North East Coastal Observatory

Royal HaskoningDHV
Enhancing Society Together

Cell 1 Regional Coastal Monitoring Programme Update Report 12: 'Partial Measures' Survey 2020

HARTLEPOOL BOROUGH COUNCIL

Hartlepool Council

July 2020

Contents

Appendices

List of Figures

List of Tables

Authors	
Alix Scullion	Royal HaskoningDHV
Dr Nick Cooper – Review and Approval	Royal HaskoningDHV

Disclaimer

Royal HaskoningDHV has prepared this report in accordance with the instructions of our client Scarborough Borough Council (SBC) for the client's sole and specific use. Any other persons who use any information contained herein do so at their own risk. Royal HaskoningDHV has used reasonable skill, care and diligence in the interpretation of data provided to them and accepts no responsibility for the content, quality or accuracy of any Third party reports, monitoring data or further information provided either to them by SBC or, via SBC from a Third party source, for analysis under this term contract.

Data and reports collected as part of the Cell 1 Regional Coastal Monitoring Programme are available to download via the North East Coastal Observatory via the webpage: www.northeastcoastalobservatory.org.uk.

The North East Coastal Observatory does not "license" the use of images or data or sign license agreements. The North East Coastal Observatory generally has no objection to the reproduction and use of these materials (aerial photography, wave data, beach surveys, bathymetric surveys, reports), subject to the following conditions:

1. North East Coastal Observatory material may not be used to state or imply the endorsement by North East Coastal Observatory or by any North East Coastal Observatory employee of a commercial product, service, or activity, or used in any manner that might mislead.

2. North East Coastal Observatory should be acknowledged as the source of the material in any use of images and data accessed through this website, please state "Image/Data courtesy of North East Coastal Observatory". We recommend that the caption for any image and data published includes our website, so that others can locate or obtain copies when needed. We always appreciate notification of beneficial uses of images and data within your applications. This will help us continue to maintain these freely available services. Send e-mail to Robin.Siddle@scarborough.gov.uk

3. It is unlawful to falsely claim copyright or other rights in North East Coastal Observatory material.

4. North East Coastal Observatory shall in no way be liable for any costs, expenses, claims, or demands arising out of the use of North East Coastal Observatory material by a recipient or a recipient's distributees.

5. North East Coastal Observatory does not indemnify nor hold harmless users of North East Coastal Observatory material, nor release such users from copyright infringement, nor grant exclusive use rights with respect to North East Coastal Observatory material.

6. North East Coastal Observatory material is not protected by copyright unless noted (in associated metadata). If copyrighted, permission should be obtained from the copyright owner prior to use. If not copyrighted, North East Coastal Observatory material may be reproduced and distributed without further permission from North East Coastal Observatory.

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 (m AOD)			
Water Level Parameter	**River Tyne to Frenchman's Bay**	**Frenchman's Bay to Souter Point**	**Souter Point to Chourdon Point**	**Chourdon Point to Hartlepool Headland**
1 in 200 year	3.41	3.44	3.66	3.91
HAT	2.85	2.88	3.18	3.30
MHWS	2.15	2.18	2.48	2.70
MLWS	-2.15	-2.12	-1.92	-1.90
	Water Level (m AOD)			
Water Level Parameter	**Hartlepool Headland to Saltburn Scar**	**Skinningrove**	**Hummersea Scar to Sandsend Ness**	**Sandsend Ness to Saltwick Nab**
1 in 200 year	3.87	3.86	4.1	3.88
HAT	3.25	3.18	3.15	3.10
MHWS	2.65	2.68	2.65	2.60
MLWS	-1.95	-2.13	-2.15	-2.20

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

Glossary of Terms

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

Preamble

The Cell 1 Regional Coastal Monitoring Programme covers approximately 300km of the north east coastline, from the Scottish Border (just south of St. Abb's Head) to Flamborough Head in East Yorkshire. This coastline is often referred to as 'Coastal Sediment Cell 1' in England and Wales (Figure 1).

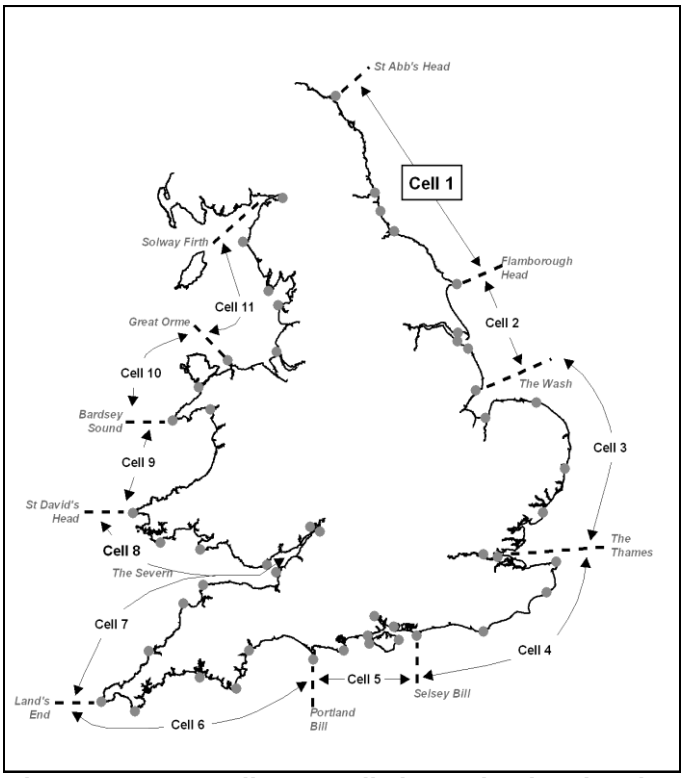


Figure 1 Sediment Cells in England and Wales

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
- LiDAR surveys
- walk-over cliff and coastal defence asset surveys

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

Table 1 Analytical, Update and Overview Reports Produced to Date

Year		Full Measures		Partial Measures		Cell 1 Overview Report
		Survey	Analytical Report	Survey	Update Report	
1	2008/09	Sep-Dec 08	May 09	Mar-May 09		-
2	2009/10	Sep-Dec 09	Mar 10	Feb-Mar 10	Jul 10	-
3	2010/11	Aug-Nov 10	Feb 11	Feb-Apr 11	Aug 11	Sep 11
4	2011/12	Sep-Oct 11	Oct 12	Mar-May 12	Oct 12	-
5	2012/13	Sep 12	Jan 13	Apr 13	May 13	-
6	2013/14	Sep-Oct 14	Feb 14	Mar 13	Jul 14	-
7	2014/15	Sep-Oct 14	Feb 15	Apr 15	Jun 15	-
8	2015/16	Aug 15	Feb 16	Apr 16	Jul 16	Jun 16
9	2016/17	Aug-Sep 16	Feb 17	Apr 17	Jul 17	
10	2017/18	Sep-Nov 17	Feb 18	Mar 18	May 18	Nov 18
11	2018/19	Aug-Oct 18	Feb 19	Feb 19	May 19	
12	2019/20	Sep-Oct 19	Nov 19	May 20	Jul 20(*)	

(*) The present report is **Update Report 12** and provides an analysis of the 2020 Partial Measures survey for Hartlepool Council's frontage.

1. Introduction

1.1 Study Area

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

- North Sands
- Hartlepool Headland
- Middleton
- Hartlepool Bay

1.2 Methodology

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

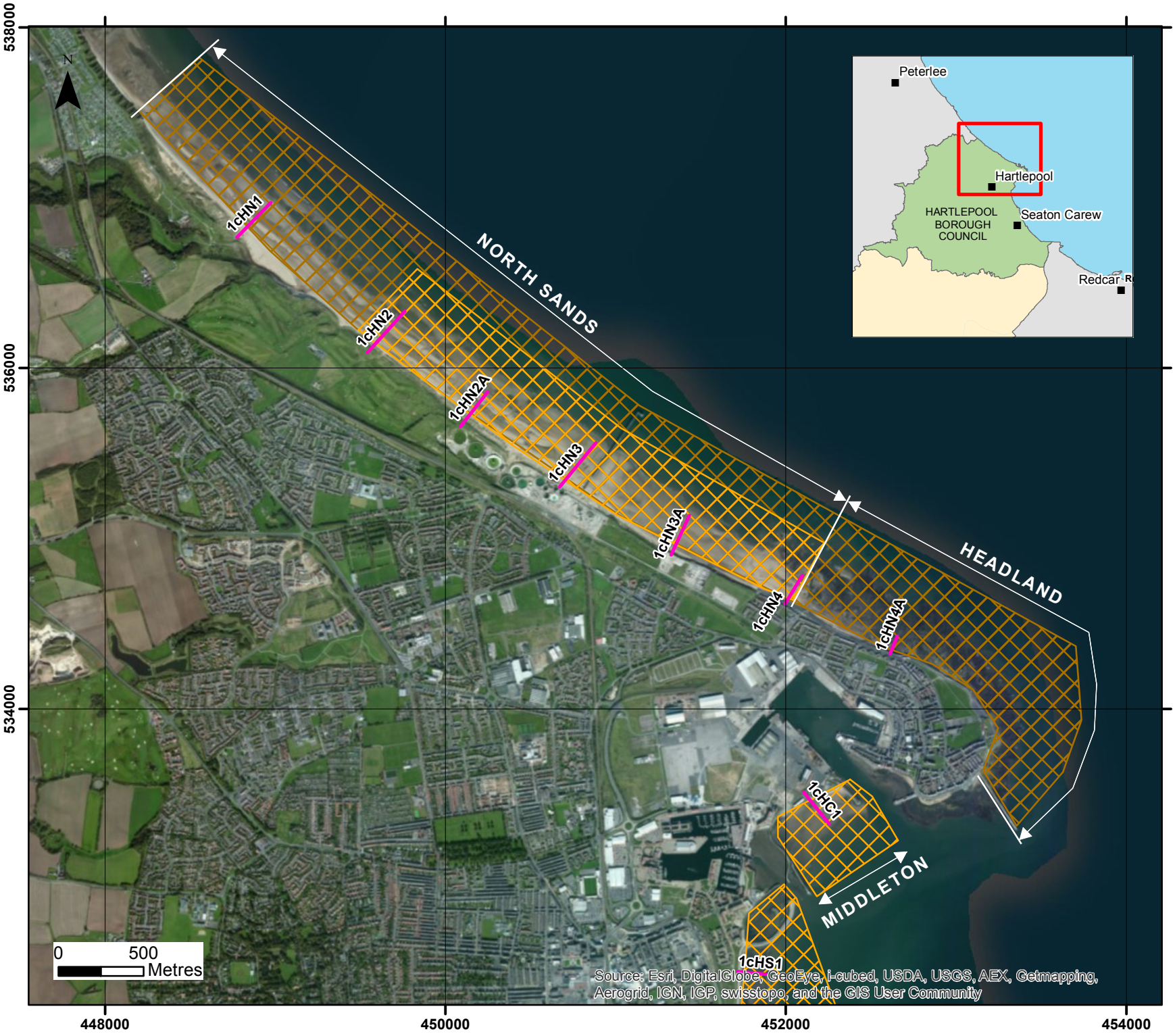
- Full Measures survey annually each autumn/early winter comprising:
    - Beach profile surveys along twelve transect lines
    - Topographic survey along part of North Sands (referred to as Hartlepool North)
    - Topographic survey along Middleton (referred to as Hartlepool Central)
    - Topographic survey along Hartlepool Bay (referred to as Hartlepool South)

- Partial Measures survey annually each spring comprising:
    - Beach profile surveys along twelve transect lines

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

The location of these surveys is shown in Figure 2. The Partial Measures survey was undertaken along this frontage on the 21st and 22nd May 2020. During this time weather conditions were dry and sunny with a slight sea state and wind force 4-7 from the south-west. Full details of the weather conditions can be found in the surveyor's reports.

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



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 Hartlepool Borough Council Frontage

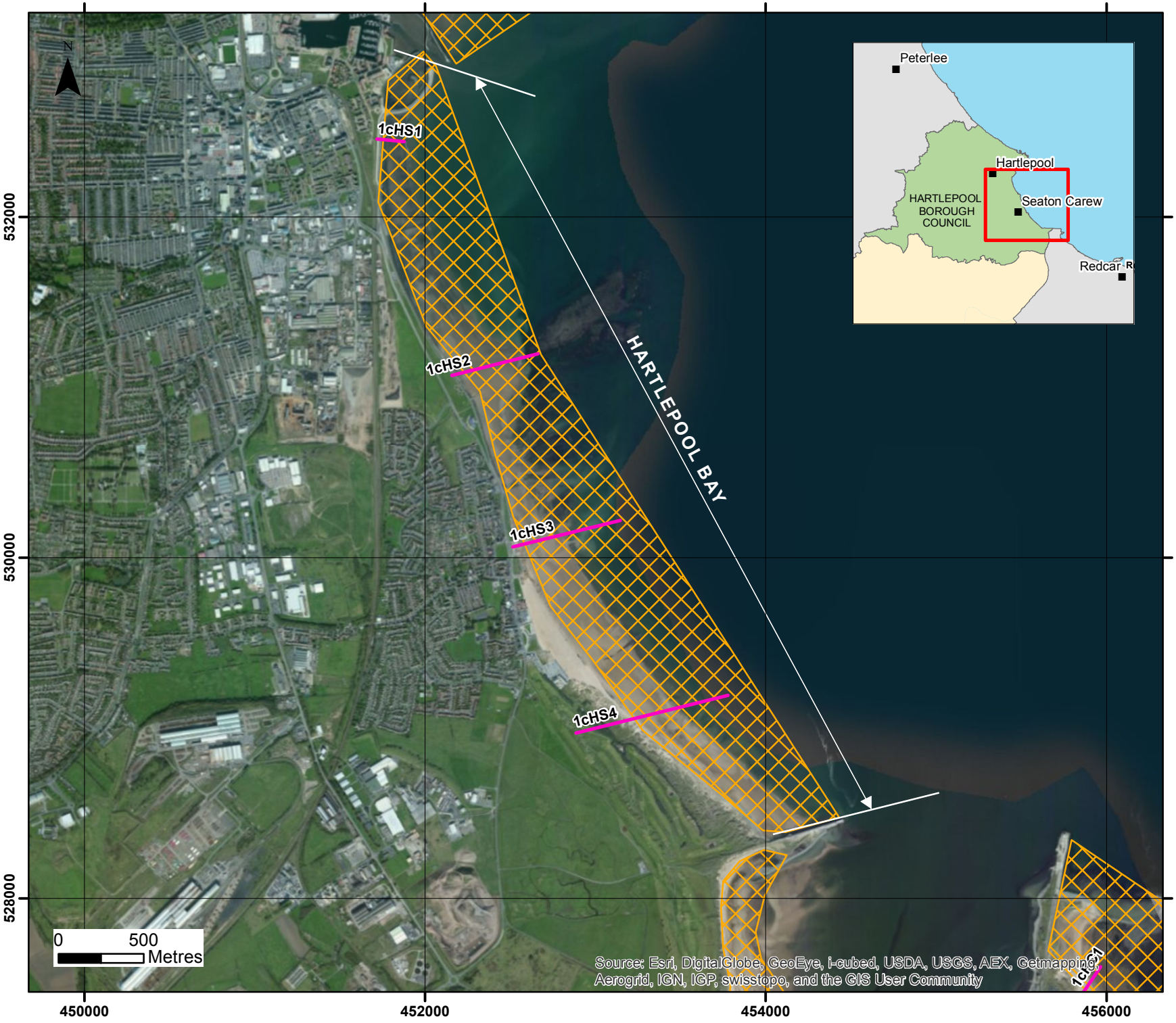
Analytical Report
Topo Surveys

Drawing Scale at A4 1:30,000

WATER
Royal HaskoningDHV
Marlborough House
Marlborough Crescent
Newcastle upon Tyne
NE1 4EE

Tel: +44 (0)191 211 1300
Fax: +44 (0)191 211 1313
www.royalhaskoningdhv.com

Royal HaskoningDHV
Enhancing Society Together



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 Hartlepool Borough Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:30,000

WATER
Royal HaskoningDHV
Marlborough House
Marlborough Crescent
Newcastle upon Tyne
NE1 4EE

Tel: +44 (0)191 211 1300
Fax: +44 (0)191 211 1313
www.royalhaskoningdhv.com

Royal HaskoningDHV
Enhancing Society Together

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 Hartlepool Borough Council Frontage

Analytical Report
Topo Surveys

Drawing Scale at A4 1:12,000

WATER
Royal HaskoningDHV
Marlborough House
Marlborough Crescent
Newcastle upon Tyne
NE1 4EE

Tel: +44 (0)191 211 1300
Fax: +44 (0)191 211 1313
www.royalhaskoningdhv.com

Royal HaskoningDHV
Enhancing Society Together

2. Analysis of Survey Data

2.1 North Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
21st May 2020	**Beach Profiles:** North Sands is covered by six beach profile lines during the Partial Measures survey (Appendix A) that were last surveyed in September 2019. **Profile 1cHN1** is located within Durham County Council's jurisdiction, c. 400m north of the outfall of Crimdon Beck. It is reported here so changes can be interpreted in association with those observed elsewhere along North Sands. The beginning of the profile between 0m and 45m chainage covers dunes and has not changed since the previous survey. The front dune at chainage 50m has accreted by up to 0.2m since the previous survey, with very little change to the dune face to chainage 66m. Between chainage 66m and 111m the upper beach has a smoothened profile, with erosion of an upper beach berm by up to 1.0m and infilling of a hollow at chainage 145m by up to 1.2m. Similarly on the middle to low beach, a berm has been eroded by up to 0.6m and a berm has formed at chainage 280m with an accretion of up to 1.0m. The beach toe has extended by 72m. Overall the profile is at a medium level compared to the range recorded from previous surveys, although it is at a higher level in the in the vicinity of the lower beach berm, particularly between chainages 275-335m which is at its highest level recorded. Profile **1cHN2** covers the dune between chainage 0m and 52m. From chainage 52m to 82m the beach level has lowered by up to 0.5m. Between chainage 82m and 141m a hollow has infilled by up to 0.6m, switching to erosion by up to 0.3m to chainage 201m. On the mid to lower beach the beach level has increased between chainages 201-250m by up to 0.2m, once again switching to erosion at the beach toe by up to 0.3m. The beach toe has moved landward by approximately 30m. Overall, the beach profile is at a medium level compared to the range recorded from previous surveys, and the beach toe is at one of the most landward positions recorded. **Profile 1cHN2A** was established in October 2011 and runs through the dunes close to North Sands. The area of dunes between 0m and 70m chainage has remained reasonably stable. Between 70m and	The profiles are generally at a medium-low level, with several profiles experiencing drawdown of sediment from the upper beach to the middle and lower beach profile. This pattern is typical of winter conditions. **Longer term trends:** Following dune erosion over the winter of 2013/14 the areas with dunes have remained stable. At HN1, 2, 2A and 3A the beach levels are medium compared with previous years. At profiles HN3, 4 and 4A the beach is low compared with previous profiles for at least some of the profile. The fluctuation in the veneer beach continues so that parts of the shore platform in the south of the bay have become exposed.

Survey Date	Description of Changes Since Last Survey	Interpretation
	85m the toe of the foredunes has accreted by approximately 0.3m over the winter of 2019. The dune face remains at its most landward position following 12m of erosion since 2011. The beach profile shows accretion of up to 1.1m on the upper beach between chainage 90m and 135m, and up to 0.4m on the lower beach between chainage 215m and 256m. The middle beach has lowered by up to 0.3m. Seaward of chainage 256m the beach toe has lowered by 0.4m and moved landward by approximately 29m. Overall the beach is at a medium level compared to the range recorded from previous surveys. At **Profile 1cHN3** there has been little change to the dunes to chainage 44m. There has been alternating sections of erosion and accretion across the beach profile. Erosion has occurred on the upper, mid to upper, and lower beach by up to 0.6m. There are two sections of accretion between chainages 75-103m and 170-220m by up to 0.3m and the beach toe has moved landward by approximately 30m. The profile is at a low level compared to the range recorded from previous surveys except at the dunes which remain stable at a high level. At **Profile 1cHN3A** the dune front at 20m chainage has remained stable. There has been erosion of up to 0.4m at the toe of the dunes, from chainage 24m to 42m. The middle beach has accreted by up to 0.4m to chainage 138m. The lower beach has extended by approximately 56m with the formation of a berm at chainage 215m. The beach profile is at a medium level, except at the beach toe which is at a high level compared to the range recorded from previous surveys. **Profile 1cHN4** shows no change in the defended part of the profile. Between chainage 15m and 46m the sandy upper beach has lowered by up to 0.6m throughout winter 2019. The general trend across the middle and lower beach (between 46m and 110m chainage) is that the bed rock remains covered by around 0.2m of sand, however there appears to be the occasional rocky outcrop which remains exposed. From chainage 110m to the end of the survey at 200m chainage the rocks at the bottom of the beach are exposed, which is common for this profile. Overall the profile is at a low level compared to the range recorded from the previous surveys, **Profile 1cHN4A** was established in October 2011. The defended part of the profile to 10m chainage has not changed since October 2011. The rocky shore platform has been exposed over the remainder of the profile, following a drop in beach level of up to 1.0m throughout the winter of 2017. There are occasional minor variations from the previous survey however these are likely to be due to the survey techniques as they generally are less than +/- 0.1m. As a result, from chainage 10m seawards, the rock platform remains exposed as it was in the previous survey. The profile is therefore at a low level compared to the	

Survey Date	Description of Changes Since Last Survey	Interpretation
	range recorded in previous surveys as no beach is present at all, with the rock platform exposed over the full profile.	

2.2 Middleton

Survey Date	Description of Changes Since Last Survey	Interpretation
22nd May 2020	**Beach Profiles:** Middleton is covered by one beach profile line during the Partial Measures survey (Appendix A). The profile was last surveyed in September 2019. At **Profile 1cHC1** the Partial Measures Survey Report notes '*no access to upper section on HC1 within the factory area*'. The seawall is in the same position as recorded in October 2018. From photographs taken during the survey the seawall face appears stable despite some open joints and evidence of differential settlement. At the toe of the seawall there has been an accretion of beach material by up to 0.5m to chainage 95m. The profile of the middle and lower beach has lowered by up to 0.1m on the lower beach and 0.4m at the beach toe. The profile has steepened since the last survey in September 2019. The upper beach profile is at its highest recorded level briefly from chainage 60m to 85m. The middle beach is at a high level, dipping to a low level on the lower beach compared to the range recorded from previous surveys.	The beach profile appears healthy and the accretion of material against the seawall has seen beach levels recover following the losses recorded in the September 2019 survey. **Longer term trends:** The beach level at this location tends to fluctuate through the year, with the most variable area being adjacent to the sea wall where wave energy is reflected. There is a pattern of seasonal variation, with lower levels typically recorded in the spring, following the period of winter storms. Recovery tends to occur by the autumn.

2.3 Hartlepool Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
22nd May 2020	**Beach Profiles:** Hartlepool Bay is covered by four beach profile lines during the Partial Measures survey (Appendix A). **Profile 1cHS1** is located c. 150m south of the root of the South Pier. The profile starts at the wall to the rear of the promenade and extends over the fronting concrete splash wall and down the sloping face of the rock armour revetment before reaching the beach. Very little change has occurred until 40m chainage, which is the toe of the sea defences, since September 2014. There has been accretion by up to 0.4m from the toe of the defences to chainage 51m. Seaward of this point, the beach level has lowered by up to 0.2m. Overall the beach is at a high level compared to the range recorded from previous surveys, particularly at the toe of the coastal defences between chainage 41m and 51m which is at its highest level recorded. **At Profile 1cHS2** there has been a loss of material at the base of the coastal defence by up to 0.3m to chainage 25m. Across the rest of the profile there has been up to 0.2m of accretion. Overall the profile is at a high level compared to the range recorded from previous surveys. **Profile 1cHS3** shows no change over the defended part of the profile up to 24m chainage. There has been accretion between the toe of the defences to chainage 55m by up to 0.6m. A shallow depression which had formed over the summer of 2019, between chainage 70m and 125m, has been infilled by up to 0.4m of sediment leading to an evenly graded upper and mid beach which is at a medium level compared to the range of previous surveys. Seaward of chainage 125m there has been erosion by up to 0.2m and the beach toe has moved landward by approximately 50m. Overall the profile is at a high level compared to the range recorded from previous surveys, particularly between chainages 28m and 34m which is at its highest level recorded. **Profile 1cHS4** is located 1km north of the North Gare Breakwater, within the area of undefended dunes at Seaton Carew. The part of the profile dominated by dunes, to 290m chainage, has remained stable. The depression between the main body of dunes and the foredune at 300m chainage has been deepening since 2013,with a further deepening of 0.3m since September 2019. The photographs suggesting lowering may result from footpath erosion. The crest of the foredune at 320m chainage has shown some accretion over the winter of 2019 by up to 0.1m. Between chainage 340m and 412m the	Overall the profiles show that the beach is at a relatively high level in most places, with several locations at their highest level recorded. The dunes are in good condition. The foredune continues to accrete but erosion associated with a walkway is causing localised lowering in HS4 that may affect stability of the wider dune system in the long term. **Longer term trends:** Beach levels within Hartlepool Bay in May 2020 were at a high level in comparison to previous surveys. The beach levels have been progressively increasing across the bay.

Survey Date	Description of Changes Since Last Survey	Interpretation
	beach level has dropped by up to 1.6m Seawards of chainage 412m the beach profile has accreted and two hollows at chainages 420m and 515m have been infilled by up to 0.6m. The overall effect of the changes is a smoother beach profile than that recorded in previous surveys. Overall the crest of the foredune and the seaward face of the dune are at their highest levels recorded since 2009. The middle beach is at a low level, whilst the lower beach profile is at a medium level compared to the range recorded by the previous surveys.	

3. Problems Encountered and Uncertainty in Analysis

Individual Profiles

- At Hartlepool North construction work which has in recent surveys restricted access to the upper reaches of profiles 1cHN4 and 1cHN4A is now complete meaning these profiles were surveyed in full. The construction works comprised of a seawall encasement and new capstone resulting in a seaward movement of the seawall by approximately 1.2m.
- At Hartlepool Central a damaged fence along the crest of the brickwork seawall means that access was restricted to the upper reaches of profile 1cHC1. The rest of the survey was completed without incident.

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

- No changes are recommended at the present time.

5. Conclusions and Areas of Concern

- At North Sands the dunes are stable and the beaches are healthy, although the sand depletes as you move east towards the headland, with HN4 showing an exposure of the wave cut platform. The profiles are generally at a medium-low level, with drawdown of sediment from the upper beach to the middle and lower beach. This pattern is typical of winter conditions.
- At Middleton the upper beach level has increased, and the lower beach level has depleted slightly. Overall, the beach profile is generally at a high level, particularly between chainage 60m and 95m which is at its highest level recorded. The lower beach now lies within the low range of previously recorded results.
- Hartlepool Bay has undergone a smoothening of beach profiles over the winter of 2019, and profiles are at high levels compared to the range recorded from previous surveys. The area of greatest concern remains in the south of the bay, at 1cHS4, where the dunes are stable but unrestricted public access may affect their stability long term.

Appendices

Appendix A

Beach Profiles

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

Beach Profile

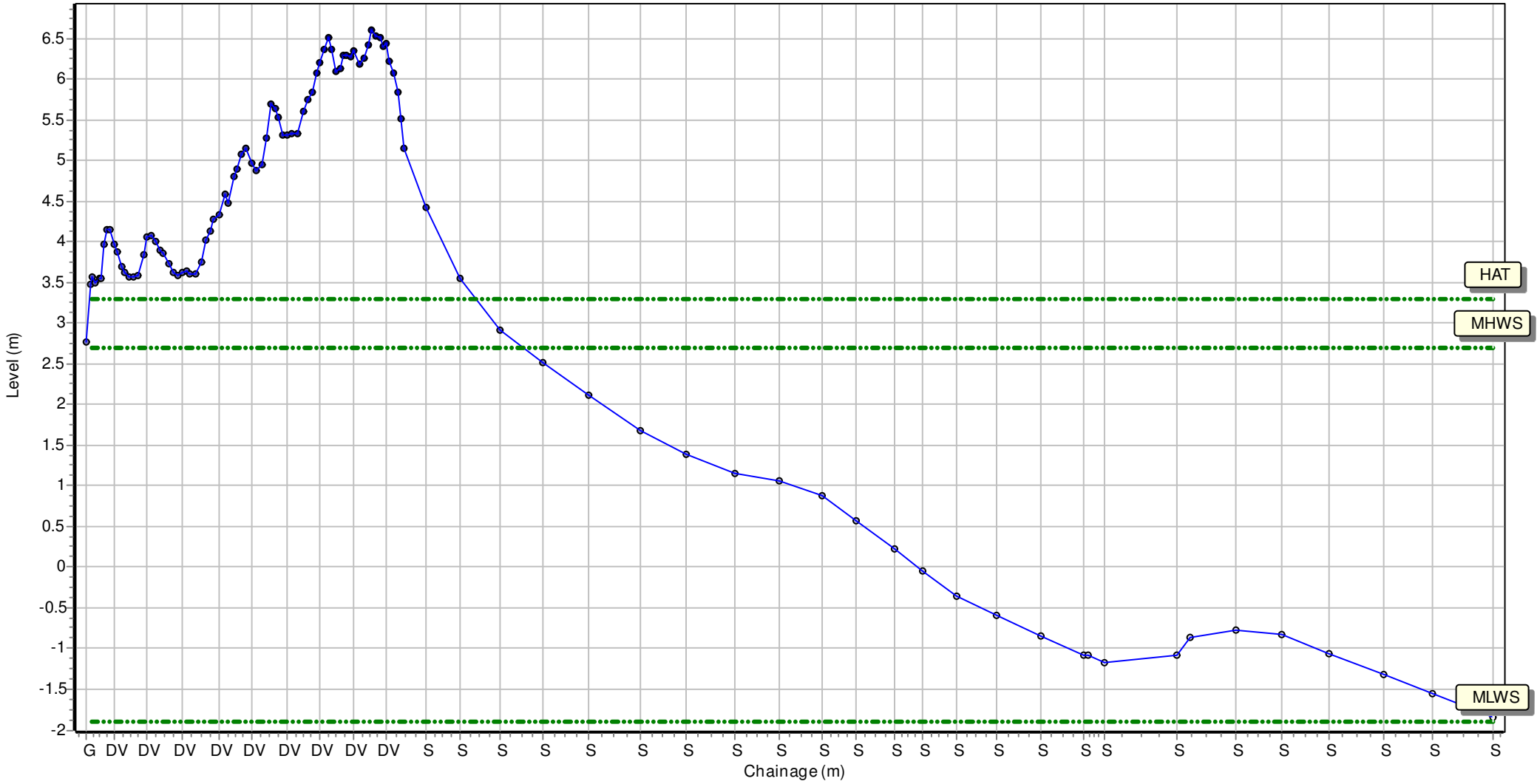
Location: 1cHN1

Date: 21/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 448779.624 **Northing:** 536767.42 **Profile Bearing:** 44 ° from North



Beach Profile

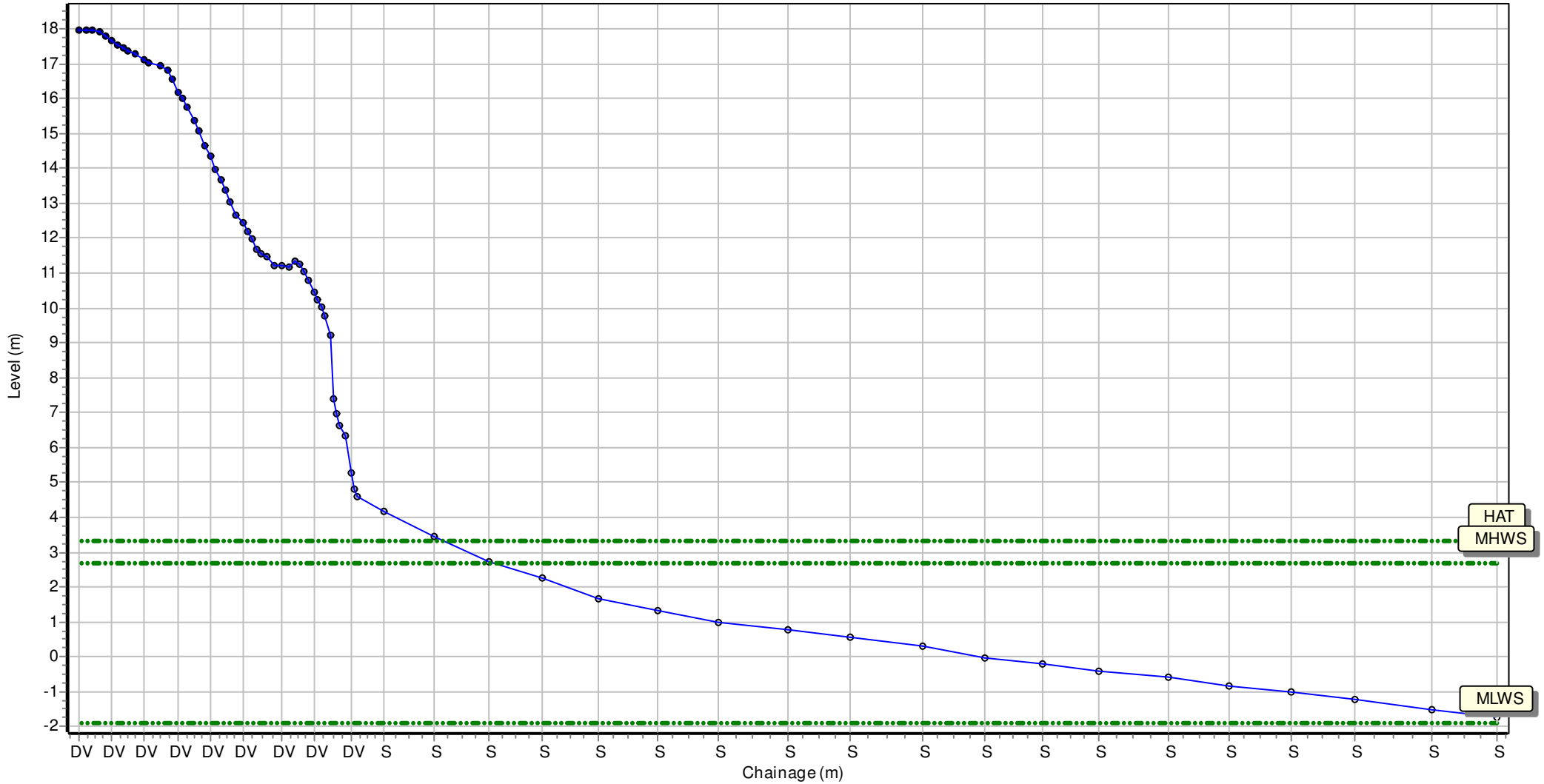
Location: **1cHN2**

Date: 21/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 449547.217 **Northing:** 536095.458 **Profile Bearing:** 42 ° from North



Beach Profile

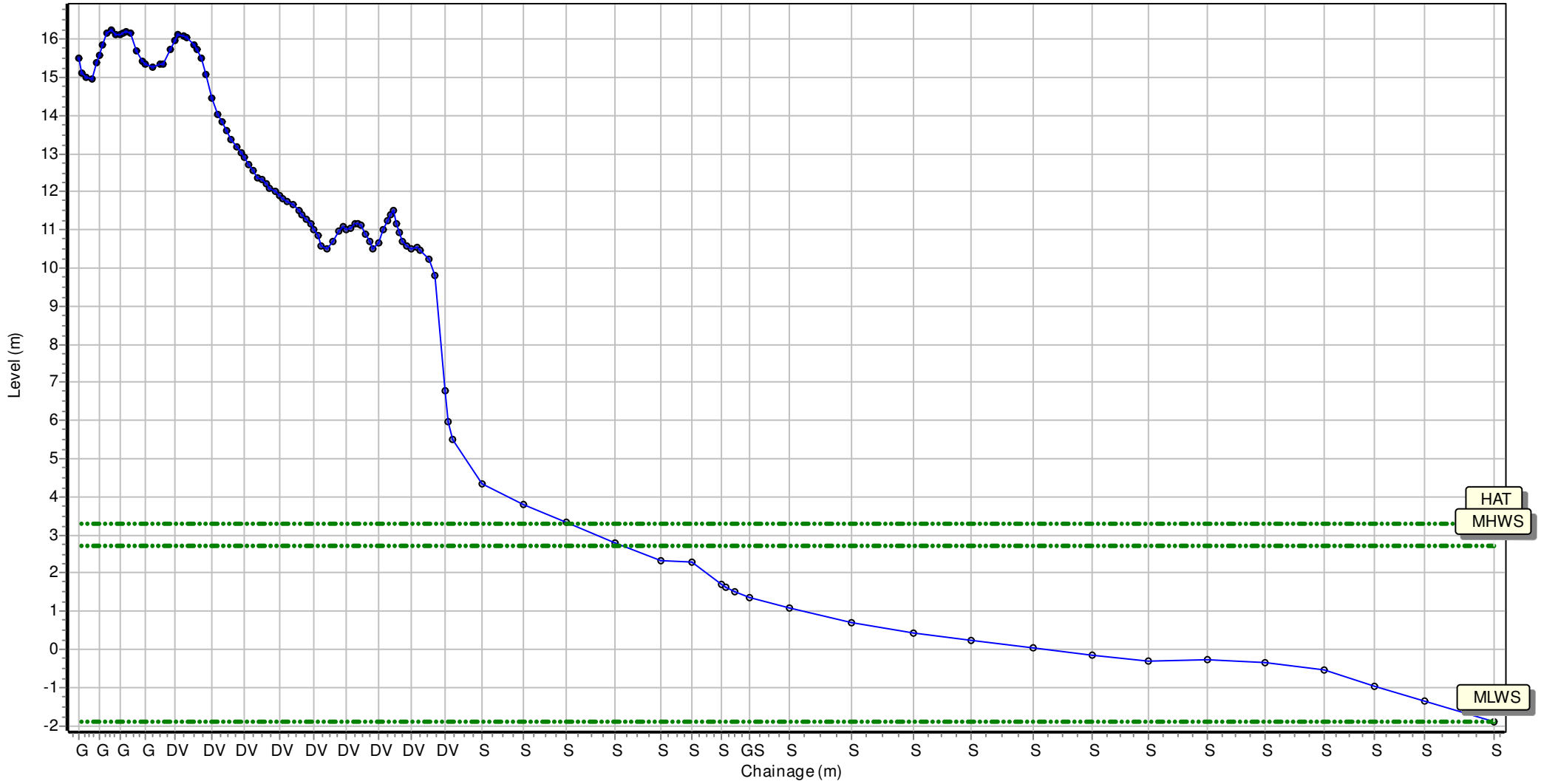
Location: **1cHN2A**

Date: 21/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 450088.047 **Northing:** 535658.212 **Profile Bearing:** 39 ° from North



Beach Profile

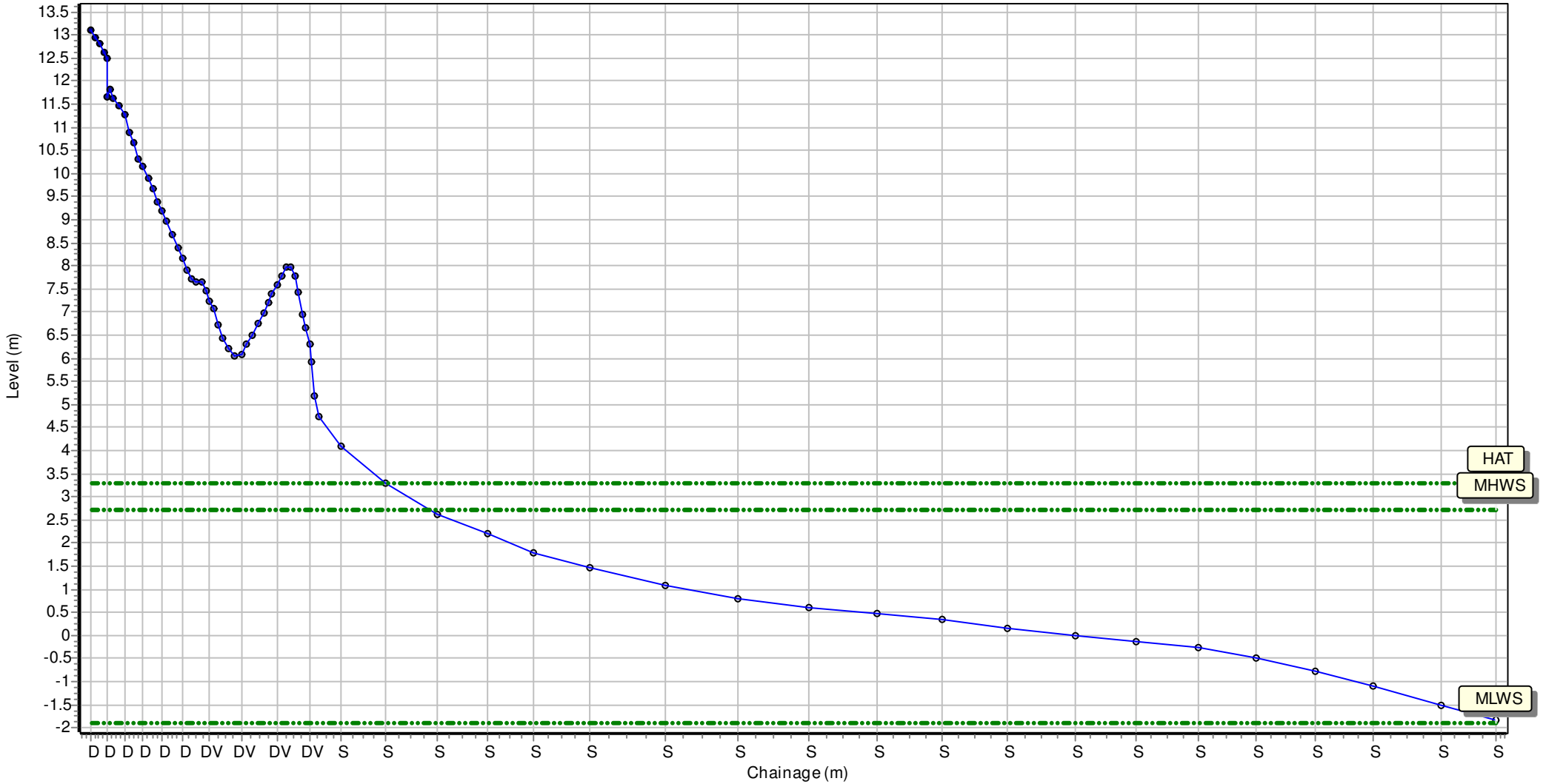
Location: **1cHN3**

Date: 21/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 450674.424 **Northing:** 535305.141 **Profile Bearing:** 30 ° from North



Beach Profile

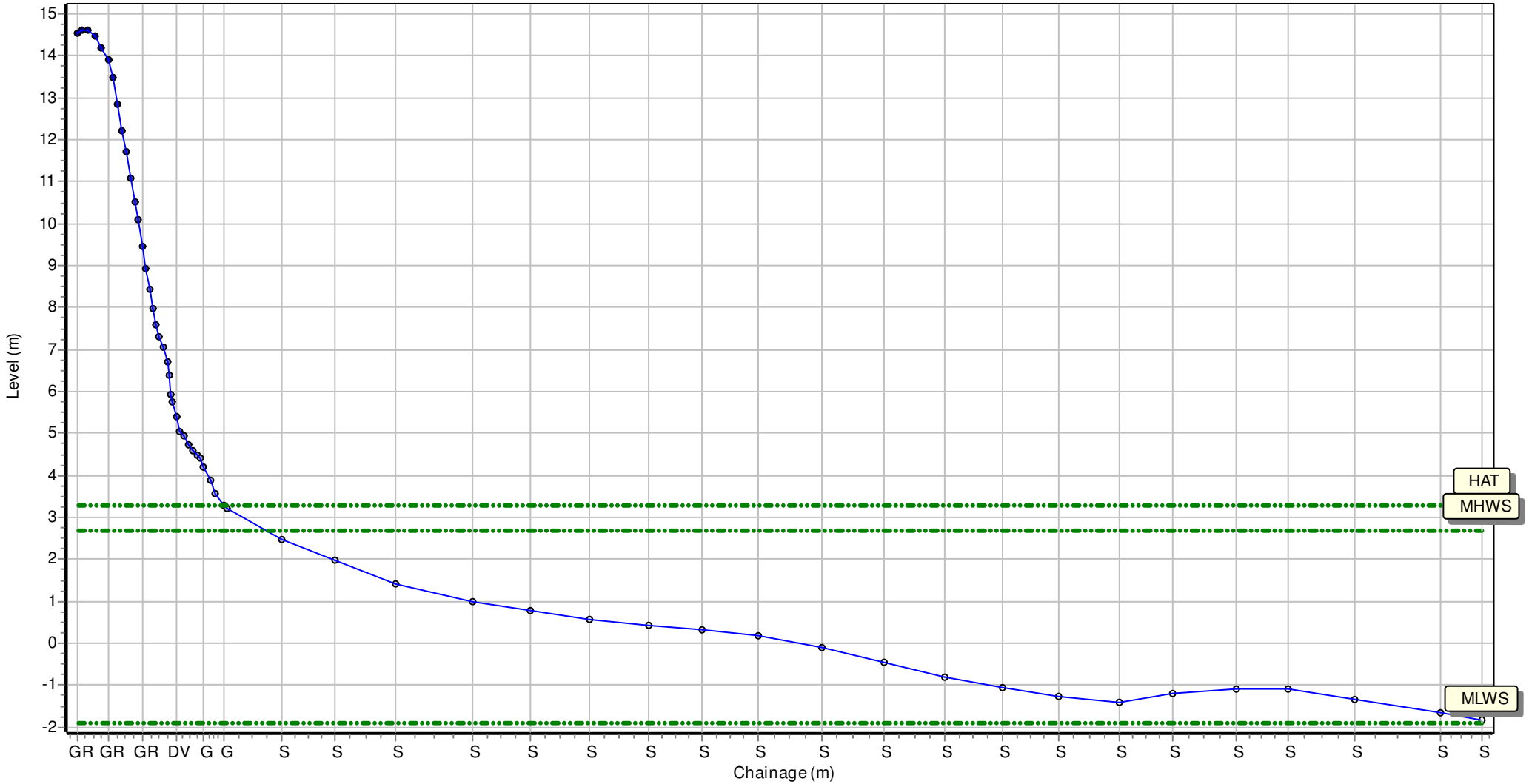
Location: **1cHN3A**

Date: 21/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 451324.71 **Northing:** 534903.35 **Profile Bearing:** 25 ° from North



Beach Profile

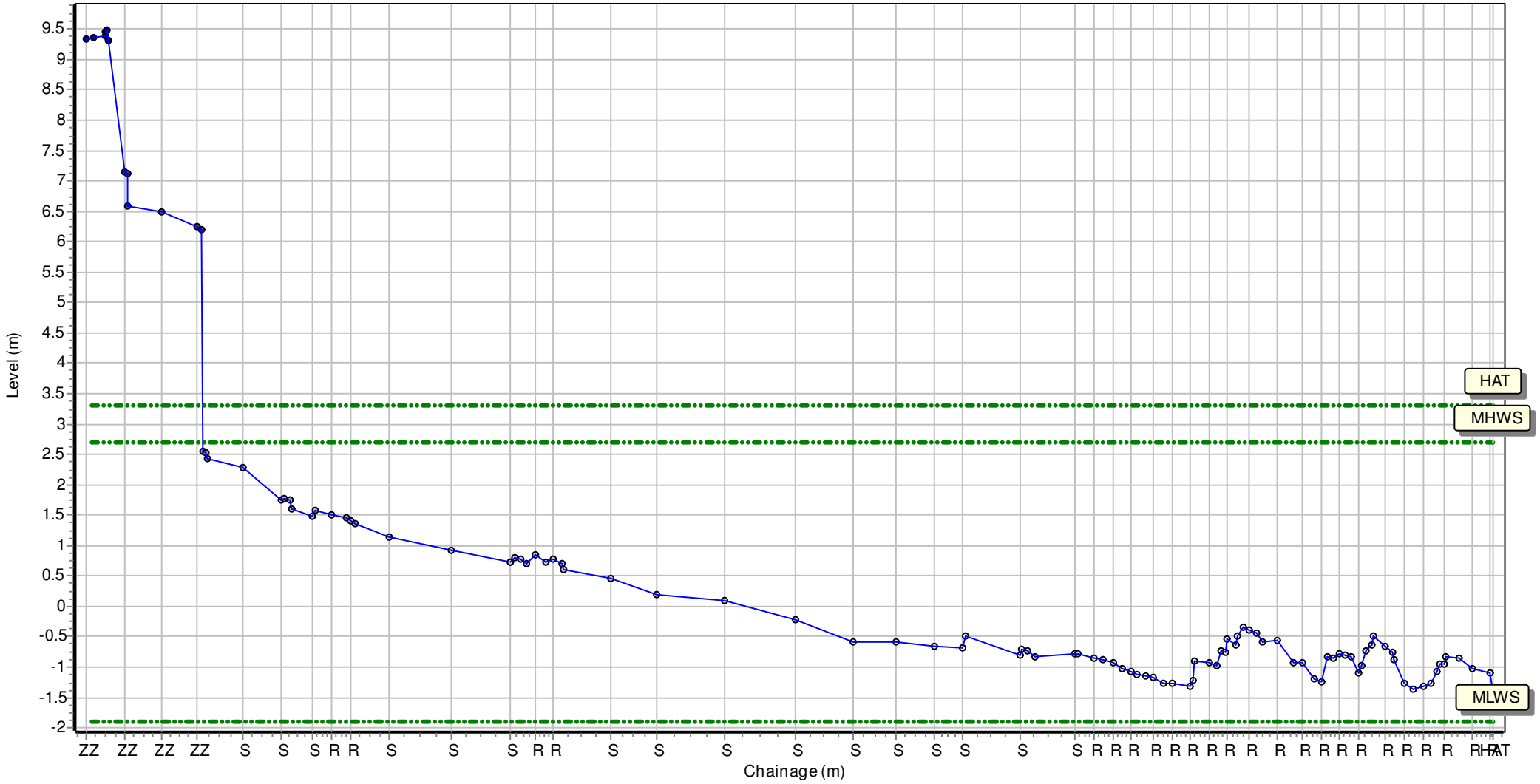
Location: **1cHN4**

Date: 21/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 451997.114 **Northing:** 534616.627 **Profile Bearing:** 25 ° from North



Beach Profile

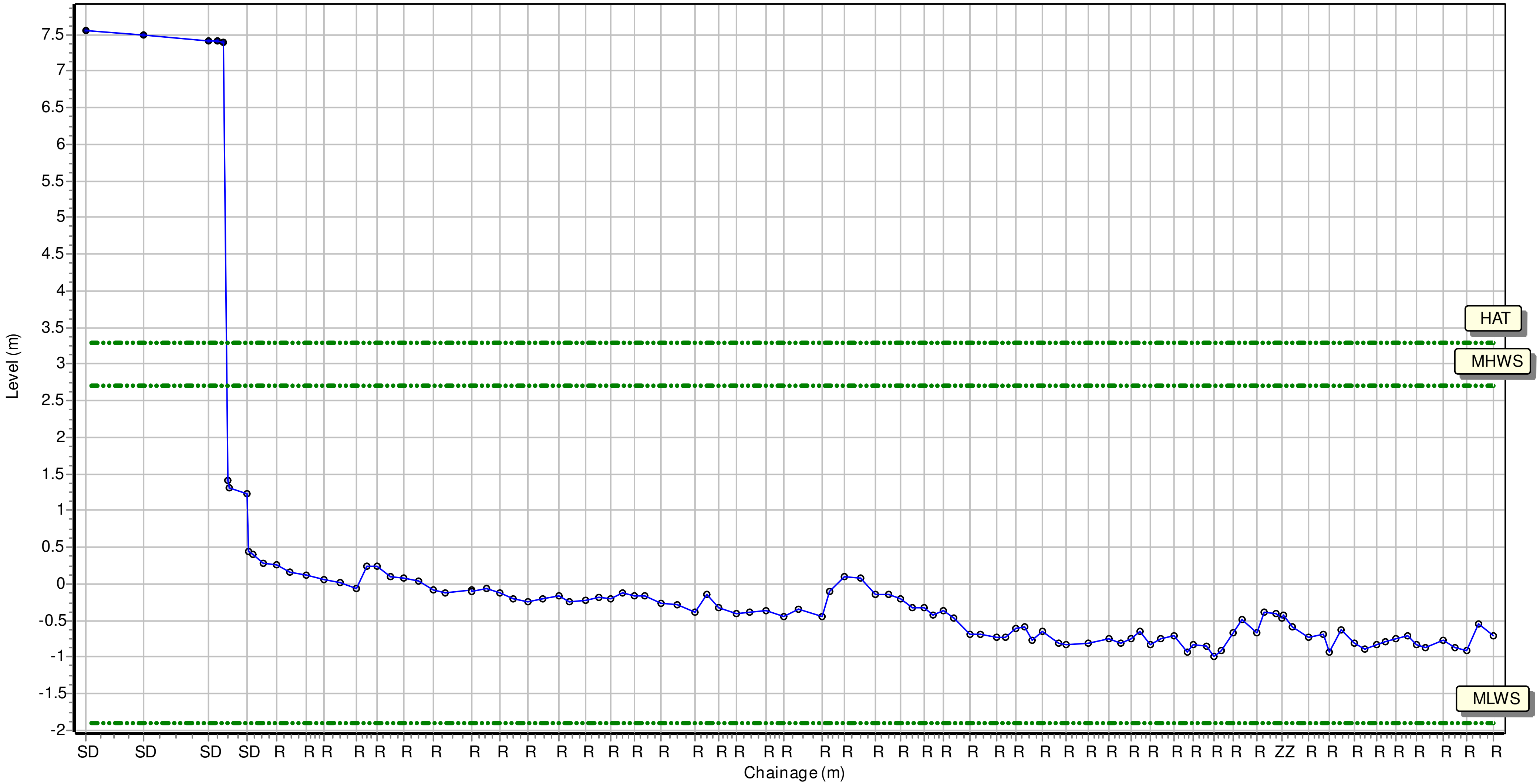
Location: 1cHN4A

Date: 21/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 452610.565 **Northing:** 534321.038 **Profile Bearing:** 23 ° from North



http://www.sandsuser.com

SANDS

Beach Profile

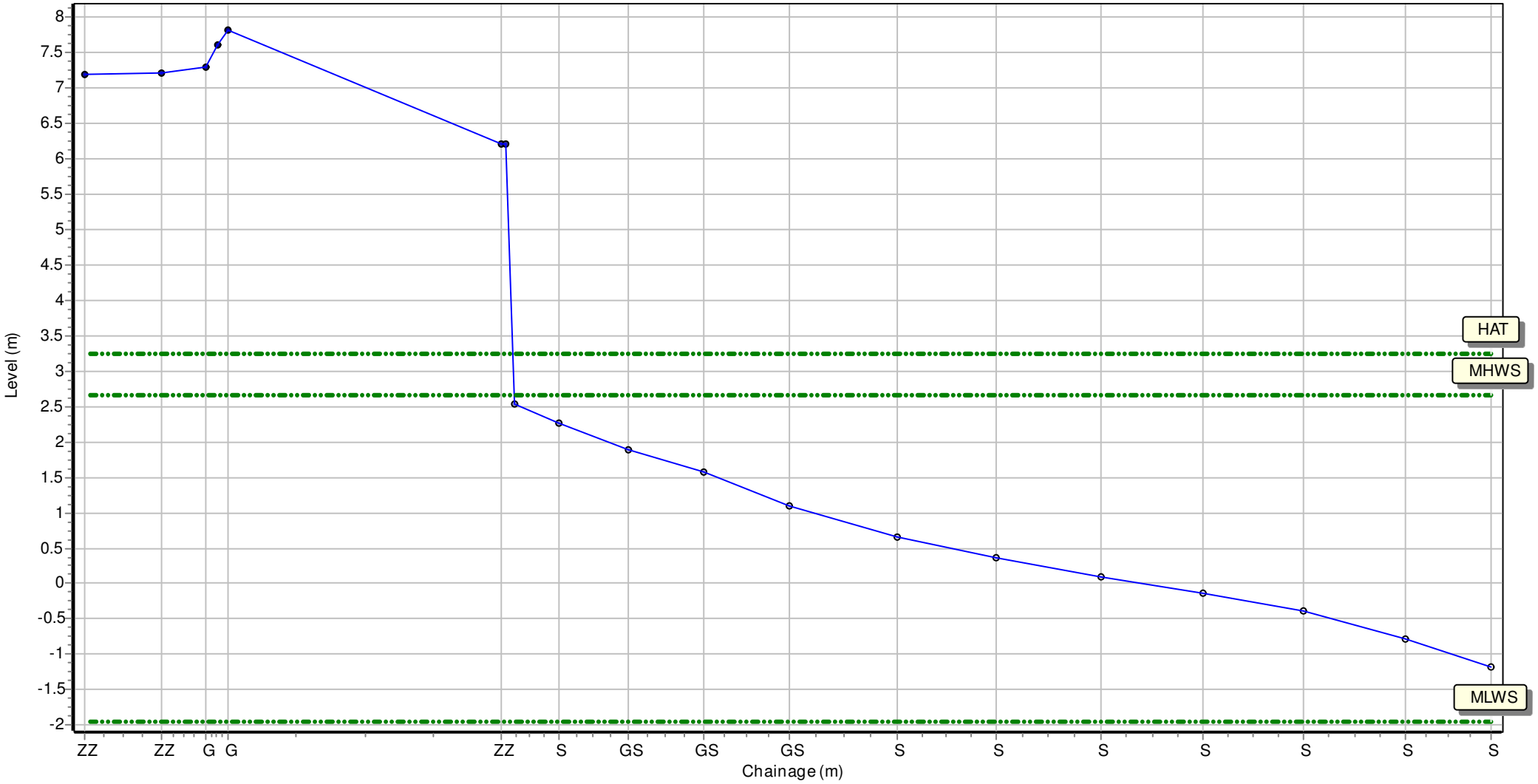
Location: **1cHC1**

Date: 22/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 452108.075 **Northing:** 533506.119 **Profile Bearing:** 150 ° from North



Beach Profile

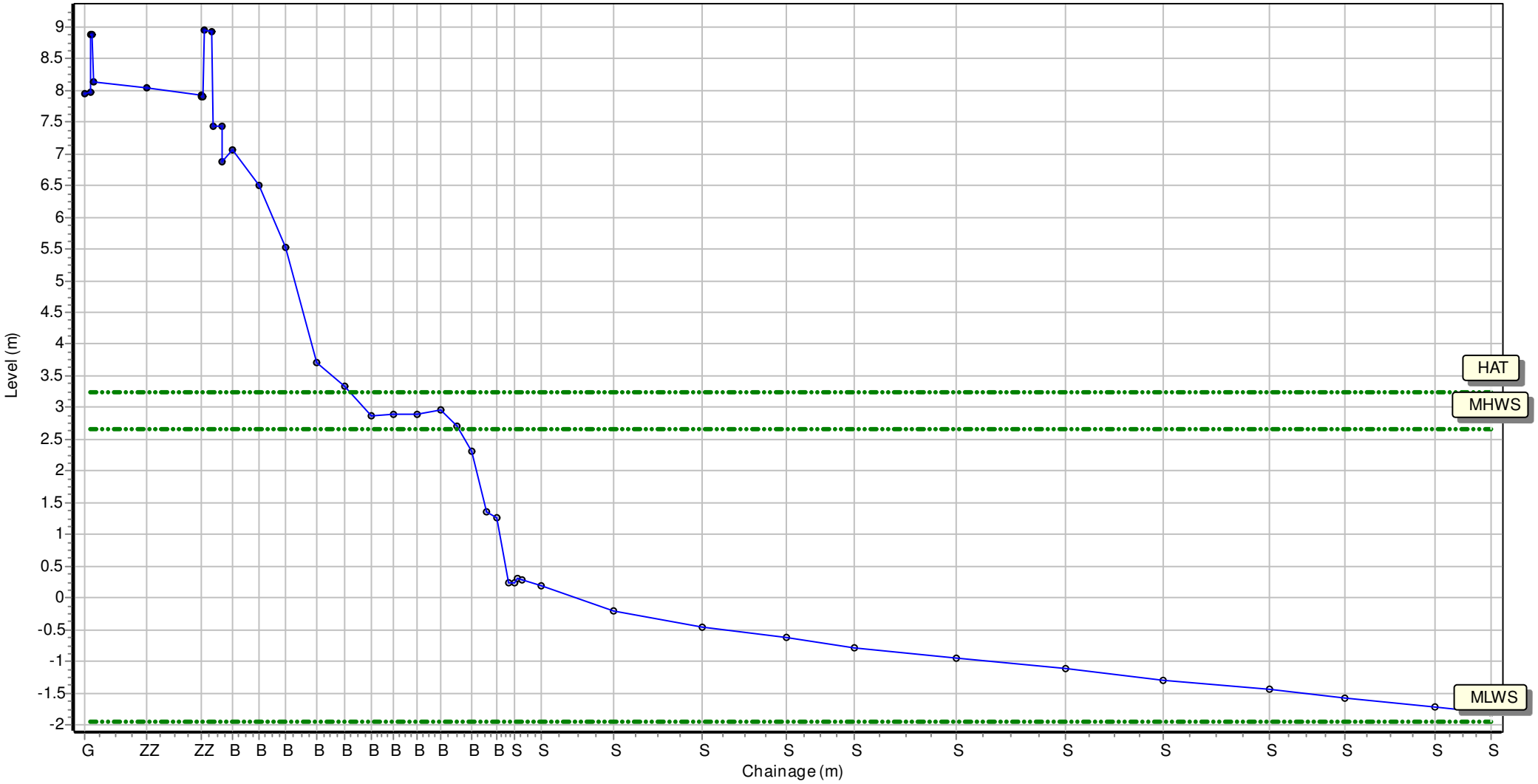
Location: 1cHS1

Date: 22/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 451718 **Northing:** 532455 **Profile Bearing:** 95 ° from North



Beach Profile

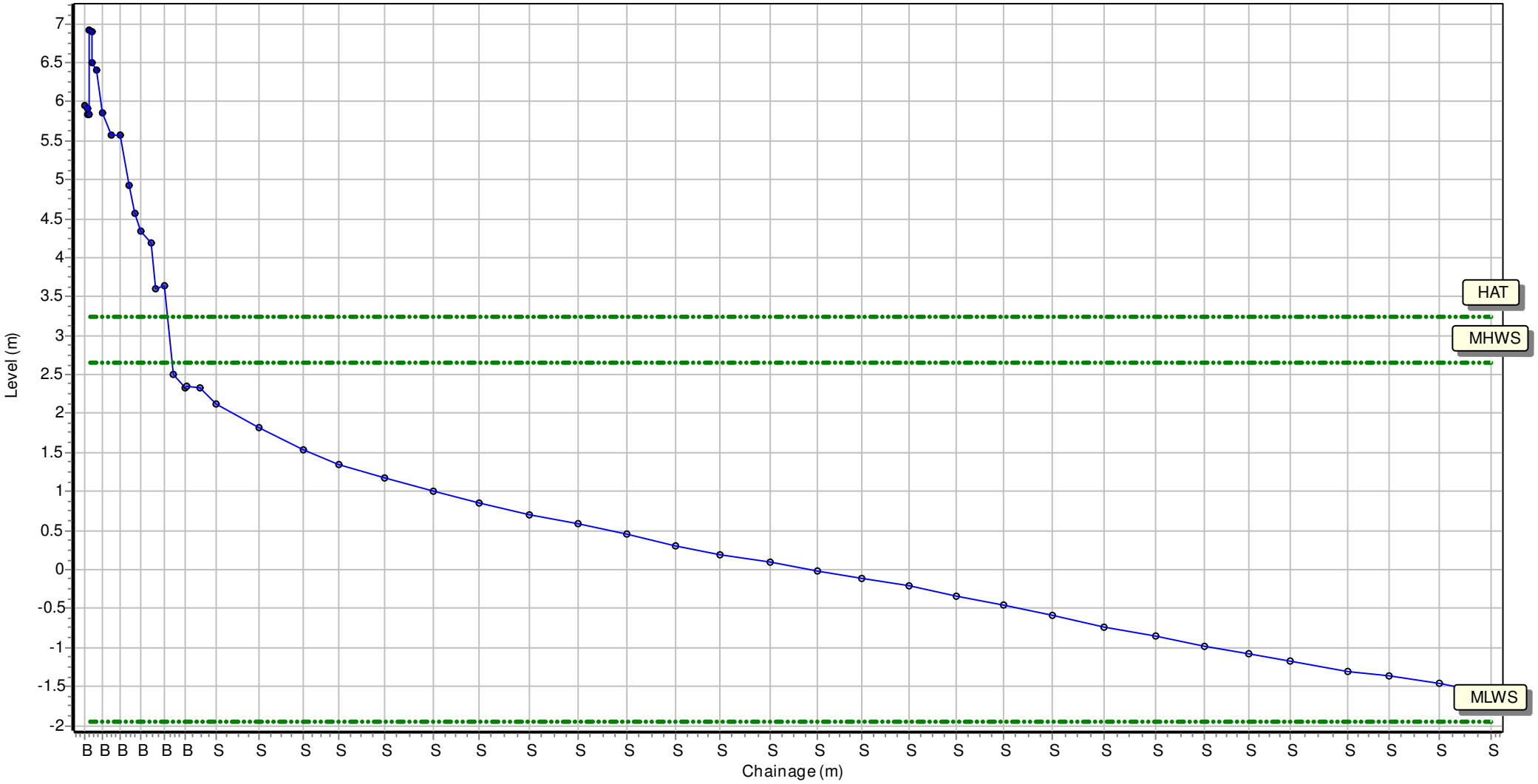
Location: **1cHS2**

Date: 22/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 452160.59 **Northing:** 531071.39 **Profile Bearing:** 77 ° from North



Beach Profile

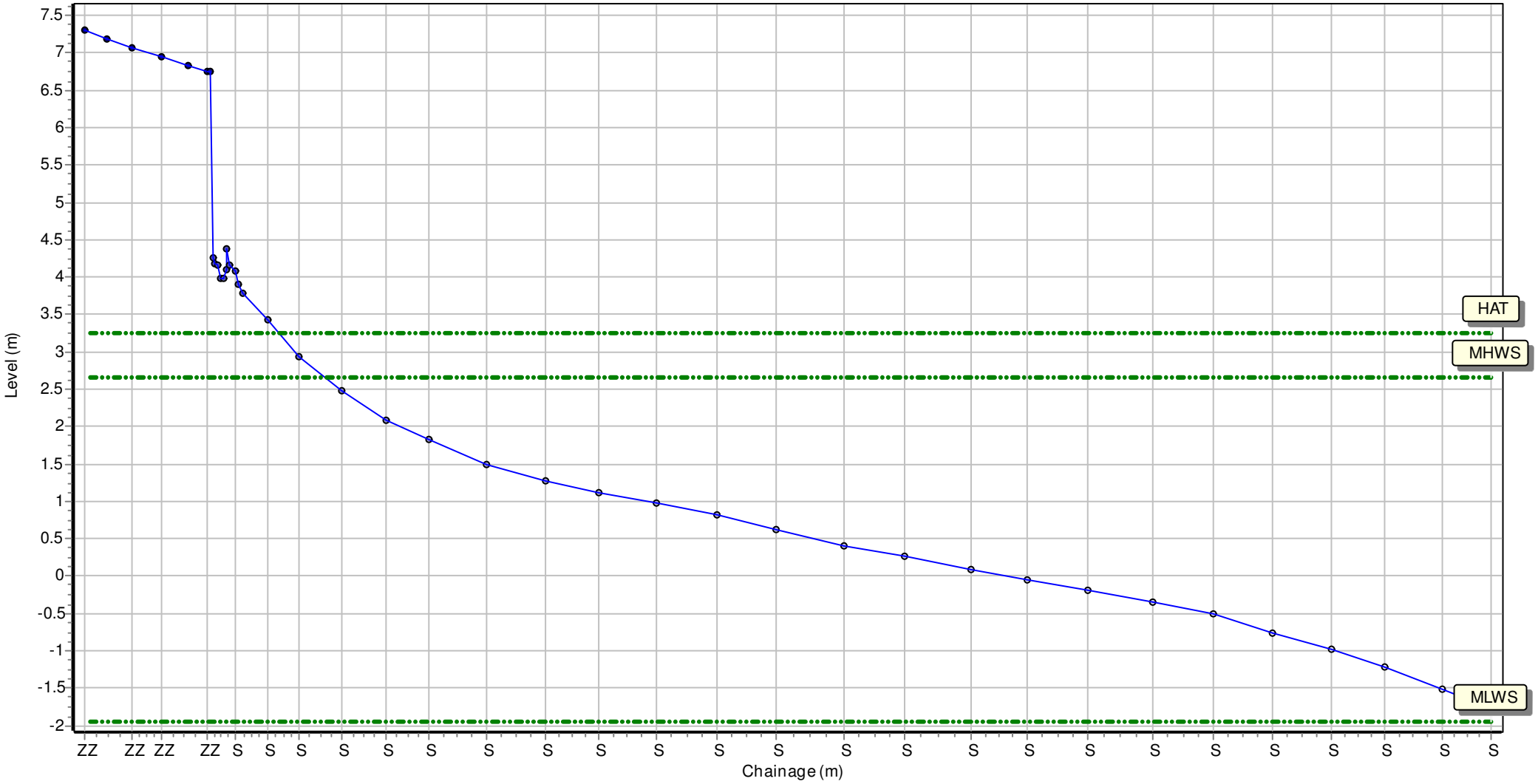
Location: **1cHS3**

Date: 22/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

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

Summary: 2020 Partial Measures Topo Survey

Easting: 452517.25 **Northing:** 530064.57 **Profile Bearing:** 76 ° from North



Beach Profile

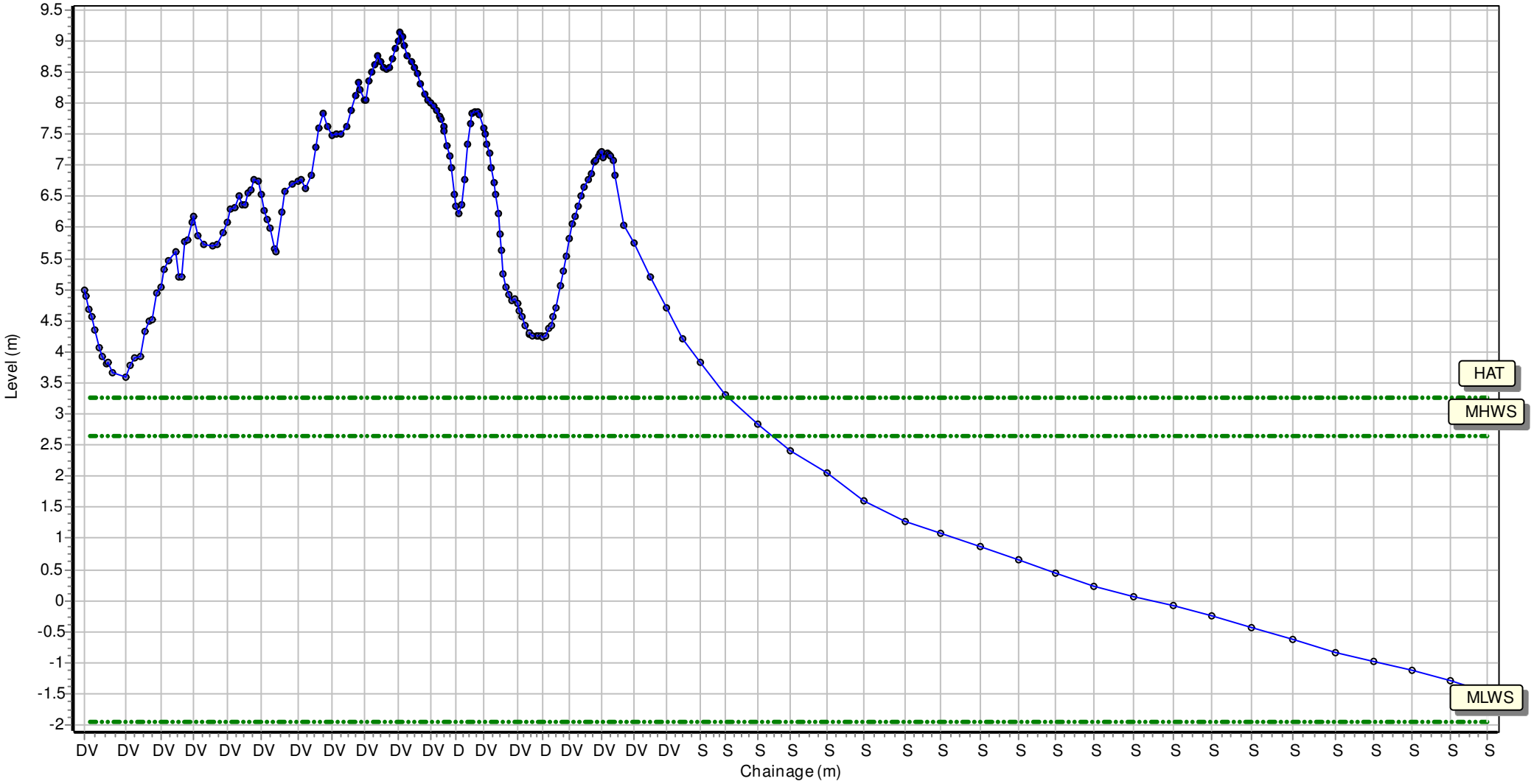
Location: **1cHS4**

Date: 22/05/2020 **Inspector:** AG **Low Tide:** **Low Tide Time:**

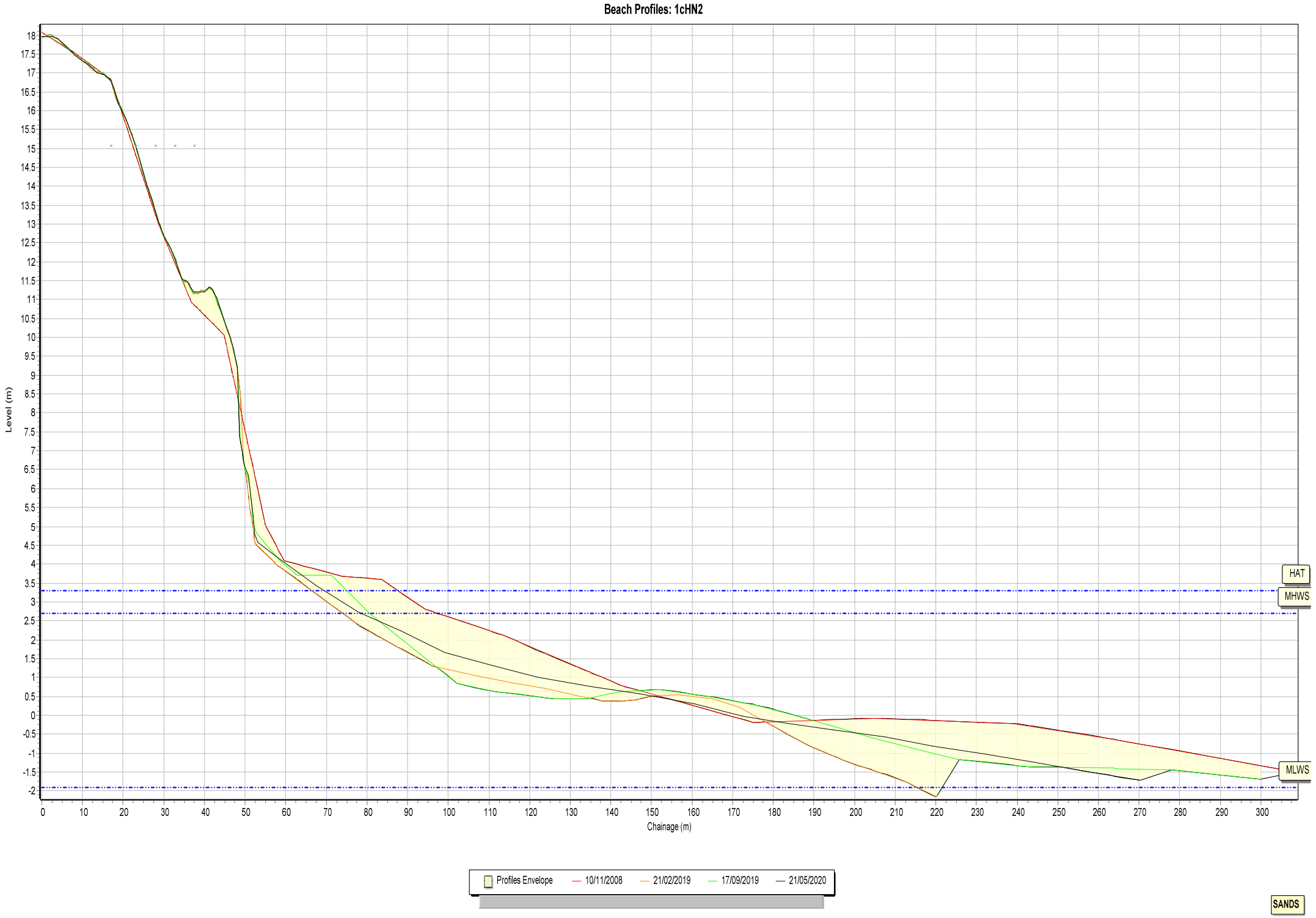
Wind **Sea State:** **Visibility:** **Rain:**

Summary: 2020 Partial Measures Topo Survey

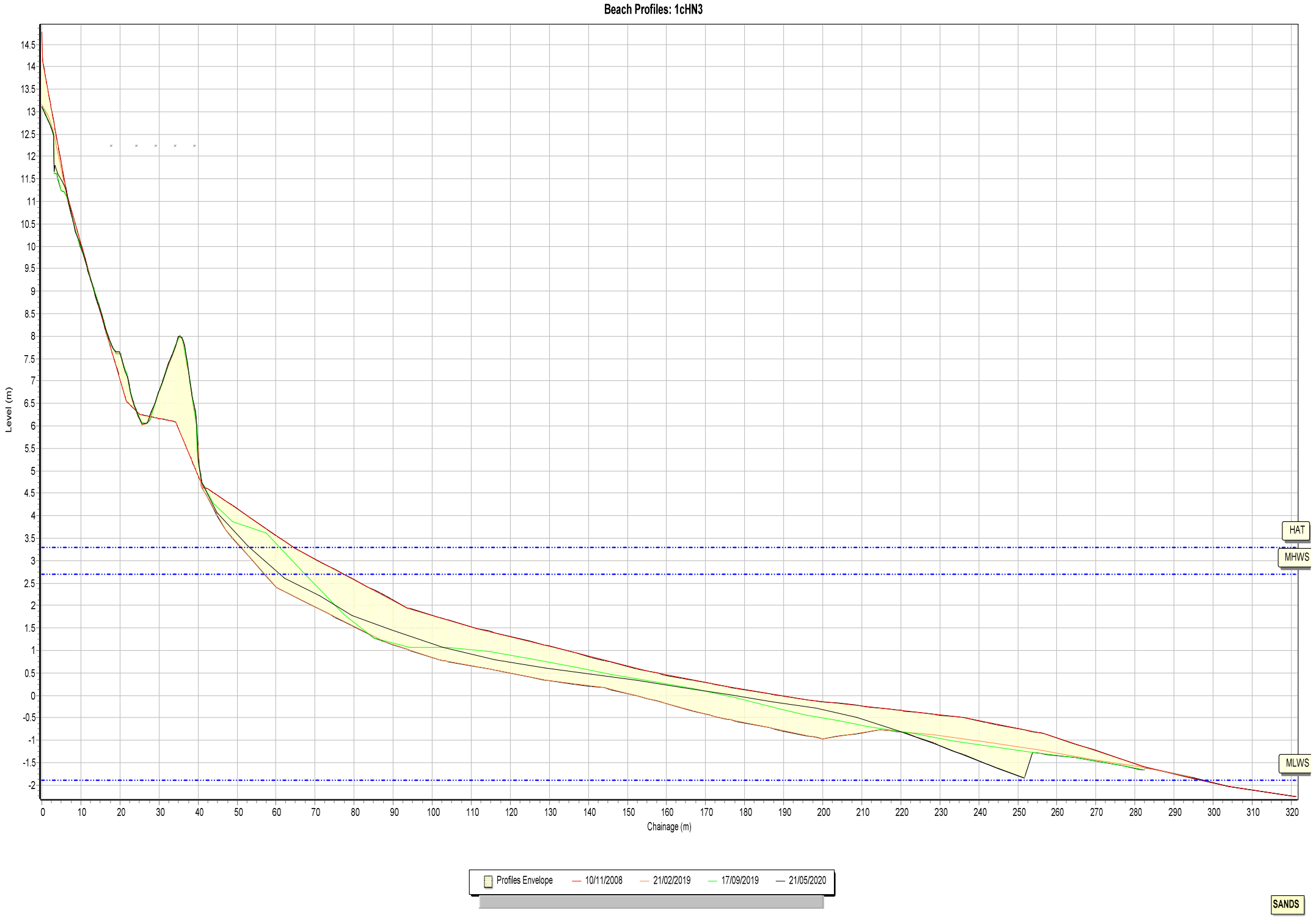
Easting: 452889 **Northing:** 528971 **Profile Bearing:** 76 ° from North

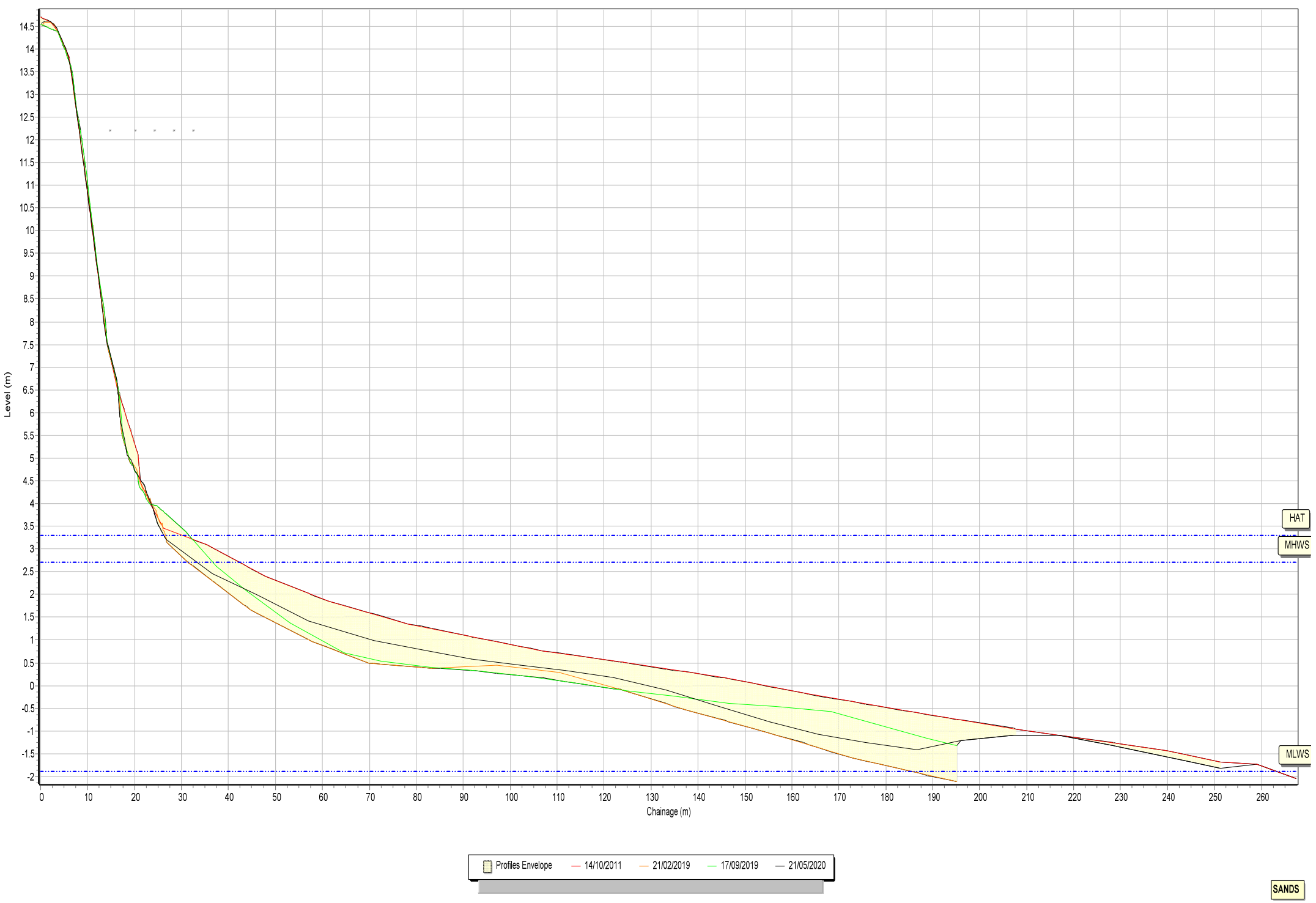



Beach Profiles: 1cHN1
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
10/11/2008
21/02/2019
17/09/2019
21/05/2020
SANDS


Beach Profiles: 1cHN2
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
10/11/2008
21/02/2019
17/09/2019
21/05/2020
SANDS

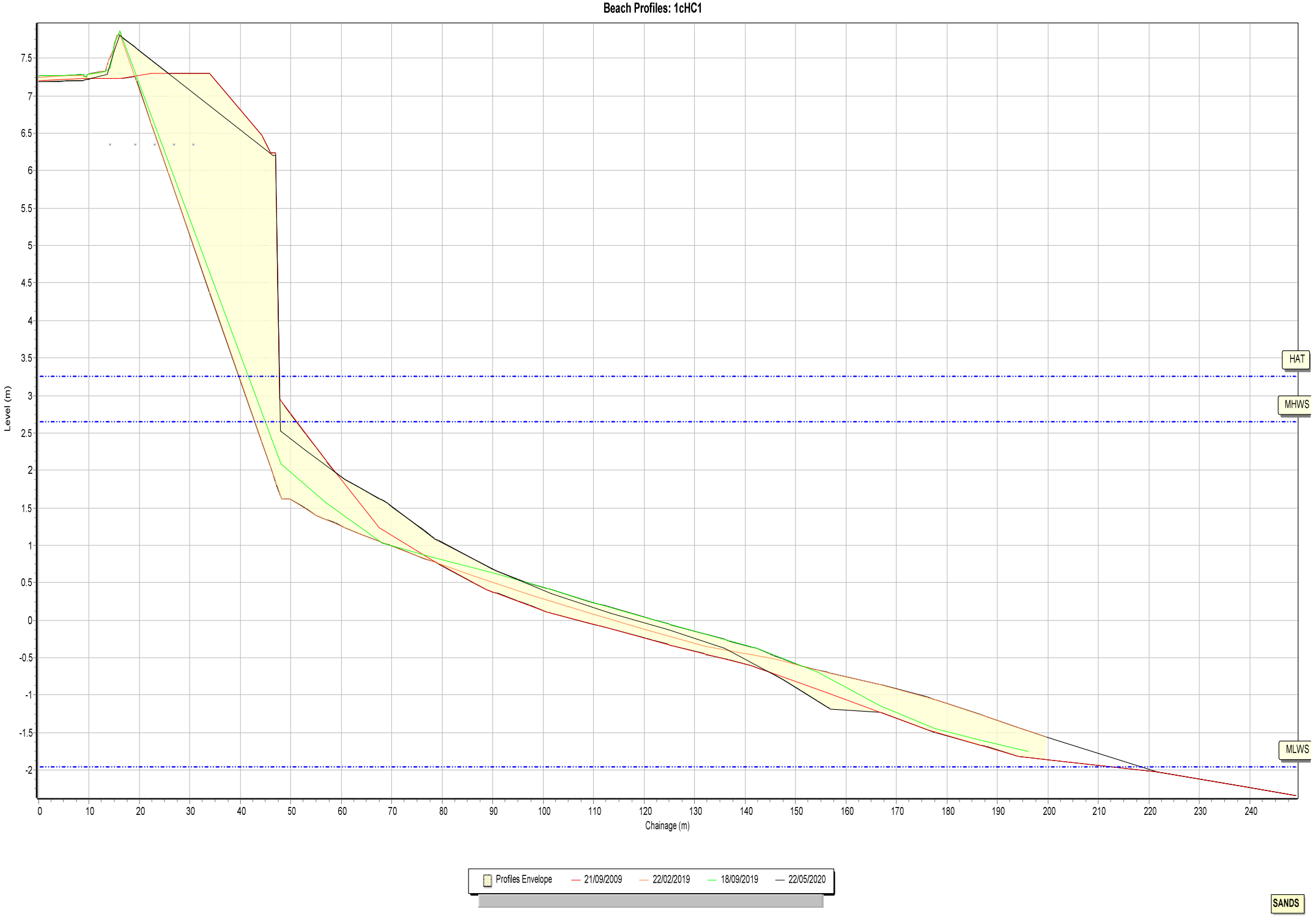
Beach Profiles: 1cHN2A

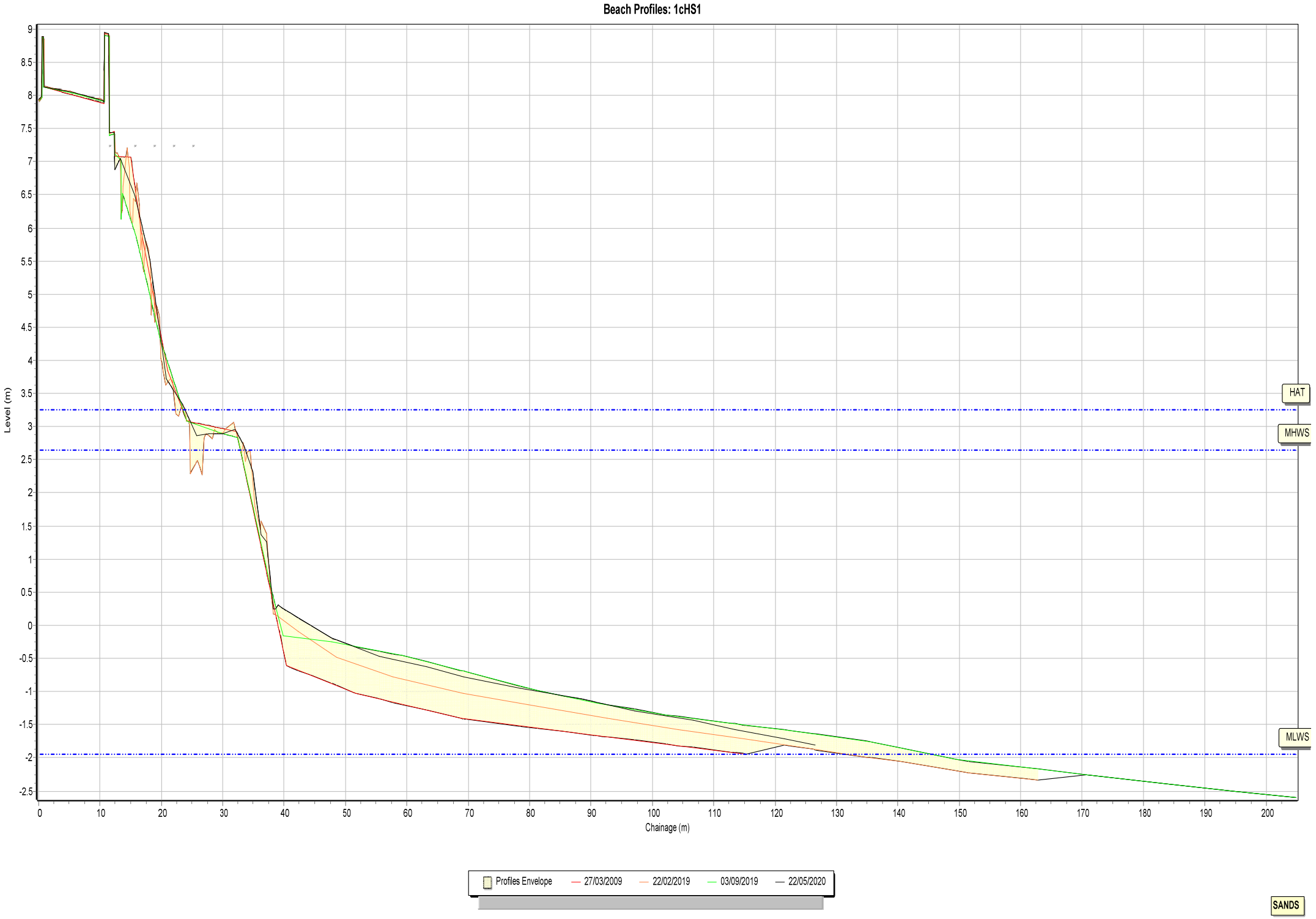

Beach Profiles: 1cHN3
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
10/11/2008
21/02/2019
17/09/2019
21/05/2020
SANDS

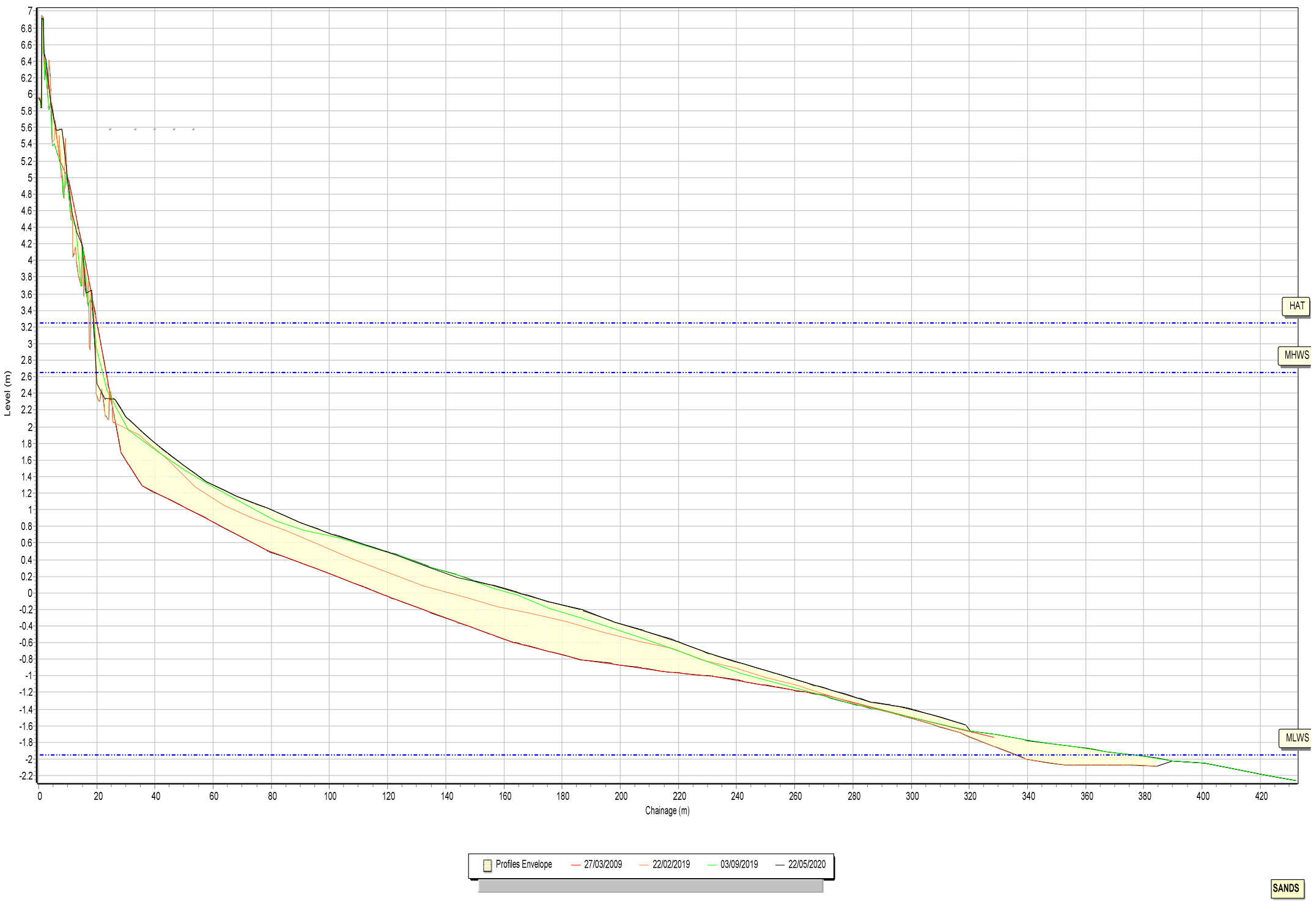

Beach Profiles: 1cHN3A
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
14/10/2011
21/02/2019
17/09/2019
21/05/2020
SANDS


Beach Profiles: 1cHN4
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
10/11/2008
21/02/2019
17/09/2019
21/05/2020
SANDS

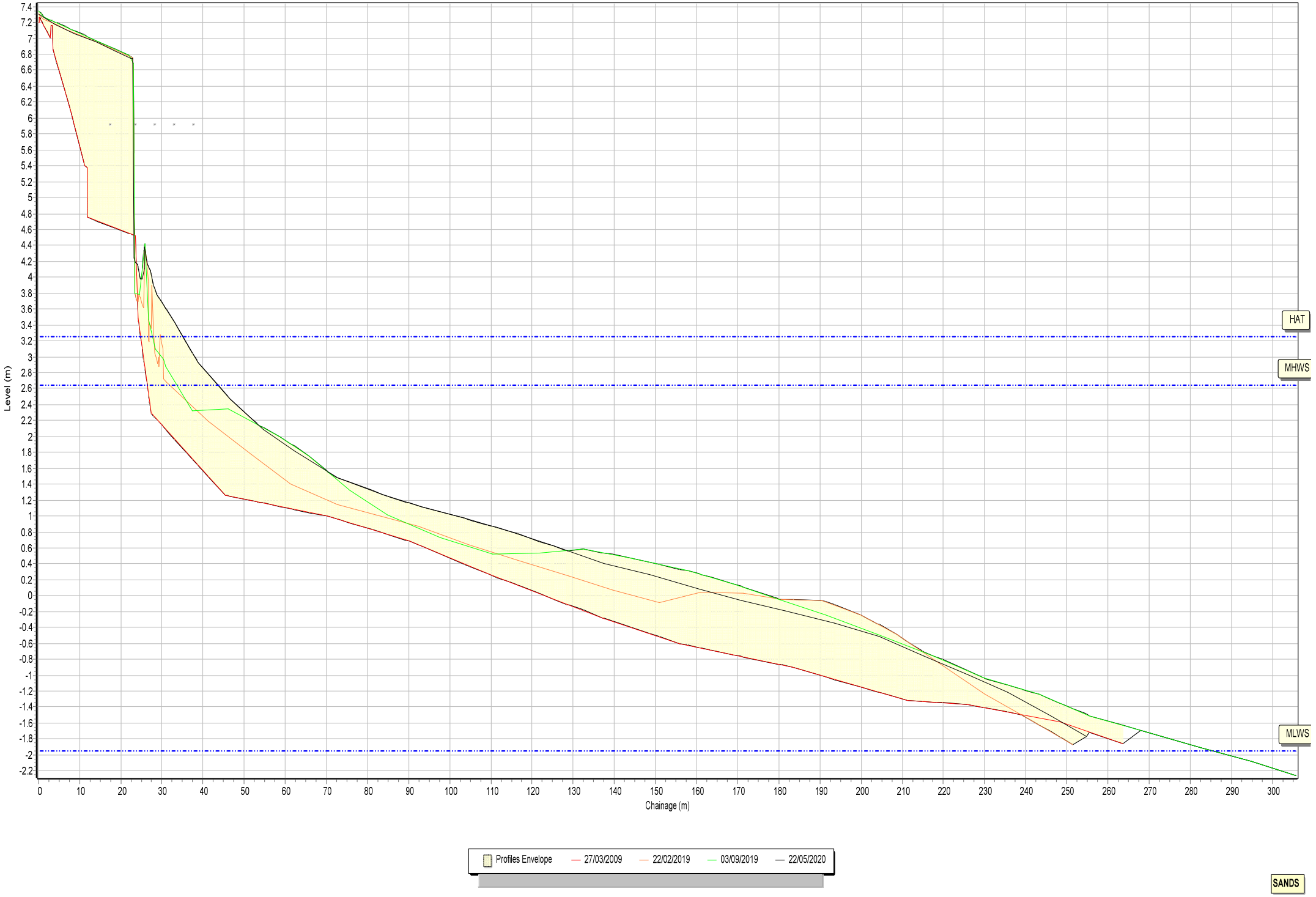
Beach Profiles: 1cHN4A


Beach Profiles: 1cHC1
Level (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
HAT
MHWS
MLWS
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
Chainage (m)
Profiles Envelope
21/09/2009
22/02/2019
18/09/2019
22/05/2020
SANDS


Beach Profiles: 1cHS1
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
27/03/2009
22/02/2019
03/09/2019
22/05/2020
SANDS


Beach Profiles: 1cHS2
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
27/03/2009
22/02/2019
03/09/2019
22/05/2020
SANDS

Beach Profiles: 1cHS3




Beach Profiles: 1cHS4
Level (m)
Chainage (m)
HAT
MHWS
MLWS
Profiles Envelope
11/09/2009
22/02/2019
03/09/2019
22/05/2020
SANDS