



Cell 1 Regional Coastal Monitoring Programme Update Report 15: 'Partial Measures' Survey 2023

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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)	Water Level (m AOD)	Water Level (m AOD)
	Berwick upon Tweed to Goswick Sands	Holy Island	Goswick Sands to Embleton Bay
HAT	2.8	3.1	3.1
MHWS	2.2	2.4	2.4
MHWN	1.3	1.3	1.3
MLWN	-1.3	-1.0	-0.9
MLWS	-1.8	-1.7	-1.6

Water Level Parameter	Water Level (m AOD)	Water Level (m AOD)
	Boulmer to Druridge Bay	Lynemouth Bay to Blyth South Beach
HAT	3.05	3.0
MHWS	2.35	2.4
MHWN	1.25	1.3
MLWN	-0.85	-0.9
MLWS	-1.75	-1.8

Source: UKHO Admiralty Tide Tables, 2020

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.

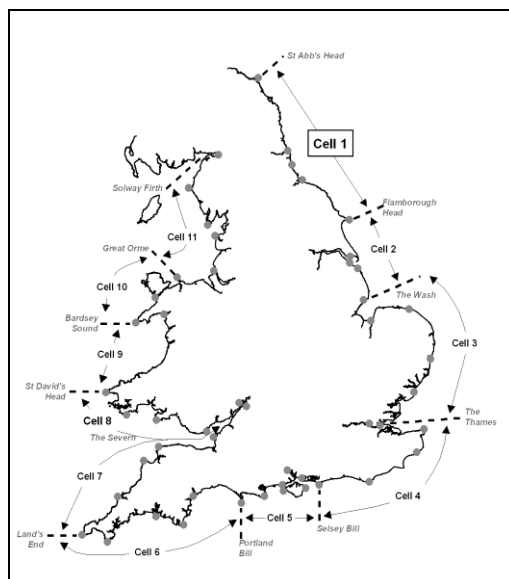


Figure 1 Sediment Cells in England and Wales

The programme commenced in its present guise in September 2008¹ and is managed by North Yorkshire Council on behalf of the North East Coastal Observatory. It is funded by the Environment Agency, working in partnership with the following organisations:



¹ Prior to 2008, coastal monitoring was undertaken on a consistent basis across Northumberland and North Tyneside as part of the (then) Northumbrian Coastal Authorities Group's monitoring programme which commenced in 2002, whilst several authorities between the River Tyne and Flamborough Head undertook their own local monitoring programmes.

Royal HaskoningDHV has been appointed to provide Analytical Services in relation to the present phase of the Cell 1 Regional Coastal Monitoring Programme, between 2016 - 2027.

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 seabed 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.

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	Jul 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-Apr 13	Jun 13	-
6	2013/14	Sept-Oct 13	Feb 14	Mar-Apr 14	Jul 14	-
7	2014/15	Sept-Nov 14	Feb 15	Mar-Apr 15	Jul 15	-
8	2015/16	Sept-Dec 15	Feb 16	Mar-May 16	Jul 16	Jun 16
9	2016/17	Aug-Nov 16	Mar 17	Feb-Apr 17	Jul 17	
10	2017/18	Sep-Dec 17	Mar 18	Feb-Apr 18	Jul 18	
11	2018/19	Sep-Dec 18	Feb 19	Feb-Apr 19	Jul 19	
12	2019/20	Aug-Dec 19	Mar 20	Mar-May 20	Jun 20	
13	2020/21	Oct-Dec 20	Feb 21	Mar 21	May 21	Aug 21
14	2021/22	Aug-Oct 21	Feb 22	Mar-Apr 22	Aug 22	
15	2022/23	Aug-Nov 22	Apr 23	Feb-Mar 23	Jul 23	

(*) The present report is **Update Report 15** and provides an analysis of the 2023 Partial Measures survey for Northumberland County Council's frontage.

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 Lynemouth Bay (commenced 2020)
- 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 Lynemouth Bay (commenced 2021)
- Topographic survey along Newbiggin Bay (commenced 2010)

Cliff top survey (bi-annually) at:

- Colliery spoil edge survey at Lynemouth Bay (commenced 2020)
- 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 Google Earth. 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 be 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 Partial Measures survey was undertaken along this frontage between February 2023 and March 2023. During this time weather conditions varied considerably; refer to the survey reports for details of the weather conditions over this survey period.

The Update Report presents the following:

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

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



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:

Figure 2 - Map 1

SPITTAL A and B

Northumberland County Council Frontage

Report:

Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:9,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:
Figure 2 - Map 2
GOSWICK SANDS
Northumberland County Council Frontage

Report:
Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:35,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:
Figure 2 - Map 3
HOLY ISLAND
Northumberland County Council Frontage

Report:
Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:35,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:

Figure 2 - Map 4

BAMBURGH

Northumberland County Council Frontage

Report:

Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:15,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:
Figure 2 - Map 5
BEADNELL VILLAGE AND BAY
Northumberland County Council Frontage

Report:
Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:25,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:
Figure 2 - Map 6
EMBLETON BAY
Northumberland County Council Frontage

Report:
Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:10,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:
Figure 2 - Map 7
BOULMER
Northumberland County Council Frontage

Report:
Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:10,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:

Figure 2 - Map 8

ALNMOUTH BAY

Northumberland County Council Frontage

Report:

Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:45,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

Client:
North East
Coastal Group

Project:
Cell 1 Regional Coastal
Monitoring Programme

Title:
Figure 2 - Map 9
HIGH HAUXLEY AND DRURIDGE BAY (NORTH)
Northumberland County Council Frontage

Report:
Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:20,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

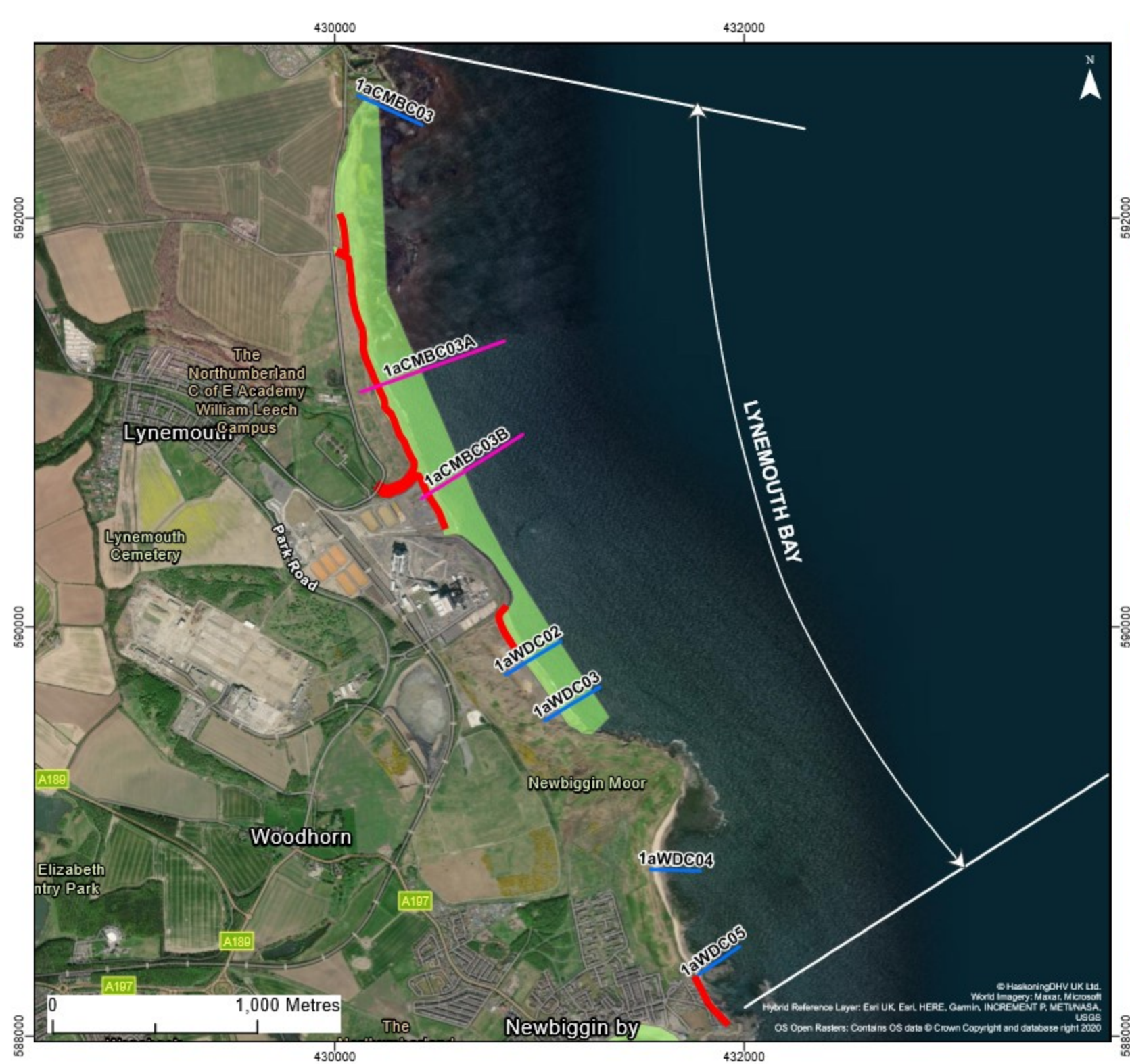
- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:
Figure 2 - Map 11
HIGH HAUXLEY AND DRURIDGE BAY (SOUTH)
Northumberland County Council Frontage

Report:						
Survey Report						
Revision:	Date:	Drawn:	Checked:	Size:	Scale:	
0	n/a	TC	NJC	A4	1:40,000	
Co-ordinate system: British National Grid						



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

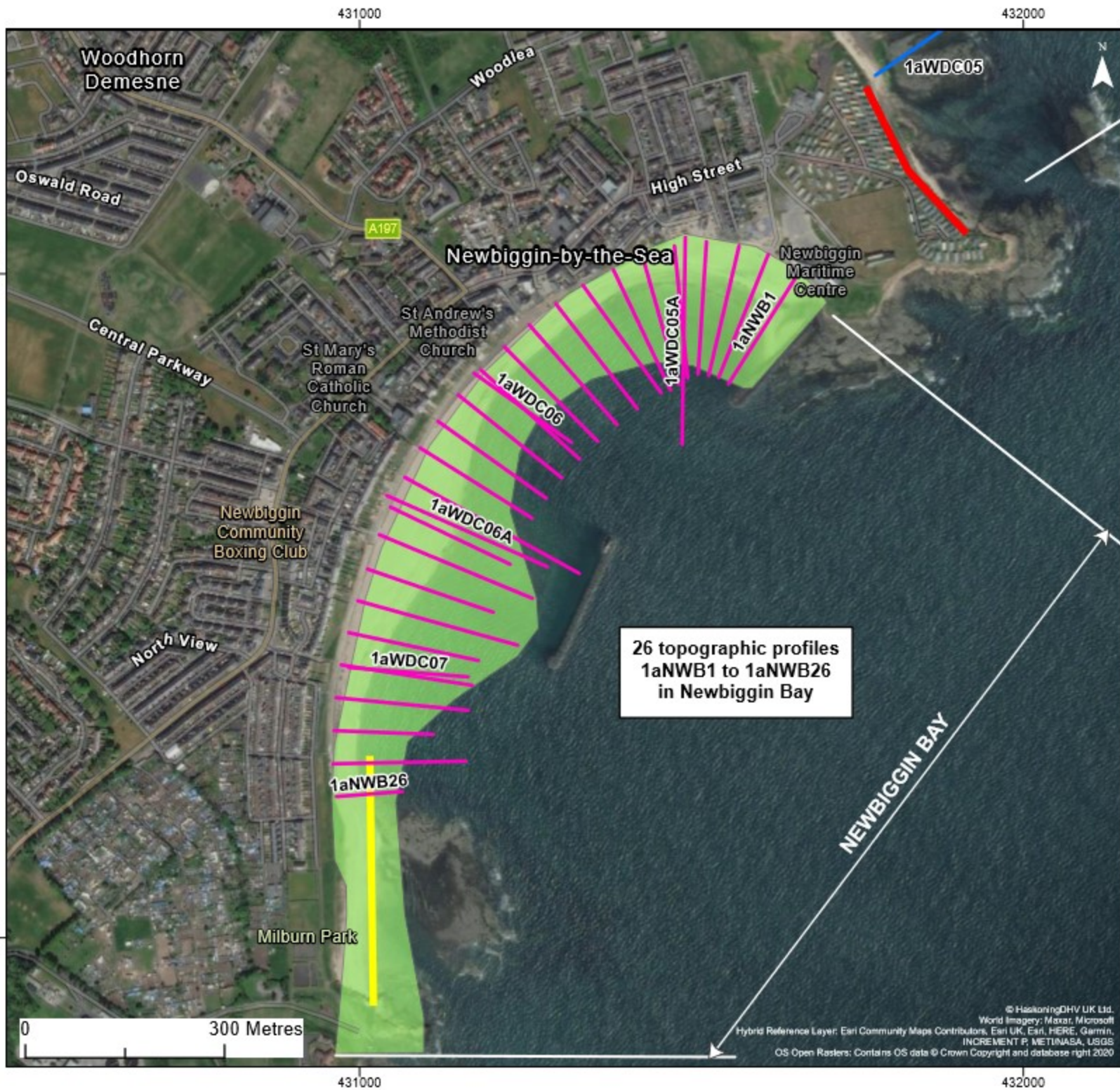
Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:
Figure 2 - Map 10
LYNEMOUTH BAY
Northumberland County Council Frontage

Report:
Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:25,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:
Figure 2 - Map 12
NEWBIGGIN BAY
Northumberland County Council Frontage

Report:
Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:8,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

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

Title:

Figure 2 - Map 13

CAMBOIS BAY

Northumberland County Council Frontage

Report:

Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:25,000

Co-ordinate system: British National Grid



SURVEY LOCATIONS

Topographic Profile

- Annual
- Bi-Annual

Topographic Area

- 6 monthly
- yearly
- 5 yearly

- Cliff Top Edge Survey
- Edge of Sand Survey

Client:

North East
Coastal Group

Project:

Cell 1 Regional Coastal
Monitoring Programme

Title:

Figure 2 - Map 14

BLYTH SOUTH BEACH

Northumberland County Council Frontage

Report:

Survey Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:25,000

Co-ordinate system: British National Grid

2. Analysis of Survey Data

2.1 Sandstell Point (Spittal A)

Survey Date	Description of Changes Since Last Survey	Interpretation
9 th March 2023	<p>Beach Profiles:</p> <p>Sandstell Point is covered by four beach profile lines for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2022.</p> <p>Profile 1aBTBC02 is located on the southern bank of the inner Tweed estuary. From the beginning of the survey to the toe of the dunes at chainage 43m, the dunes have remained largely stable with all change limited to ± 0.1m. It is noted that at the time of the survey the dunes were covered in a dusting of snow which may explain some of the change. On the upper beach, between chainages 43m and 47m, beach levels have increased by up to 0.4m in level. Between chainages 58m and 80m the beach has dropped by 0.2m in level, resulting in a more uniform profile. Overall, the dunes remain at a high level and the beach profile is at a medium level across the upper-middle beach, whilst the lower beach is at a low level compared to the range recorded from previous surveys.</p> <p>Profiles 1aBTBC04 (longitudinal section) and 1aBTBC05 and 1aBTBC06 (both cross-sections) cover the spit at Sandstell Point.</p> <p>At Profile 1aBTBC04, the crest of the foredune has accreted by 0.15m in level. Between chainage 71m and 141m the beach has accreted with the crest of the spit now at 3.9mOD. Between 141m and 272m the sediment has dropped in level by up to 1.2m. The distal end of the spit has accreted by up to 0.35m in level between chainages 272m and 415m. The end of the spit has retreated landward by 3m. Compared to the range of the previous surveys, the profile is at a medium level with exception of the upper beach which is at the highest level on record.</p> <p>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.</p> <p>At 1aBTBC05, there has been the drawdown of material on the seaward side of the spit from the upper profile to the lower profile. This has resulted in an increase in level between chainages -77m to 19m of up to 1m and a decrease in level between chainages 19m and 88m of 0.4m. The crest of the spit has</p>	<p>The profile suggests the dunes along the south bank of the River Tweed have remained stable again, with change limited to ± 0.15m. However, the PM2023 survey report notes 'the new dune is becoming more prominent at the top of the beach', suggesting that the profile may not represent the change experienced across the dune system in this survey.</p> <p>There has been redistribution of sediment across the spit with the near and far ends both accreting, (coinciding with the two cross sectional profiles) and the middle section reducing. The end of the spit has retreated 3m landward since the previous survey.</p> <p>Longer term trends: The small change in dune profile is within the bounds of previous surveys that indicate they have remained stable over the past 12 years.</p> <p>The wide variation in profile forms over time is indicative of this being one of the most dynamic systems on the north east coast.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>accreted by up to 0.7m and is now at the highest level on record (compared to the range of the previous surveys). The river channel side of the spit has remained stable since the previous survey.</p> <p>At 1aBTBC06 the seaward side of the spit has been dominated by erosion, dropping in level by up 0.6m across the entire aspect. The crest of the spit has risen by 1m in level and is now at the highest level on record (compared to the range of the previous surveys). The upper section of the river channel side has accreted by a similar amount. The lower section has remained stable.</p>	
9th March 2023	<p>Topographic Survey:</p> <p>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 2011. The previous survey was undertaken for the Full Measures survey in autumn 2022.</p> <p>Data from the most recent topographic survey (Partial Measures, spring 2022) 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 produced topographic survey and the present survey.</p> <p>The difference plot shows that the beach and seaward face of the spit have been dominated by shoreline parallel bands of change. Accretion has dominated the upper and lower beach (at a magnitude of up to +1.0) and with erosion dominating the middle section (at a magnitude up -1.5m). On the River Tweed face of the spit, erosion is observed on the lower beach towards the root. The most intense change has occurred at the distal end with accretion of up 2.0m.</p>	<p>Previous surveys have noted a general trend of migration of both the river channel and the spit in a clockwise direction around the headland.</p>

2.2 Spittal (Spittal B)

Survey Date	Description of Changes Since Last Survey	Interpretation
9 th March 2023	<p>Beach Profiles:</p> <p>Spittal B is covered by two beach profile lines for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2022.</p> <p>Profile 1aBTBC11 is located to the north of Spittal Beach. Since the previous survey (September 2022) there has been a redistribution of material across the profile, generally drawing down material from the upper to lower beach. The previously undulating profile has become more uniform resulting in alternating lengths of erosion and accretion, limited to $\pm 0.5\text{m}$ in level. Overall, the beach is at a medium level when compared to the range of the previous survey.</p> <p>Profile 1aBTBC13 is located towards the centre of Spittal Beach. The beach has been dominated by accretion since the previous survey, increasing from chainage 0m to 69m and again between 100m and 169m by up to 1m in level. A small length of erosion is observed on the centre of the beach at a magnitude of up to 0.2m in level. The beach is at a high level overall especially between chainage 104m and 149m which is at the highest level on record.</p>	Both profiles have experienced accretion of the lower beach. Southern profile has accreted, northern profile more a redistribution of sediment but both profiles reiterate the dynamism of sediment along this stretch.

2.3 Goswick Sands

Survey Date	Description of Changes Since Last Survey	Interpretation
Feb / March 2023	<p>Beach Profiles:</p> <p>Goswick Sands are covered by two beach profile lines for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2022.</p> <p>Profile 1aBTBC16 is located to the north of Goswick Sands, between Far Skerr and Cheswick Black Rocks. The dune up to the seaward toe, at chainage 42m, has remained stable. At the toe itself a small, 0.4m high cliff, has formed. Between chainages 42m and 118m, the beach has been dominated by erosion up to 0.35m in level. Seawards of chainage 118m, the lower beach has steepened resulting in an increasing drop in level, peaking at chainage 180m with a 1.2m drop. When compared to the range of the previous surveys, the dunes remain at a high level, but the beach is at a low level, particular between chainages 70m and 115m where it is at the lowest level on record.</p> <p>Profile 1aBTBC19 is located to the south of Goswick Sands. The dunes have remained stable since the last survey, with changes generally restricted to ± 0.1m. The seaward face of the foredune has slackened marginally. The upper beach between chainages 49m and 156m has dropped in level by up to 0.15m. Seawards of this, the rest of the beach has also been dominated by accretion, albeit at a low magnitude, with a maximum drop of 0.15m observed. Overall, the beach profile is at a medium level when compared to the range of previous surveys with the exception of the lower beach which is at the high level on record.</p>	<p>Change across Goswick Sands is varied. In the north erosion has dominated the profile whilst in the south accretion has dominated (albeit at a low magnitude).</p> <p>Longer term trends: The majority of change is a appears to be in line with seasonal behaviour. The notable barrier feature observed in profiles 1aBTBC18 and 1aBTBC19 has been reported to be gradually reducing in height since 2003. The feature appears to have landward in 2023 although the profile is incomplete and therefore</p>

2.4 Holy Island

Survey Date	Description of Changes Since Last Survey	Interpretation
Feb / March 2023	<p>Beach Profiles:</p> <p>Holy Island is covered by two beach profile lines for the Partial Measures surveys (Appendix A). The previous survey was undertaken for the Full Measures survey in September 2022.</p> <p>1aBTBC21 and 1aBTBC23 are located on the north-west side of the island, along The Snook.</p> <p>At profile 1aBTBC21 the dunes have remained stable since the last survey, with a slight accretion (+0.1m) observed to the crest of both the main and foredune. From the toe of the foredune at chainage 70m to the end of the profile at chainage 377m the beach has been dominated by low level erosion (-0.1m). The beach has maintained its undulating profile. The beach is at a low level compared to the range recorded from previous surveys.</p> <p>Profile 1aBTBC23 spans both the beaches to the north and south of the snook and is bisected by the dune system in the middle. The profile overall has not experienced any significant change. The beach to the south, from chainage 0m to 220m has been dominated by very low-level accretion (0.1m) since the previous survey. The dune system has also remained stable with all change limited to $\pm 0.1\text{m}$. The toe of the northern foredune has accreted by 0.2m in level. Seawards of chainage 520m, the beach is again dominated by low level accretion. The beach is at a high level compared to the range recorded from previous surveys.</p>	<p>The profiles suggest that the dunes and beach around Holy Island have remained stable since the previous survey with all change limited $\pm 0.1\text{m}$</p> <p>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.</p>

2.5 Beadnell Village

Survey Date	Description of Changes Since Last Survey	Interpretation
Feb / March 2023	<p>Beach Profiles:</p> <p>Beadnell Village is covered by one beach profile line for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2022.</p> <p>1aBTBC31 is in Nacker Hole and extends across the promenade and seawall. From the toe of the seawall at chainage 12m to chainage 15m there has been erosion up to 0.4m in level. Erosion is again observed seawards of chainage 20m of up to 0.25m in level. This erosion has resulted the rocky foreshore becoming exposed from chainage 32m. Overall the beach is at a medium level when compared to the range of the previous survey except for the lower beach which is at a low level.</p>	<p>The beach at Nacker Hole has been dominated by erosion since the previous survey but despite remains at a medium level compared to the range of the previous surveys.</p> <p>Longer term trends: The profile has typically remained stable over the monitoring period due to the presence of the rocky foreshore that is periodically exposed and submerged as beach levels fluctuate.</p>

2.6 Beadnell Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
21 st March 2023	<p>Beach Profiles:</p> <p>Beadnell Bay is covered by five beach profile lines for the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in September 2022.</p> <p>Profiles 1aBTBC33 and 1aBTBC34 are located in Beadnell Harbour to the north of Beadnell Bay. Profile 1aBTBC37 is located further south towards the outfall of Brunton Burn/Long Nanny.</p> <p>At profile 1aBTBC33, there has been very little change on the dunes, limited to $\pm 0.05\text{m}$. At the toe of dunes, the beach accreted by 0.1m in level up to chainage 66m. From chainage 66m to chainage 120m, the beach has accreted by up to 0.4m in level. Between chainage 120m and 220m the beach has remained stable. Seawards of chainage 210m the lower beach has slackened, resulting in an increase in level of 0.2m at chainage 237m. Overall, the beach is at a medium when compared to the range of the previous survey with some parts of the upper beach at the highest level on record.</p> <p>Profile 1aBTBC34 is covered by dunes up to chainage -2m. The most significant change over which length has occurred between -13m and -8m, where a section of foredune previously present, has started to return with accretion up 1m observed since the last survey. Erosion at the toe of the dunes has caused cliffing 0.2m in height to form. Seawards of the dunes, the beach has generally been dominated by accretion, with the profile between chainages 32m and 153m increasing in level by up to 0.25m. A shallow berm on the upper beach has been eroded causing a slight drop in level between 5m and chainage 30m.</p> <p>At profile 1aBTBC37, significant erosion has caused the toe of the foredune to retreat 10m and steepen notably. Between chainages 38m and 207m the beach has accreted by up to 0.35m in level. Seawards of chainage 207m a shallow berm observed previously has been eroded resulting in a drop in level of up to 0.3m. Overall, the beach is at medium level when compared to the range of the previous surveys. The erosion at the toe of the dune has brought the level back to medium whereas it was previous at a very high level.</p> <p>Profiles 1aADC01 and 1aADC02 are located along the frontage to the south of the outfall of Brunton Burn/Long Nanny.</p>	<p>The profiles along Beadnell Bay remain at a healthy level and within the envelope of previous surveys. Accretion appears to have been the dominant process with all but 1aADC02 experiencing a net increase.</p> <p>The dunes have also remained stable, with foredune growth noted on profile 1aBTBC34. However, two profiles (1aBTBC37 and 1aBTBC39) have both experienced erosion at the toe of the foredune causing significant cliffing.</p> <p>Longer term trends: Along the length of Beadnell Bay, the dunes remain a similar form to those observed in the past. Generally, the beach changes are consistent with the seasonal fluctuations of sediment with a bay system.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>At profile 1aADC01 the dune has remained stable with all change limited to ± 0.1m. The face of the dune has accreted by 0.2m in level between chainage 249m and 256m. Similarly, the toe of the dune, between chainages 283m and 310m, has accreted by 0.6m. The beach profile has generally become more uniform, filling in shallow depressions observed previously. The lower beach has also slackened resulting in an increase in level at the end of the previous profile (chainage 463m) of 0.3m. Overall, the beach is at a high level when compared to the range of the previous surveys.</p> <p>At profile 1aADC02 the dunes, up to chainage 47m, have remained stable with all change limited to ± 0.1m in level. Significant erosion caused cliffing at the toe of the dune, 1.4m in height. Seawards of this, the beach has been dominated by erosion across the entire length of up to 0.2m in level. Despite this the beach remains at a high level when compared to the range of the previous surveys.</p>	

2.7 Boulmer

Survey Date	Description of Changes Since Last Survey	Interpretation
Feb / March 2023	<p>Beach Profiles:</p> <p>Boulmer is covered by two beach profile lines for the Partial Measures survey (Appendix A). These were added to the programme in October 2007. The previous survey was undertaken for the Full Measures survey in August 2022.</p> <p>At profile 1aADC04A, the cliff top, from the start of the profile to chainage 14m, has risen in level by 0.1m. However, the survey photos show snow on the ground that may explain this change. The upper beach from chainage 15m to 20m has remained unchanged. The beach has accreted from chainage 20m to 56m by up to 0.35m. Seawards of chainage 56m, the rocky foreshore remains exposed. As expected, the change along this section is limited to ± 0.1m. When compared to the range of the previous surveys, the upper beach is at a high level and the lower beach at a low level.</p> <p>At profile 1aADC04B the backshore (now rock armour) and upper beach to chainage 30m has remained stable since the last survey. Between chainage 30m and 80m the beach profile has become uniform, removing a berm observed in the previous survey. The rocky foreshore is exposed from chainage 55m. Overall, the beach is at a medium level when compared to the range of previous surveys.</p>	<p>Change at Boulmer has been limited since the previous survey. The rock armour toe appears to be effective in preventing erosion of the dunes. The rocky foreshore remains exposed seaward of chainage 55m.</p> <p>Longer term trends: At Boulmer, the beach generally remains stable with the rocky foreshore exposed on the lower beach. The now defended dunes remain stable.</p>

2.8 Alnmouth Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
8 th March 2023	<p>Beach Profiles:</p> <p>Alnmouth Bay is covered by three beach profile lines during the Partial Measures survey (Appendix A). The previous survey was undertaken for the Full Measures survey in autumn 2022.</p> <p>The three profiles are located to the north of Alnmouth Bay between Marden Rocks and the mouth of the River Aln Estuary.</p> <p>At profile 1aADC07 the dune crest and face have remained unchanged since the previous survey. At the toe of the dune, the upper beach has initially accreted to chainage 30m before switching to erosion. This erosion continues until 170m, at magnitude of up to 0.5m. The berm on the lower beach, noted in the previous inspection, has flattened by 0.3m in level and retreated landward by approximately 15m. Overall the beach is at medium level when compared to the range of the previous surveys.</p> <p>At profile 1aADC08, change across the dunes and upper beach until chainage 18m is limited to ± 0.1m. From chainage 18m to the end of the profile (at chainage 139m), the beach has consistently accreted by 0.2m in level. The survey report notes heavy onshore winds restricted the achievable survey depth, which explains why the profile is 150m short of the typical profile length.</p> <p>At profile 1aADC09, there appears to have been significant erosion at the toe of the dune (chainage 18m), where a 2m high cliff has formed. However, when checking the survey photos cliffing to this extent is not apparent suggesting an error in the survey data. Seawards of chainage 25m the beach profile has become more uniform than the previous undulating profile. This has resulted in alternating lengths of accretion and erosion of up to ± 0.5m in magnitude. (Erosion from 26m to 37m and from 43m to 58m. Accretion from 58m to 89m and seawards of 109m). The beach is at a very high level when compared to the range of the previous surveys.</p>	<p>The dunes have remained stable since the last survey. There has been alternating patterns of accretion and erosion across the beach profiles, however Profiles 1aADC07 and 1aADC09 have both, to an extent, eroded on the upper beach and accreted on the lower beach which is typical of seasonal sediment fluctuations.</p> <p>Longer term trends: The dunes show long-term stability. The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys, although change in the position of the river channel has substantially curtailed profile 1aADC09 and therefore no information is available about beach elevations on the opposite bank of this channel along this profile alignment (this been the case since 2015).</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
<p>March 2023</p>	<p>Topographic Survey:</p> <p>The northern part of Alnmouth Bay (to the north of the River Aln estuary) is covered by bi-annual topographic survey, which commenced in April 2005. Data from the most recent topographic survey (Partial Measures, March 2023) 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, August 2022) and the present survey.</p> <p>In the southern extent of the survey area, accretion in shoreline parallel has dominated the pattern of change. The accretion is most intense on the banks of the River Aln estuary where the level increase is up to 1.25m in level. In the northern extents of the survey area, the pattern of change is more balanced, with equal shoreline parallel bands of erosion and accretion evident. The toe of the dunes are protected by “antitank” blocks along much of the beach which creates the patchy change observed at the toe of the dunes.</p>	<p>The findings of the topographic survey show a mixture of erosion and accretion, some resulting from winter erosion of the upper beach and consequent accretion in the lower beach (draw down), whereas other changes result from migration of the mouth of the River Aln across the beach.</p>

2.9 High Hauxley & Druridge Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
Feb - March 2023	<p>Beach Profiles:</p> <p>High Hauxley to Druridge Bay is covered by eight beach profile lines during the Partial Measures survey (Appendix A). Four of these (with A or B suffixes) were added to the programme in October 2007. The previous survey was undertaken for the Full Measures survey in Autumn 2022.</p> <p>1aADC15A, 1aADC16 and 1aADC16A are located around Hauxley Haven.</p> <p>At profile 1aADC15A, the cliff face and upper beach have remained stable since the previous survey with all change limited to $\pm 0.1\text{m}$. Between chainage 100m and 190m the beach has eroded by up to 0.4m in level. This erosion has caused this section of beach to be the lowest level on record when compared to the range of the previous surveys. The rest of the profile remains at a medium level.</p> <p>At profile 1aADC16 the survey report notes '<i>gaps in section due to bushes and no access to resident's garden</i>' which appear to be in the dune part of the section. At the toe of the dune from chainage 69m to chainage 138m, the beach has accreted by up to 0.4m in level, before switching to erosion until the end of the profile (chainage 246m). The magnitude of erosion is up to 0.3m in level. As a result, when compared to the range of the previous profiles, the upper beach is at a high level and the lower beach at a low level. Between chainages 155m and 175m the beach is at the lowest level on record.</p> <p>Profile 1aADC16A has remained largely stable since the previous survey. The dunes and rock armour toe are unchanged until chainage 81m. Between chainages 96m and 136m, the beach has accreted up to 0.2m. Between chainages 150m and 200m, the beach has eroded again by to 0.2m in level. The upper beach is at a high level and lower beach at a low when compared to the range of the previous surveys.</p> <p>1aADC16B, 1aADC17 and 1aADC17A are located to the north of Druridge Bay, between Bondi Carrs and Hadston Carrs and extend seawards from Togston Links.</p> <p>At profile 1aADC16B there has been minimal change up to the toe of the cliffed dune at chainage 79m. The upper beach, between chainages 79m and 152m, has dropped in level by up to 0.7m. Between chainages 152m and 184m, the rocky outcrop remains exposed and is unchanged. Seawards of chainage 184m the profile has again eroded dropping level by 0.5m. Overall, the beach is at a very low</p>	<p>At High Hauxley, all three profiles have experienced a pattern of accretion on the upper beach and erosion of the lower beach since the previous surveys. This contrasts with expected typical seasonal fluctuations of drawdown of material during the winter months.</p> <p>The pattern along Druridge Bay is more varied with both erosion and accretion evident. However, the change is not uncharacteristic of the bay and on the whole remains within the envelope of the previous surveys</p> <p>Longer term trends: At Hauxley Haven and Druridge Bay, the dunes have demonstrated a long-term trend of stability, with the majority of profiles at a medium-high level. The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>level when compared to the range of the previous surveys.</p> <p>At profile 1aADC17 the dunes have remained stable until chainage 29m. At the toe of the dunes to chainage 40m, the upper beach has accreted by up to 0.25m in level. Low level accretion has also occurred between chainages 60m and 170m (+0.1m) before increasing in magnitude (+0.4m) until chainage 234m. Seawards of chainage 234m, the lower beach has steepened resulting in a drop in level at the end of the profile 0.2m. Overall the profile is at a high level when compared to the range of the previous surveys. The beach is at a medium level when compared to the range of the previous survey.</p> <p>At profile 1aADC17A the dune crest and face are unchanged. The toe of dune has advanced seaward by 0.75m. The upper beach, between chainages 23m and 60m, has accreted by up to 0.2m. This accretion then increases in magnitude to 0.7m by chainage 75m, tapering to no change by chainage 111m. Between chainages 111m and 186m the beach eroded by up to 0.4m in level. Seawards of 186m the profile has slackened resulting in accretion of the lower beach. The beach is at a medium level when compared to the range of the previous survey.</p> <p>1aCMBC01 and 1aCMBC02 are located in the southern section of Druridge Bay.</p> <p>At profile 1aCMBC01, the dunes have remained stable with all changed limited to ± 0.1m. The of toe foredune has accreted between chainages 187m and 198m by up to 0.1m in level. From chainage 198m to chainage 245m, the profile has dropped in level by 0.7m. A berm has formed at chainage 245m resulting in an increase in level until the end of the profile of 1m. The profile remains within the envelope of the previous surveys.</p> <p>At profile 1aCMBC02, the dunes have remained stable until the crest of the foredune at chainage 181m. The face of the foredune has accreted between 183m and 194m by up to 0.4m in level. A berm has formed on the upper beach, between chainages 194m and 244m, resulting in an increase in level of up to 1.6m. On the lower beach, a berm has shifted landward by 26m resulting in a length of accretion followed by erosion. The magnitude of change is up to 1.0m over this section. The beach is generally at a medium level compared to the range of the previous surveys other than at the crest of the new berm which is at the highest level on record.</p>	

2.10 Lynemouth Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
16-22nd March 2023	<p>Beach Profiles:</p> <p>Lynemouth is covered by two beach profile lines during the Partial Measures survey (Appendix A). Profiles 1aCMBC03A and 1aCMBC03B were added to the programme in October 2007. The previous survey was undertaken for the Full Measures survey in autumn 2022.</p> <p>1aCMBC03A is located c.450m north of the mouth of the River Lyne and extends across the extensive colliery spoil banks before reaching the foreshore. The profile of the top of the colliery spoil bank has not experienced any significant change since the last survey. The toe of the cliff has advanced seaward by 0.5m since the previous survey. It is unclear whether this is slumping of the cliff or a survey error. The upper beach between chainage 81m and 109m has accreted by up to 0.2m in level. Between chainages 109m and 159m the beach has experienced erosion of a more significant magnitude, up to 0.55m. The lower beach has slackened, increasing the level at chainage 179m by 0.4m in level. The beach is at a very low level when compared to the range of the previous surveys.</p> <p>1aCMBC03B is located to the north of Lynemouth Power Station and extends across the extensive colliery spoil banks before reaching the foreshore. The process of colliery spoil bank erosion has been progressing for some years. Albeit since the last survey only a minor retreat of 0.2m is observed at the toe of the cliff. The beach seaward of this point has accreted along its entirety by up to 0.65m in level. Despite this accretion, the beach remains at a low level when compared to the range of the previous surveys, although this is somewhat skewed by the retreating colliery spoil cliff.</p>	<p>At the two profiles, the colliery cliffs at Lynemouth appear to have remained stable since the previous survey with neither profile retreating. The toe of the cliff at Profile 1aCMBC30A in fact appears to have advanced, it is unclear whether this is slumping of material or a survey error. The beach profiles have generally accreted particular the most southern profile where vast accretion has occurred.</p> <p>Longer term trends:</p> <p>Opposite Lynemouth, the colliery spoil has demonstrated a total recession between the first survey in autumn 2007 and the most recent survey in spring 2023 of 38m overall.</p> <p>To the north of the power station, total recession between the first survey in autumn 2007 and the most recent survey in spring 2023 is 55.00m.</p>
Feb 2023	<p>Beach Topographic Survey:</p> <p>Lynemouth Bay is covered by a 6-monthly topographic survey, which was added to the programme in December 2020. Data from the most recent topographic survey (Partial Measures, spring 2023) have been used to create a DGM (Appendix B – Map 3) using a GIS. A difference plot has also been produced using the DGM (Appendix B – Map 7) produced from the last topographic survey (Full Measures, autumn 2022) and the present survey.</p> <p>The difference plot shows the southern section of the bay has been dominated by accretion, particular</p>	<p>The most significant changes has occurred surrounding the power Station where accretion has up to 1.75m has dominated. It is apparent this accretion coincides with areas of cliff retreat noted in the cliff edge survey below</p> <p>Longer term trends: The beach in the northern survey extent and in the lee of Headagee has</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	on either side rock armour promontory protecting the Power Station. The magnitude of accretion peaks at 1.75m on the south side of the Power Station at the transition with the rock armour. The pattern of change becomes more varied and less significant in magnitude the further north up the bay. The magnitude of change between Headagee and Snab Point is limited to $\pm 0.5\text{m}$.	remained relatively stable since the previous survey. The areas where the largest landward retreat has occurred are the areas where historically tipped colliery spoil is eroded on an ongoing basis.
Feb / March 2023	<p>Colliery Spoil / Cliff Edge Survey:</p> <p>Colliery spoil edge survey data was collected for a baseline survey in autumn 2022, and again in spring 2023.</p> <p>In the very north of the bay, the colliery spoil forms a beach and protects the natural cliffs/ coastal slopes behind. The edge of the colliery spoil beach then merges back into the colliery spoil cliff toe just to the south of the rock outcrops. The cliff edge over this length has remained largely still the previous survey. The most notable change has occurred just to the south of where the spoil platform merges with the cliff where an approximately 30m has retreated by up to 3m. In the centre of the bay the colliery spoil cliff is no longer protected by a distinct fronting colliery spoil beach (although the natural beach is very much intermixed with spoil, it does not form a distinct spoil beach like that present in the north of the bay). The change here is lower than further north, limited to 1.5m recession. Between the Power Station and the River Lyne, the colliery spoil cliff has generally remained stable. The only notable change has occurred at the interception with the River itself where a 15m stretch has retreated 2m.</p> <p>In the south of the bay (south of the power station) the colliery spoil extends some distance seaward of the backing (and underlying) natural dunes, forming a 'berm' (rather than a distinct cliff edge) at the seaward edge. Since the previous survey, the colliery spoil edge has continued to retreat. The most significant change has occurred at the transition with the rock armour to the north, where a 20m long section of cliff has retreated up to 5m.</p>	<p>Where a spoil beach is present on the foreshore, the backing spoil cliffs or natural cliffs/dune are stable because they are not currently affected by marine processes.</p> <p>Where the spoil beach is absent (such as in the centre of the bay), the backing colliery spoil cliffs are actively eroding, causing measurable landward recession.</p> <p>The most significant change has again occurred to the south of the power station at the transition with the rock armour. This should be continued to be monitored to ensure the defence is not outflanked by erosion.</p> <p>Longer term trends: Since cliff top surveys began in December 2020, cliff movement has been greatest in the centre of the bay (north of the River Lyne) with up to 18.0m of cliff top retreat and to the south of the Power Station (with up to 13m), whilst the northern parts of the survey area have shown less movement with small sections of retreat up to 3.0m.</p> <p>Future repeat cliff top surveys are expected to help quantify rates of erosion (landward recession) of the historically tipped colliery spoil on a wider basis than is possible from the beach profile surveys alone.</p>

2.11 Newbiggin-by-the-Sea

Survey Date	Description of Changes Since Last Survey	Interpretation
24 th February 2023	<p>Beach Profiles:</p> <p>Newbiggin-by-the-Sea is covered by four beach profile lines during the Partial Measures survey (Appendix A). Two of these (with an 'A' suffix) 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. It should be noted that an extended series of profiles and a topographic survey are also recorded via the Cell 1 Regional Coastal Monitoring Programme for purposes of post-project evaluation of this capital scheme. These profiles are not analysed here, however, the findings of the topographic survey are presented below. The previous survey was the Full Measures assessment undertaken in autumn 2022. The survey report noted that “<i>Onshore winds restricted the depth that achievable during the survey.</i>”</p> <p>Profile 1aWDC05A is in the north of Newbiggin Bay. From the toe of the seawall at chainage 7m to chainage 32m the profile has remained largely stable with change limited to accretion of up to 0.1m. Between chainages 32m and 42m a berm has been deposited resulting in accretion of up to 0.2m in level. Seawards of chainage 42m, the beach has steepened resulting in a length of accretion followed by a length of erosion of up to 0.6m in level. The rocky foreshore is exposed from chainage 89m.</p> <p>Profile 1aWDC06 is located in the centre of the northern part of Newbiggin Bay, between the two breakwaters. The profile is split into two distinct bands of change. The upper beach, between chainages 15m and 49m, has accreted by up to 0.5m in level and the lower beach, seawards of chainage 49m, has eroded by up to 0.75m. As a result, the upper beach is at a high level when compared to the range of the previous surveys and the lower beach at a low level.</p> <p>Profile 1aWDC06A is located in the centre of Newbiggin Bay, behind the offshore breakwater. There has been no change over the defenced section until chainage 12m. From the toe of the defence to chainage 70m, the profile has remained stable, with all change limited to ± 0.1m. Between chainage 80m and 109m, the middle section has accreted by up to 0.4m in level. Seawards of chainage 109m, the lower beach has been dominated by erosion of up to 0.5m in level. The beach is at a medium to high level when compared to the range of the previous surveys.</p>	<p>The pattern of change across Newbiggin Bay since the previous survey is varied. To the North of the bay, the beach has appeared to have steepened resulting in accretion on the upper beach and erosion on the lower beach. A mixture of erosion and accretion is observed to the south of the bay with all change constrained within the envelope of the previous surveys. The most southerly profile is at low level.</p> <p>Longer term trends: Data collected since the start of monitoring 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.</p> <p>The changes in beach profile form and position observed since the last survey are within the bounds of previous surveys, except profile 1aWDC07 which is generally continuing to decrease in level (albeit has marginally increased this time)..</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>At profile 1aWDC07 there has been no change across the rock armour until chainage 7m. At the toe of the rock armour, the beach has initially accreted by 0.2m in level tapering to no change by chainage 12m. The rest of the beach has been dominated by low level erosion, dropping by 0.2m in level between chainage 12m and 59m. The beach is at a low level when compared to the range of the previous surveys, particular between chainages 13m and 33m which is at the lowest level on record.</p>	
24 th February 2023	<p>Topographic Survey:</p> <p>Newbiggin-by-the-Sea is covered by bi-annual topographic survey, which commenced in September 2010 to assess the performance of the capital scheme constructed in 2007. Prior to incorporation in the programme, these surveys were undertaken on occasions between 2007 and 2010 as part of the scheme development. The previous survey was the Full Measures assessment undertaken in autumn 2022.</p> <p>Data from the most recent topographic survey (Partial Measures, spring 2023) have been used to create a digital ground model (DGM) (Appendix B – Map 4) using a Geographical Information System (GIS). A difference plot has also been produced using the DGM (Appendix B – Map 8) produced from the previous and present surveys.</p> <p>The topographic survey shows the pattern of change in the south is sporadic with equal patches of accretion and erosion, the pattern is reflective of exposed rocky foreshore in this location. The most intense change has occurred on the upper beach where a drop up to 1.25m is observed. North of exposed rock, the beach has experienced shoreline parallel bands of changed with generally accretion observed on the lower and upper beach and erosion in the mid sections. In the lee of the offshore breakwater, the upper beach has experienced no change and the lower reaches experienced a drop in the order of 0.75m.</p>	<p>The topographic survey shows shore parallel bands of erosion and accretion in the north and central bay, whilst the southern end of the bay shows a much patchier distribution of change. Changes are limited to $\pm 1.25\text{m}$. The topographic survey generally shows a trend of sand bar movement across the beach profile.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
Feb 2023	<p>Sand Extent Survey:</p> <p>Spital Carrs is located to the south of Newbiggin Bay and is covered by a bi-annual sand extent survey, which commenced in 2011. The survey was designed to address concerns that the beach recharge scheme undertaken in Newbiggin Bay may impact on the Spital Carrs SSSI and SPA. The sand extent survey therefore identifies the boundary of the sand beach on the rock platform.</p> <p>Data from the most recent sand extent survey (Partial Measures, spring 2023) has been plotted onto aerial imagery (refer to Appendix C – Map 1). In general, the plot shows a seaward migration of the extent of sand in the south (in the lee of Spital Point) and a landward retreat of sand in the north and central areas. The landward retreat in the north is up to a maximum of 17m over an 170m stretch. Accretion in the south is up to a maximum of 66m over a 70m stretch. Towards the centre of the bay, there is an approximately 120m stretch of coastline that is the most landward position on record when compared to the range of the previous surveys. The southern section is a medium level.</p>	<p>Longer term trends: Sand extent surveys over the past 12 years (2011-2023) shows oscillation of the edge of the beach with a general net trend of erosion landward. This is reinforced by the latest PM survey where</p>
Feb / March 2023	<p>Cliff-top Survey:</p> <p>Cliff top survey data collected for baseline survey (autumn, 2009, the previous Full Measures surveys (autumn 2022) and the present Partial Measures (spring 2023) is presented in this report. The cliff top survey is carried out as a continuous cliff edge line survey at the Newbiggin Caravan Park at Newbiggin Point. The results from the cliff top monitoring are anticipated to have an accuracy of $\pm 0.2\text{m}$ 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.</p> <p>Overall, there has been very little change across the survey area since autumn 2022. The most significant change has occurred towards the centre of the area, behind the 'anti-tank' blocks, where a length of 5m has retreated up to 1m. There are several lengths of cliff 'advancement' evident that highlights the difficulty of precisely locating the cliff top in this location.</p>	<p>The cliff has remained stable since the previous survey.</p> <p>Longer term trends: Since surveys began in October 2008, cliff movement has been greatest in the north of the survey area with up to 3.3m of cliff top retreat, whilst the central and southern parts of the survey area have shown less movement with retreat of less than 2.0m.</p>

2.12 Cambois Bay

Survey Date	Description of Changes Since Last Survey	Interpretation
February / March 2023	<p>Cliff-top Survey:</p> <p>Cliff top survey data collected for baseline survey (spring, 2009), the previous Full Measures survey (autumn 2022) and the present Partial Measures survey (spring 2023) is presented in this report.</p> <p>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 cliff top monitoring are anticipated to have an accuracy of $\pm 0.2\text{m}$ 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. The survey report noted that '<i>very thick dense vegetation at north end of Cambois cliff top hinders survey of line</i>' and '<i>a small section of the gabion baskets at Cambois have been displaced</i>'</p> <p>At Sandy Bay Caravan Park, the northern section of the cliff, backing the rock armour, appears to have remained stable since the previous survey. The southern section has been more active with several areas of erosion evident. Two lengths of between 6-8m have retreated between 1 to 2m.</p> <p>Along Cambois Beach there has been very little change along the survey length indicating a period of stability. The largest area of change has occurred adjacent to the buccaneers Car Park where a lengths of 10m has retreated 1.5m.</p>	<p>At Sandy Bay Caravan Park it appears the rock armour is being effective in protecting the cliffs with the southern, undefended, section appearing to have been more active.</p> <p>In Cambois Bay, the cliffs have remained stable since the previous survey.</p> <p>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 5.0m of erosion since 2013, whilst the northern part has eroded by c.1-3m since 2013.</p> <p>In Cambois Bay, the area of greatest cliff top retreat since the surveys began in 2009 is in the centre of the bay opposite the car park in the dunes, Cambois, where up to 12m of erosion has occurred. The north and south of the bay have more typical retreats of c.3-7m.</p>

2.13 Blyth South Beach

Survey Date	Description of Changes Since Last Survey	Interpretation
Feb / March 2023	<p>Beach Profiles:</p> <p>Blyth South Beach is covered by six beach profile lines for the Partial Measures survey (Appendix A). The previous survey was the Full Measures assessment undertaken in autumn 2022.</p> <p>Profile 1aBVBC01 is located towards the north of South Beach, in front of the land owned by the Port of Blyth. There has been accretion of 0.15m in the lee of the concrete boundary wall at chainage 10m. The rest of the dunes have remained stable since the previous survey. The beach itself is divided into three distinct swathes of change. Between chainages 36m and 77m, the beach has eroded by up to 0.45m in level. In the middle section of the profile, the beach has accreted by up to 0.3m in level before alternating to erosion from chainage 136m at a magnitude up to 0.65m. When compared to the range of the previous surveys, the majority beach is at a medium level where as the dunes and upper beach are at a high level.</p> <p>At profile 1aBVBC02, the beach has dropped from the toe of the seawall at chainage 6m to chainage 19m, by to 0.4m in level. Between chainages 18m and 49m the beach accreted by up to 0.7m in level. Seawards of chainage 60m the lower beach has been dominated by erosion dropping in level by up to 0.8m. The lower beach is at a low level compared to the range of the previous surveys and the upper beach at a high level.</p> <p>At profile 1aBVBC03, the crest of the foredune has retreated 0.5m landward. The upper beach from the toe of the dune (chainage 76m) to chainage 90m, has accreted by up to 0.4m in level. A berm on the mid beach has advanced seaward by 8m to chainage 112m. Erosion has occurred between chainage 128m to 160m of up to 0.35m in level. Seawards of chainage 160m, the profile has accreted by up to 0.45m in level. The dune face is in the most landward position compared to the range of the previous surveys. The beach is at medium level.</p> <p>Profile 1aBVBC04 has remained stable up to the toe of the dune at chainage 32m. On the upper beach, there has been alternating length of erosion and accretion, Erosion (up to 0.35m) in level has occurred between chainages 32 to 45m and between 81m to 100m. With accretion occurring between 45m to 81m at a magnitude of 0.7m. On the lower beach a shallow berm has retreated landward approximately</p>	<p>Since the last survey, the dune crests at Blyth South Beach have remained stable, generally retaining the same form and position.</p> <p>Change across the beach has been dominated by shifting sand berms creating alternating lengths of erosion and accretion.</p> <p>Longer term trends: At Blyth South Beach, the dunes have generally demonstrated a long-term trend of stability. Beach profiles exhibit a seasonal movement of berms.</p>

Survey Date	Description of Changes Since Last Survey	Interpretation
	<p>40m. The beach is generally at a medium level compared to the range of the previous surveys.</p> <p>At profile 1aBVBC05, the dunes have generally experienced a low level accretion (up to 0.1m) since the previous survey. Similarly, the toe of the dune, between chainages 51m and 63m, has accreted by 0.2m in level. Accretion has occurred between 75m and 114m as at a magnitude of 0.9m before switching to erosion of a similar magnitude until chainage 153m. ,At chainage 153m, a berm has formed on the lower beach, resulting in an increase in level of up to 0.9m. The beach is generally at medium level compared to the range of the previous survey with the exception of the lower beach (where the berm has formed) which in places is at the highest level on record.</p> <p>Profile 1aBVBC06 is located at the southern end of the beach, towards Seaton Sluice. No change has occurred across the profile, including the dunes, until chainage 100m. The beach accreted on the upper and lower extents and been eroded in the middle. The accretion has occurred between chainage 100m and 145m (at a magnitude up to 1.0m) and seawards of chainage 197m (at a magnitude of up to 0.4m). The erosion has occurred between 145m and 197m at a magnitude of up to 0.5m. The dunes remain at a high level when compared to the range of the previous surveys with the beach at a medium level.</p>	

3. Problems Encountered and Uncertainty in Analysis

Individual Profiles

- Profiles 1aBTBC19, 1aBTBC21, and 1aBTBC23 all end at drains.
- At profiles 1aADC08 and 1aADC09, the profiles end at the River Aln channel due to quicksand.
- At profile 1aADC16 there are gaps in the section due to bushes, and no access to resident's gardens.
- Profile 1aADC16B now starts at the new fence.

Topographic Surveys

- At Newbiggin-by-the Sea, onshore winds restricted the depth achievable on the survey.
- At Lynemouth, the River Lyne was too deep to survey bed levels.
- At Alnmouth, heavy onshore winds restricted the achievable survey depth.
- At Berwick, there was a lot of driftwood on the upper part of the beach.

Cliff Top Surveys

Surveying any cliff top is difficult due to the need for a consistent interpretation of the cliff edge in successive surveys, which can be challenging, especially when vegetation is thick. For these reasons, it has been assumed that any changes of $\pm 0.2\text{m}$ may be considered as being within the margins of error of the surveying technique, and that any indication of an advancing cliff line is error.

Surveying the cliff top along Cambois Bay is more difficult than the similar surveys at Newbiggin Caravan Park and Sandy Bay Caravan Park because the cliff edge is less distinct and hard to precisely define due to vegetation coverage and its smooth, degraded form.

The surveyors noted the following at Cambois:

- there was very thick dense vegetation at the north end of the cliff top which hindered the survey of the line;
- A small section of the gabion baskets were displaced

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

No changes to the monitoring programme are recommended at this time.

5. Conclusions and Areas of Concern

- At Sandstell Point (Spittal A), although not observed in the profile, the survey report notes 'the new dune is becoming more prominent at the top of the beach,' suggesting that the profile may not represent the change experienced across the dune system in this survey. At the spit, there has been redistribution of sediment with the near and far ends both accreting, (coinciding with the two cross sectional profiles) and the middle section reducing. The end of the spit has retreated 3m landward since the previous survey.
- At Spittal (Spittal B), there has again been a redistribution of sediment throughout the profiles highlighting the dynamism of sediment along this stretch.,
- At Goswick Sands, change across is varied. In the north erosion has dominated the profile whilst in the south accretion has dominated (albeit at a low magnitude).
- At Holy Island, the profiles suggest that the dunes and beach have remained stable since the previous survey with all change limited $\pm 0.1\text{m}$.

- At Beadnell Village, the beach has been dominated by erosion since the previous survey but despite this remains at a medium level compared to the range of the previous surveys.
- At Beadnell Bay, the profiles remain at a healthy level and within the envelope of previous surveys, with Accretion appearing to have been the dominant process since the previous survey. The cliffing at toe of the foredune should be monitored closely.
- At Boulmer, change has been limited since the previous survey. The rock armour toe appears to be effective in preventing erosion of the dunes. The rocky foreshore remains exposed. The recorded profile present no cause for concern.
- At Alnmouth Bay, there has been alternating patterns of accretion and erosion across the beach profile. The recorded profiles and topographic surveys present no causes for concern.
- At High Hauxley, all three profiles have experienced a pattern of accretion on the upper beach and erosion of the lower beach since the previous surveys. This contrasts with expected typical seasonal fluctuations of drawdown of material during the winter months. Along Druridge Bay the pattern is more varied with both erosion and accretion evident. However the change is not uncharacteristic of the bay and on the whole remains with the envelope of the previous surveys
- At Lynemouth Bay, the colliery spoil cliffs have continued to retreat albeit at varying rates along the bay. One of the most significant changes has occurred to the south of the power station at the transition of the rock armour where the cliff has retreated up to 13m. This should be continued to be monitored to ensure the defence is not outflanked by erosion.
- At Newbiggin Bay, the pattern of change is varied. To the North of the bay, the beach has appeared to have steepened resulting in accretion on the upper beach and erosion on the lower beach. A mixture of erosion and accretion is observed to the south of the bay with all change constrained within the envelope of the previous surveys. The recorded profiles and topographic surveys present no causes for concern.
- At Cambois Bay, the cliff top survey shows the cliffs have remained stable since the previous survey. Fronting the caravan park, the southern section has been more active than the northern section.
- At Blyth South Beach, change has been dominated by shifting sand berms creating alternating lengths of erosion and accretion.

Appendices

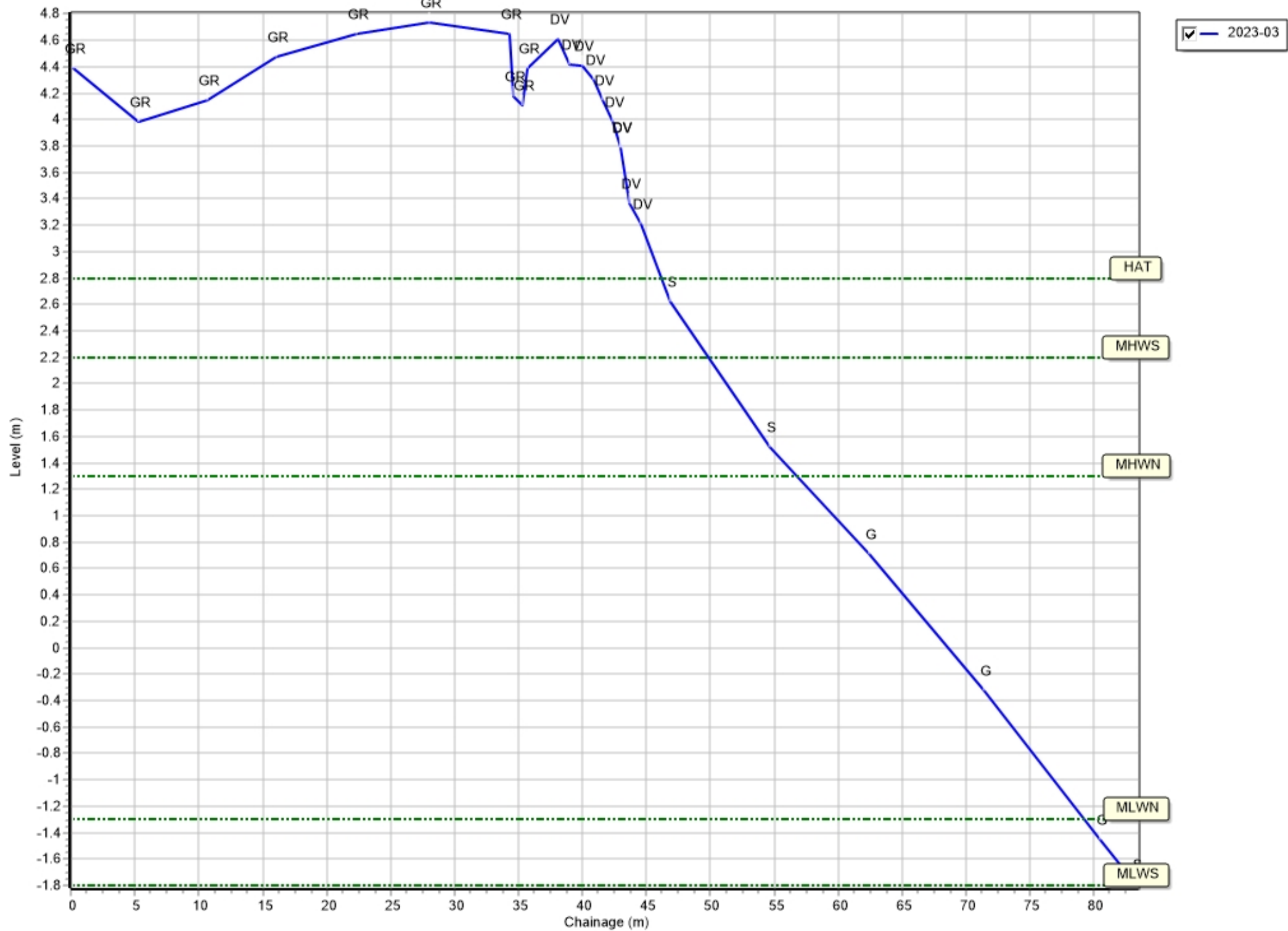
Appendix A

Beach Profiles

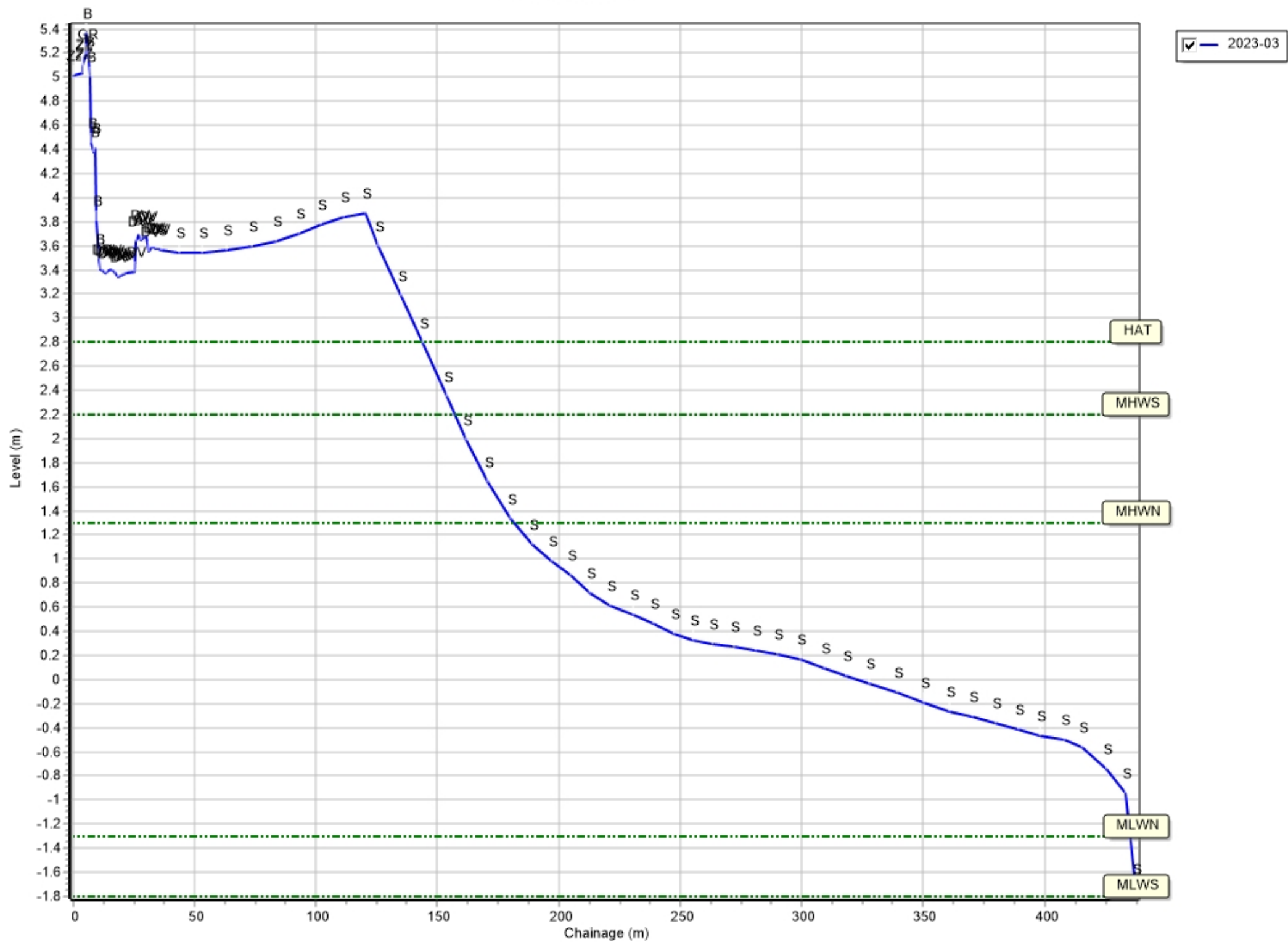
The following sediment feature codes are used on some profile plots:

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

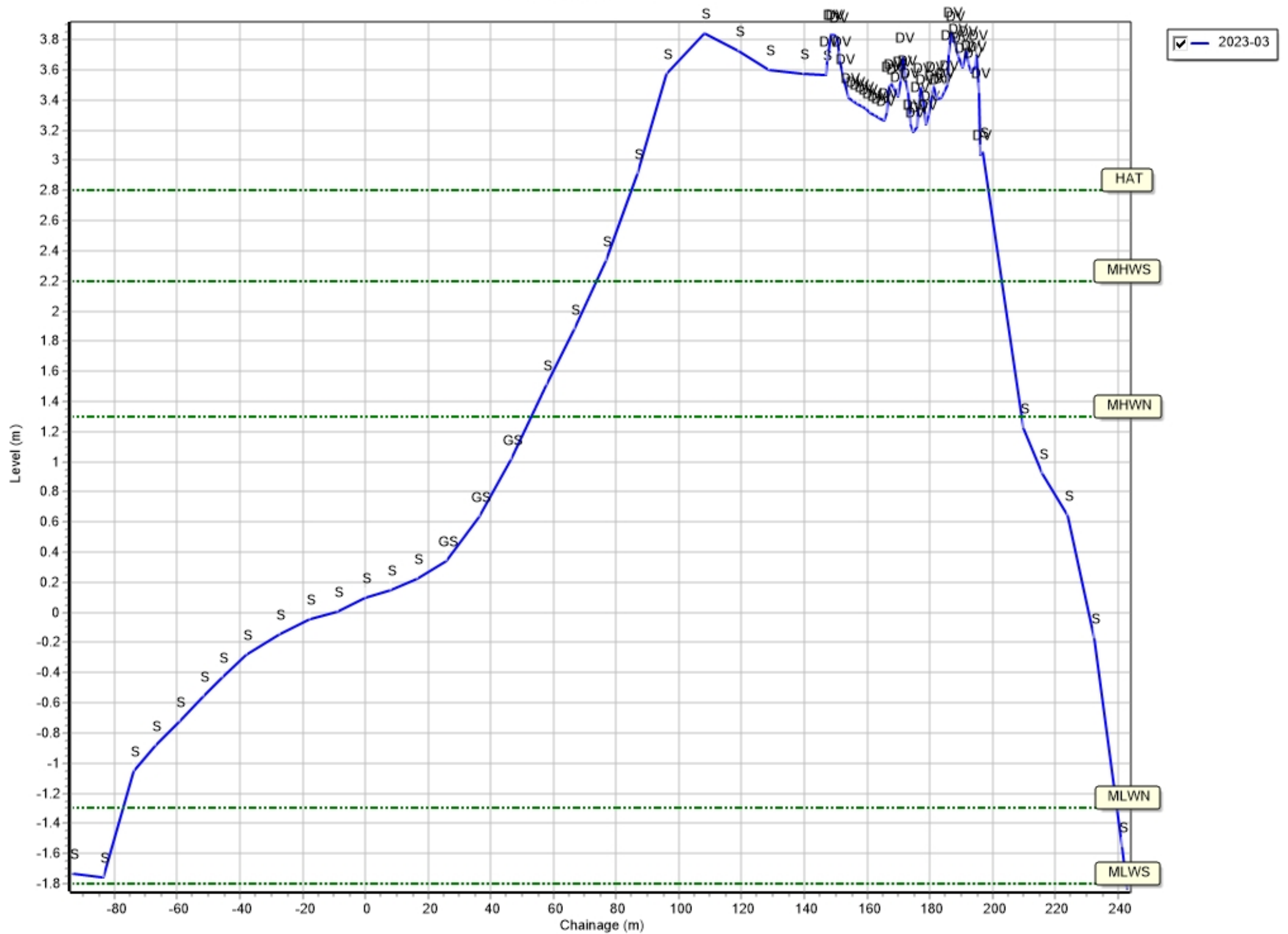
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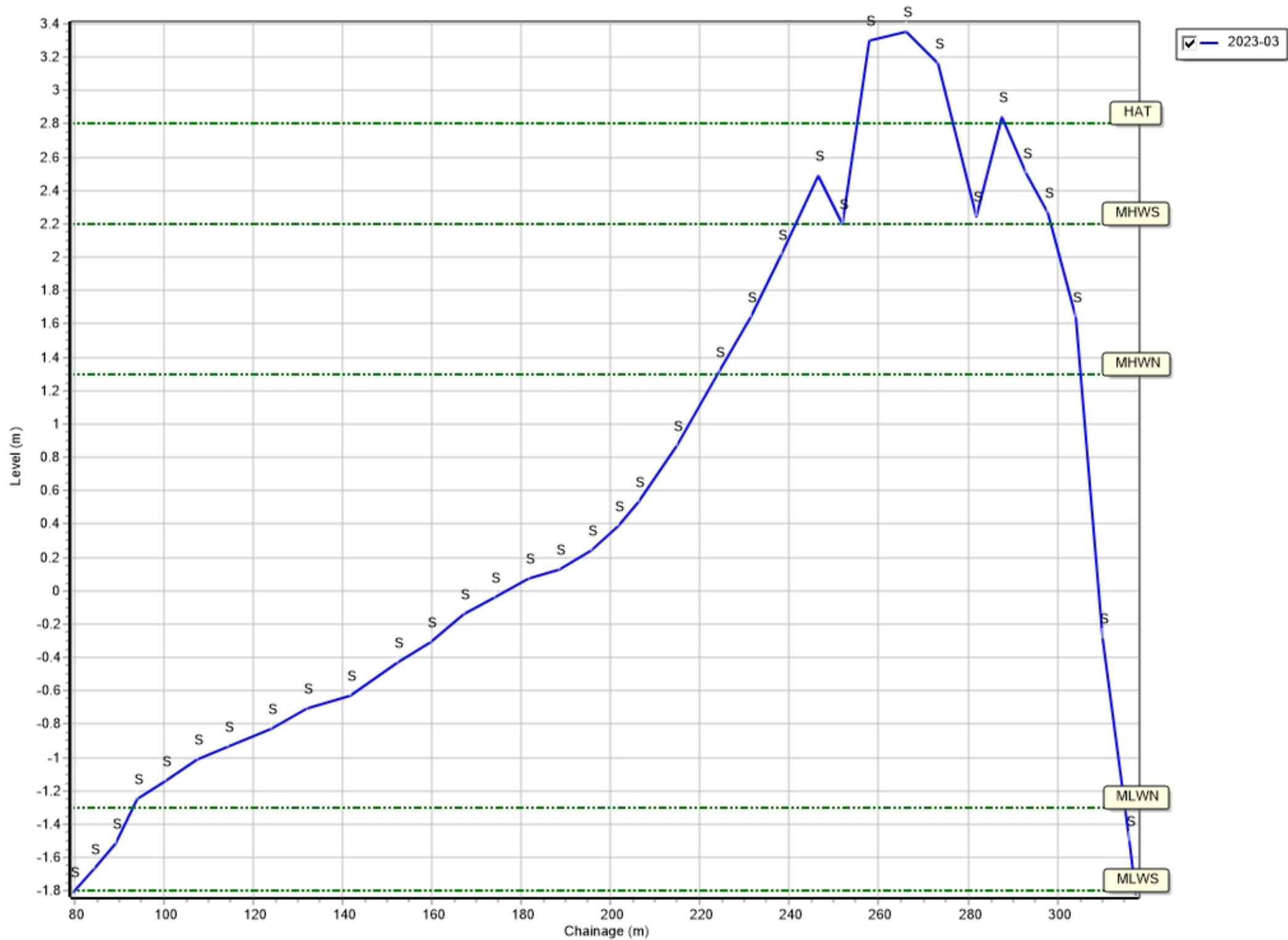
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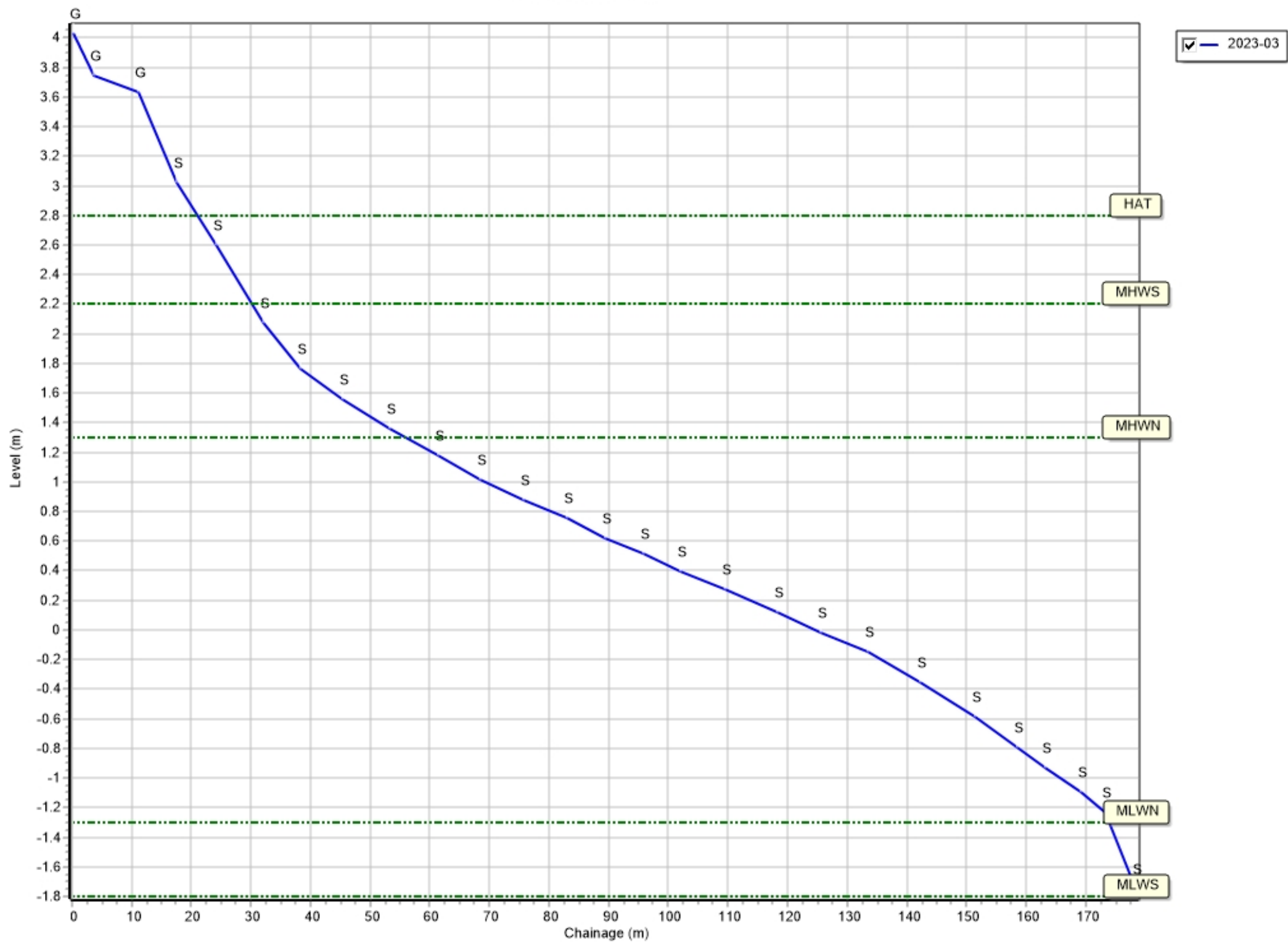
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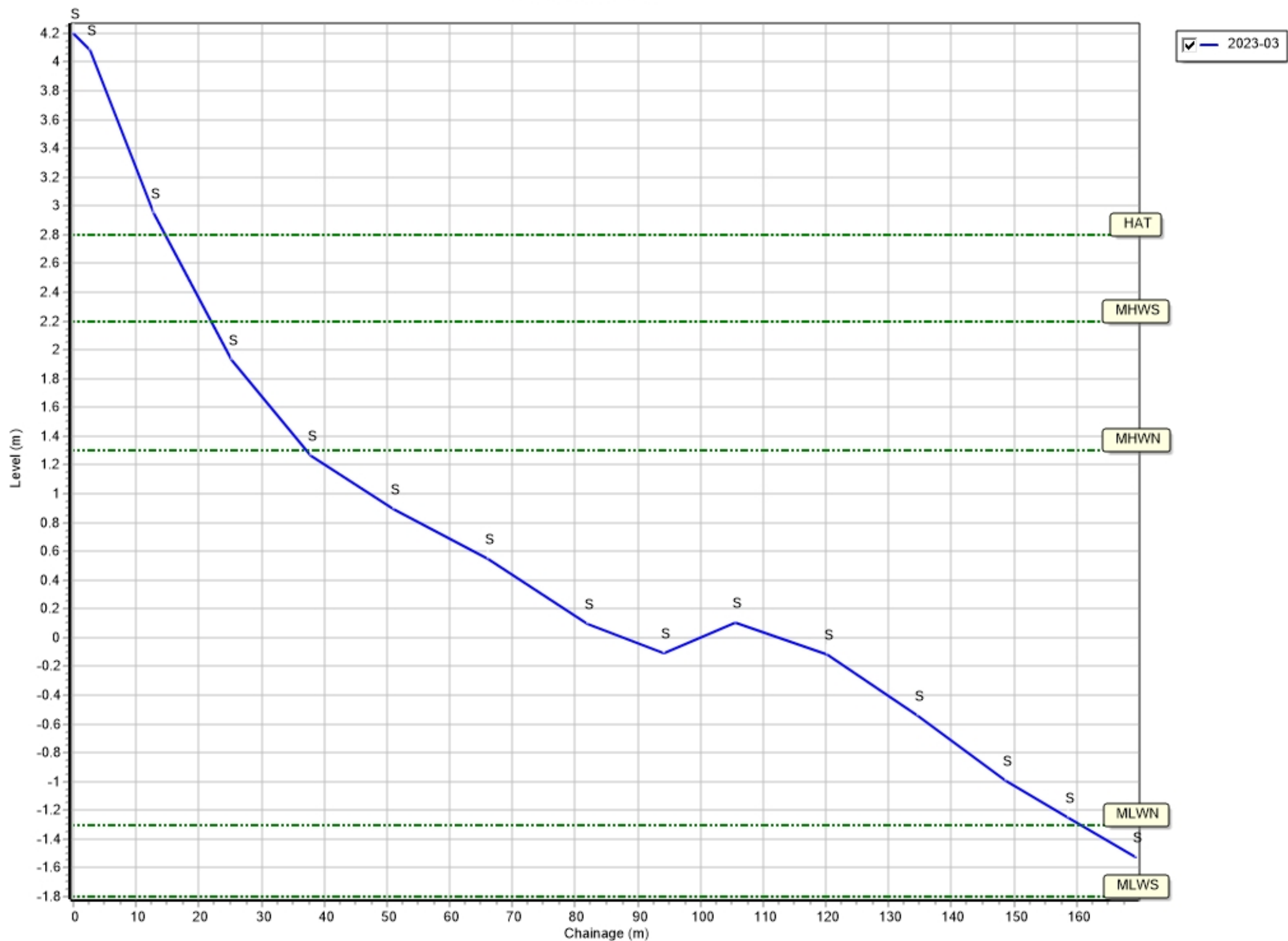
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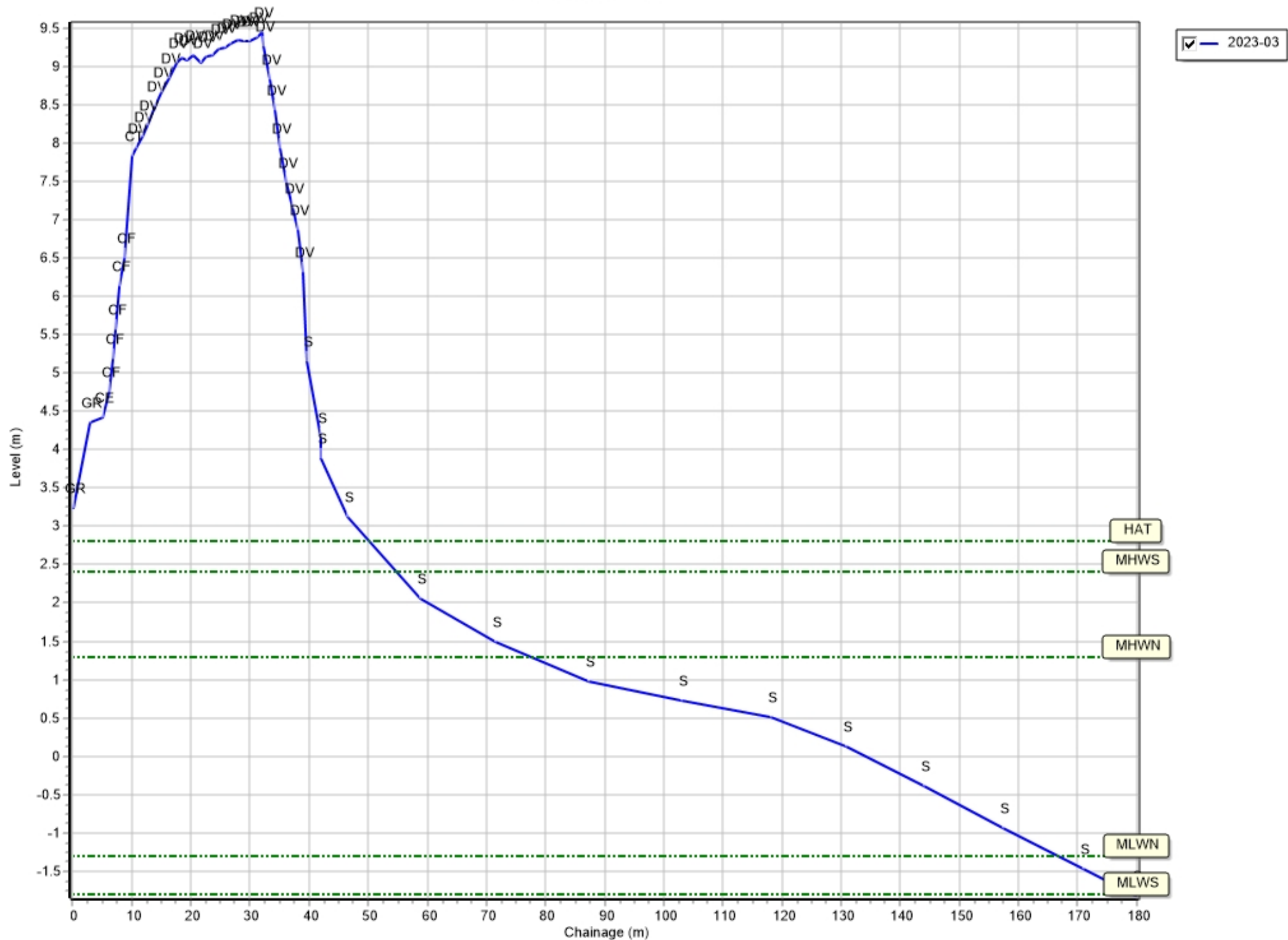
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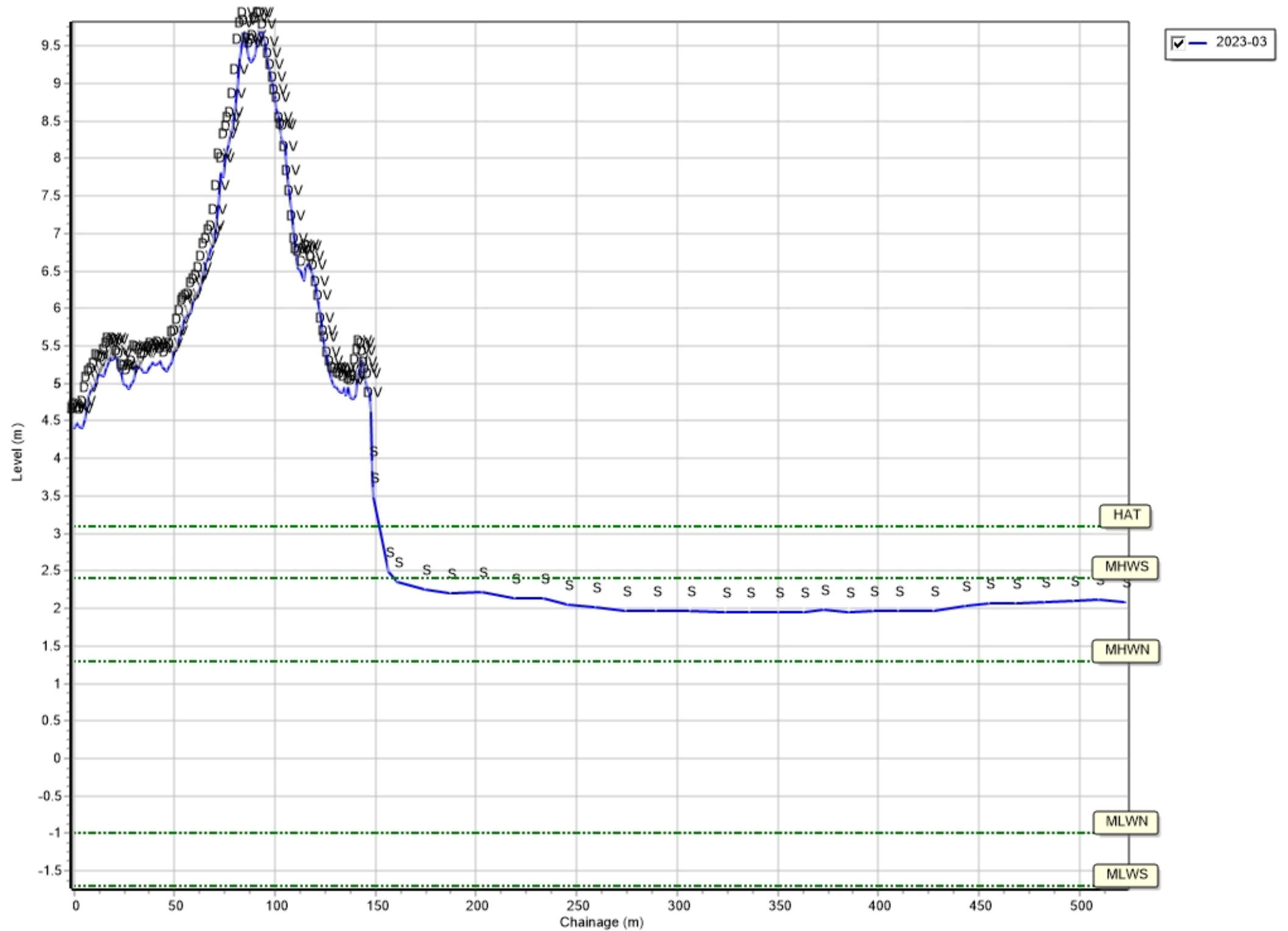
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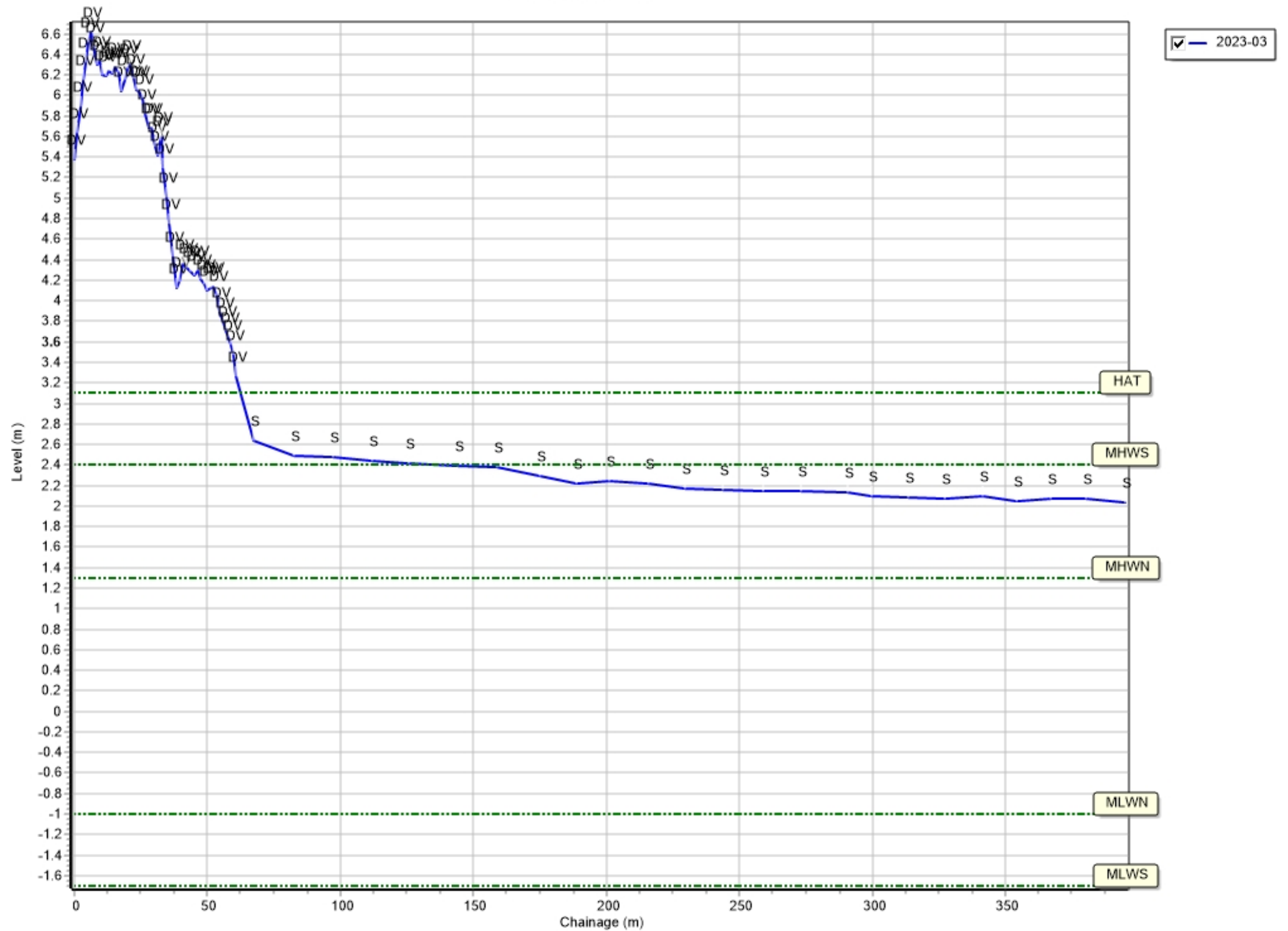
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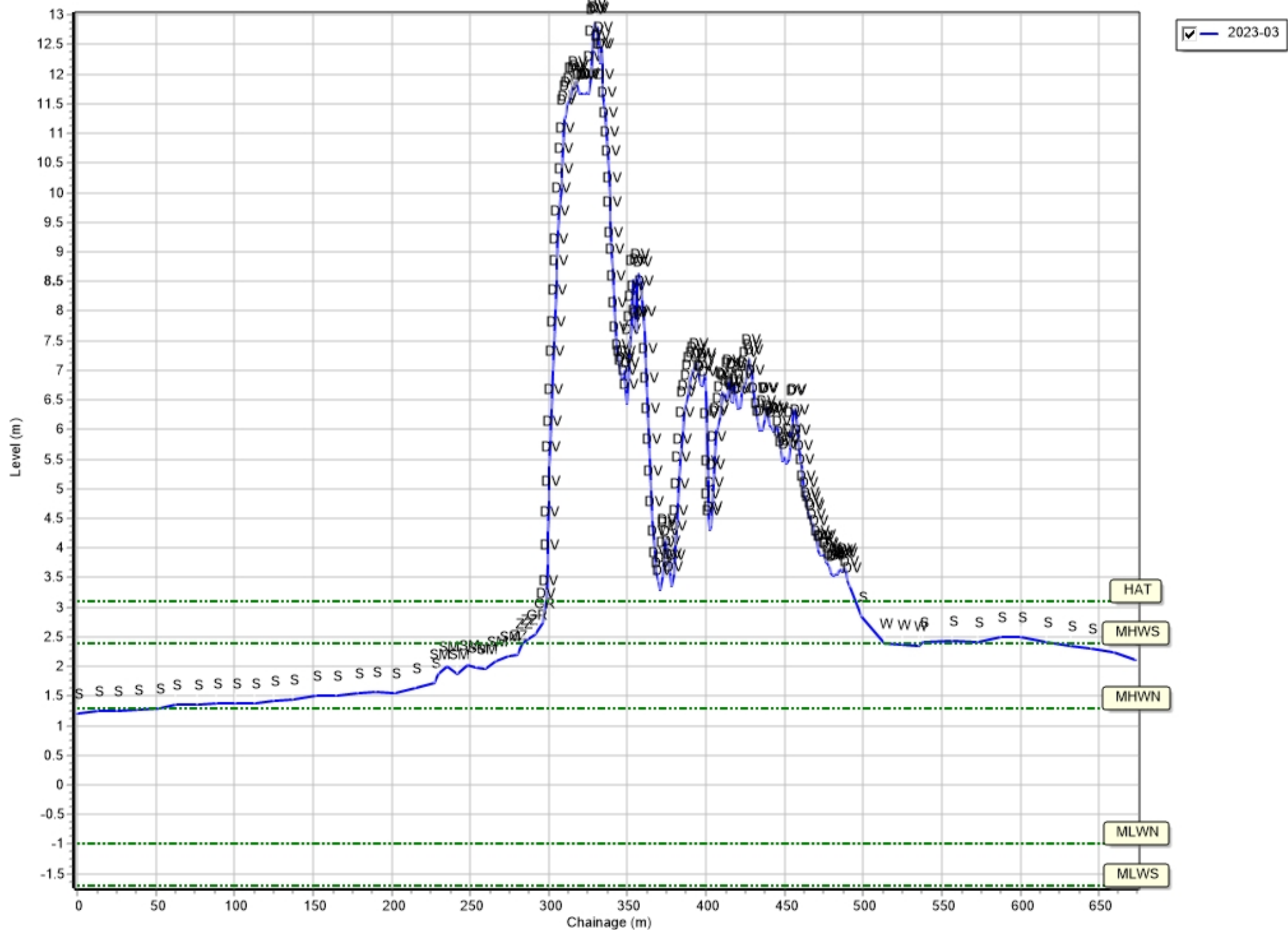
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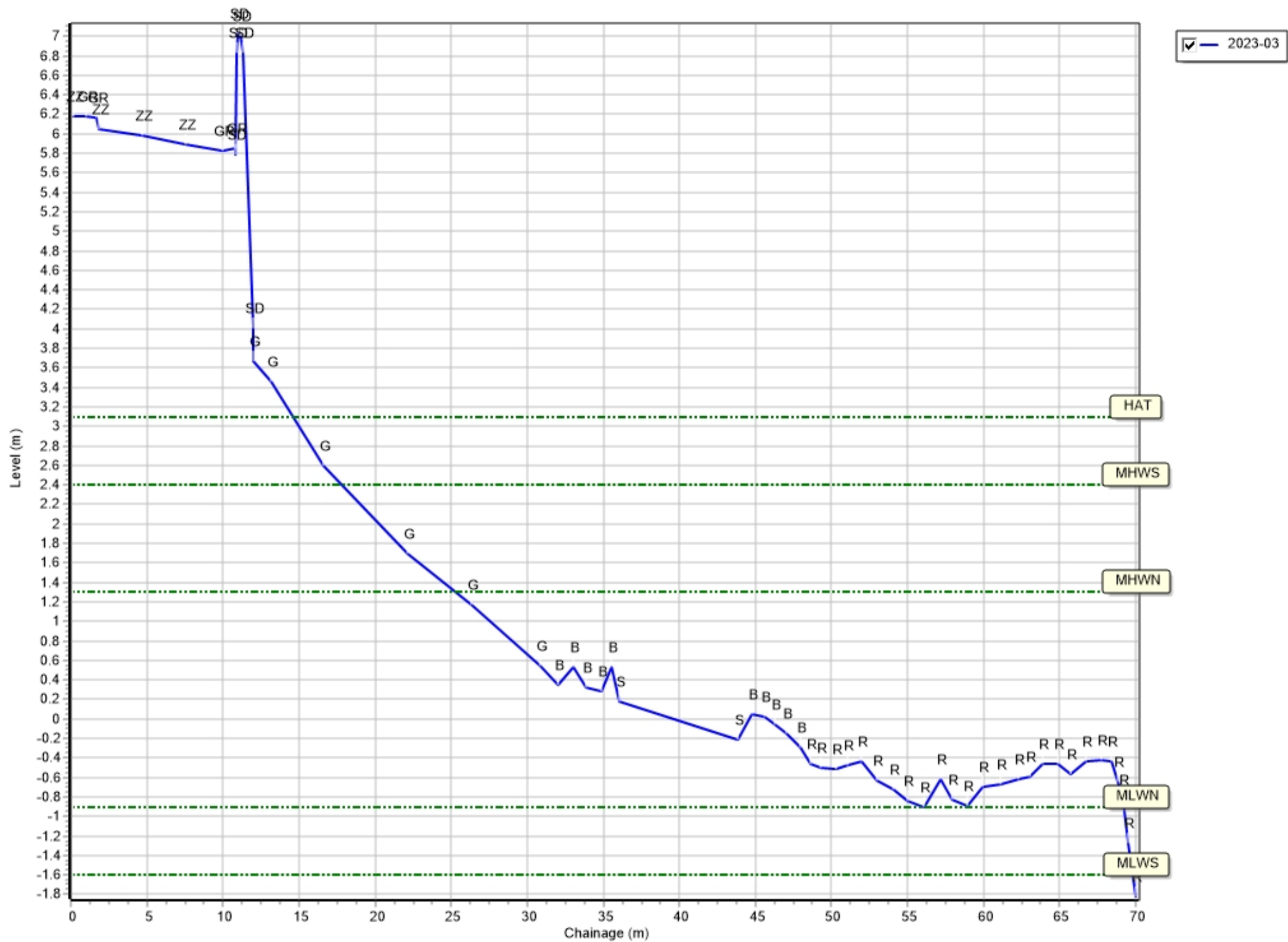
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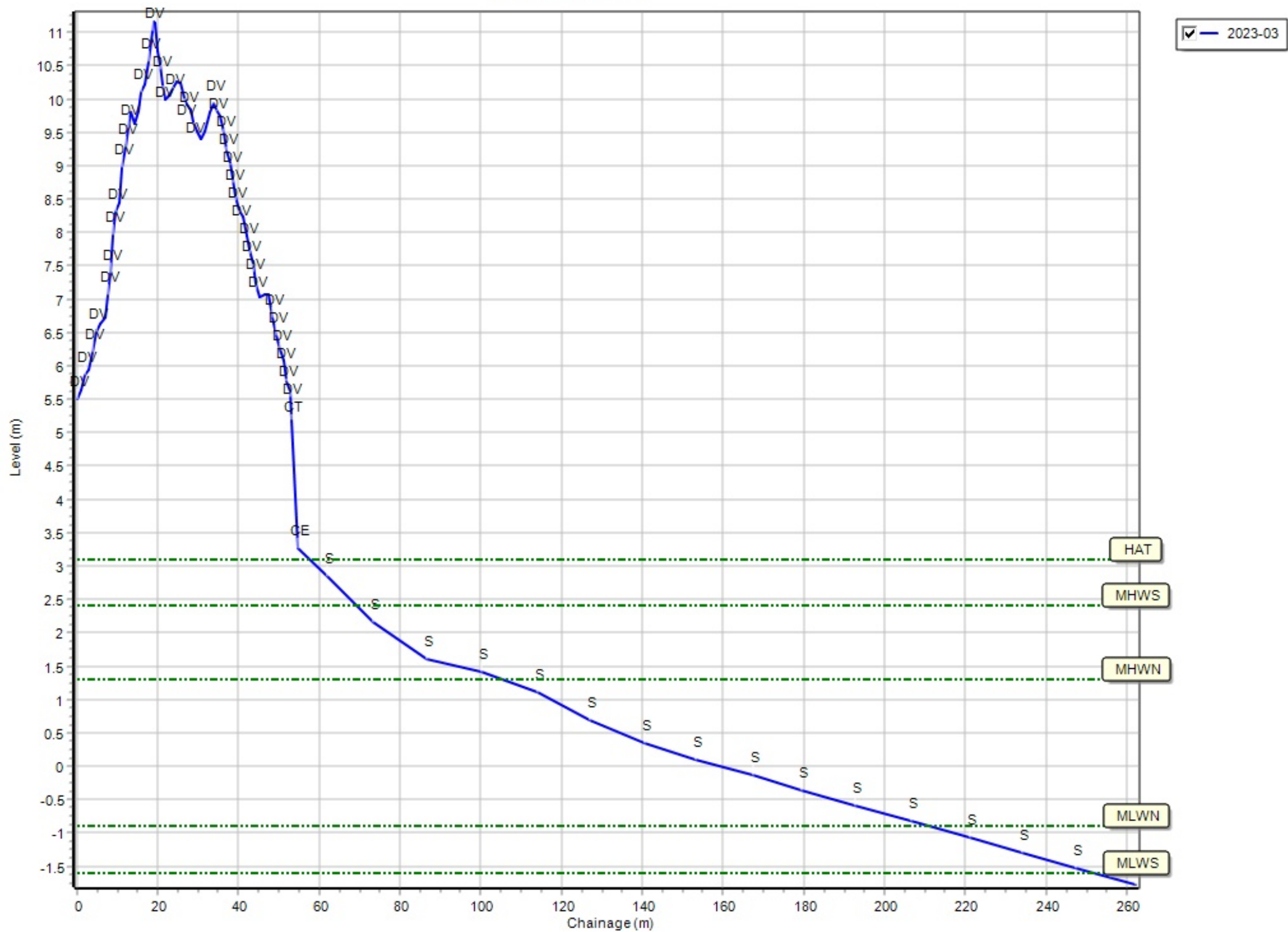
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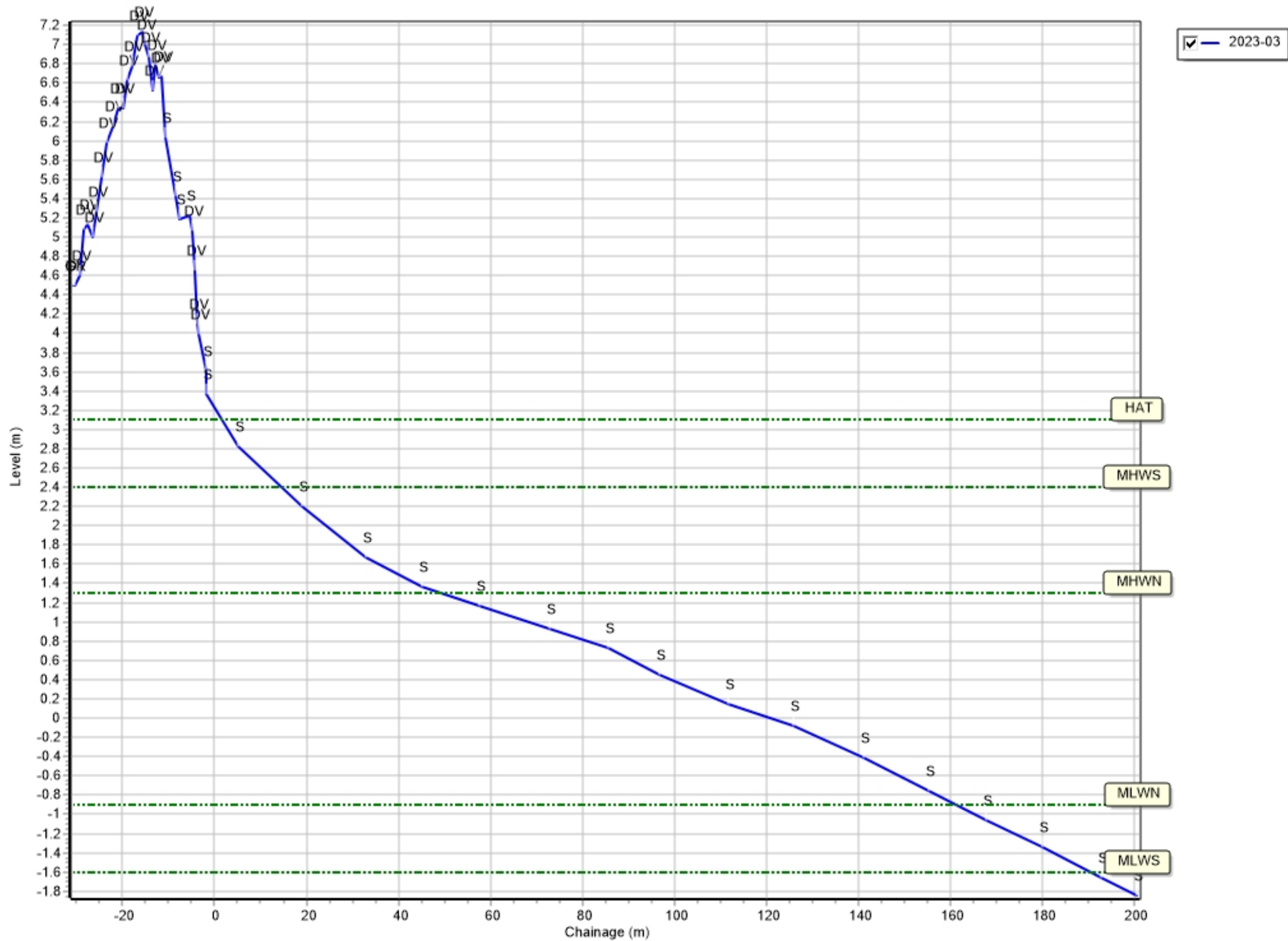
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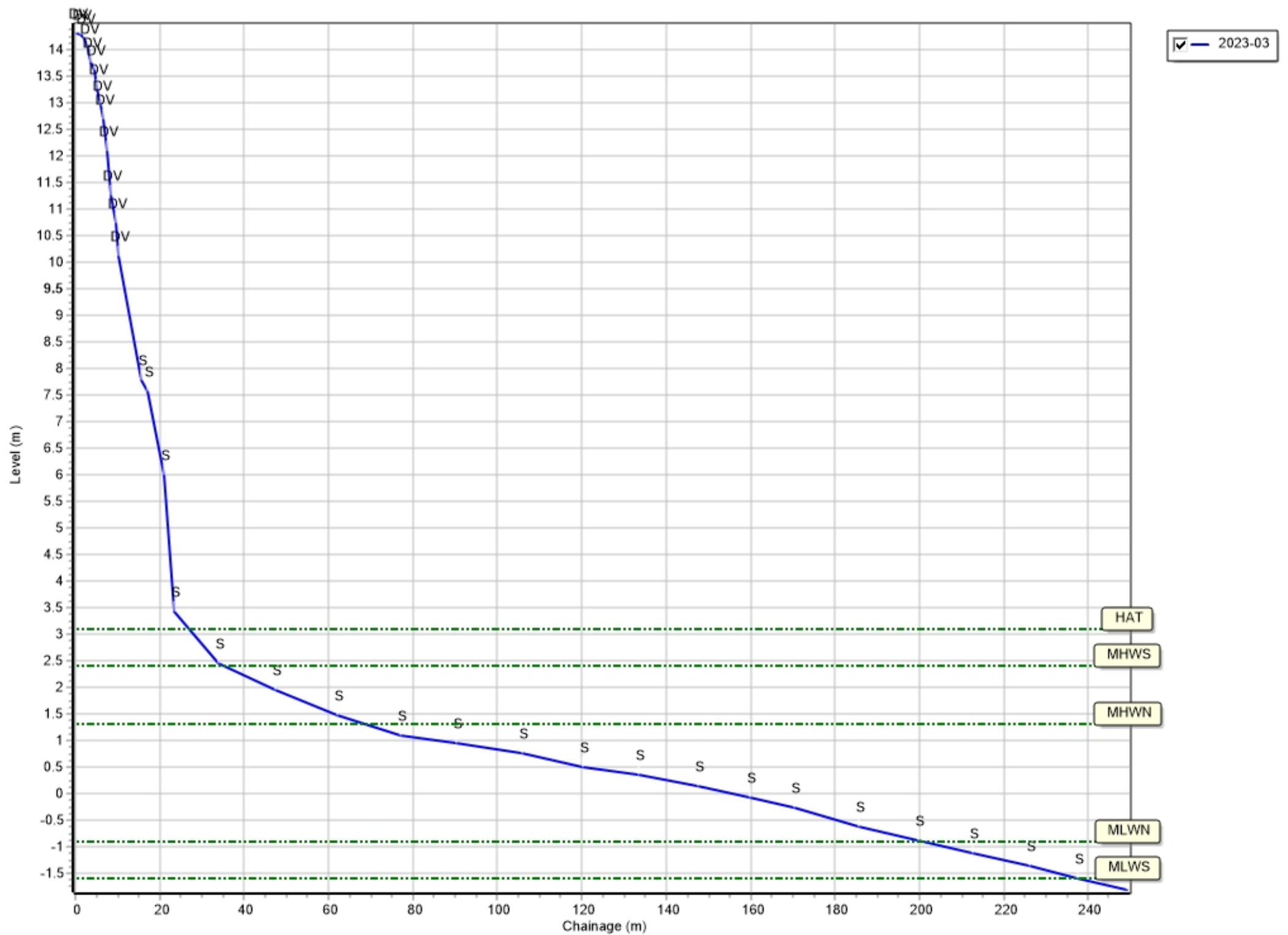
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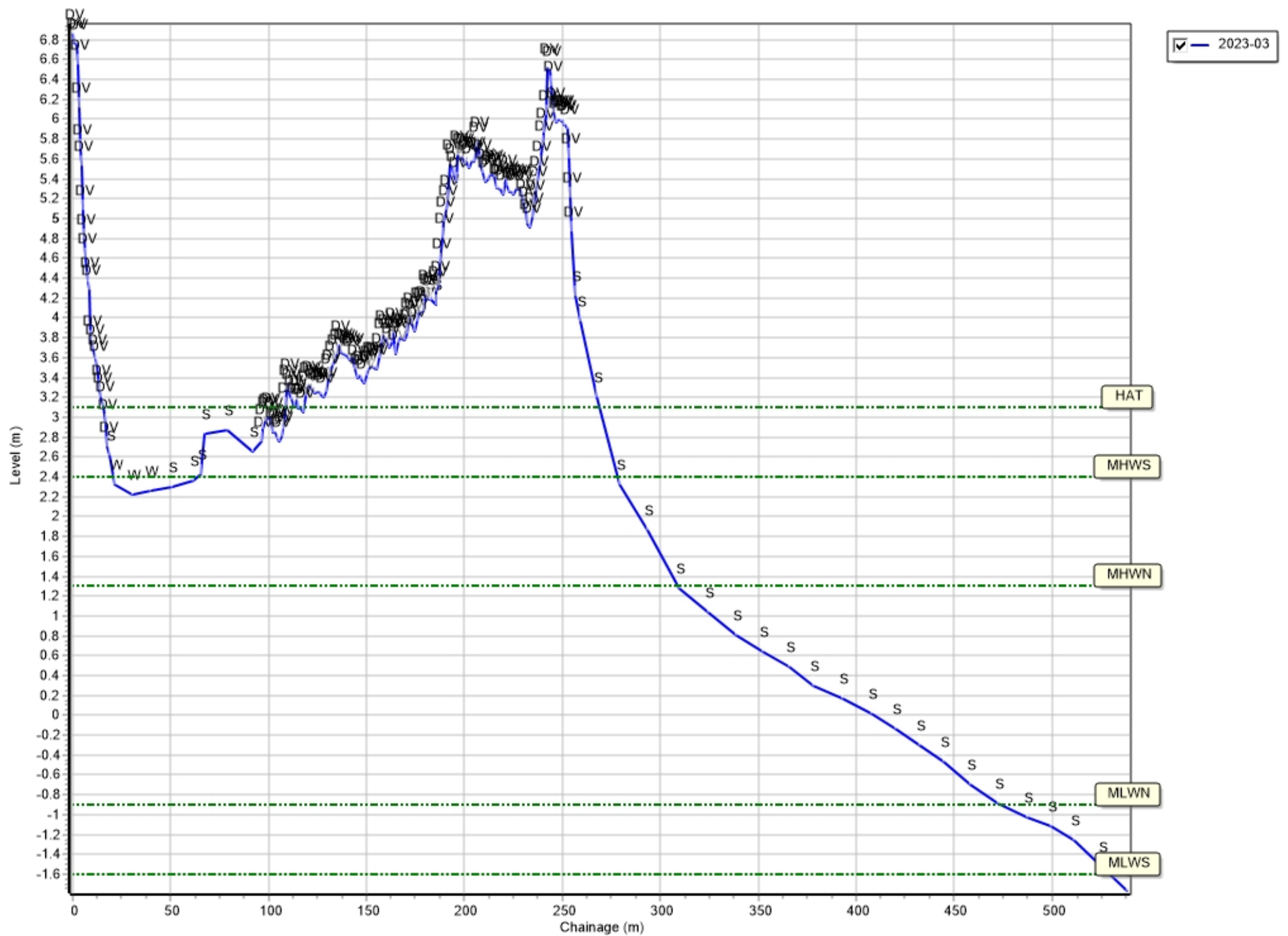
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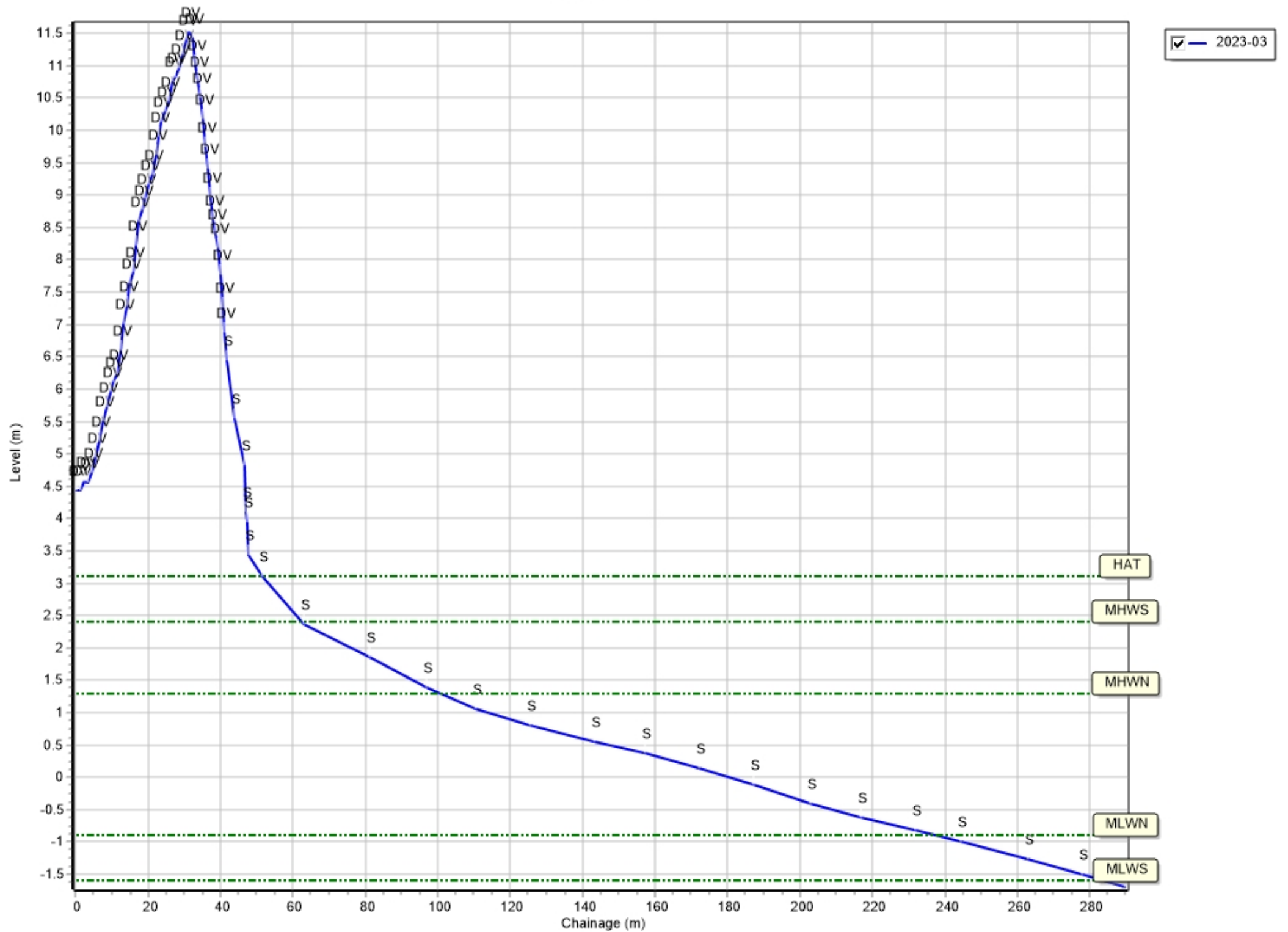
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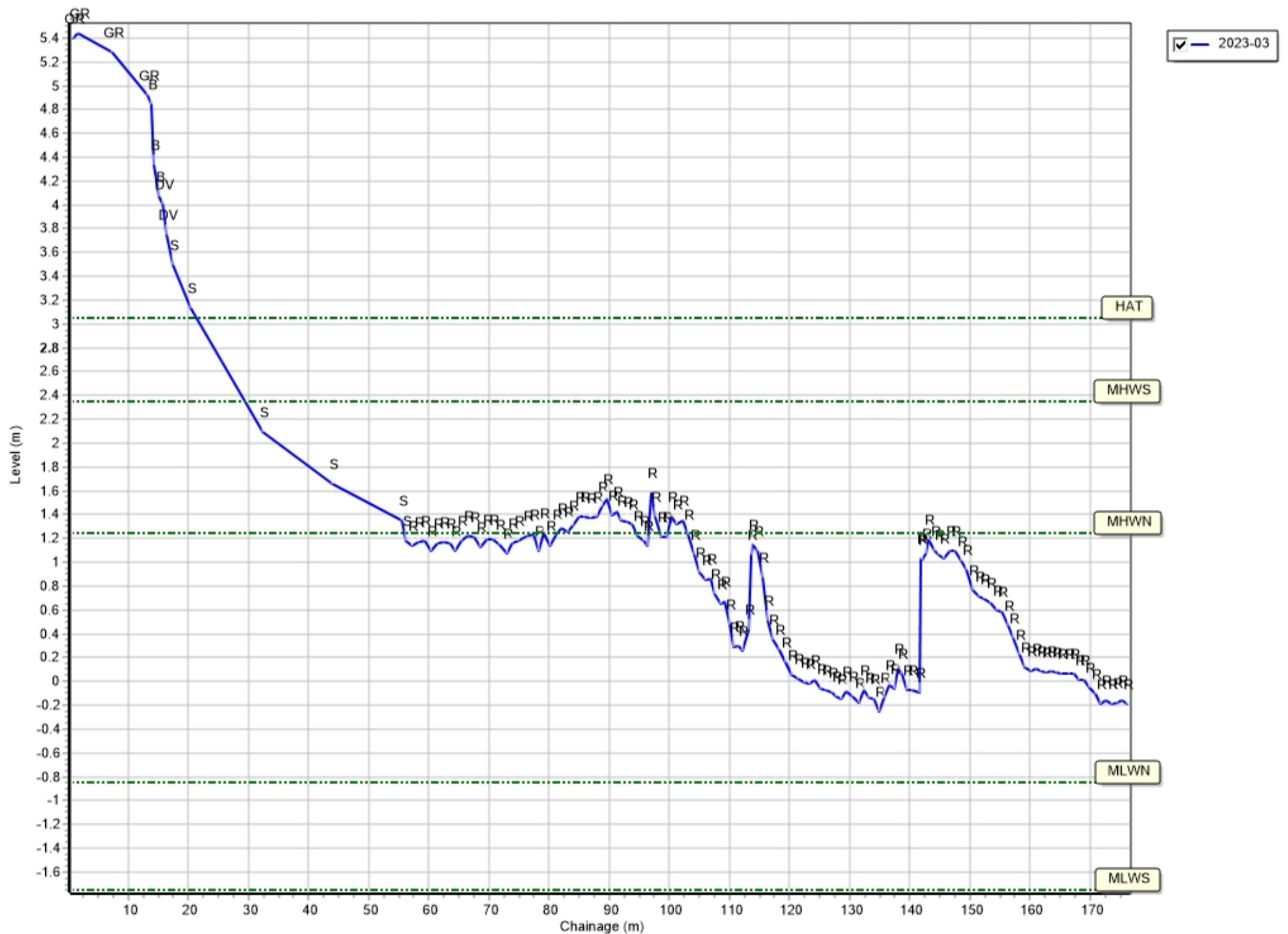
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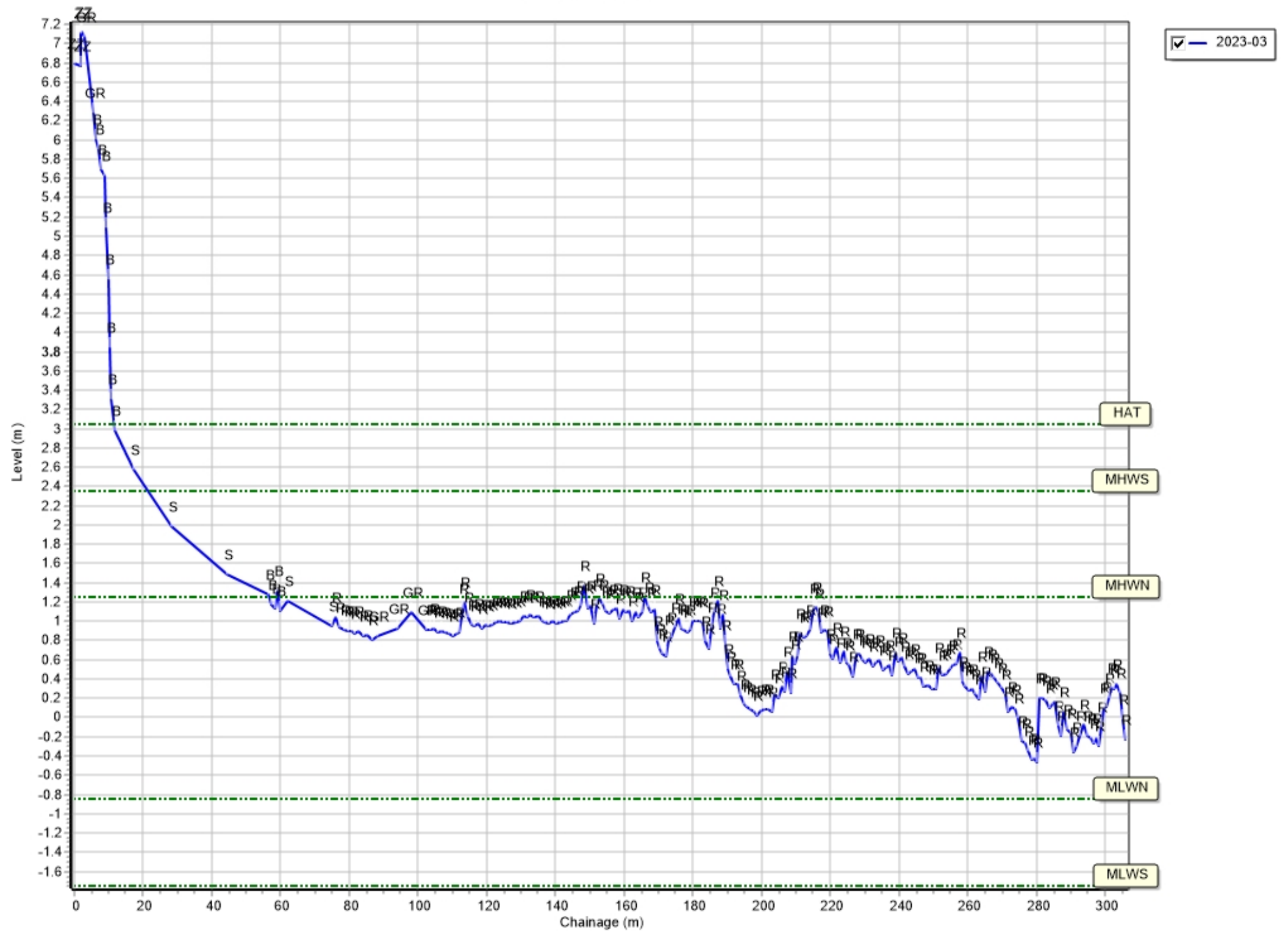
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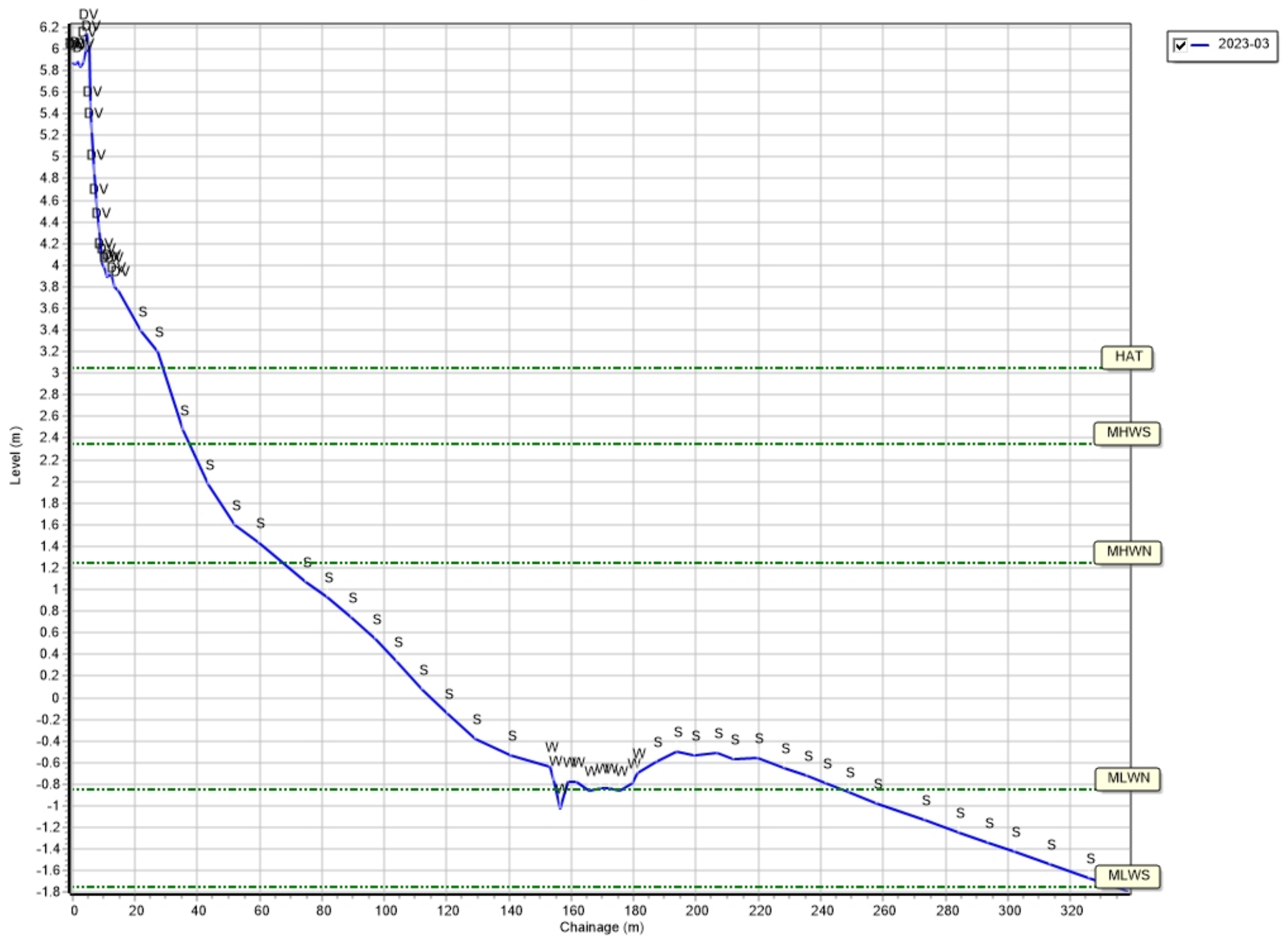
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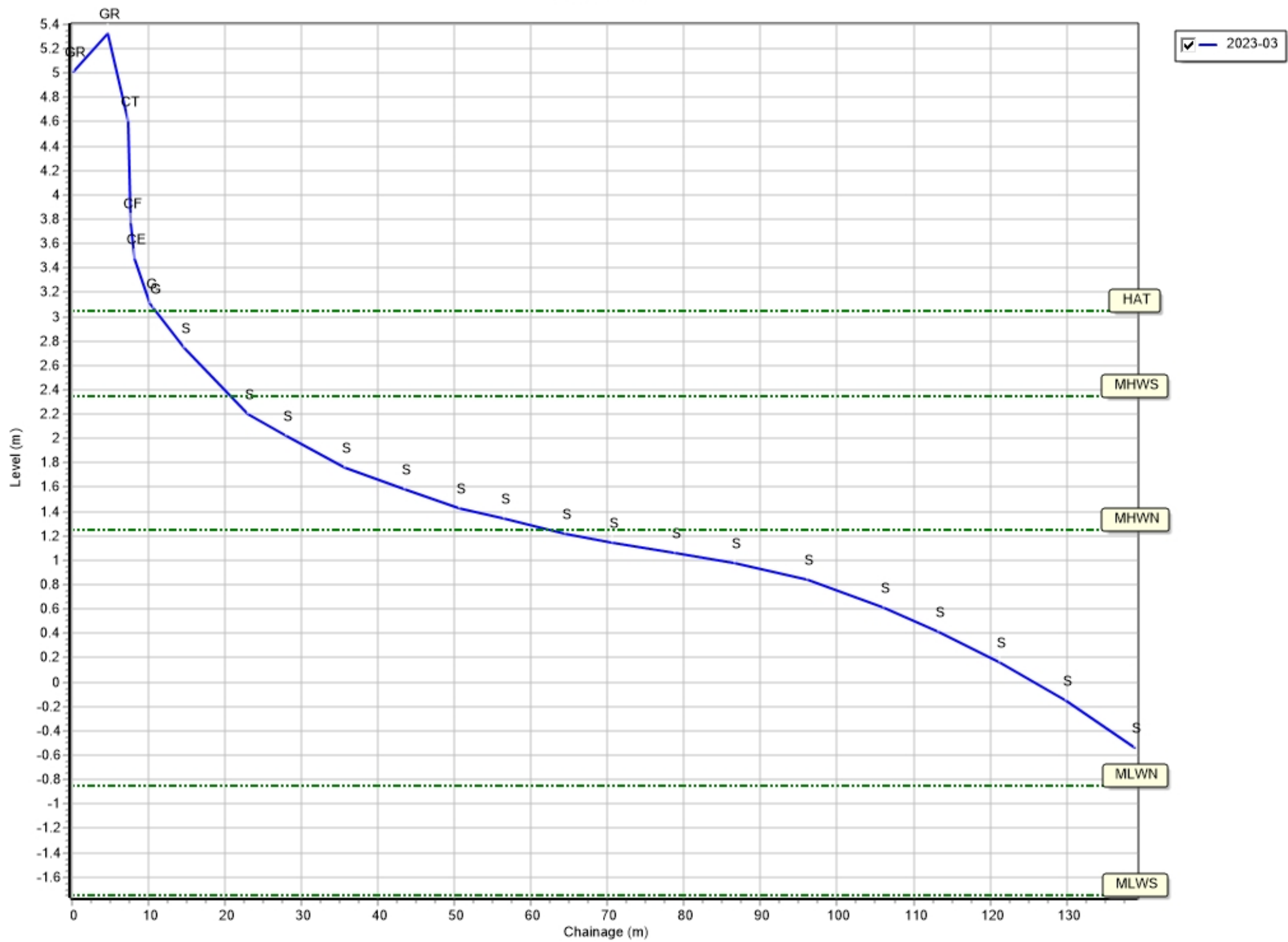


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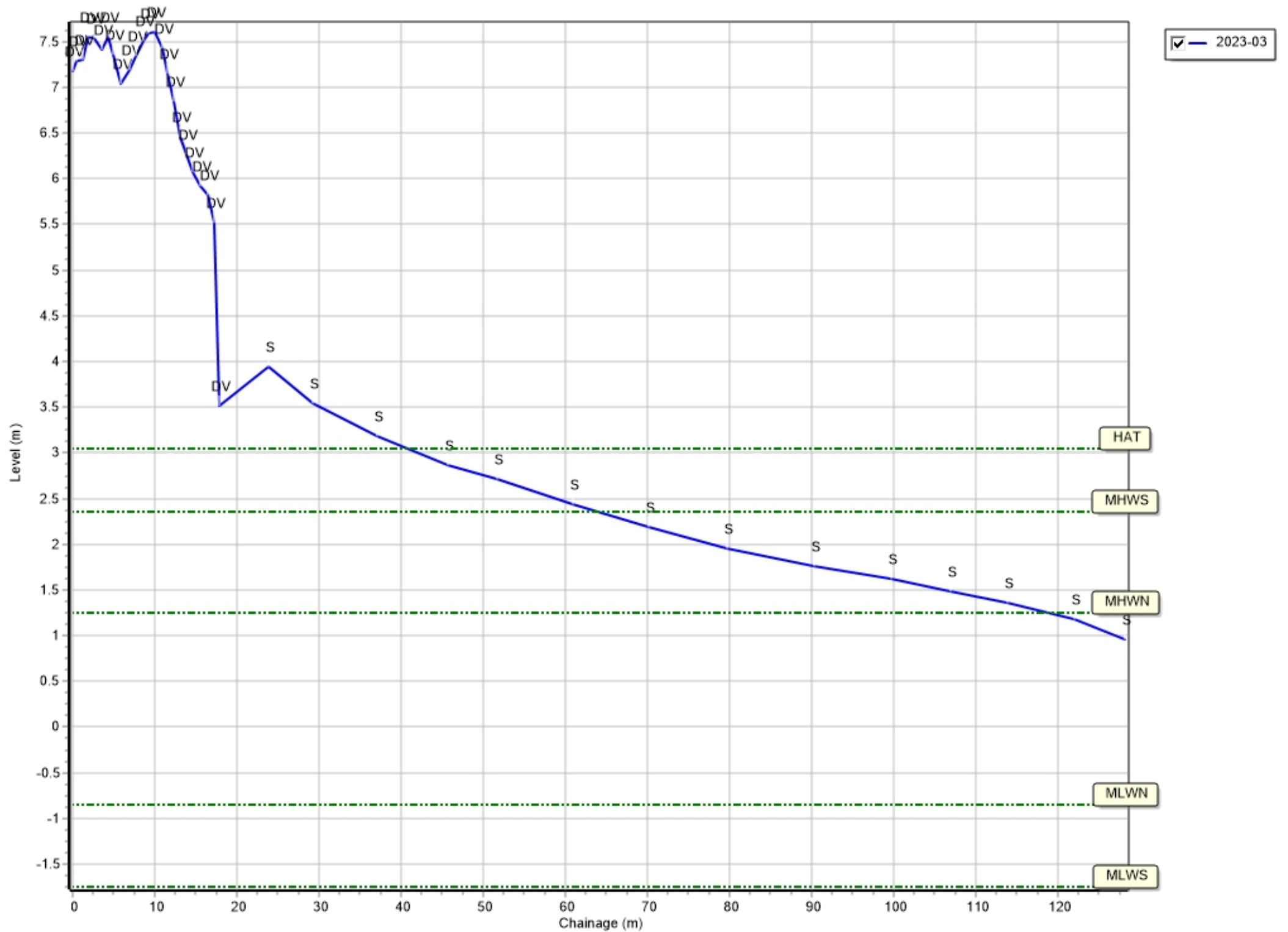


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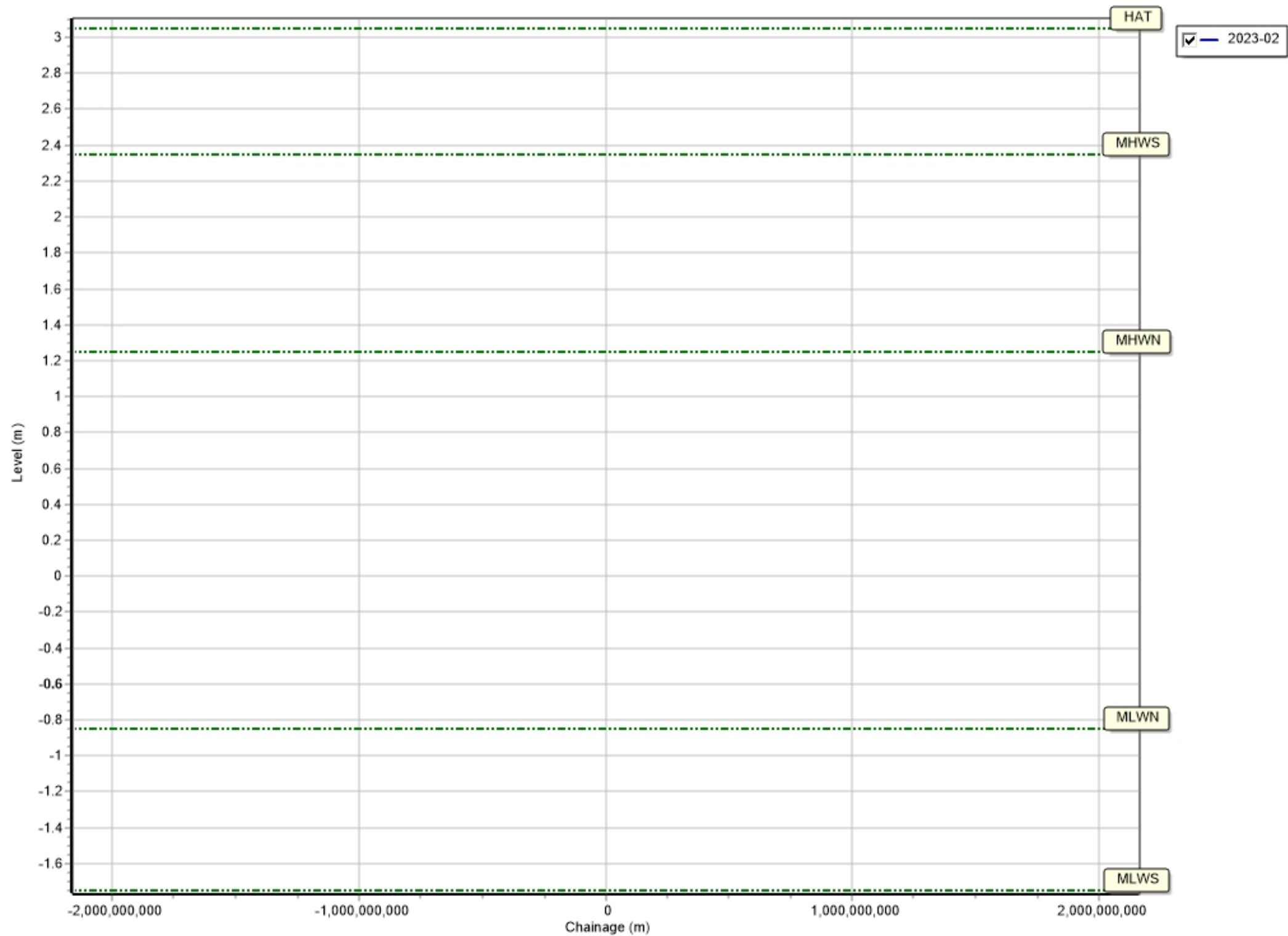


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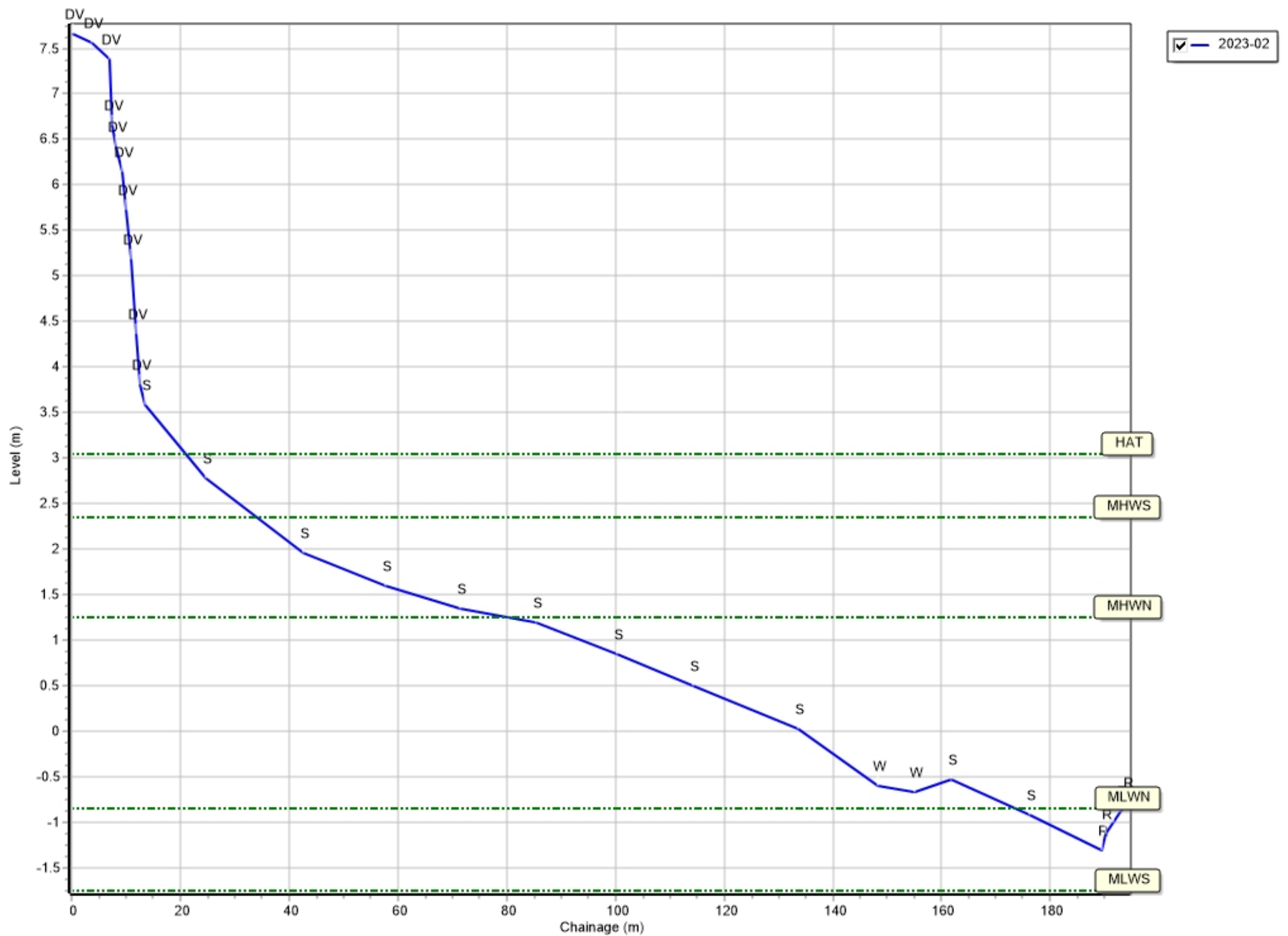
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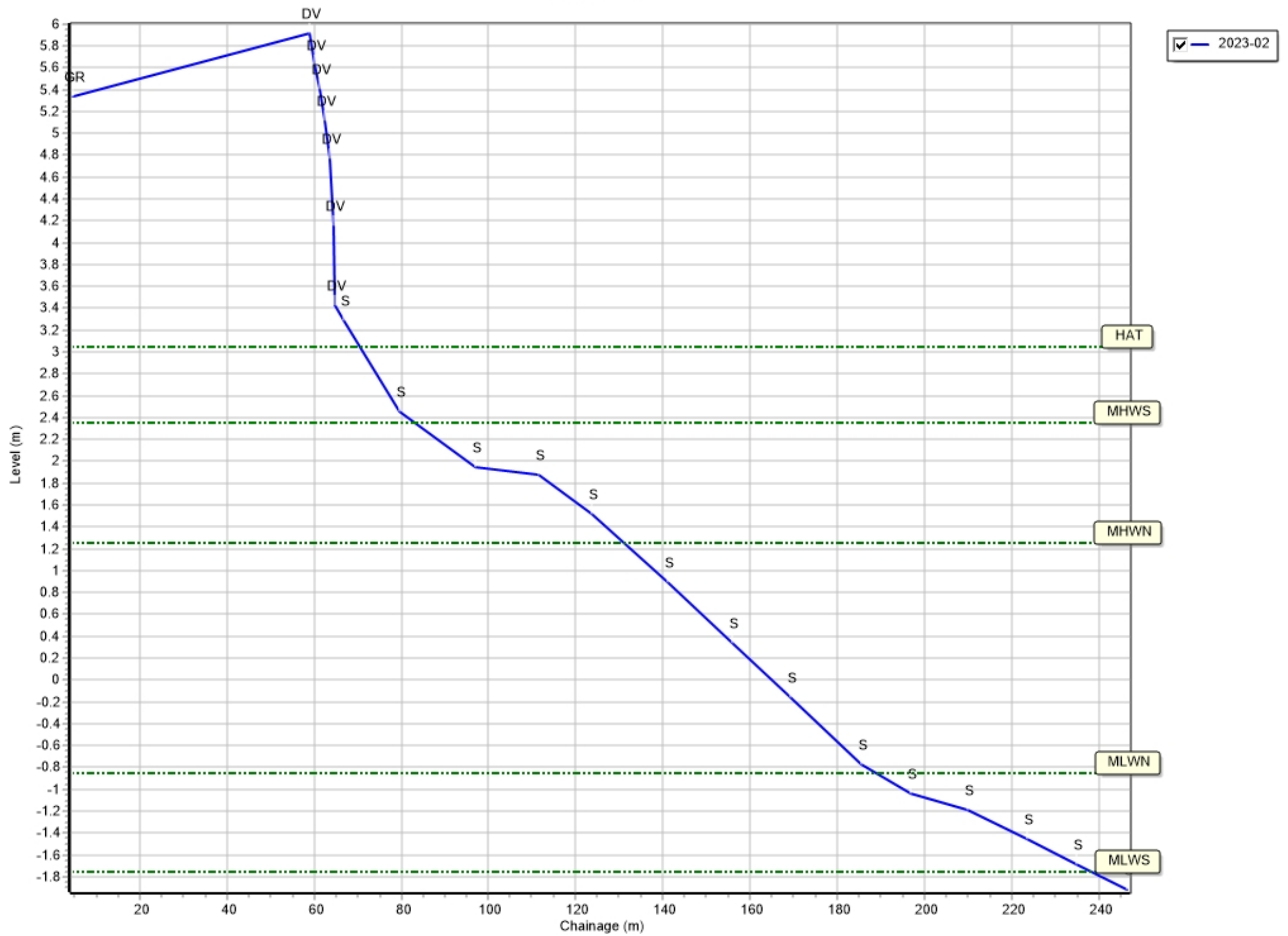
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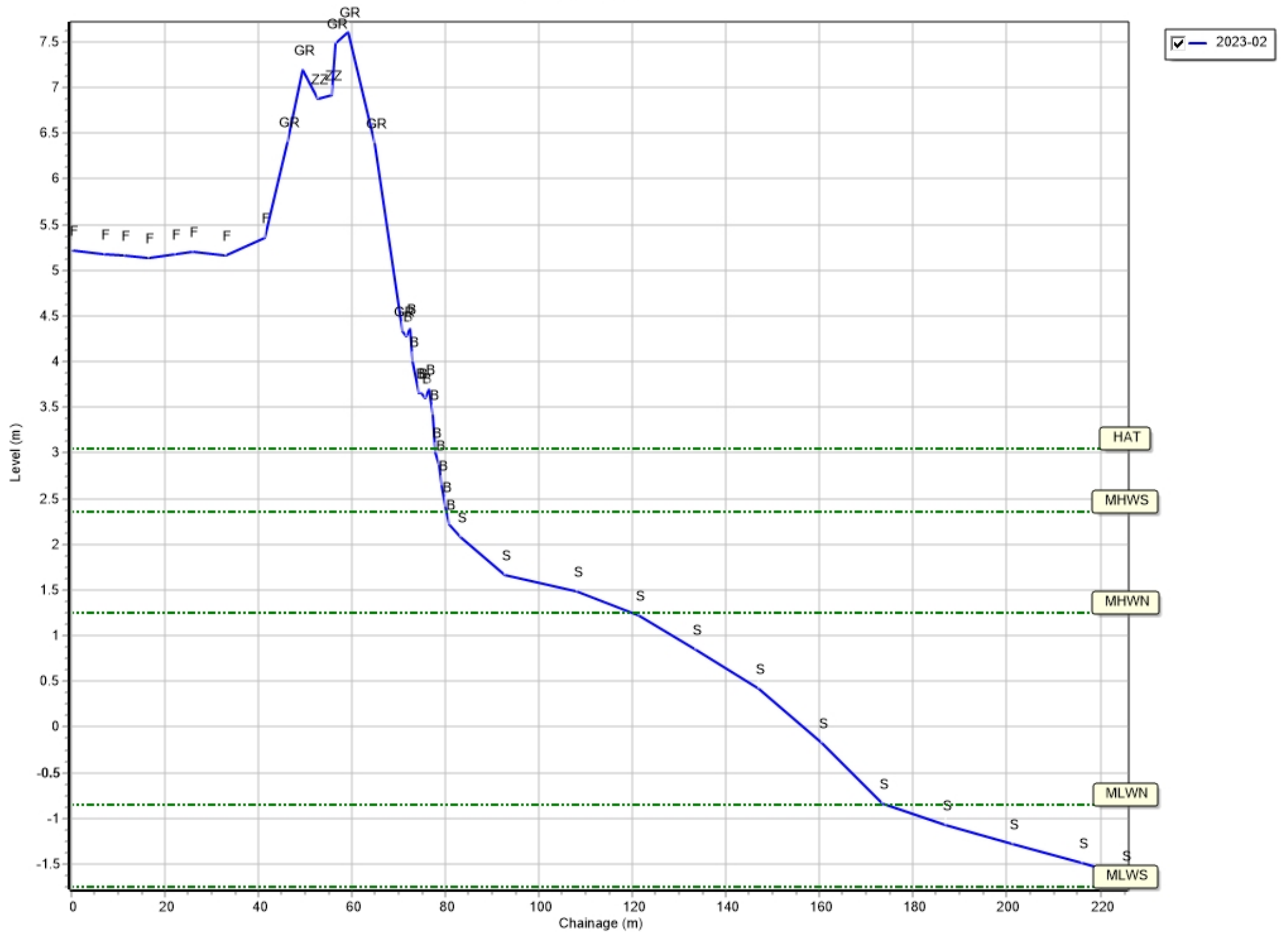
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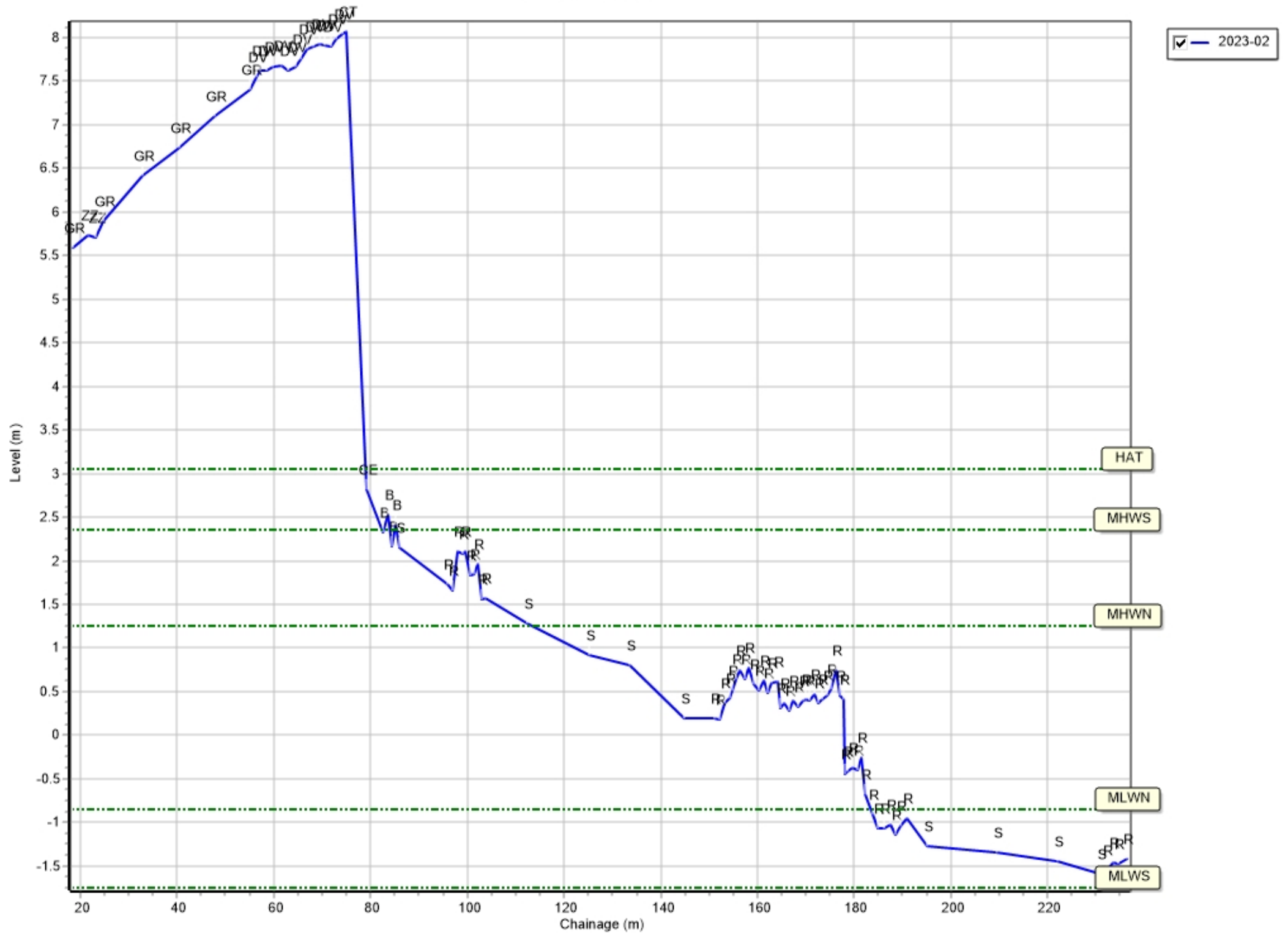
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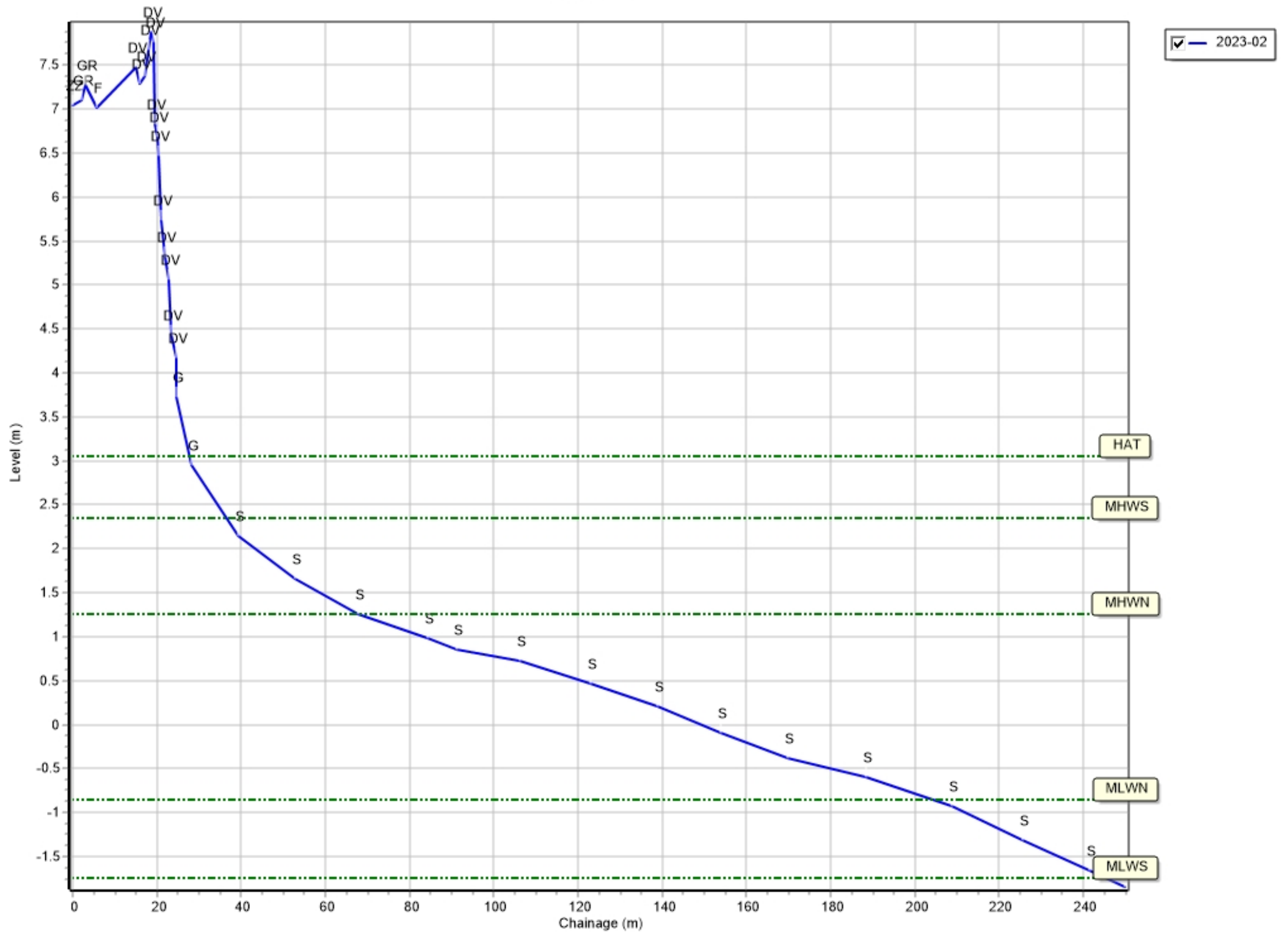
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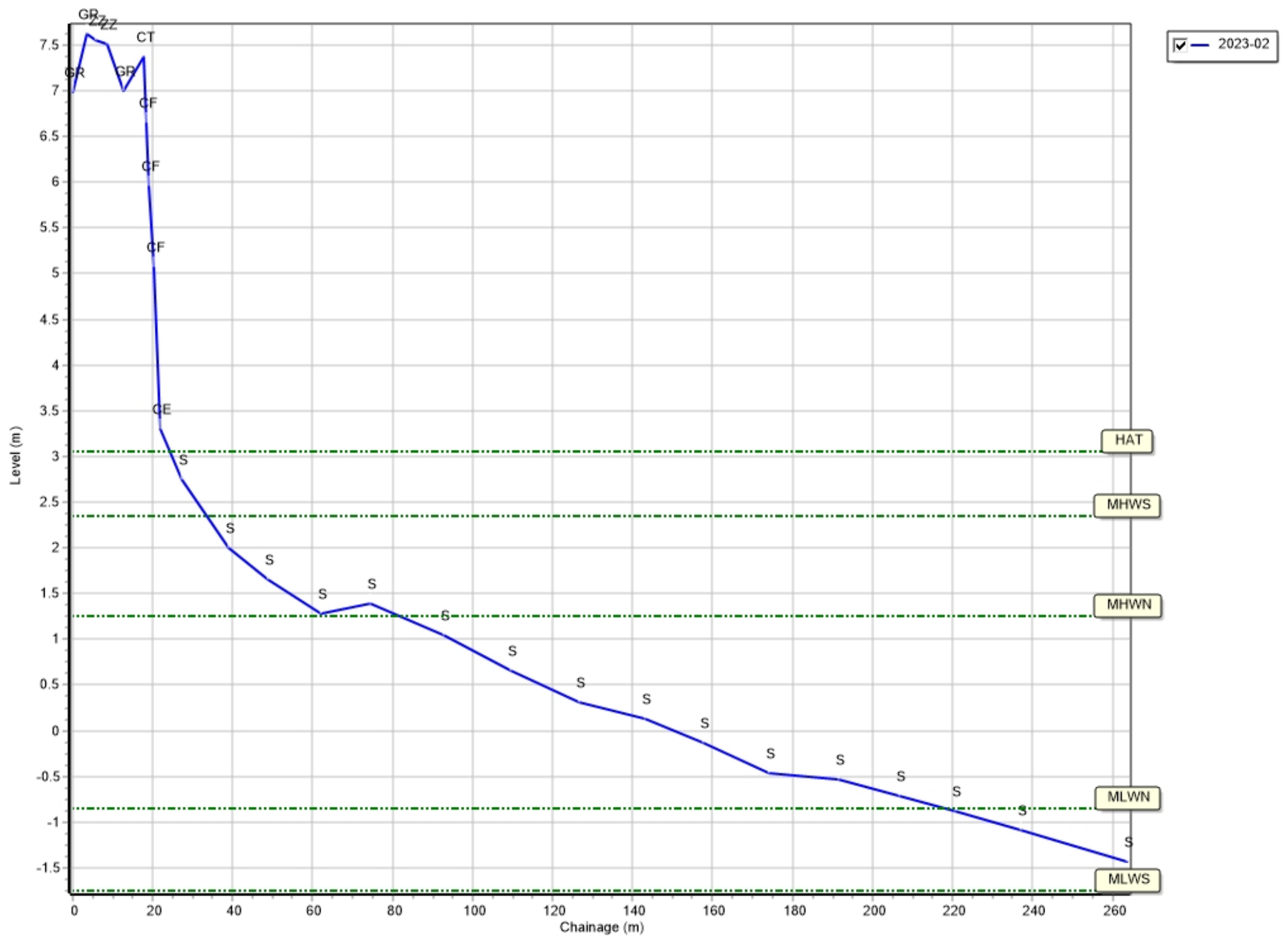
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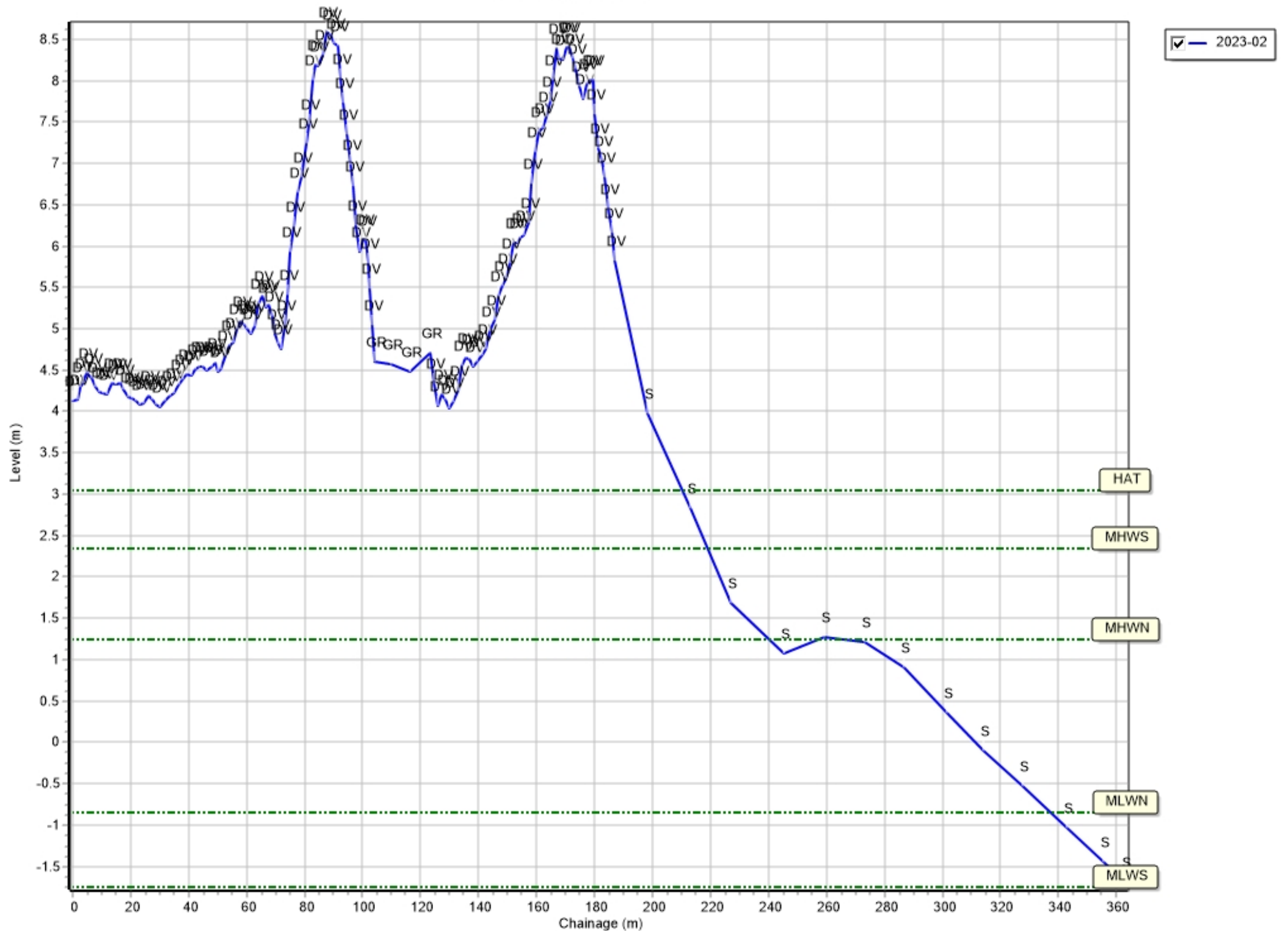
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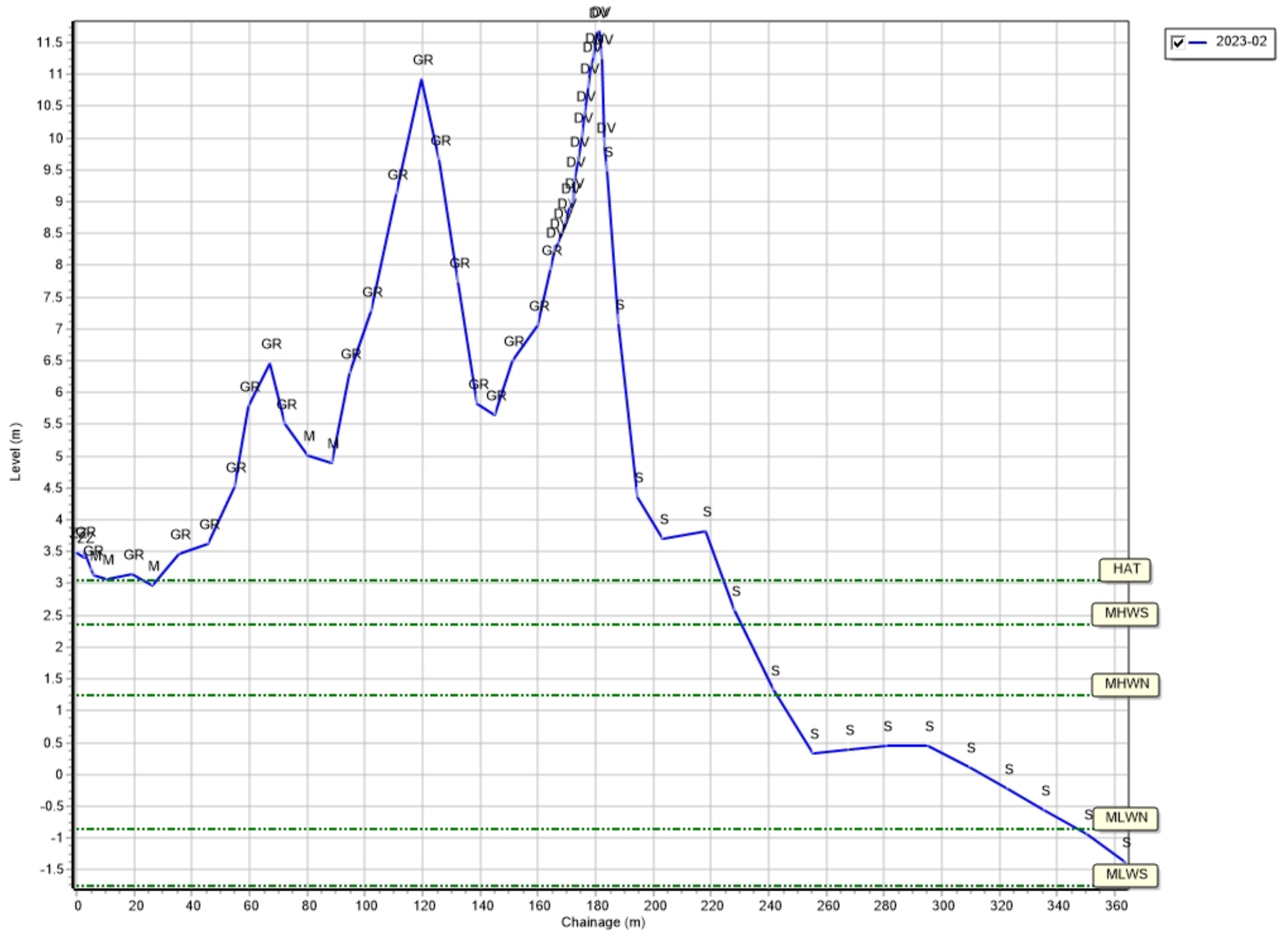
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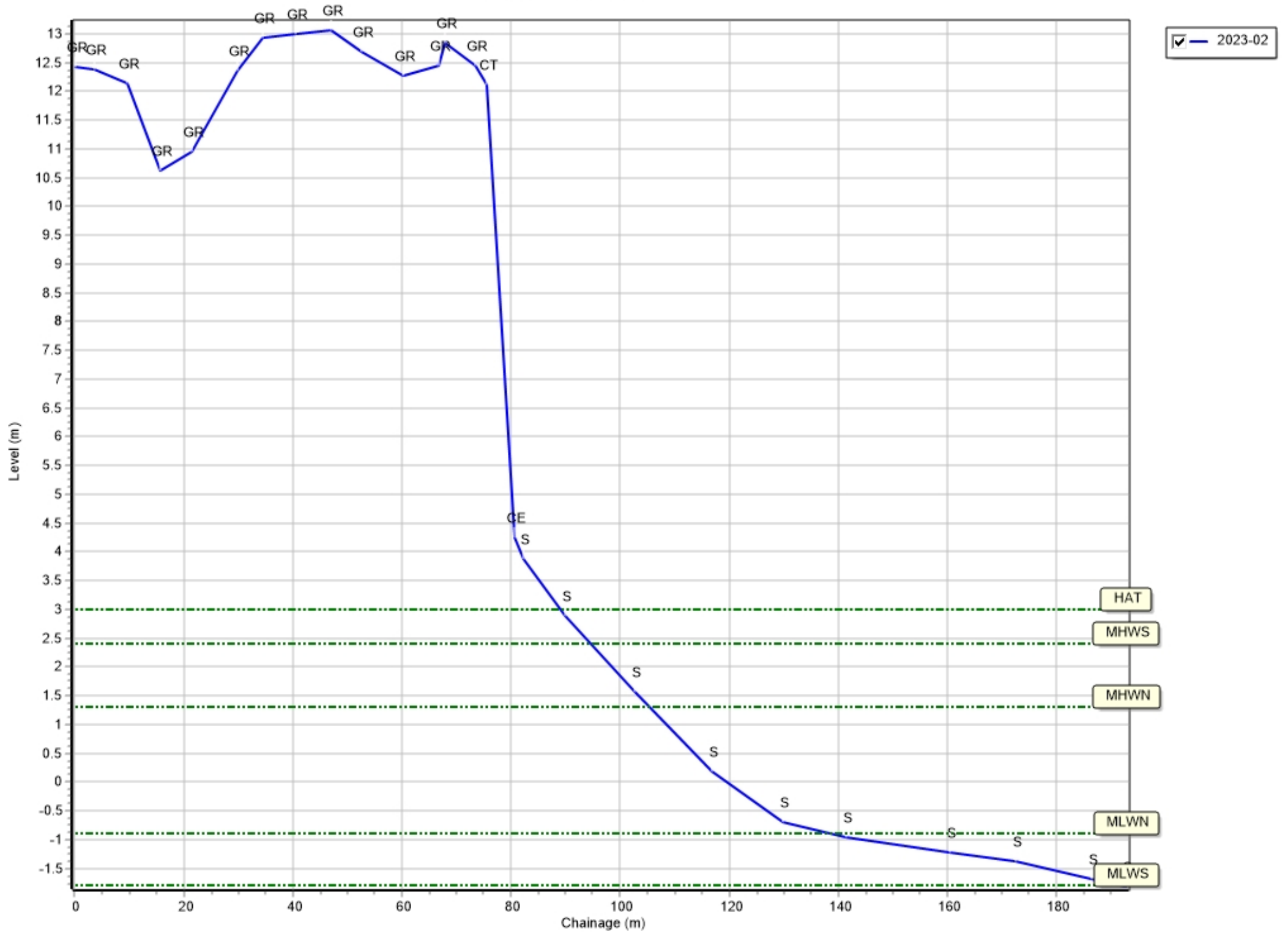
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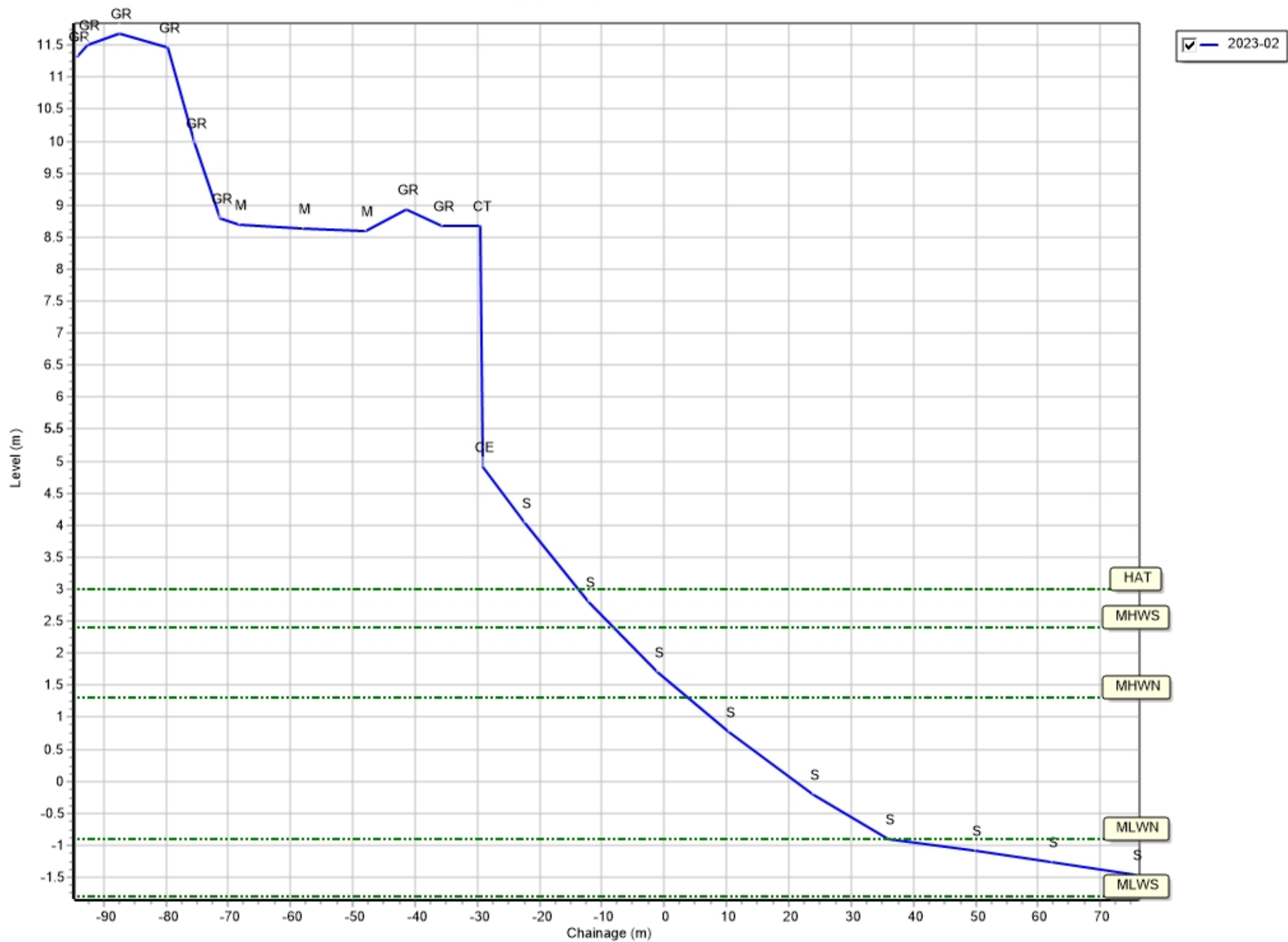
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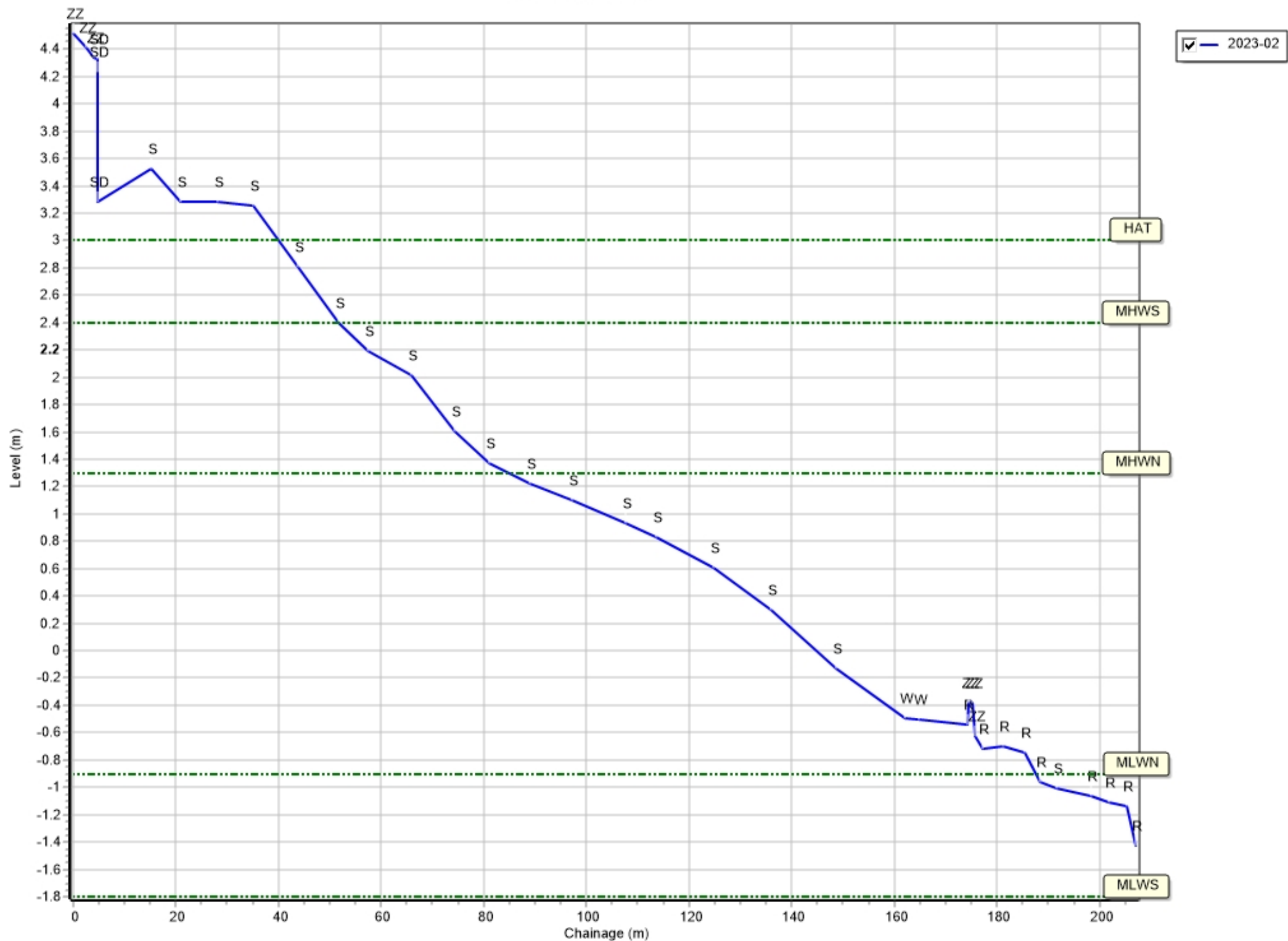
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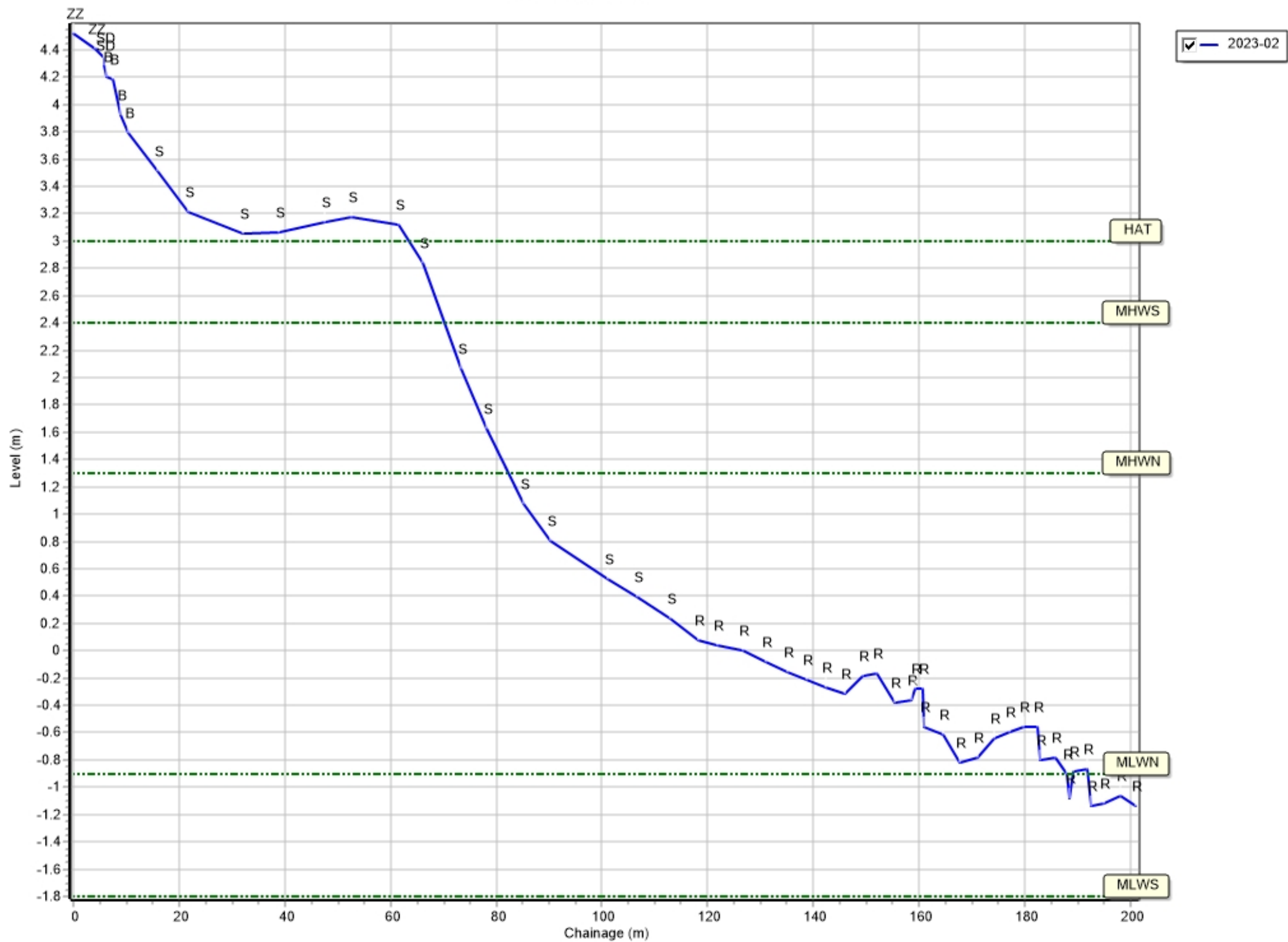
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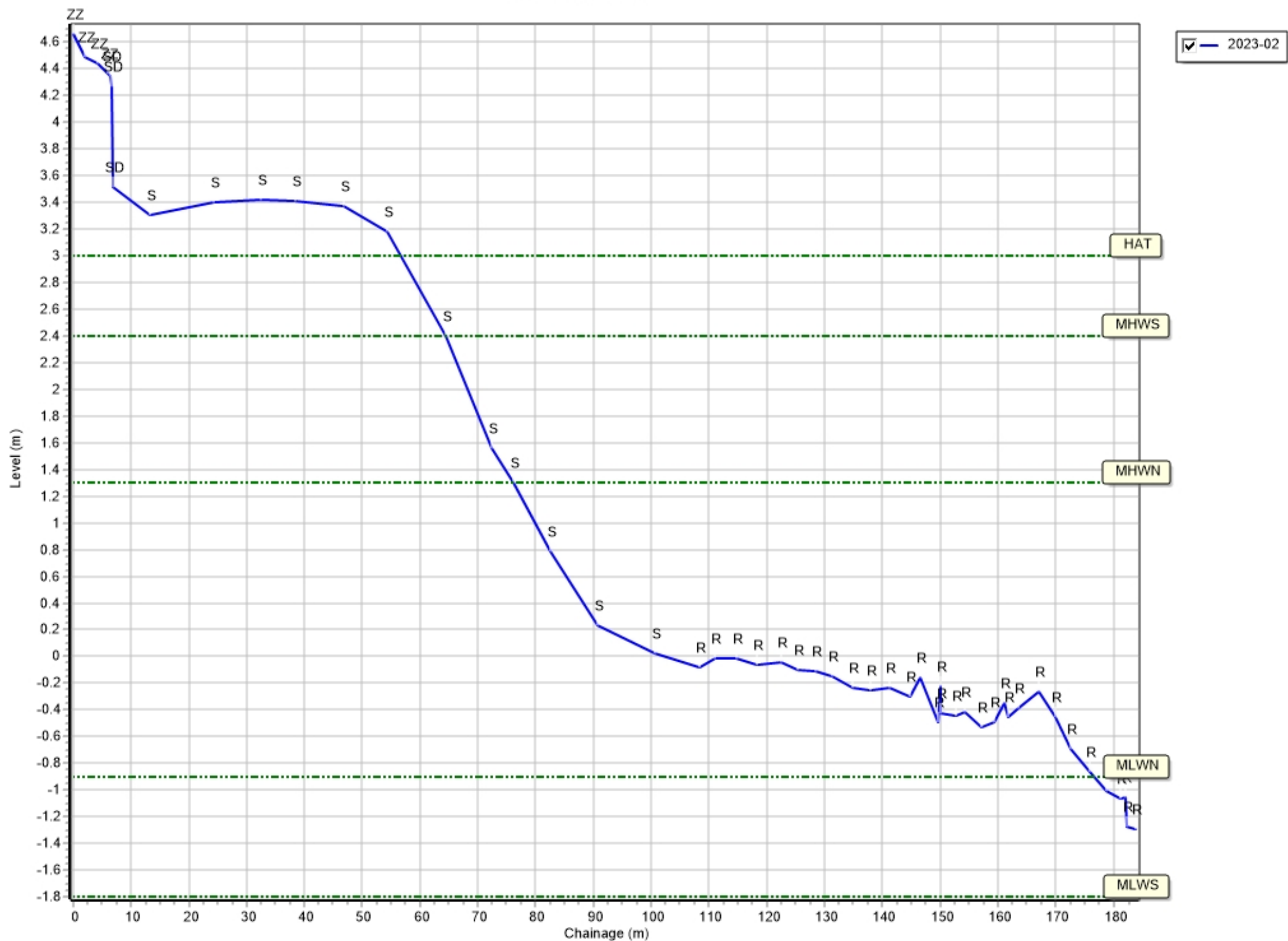
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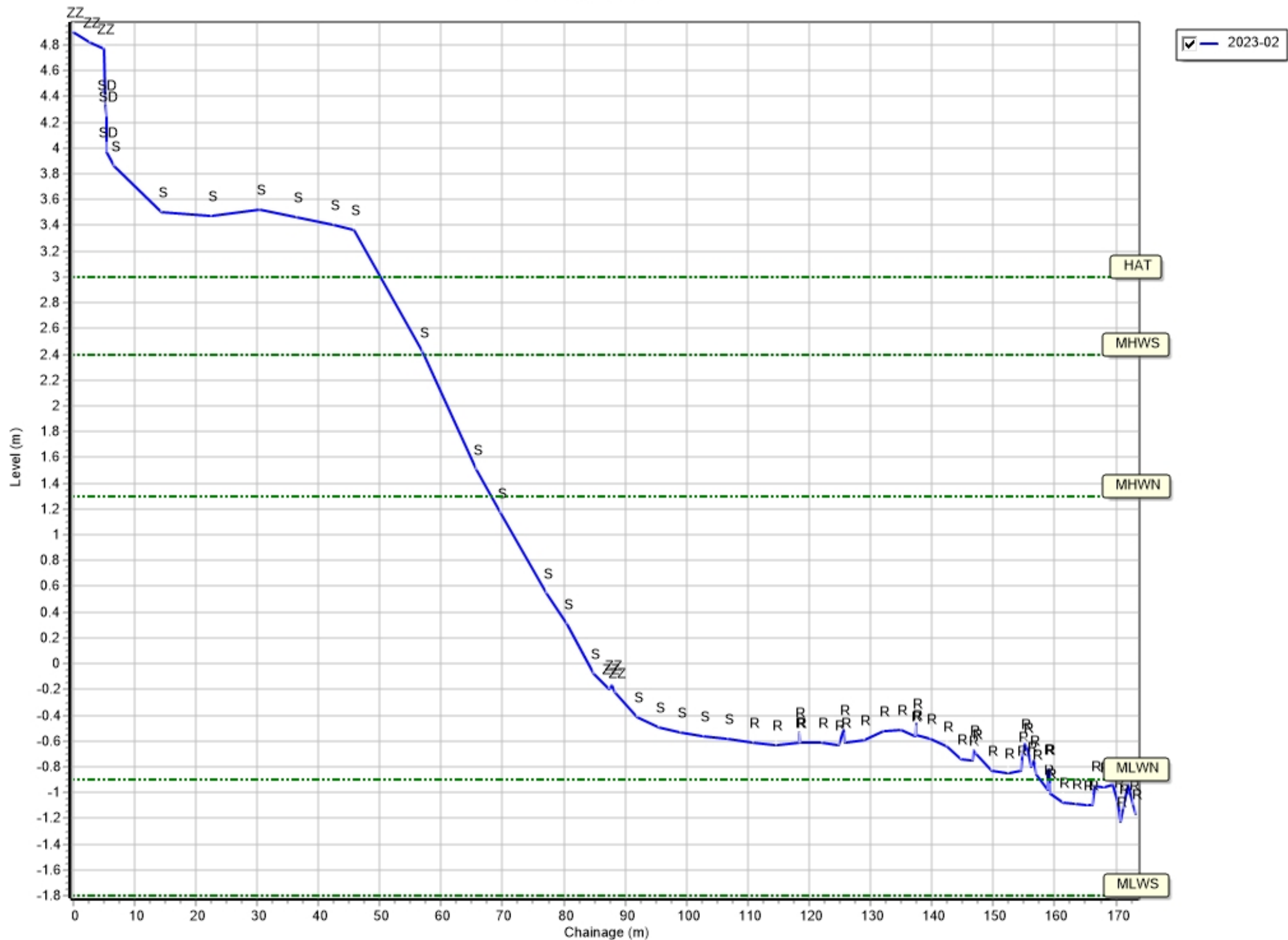
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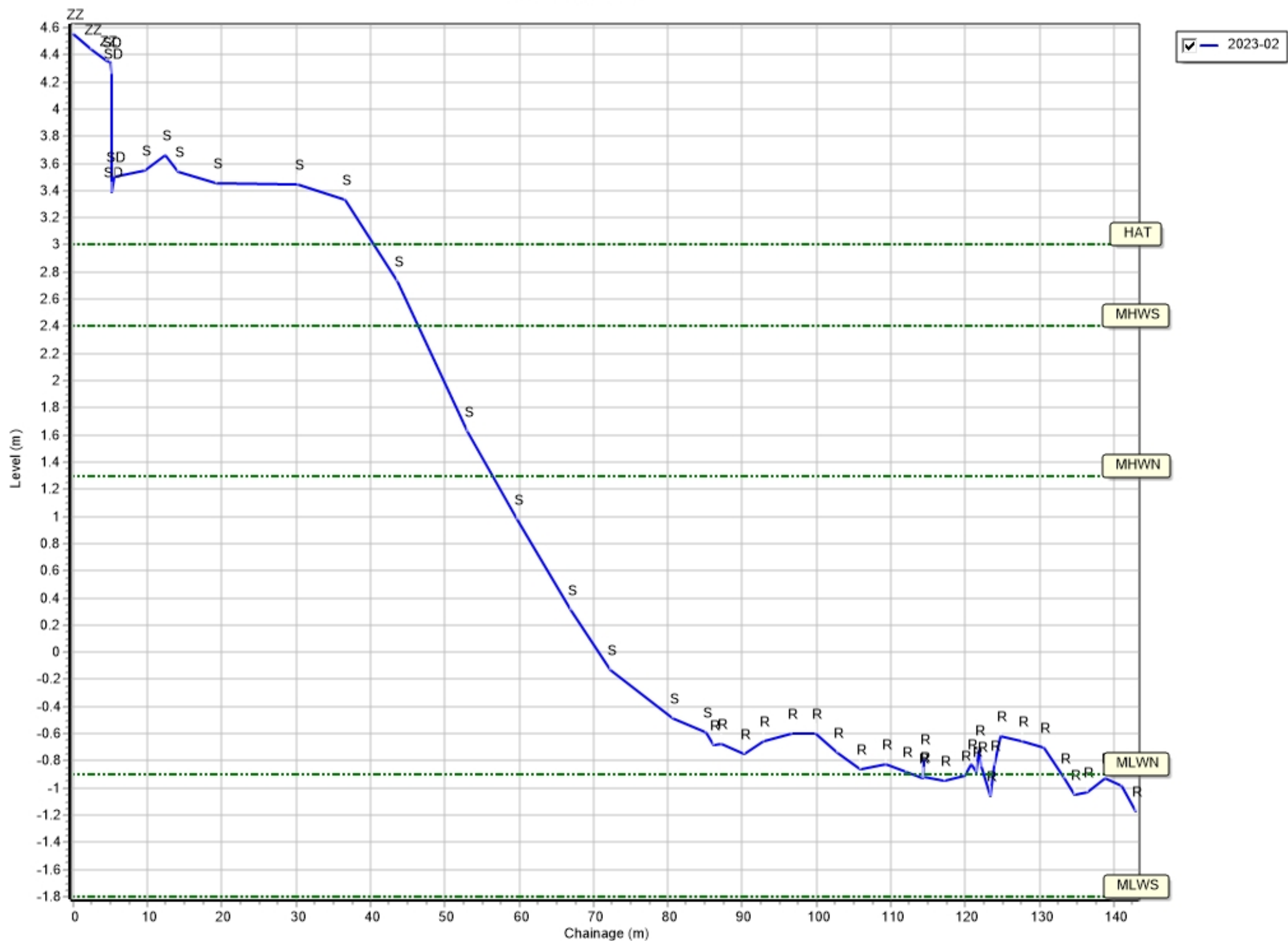
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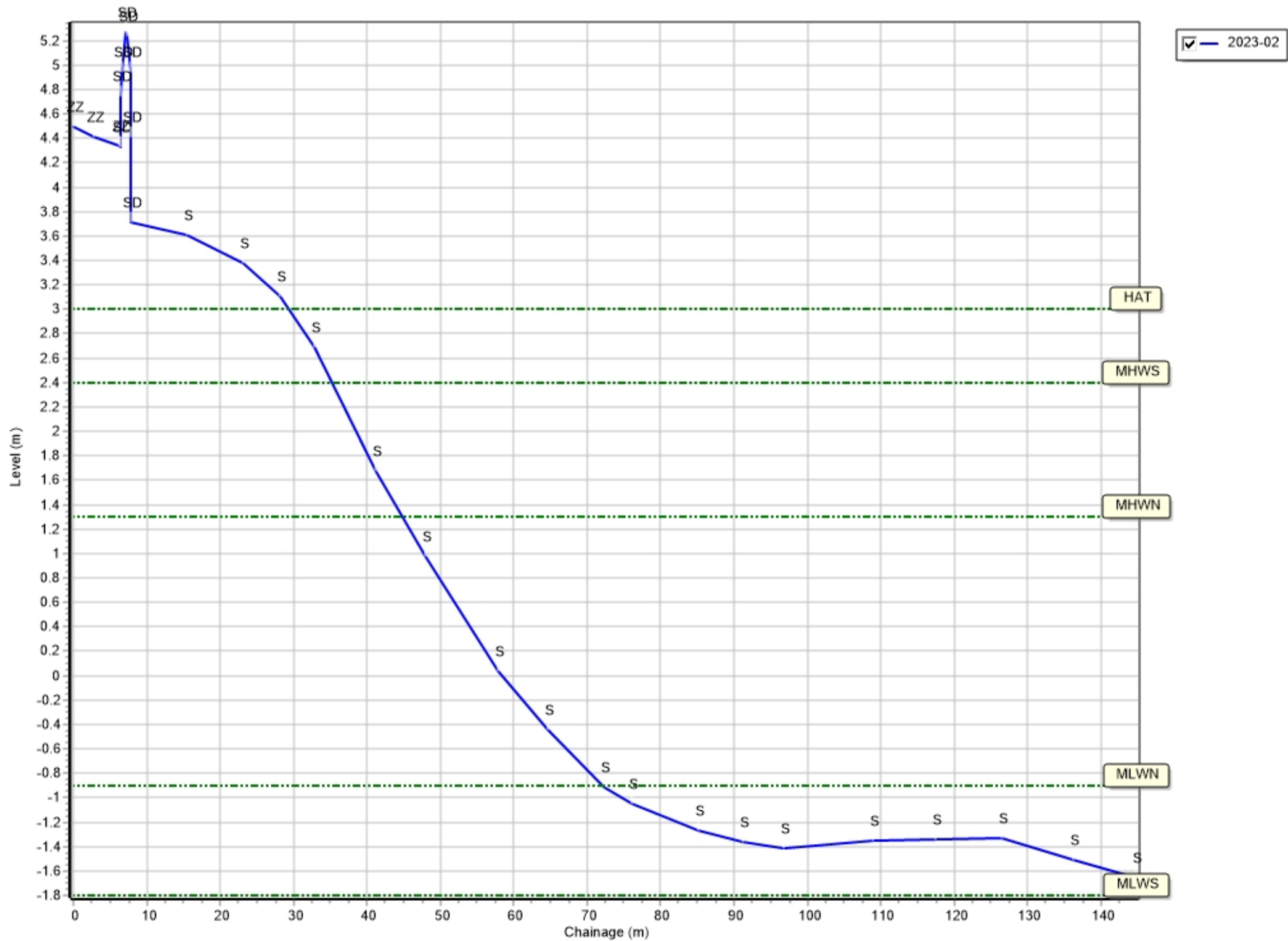
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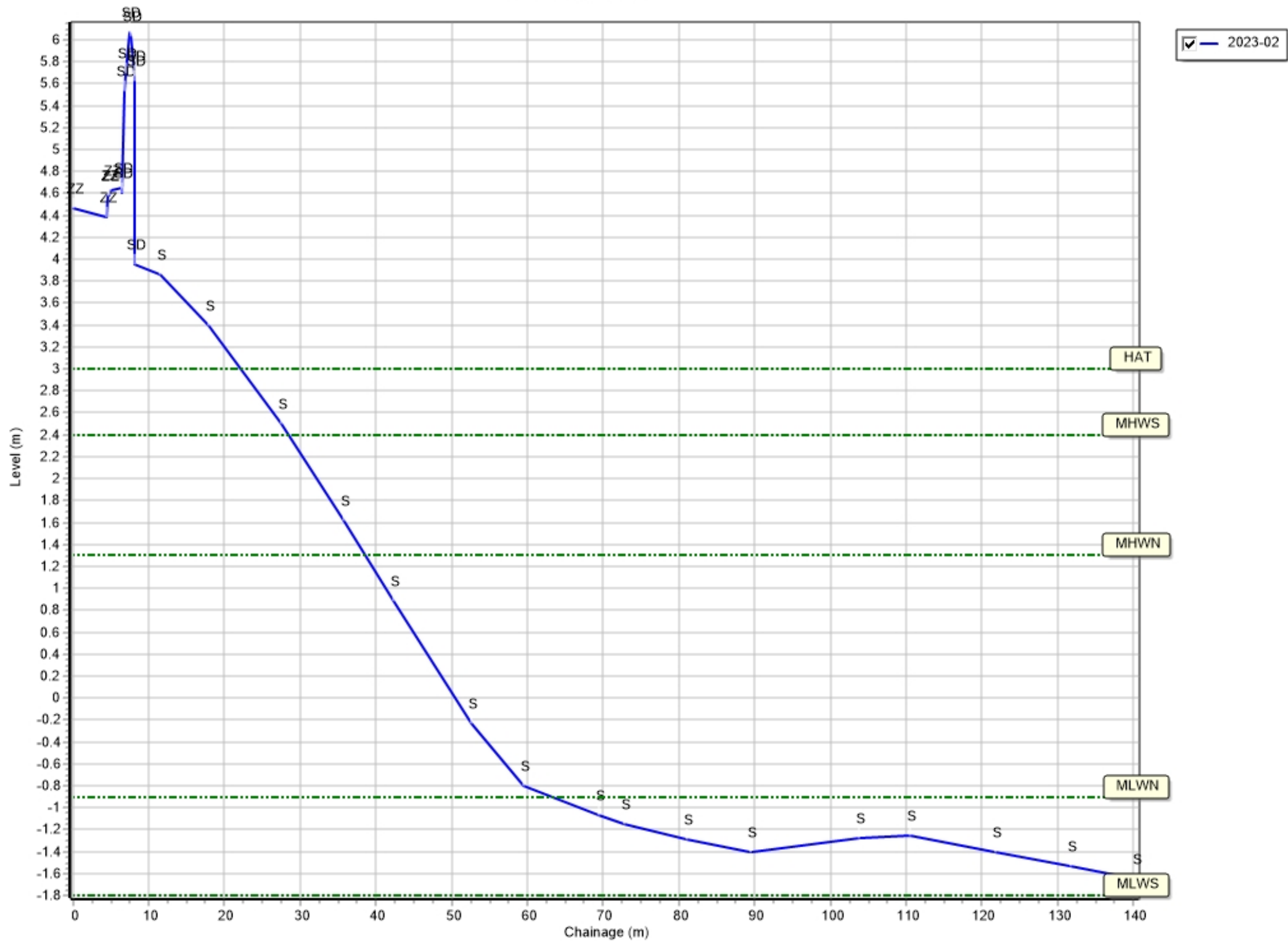
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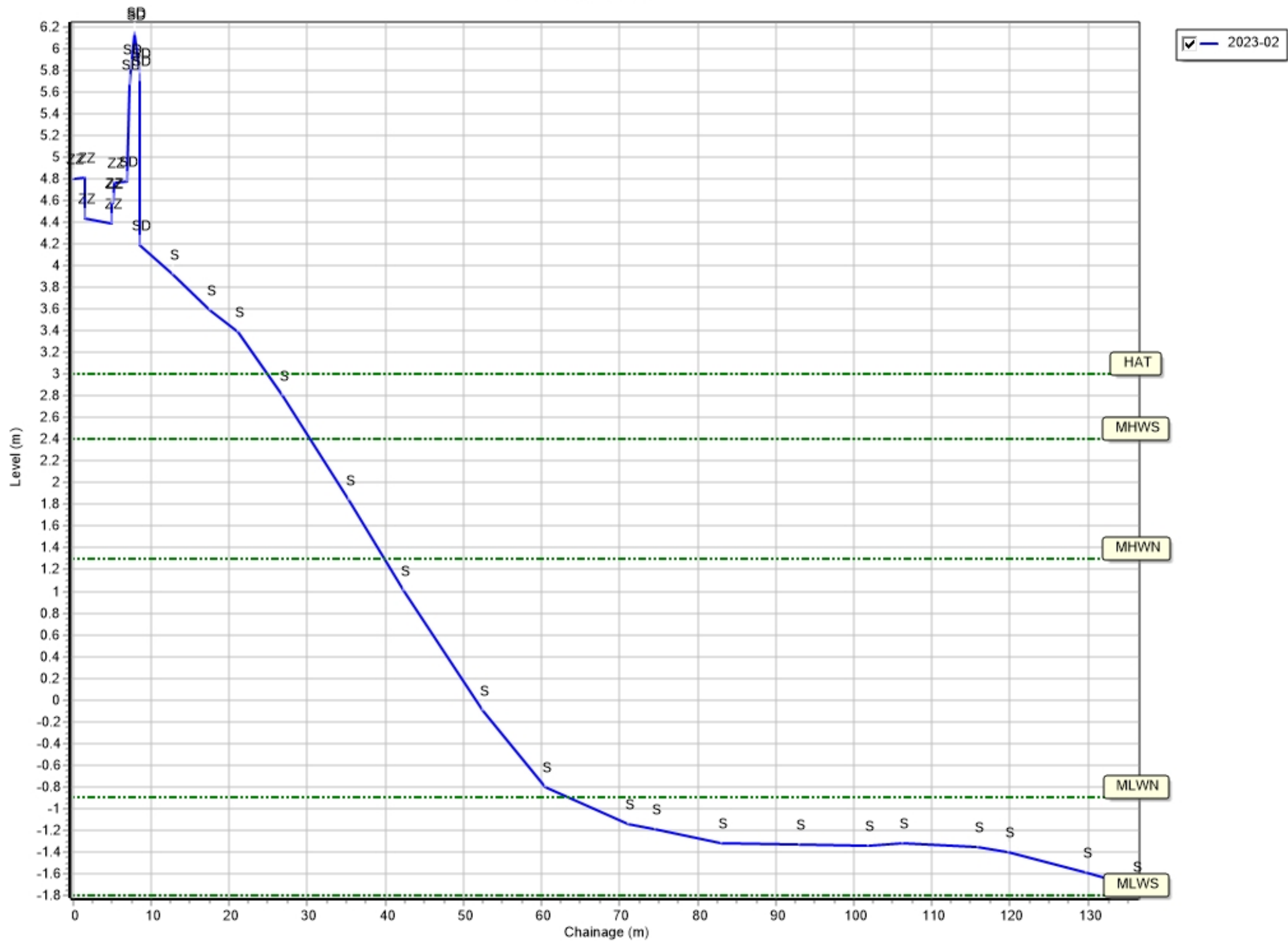
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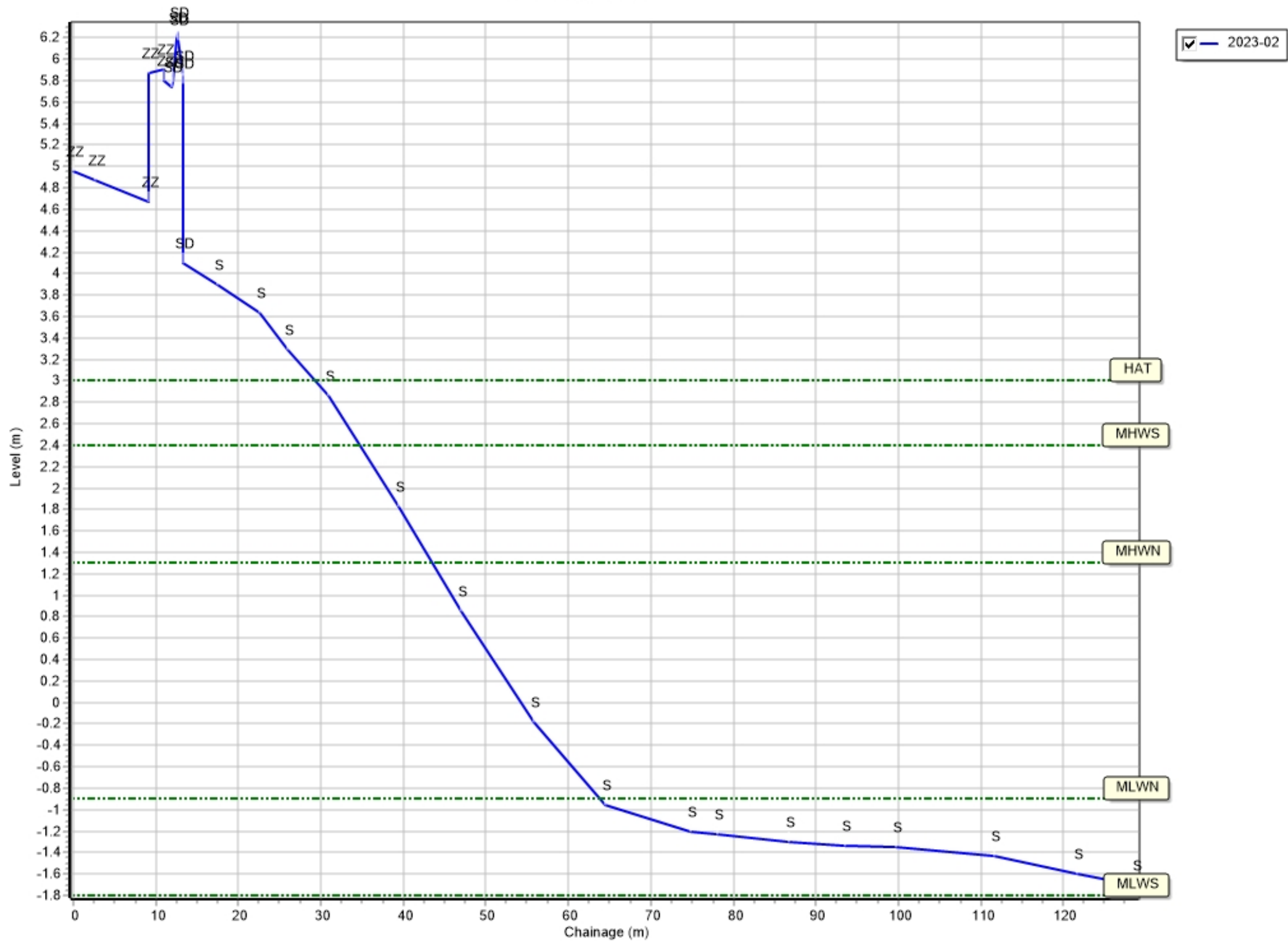
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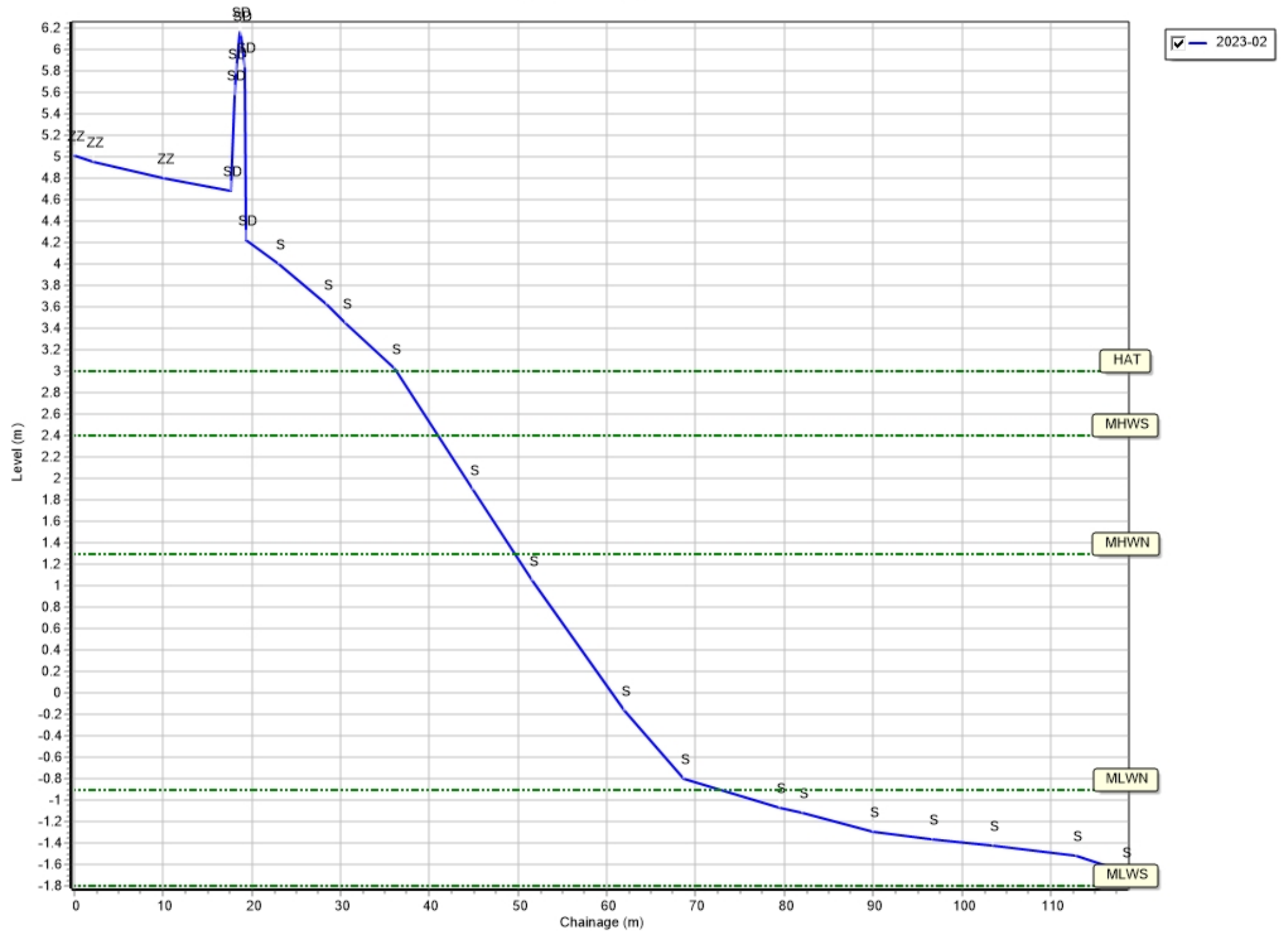
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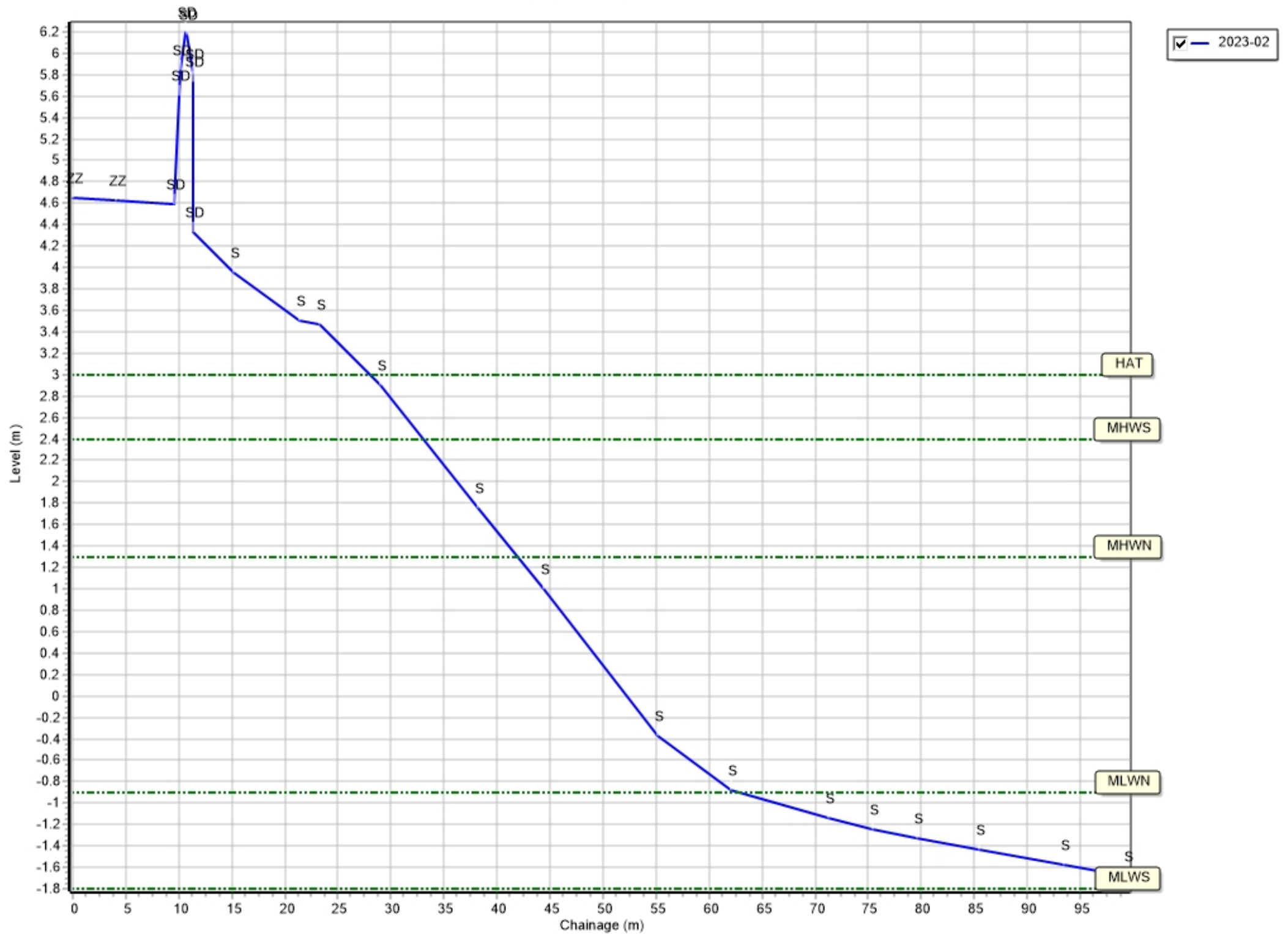
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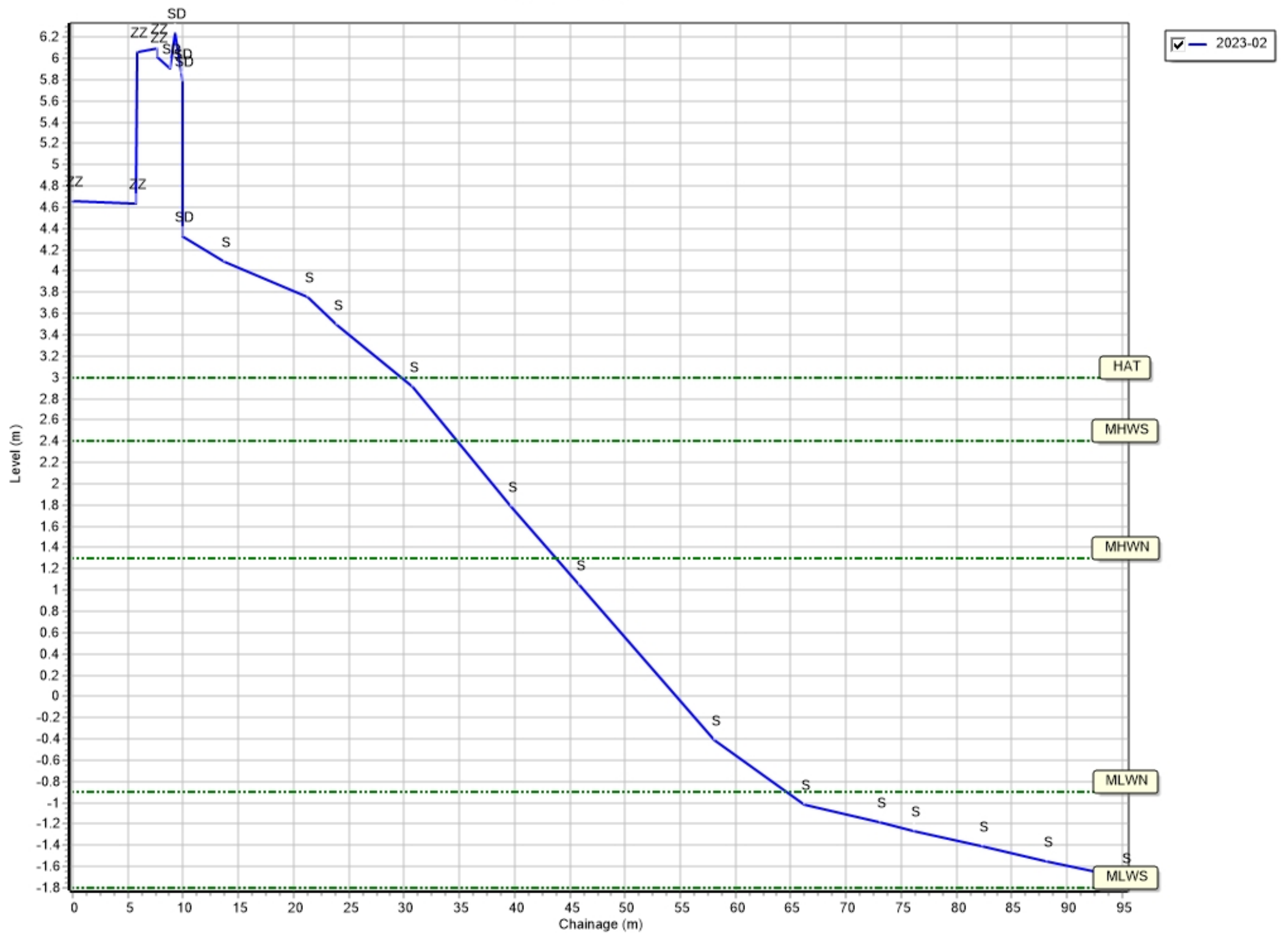
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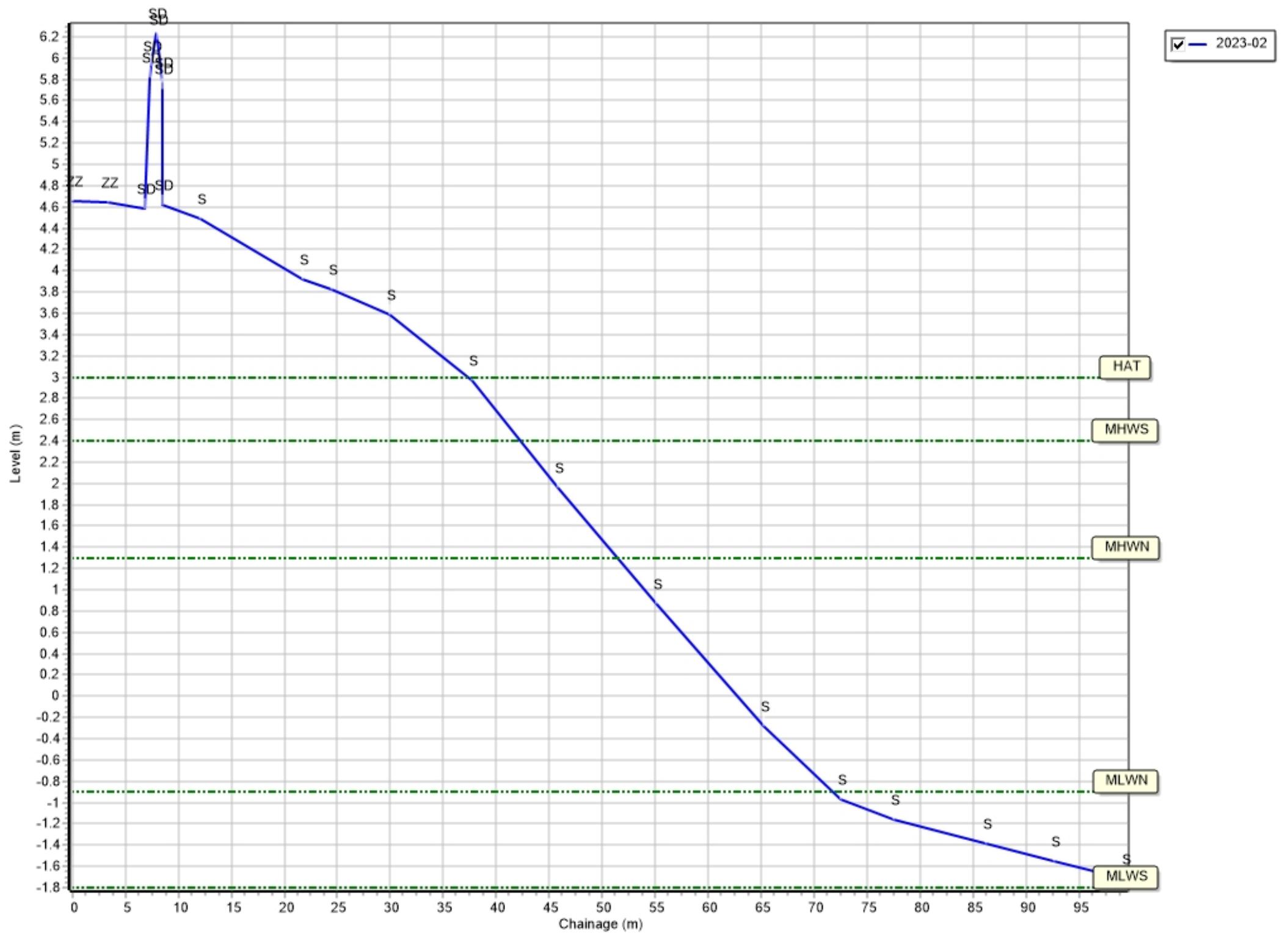
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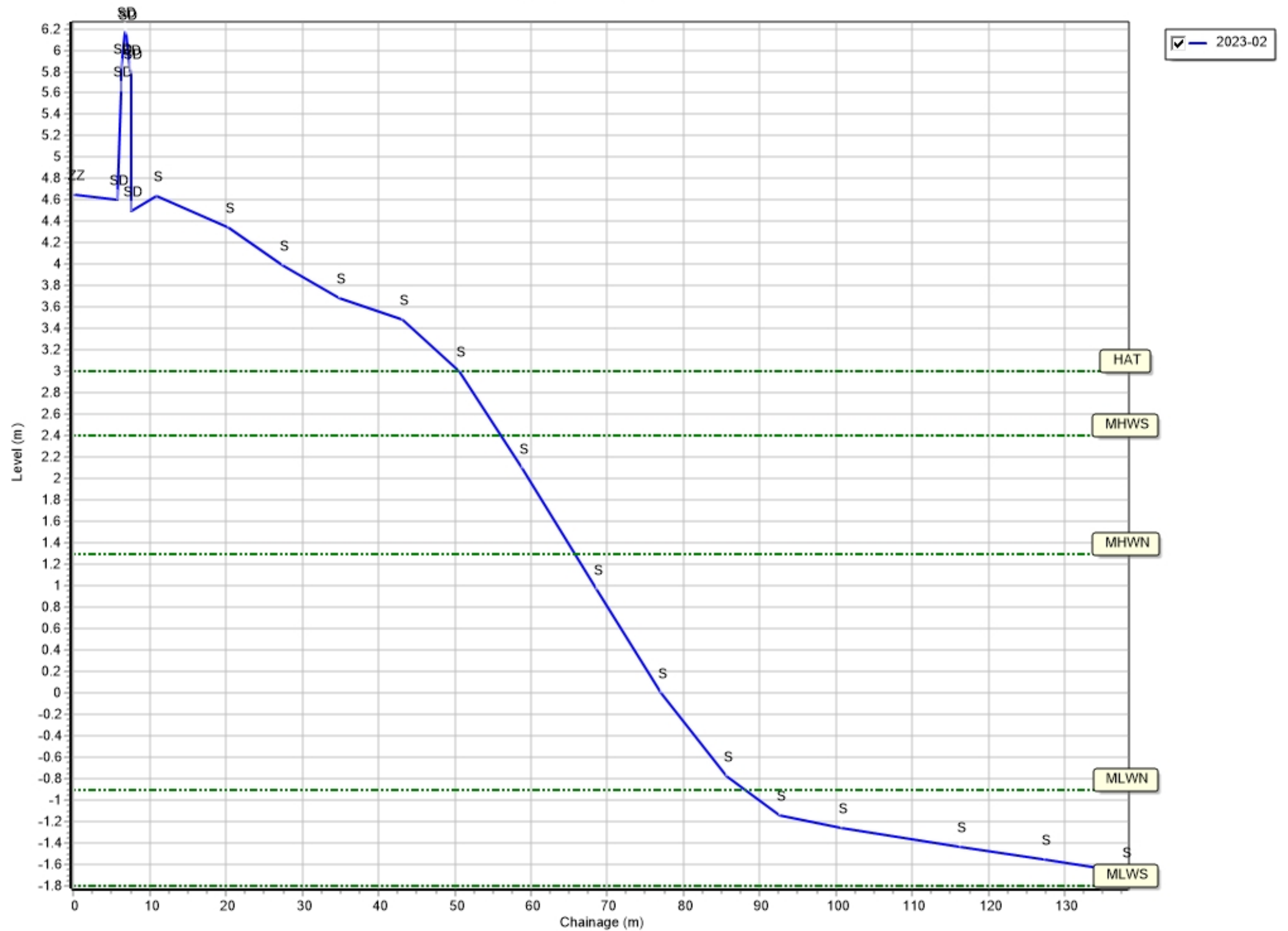
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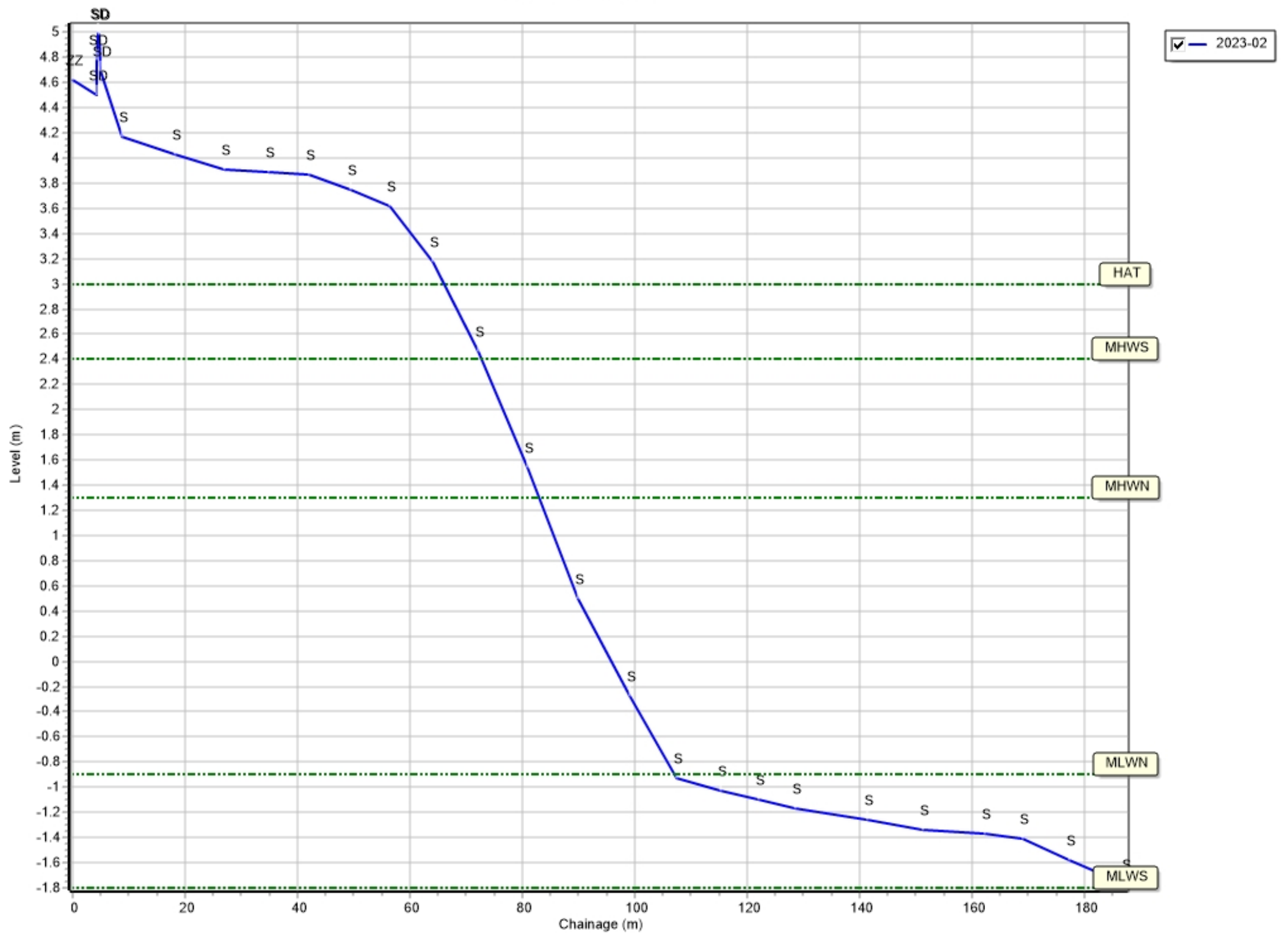
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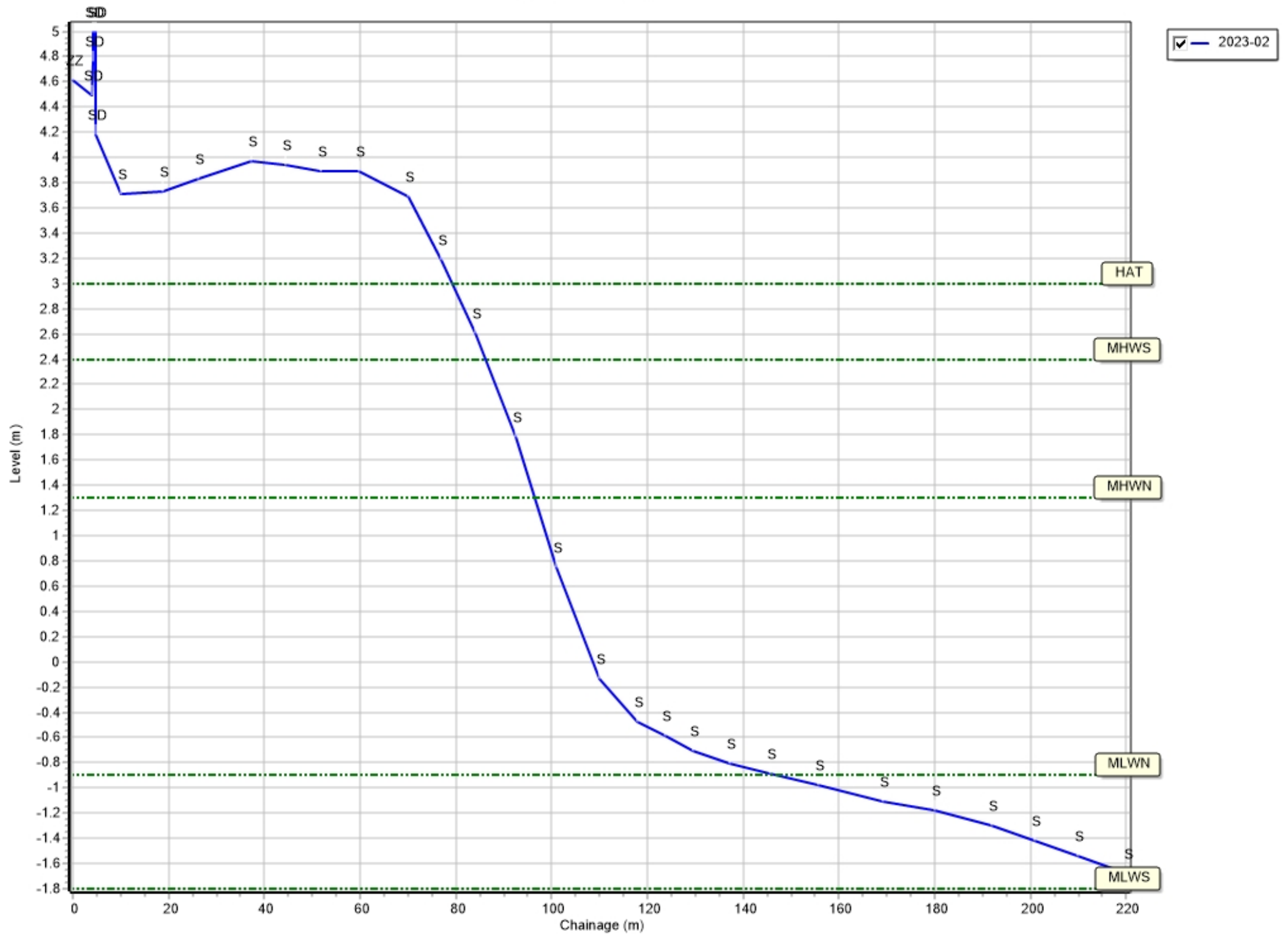
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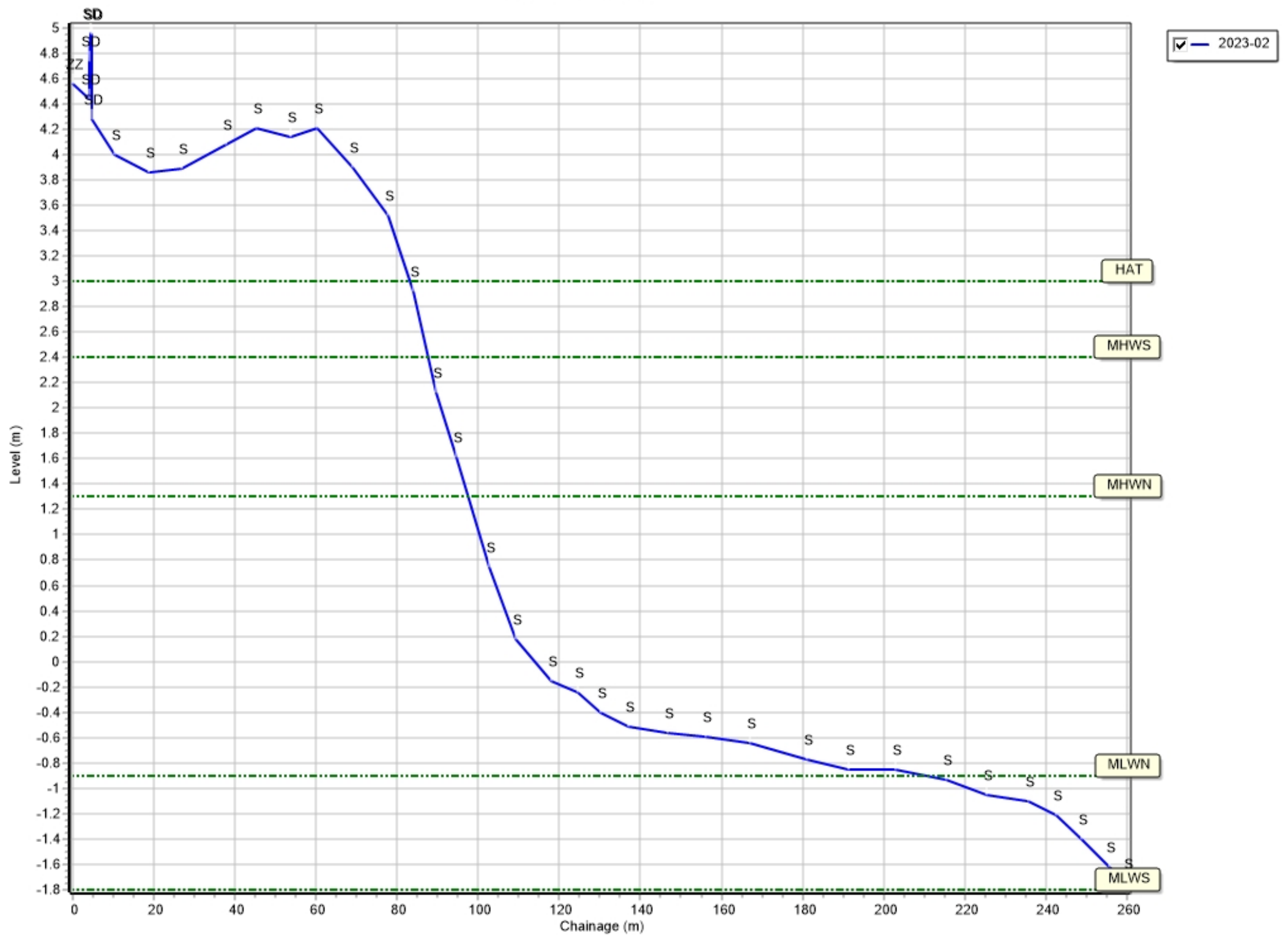
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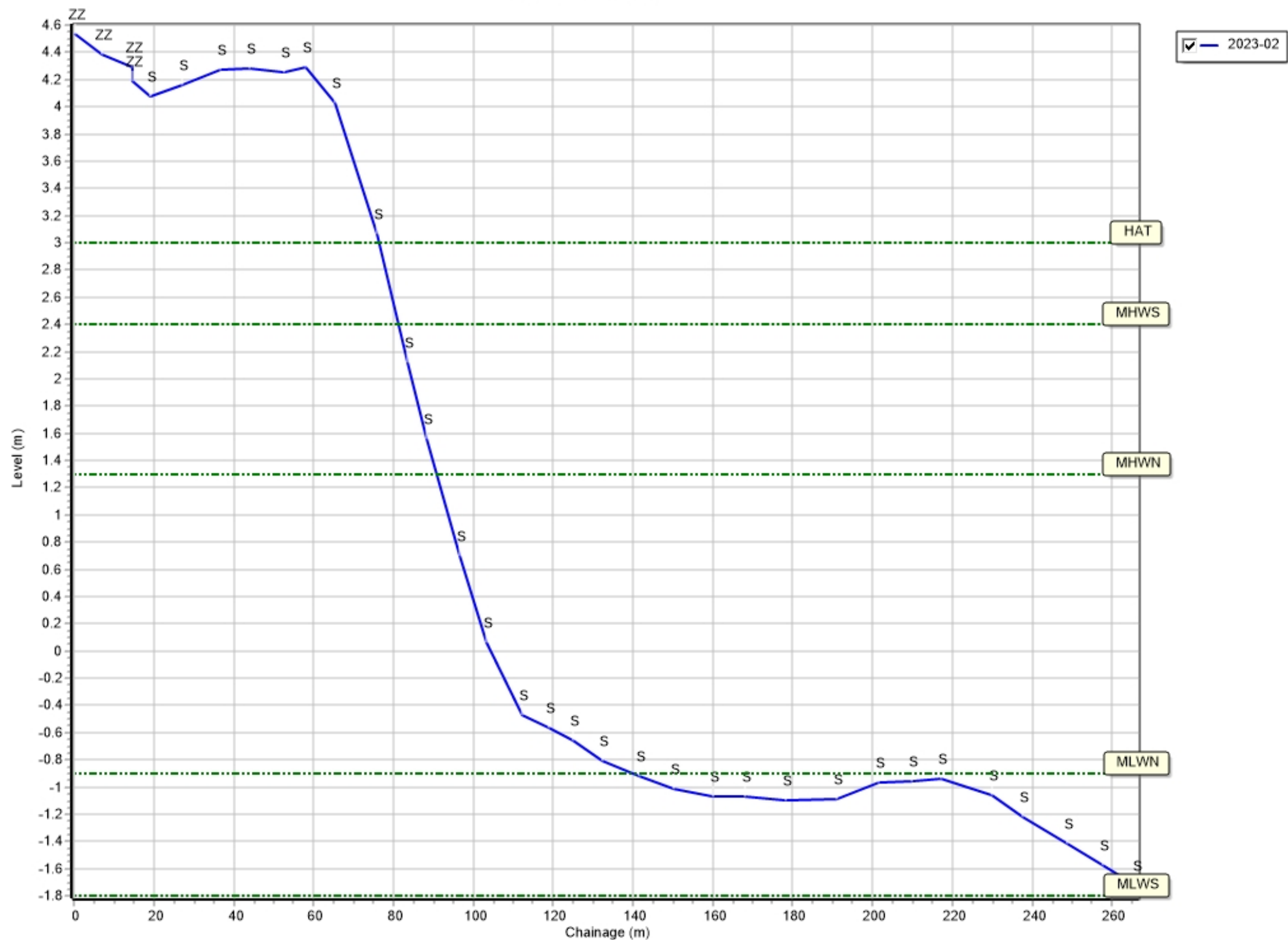
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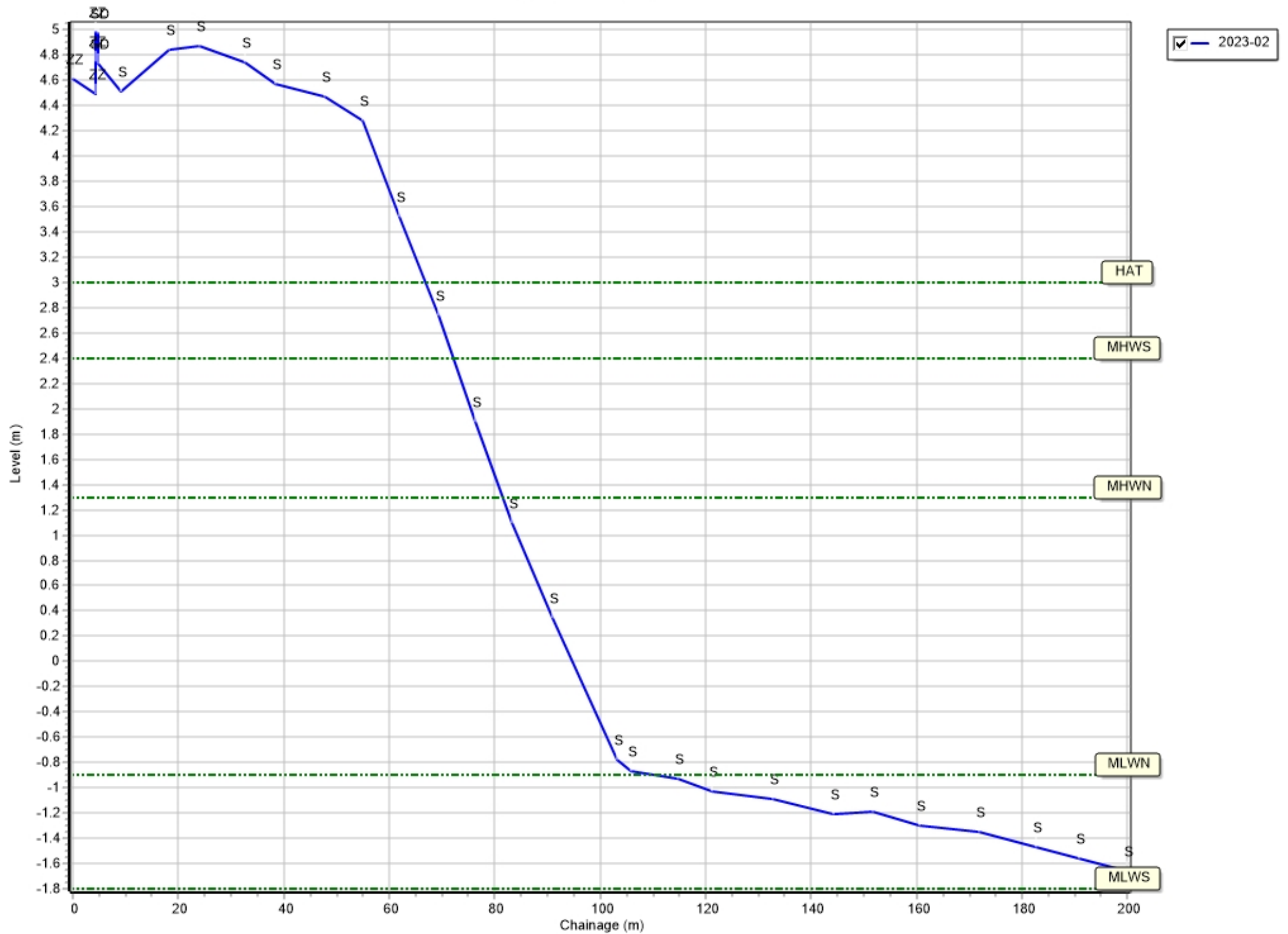
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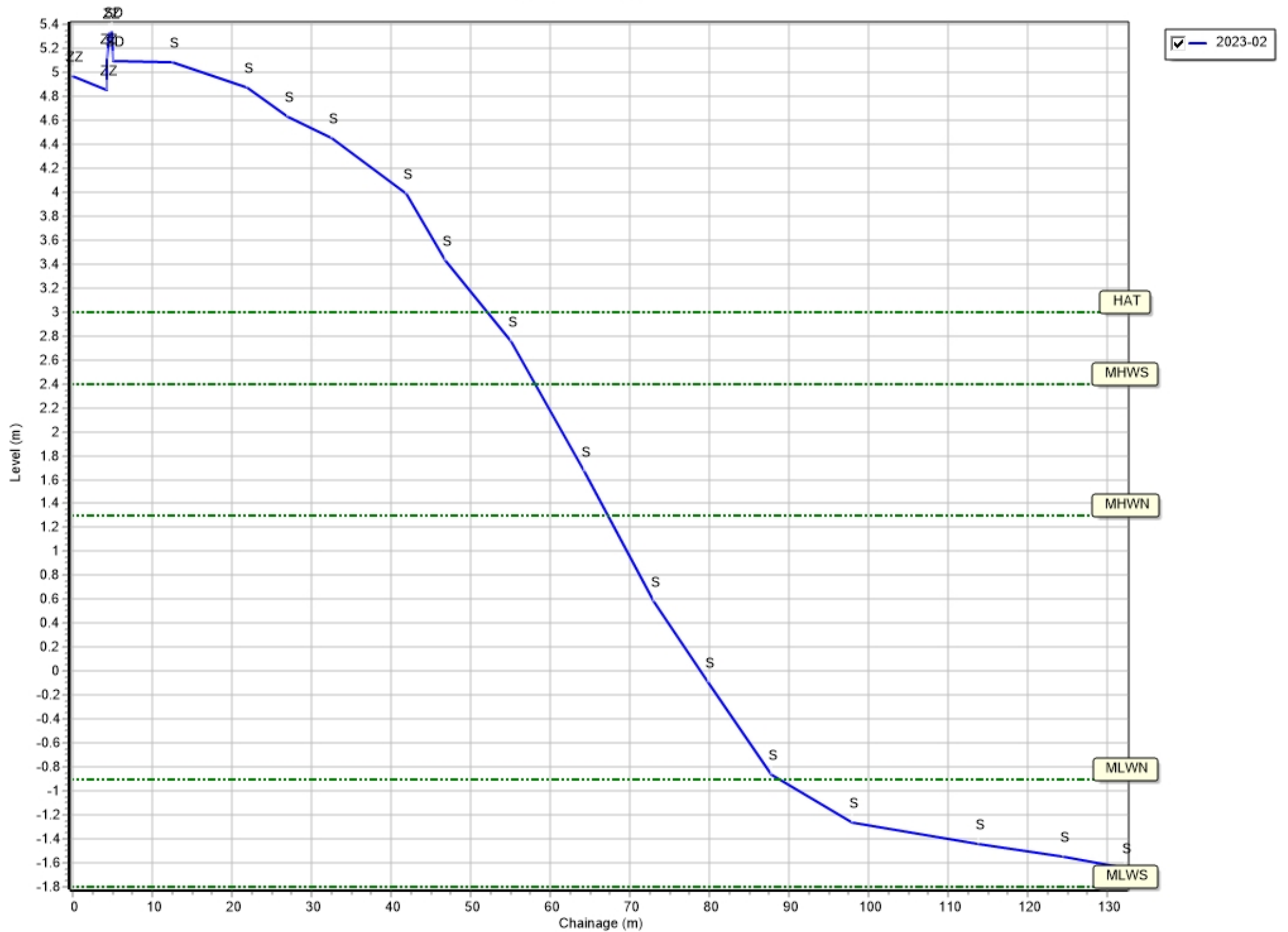
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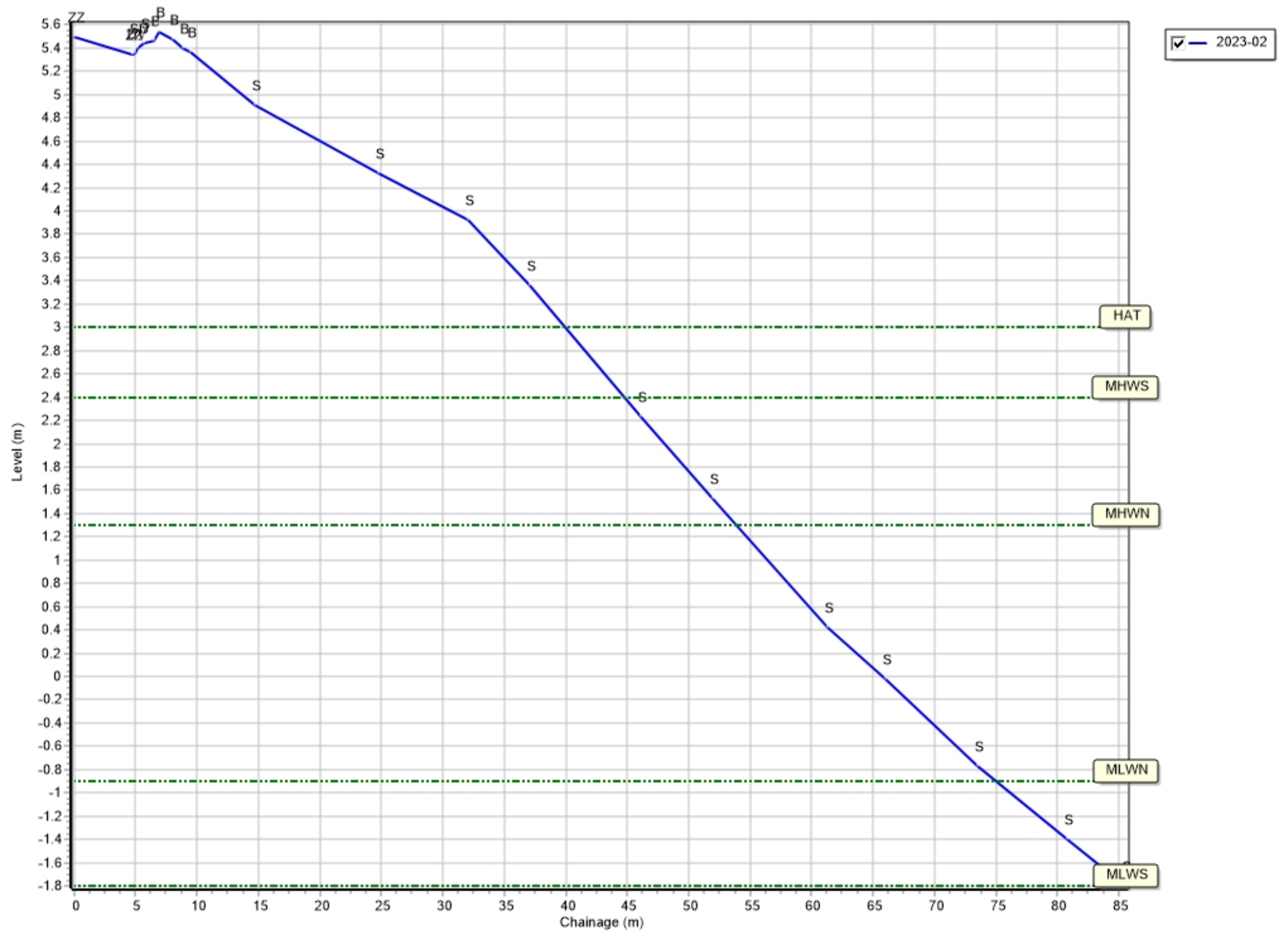
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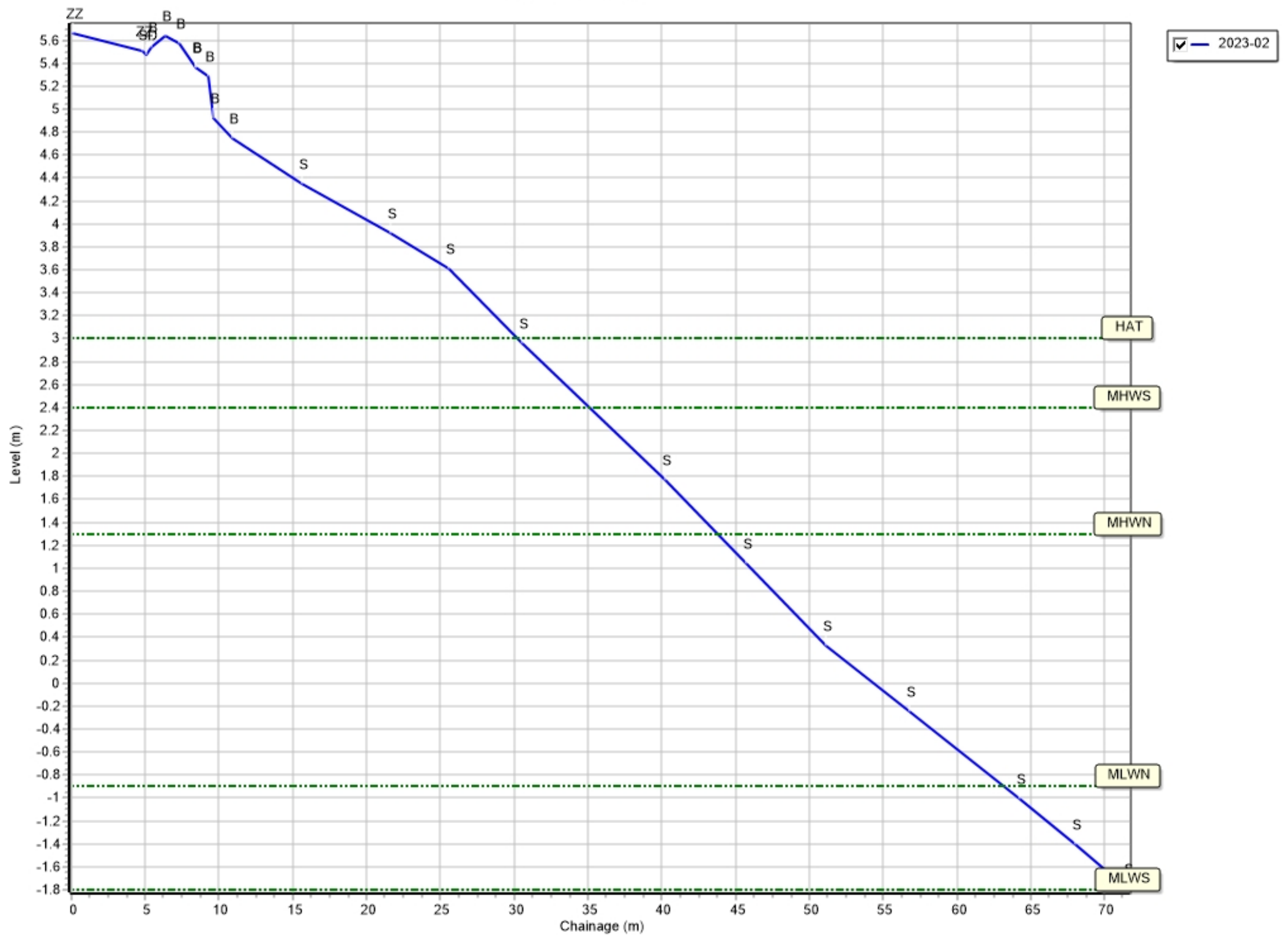
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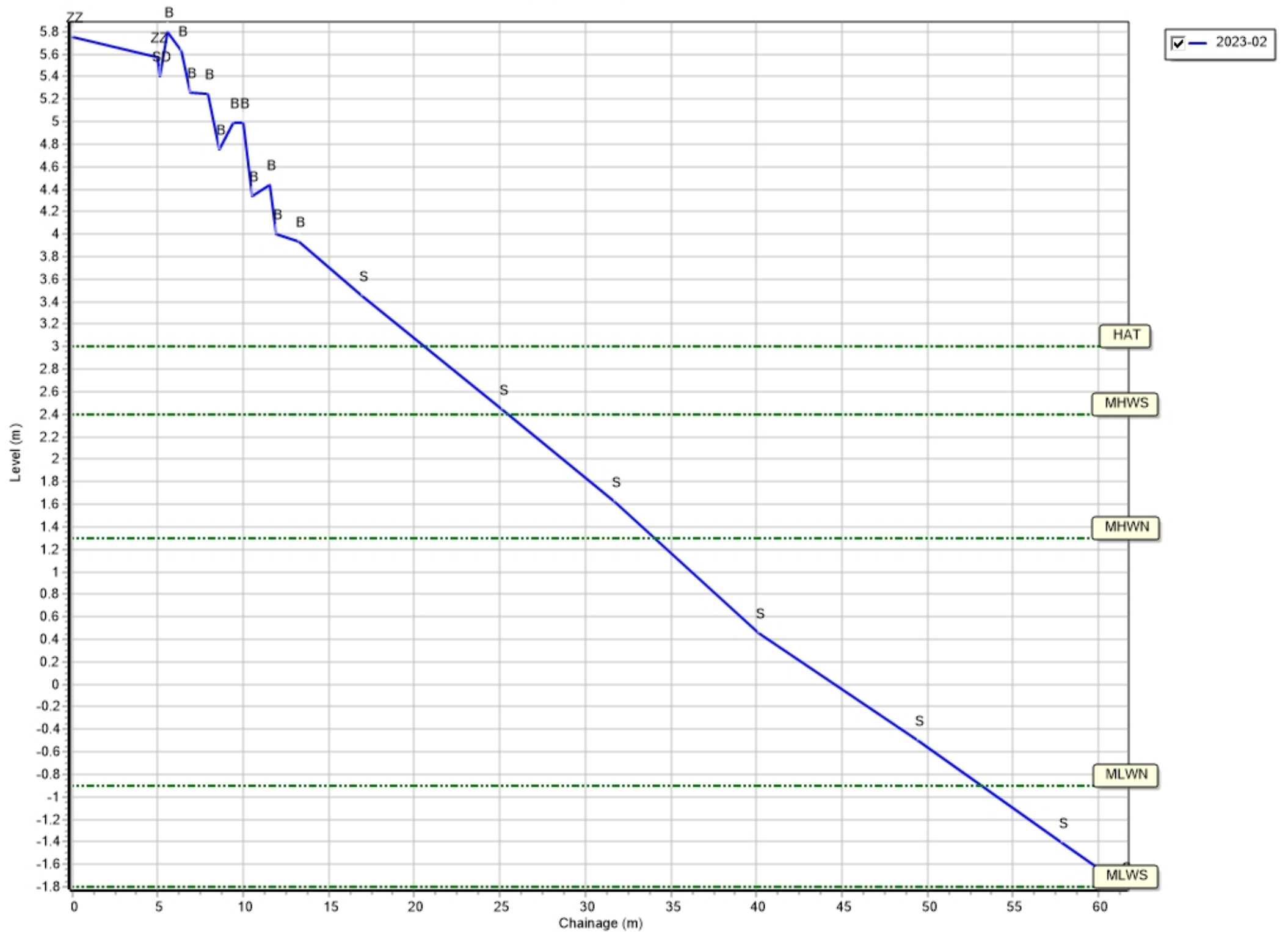
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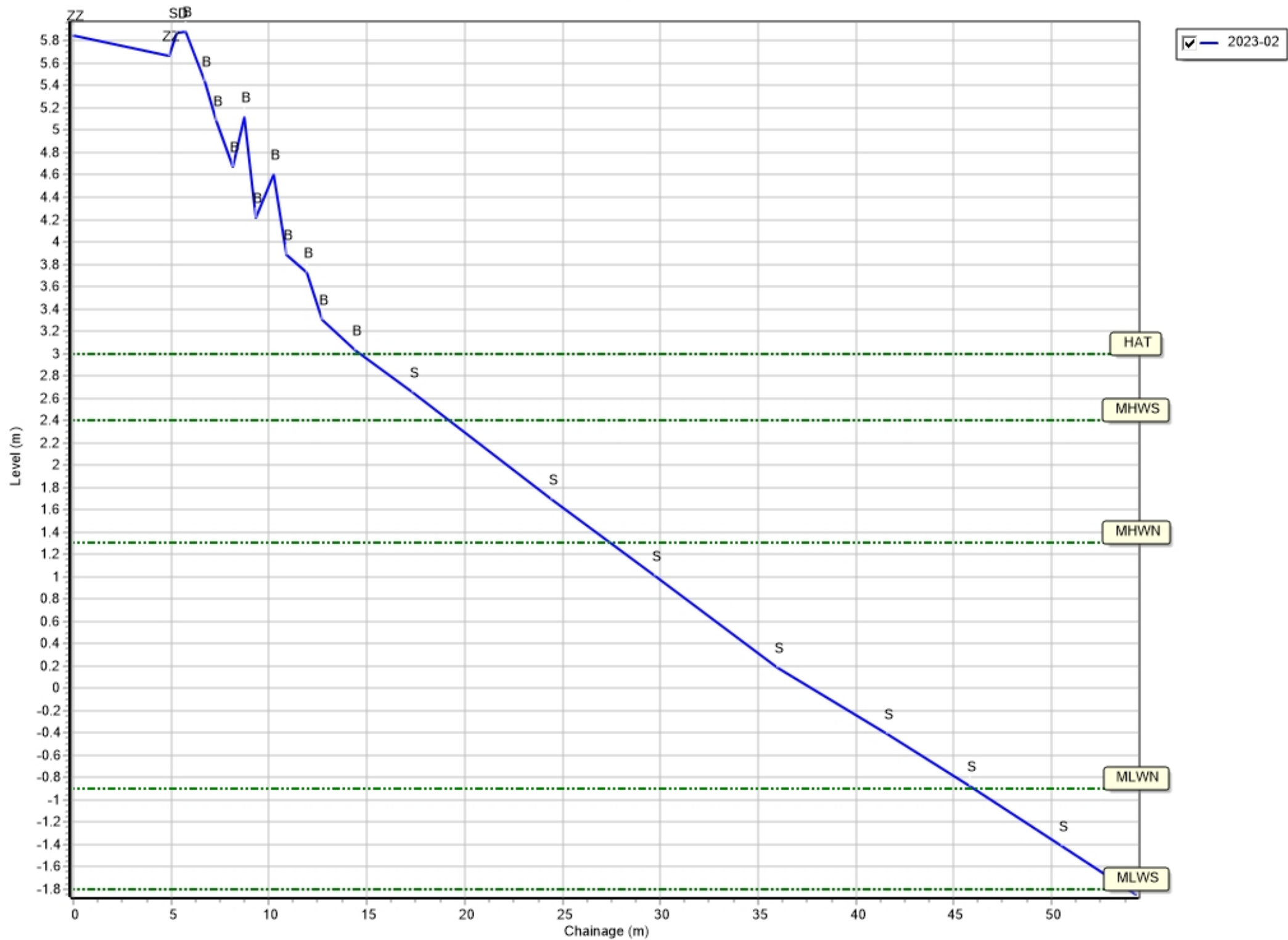
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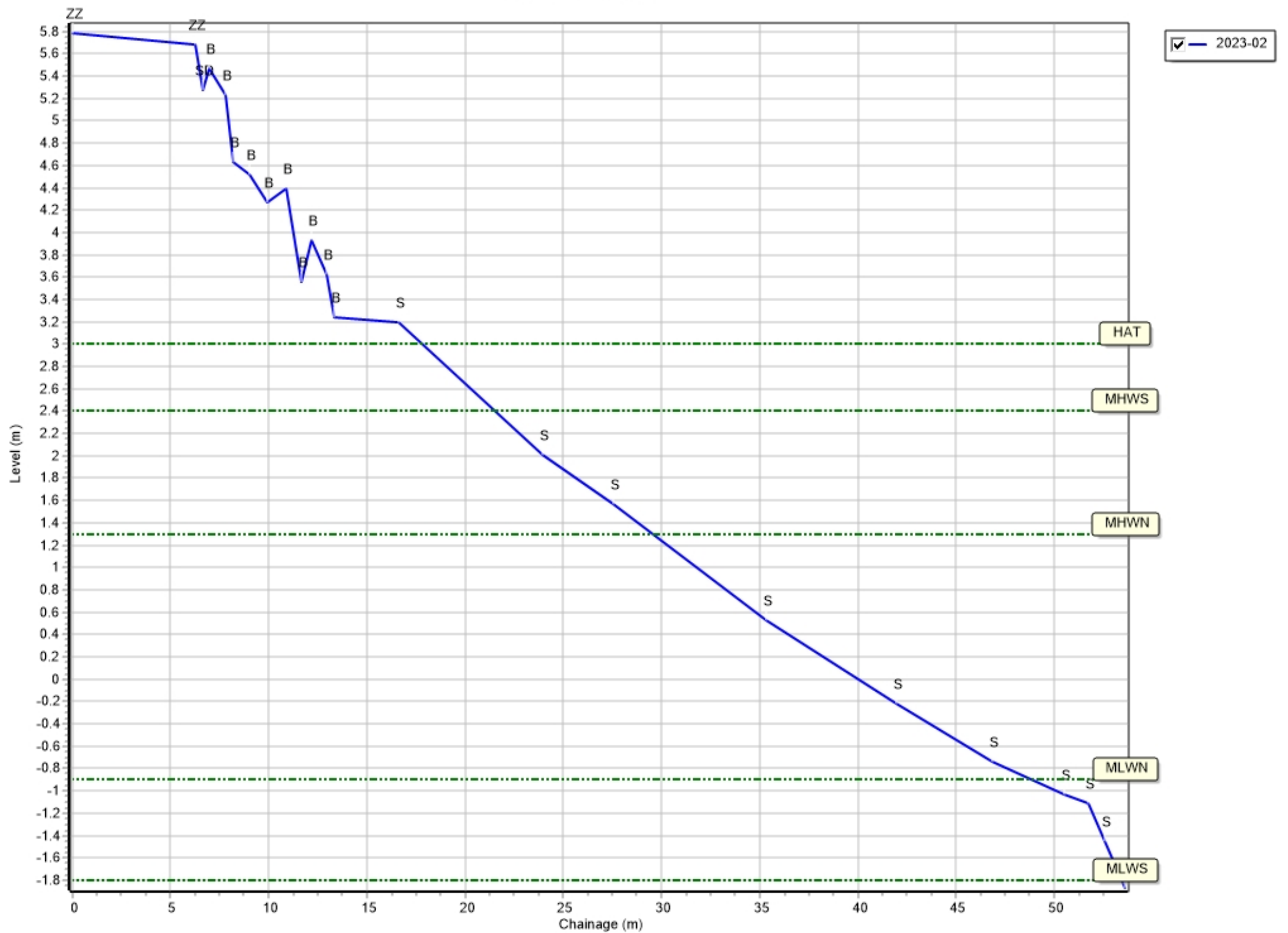
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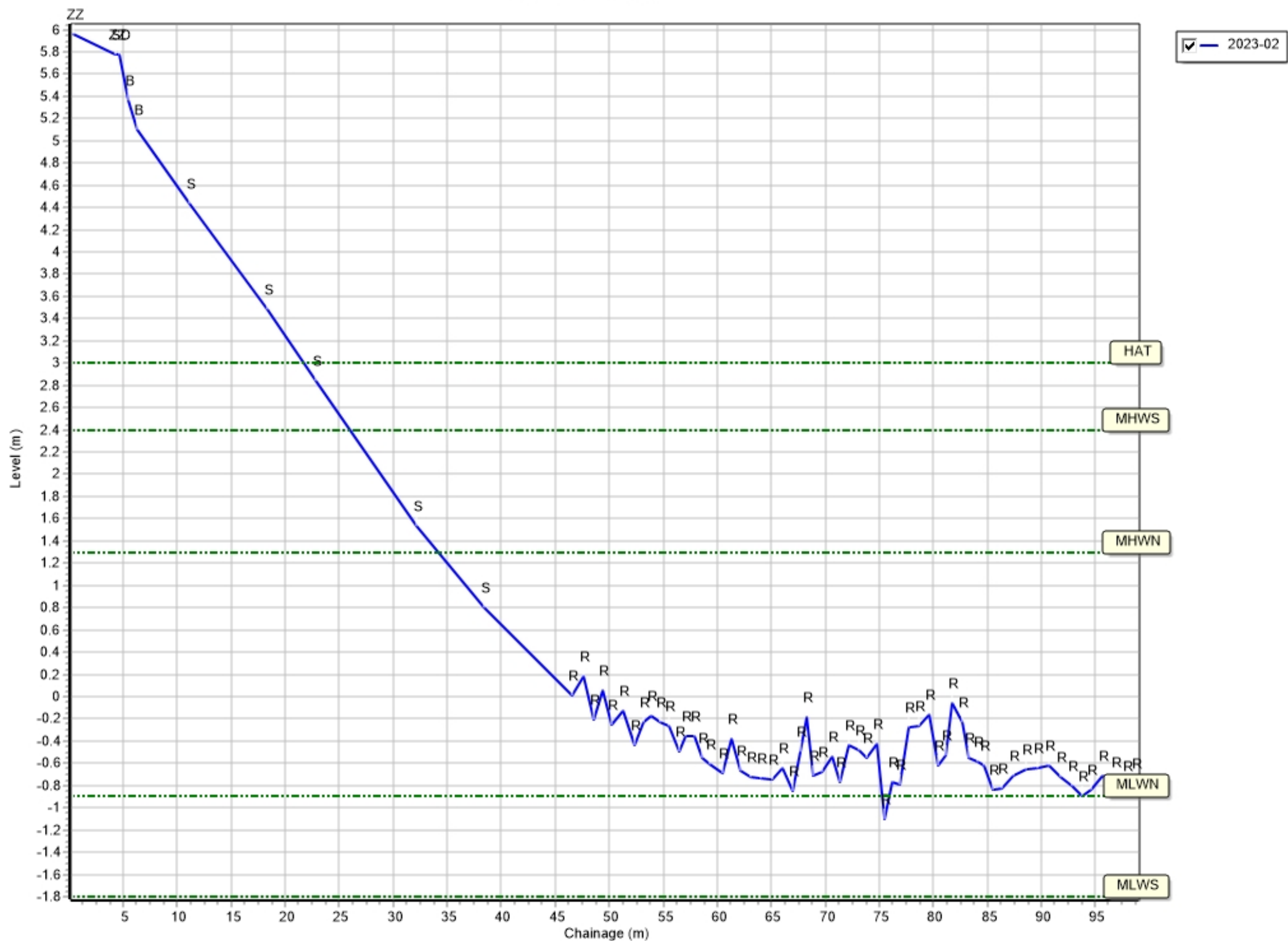
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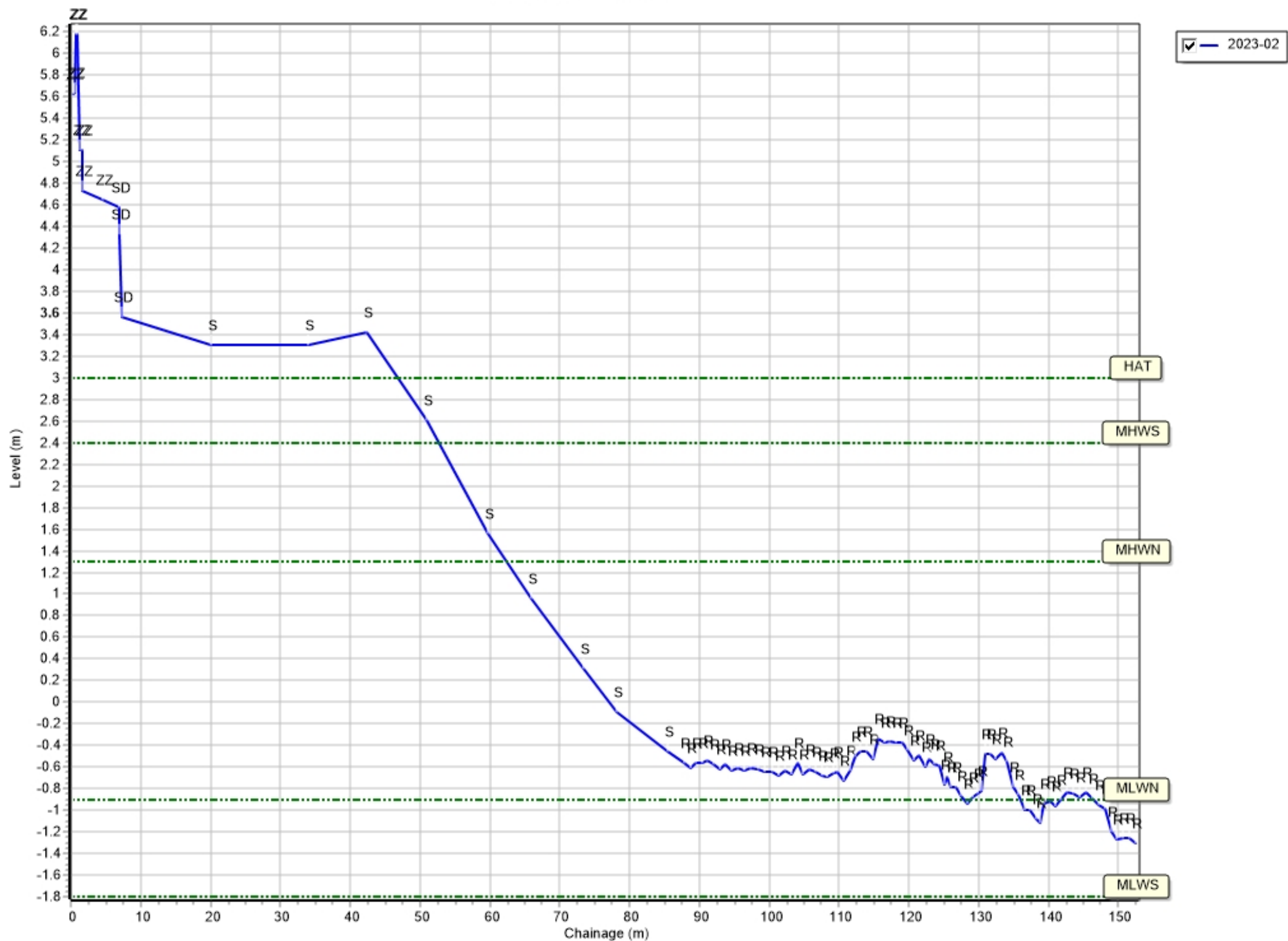
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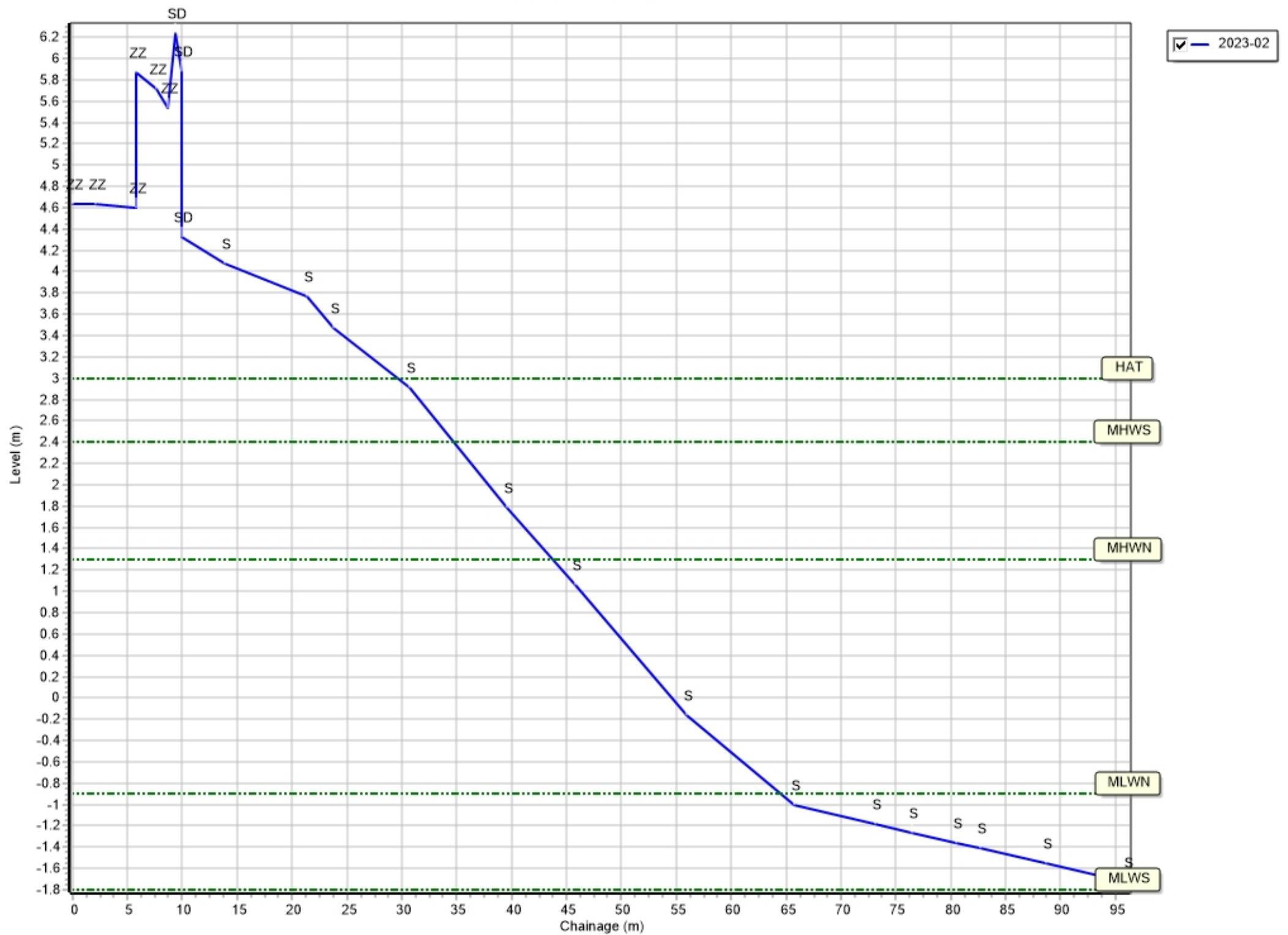
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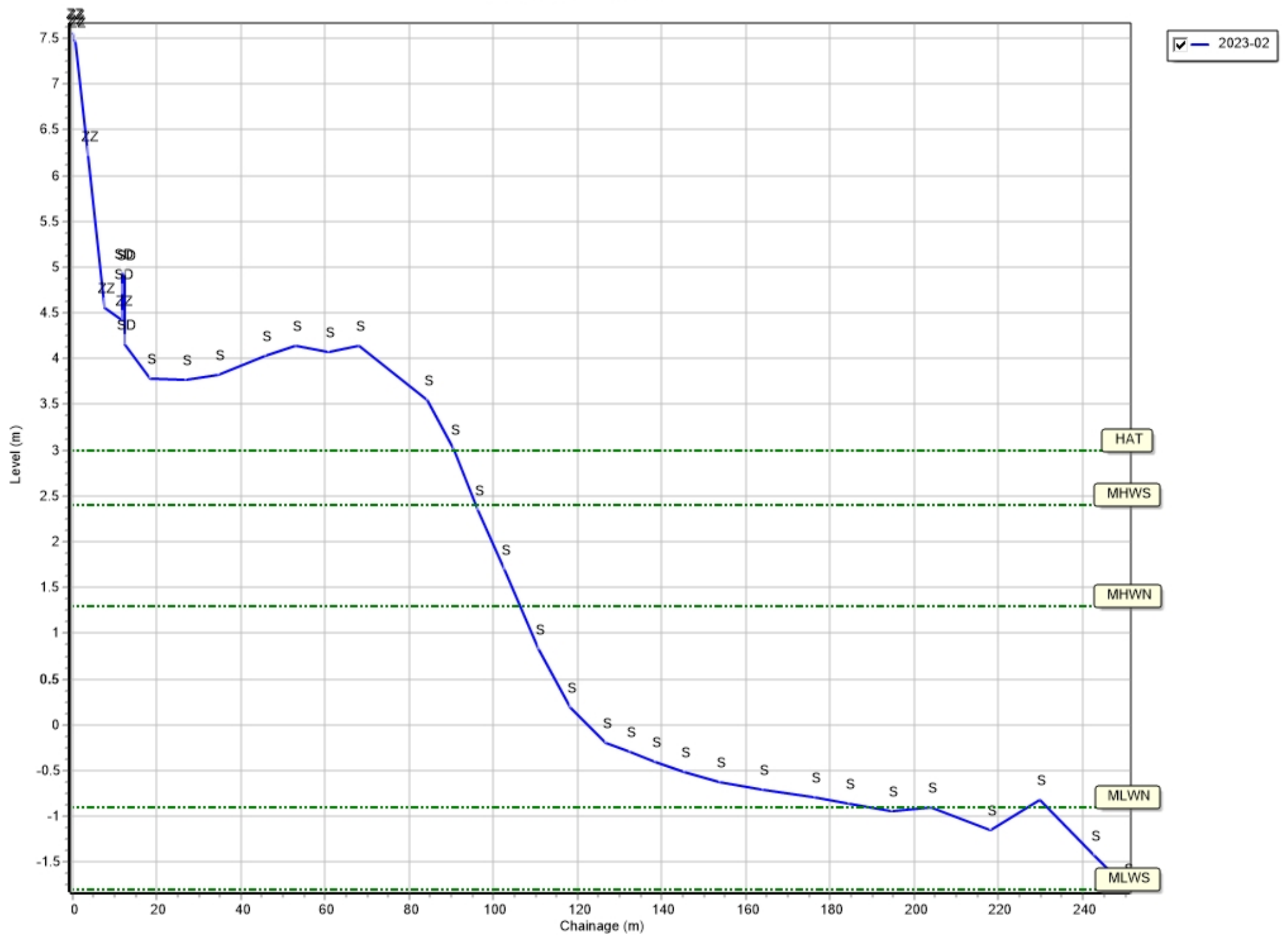
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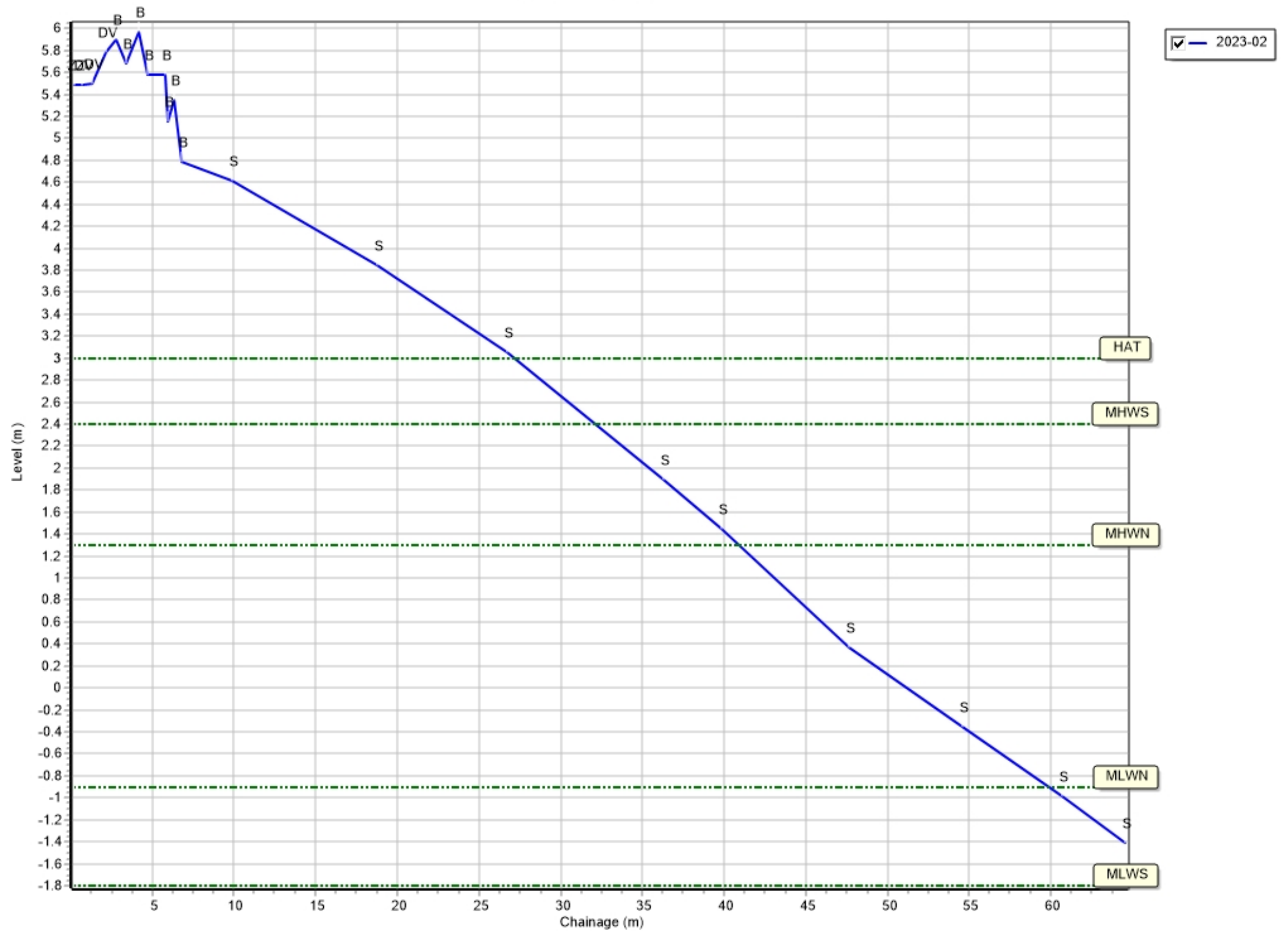
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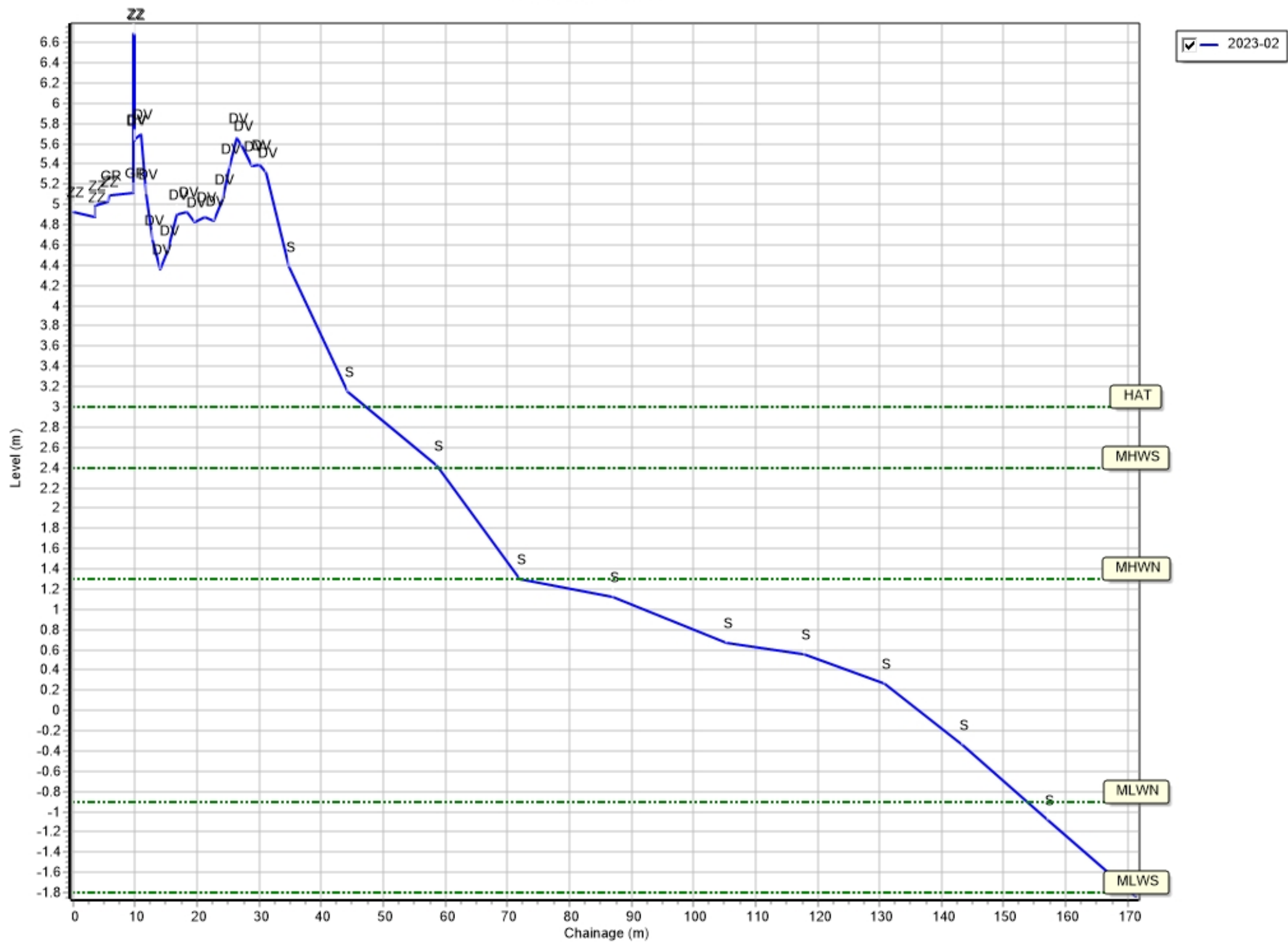
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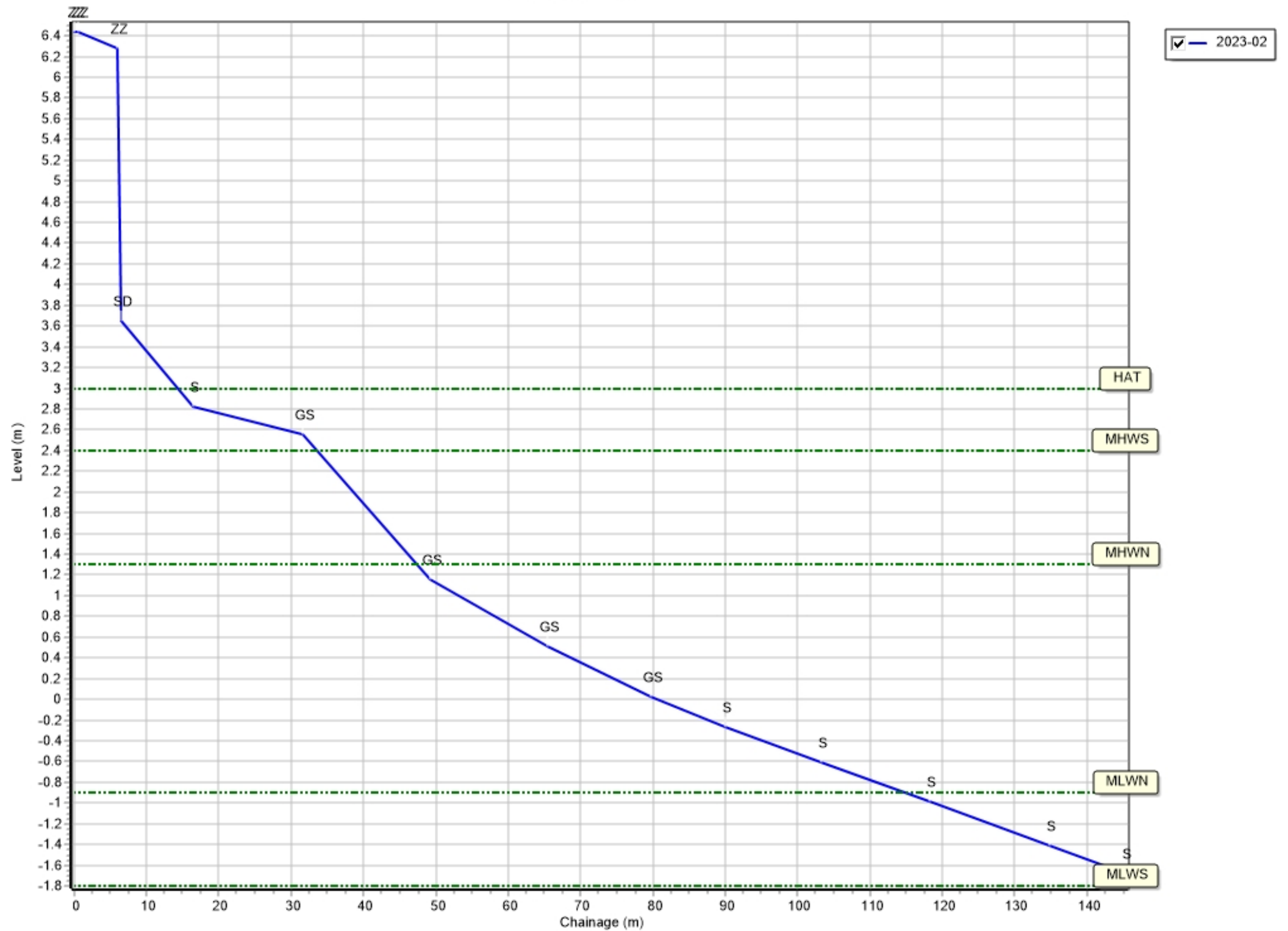
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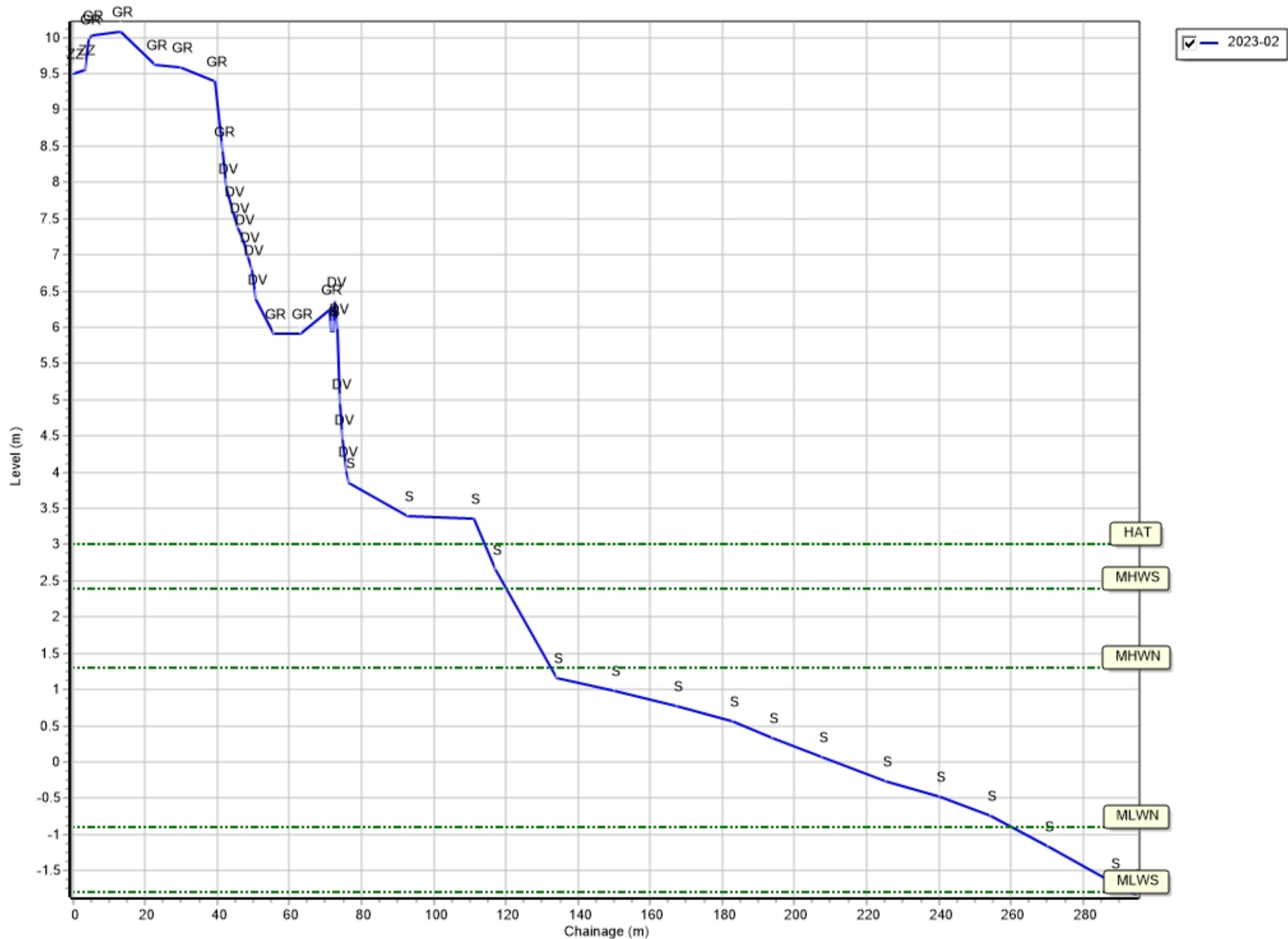
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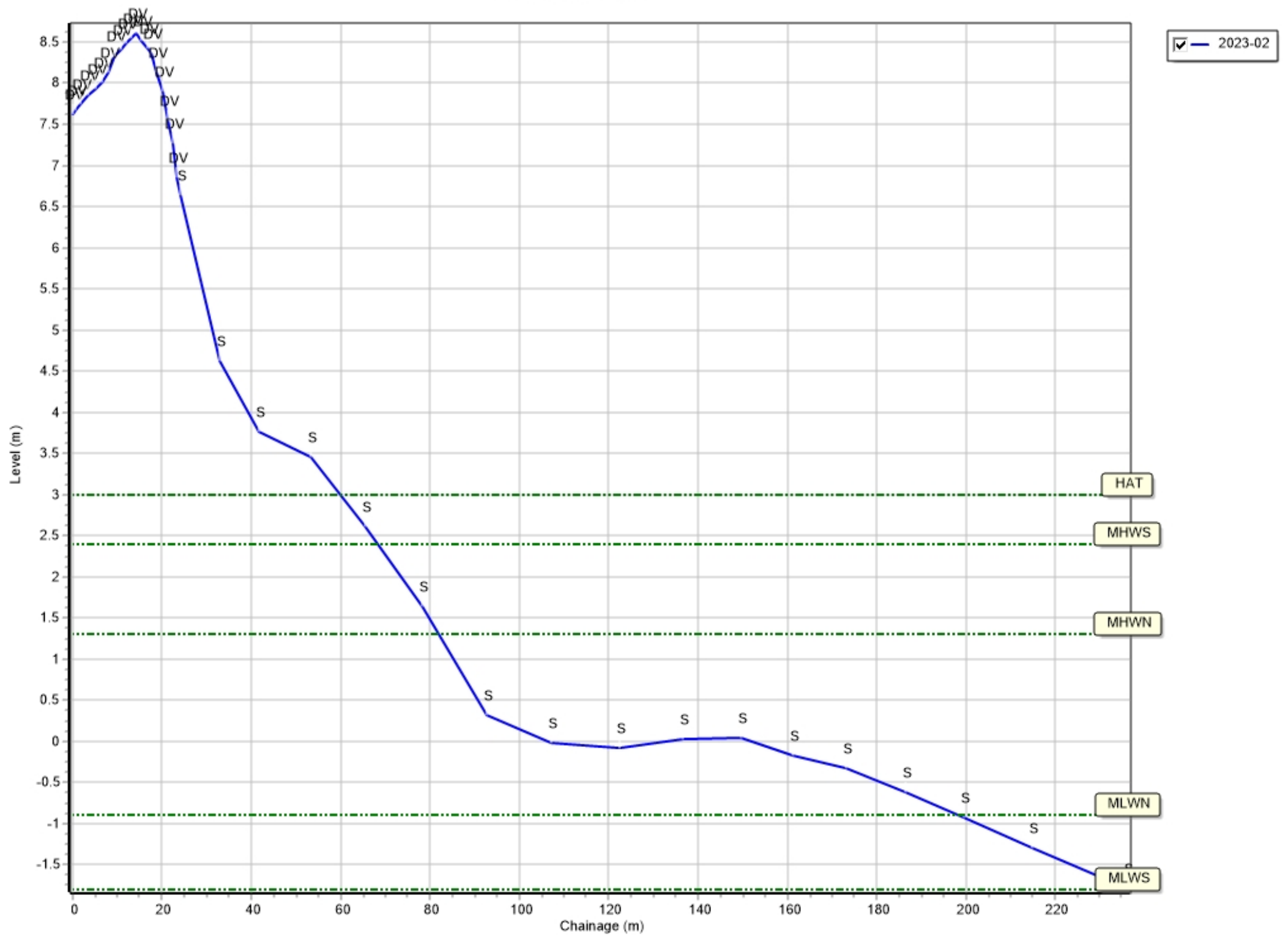
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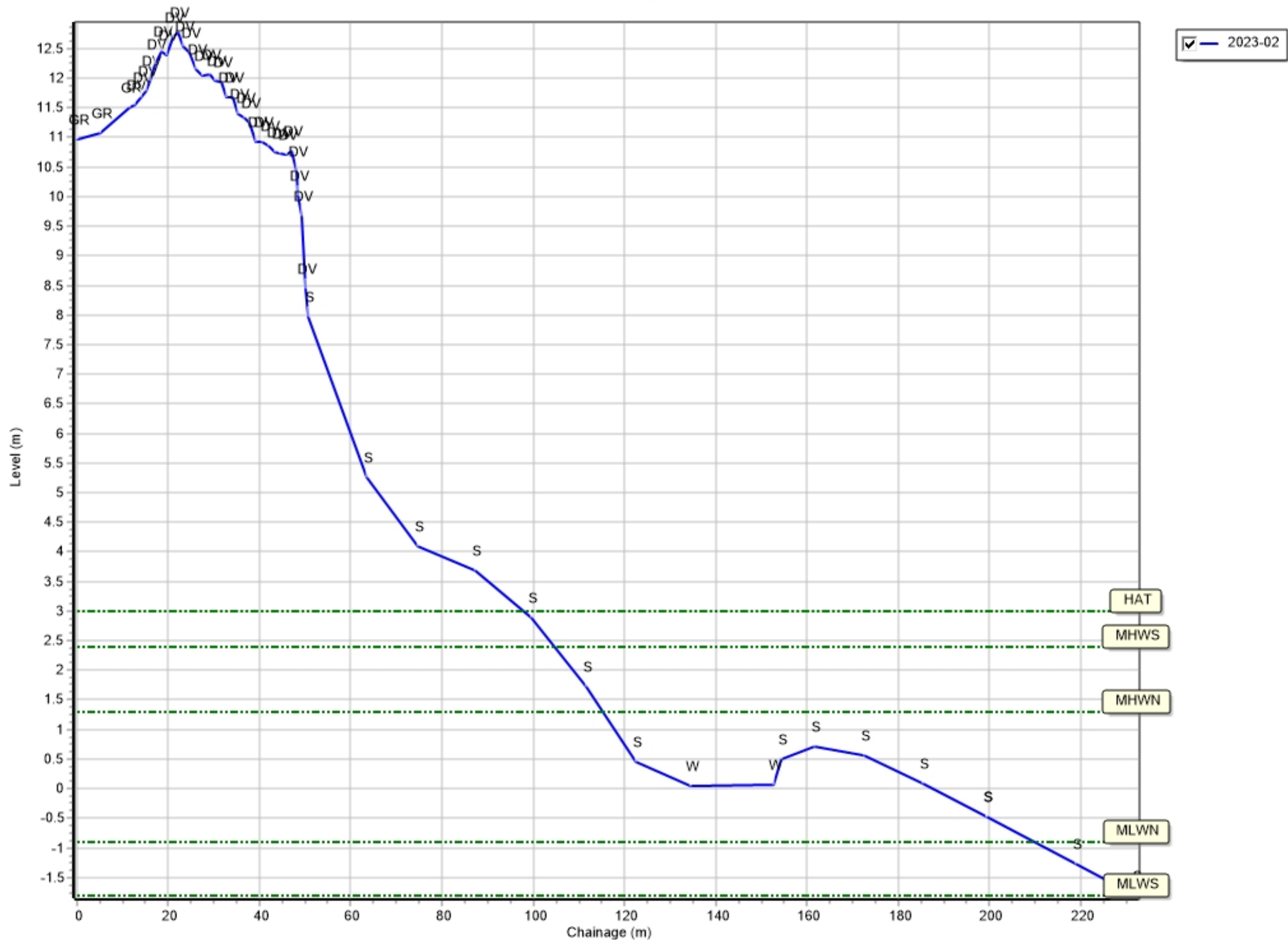
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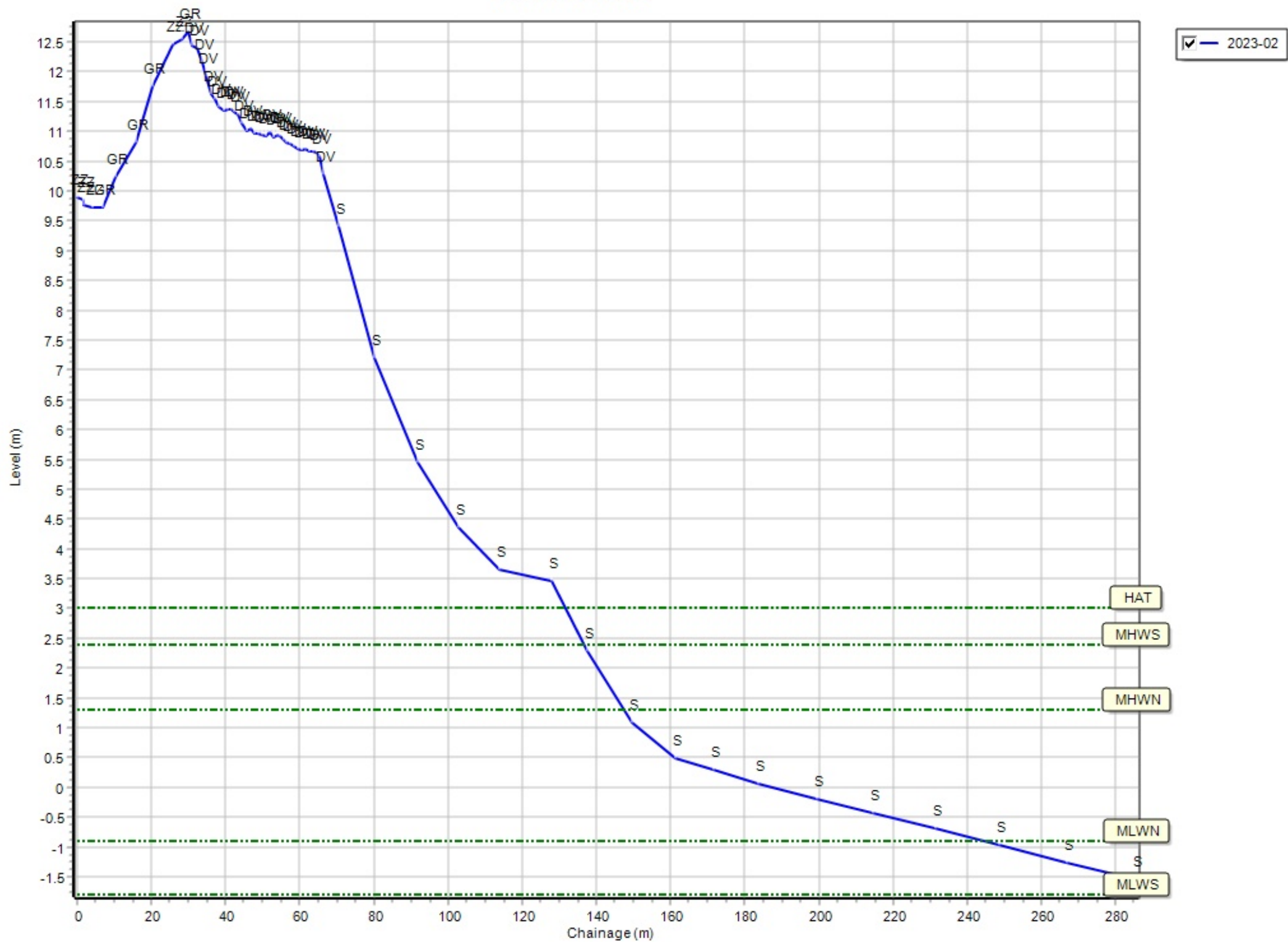
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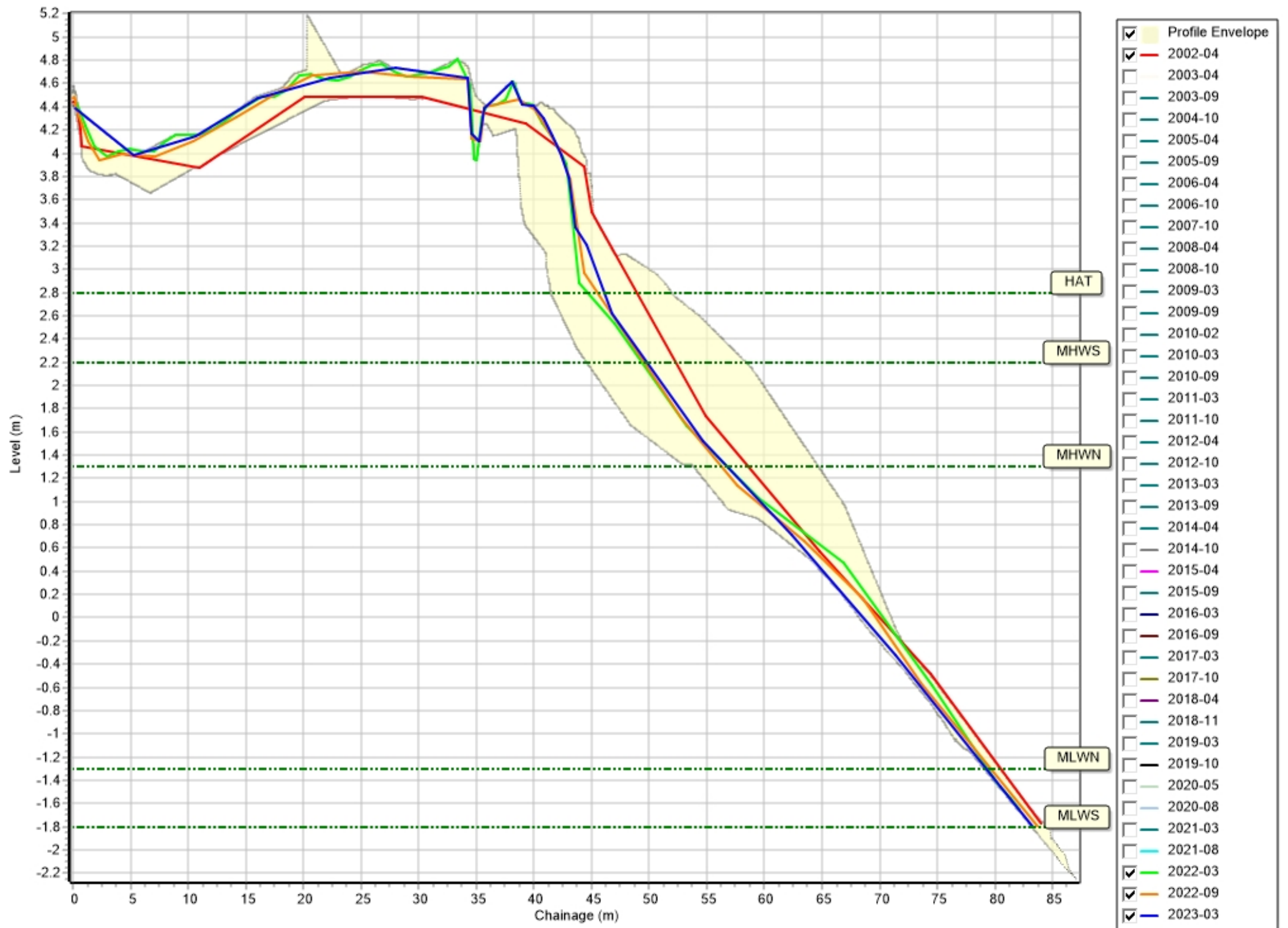
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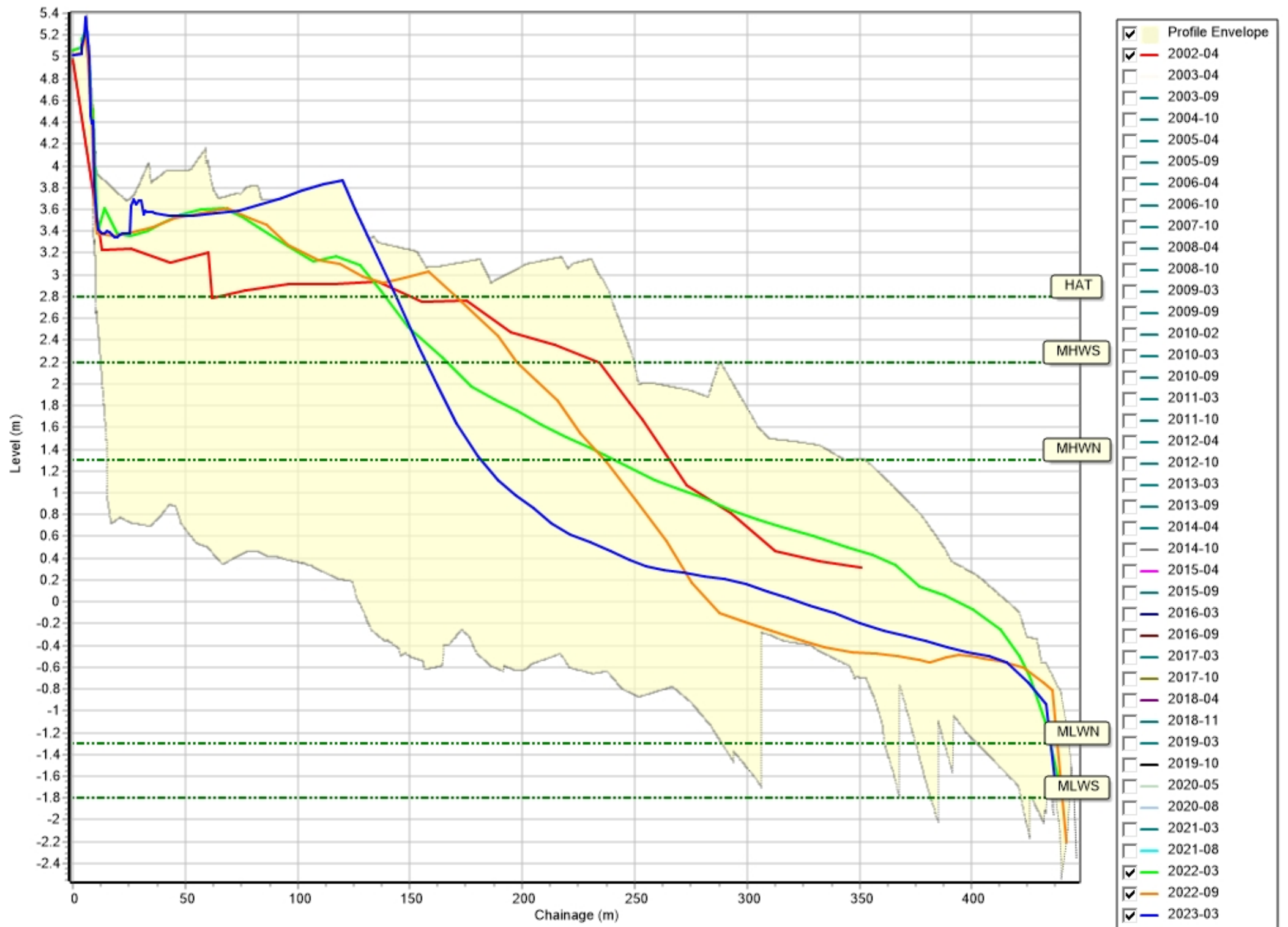
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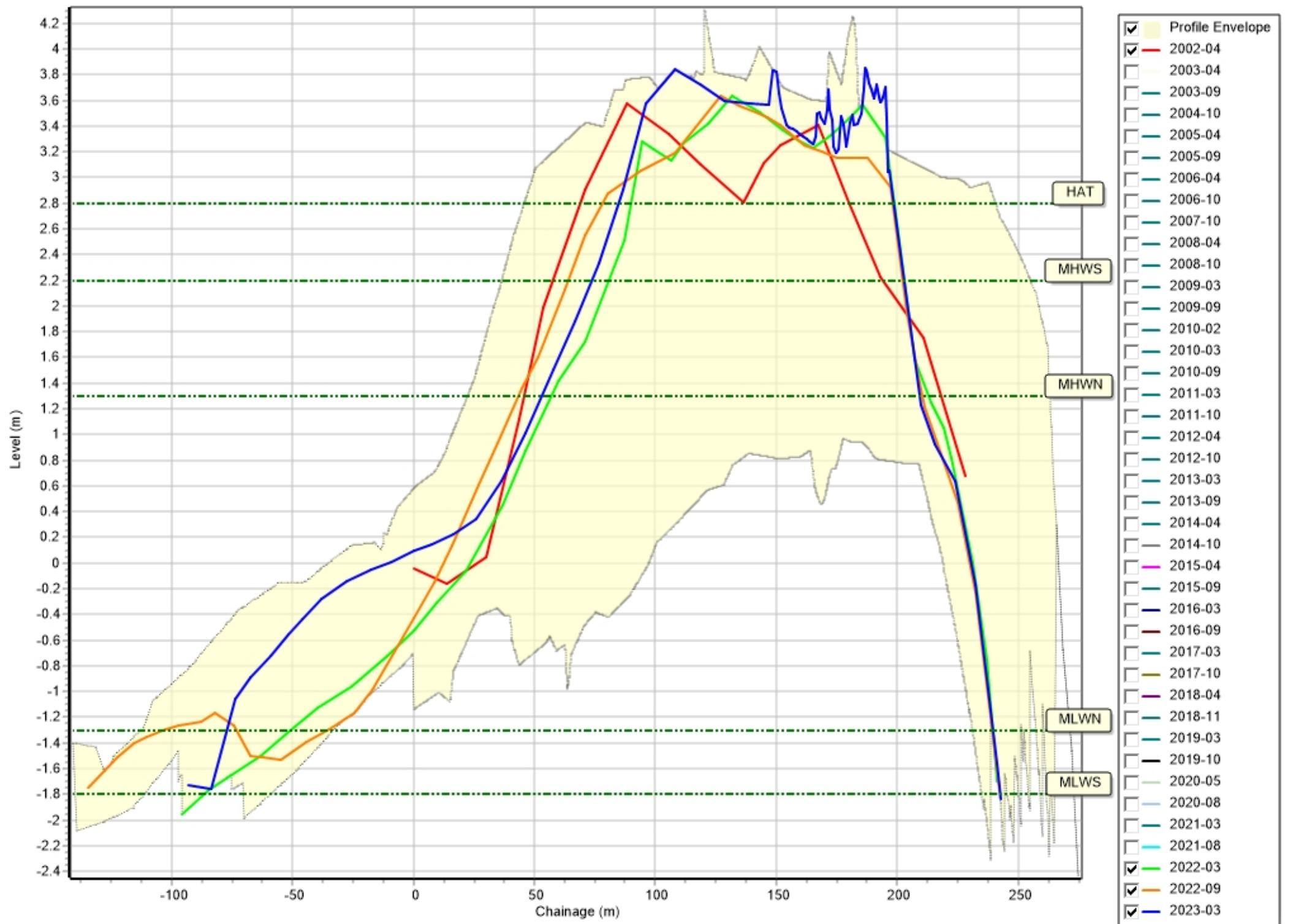
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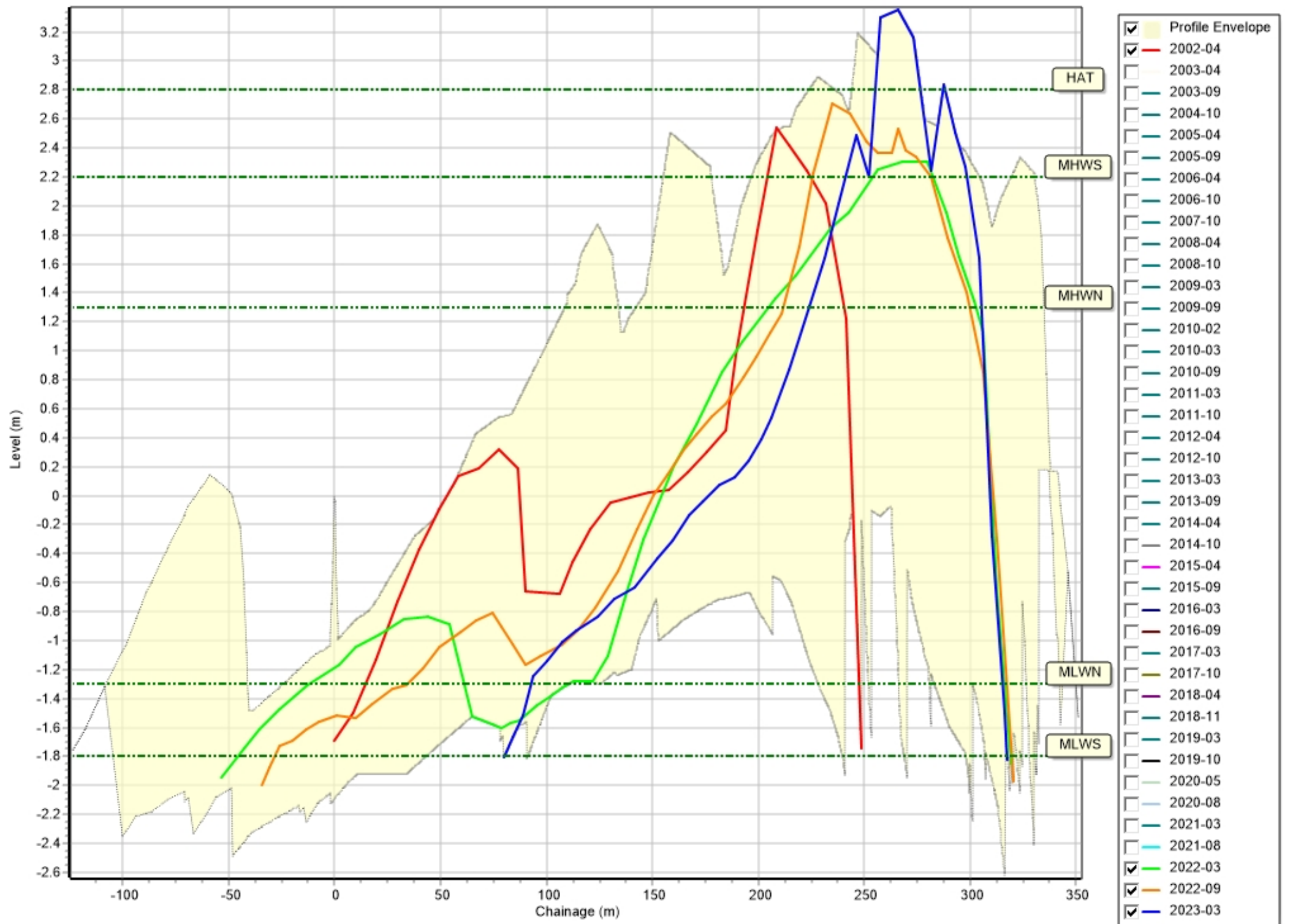
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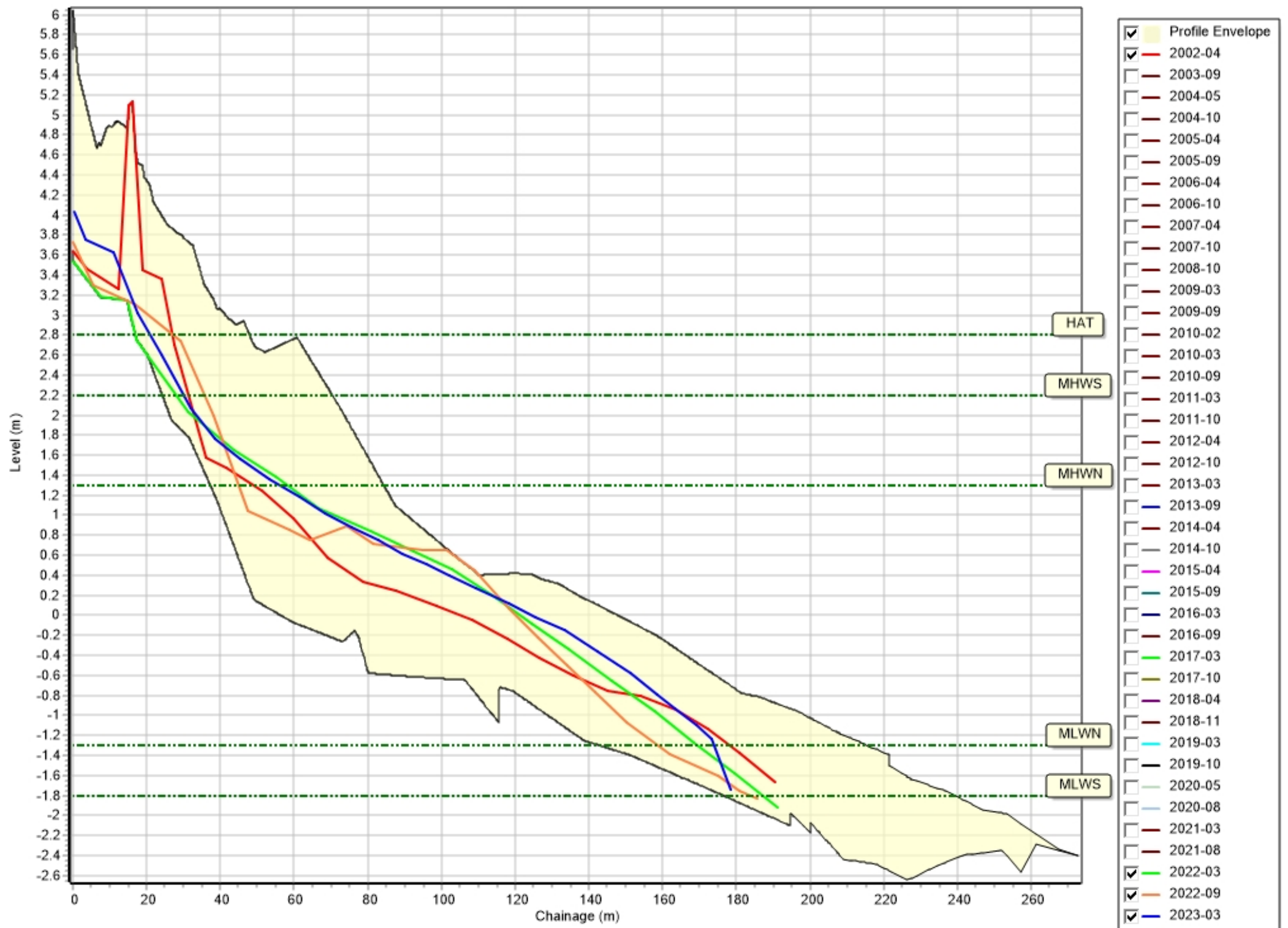
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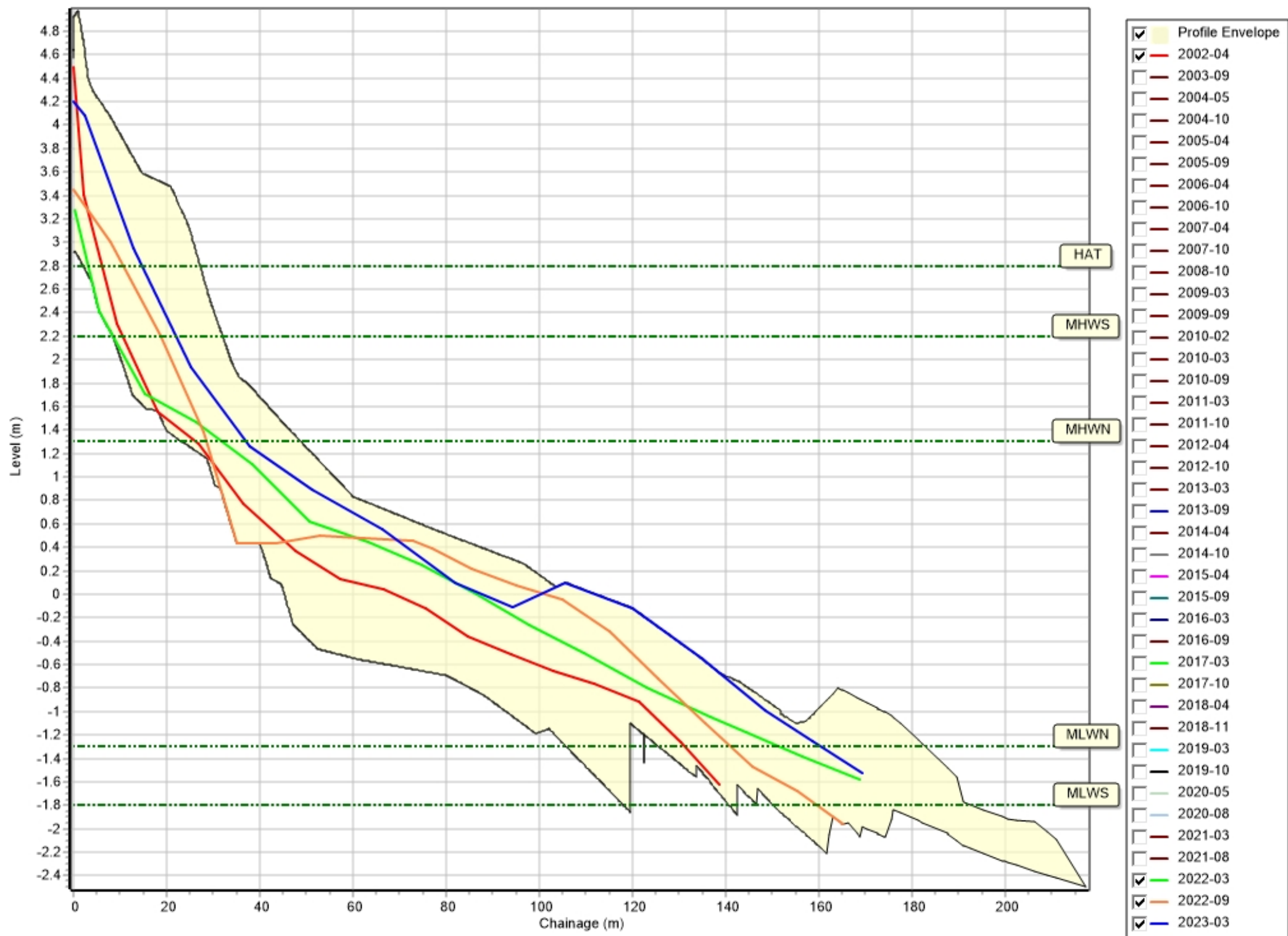
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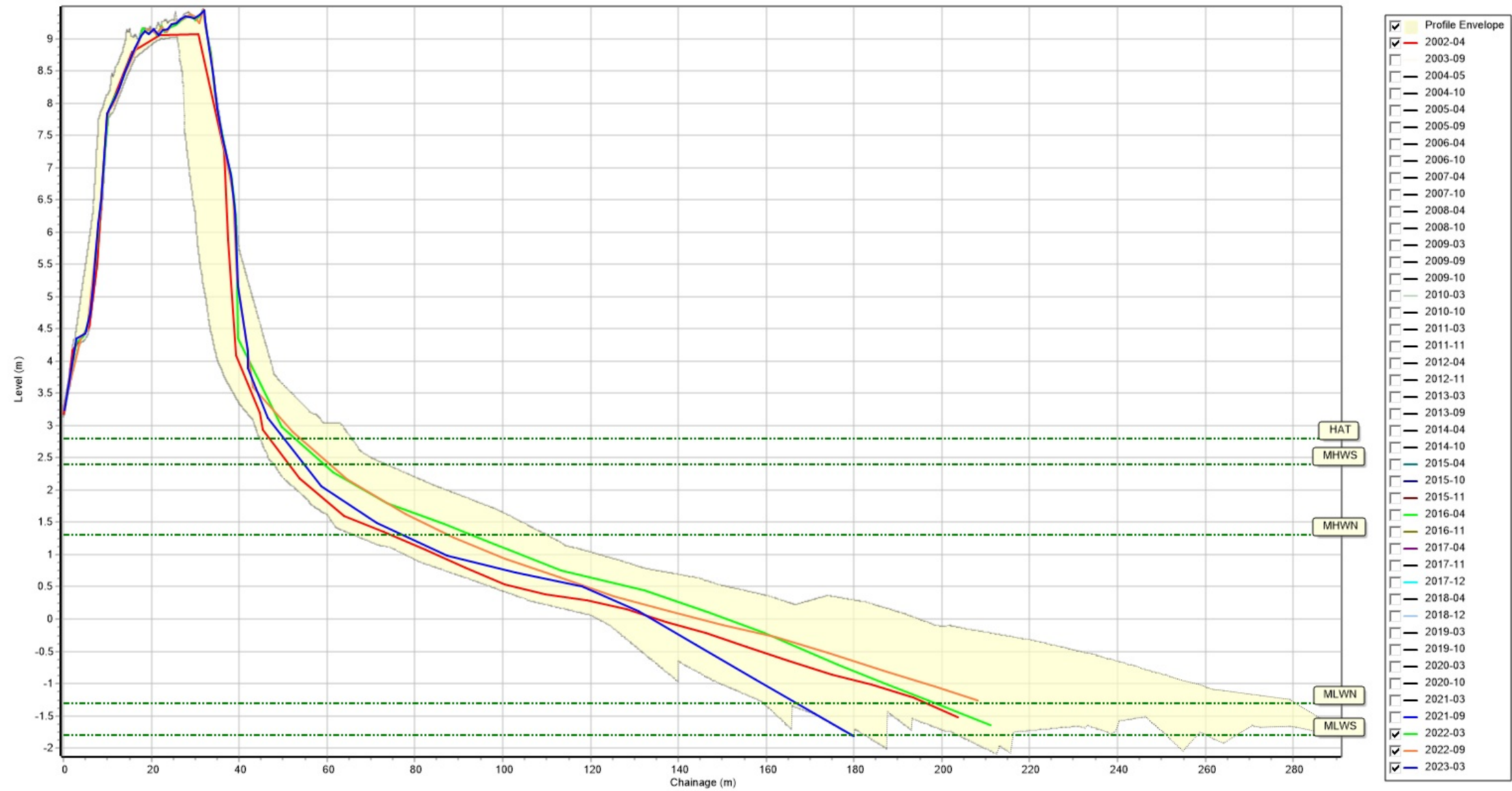
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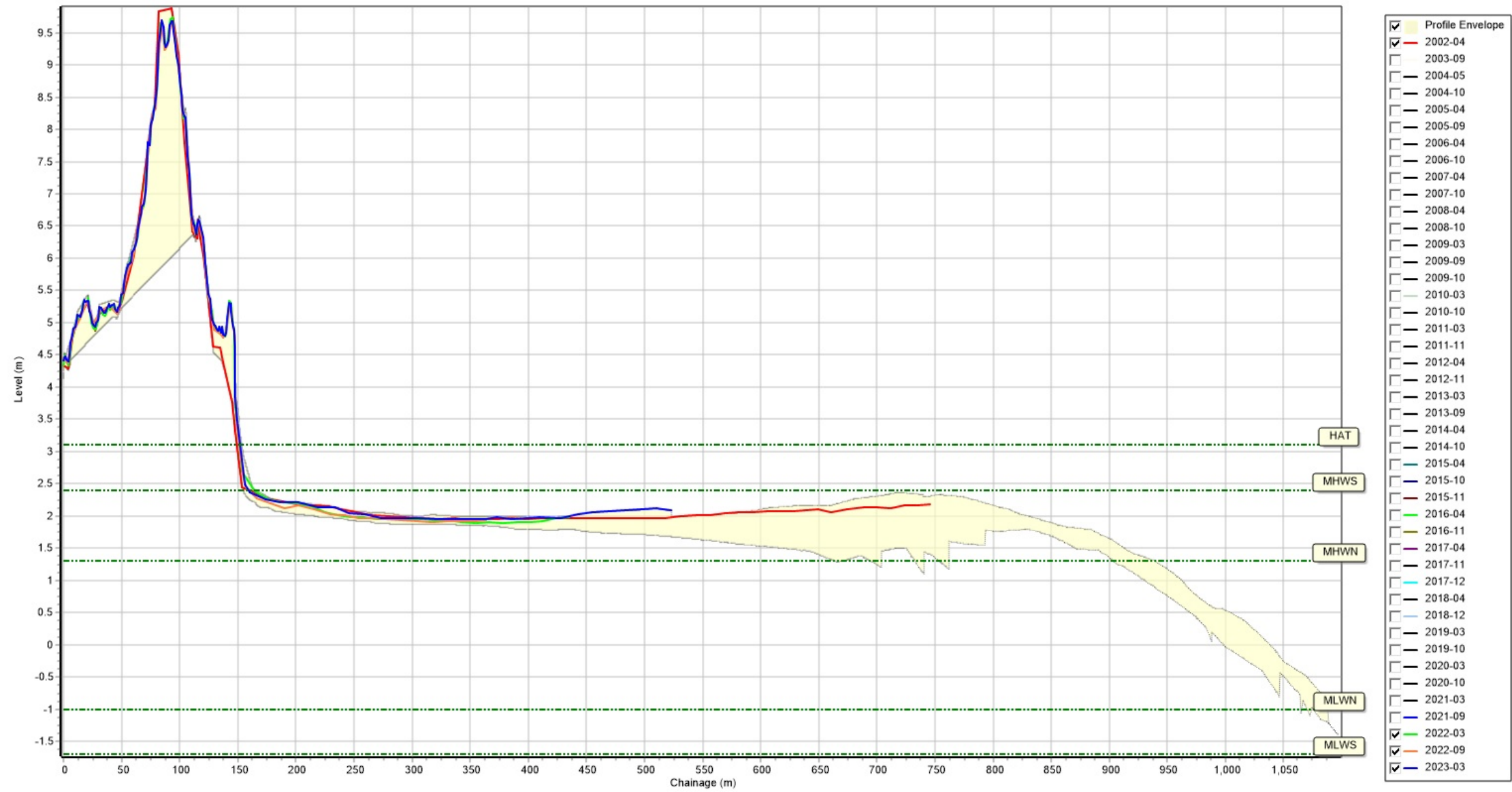
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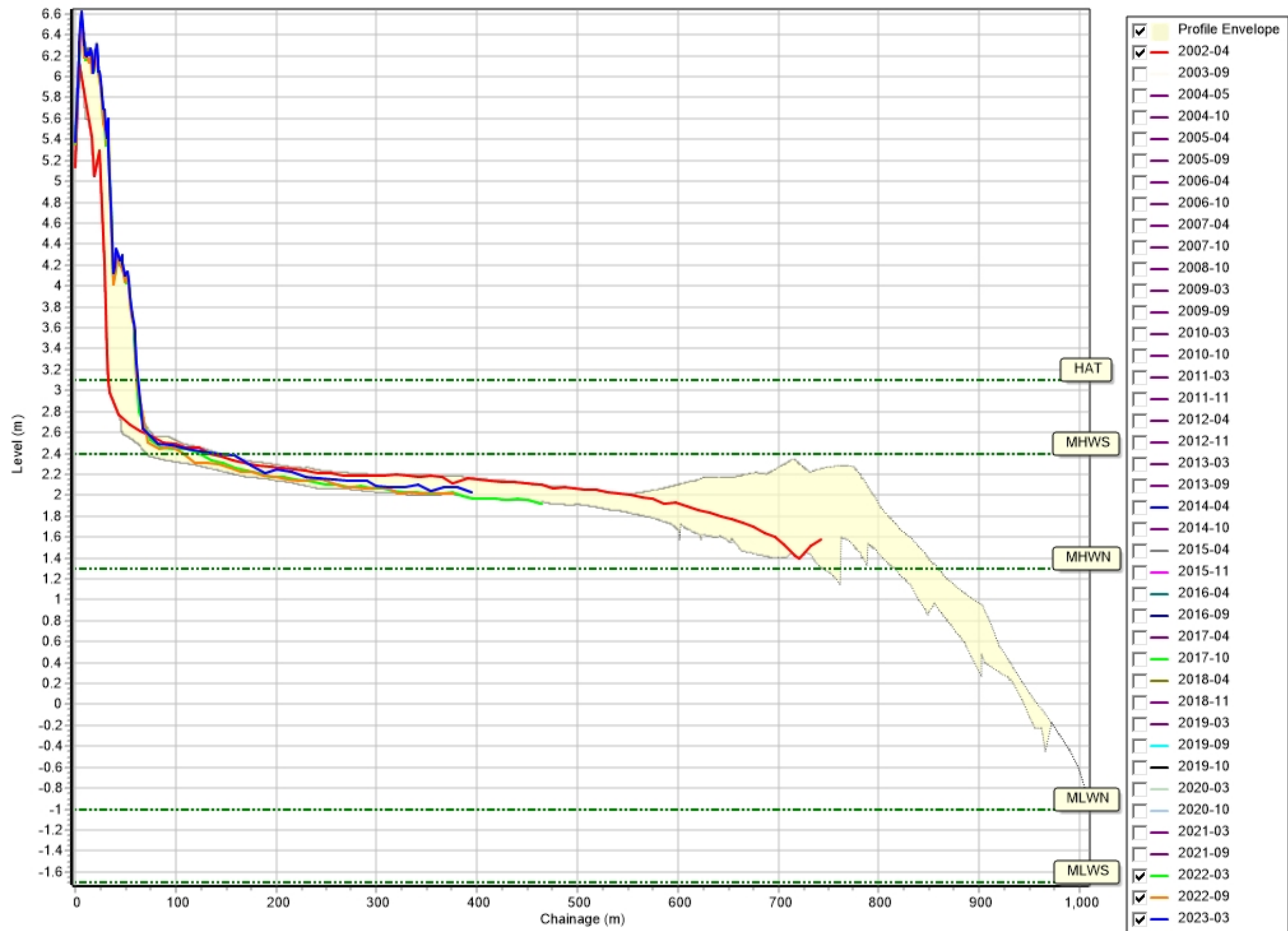
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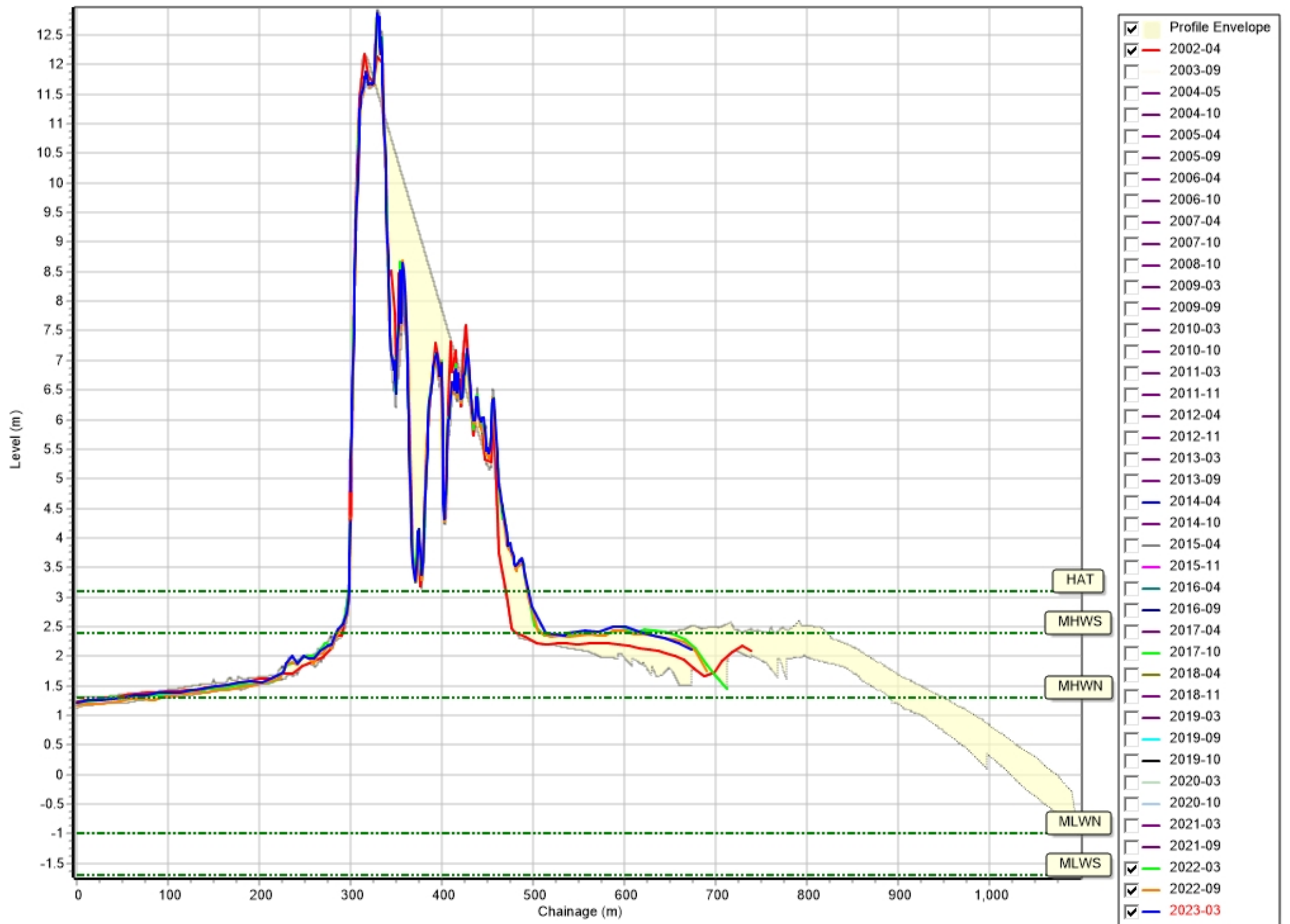
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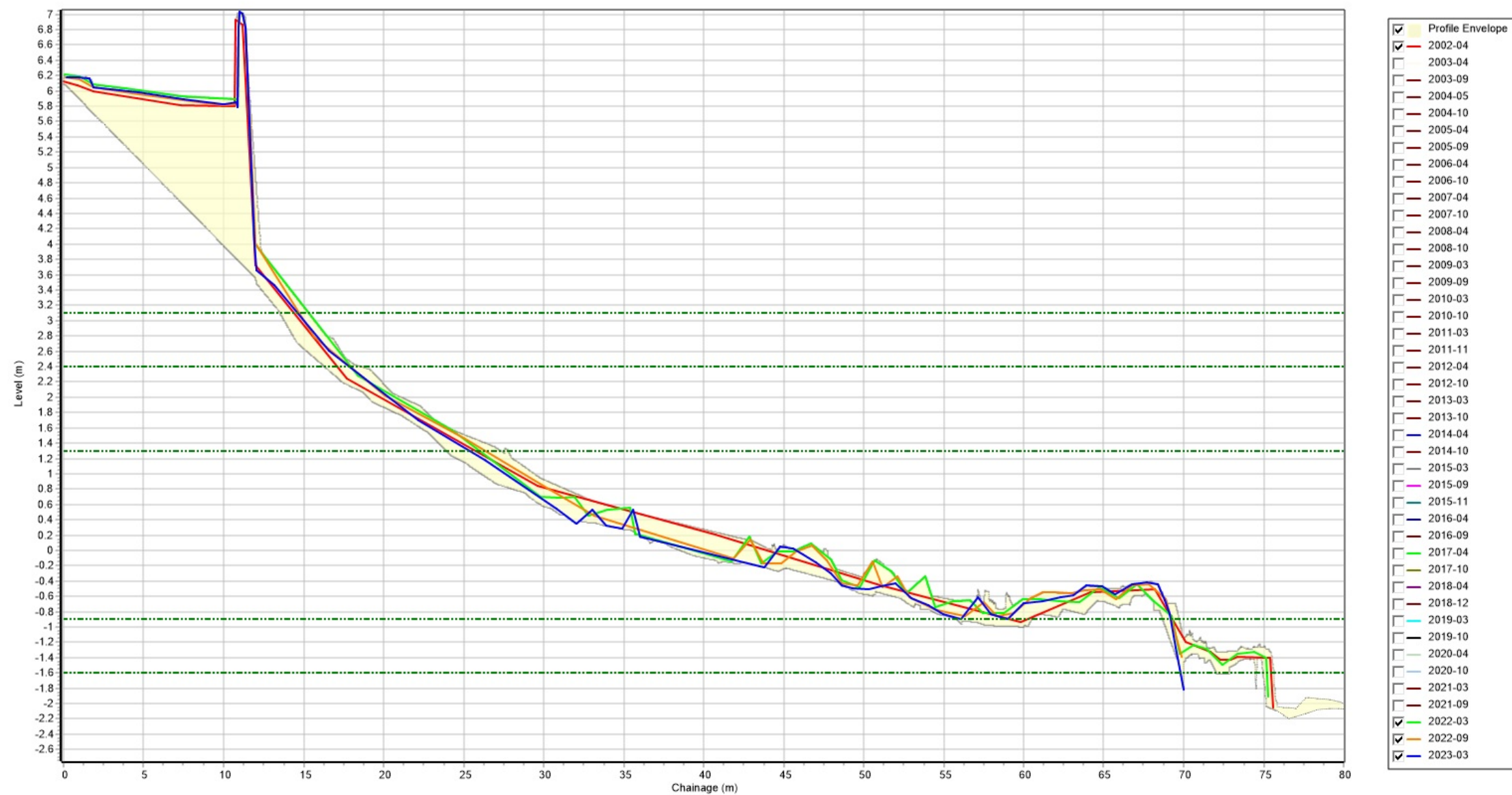
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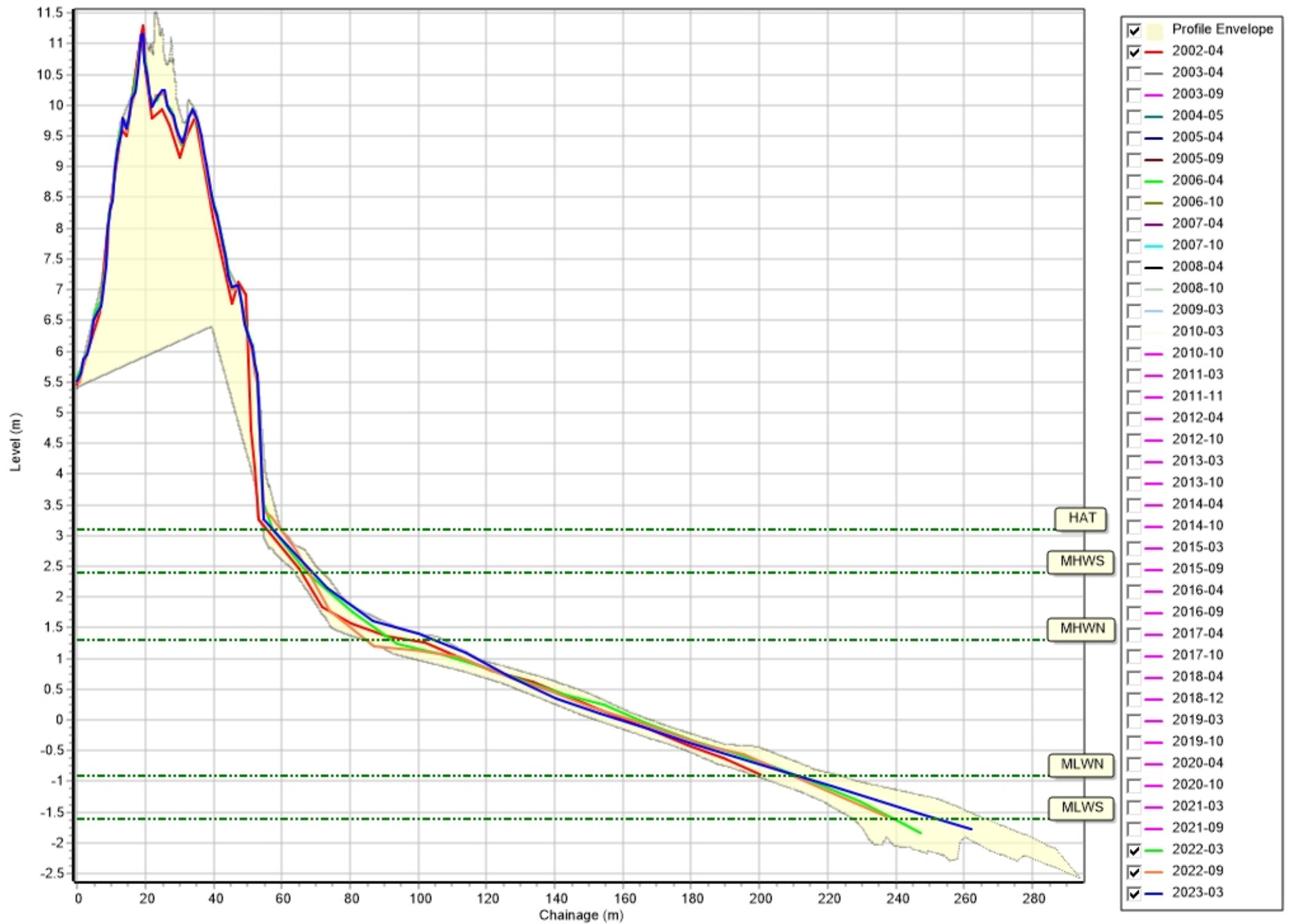
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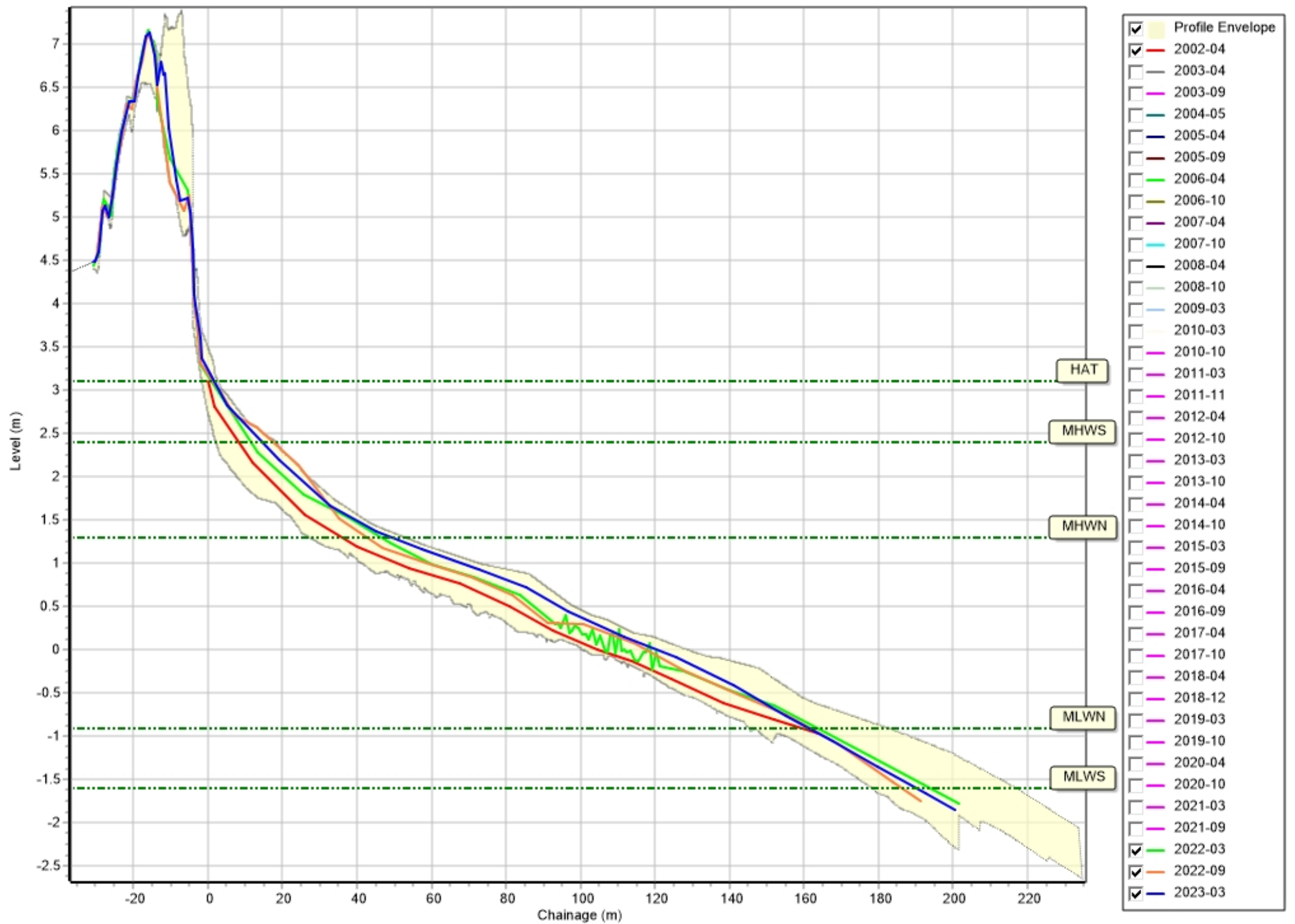
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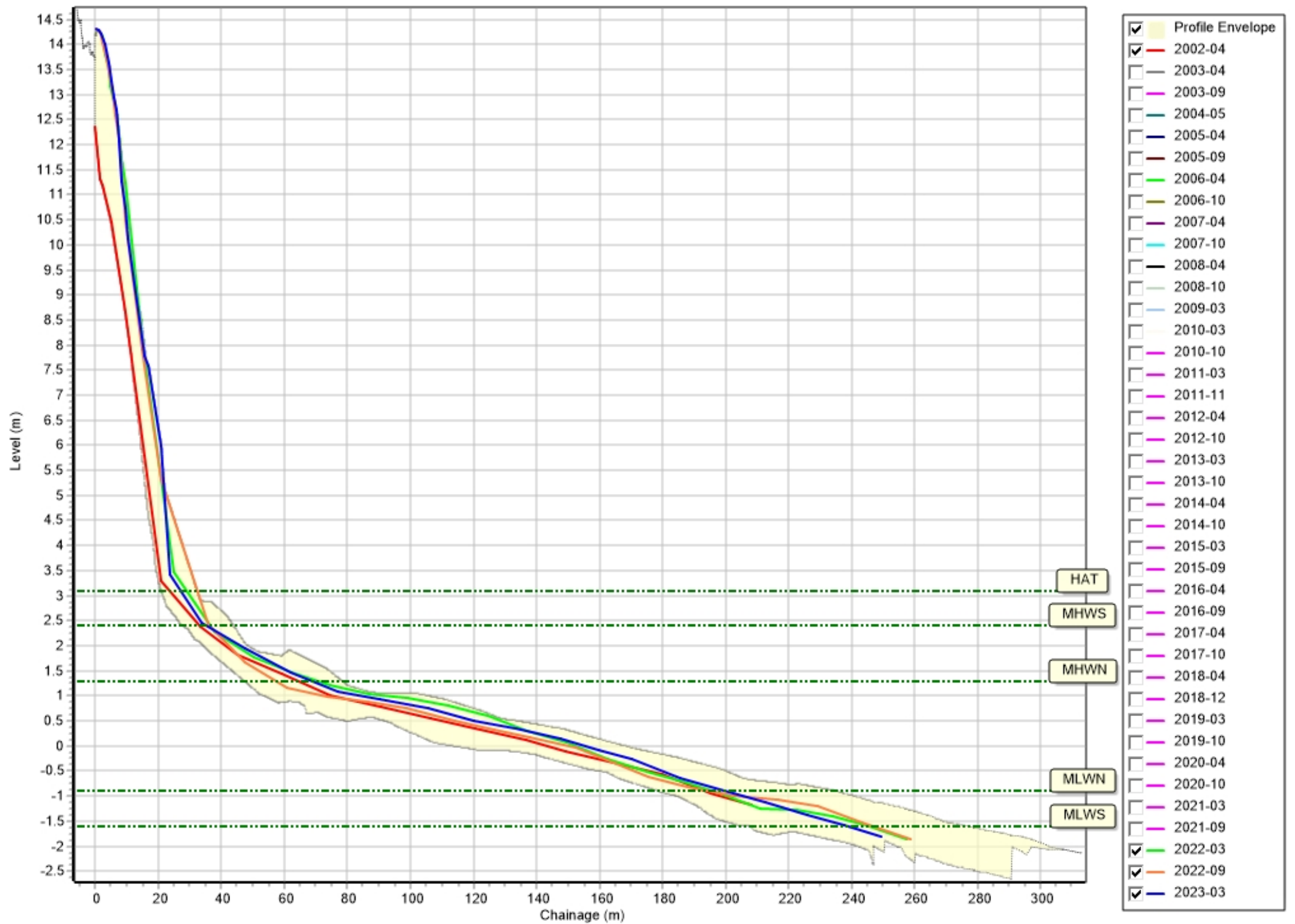
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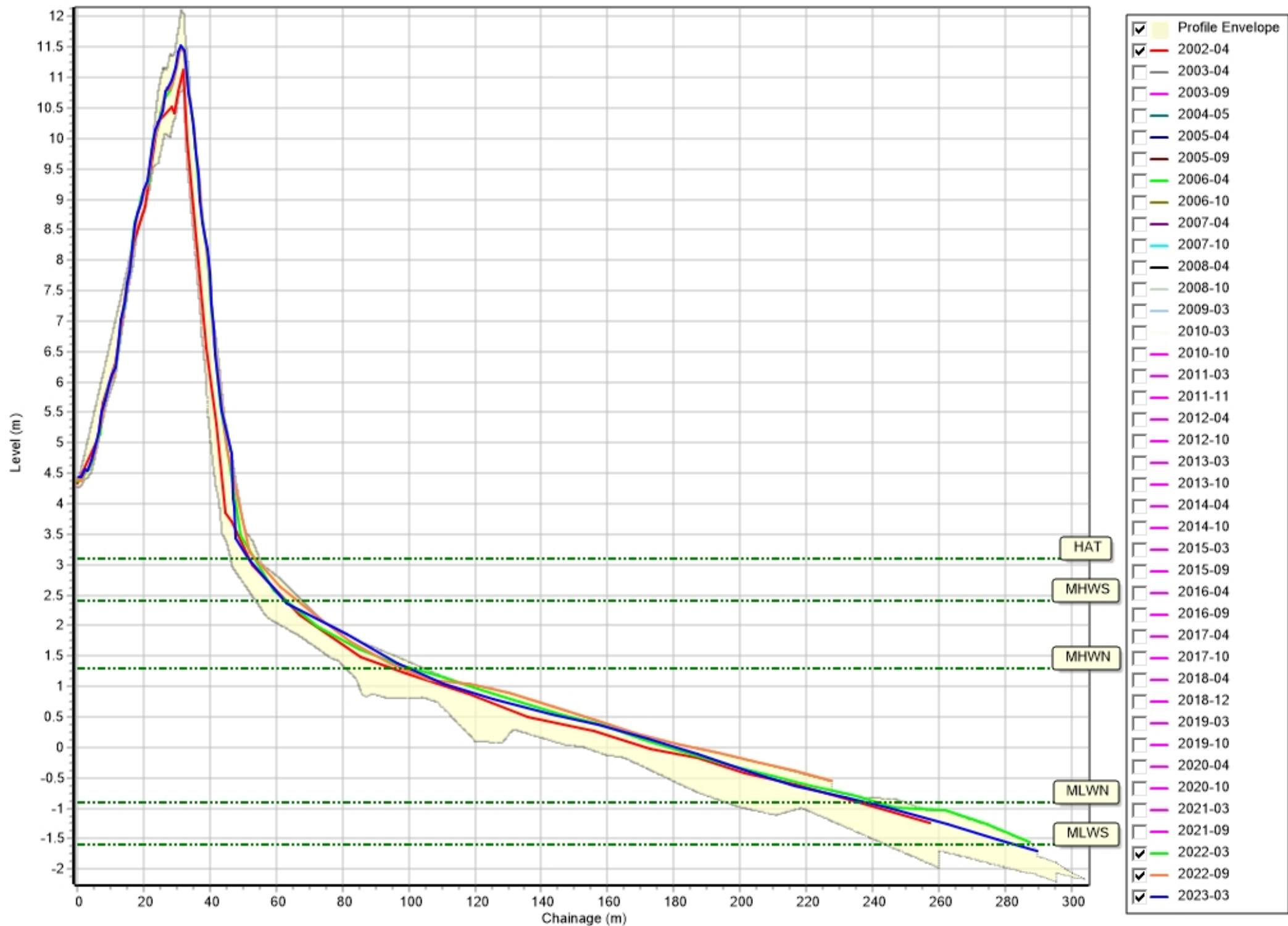
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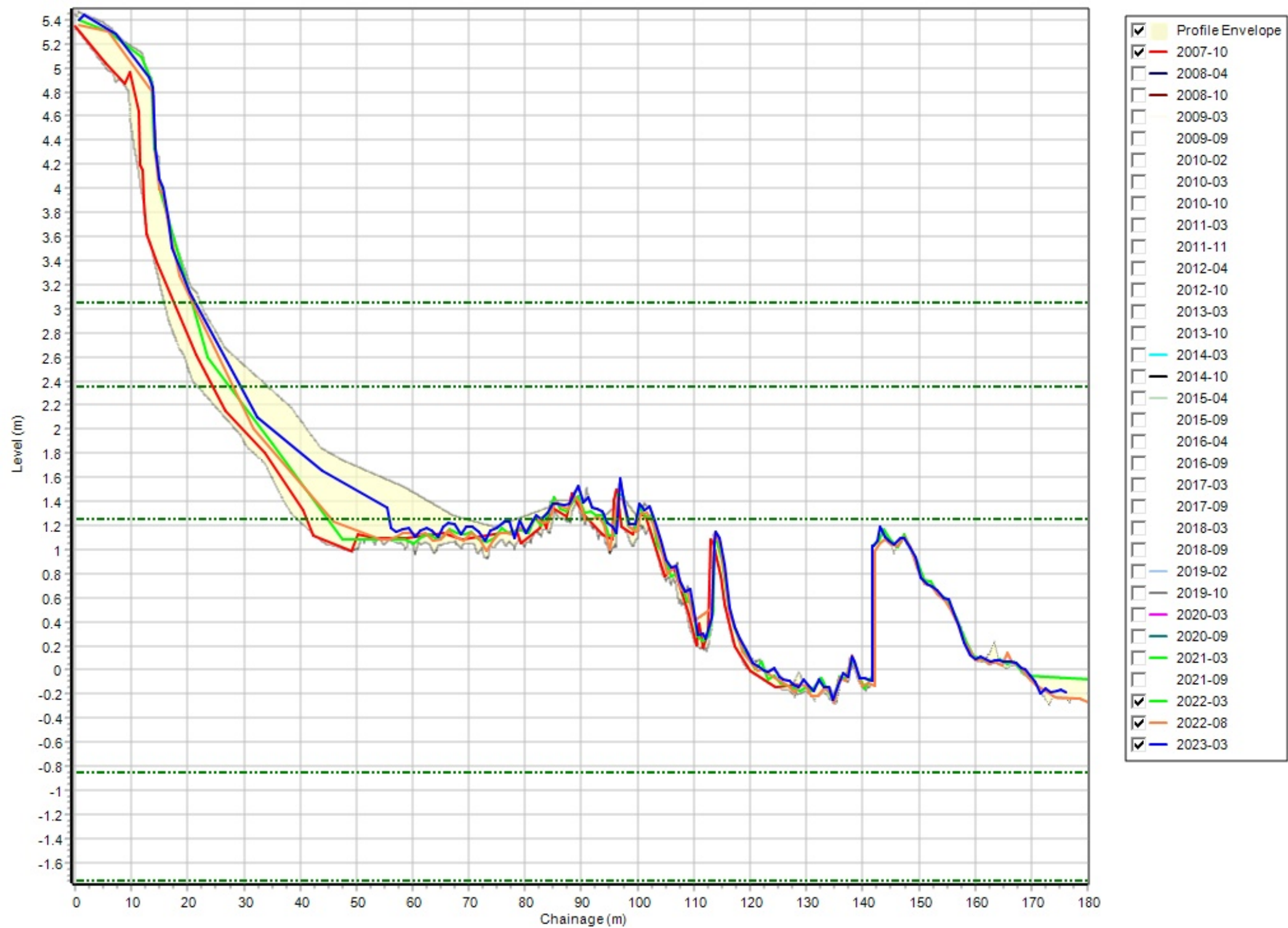
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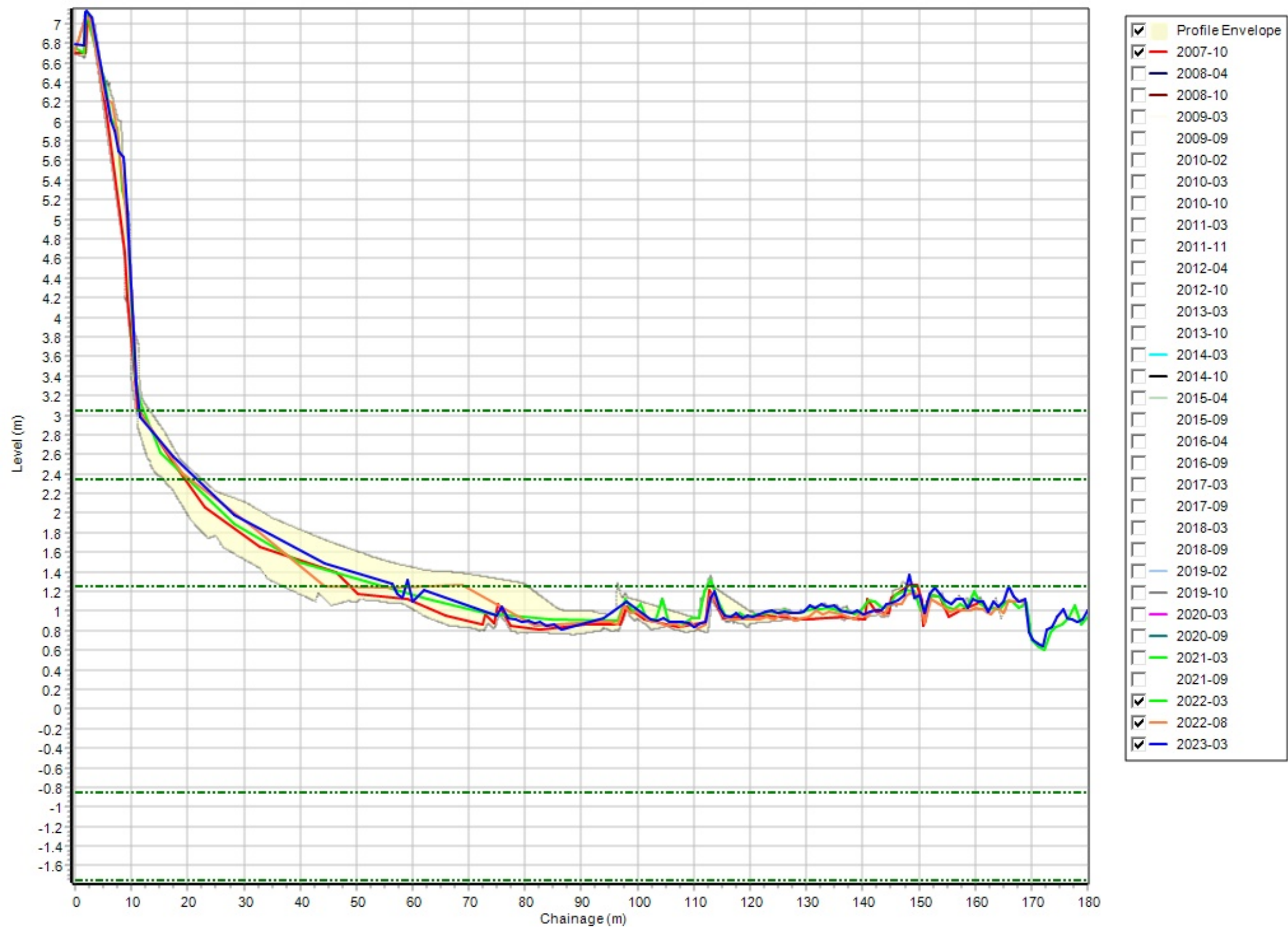
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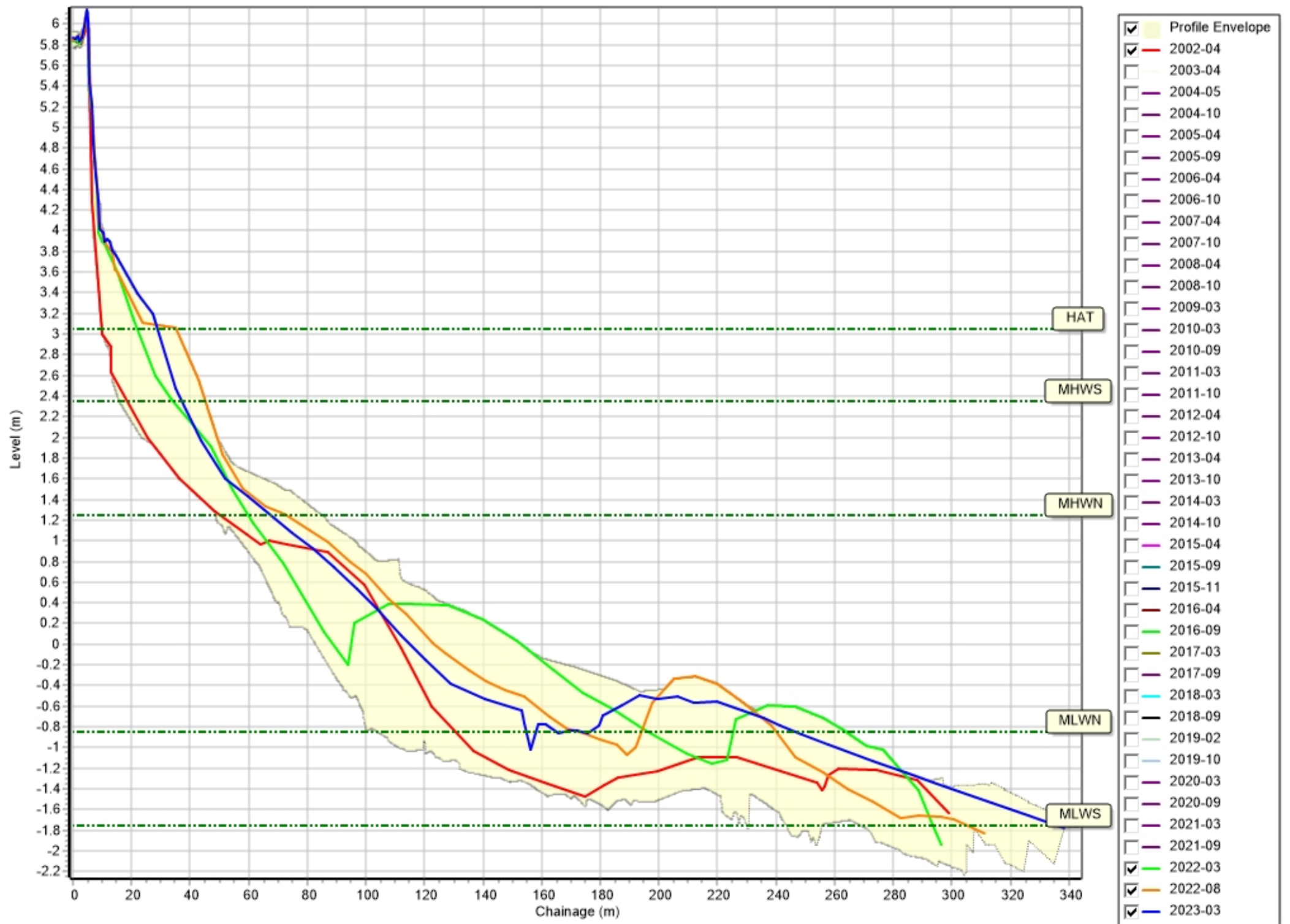
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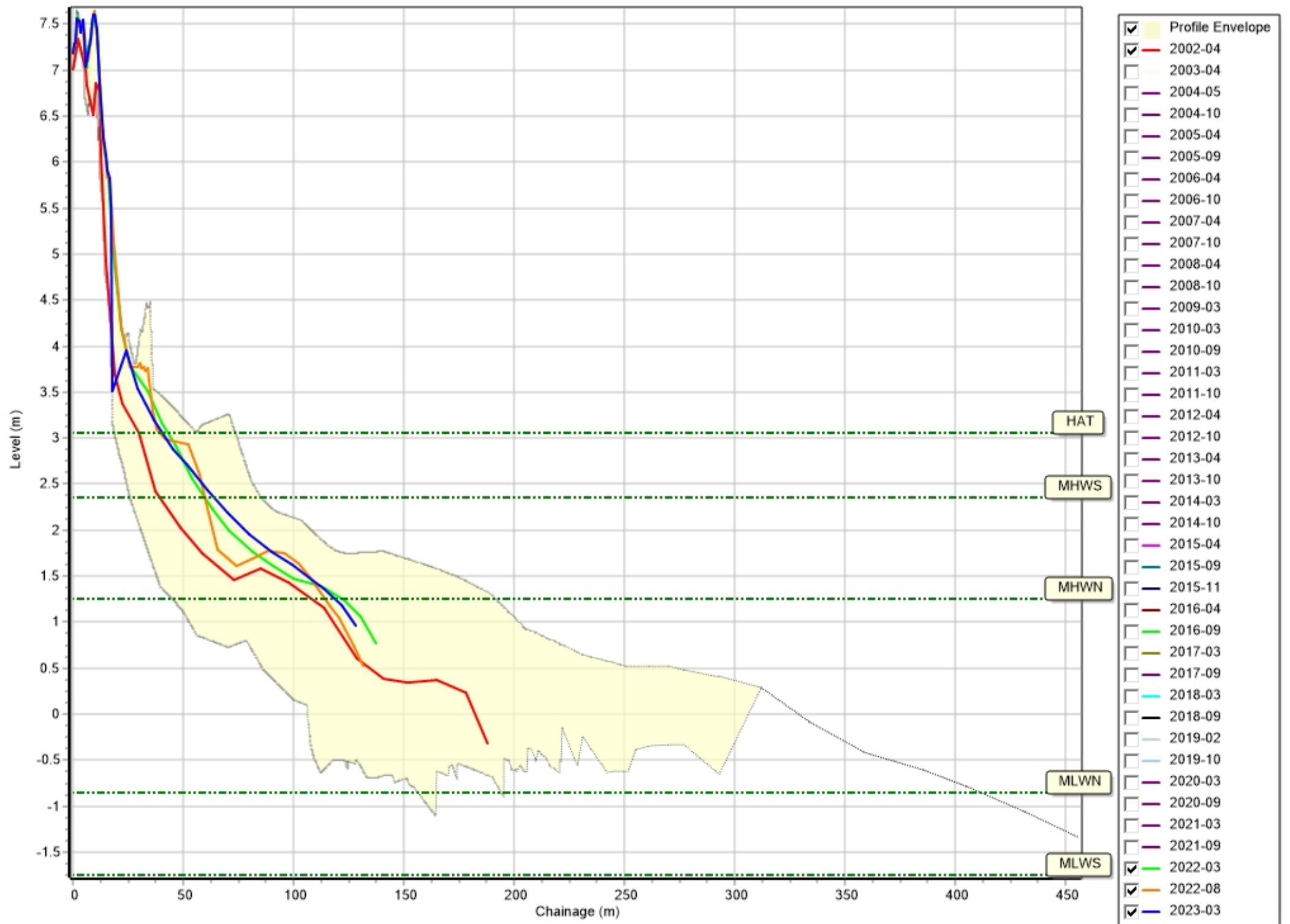
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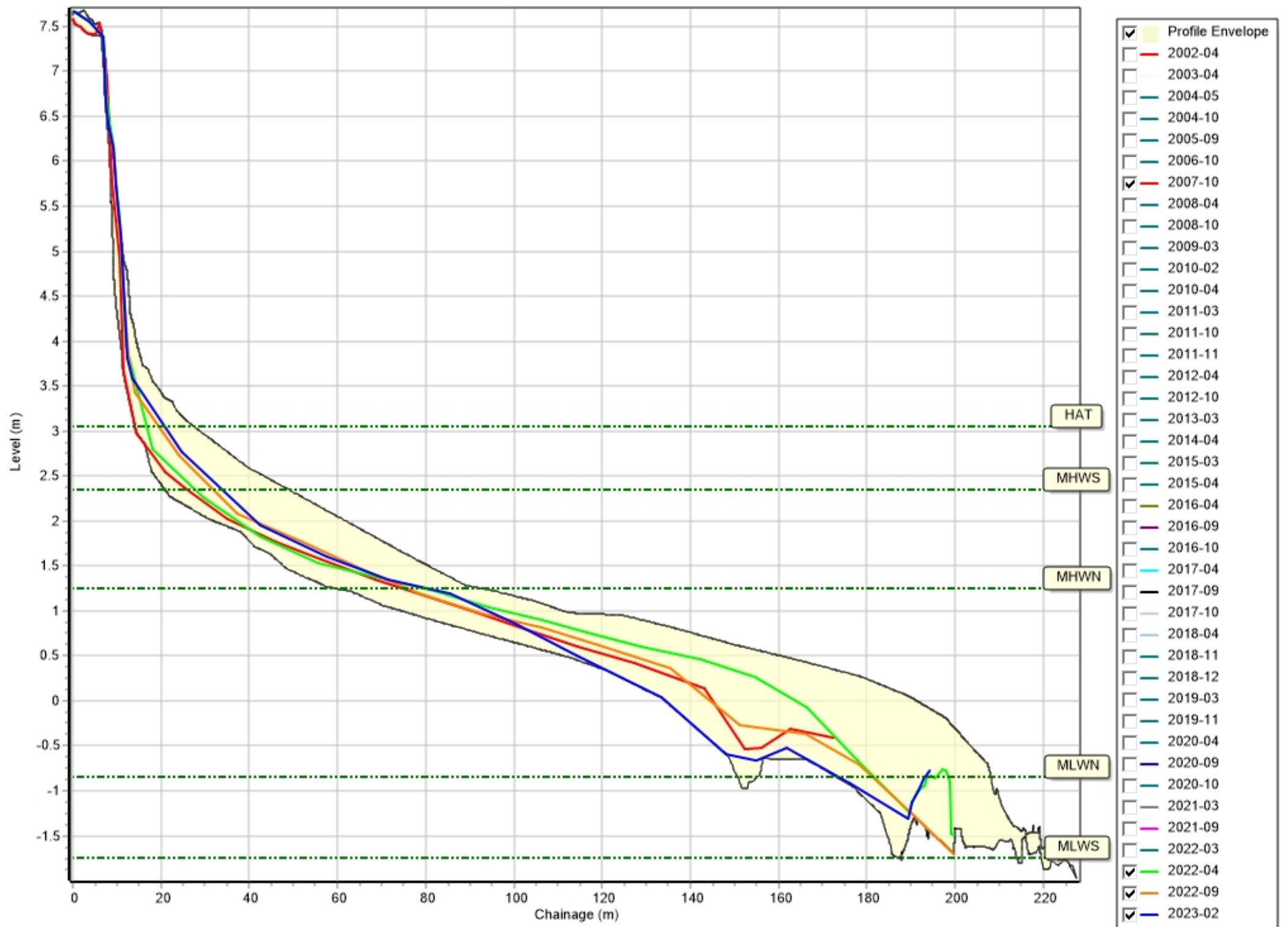
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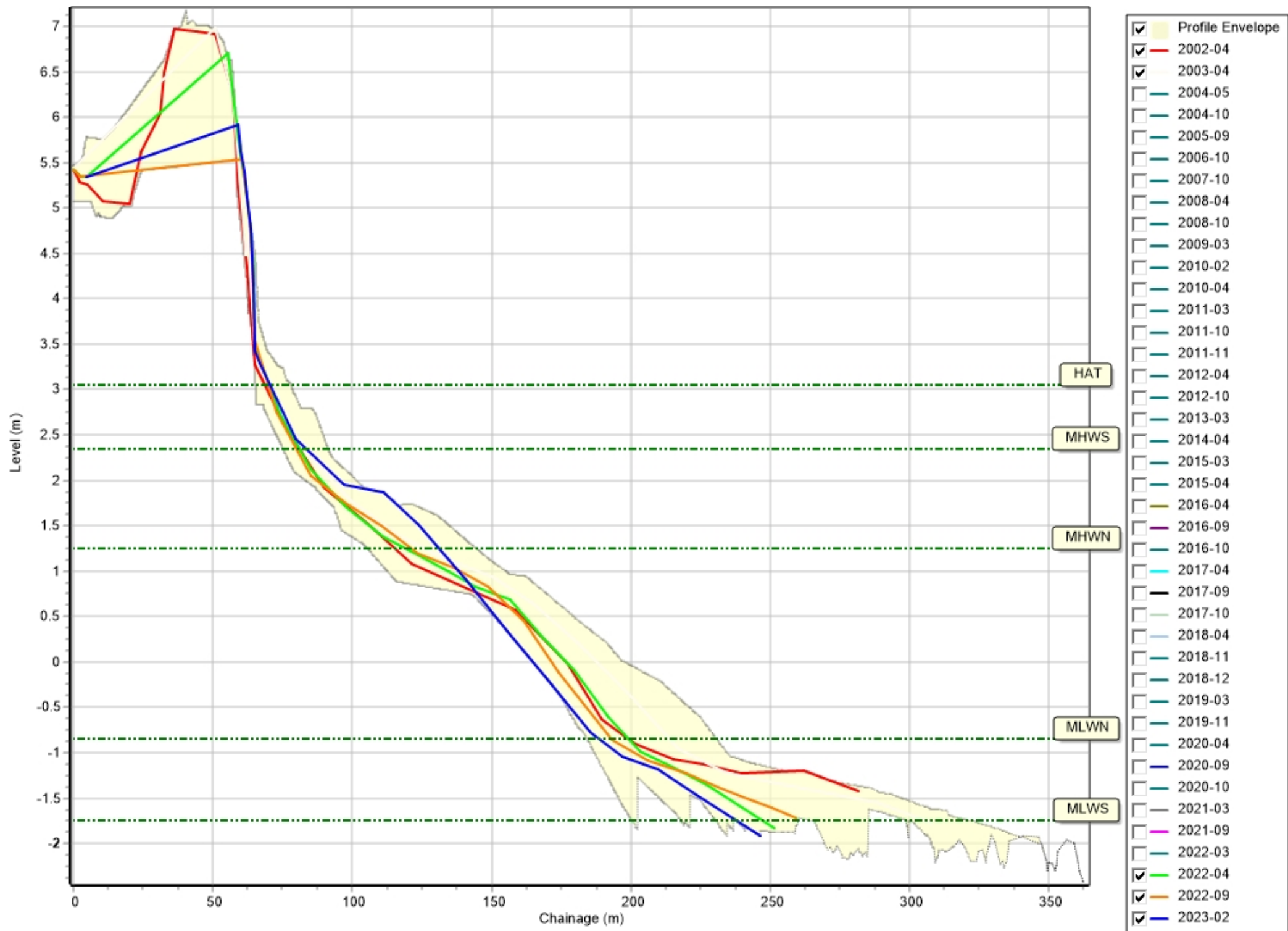
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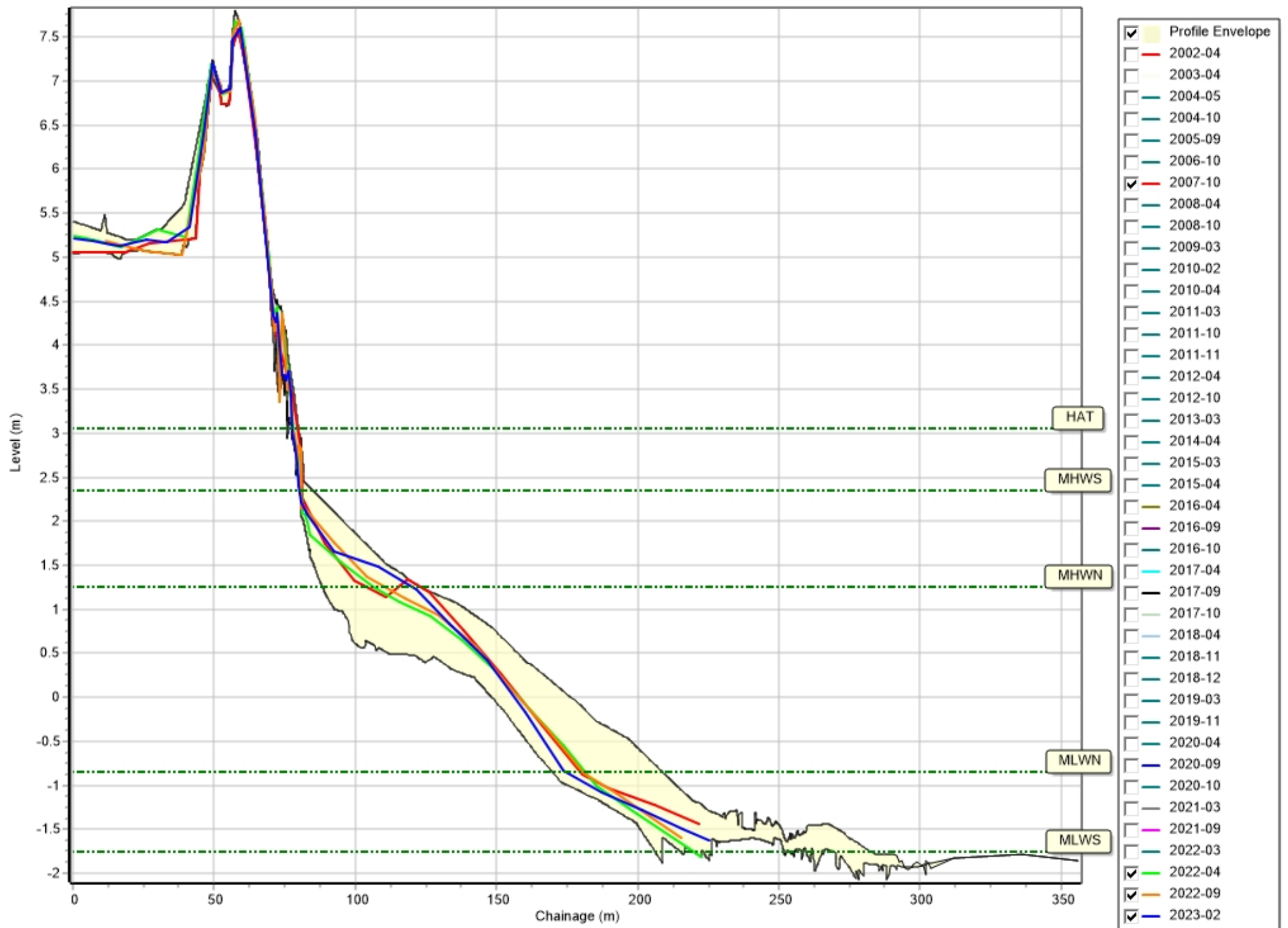
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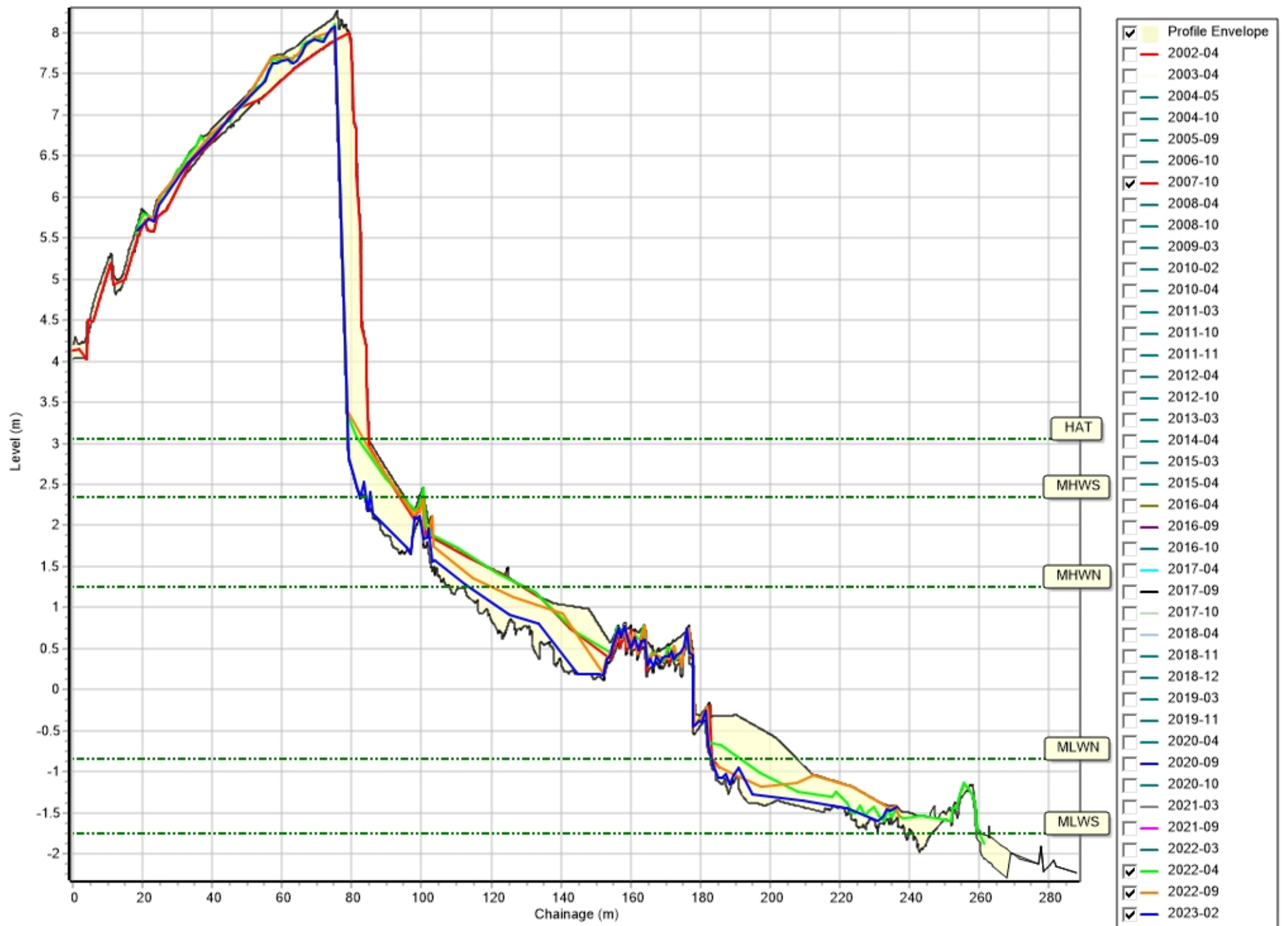
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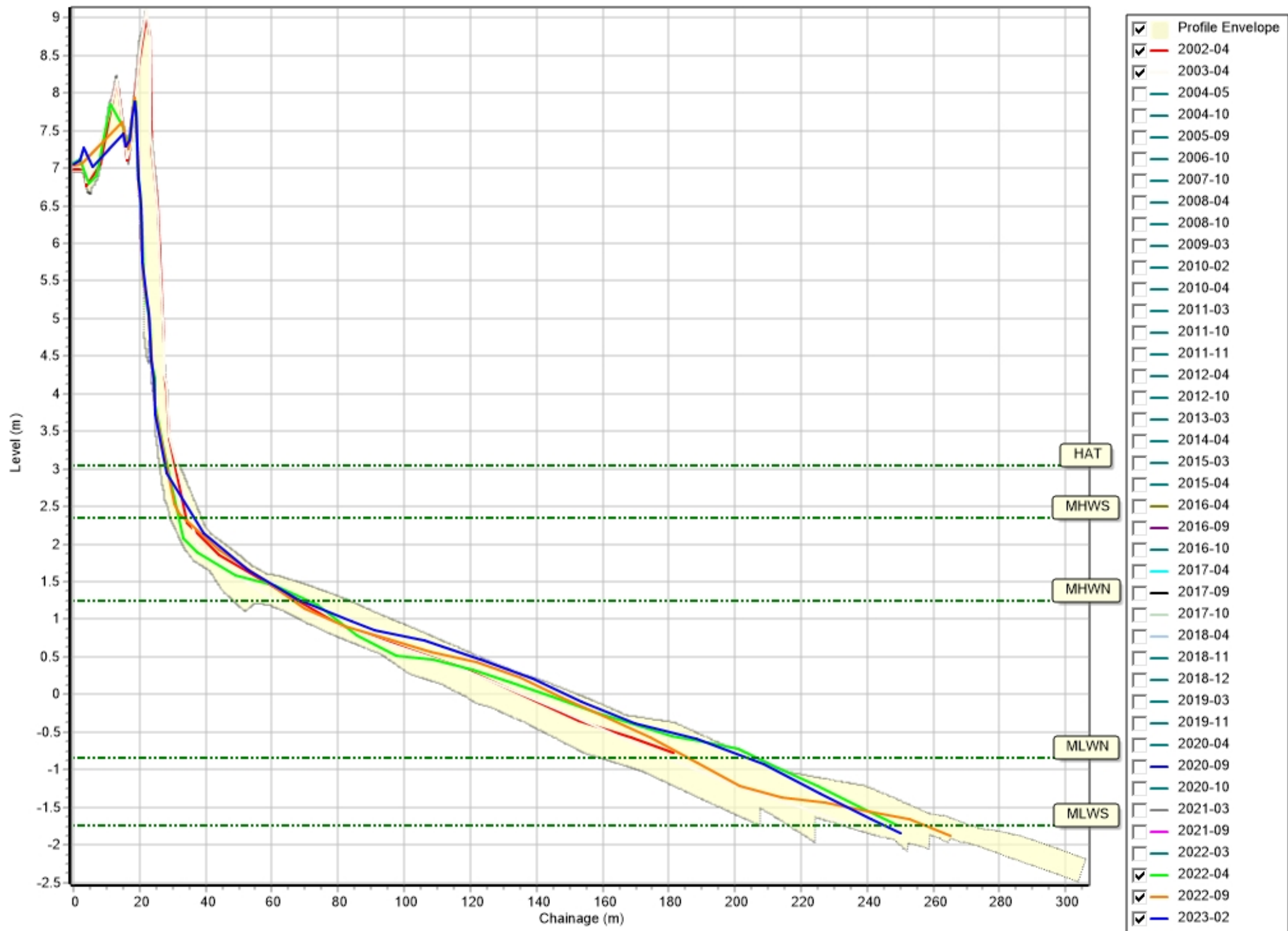
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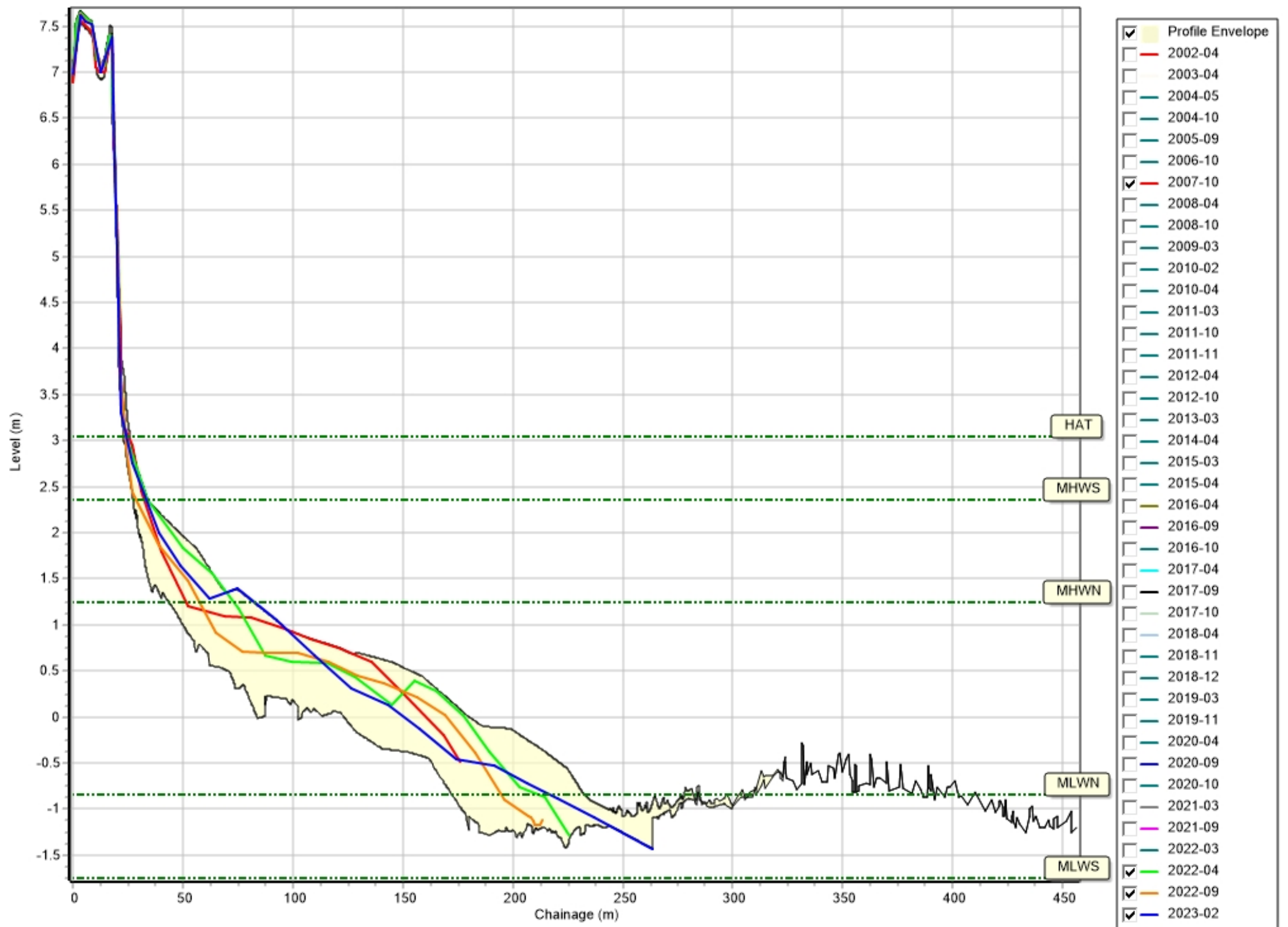
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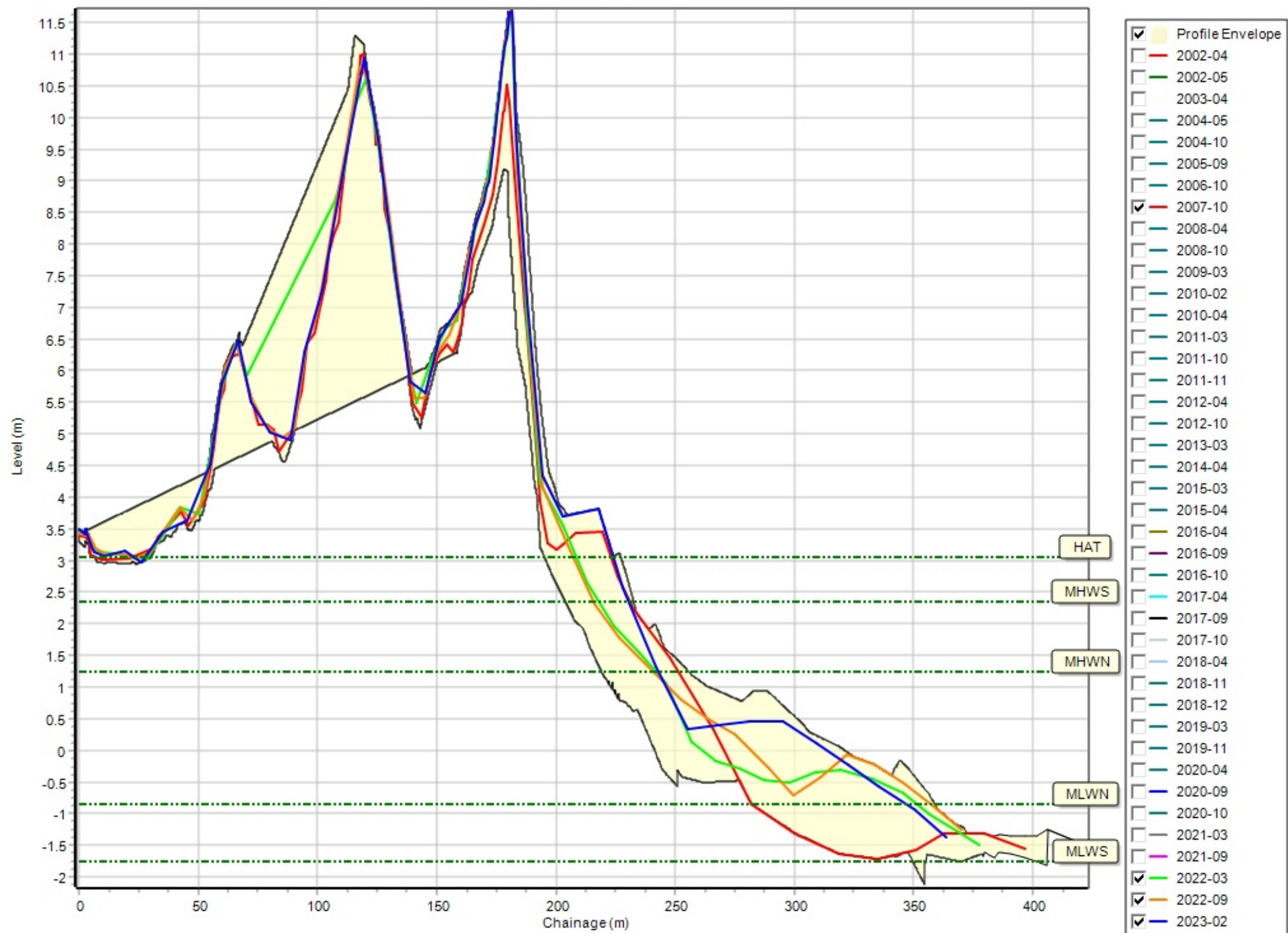
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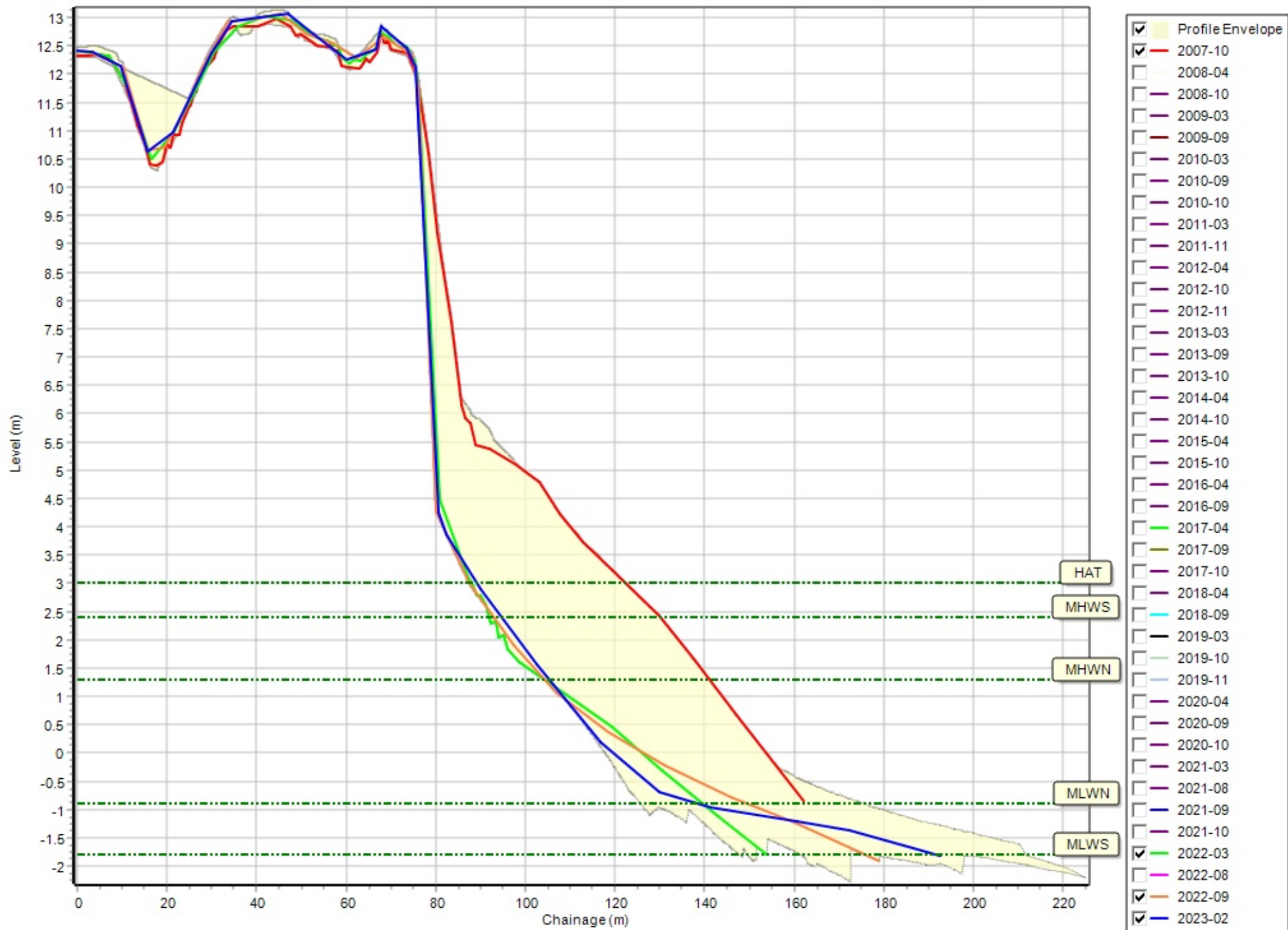
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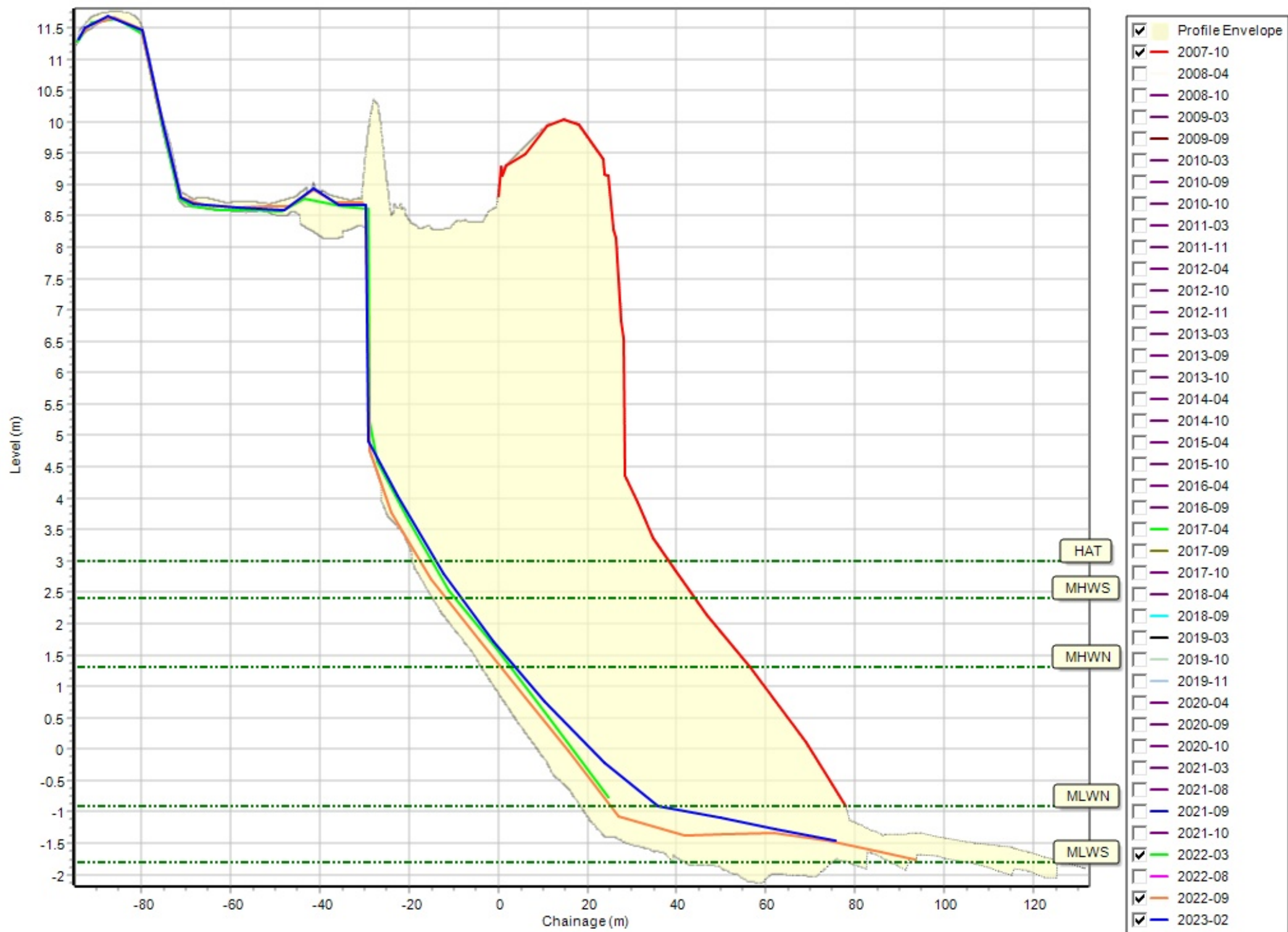
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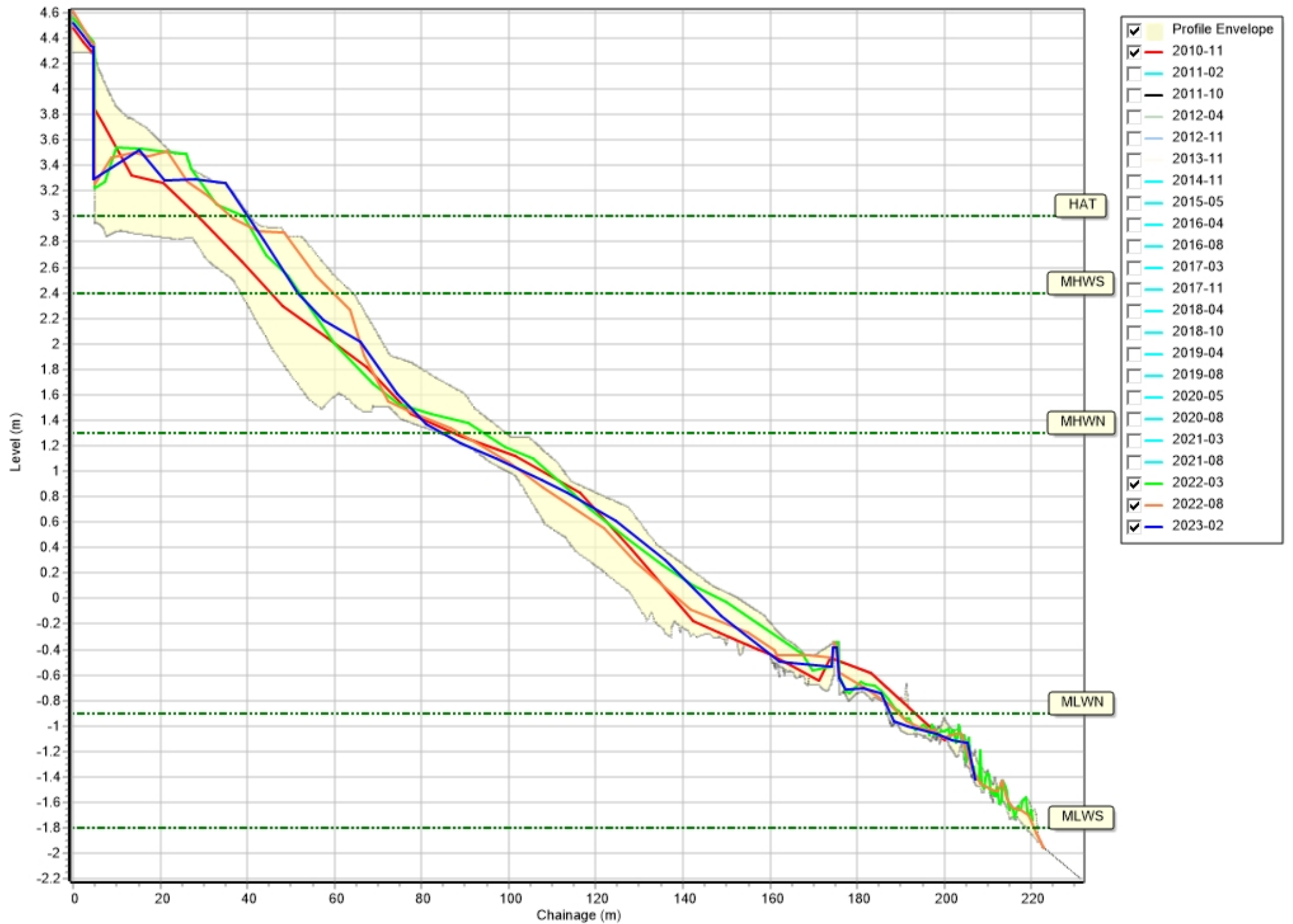
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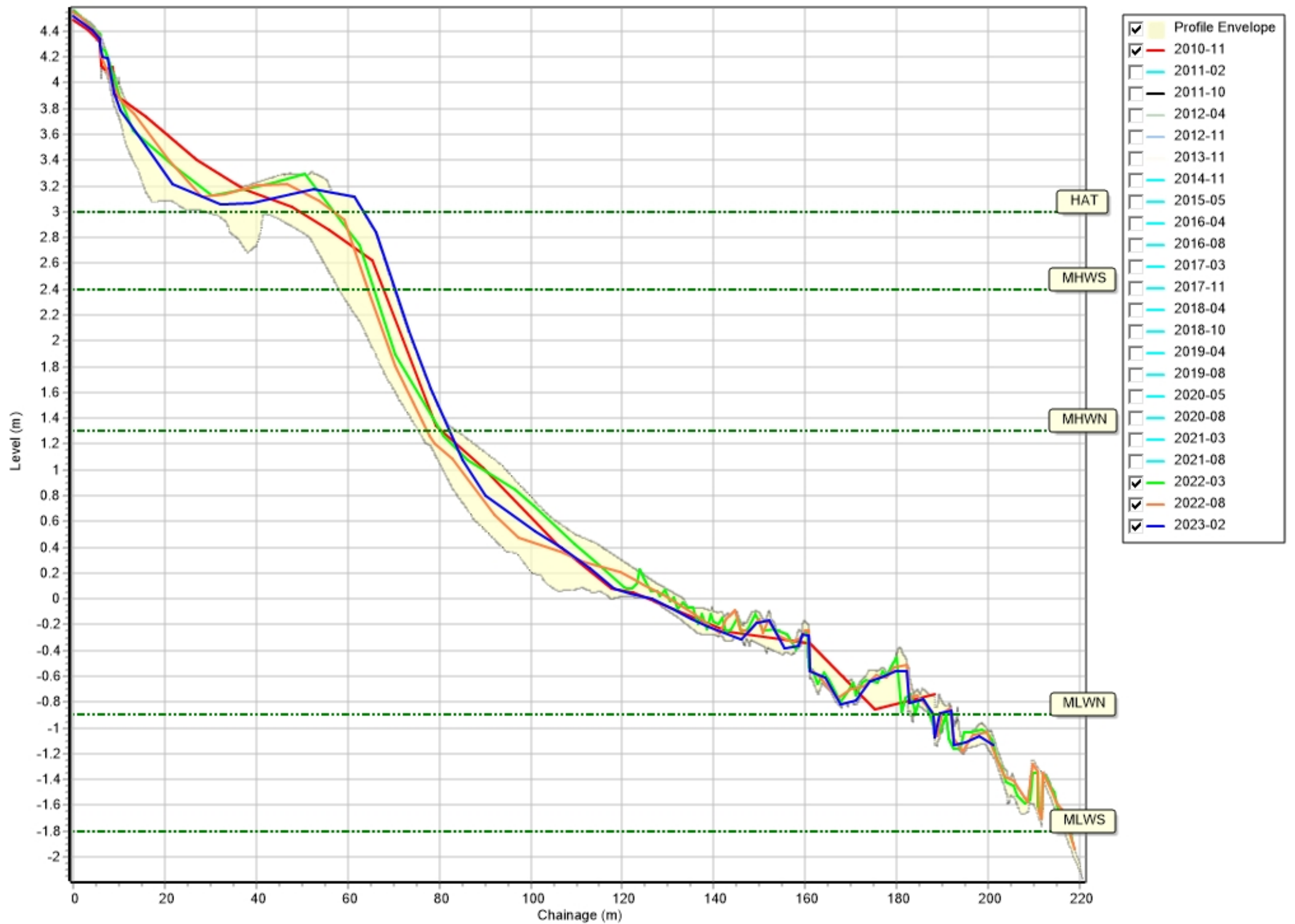
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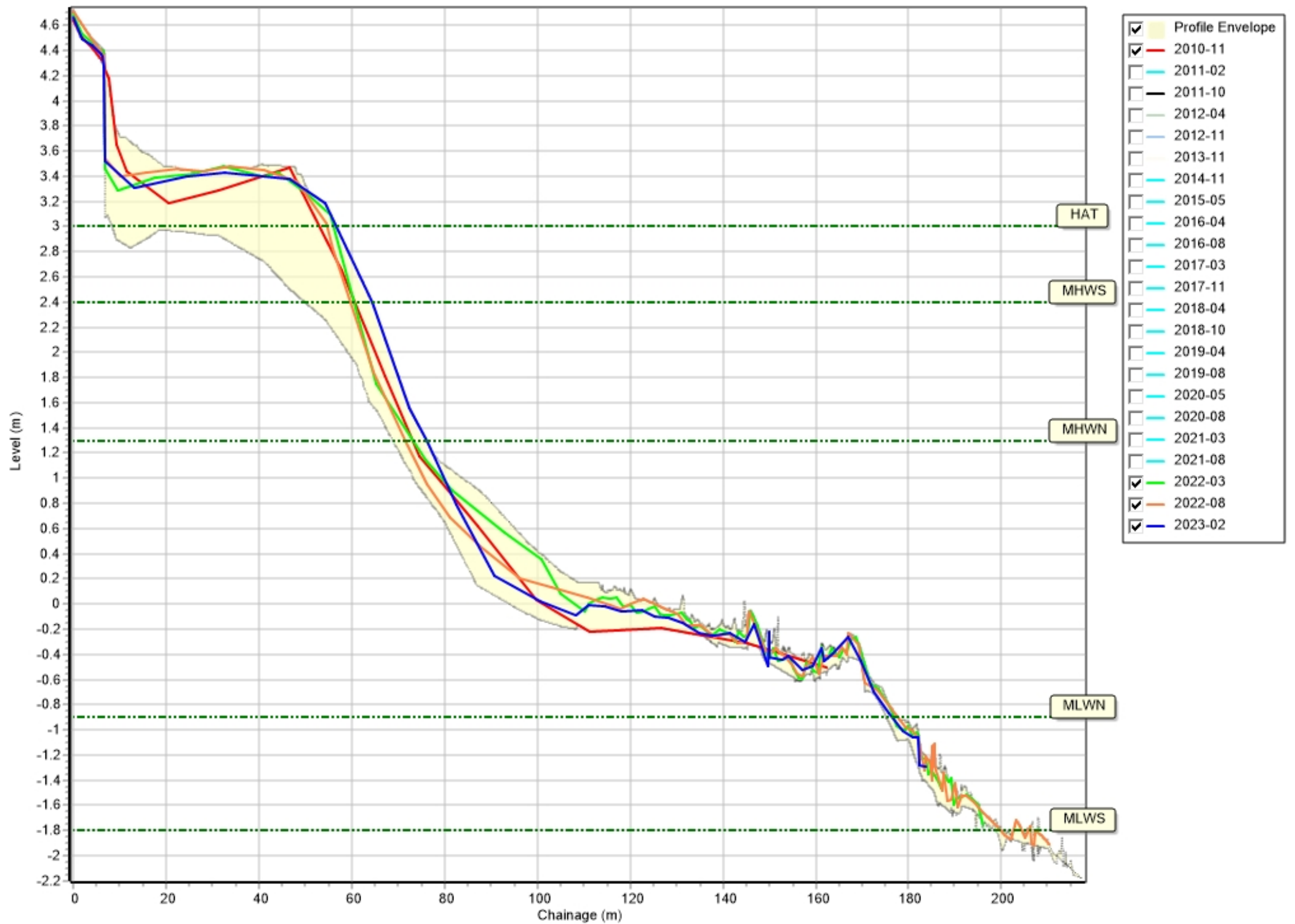
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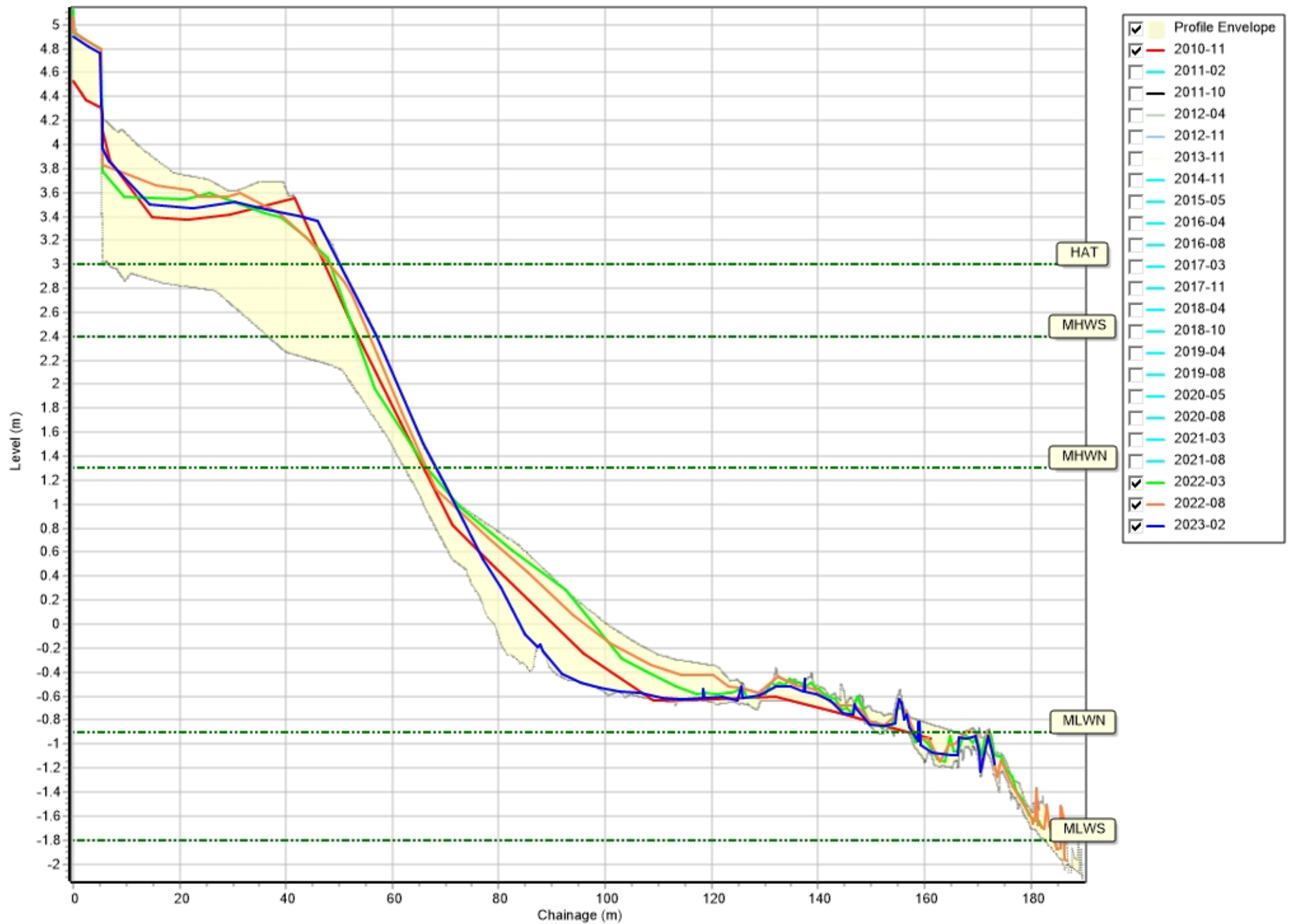
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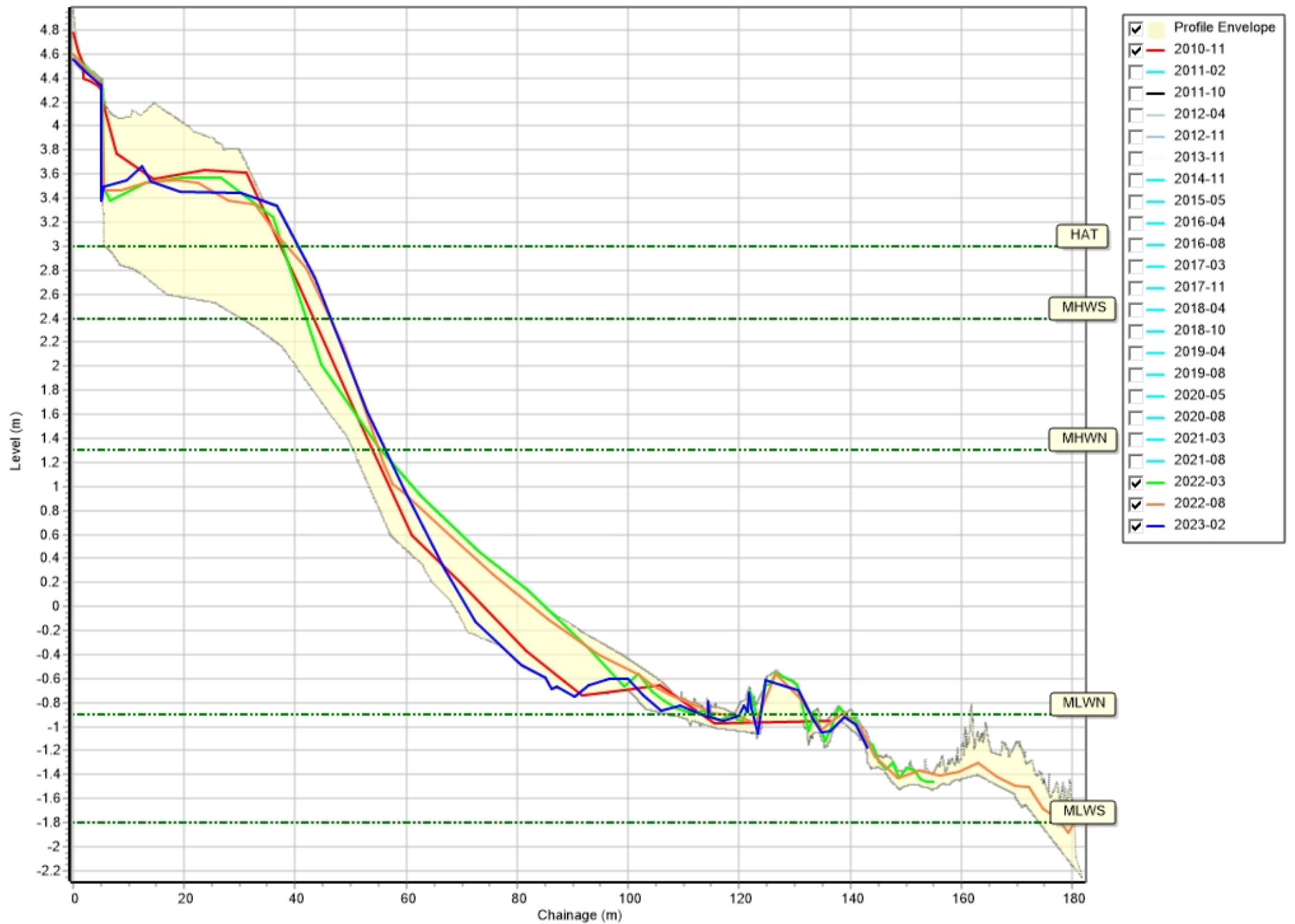
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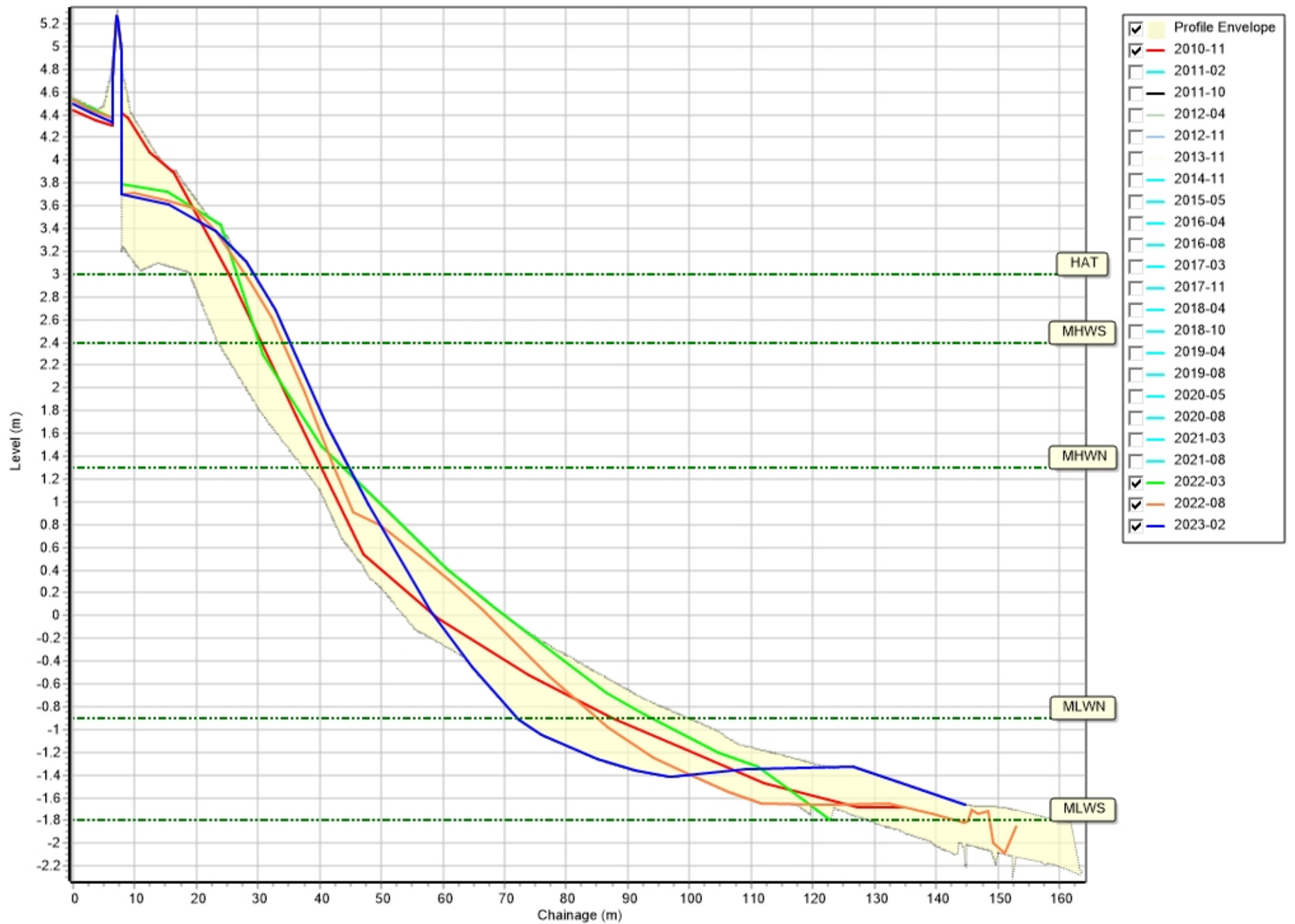
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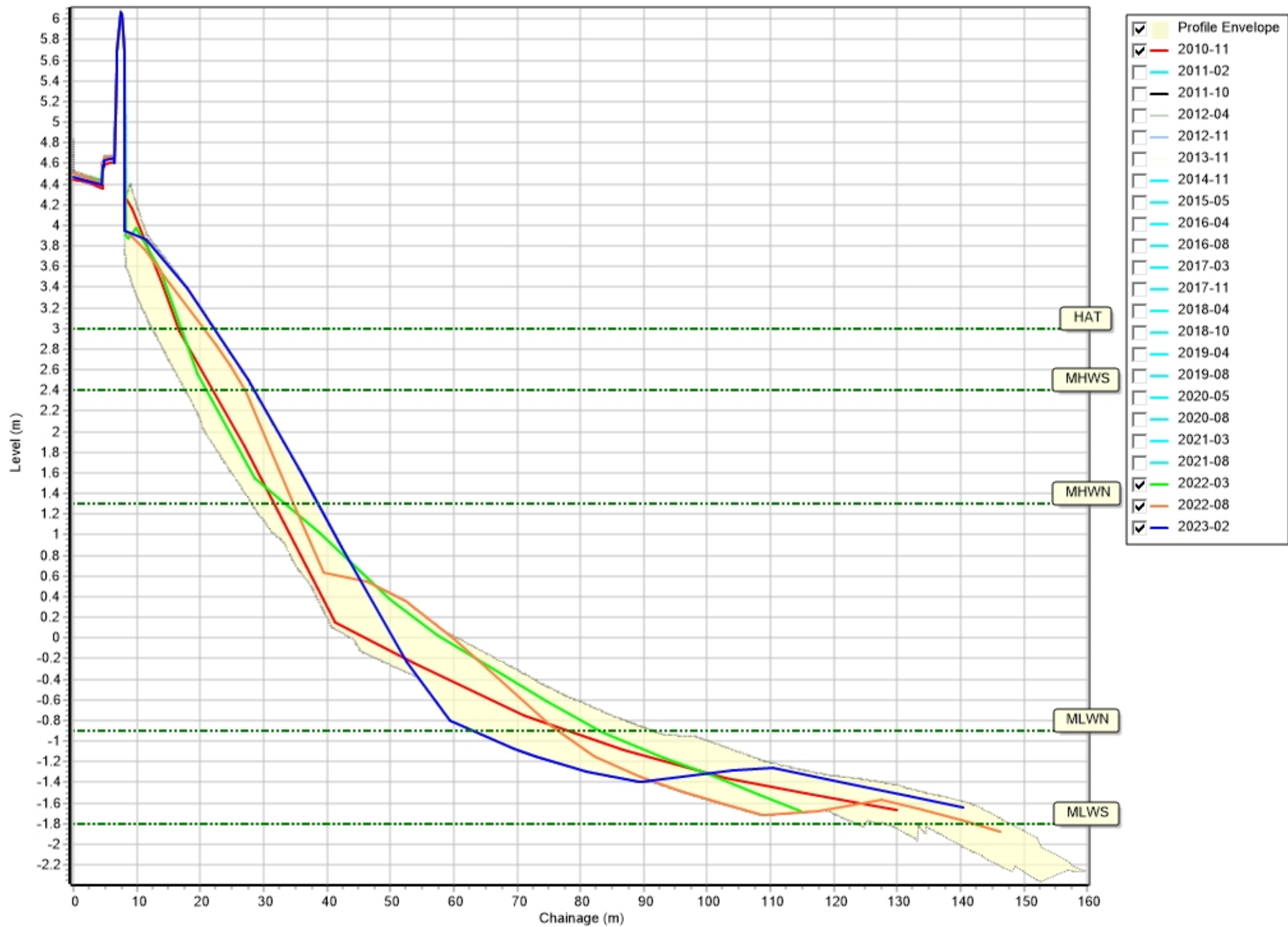
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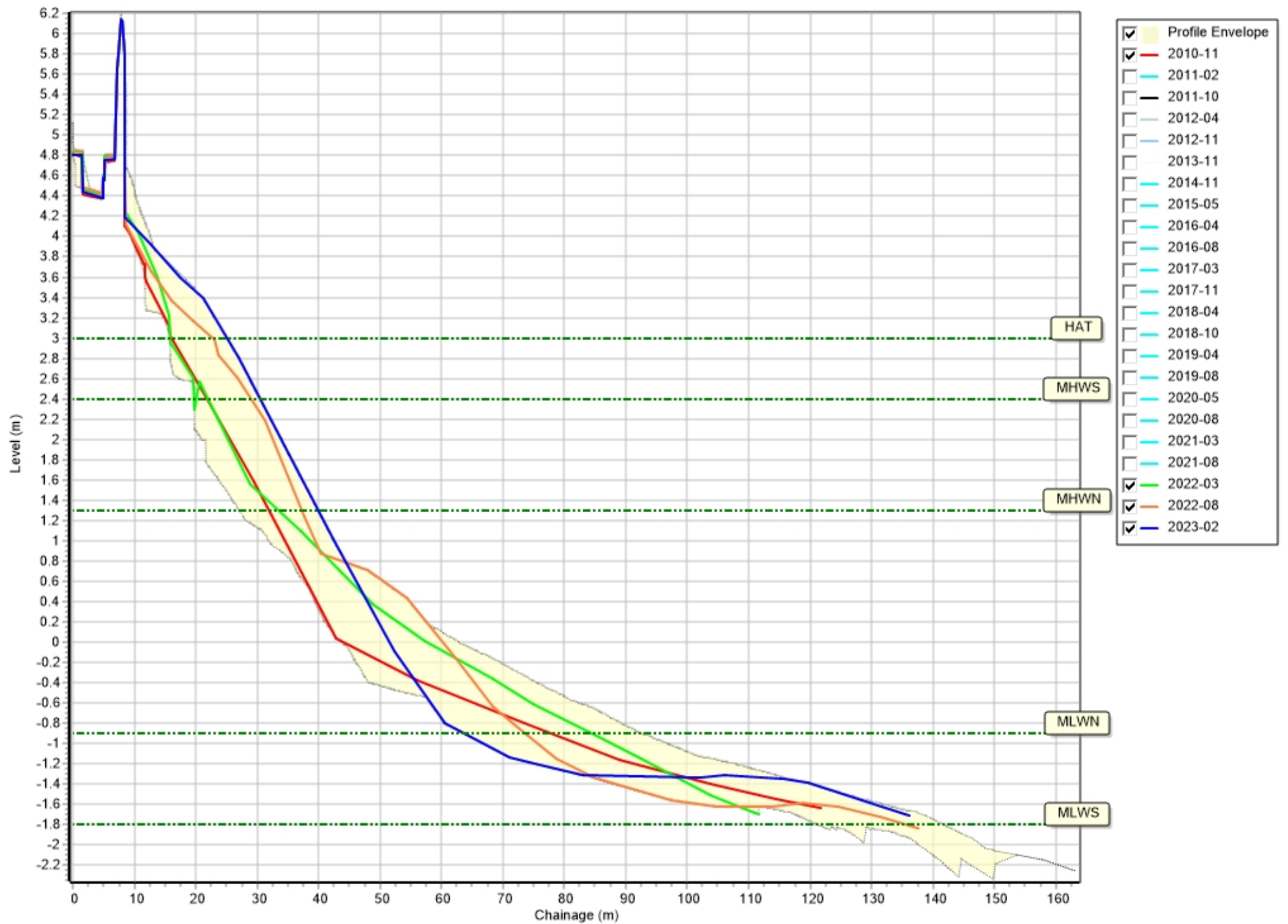
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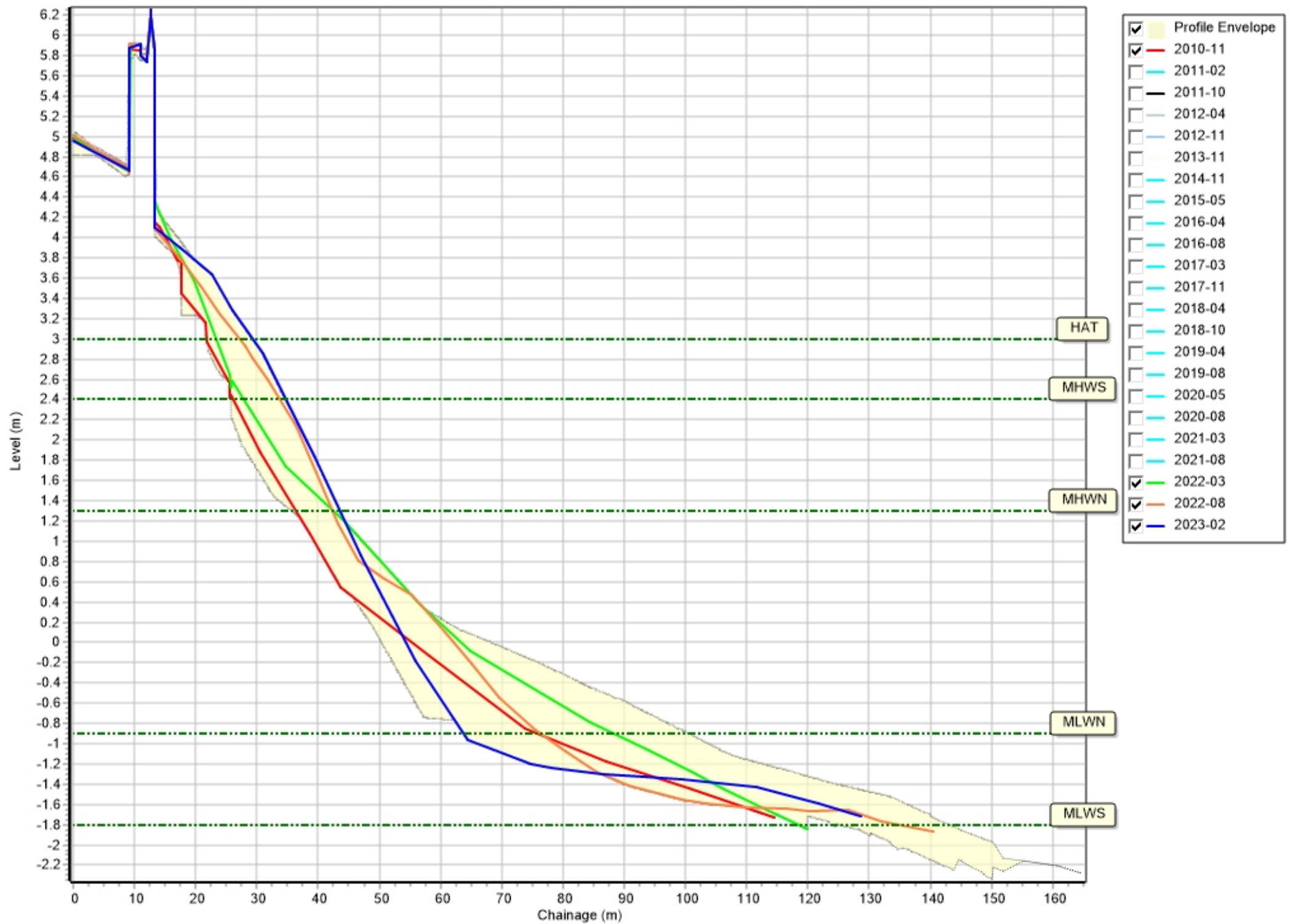
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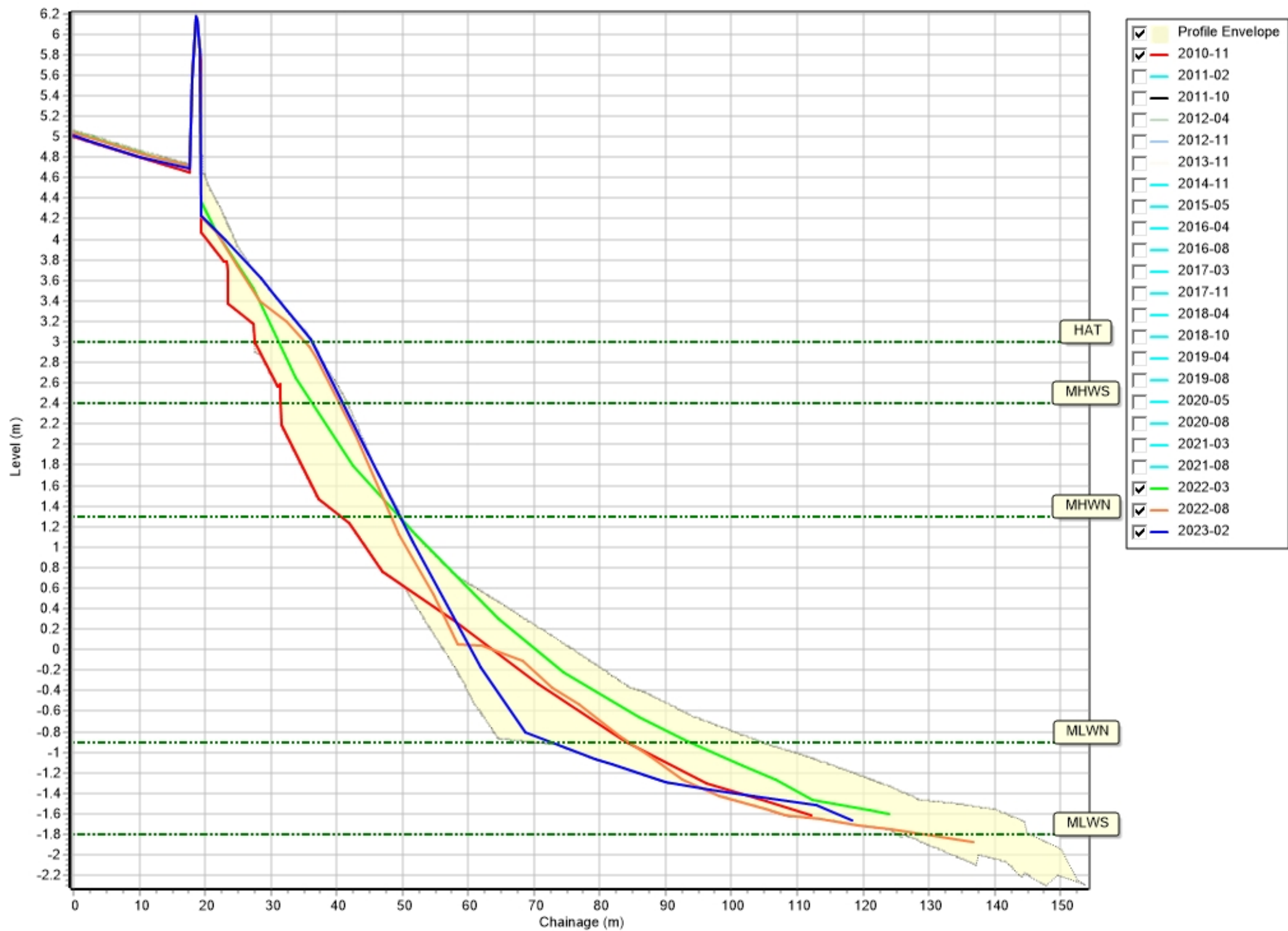
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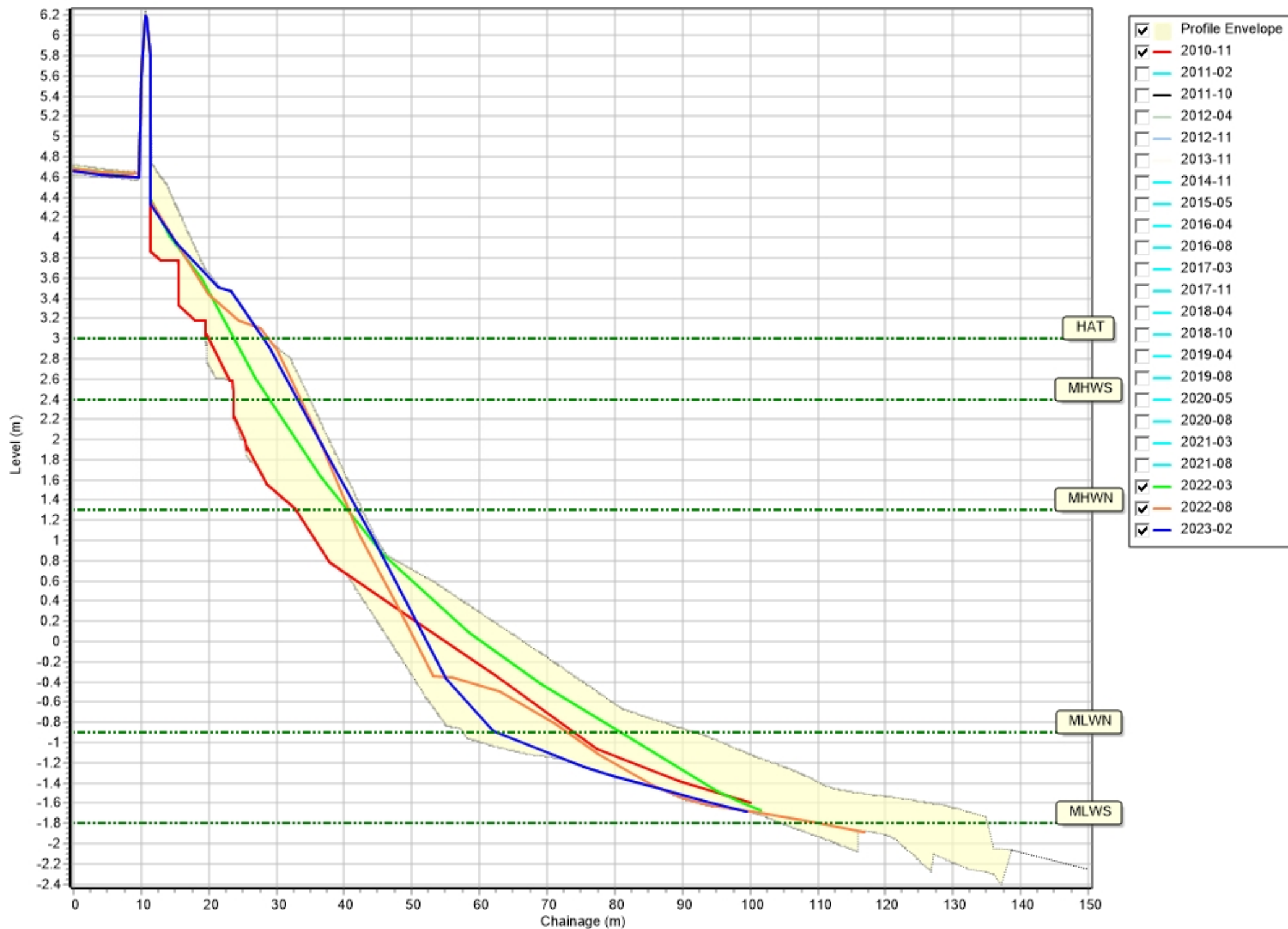
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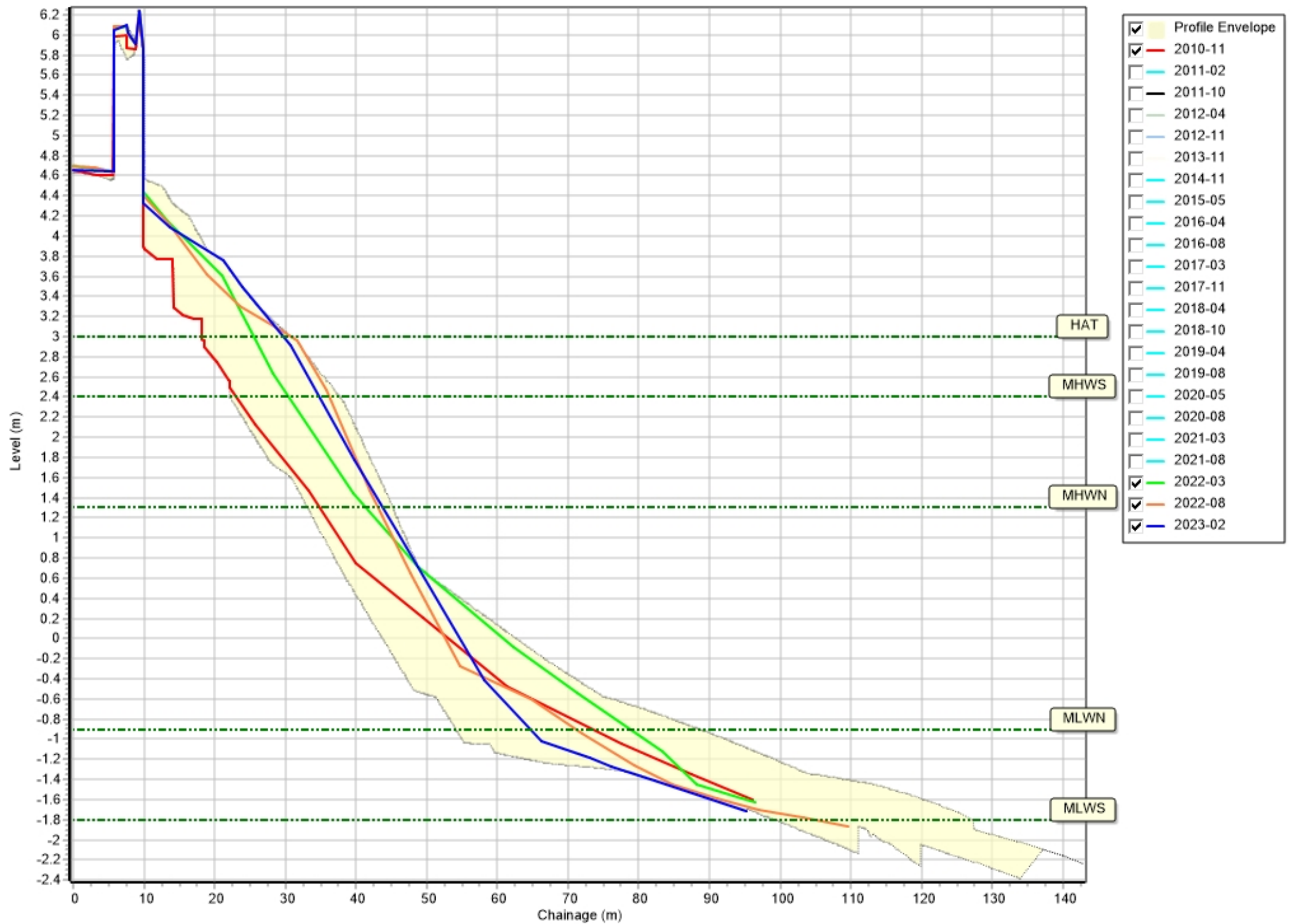
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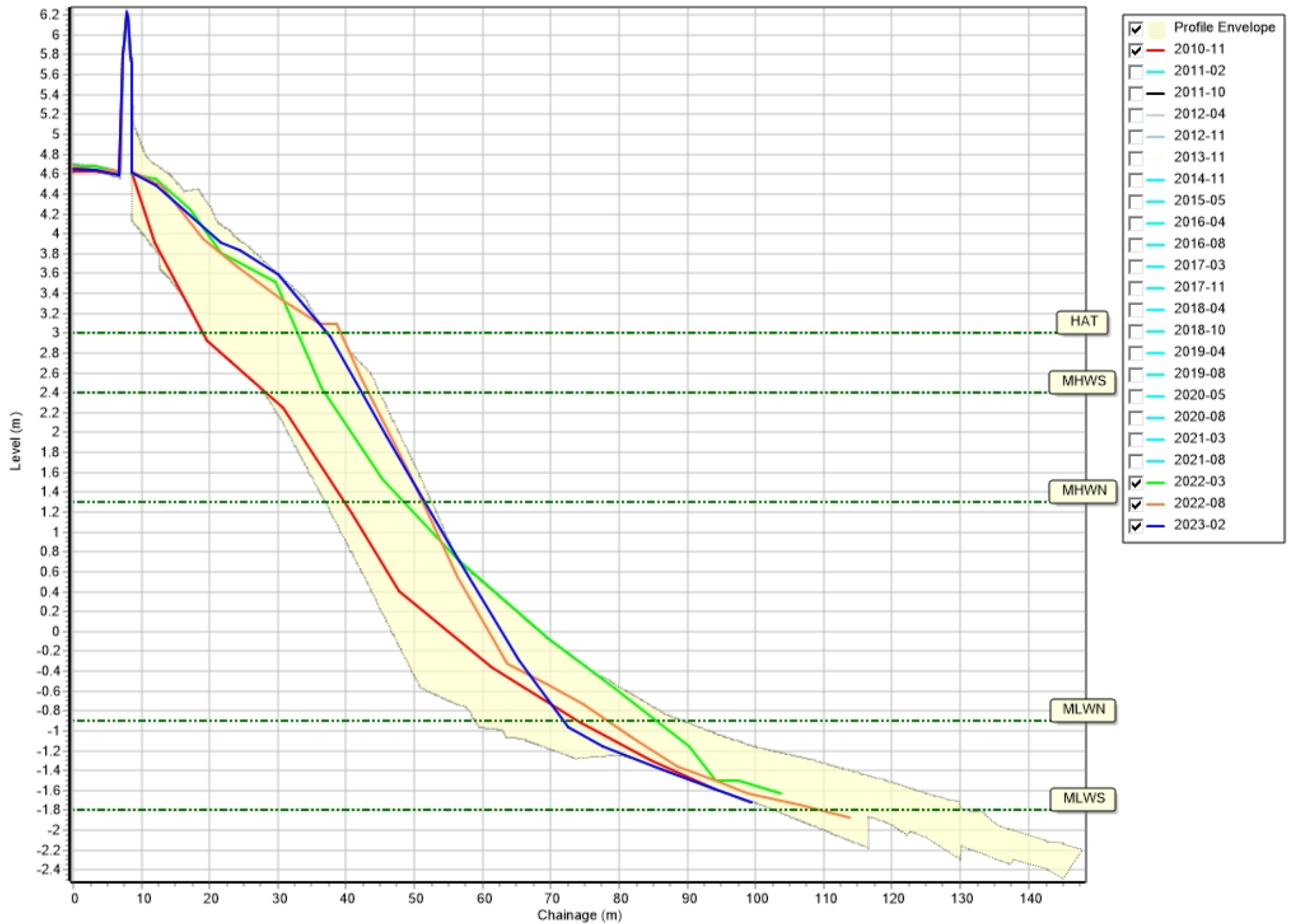
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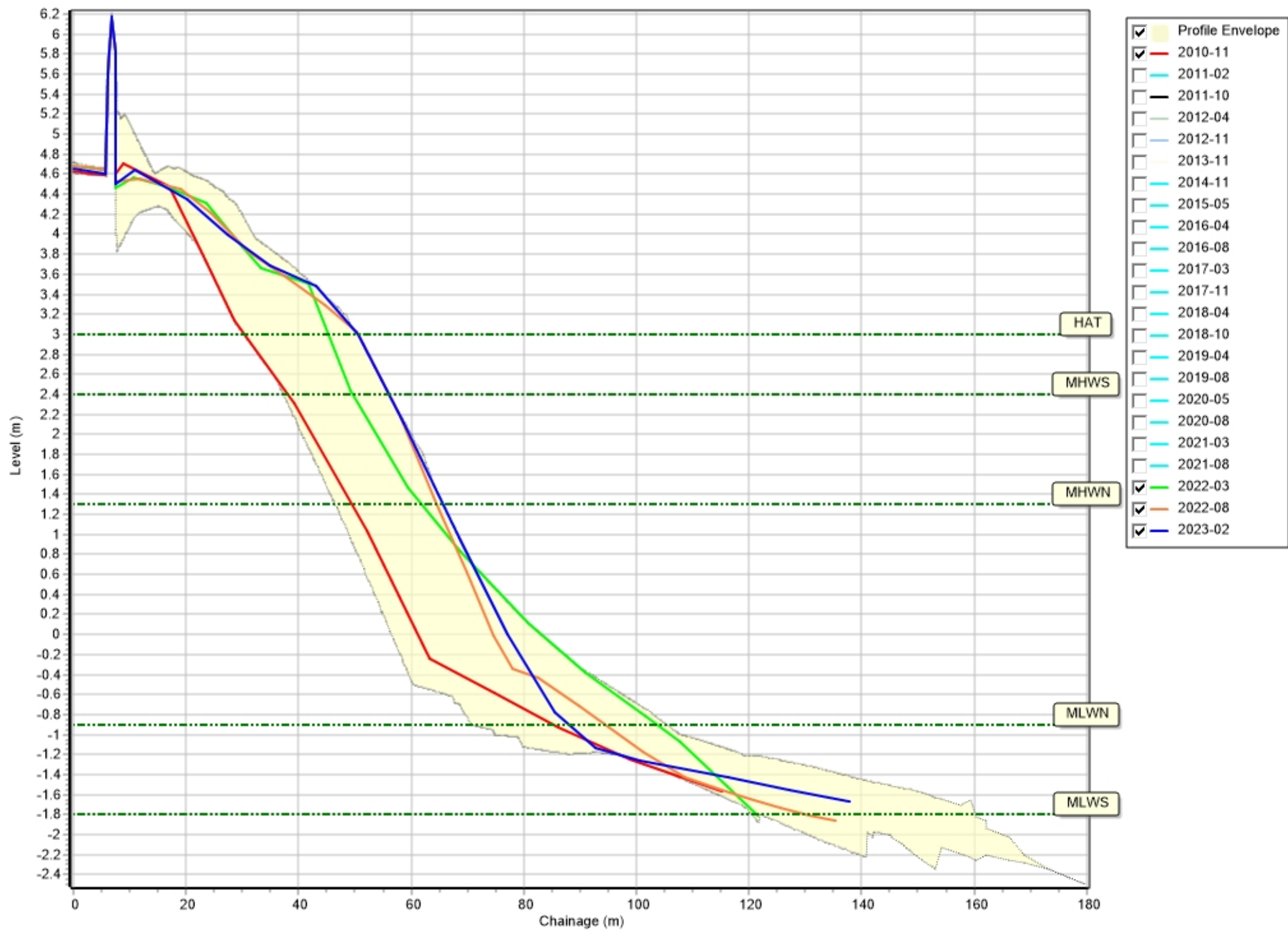
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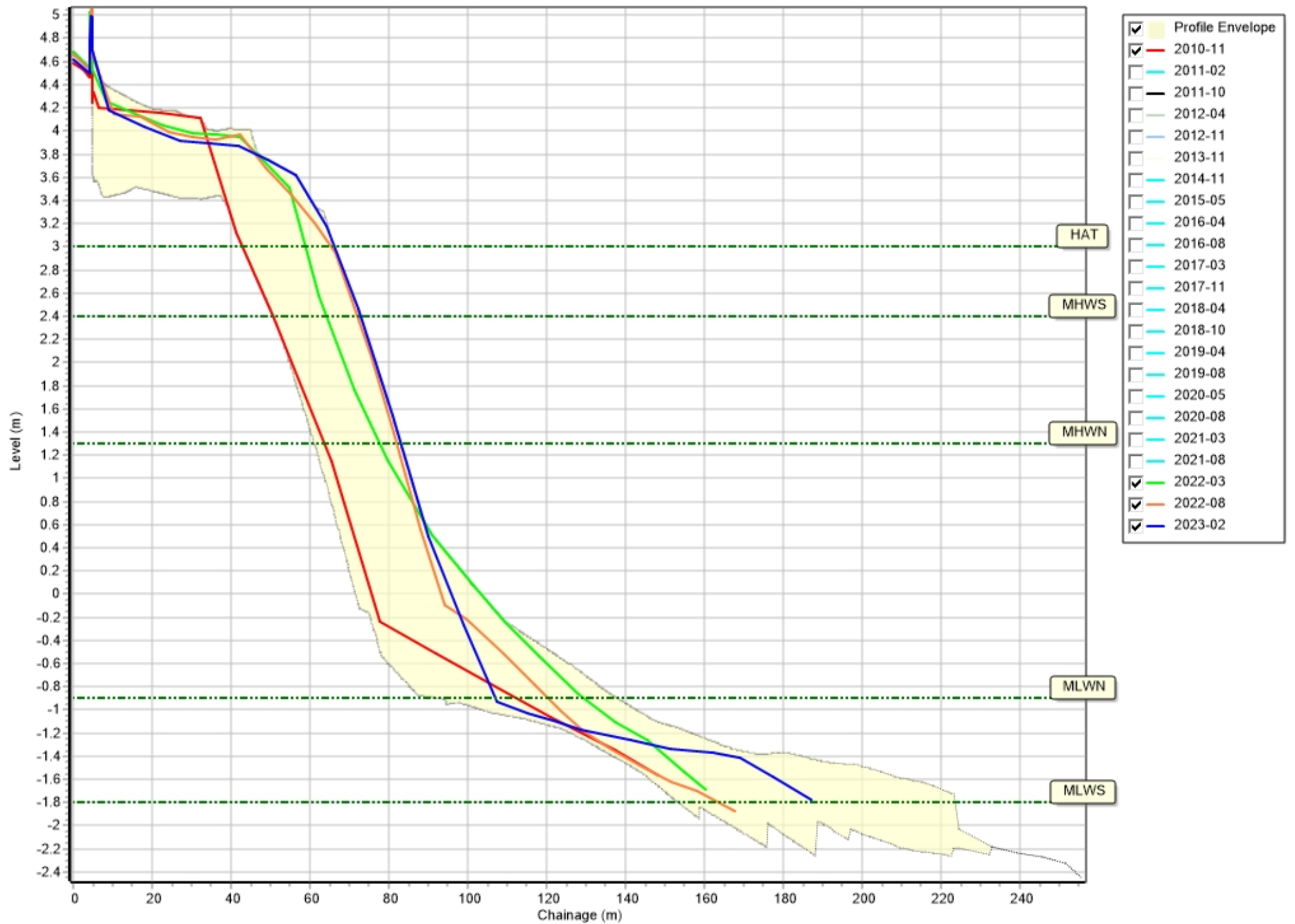
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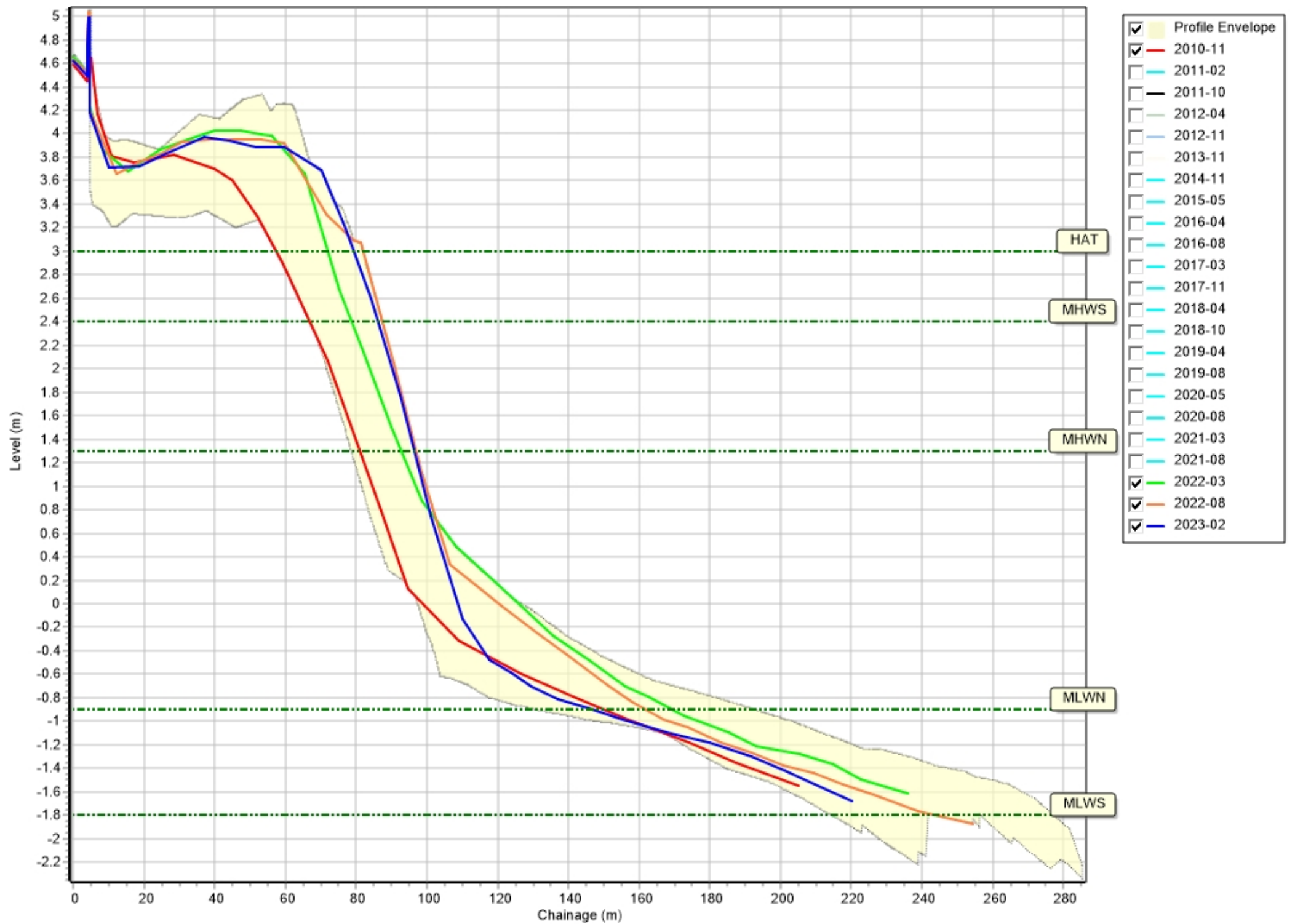
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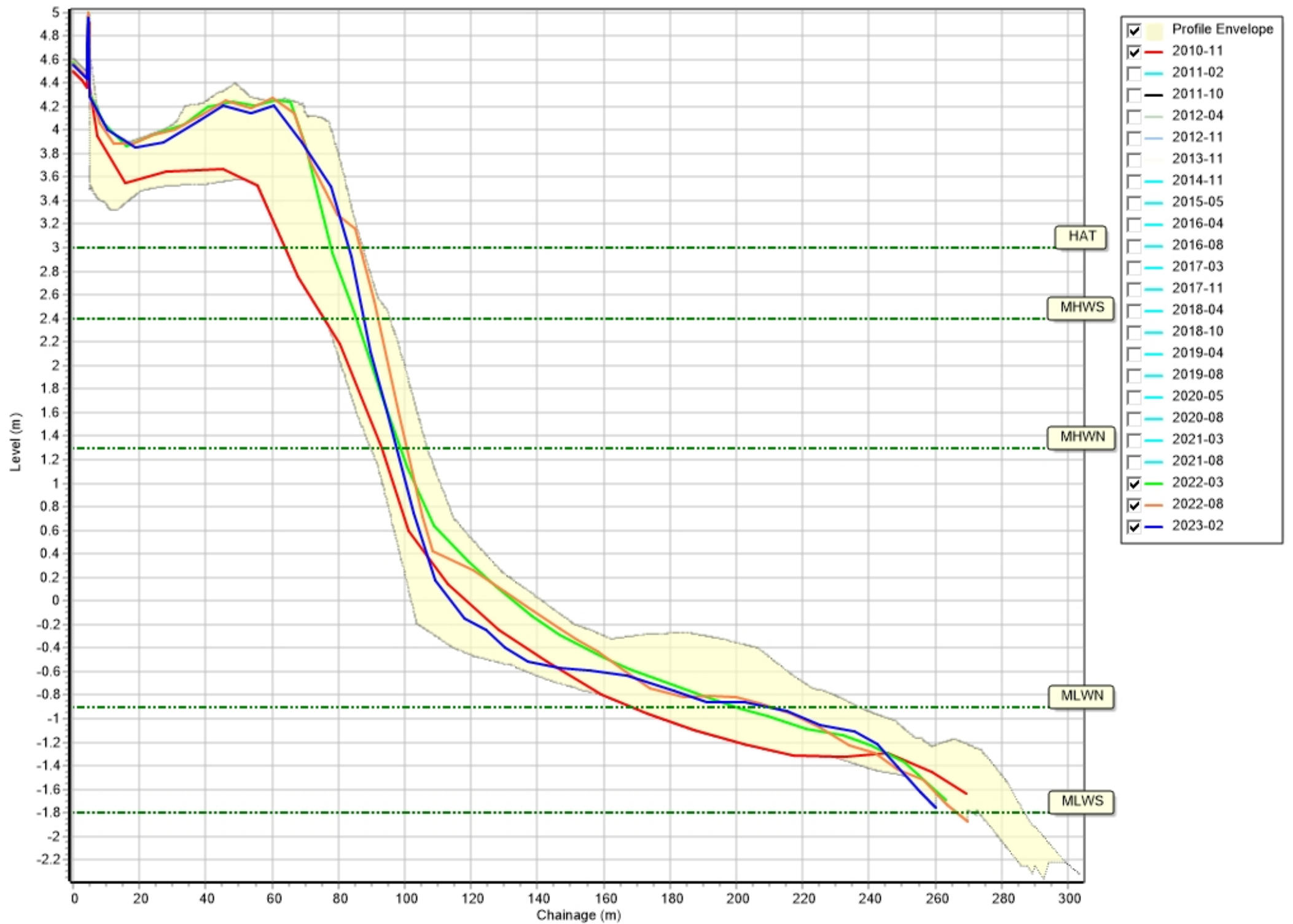
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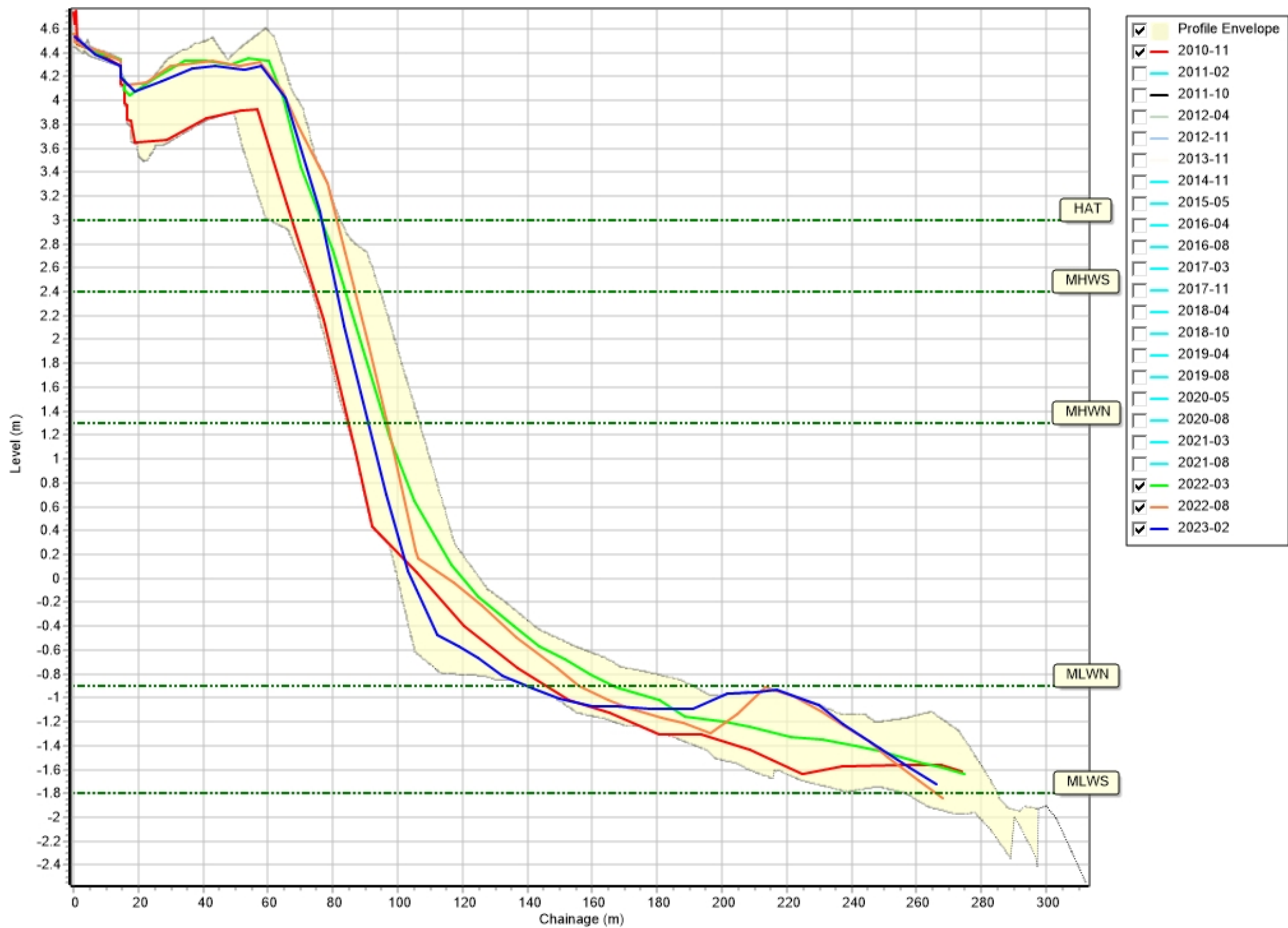
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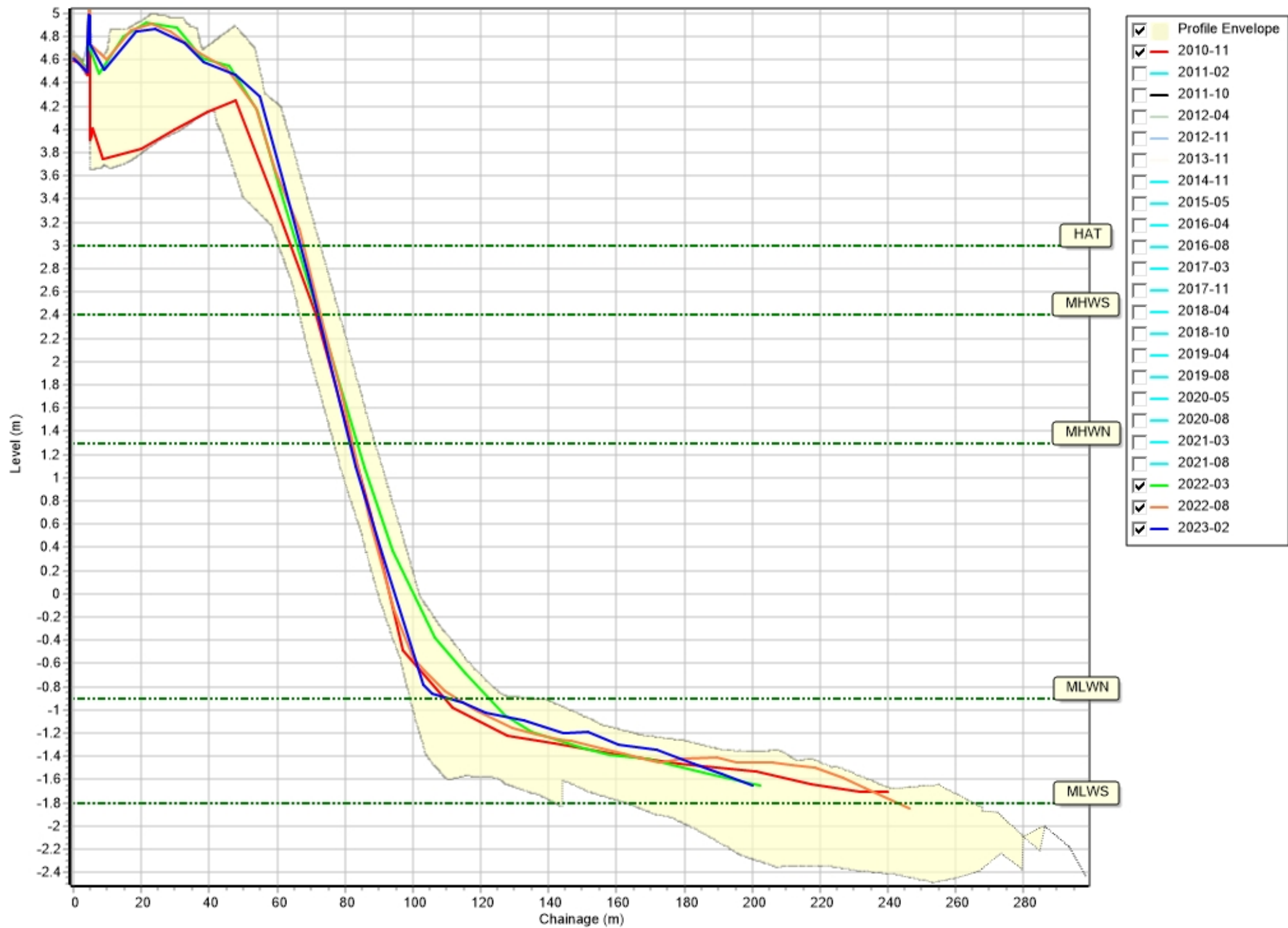
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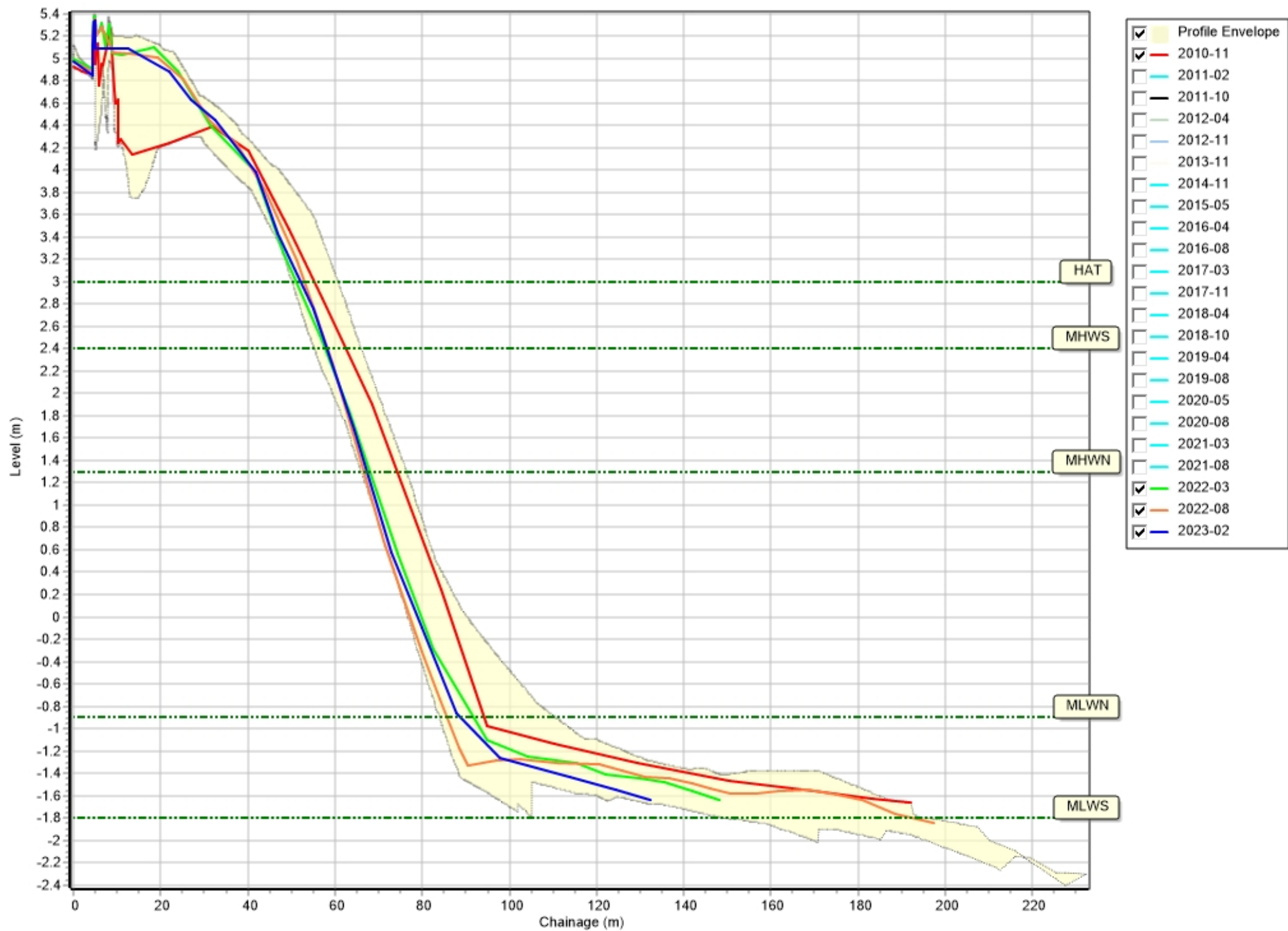
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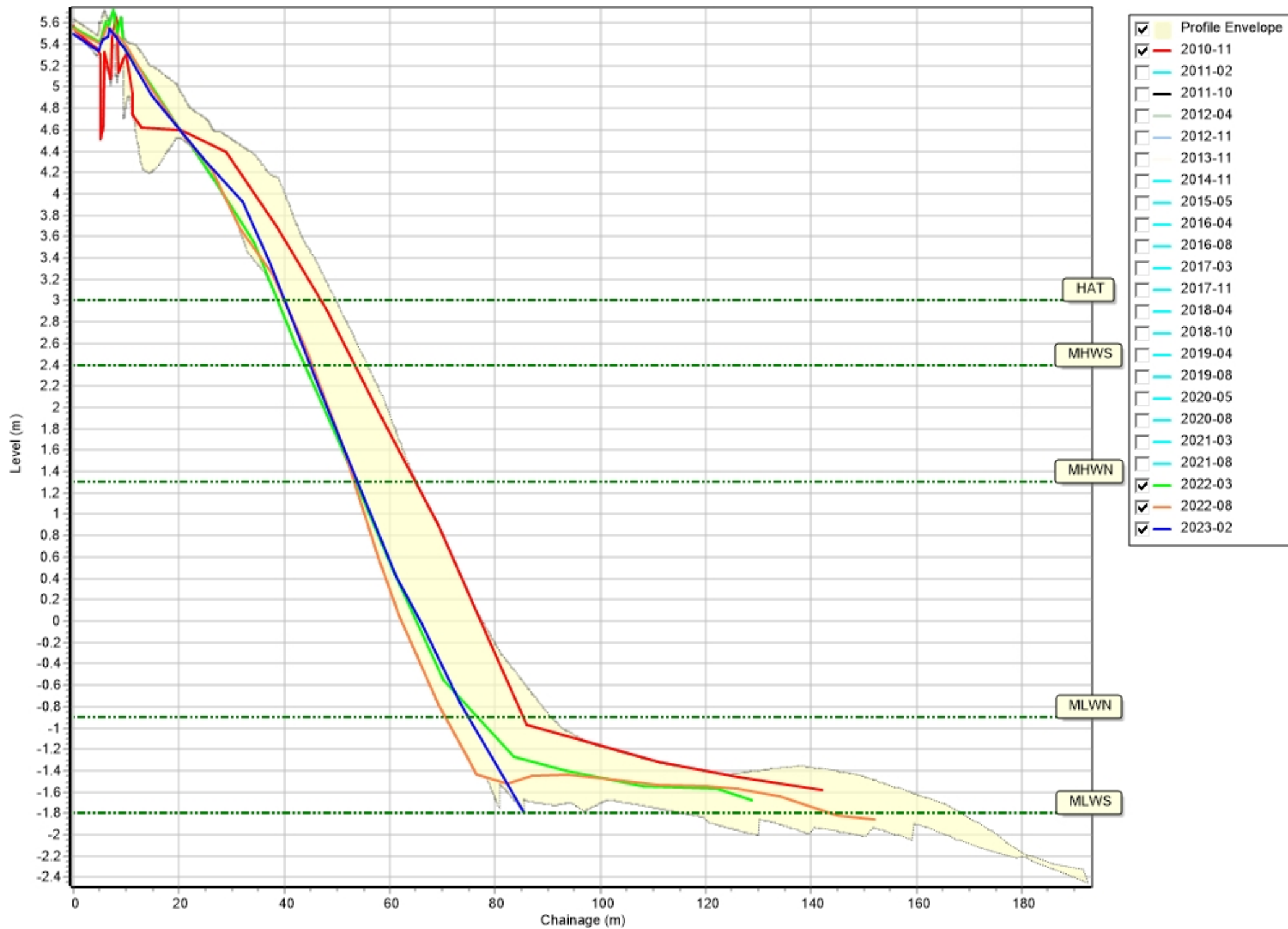
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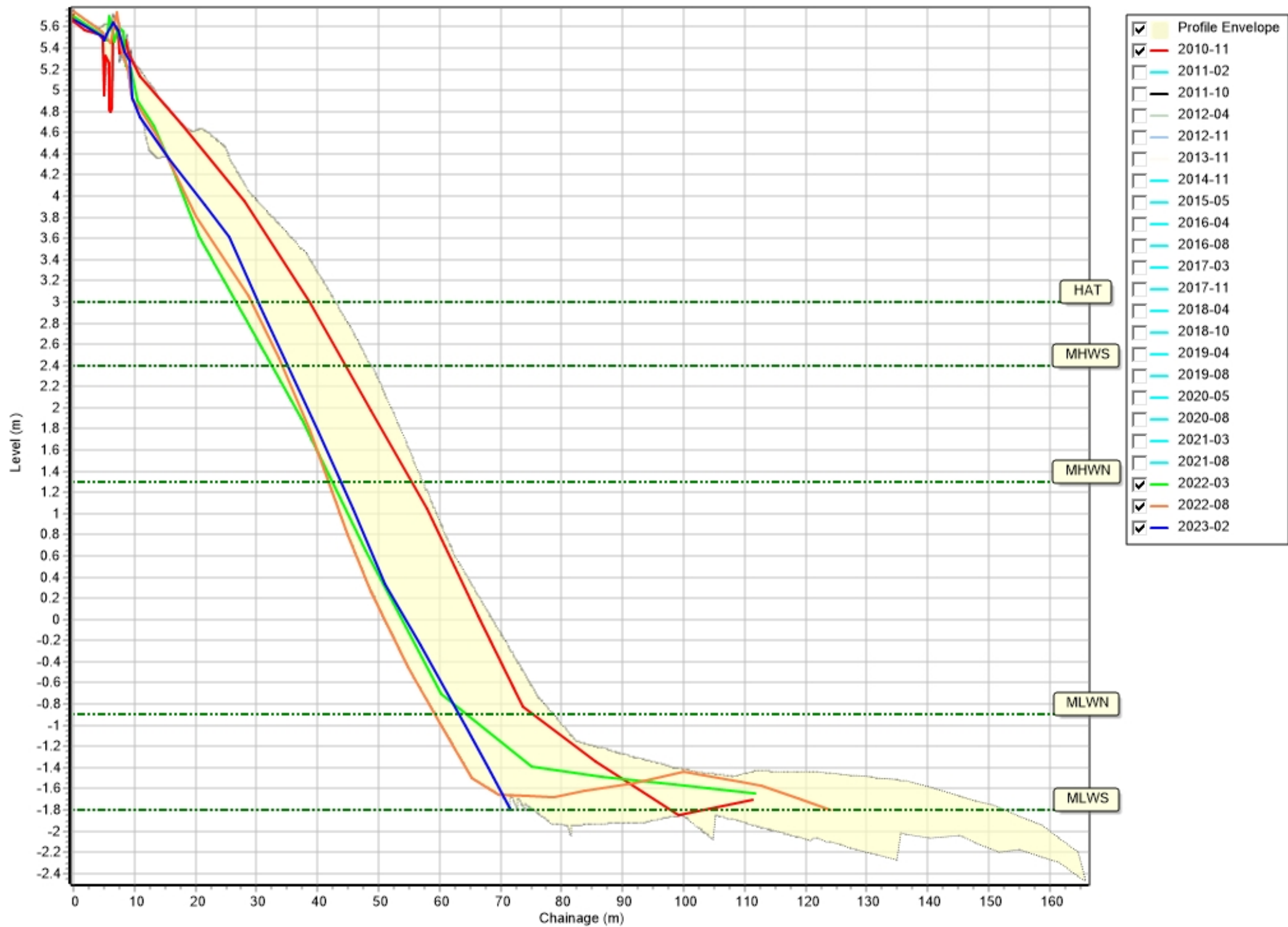
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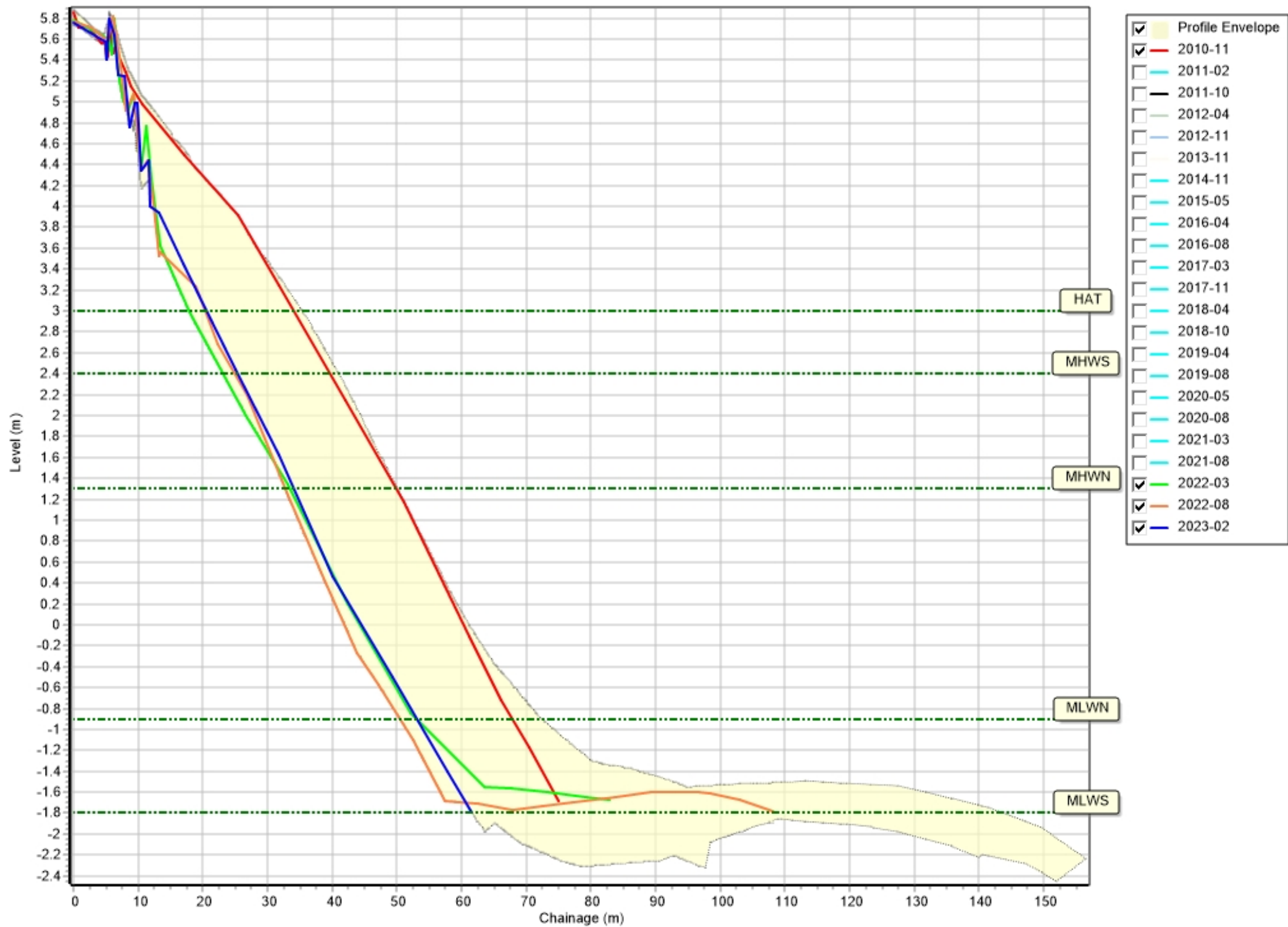
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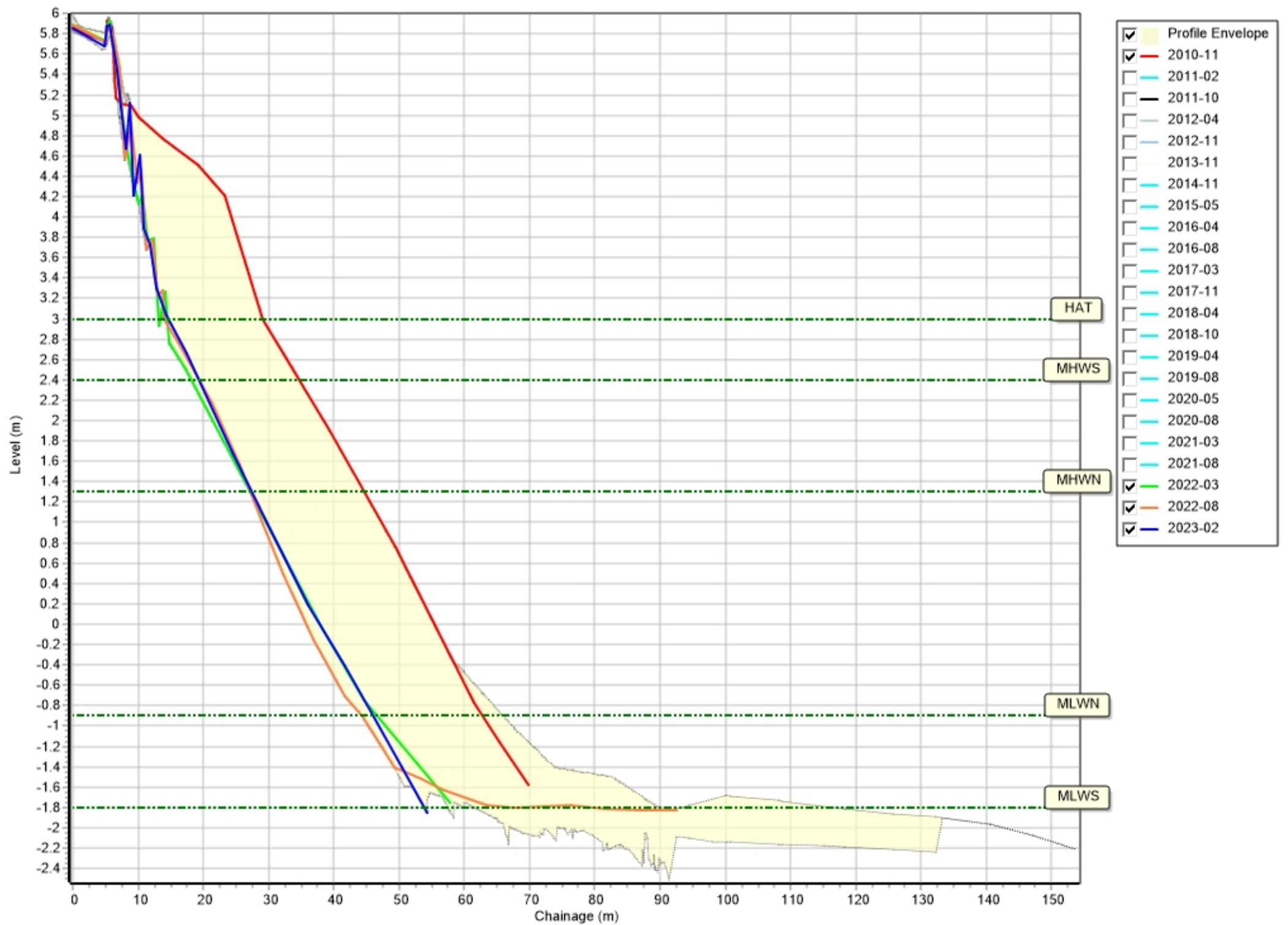
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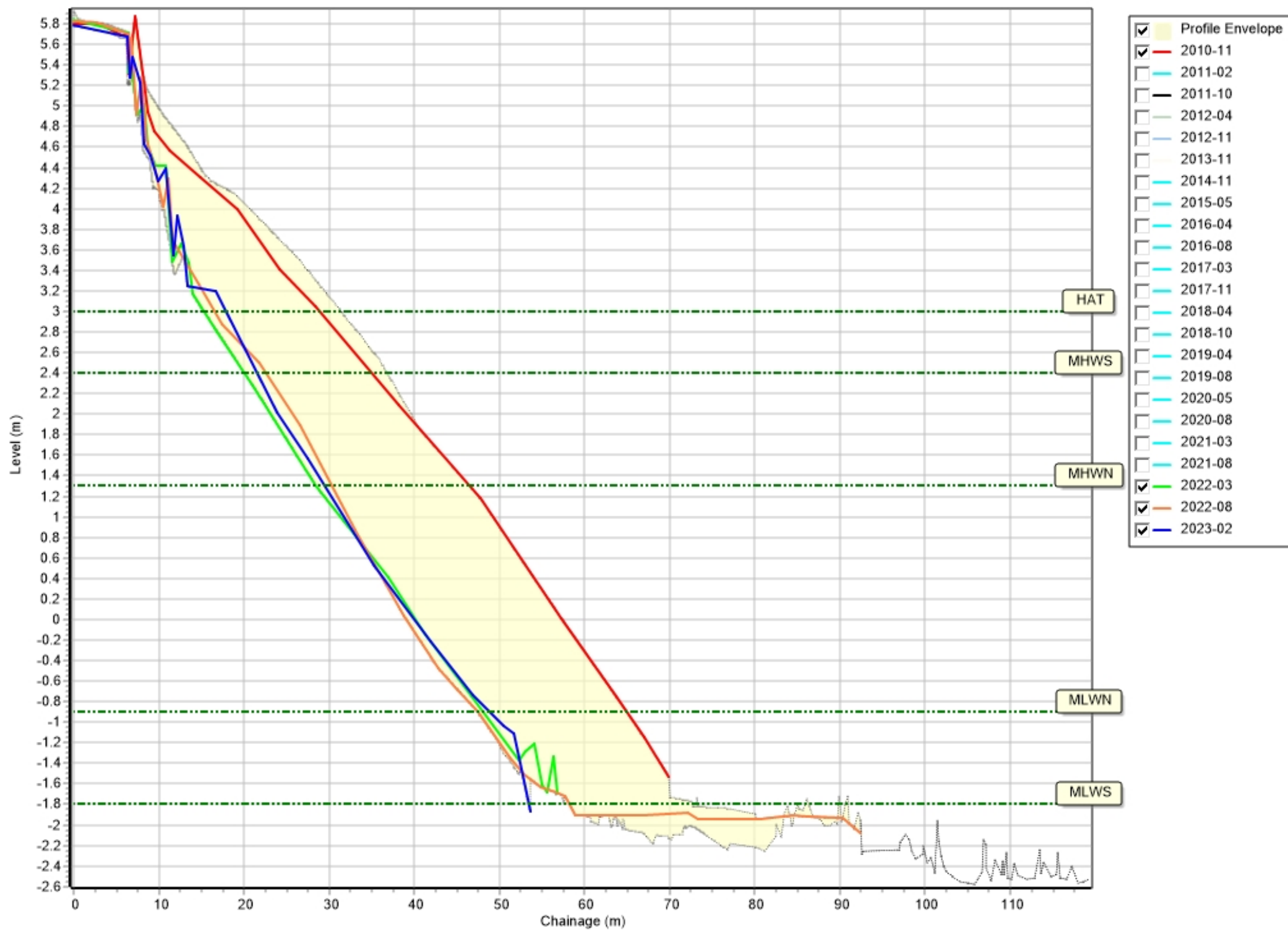
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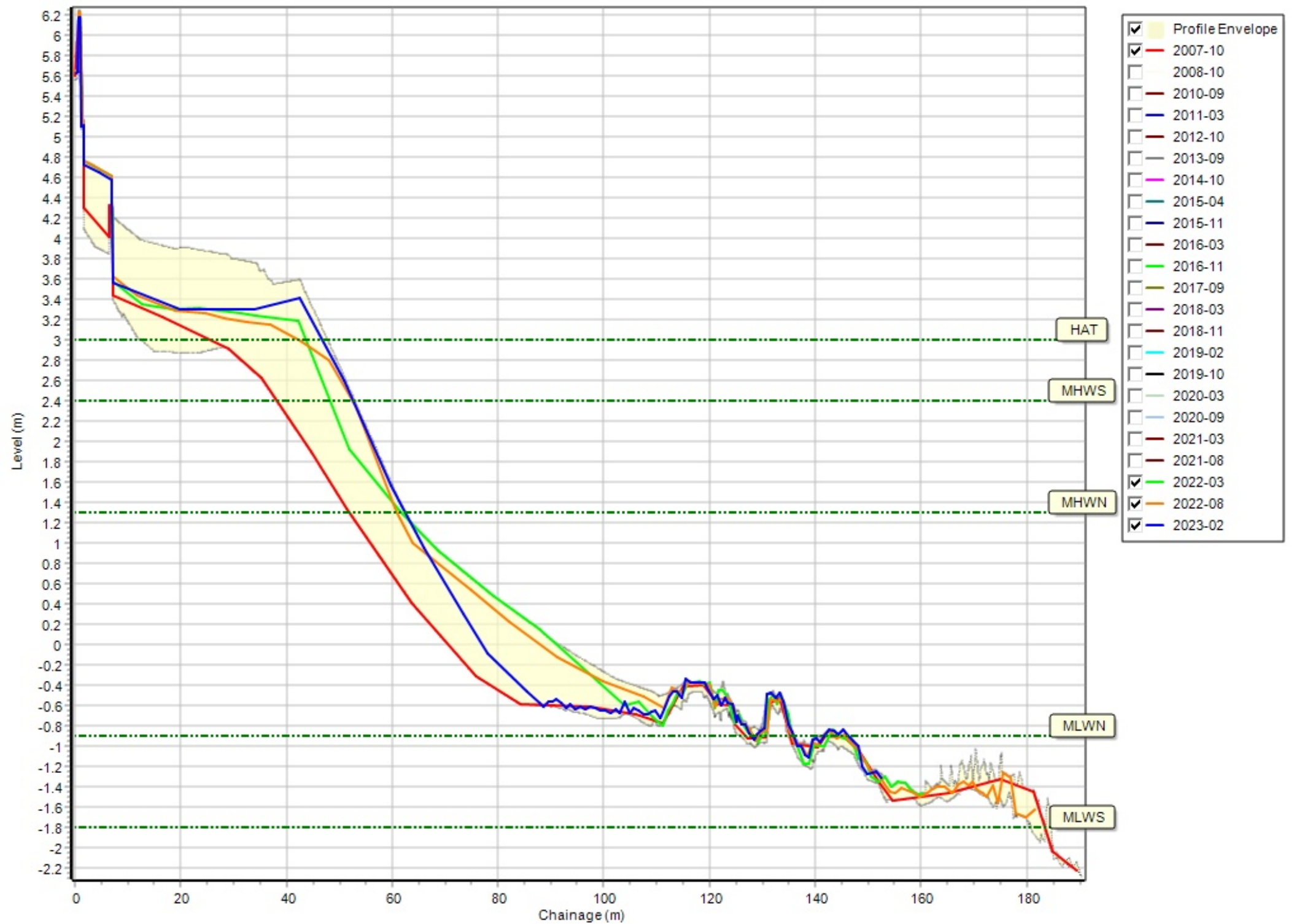
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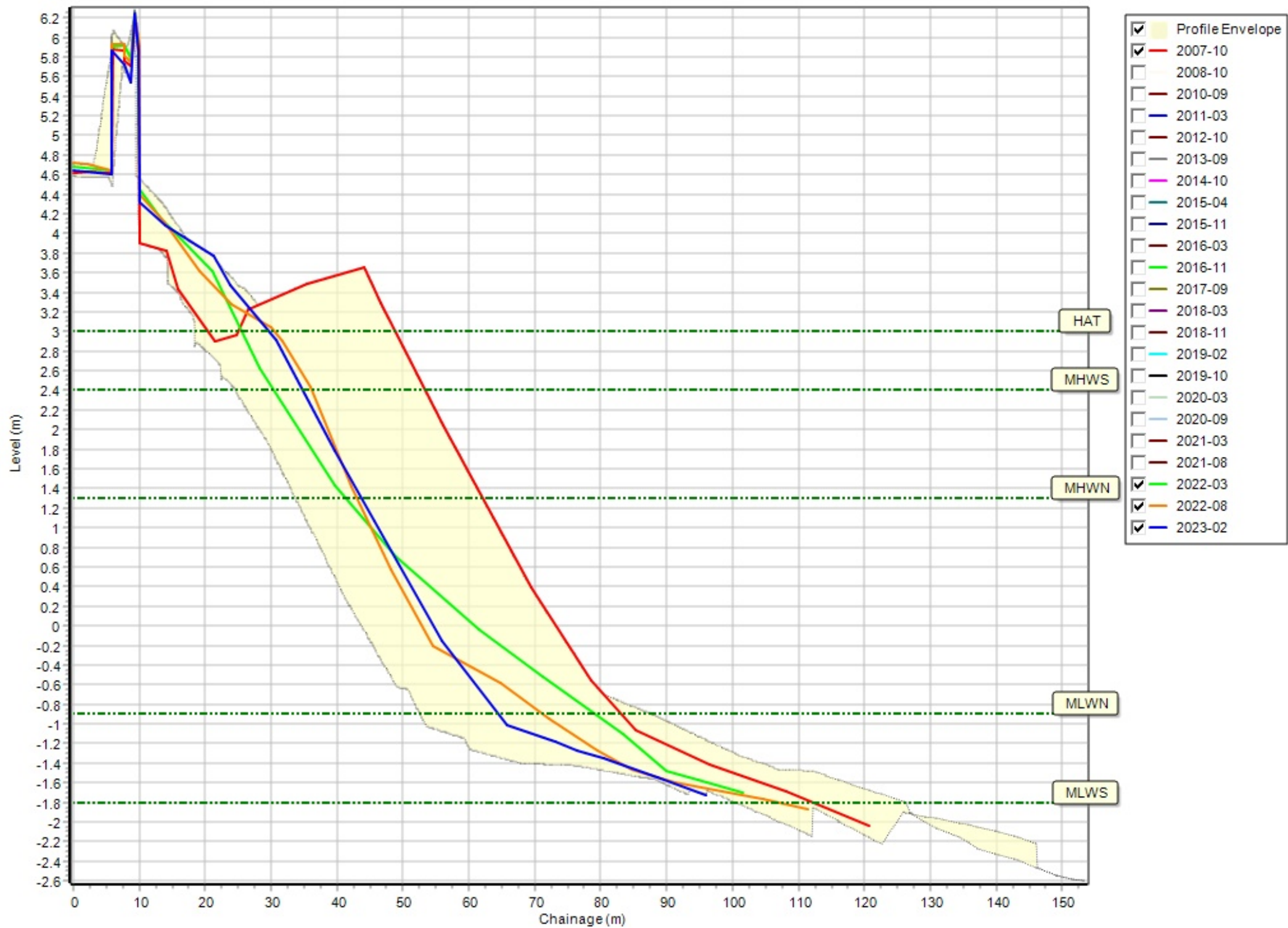
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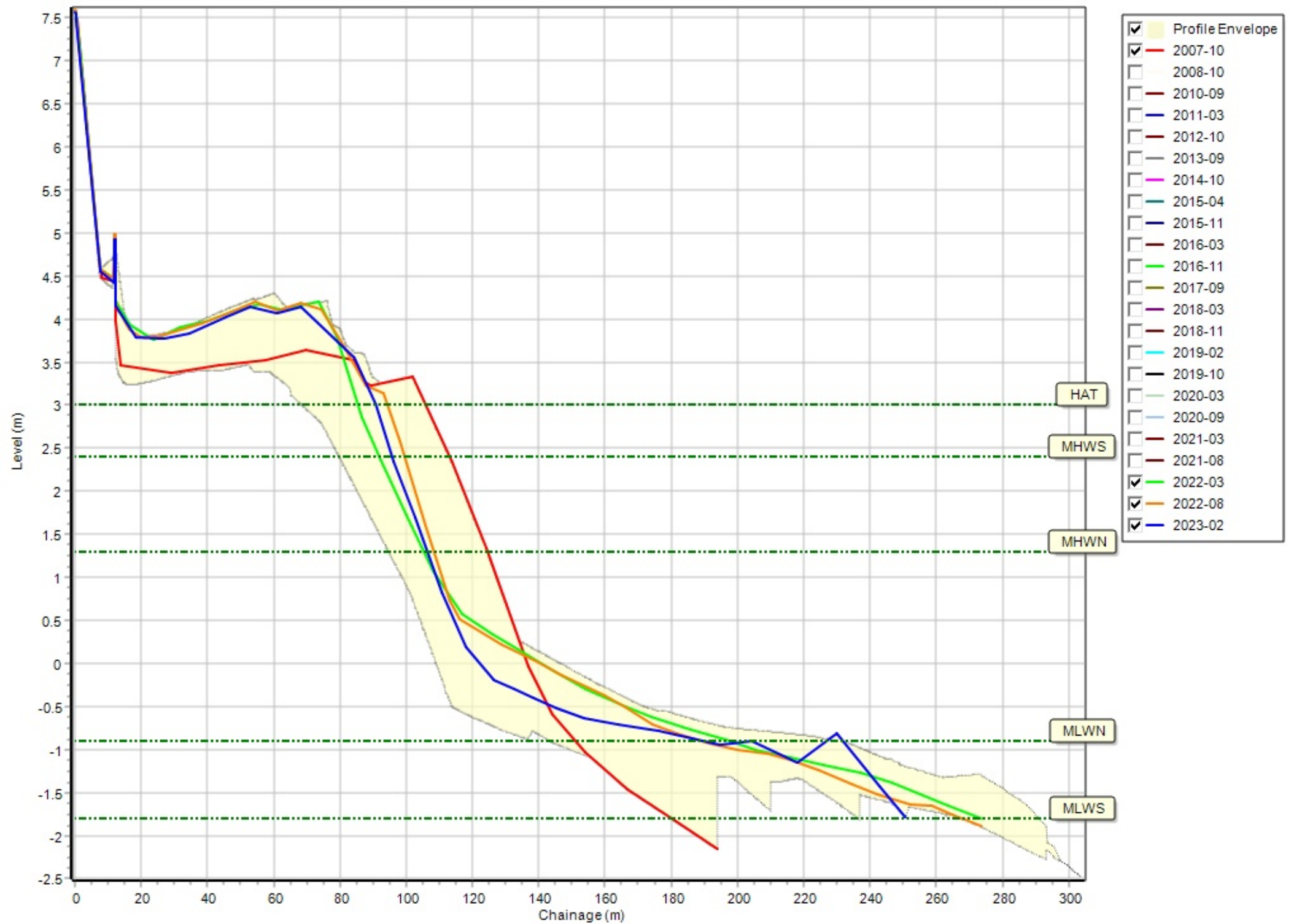
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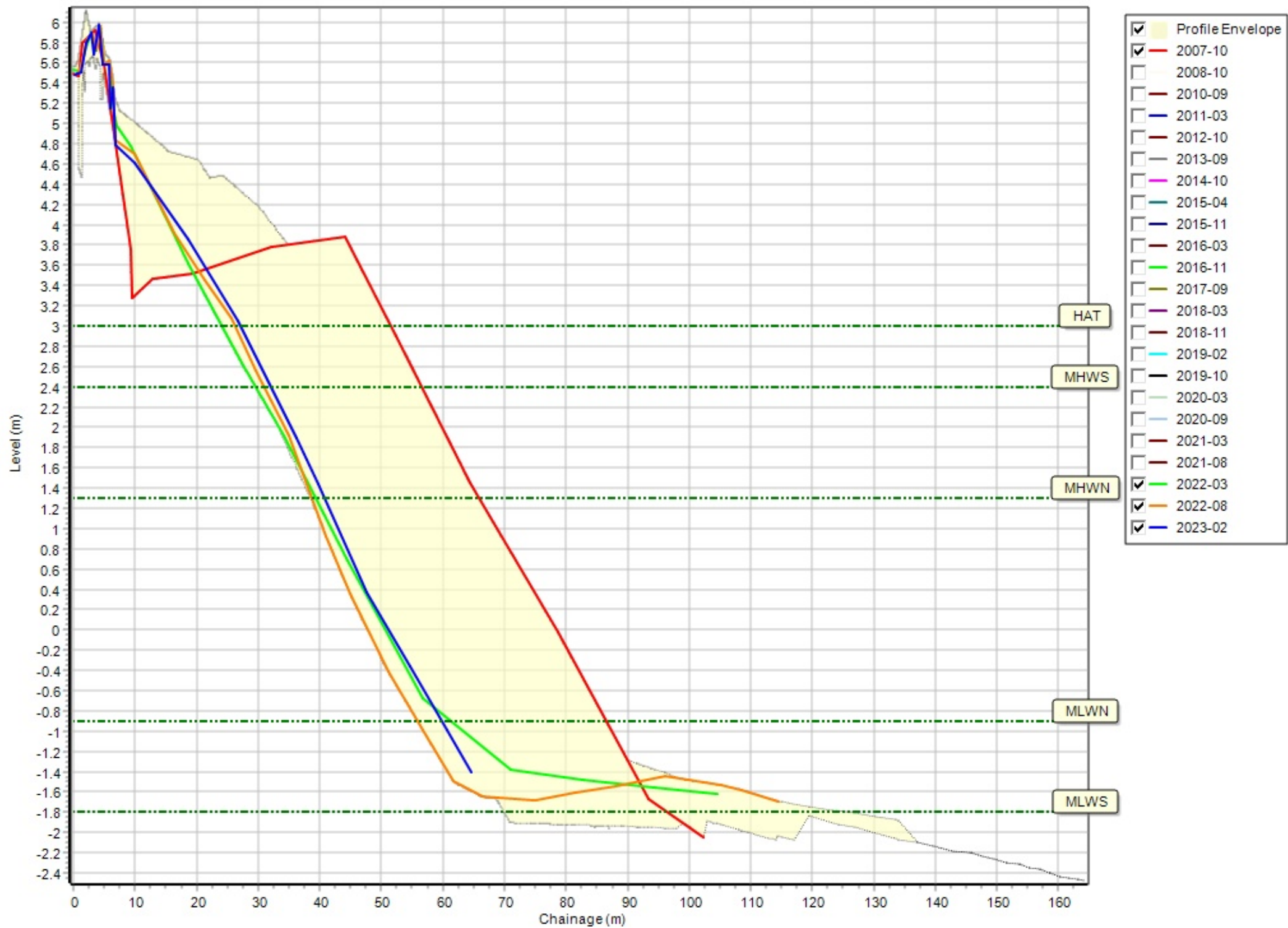
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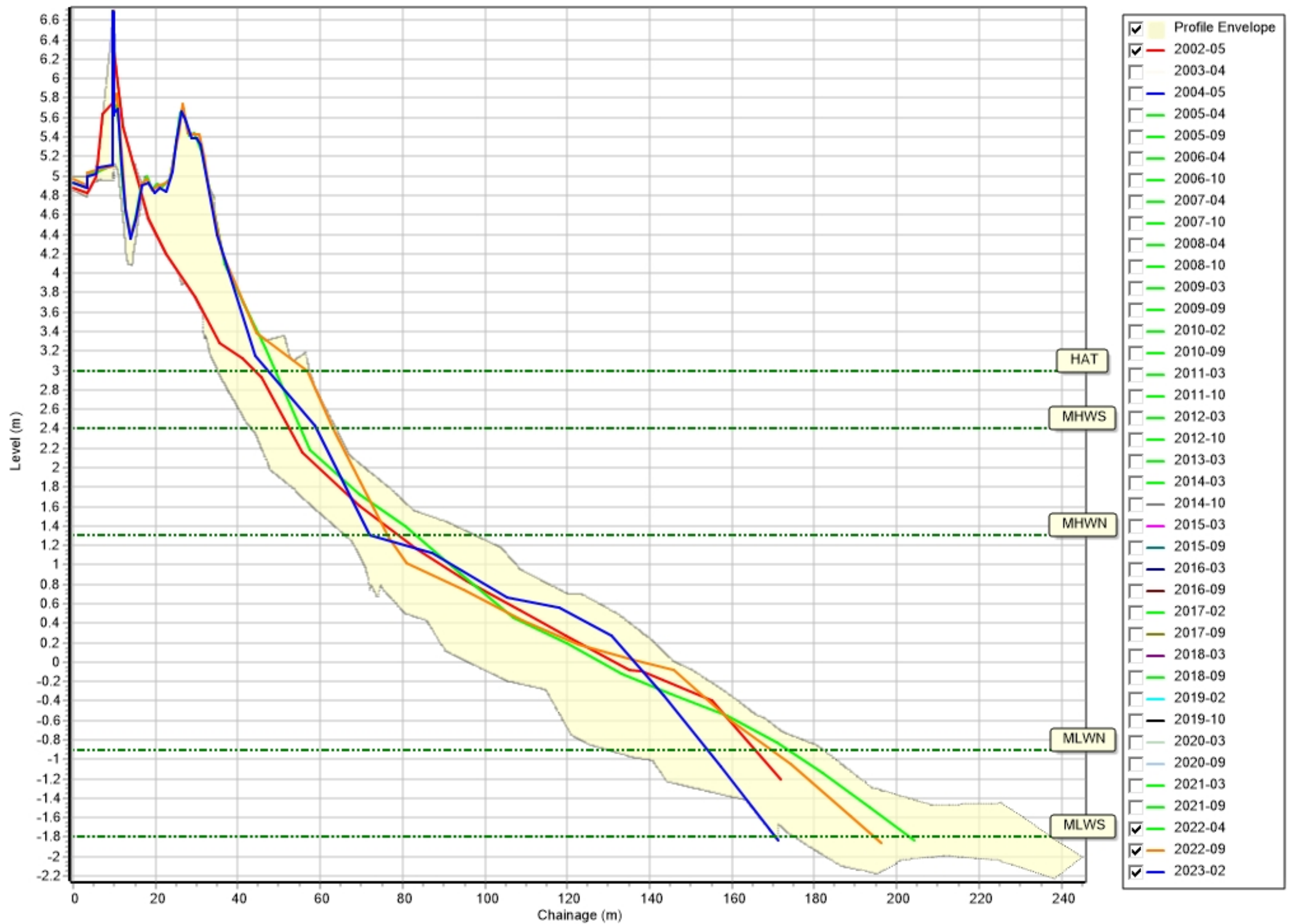
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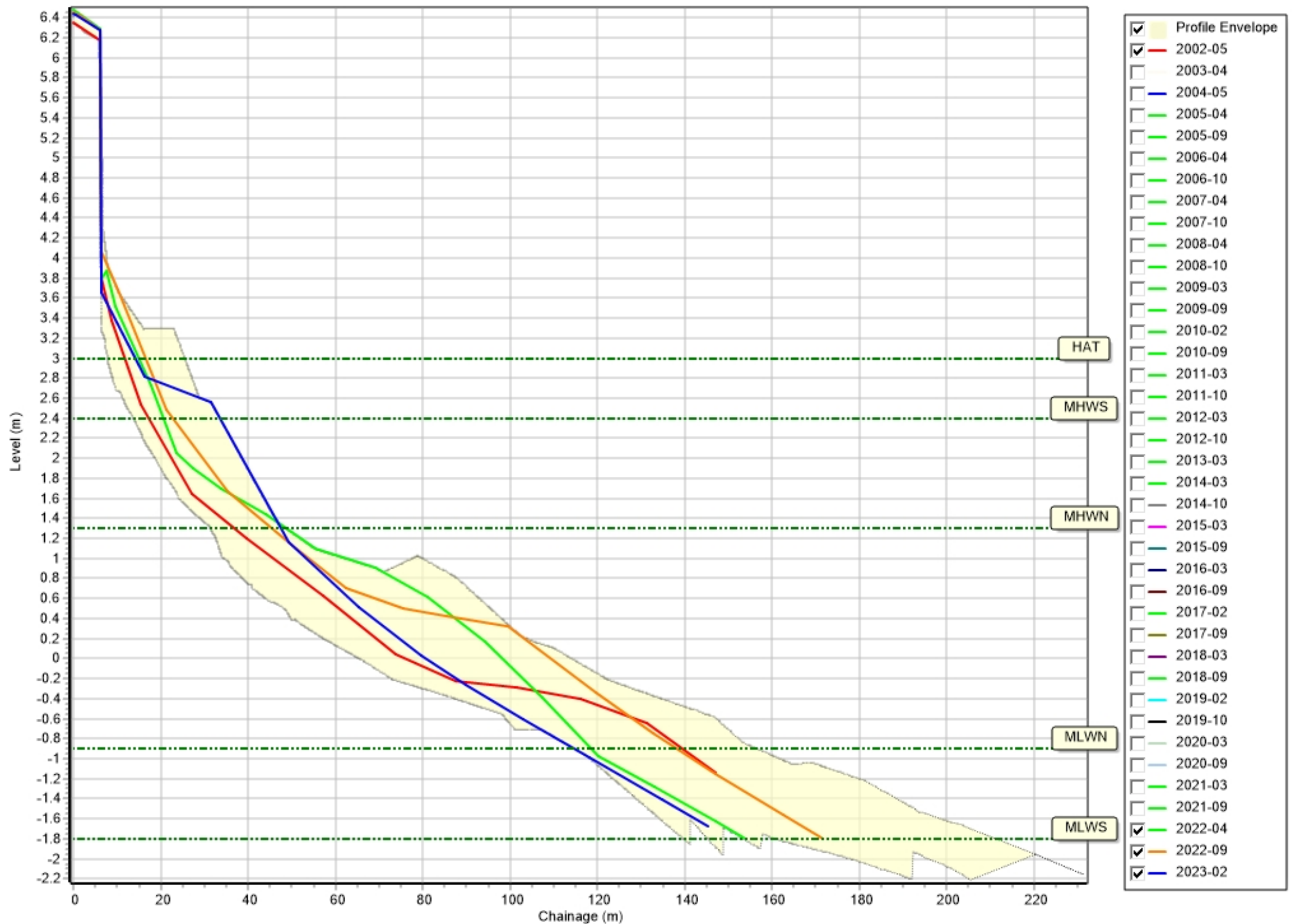
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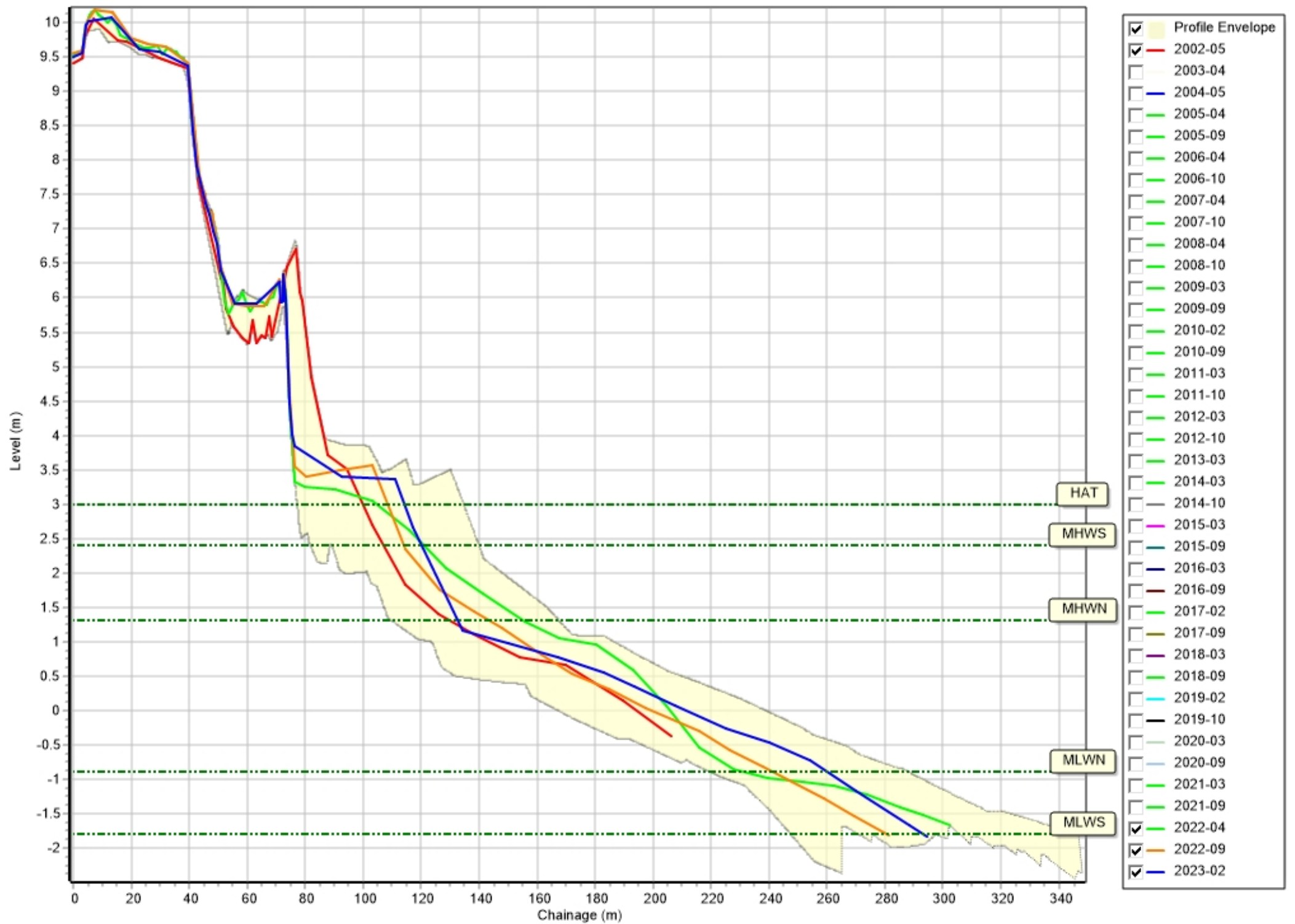
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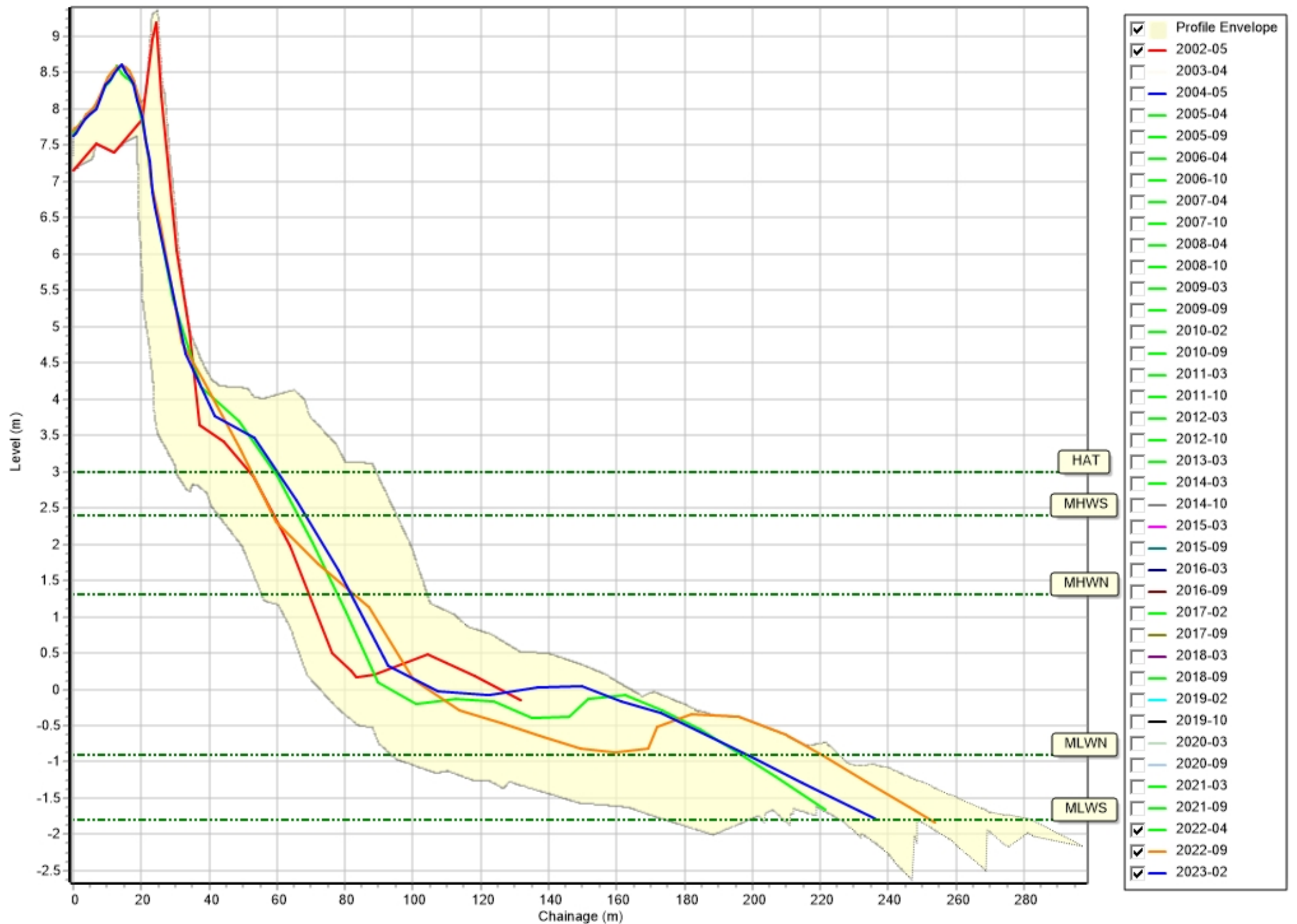
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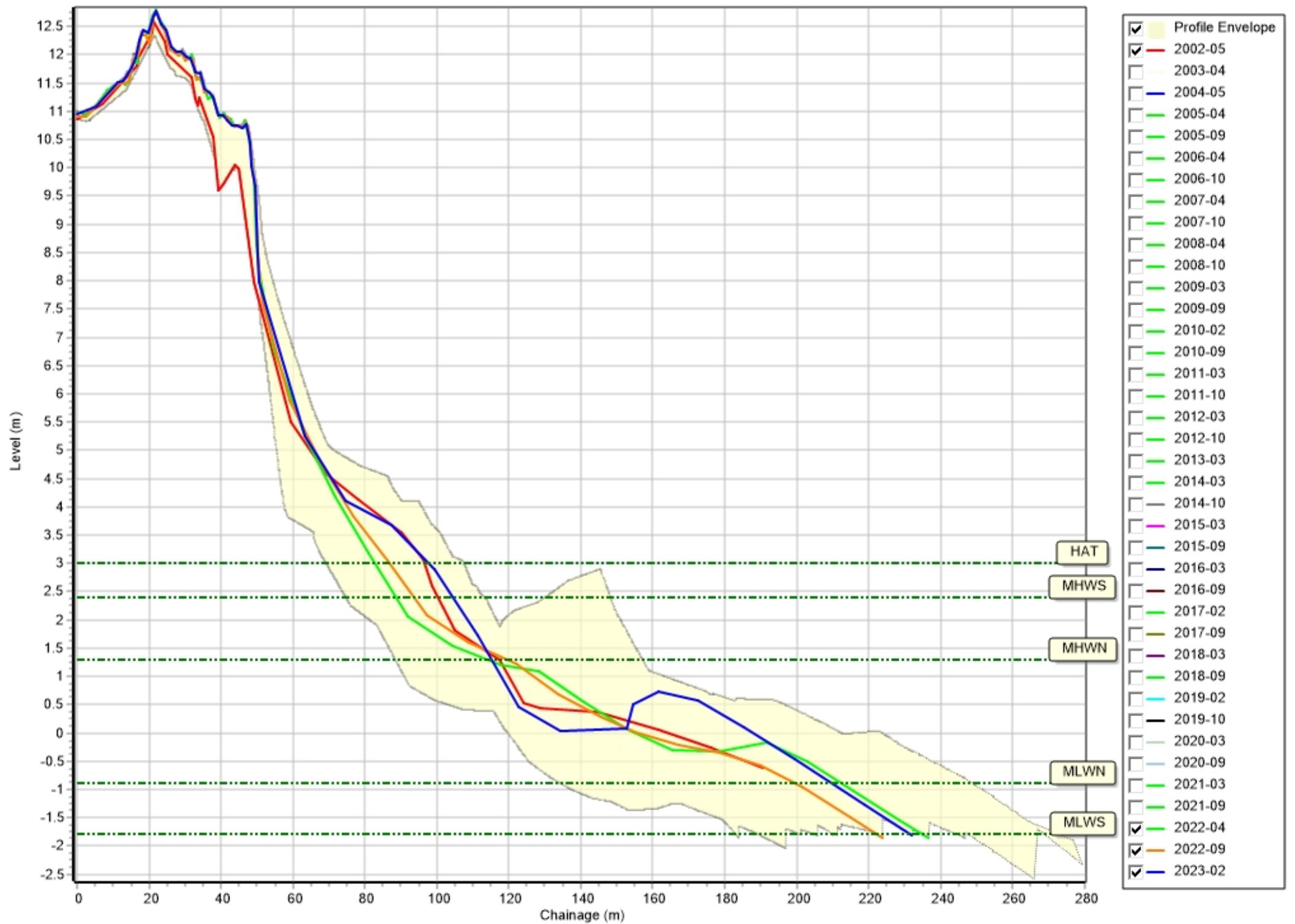
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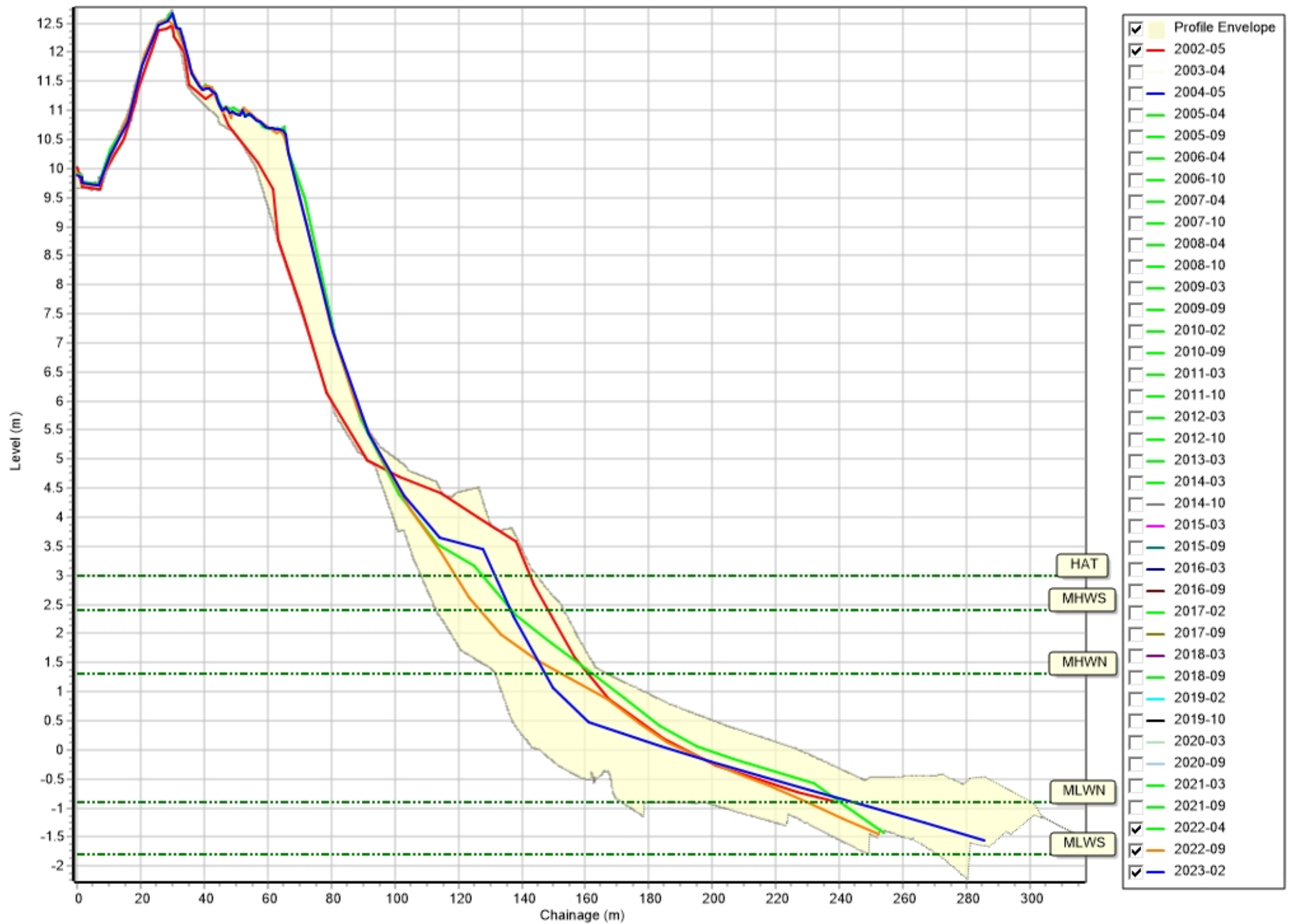
Profiles: 1aBVBC04



Profiles: 1aBVBC05

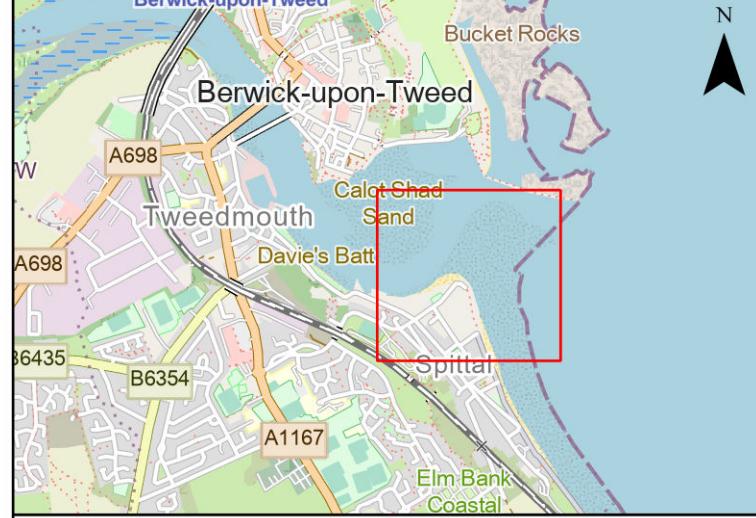
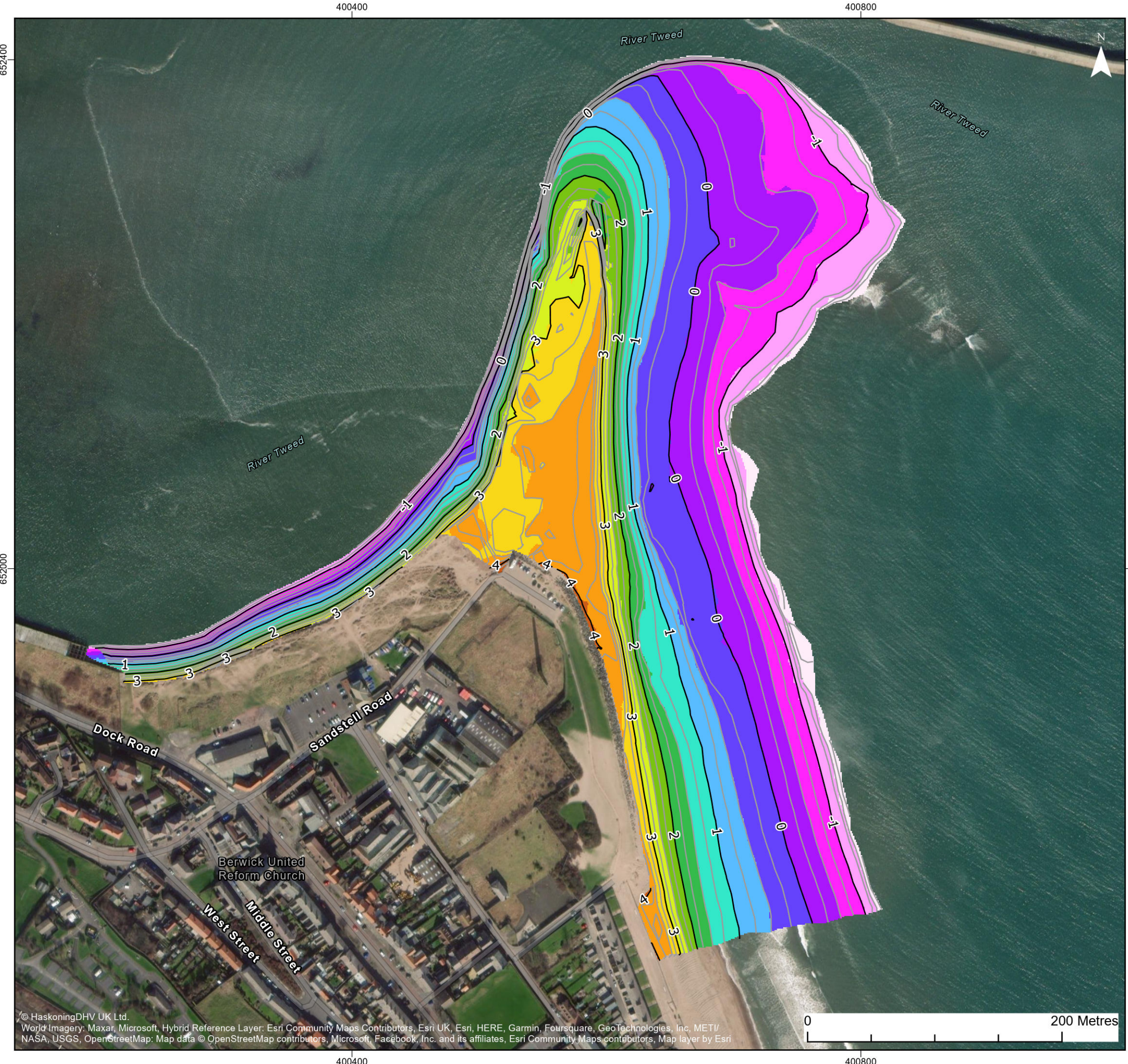


Profiles: 1aBVBC06



Appendix B

Topographic Survey



TOPOGRAPHIC SURVEY (March 2023)

Elevation (mOD)

- 1.8 - -1.5
- 1.4 - -1
- 0.9 - -0.5
- 0.4 - 0
- 0.1 - 0.5
- 0.6 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5

Contours (mOD)*

- 1.0m interval
- 0.25m interval

* Contours only cover sandy beach areas.

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

Title:

Appendix B - Map 1

Spittal A and B

Northumberland County Council Frontage

Report:

Update Report
'Partial Measures' Survey 2023

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:3,000

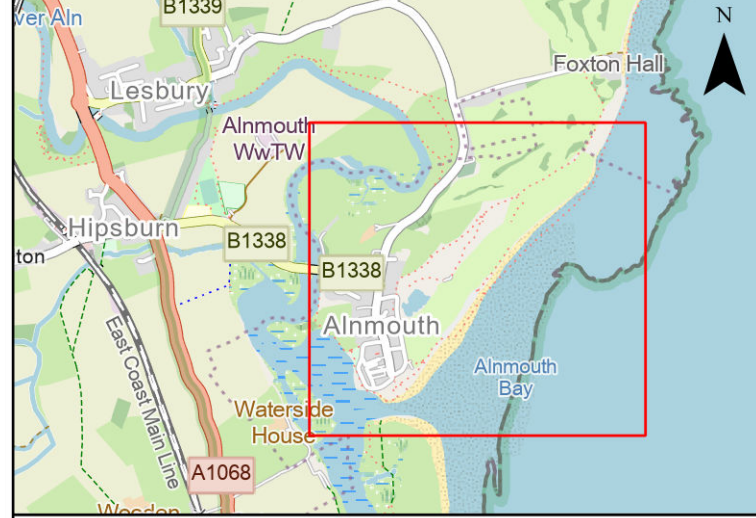
Co-ordinate system: British National Grid



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TOPOGRAPHIC SURVEY (March 2023)

Elevation (mOD)	Contours (mOD)*
7.6 - 8	— 1.0m interval
7.1 - 7.5	— 0.25m interval
6.6 - 7	
6.1 - 6.5	
5.6 - 6	
5.1 - 5.5	
4.6 - 5	
4.1 - 4.5	
3.6 - 4	
3.1 - 3.5	
2.6 - 3	
2.1 - 2.5	
1.6 - 2	
1.1 - 1.5	
0.6 - 1	
0.1 - 0.5	
-0.4 - 0	
-0.9 - -0.5	
-1.4 - -1	
-1.8 - -1.5	

* Contours only cover sandy beach areas.

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

Title:

Appendix B - Map 2

Alnmouth Bay

Northumberland County Council Frontage

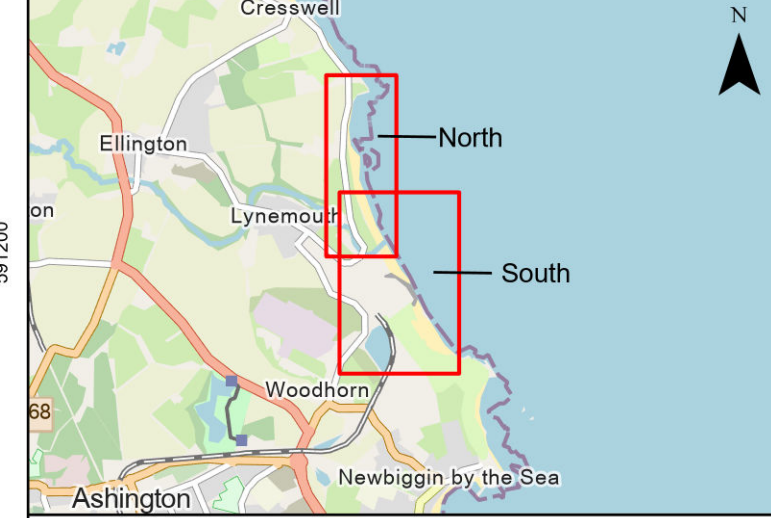
Report:

Update Report
'Partial Measures' Survey 2023

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:5,500

Co-ordinate system: British National Grid





TOPOGRAPHIC SURVEY (February 2023)



Elevation (mOD)

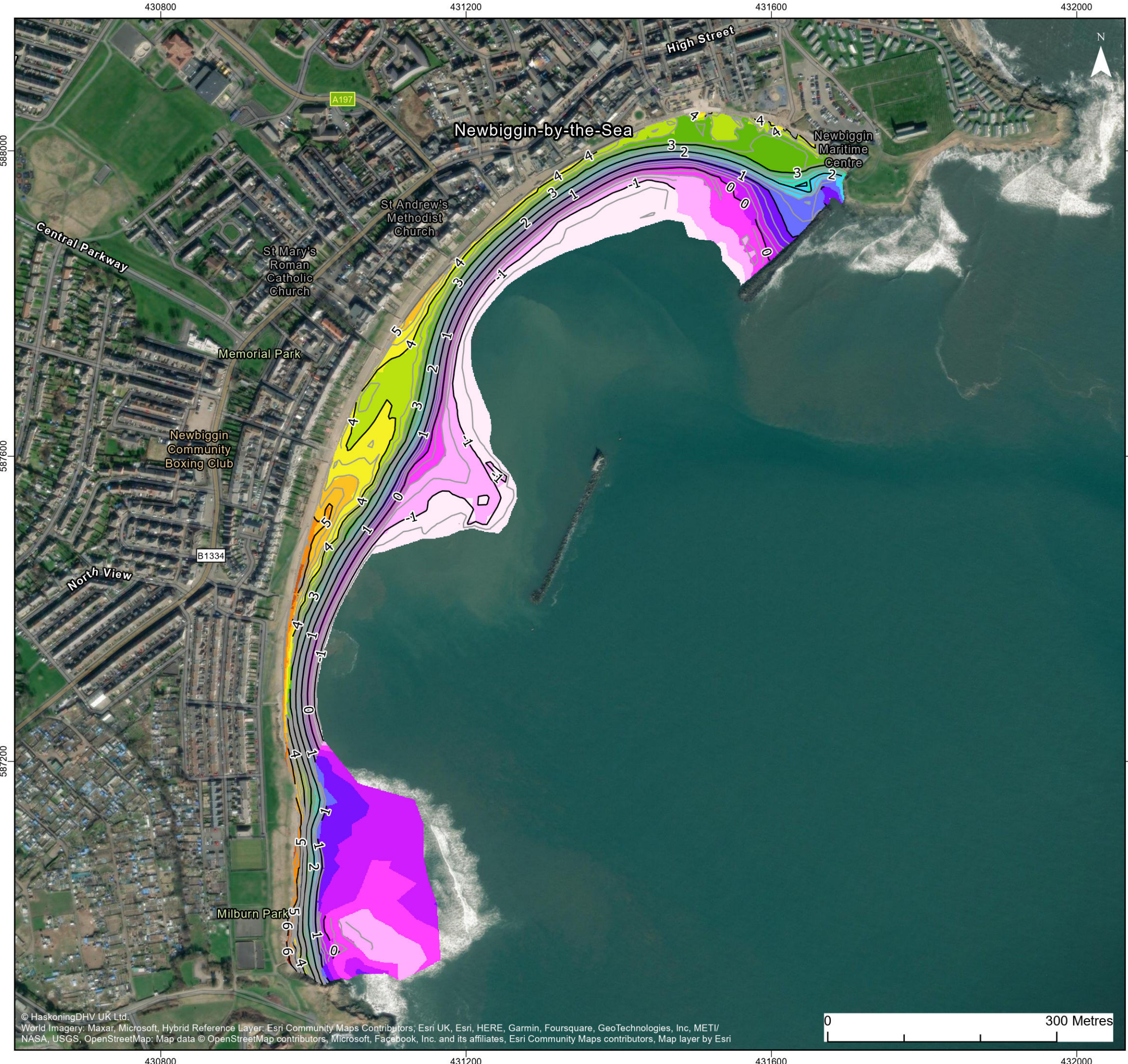
- 1.9 - -1.5
- 1.4 - -1
- 0.9 - -0.5
- 0.4 - 0
- 0.1 - 0.5
- 0.6 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8

Contours (mOD)*

- 1.0m interval
- 0.5m interval

* Contours only cover sandy beach areas.

Client:	North East Coastal Group	Project:	Cell 1 Regional Coastal Monitoring Programme		
Title:					
Appendix B - Map 3					
LYNEMOUTH					
Northumberland County Council Frontage					
Report:					
Update Report					
'Partial Measures' Survey 2023					
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:8,000
Co-ordinate system: British National Grid					
 					



TOPOGRAPHIC SURVEY (February 2023)

Elevation (mOD)	Contours (mOD)*
-1.4 - -1	— 1.0m interval
-0.9 - -0.5	— 0.25m interval
-0.4 - 0	
0.1 - 0.5	
0.6 - 1	
1.1 - 1.5	
1.6 - 2	
2.1 - 2.5	
2.6 - 3	
3.1 - 3.5	
3.6 - 4	
4.1 - 4.5	
4.6 - 5	
5.1 - 5.5	
5.6 - 6	
6.1 - 6.5	

* Contours only cover sandy beach areas.

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

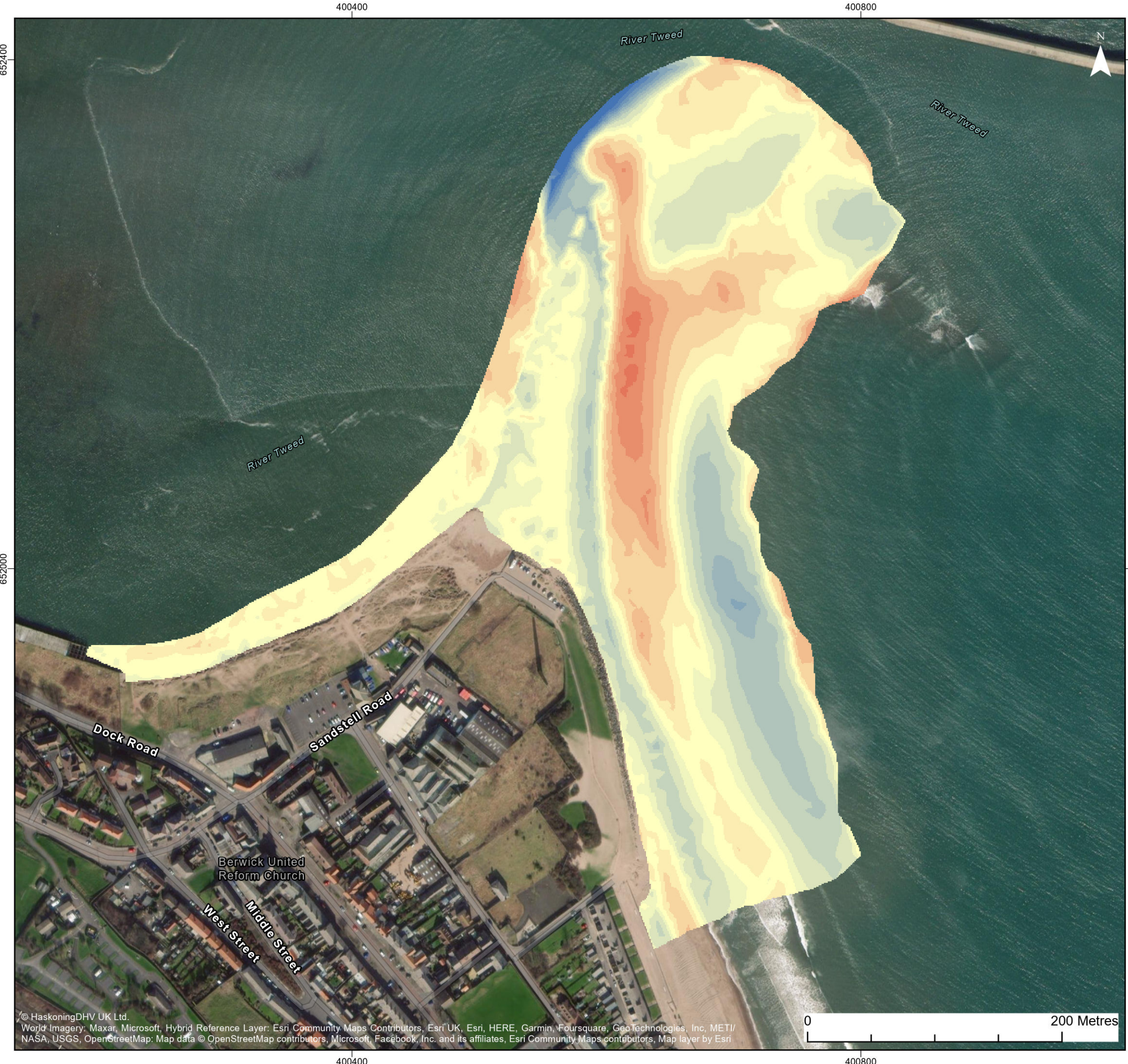
Title:
Appendix B - Map 4
Newbiggin Bay
Northumberland County Council Frontage

Report:
Update Report 'Partial Measures' Survey 2023

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:5,000

Co-ordinate system: British National Grid





Difference between topographic surveys
(Sep 2022 to Mar 2023)

Change in Elevation (mOD)

↑ Gain	>2.0
	1.75 - 2
	1.5 - 1.75
	1.25 - 1.5
	1 - 1.25
	0.75 - 1
	0.5 - 0.75
	0.25 - 0.5
	0.1 - 0.25
Change +/- 0.1m	0 - 0.1
	-0.1 - 0
	-0.25 - -0.1
	-0.5 - -0.25
	-0.75 - -0.5
	-1 - -0.75
	-1.25 - -1
	-1.5 - -1.25
	-1.75 - -1.5
	-2 - -1.75
↓ Loss	<-2

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

Title:

Appendix B - Map 5

Spittal A and B

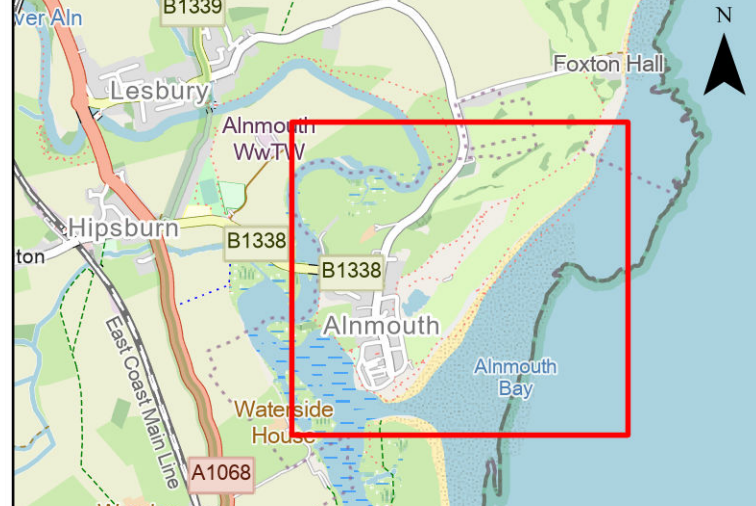
Northumberland County Council Frontage

Report:

Update Report
'Partial Measures' Survey 2023

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:3,000

Co-ordinate system: British National Grid



Difference between topographic surveys
(Aug 2022 to Mar 2023)

Change in Elevation (mOD)

Gain	>2.0
	1.75 - 2
	1.5 - 1.75
	1.25 - 1.5
	1 - 1.25
	0.75 - 1
	0.5 - 0.75
	0.25 - 0.5
	0.1 - 0.25
Change +/- 0.1m	0 - 0.1
	-0.1 - 0
	-0.25 - -0.1
	-0.5 - -0.25
	-0.75 - -0.5
	-1 - -0.75
	-1.25 - -1
Loss	-1.5 - -1.25
	-1.75 - -1.5
	-2 - -1.75
	<-2

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

Title:

Appendix B - Map 6

Alnmouth Bay

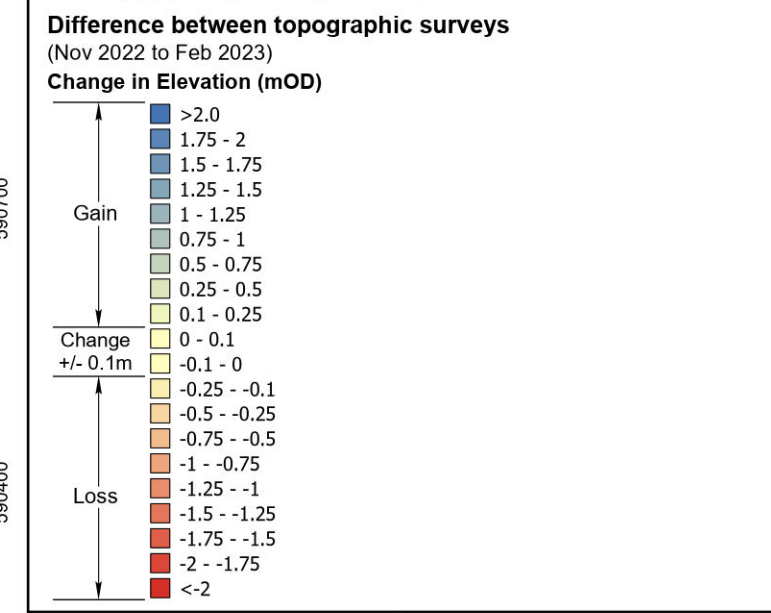
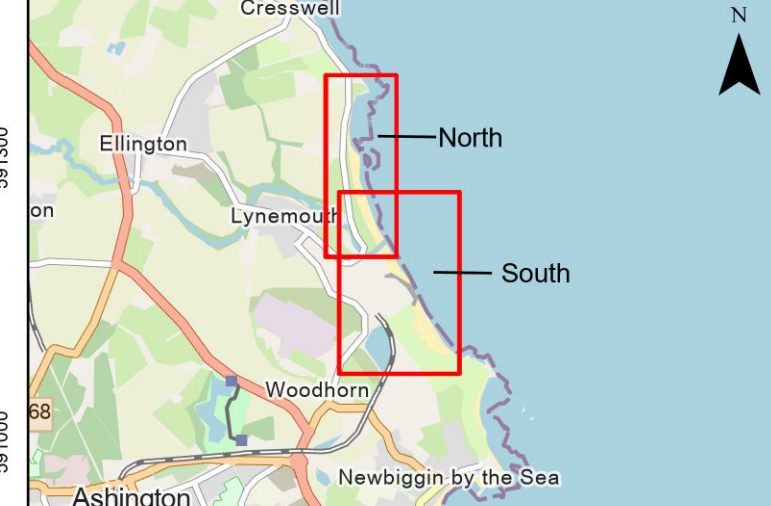
Northumberland County Council Frontage

Report:	Update Report 'Partial Measures' Survey 2023
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Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:5,500

Co-ordinate system: British National Grid





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

Title:

Appendix B - Map 7

LYNEMOUTH

Northumberland County Council Frontage

Report:

Update Report
'Partial Measures' Survey 2023

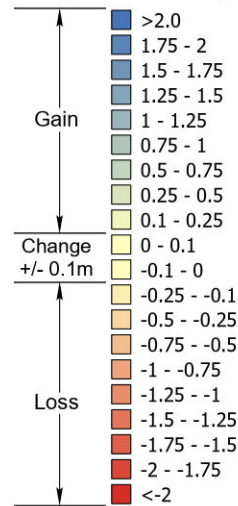
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:8,000

Co-ordinate system: British National Grid



Difference between topographic surveys
(Aug 2022 to Feb 2023)

Change in Elevation (mOD)



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

Title:

Appendix B - Map 8

Newbiggin Bay

Northumberland County Council Frontage

Report:

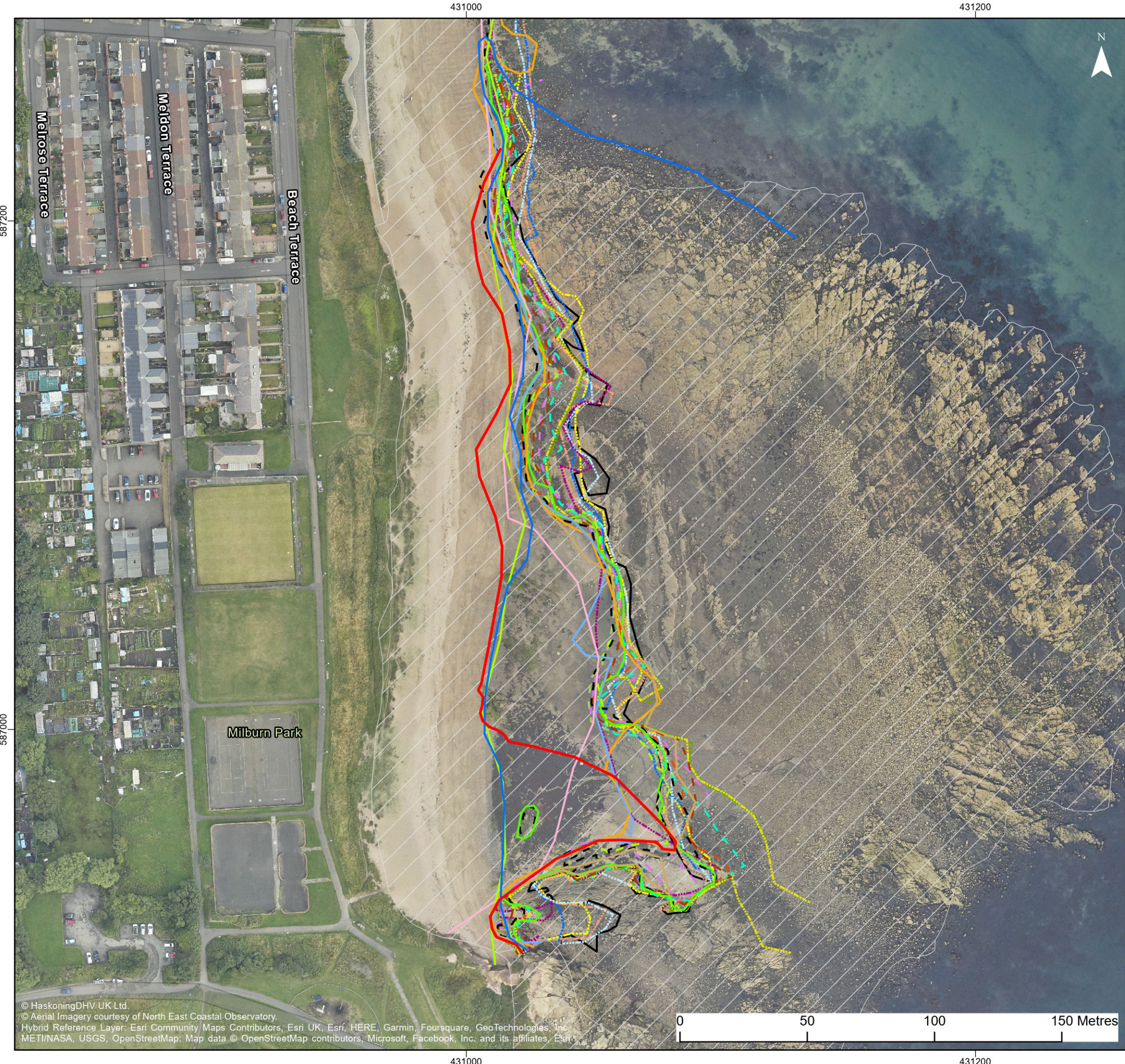
Update Report
'Partial Measures' Survey 2023

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:5,000

Co-ordinate system: British National Grid

Appendix C

Sand Extent Survey



SAND EXTENT

— Spring 2023	— Spring 2017
— Autumn 2022	— Autumn 2016
— Spring 2022	— Spring 2016
— Autumn 2021	— Autumn 2015
— Spring 2021	— Spring 2015
— Autumn 2020	— Autumn 2014
— Spring 2020	— Spring 2014
— Autumn 2019	— Autumn 2013
- - Spring 2019	— Spring 2013
- - Autumn 2018	— Autumn 2012
- - Spring 2018	— Spring 2012
- - Autumn 2017	— Autumn 2011

▨ Site of Special Scientific Interest (SSSI)

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

Title:

Appendix C - Map 1

Newbiggin-by-the-Sea Sand Extent

Northumberland County Council Frontage

Report:	Update Report 'Partial Measures' Survey 2023
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Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/03/2023	TC	NJC	A3	1:1,500

Co-ordinate system: British National Grid



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