



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

## Contents

Disclaimer .....	i
Abbreviations and Acronyms.....	ii
Water Levels Used in Interpretation of Changes .....	ii
Glossary of Terms.....	iii
Preamble .....	iv
1. Introduction.....	1
1.1 Study Area .....	1
1.2 Methodology.....	1
2. Analysis of Survey Data .....	4
2.1 Featherbed Rocks .....	4
2.2 Seaham (Dawdon) .....	5
2.3 Blast Beach .....	6
2.4 Hawthorne Hive.....	7
3. Problems Encountered and Uncertainty in Analysis .....	8
4. Recommendations for 'Fine-tuning' the Monitoring Programme .....	8
5. Conclusions and Areas of Concern .....	8

## Appendices

Appendix A	Beach Profiles
Appendix B	Cliff Top Survey

## List of Figures

Figure 1	Sediment Cells in England and Wales
Figure 2	Survey Locations
Figure 3	Cliff Top Survey Locations

## List of Tables

Table 1	Analytical, Update and Overview Reports Produced to Date
Table 2	Sub-division of the Cell 1 Coastline

Authors	
Alix Scullion	Royal HaskoningDHV
Dr Nick Cooper – Review & 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](http://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](mailto: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 Parameter	Water Level (m AOD)			
	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

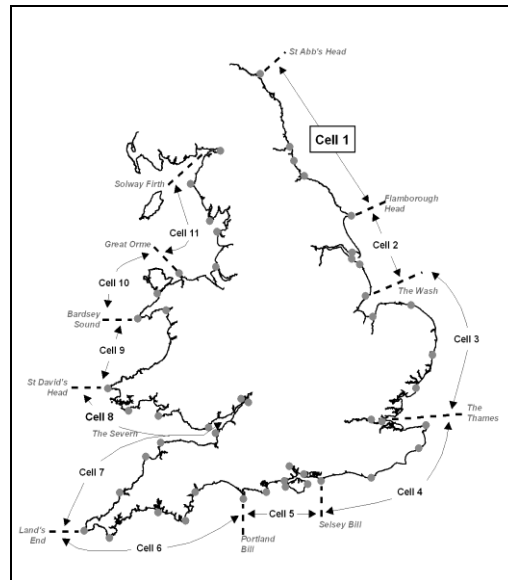
**Source:** *River Tyne to Flamborough Head Shoreline Management Plan 2.*  
Royal Haskoning, February 2007.

## 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 1	Sep 11
4	2011/12	Sep 11	Aug 12	Mar-May 12	Feb 13	-
5	2012/13	Sep 12	Feb 13	Mar-Apr 13	May 13	-
6	2013/14	Oct 13	Feb 14	Mar-Apr 14	Jul 14	-
7	2014/15	Nov 14	Feb 15	Mar 15	Jun 15	-
8	2015/16	Nov 15	Feb 16	Apr 16	Jul 16	Jun 16
9	2016/17	Aug-Sep 16	Jan 17	Mar 17	Jul 17	
10	2017/18	Sep 17	Feb 18	Apr 18	Jun 18	Nov 18
11	2018/19	Oct - Dec 18	Jan 19	Apr 19	May 19	
12	2019/20	Oct-Nov 19	Jan 20	May 20	Jul 20(*)	

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

## **1. Introduction**

### **1.1 Study Area**

Durham Council's frontage extends from Ryhope Dene to Crimdon Beck. For the purposes of this report, it has been sub-divided into five areas, namely:

- Featherbed Rocks
- Seaham (Dawdon)
- Blast Beach
- Hawthorn Hive
- Blackhall Colliery

### **1.2 Methodology**

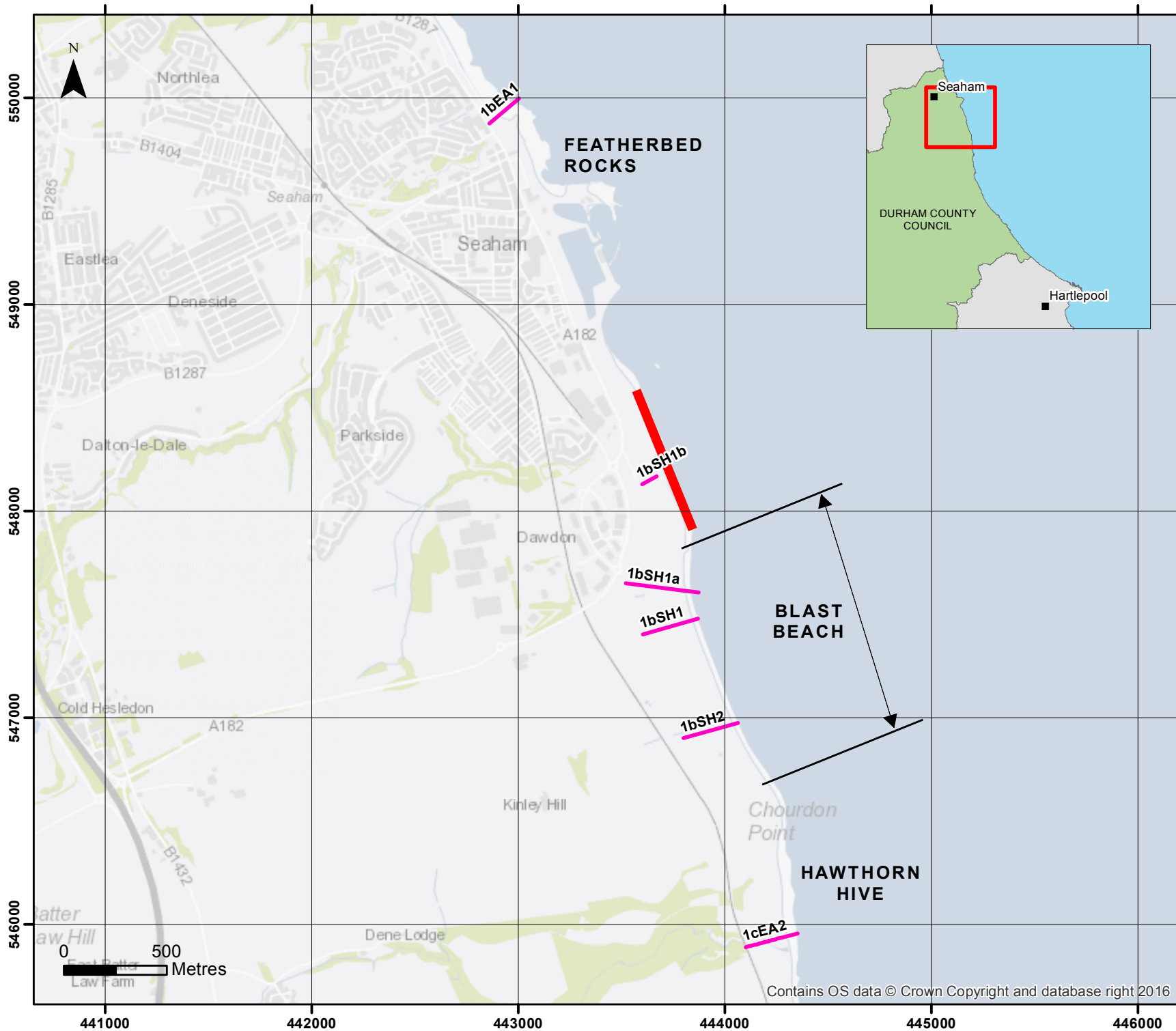
Along Durham County Council's frontage, the following surveying is undertaken:

- Full Measures survey annually each autumn/early winter comprising:
  - Beach profile surveys along nine transect lines
- Partial Measures survey annually each spring comprising:
  - Beach profile surveys along six transect lines
- Cliff top survey bi-annually at:
  - Seaham (Dawdon)

The location of these surveys is shown in Figure 2. The Partial Measures survey was undertaken along this frontage on 23<sup>rd</sup> May 2020. During the survey the weather was sunny and dry, with a force 7 wind from the south-west and a moderate sea state.

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

**Cliff Top Monitoring Pegs**

- @ 300

*(Indicative Survey Extents shown)*

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

**Figure 2 - Map 1**

**Durham County Council Frontage**

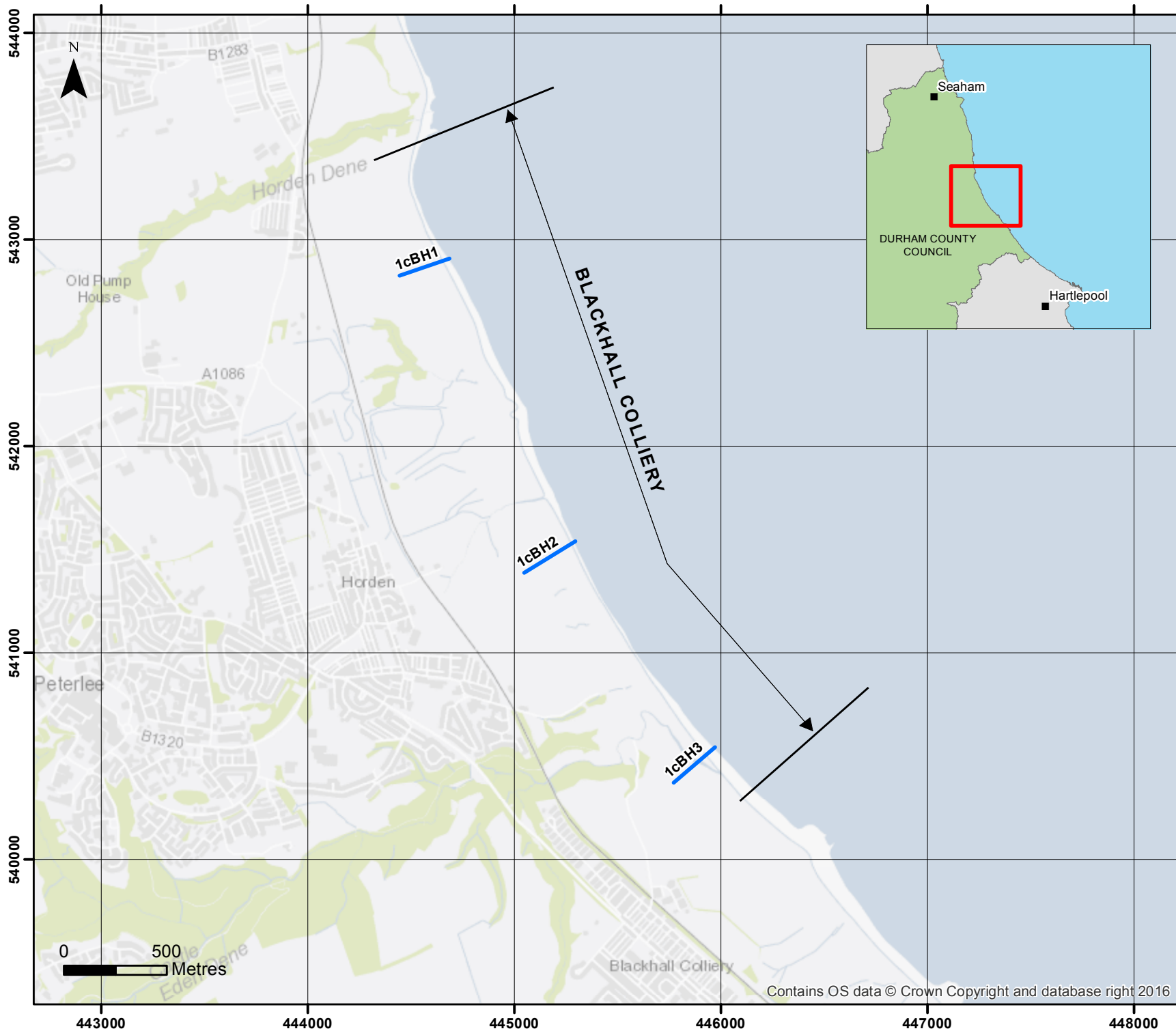
Analytical Report Topo Surveys

Drawing Scale at A4 1:25,000

**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





Key

**SURVEY LOCATIONS**

**Topographic Profiles**

- Annual
- Bi-Annual

*(Indicative Survey Extents shown)*

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

**Figure 2 - Map 2**  
**Durham County Council**  
**Frontage**

Analytical Report  
 Topo Surveys

Drawing Scale at A4 1:25,000

**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](http://www.royalhaskoningdhv.com)



Contains OS data © Crown Copyright and database right 2016

## 2. Analysis of Survey Data

### 2.1 Featherbed Rocks

Survey Date	Description of Changes Since Last Survey	Interpretation
<p><b>23<sup>rd</sup> May 2020</b></p>	<p><b>Beach Profiles:</b></p> <p>Featherbed Rocks is monitored by one beach profile line (EA1) during the Partial Measures survey (Appendix A). The previous survey was October 2019.</p> <p>Profile 1bEA1 has changed very little to 55m chainage, which covers the cliff and promenade. The uneven profile at the base of the sea wall between 55m and 80m is due to the rock armour. There has been accretion between chainages 64-69m by up to 0.8m, and erosion between 71-79m by up to 0.8m. Beyond 80m there has been little change over the winter of 2019/20, the beach profiles reflect the rocky nature of the foreshore and that there is no beach over the shore platform.</p>	<p>The rocky nature of the foreshore means it is unlikely to undergo significant changes in morphology unless sediment is deposited. Previous monitoring indicates that a veneer beach tends to accumulate over the summer and is stripped off by winter storms, giving rise to small and localised changes in profile. The upper part of the profile, which covers the cliff promenade and rock armour remains unchanged, as does the lower part of the profile which covers the beach.</p> <p><b>Longer term trends:</b></p> <p>The level of the beach in May 2020 was comparable with the lowest beach levels recorded in March 2010, April 2013 and October 2013. The shore platform is exposed and as a result any apparent changes are likely to be due to differences in the survey point locations and the way that survey points are joined to show an interpolated surface.</p>

## 2.2 Seaham (Dawdon)

Survey Date	Description of Changes Since Last Survey	Interpretation
23 <sup>rd</sup> May 2020	<p><b>Cliff-top Survey:</b></p> <p>Three ground control points have been established along the cliff top at Dawdon (Figure 3). The separation between any two points is nominally 300m. These cliff top surveys are intended to inform on erosion rates of the undefended sea cliffs extending south of the rock armour revetment to the south of Seaham Harbour. The cliff top surveys at Dawdon are undertaken bi-annually.</p> <p>Measurements are taken from a fixed ground control point along a fixed bearing to the edge of the cliff top. Appendix B provides results from the May 2020 survey showing the position from the ground control point to the edge of the cliff top along the defined bearing and changes since the November 2008 baseline survey.</p> <p>The cliff monitoring data shows that there has been very little change over the winter of 2019/20, with no control points experiencing recession greater than the survey error of <math>\pm 0.2\text{m}</math>. The cliff face at control point 1, located at Dawdon, has experienced an advancement of 0.05m over the winter of 2019/20. It is likely that this is caused by slumping of the upper cliff, however this cannot be confirmed without a detailed visual inspection.</p>	<p>There has been little change over the winter of 2019/20. Overall ground control point number 1 showed erosion of 1.01m, and ground control point 3 showed erosion of 1.25m since November 2008. Point 2 has shown little change.</p> <p><b>Longer term trends:</b></p> <p>There is more confidence in the long-term pattern of change, where the cumulative measured erosion is greater than the error inherent in the technique.</p> <p>Ground control points 1 and 3 have both shown an average recession rate of 0.1m/yr, since monitoring began in 2008.</p>

## 2.3 Blast Beach

Survey Date	Description of Changes Since Last Survey	Interpretation
23 <sup>rd</sup> May 2020	<p><b>Beach Profiles:</b></p> <p>Blast Beach is covered by four beach profile lines during the Partial Measures survey (Appendix A). Two of these commenced in November 2008, with 1bSH1a being added in October 2009, and 1bSH1b added in October 2015.</p> <p>Profile <b>1bSH1b</b> is adjacent to the sewage works south of Seaham. The 2020 survey recorded erosion from the cliff toe to chainage 36m by up to 0.2m. A small berm formed at chainage 39m with an accretion of 0.4m to chainage 45m, switching to erosion across the lower beach by up to 0.4m on the landward side of the concrete blocks and up to 0.8m on the seaward side. The beach toe has extended seaward by up to 4m. Overall the profile is at a medium level on the upper beach compared to the range recorded from previous surveys, whilst the lower beach is at a low level, particularly between chainages 63-71m which is at its lowest level recorded.</p> <p>The 2020 Partial Measures Survey Report notes that at <b>1bSH1a</b> dense vegetation restricts access to the cliff top and cliff base. There has been very little change to the spoil face at chainage 140m. Seaward of chainage 140m there has been accretion by up to 1.2m forming a small berm at chainage 147m. Seaward of chainage 160m there has been very little change in the beach profile. Overall the profile is at a low level compared to the range recorded from previous surveys.</p> <p>At <b>1bSH1</b> dense vegetation also restricts access to the cliff tops. There has been accretion of up to 0.1m from the base of the cliff across the upper beach to chainage 97m. The lower beach has experienced erosion of up to 0.4m chainage to the rocky foreshore at chainage 132m which is exposed until the end of the survey at 164m. The upper beach is at a high level compared to the range recorded from previous surveys whilst the middle and lower beach are at a low level.</p> <p>At <b>1bSH2</b> there has been accretion from the cliff toe to chainage 106m by up to 0.1m. The berm crest has experienced very little change. From chainage 120-155m there has been erosion of up to 0.2m across the middle beach, with very little change seaward of this until the end of the survey. Overall the beach is at a medium level compared to the range recorded from previous surveys.</p>	<p>Through the winter there has generally been accretion on the upper and middle beach and erosion on the lower beach. Rock platforms remain exposed across this section of frontage. The profiles remained a similar gradient to the spring and autumn profiles.</p> <p>All the profiles show the beach levels are generally in the range of previous profiles, however the section between chainage 63-71m at profile 1bSH1b is now at its lowest level recorded.</p> <p><b>Longer term trends:</b></p> <p>The beach at 1bSH2 shows an overall pattern of erosion from October 2008 to its lowest level at April 2014, showing recovery to the most recent survey in May 2020. However, SH1 and SH1a show much more fluctuation in beach level between 08/09 and May 2020.</p>

## 2.4 Hawthorne Hive

Survey Date	Description of Changes Since Last Survey	Interpretation
23 <sup>rd</sup> May 2020	<p><b>Beach Profiles:</b></p> <p>Hawthorne Hive is covered by one beach profile line <b>1cEA2</b> during the Partial Measures survey (Appendix A). The survey report notes “<i>unable to measure start of Section EA2 as the vegetation has choked out the section line and route over cliff faces</i>” and therefore all surveys following October 2012 start at 95m chainage.</p> <p>Until the partial measures survey in April 2013, a channel was present between 95m and 105m chainage, but it has infilled.</p> <p>The profile has generally eroded since the previous survey in October 2019. From the start of the survey to chainage 118m there has been erosion by up to 0.6m, switching to a small section of accretion by up to 0.2m. Seaward of chainage 121m there was erosion of up to 0.5m to chainage 152m. From 152m chainage to the end of the survey at 211m chainage the boulders from the previous survey appear to have moved in some places. Overall the beach is at a medium-low level compared to the range recorded from previous surveys.</p>	<p>The beach has recovered since the low levels in 2014, and December 2018. The profile is towards the middle of the range of previous profiles.</p> <p><b>Longer term trends:</b></p> <p>The profiles show the beach is undergoing progressive erosion.</p> <p>The infilling and incision of the channel seems to be an episodic process and is likely to reflect a combination of annual and seasonal variations in the flow of Hawthorn Burn and storm events which move sediment onshore to block the outflow of the burn.</p>

### **3. Problems Encountered and Uncertainty in Analysis**

#### **Individual Profiles**

- The surveyor noted difficulties accessing the cliff tops of sections SH1 and SH1A and the cliff base of SH1A due to dense vegetation.
- At Hawthorne Hive the surveyor was unable to measure the start of Section EA2 due to vegetation cover.

#### **Cliff Top Surveys**

- Whilst there is low confidence in the short-term erosion rates due to the error in the method, longer-term data are more reliable and suggest erosion rates of up to 0.1m/yr.

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

- No changes are recommended at the present time.

### **5. Conclusions and Areas of Concern**

- The level of the beach at Featherbed Rocks in May 2020 was comparable to the lowest beach levels recorded in March 2010, April 2013 and October 2013. The shore platform is exposed on the lower beach.
- At Seaham Cliffs, the survey data indicates that the average recession rate since monitoring began in 2008 is 0.08m/yr at point 1 and 0.1m/yr at point 3. Point 2 shows little change over the monitoring period.
- At Blast Beach, colliery spoil still prevents the sea from actively eroding the cliffs. However, there have been some changes in the beach profile over the winter of 2019/20, typically consisting of accretion on the upper and middle beach and erosion on the lower beach.
- At Hawthorn Hive the beach level was low in April and November 2014. The beach has now recovered slightly and is close to the middle of the previous range of results. However, it is likely that the long-term trend of progressive erosion will continue on this profile.

## **Appendices**



**Appendix A**  
**Beach Profiles**

# Beach Profile

Location: 1bEA1

Date: 23/05/2020

Inspector: AG

Low Tide:

Low Tide Time:

Wind

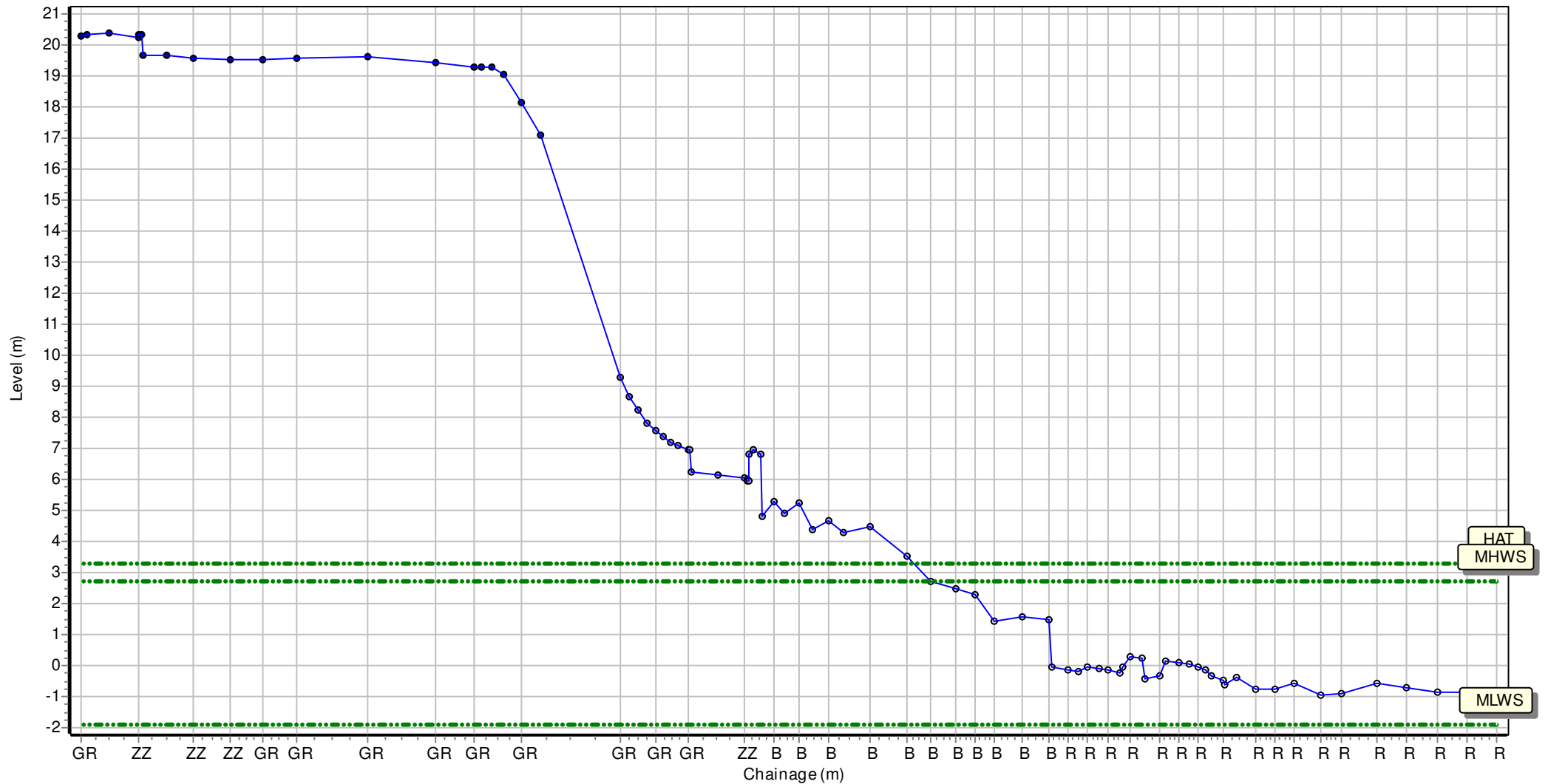
Sea State:

Visibility:

Rain:

Summary: 2020 Partial Measures Topo Survey

Easting: 442861.92 Northing: 549874.593 Profile Bearing: 50 ° from North



# Beach Profile

Location: 1bSH1B

Date: 23/05/2020

Inspector: AG

Low Tide:

Low Tide Time:

Wind

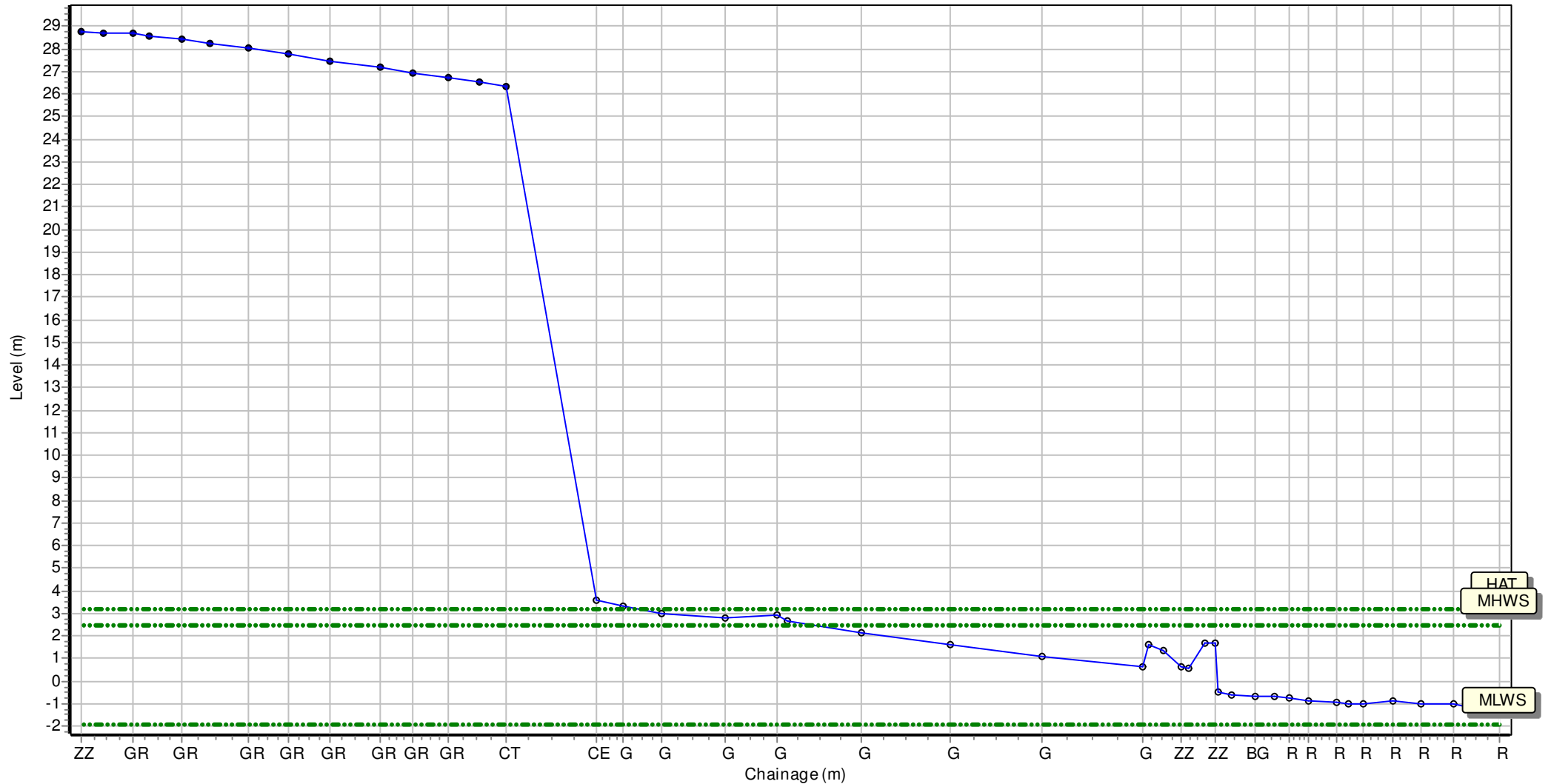
Sea State:

Visibility:

Rain:

Summary: 2020 Partial Measures Topo Survey

Easting: 443599.944 Northing: 548130.378 Profile Bearing: 63 ° from North



# Beach Profile

Location: 1bSH1A

Date: 23/05/2020

Inspector: AG

Low Tide:

Low Tide Time:

Wind

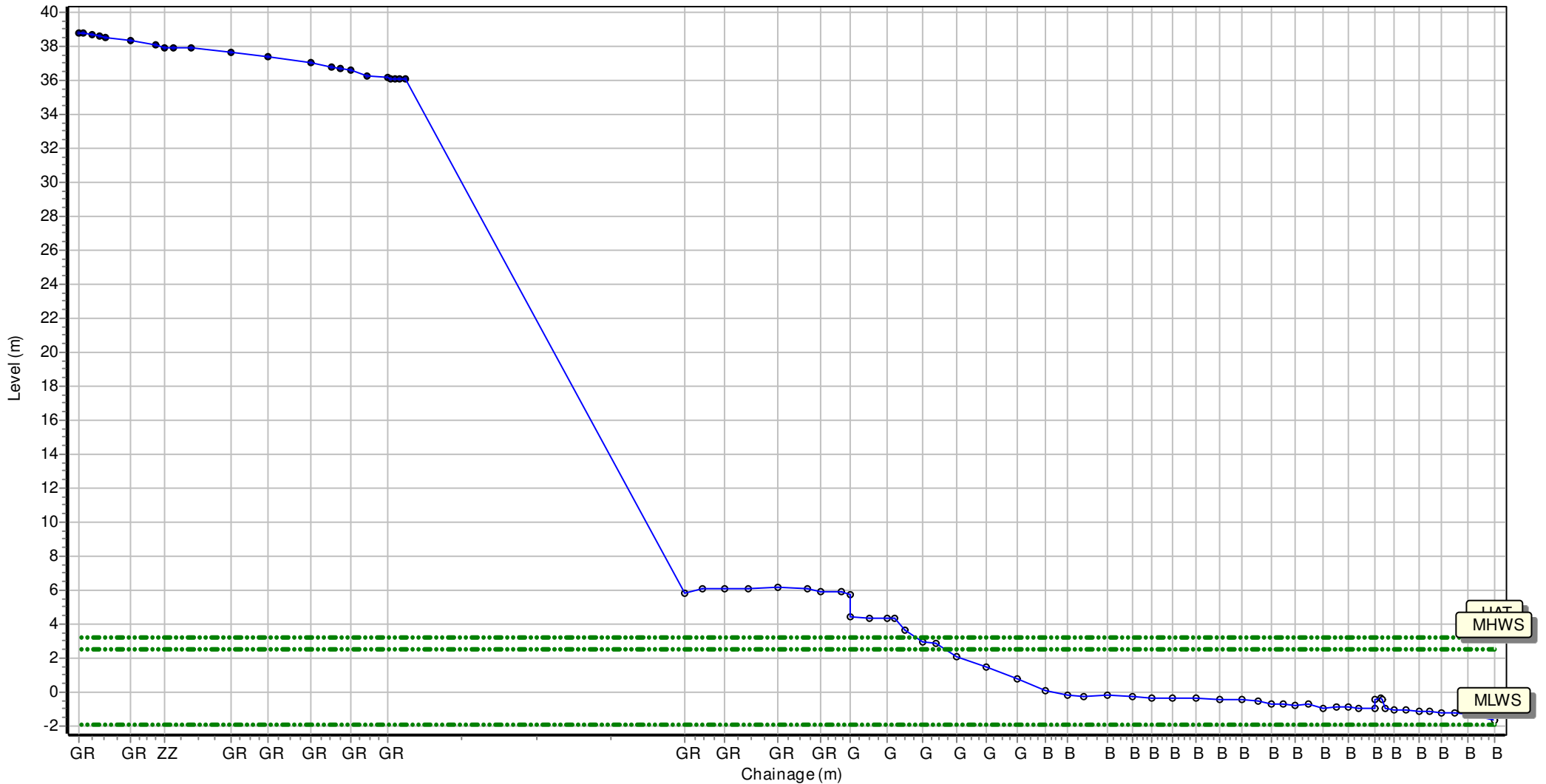
Sea State:

Visibility:

Rain:

Summary: 2020 Partial Measures Topo Survey

Easting: 443519.427 Northing: 547648.502 Profile Bearing: 97 ° from North



# Beach Profile

Location: 1bSH1

Date: 23/05/2020

Inspector: AG

Low Tide:

Low Tide Time:

Wind

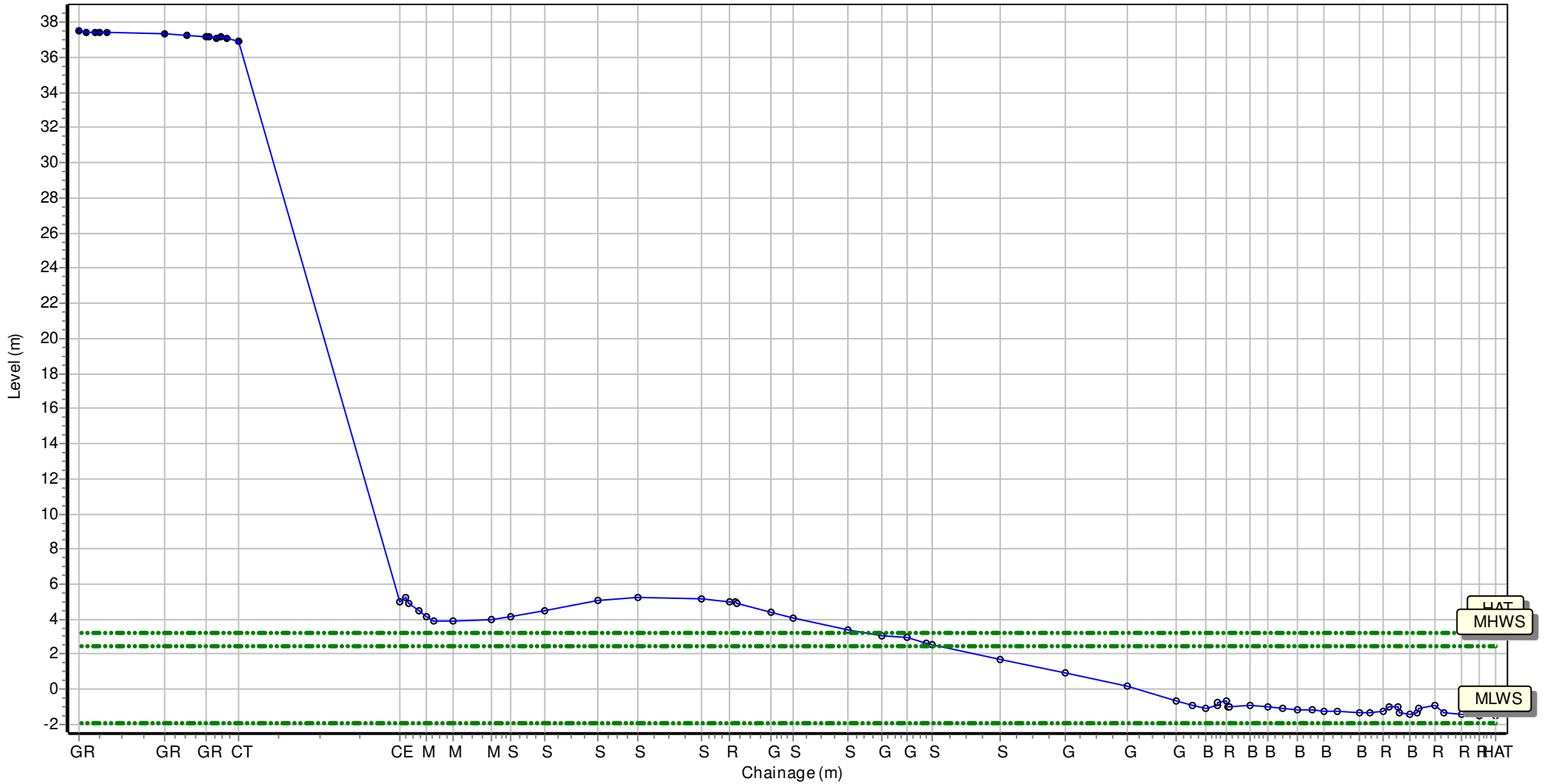
Sea State:

Visibility:

Rain:

Summary: 2020 Partial Measures Topo Survey

Easting: 443613.742 Northing: 547404.589 Profile Bearing: 74 ° from North



# Beach Profile

Location: 1bSH2

Date: 23/05/2020

Inspector: AG

Low Tide:

Low Tide Time:

Wind

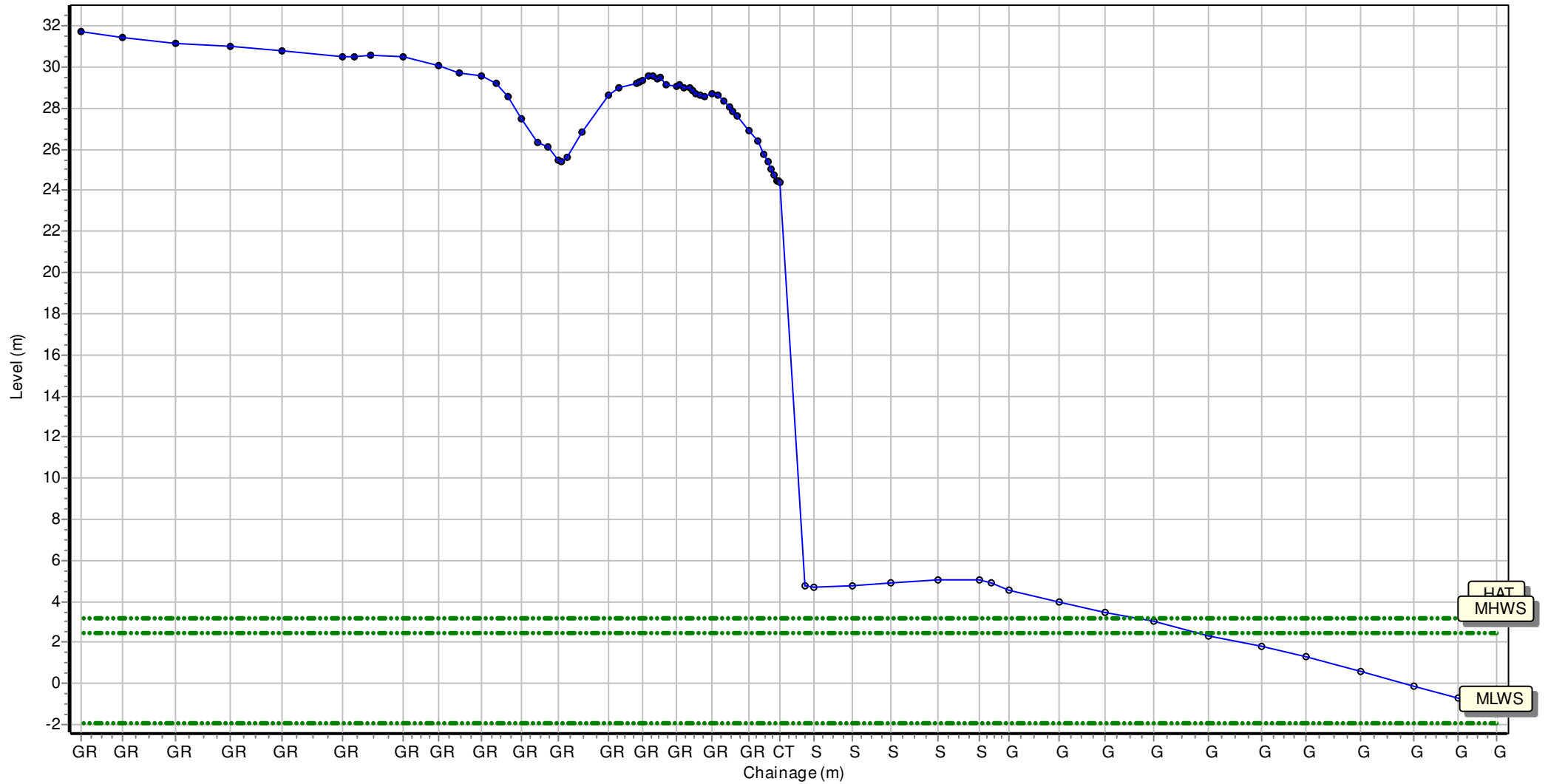
Sea State:

Visibility:

Rain:

Summary: 2020 Partial Measures Topo Survey

Easting: 443806.533 Northing: 546899.552 Profile Bearing: 74 ° from North



# Beach Profile

Location: 1cEA2

Date: 23/05/2020

Inspector: AG

Low Tide:

Low Tide Time:

Wind

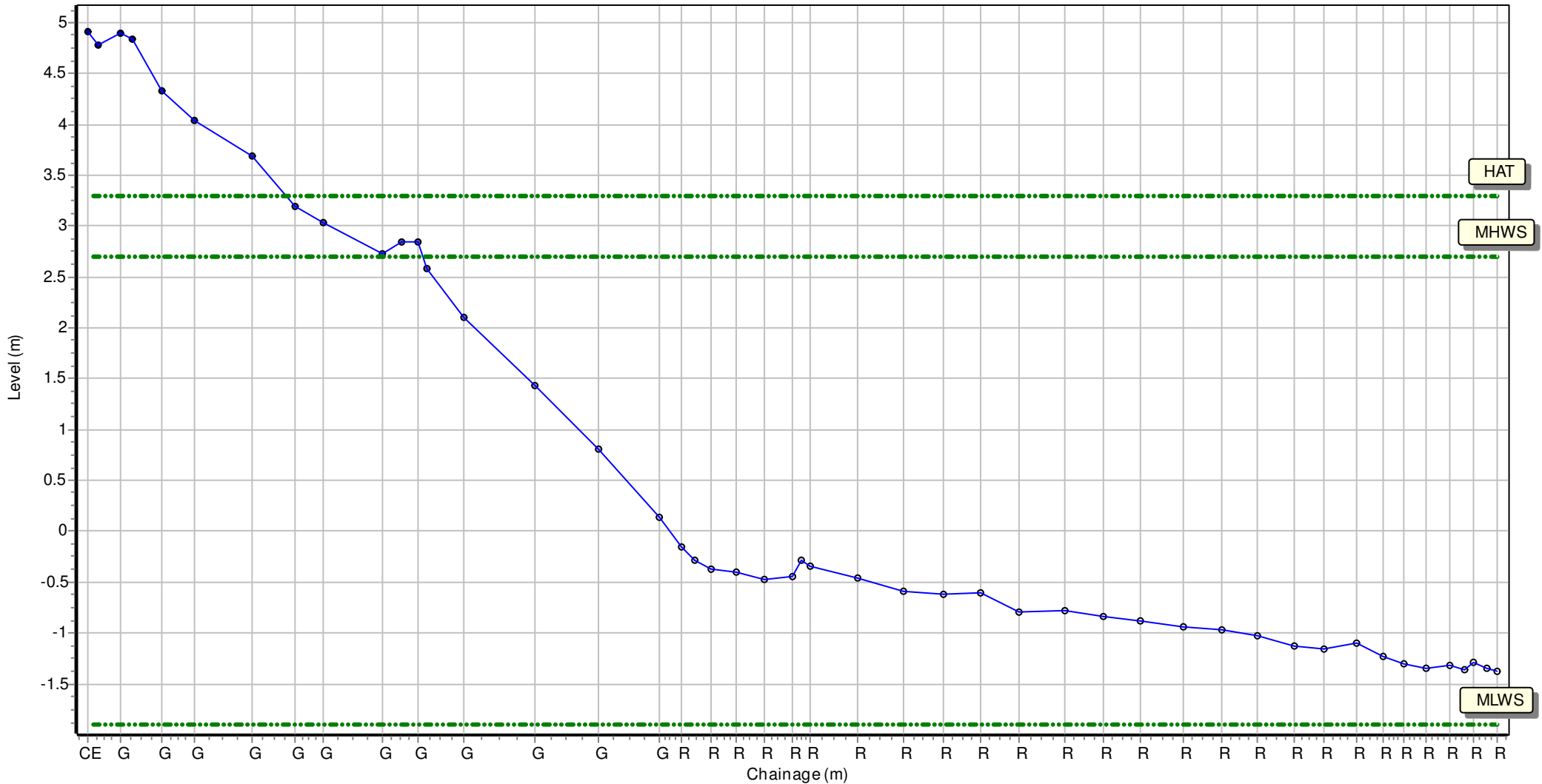
Sea State:

Visibility:

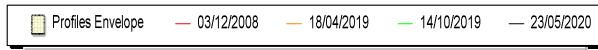
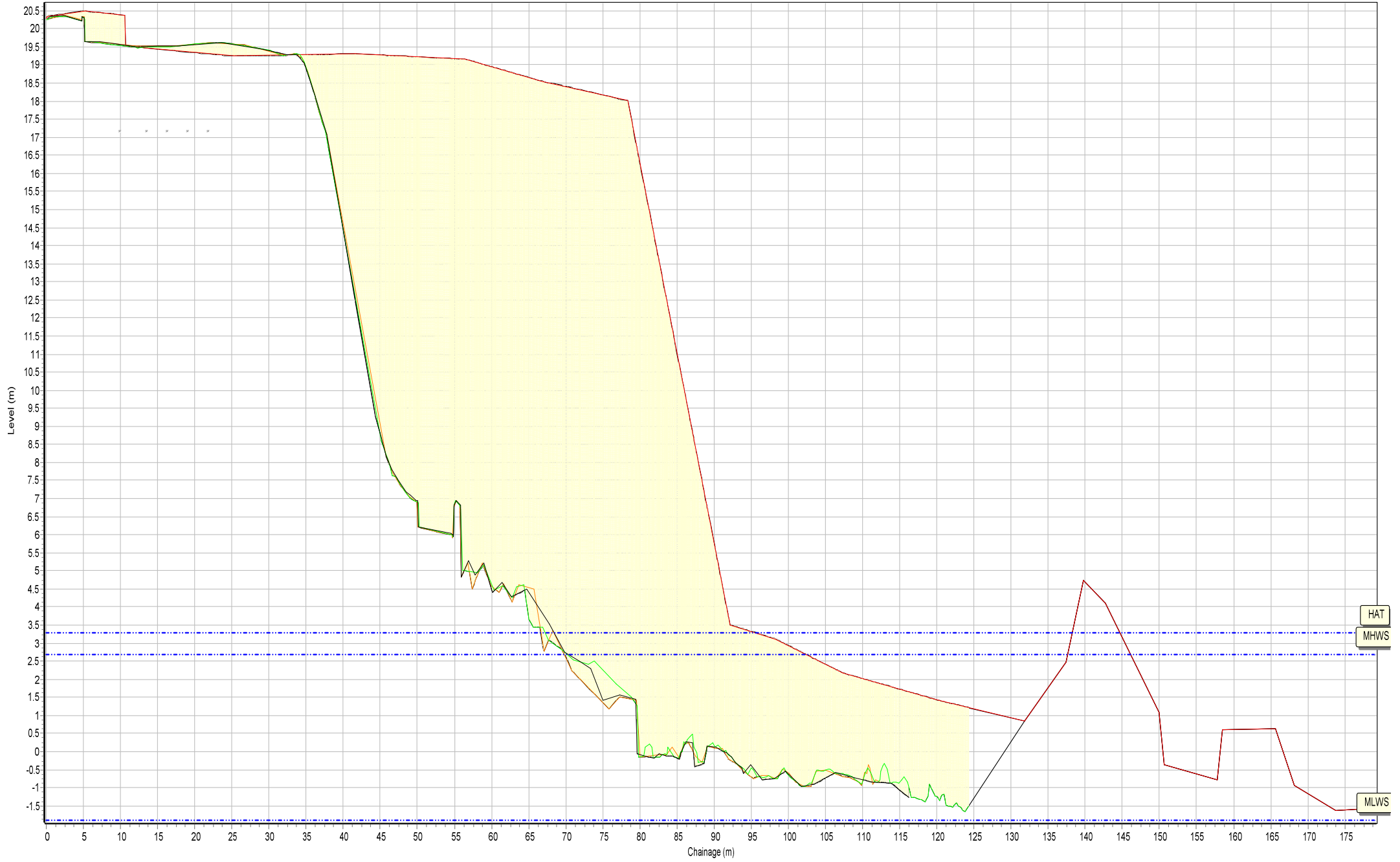
Rain:

Summary: 2020 Partial Measures Topo Survey

Easting: 444101.532 Northing: 545888.48 Profile Bearing: 75 ° from North



# Beach Profiles: 1bEA1





# Beach Profiles: 1bSH1B



# Beach Profiles: 1bSH1A



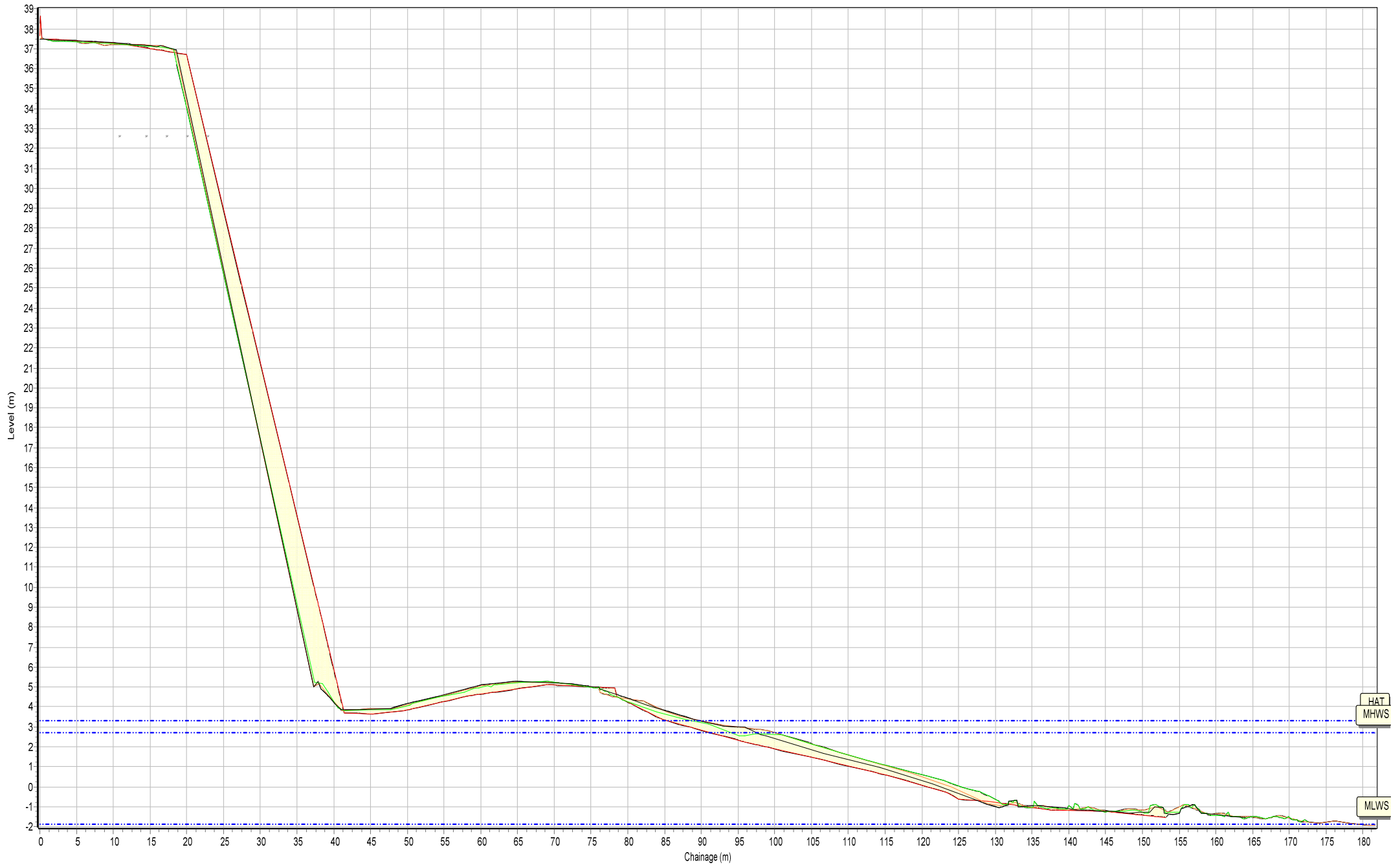
Profiles Envelope 21/10/2009 18/04/2019 14/10/2019 23/05/2020

HAT  
MHWS

MLWS

SANDS

# Beach Profiles: 1bSH1



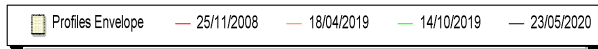
Profiles Envelope 25/11/2008 18/04/2019 14/10/2019 23/05/2020

HAT  
MHWs

MLWS

SANDS

Beach Profiles: 1bSH2

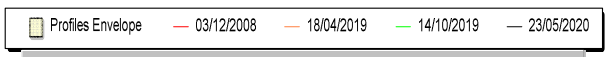
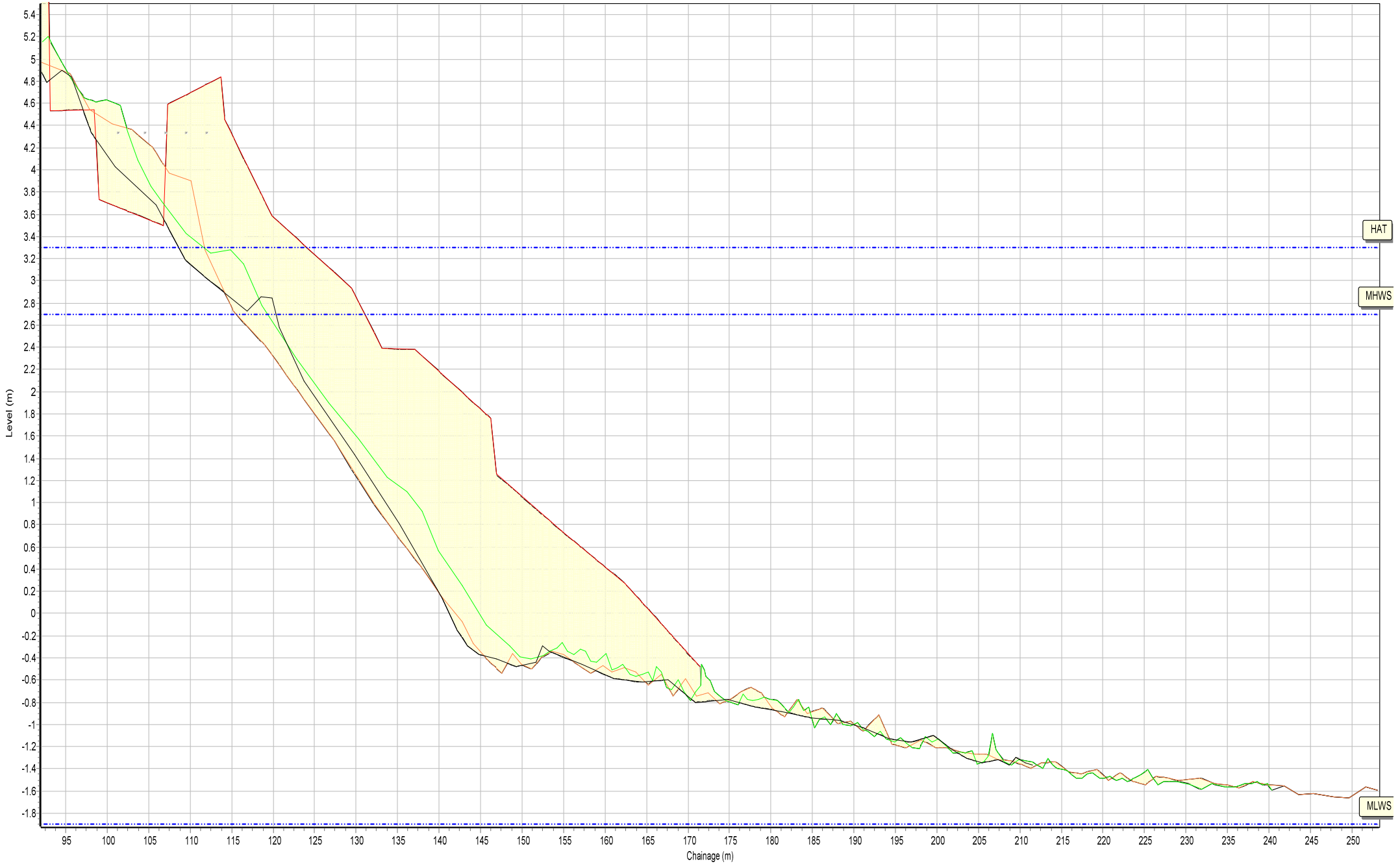


HAT  
MHWS

MLWS

SANDS

# Beach Profiles: 1cEA2



HAT

MHWS

MLWS

SANDS

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

<b>Code</b>	<b>Description</b>
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**  
**Cliff Top Survey**



Key  
 ● Cliff Top Survey Locations

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

**Figure 3 - Map 1**

**SEAHAM**  
**Durham County Council Frontage**

Cliff Top Survey Locations

Drawing Scale at A4 1:8,000

**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](http://www.royalhaskoningdhv.com)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

443000

444000

548000



## Cliff Top Survey

### Seaham (Dawdon)

Three ground control points have been established at Dawdon (Figure 3). The maximum separation between any two points varies along the coast, reflecting the degree of risk from erosion.

The cliff top surveys at Dawdon are undertaken bi-annually. Measurements are taken from a fixed ground control point along a fixed bearing to the edge of the cliff top.

Table B1 provides baseline information about these ground control points and results from the 2008 (baseline) survey showing the position from the ground control point to the edge of the cliff top along the defined bearing. Future reports will show results from subsequent surveys and provide a means of assessing erosion since the baseline survey.

**Table B1 – Cliff Top Surveys at Dawdon**

Ground Control Points				Distance to Cliff Top (m)			Total Erosion (m)		Erosion Rate (m/year)
Ref	Easting	Northing	Bearing	Baseline Survey	Previous Survey	Present Survey	Baseline to Present	Previous to Present	Baseline to Present
			(°)	Nov 2008	Oct 2019	May 2020	Nov 2008 – May 2020	Oct 2019- May 2020	Nov 2008 – May 2020
1	443515.4	548421.7	70	16.1	15.04	15.09	-1.01	0.05	-0.08
2	443607.8	548136.3	90	13.3	13.24	13.24	-0.06	0	0.00
3	443756.1	547858.5	95	14.8	13.55	13.55	-1.25	0	-0.10