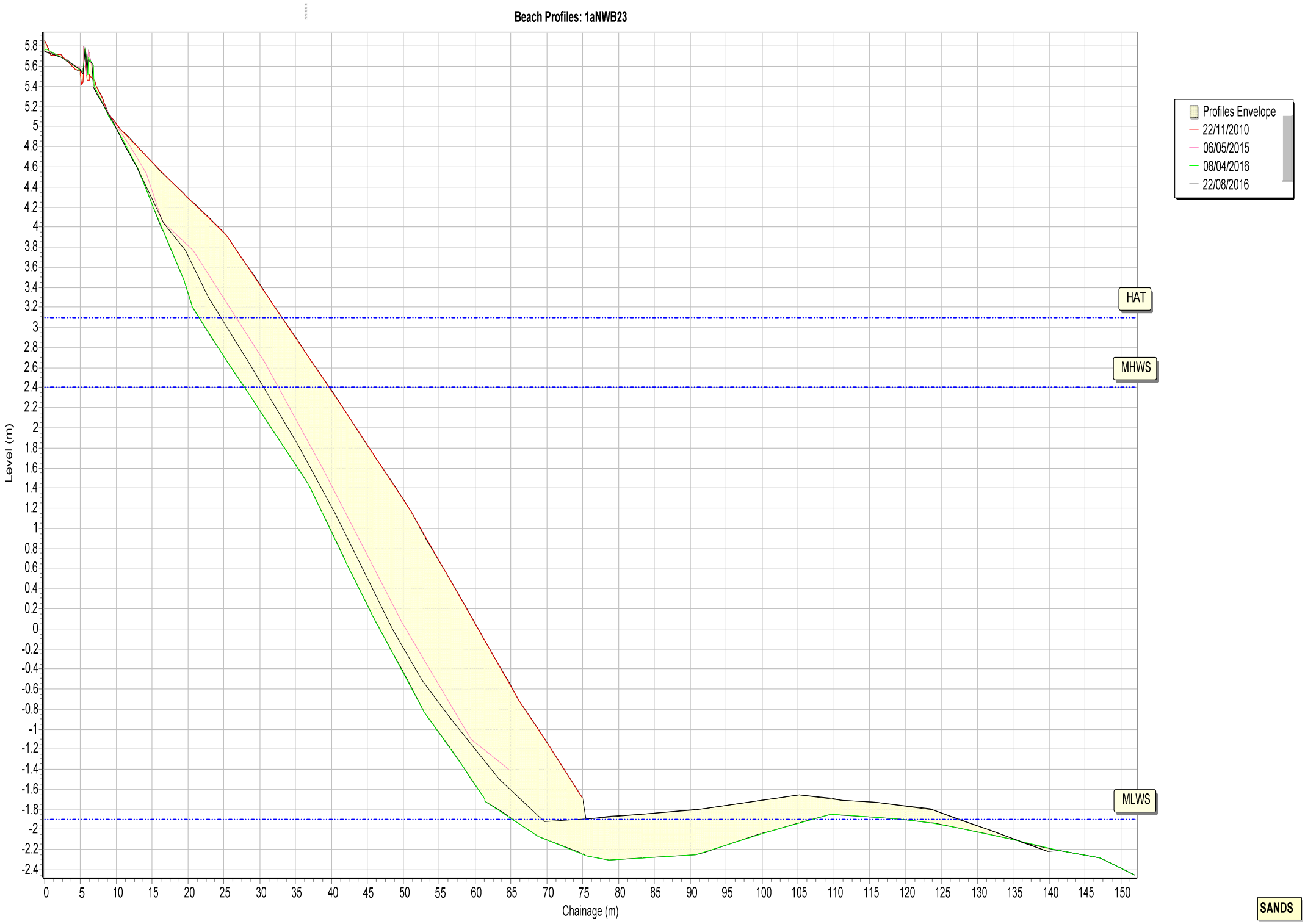
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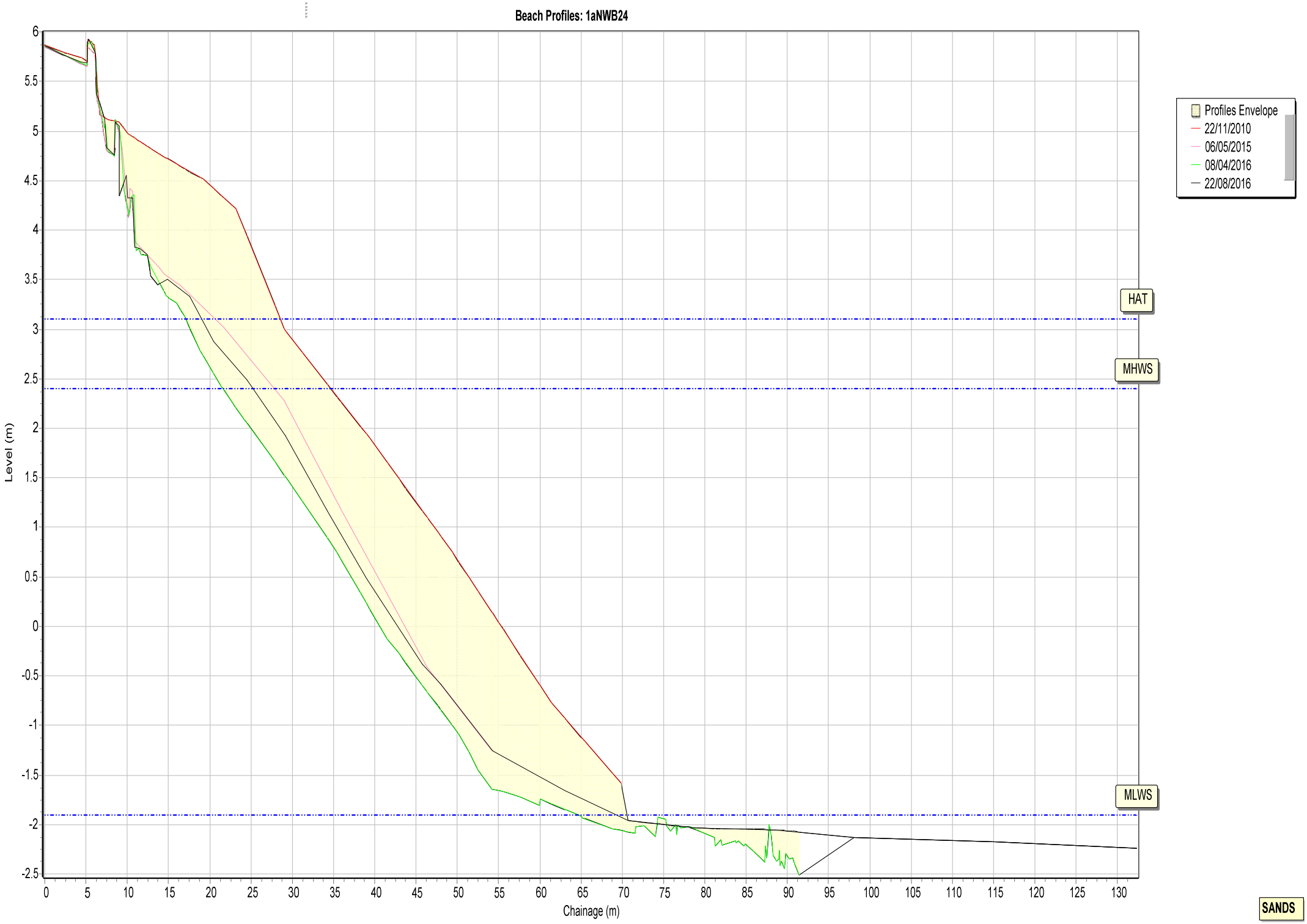
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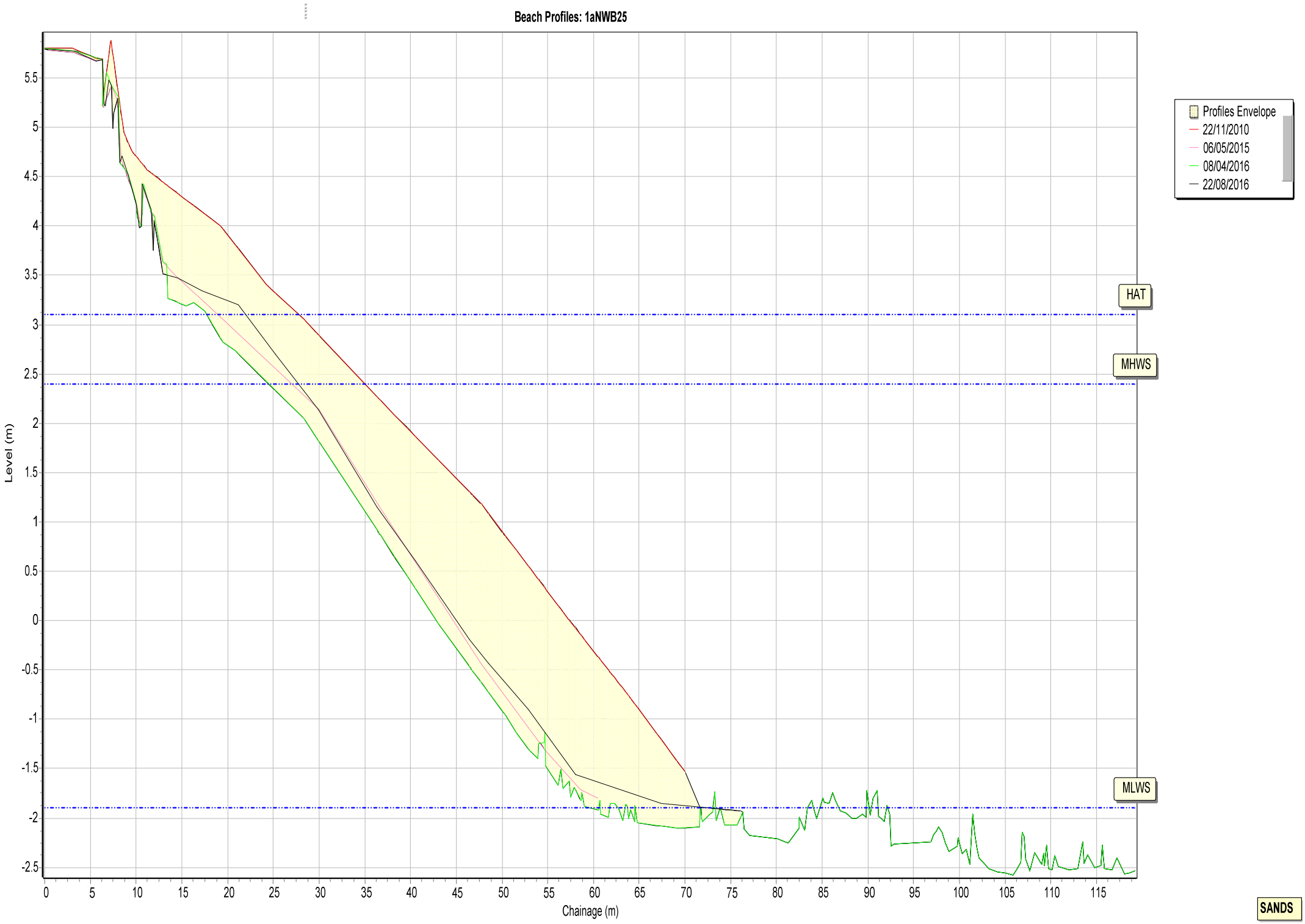
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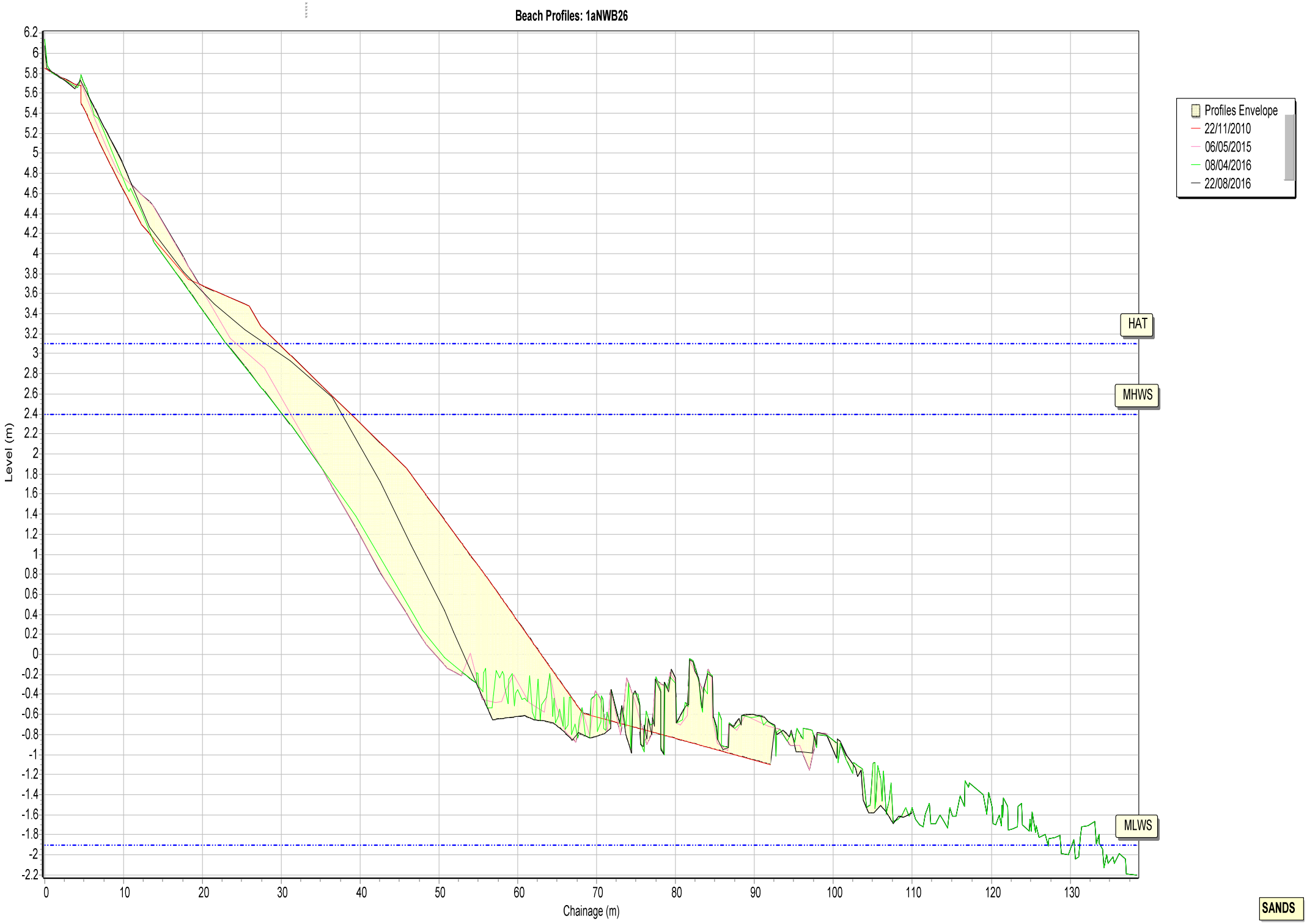
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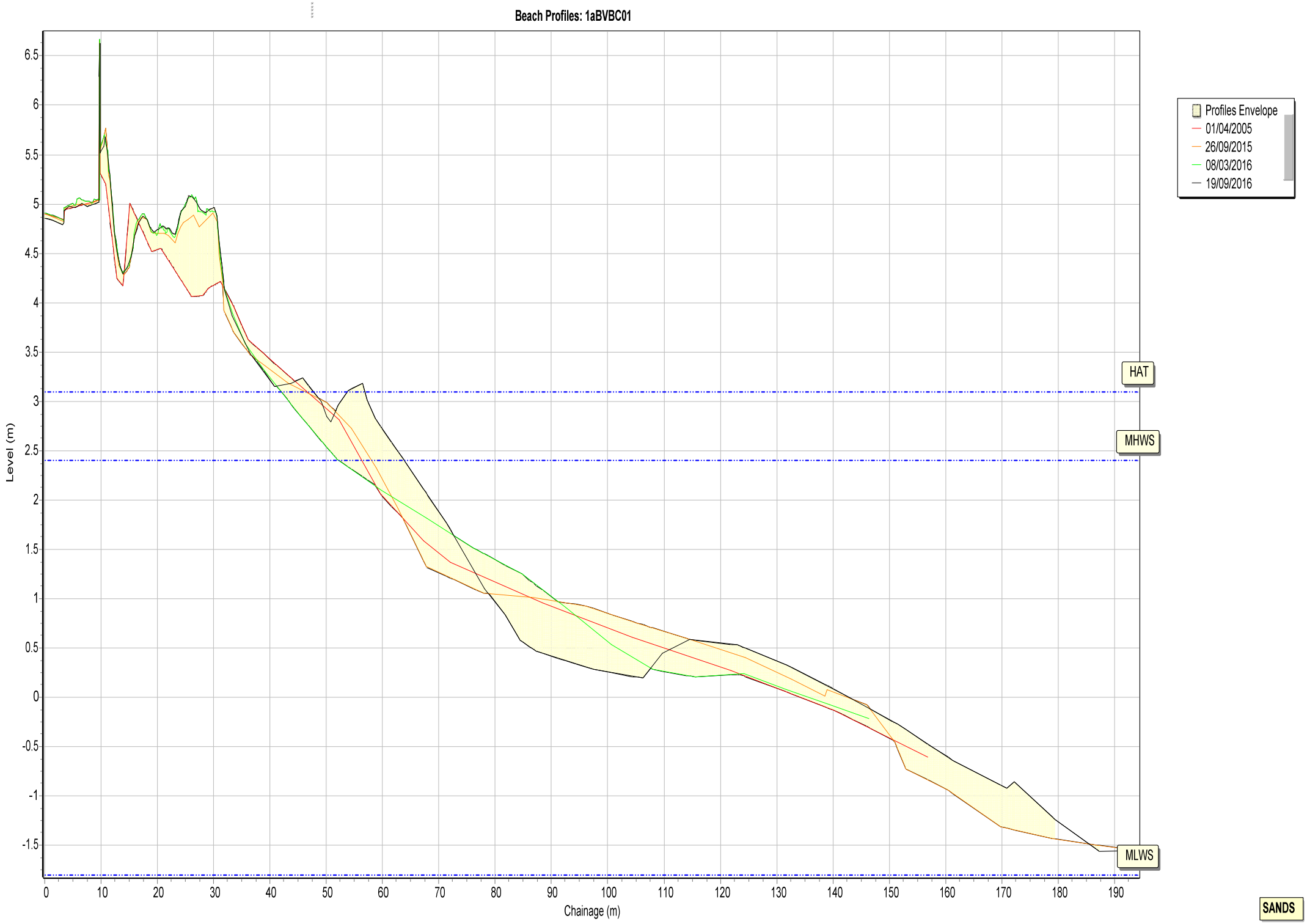
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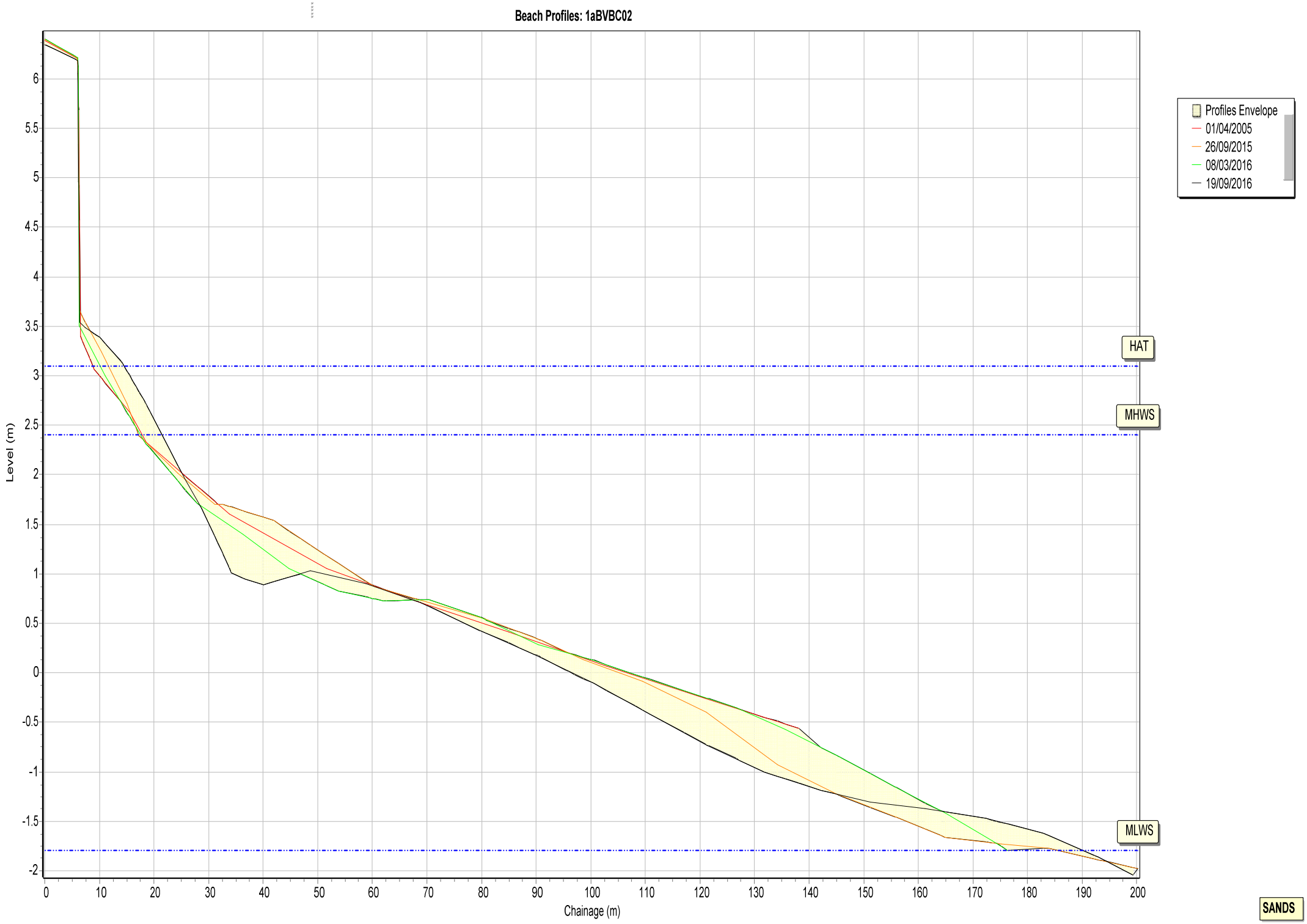
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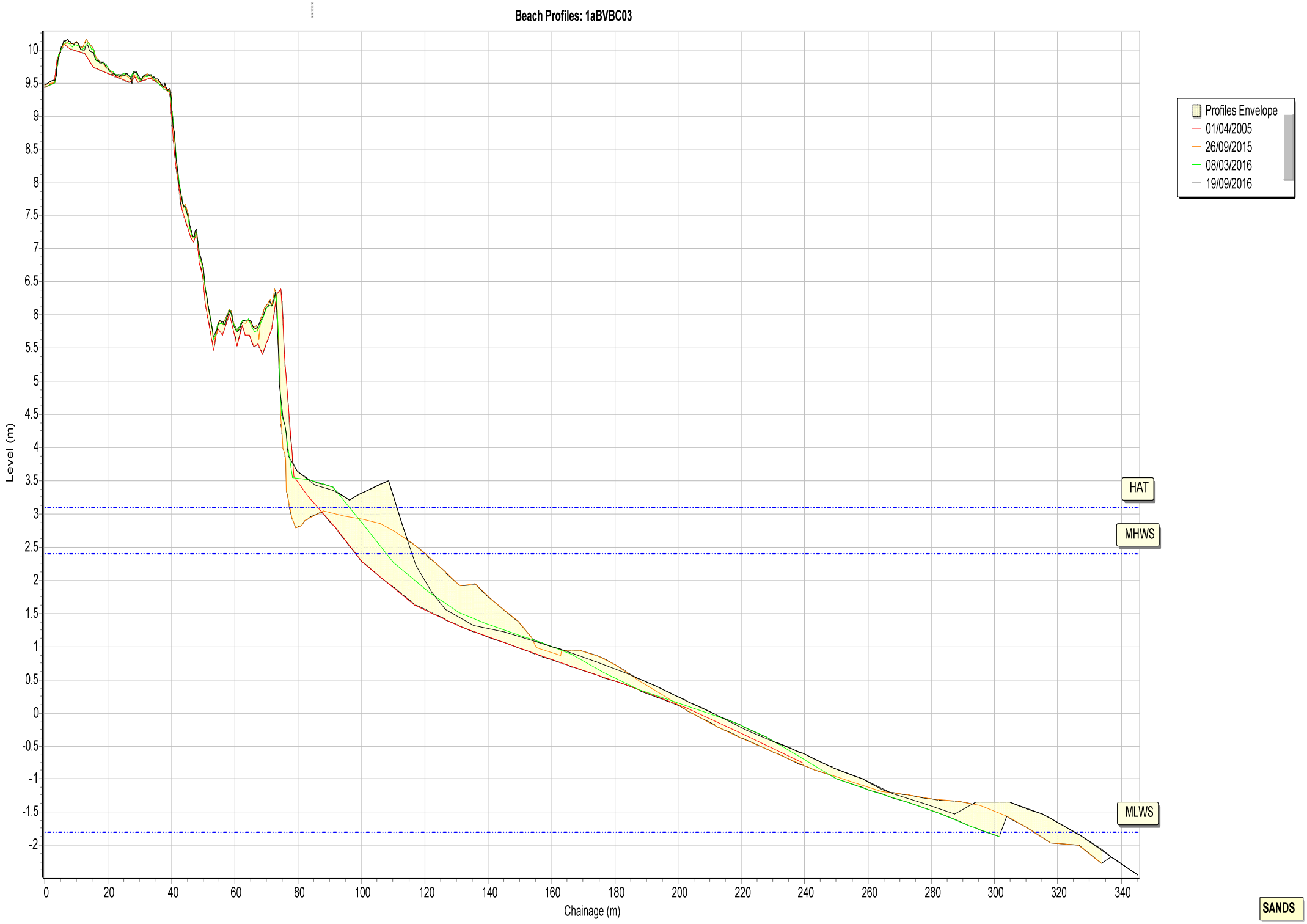
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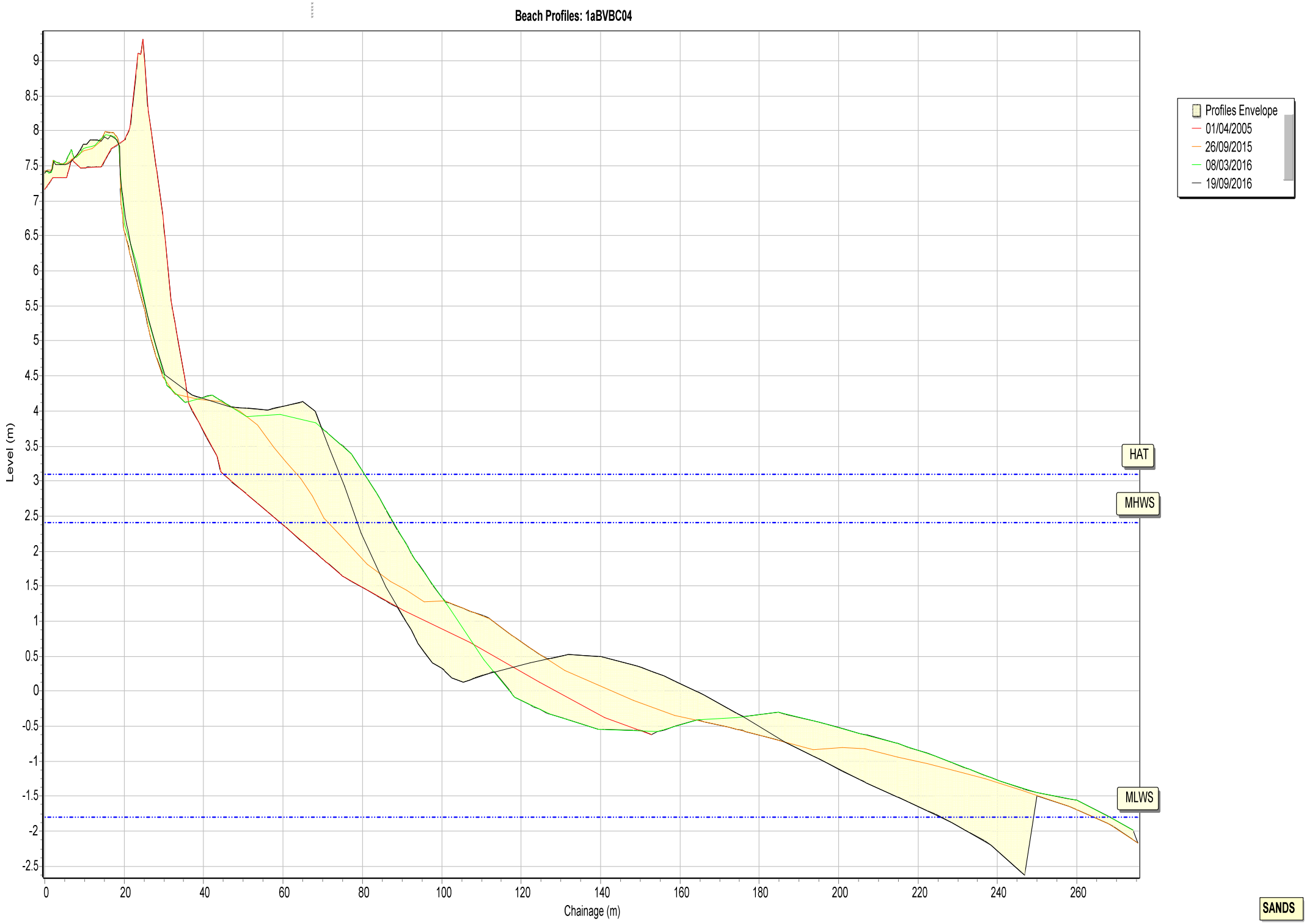
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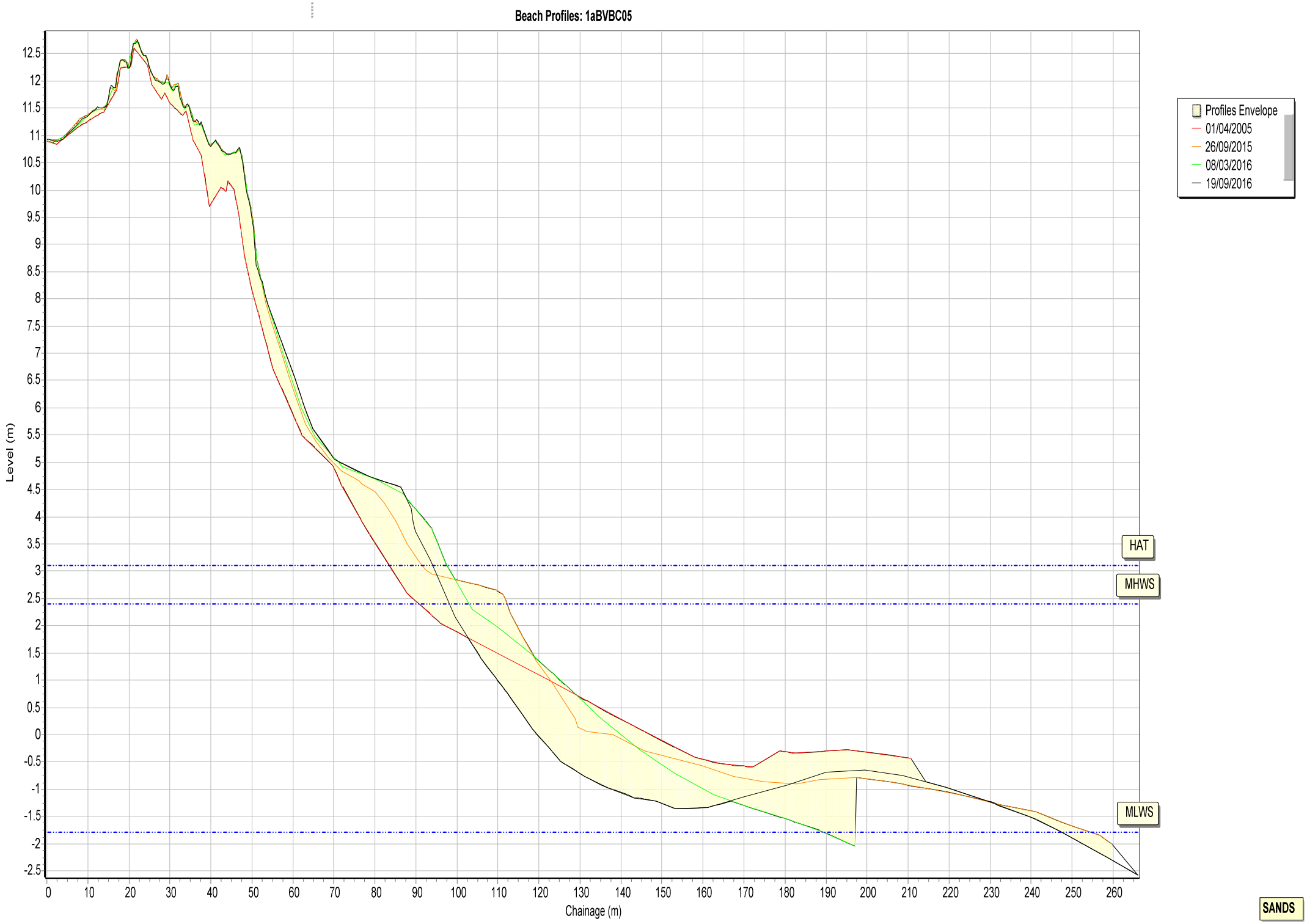
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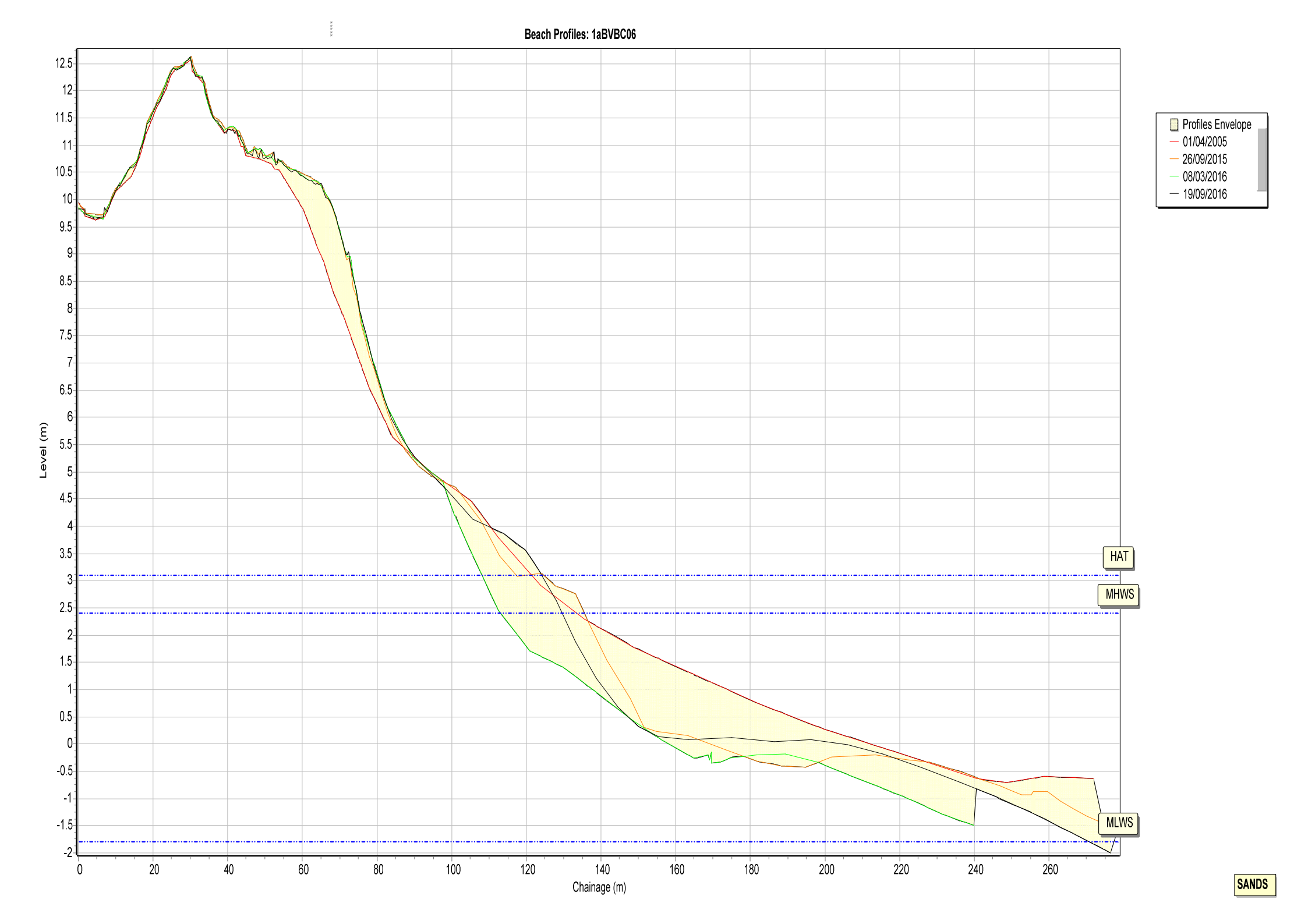
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Chainage (m)
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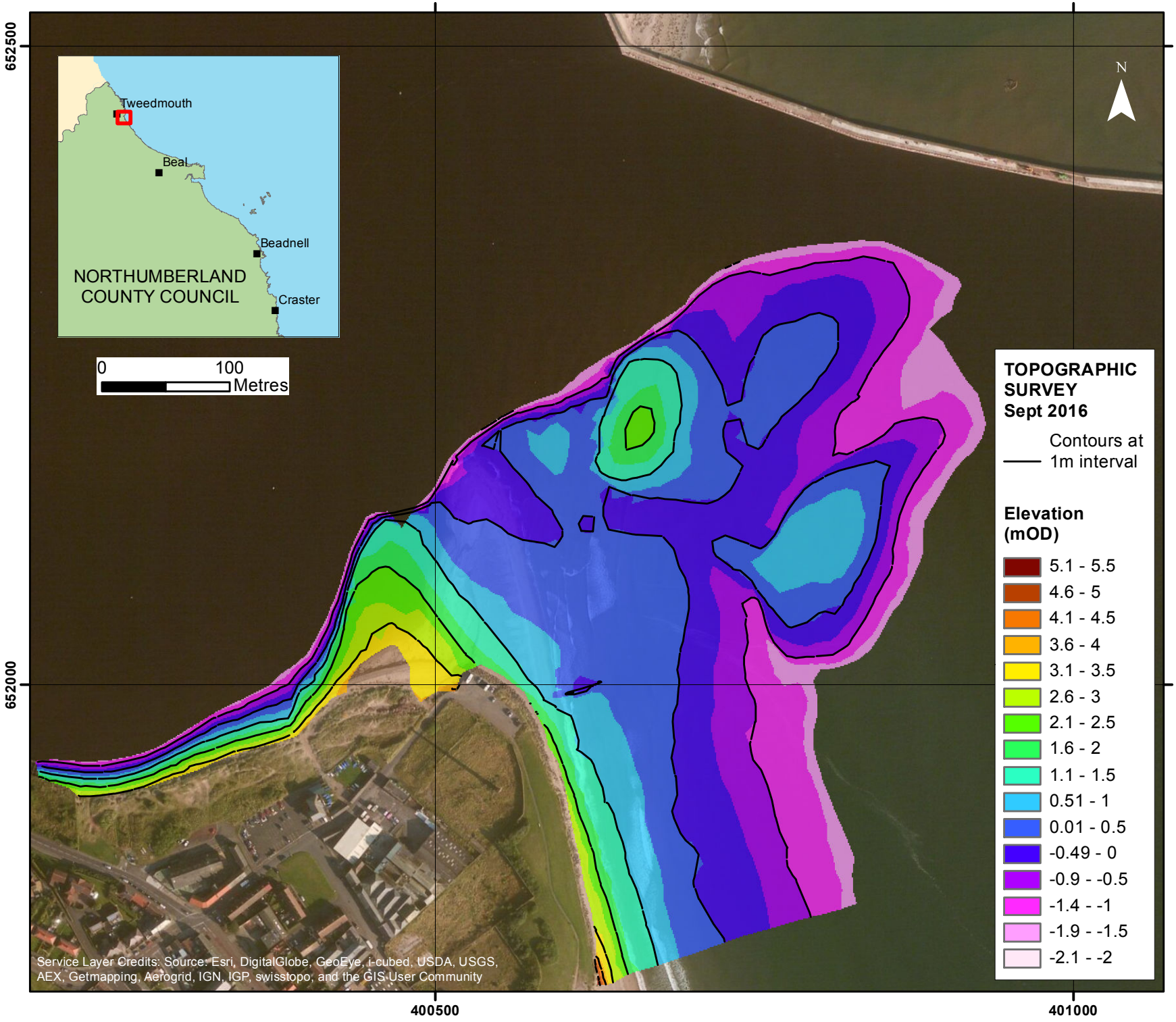
The following sediment feature codes are used on some profile plots:

Code	Description
S	Sand
M	Mud
G	Gravel
GS	Gravel & Sand
MS	Mud & Sand
B	Boulders
R	Rock
SD	Sea Defence
SM	Saltmarsh
W	Water Body
GM	Gravel & Mud
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
ZZ	Unknown

Appendix B

Topographic Survey



Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 1

BERWICK

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2016

Drawing Scale at A4 1:4,000

WATER
Royal HaskoningDHV
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Fax: +44 (0)191 211 1313
www.royalhaskoningdhv.com

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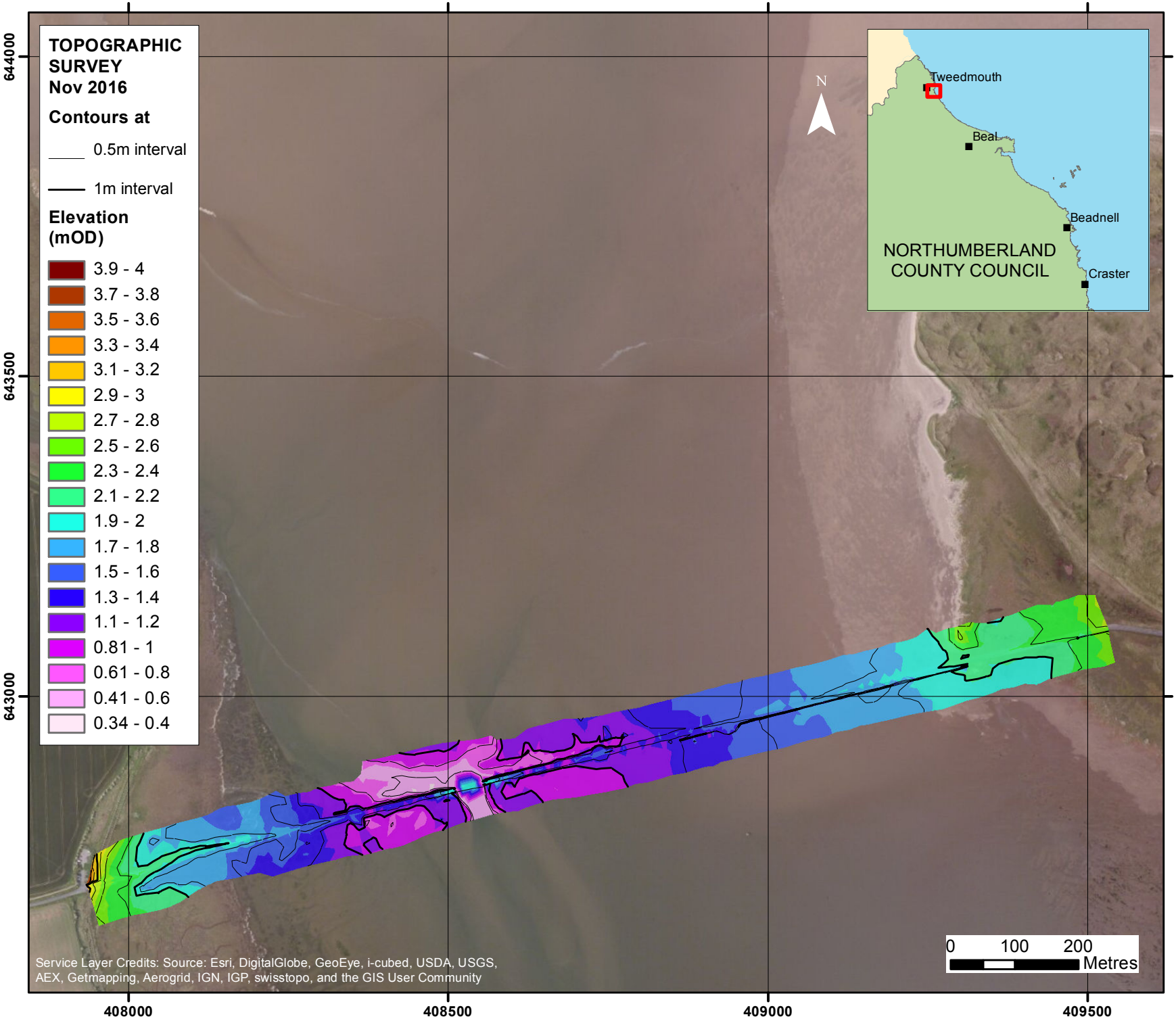

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 2

HOLY ISLAND CAUSEWAY

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2016

Drawing Scale at A4 1:8,000

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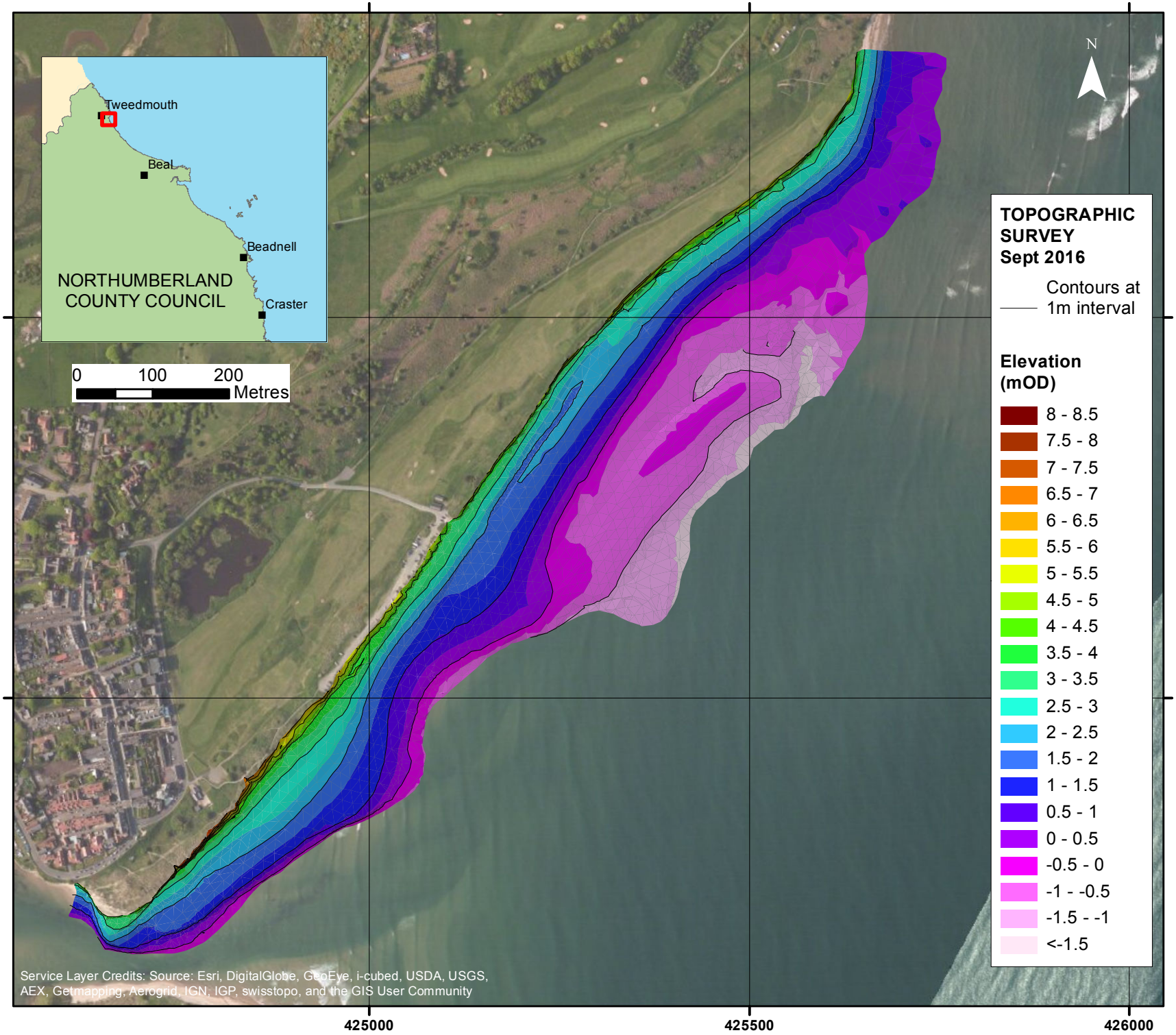

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 3

ALNMOUTH

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2016

Drawing Scale at A4 1:6,821

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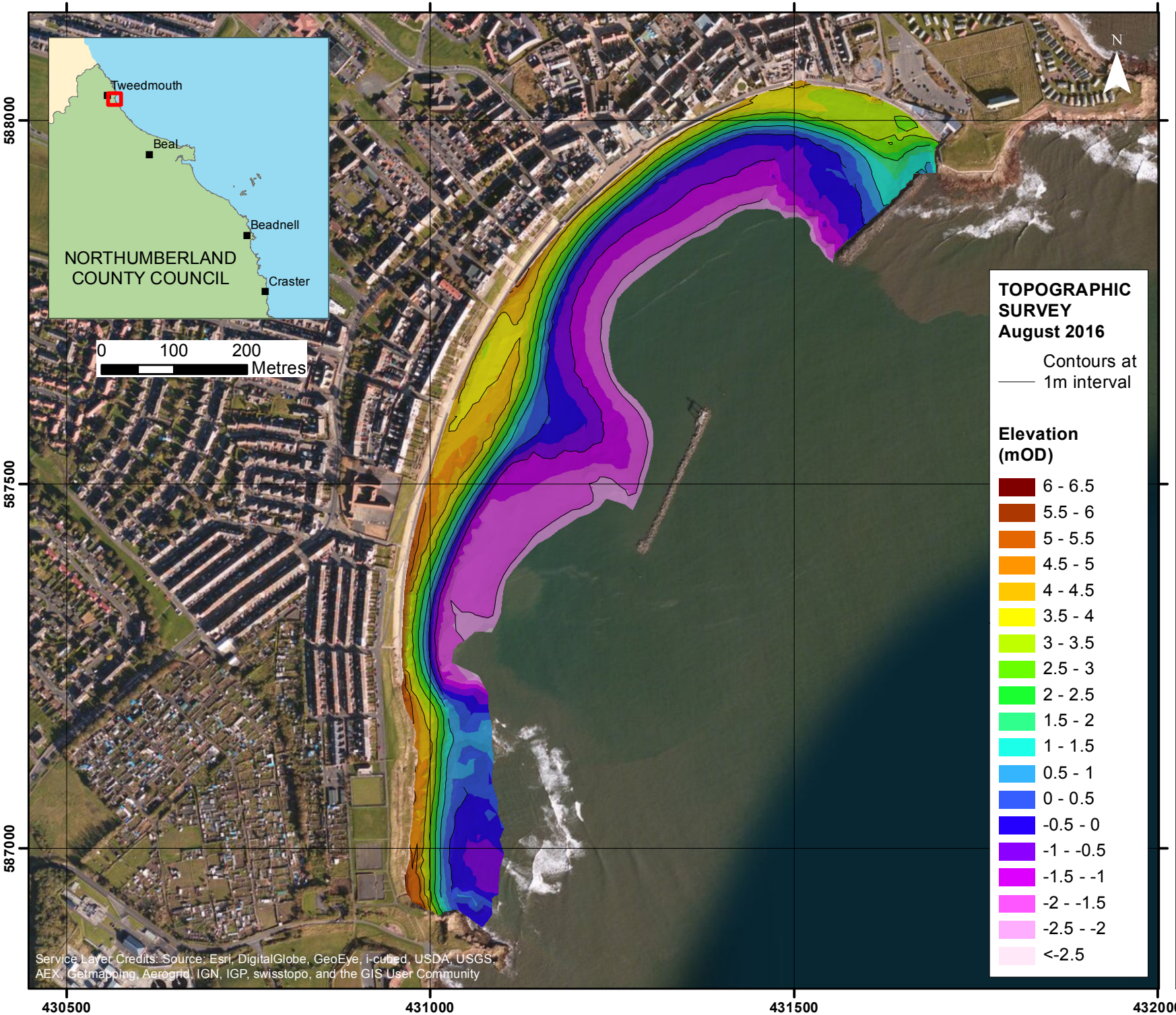

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 4

NEWBIGGIN-BY-THE-SEA

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2016

Drawing Scale at A4 1:7,000

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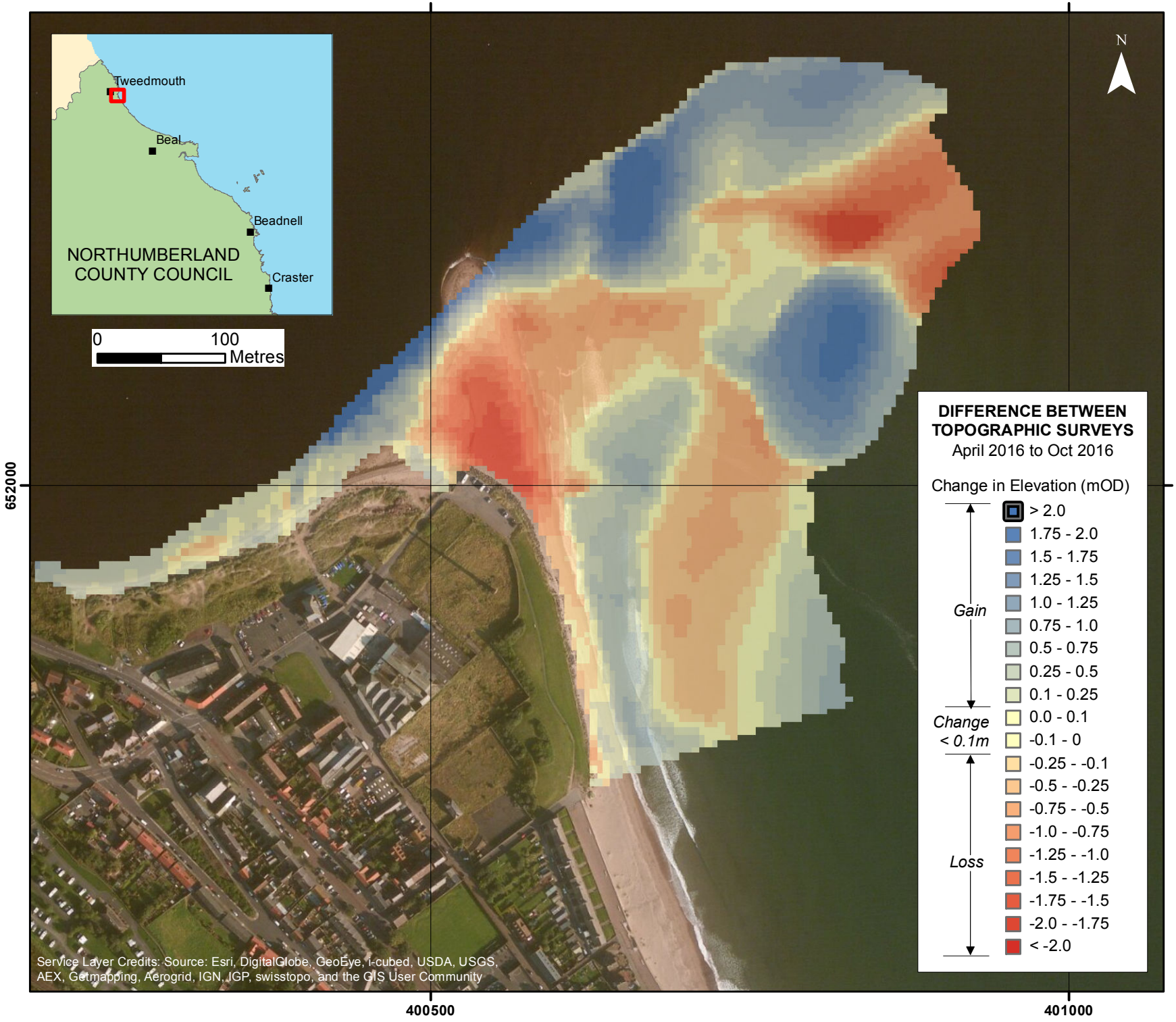

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 5

BERWICK

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2016

Drawing Scale at A4 1:4,000

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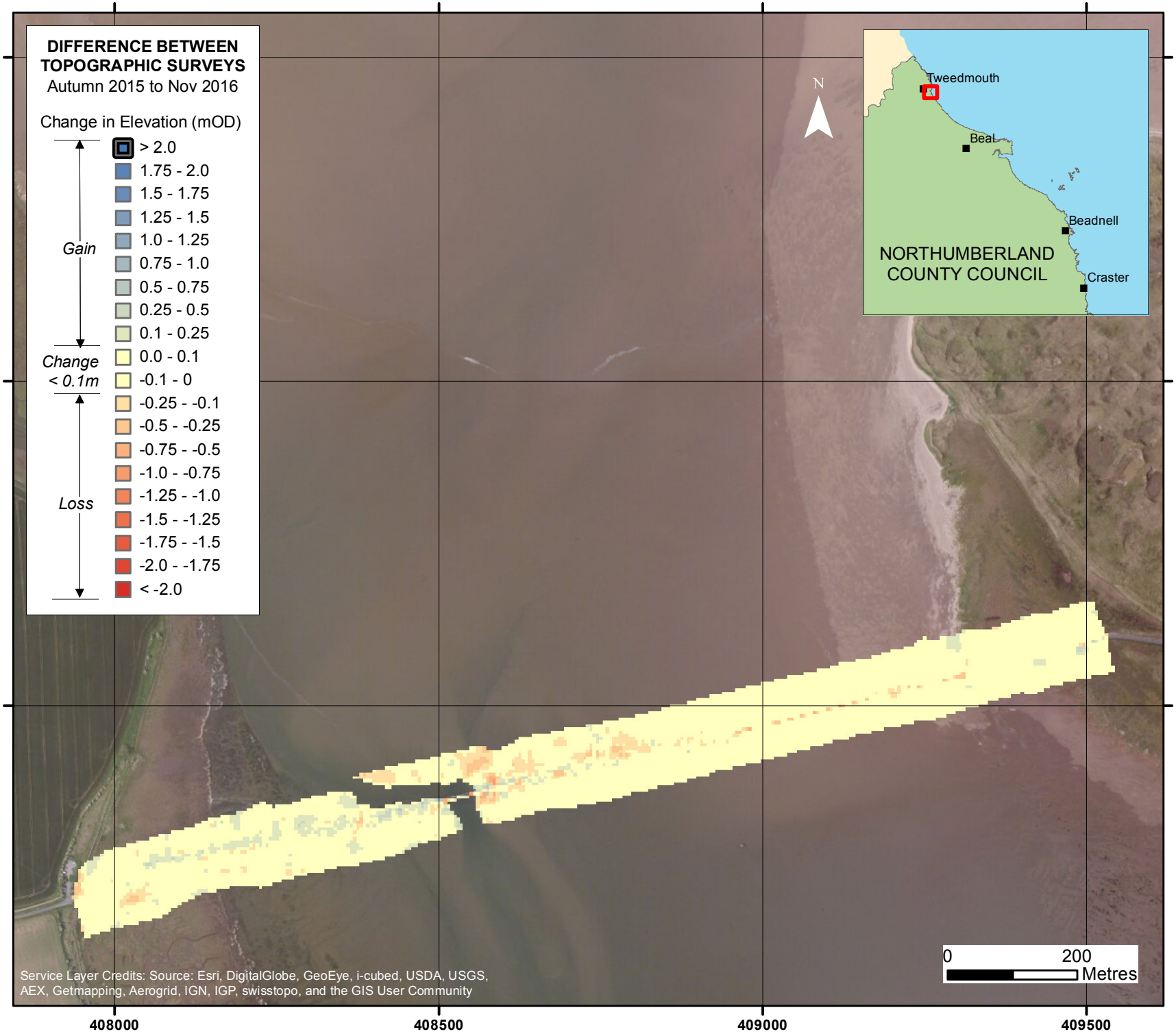

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 6

HOLY ISLAND CAUSEWAY

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2016

Drawing Scale at A4 1:8,000

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www.royalhaskoningdhv.com

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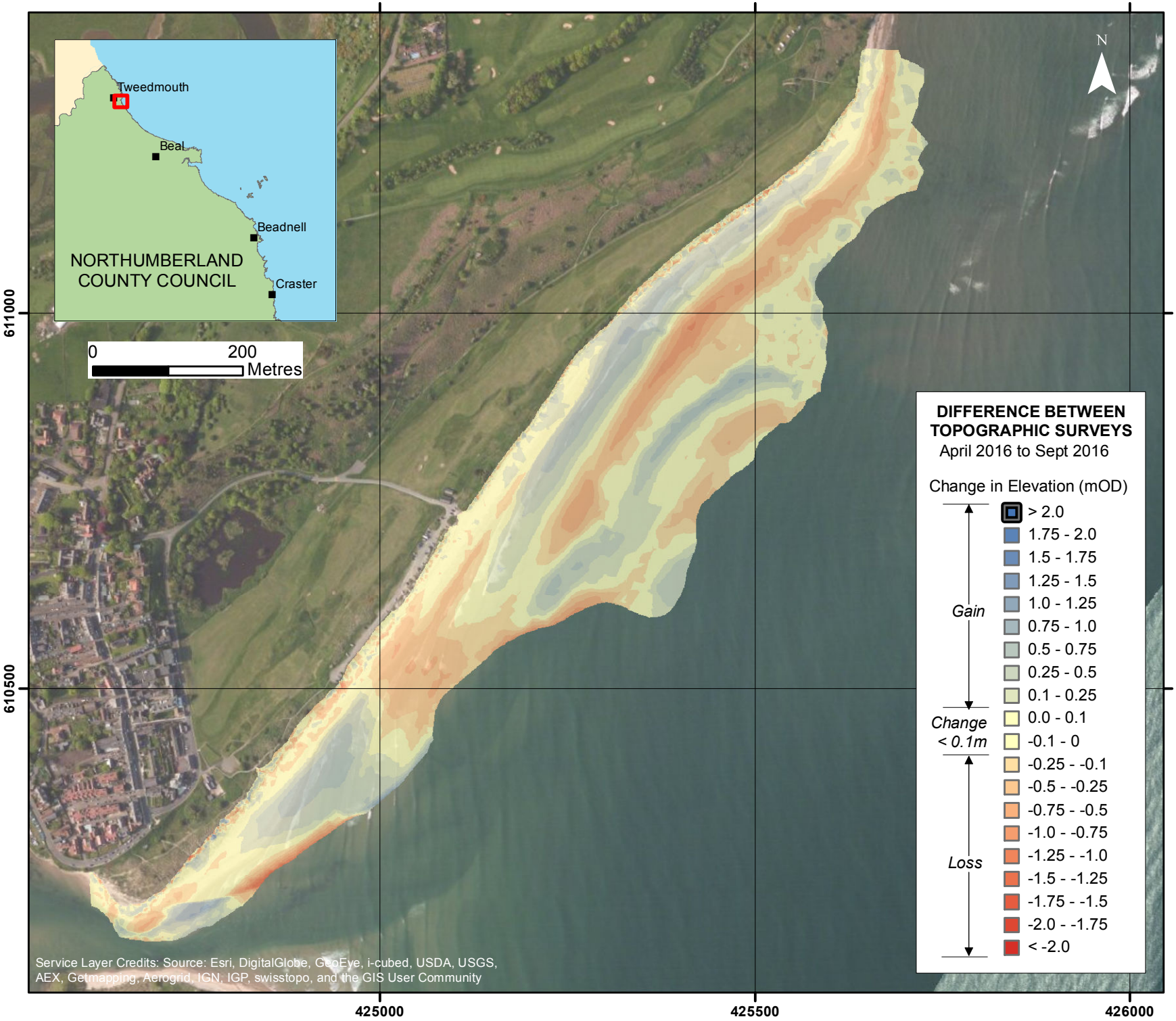

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 7

ALNMOUTH

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2016

Drawing Scale at A4 1:6,821

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Newcastle upon Tyne
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www.royalhaskoningdhv.com

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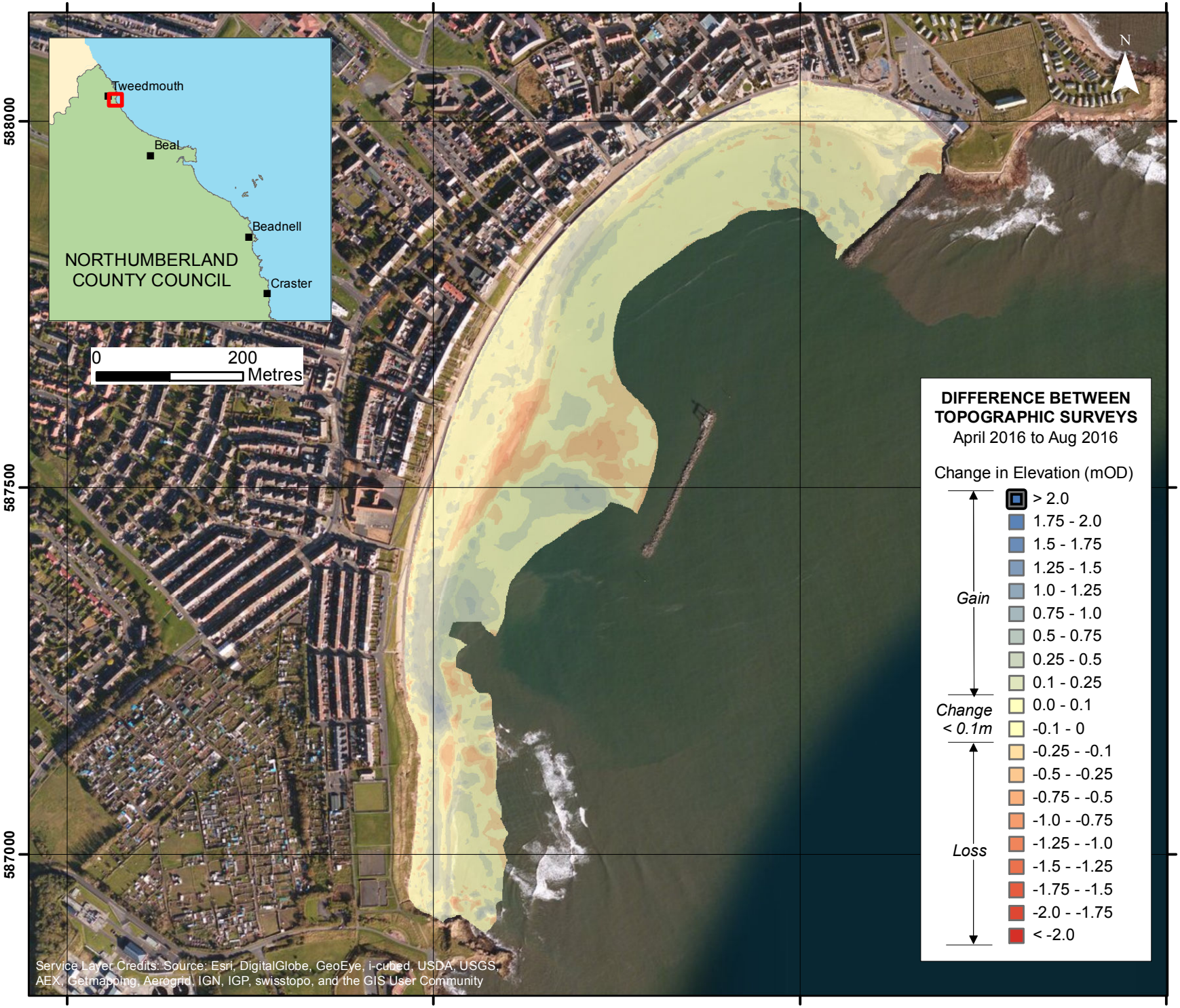

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Appendix B - Map 8

NEWBIGGIN-BY-THE-SEA

Northumberland County Council Frontage

Analytical Report
'Full Measures' Survey 2016

Drawing Scale at A4 1:7,000

WATER
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Appendix C

Cliff Top Survey

Appendix D

Sand Extent Survey