

Sure Partners Limited

ARKLOW BANK WIND PARK
PHASE 2

**ONSHORE GRID
INFRASTRUCTURE**

VOLUME III

Chapter 9 APPENDICES

Appendix 9.1e GI Reports - Pavement Survey

ARUP

 **sse**
Renewables

Appendix 9.1e

Pavement Construction

Investigation Report

AGP20212_01

**REPORT
ON THE
PAVEMENT CONSTRUCTION
INVESTIGATION
AT THE
ARKLOW BANK CABLE ROUTE
Co. WICKLOW
FOR
SCANTECH GEOSCIENCE LIMITED**



**APEX Geophysics Limited
Unit 6, Knockmullen Business Park
Gorey
Co. Wexford**

T: 0402 21842

F: 0402 21843

E: info@apexgeophysics.ie

W: www.apexgeophysics.com

18TH NOVEMBER 2020

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THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOPHYSICS LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.

PROJECT NUMBER	AGP20212		
AUTHOR	CHECKED	REPORT STATUS	DATE
IAN SHARKEY (DIP MIN ENG)	TONY LOMBARD M.Sc (GEOPHYSICS)	V.01	18 TH NOVEMBER 2020

CONTENTS

1.	EXECUTIVE SUMMARY	1
2.	INTRODUCTION	2
2.1	Survey Objectives.....	2
2.2	Site Background	2
2.3	Survey Rationale	3
3.	DETAILED METHODOLOGY	4
3.1	Ground Penetrating Radar (GPR)	4
3.2	Principles	4
3.3	Data Collection	4
3.4	Data Processing.....	5
3.5	Calibration.....	5
4.	FINDINGS.....	6
4.1	Description	6
4.2	Pavement Construction Chart Legend	7
4.3	Data Examples.....	8
5.	RECOMMENDATIONS	9
	REFERENCES.....	10
6.	APPENDIX A: PAVEMENT CONSTRUCTION CHARTS.....	11
7.	APPENDIX B: PAVEMENT CONSTRUCTION SUMMARY TABLES	12

1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by Scantech Geoscience Limited on behalf of SSE Renewables Limited, to carry out a geophysical investigation at seven road pavement sections located along the proposed Arklow Bank Wind Farm cable route, Arklow, Co. Wicklow in order to determine the pavement construction detail for use in the project design.

The geophysical investigation was carried out with Ground Penetrating Radar (GPR) on the 22nd October 2020, at the following seven sections:

SITE 1. L6179 - Kilbride Road (1027 m).

SITE 2. Unnamed Local Road (576.5 m).

SITE 3. L2180 - Beech Road (250.75 m).

SITE 4. R772 - Dublin Road 1b (186 m).

SITE 5. R772 - Dublin Road 1a (176 m).

SITE 6. L95115 (83 m).

SITE 7. R750 - Coast Road (260 m).

The combined length of the investigation is 5118 m. GPR data were collected with 500 MHz and 1600 MHz antenna frequencies at 0.25m centres along the near side wheel path in Lane 1 in both carriageway directions

The findings from the investigation are presented in a series of Pavement Construction Charts (Appendix A) and Pavement construction summary tables (Appendix B) for the specified sections.

Features resolved in the GPR data include the bituminous material thickness, Internal bituminous layers, construction changes in the pavement, sub-base material thickness and presence of layers beneath the subbase.

2. INTRODUCTION

APEX Geophysics Limited was requested by Scantech Geoscience Limited on behalf of SSE Renewables Limited, to carry out a geophysical investigation at seven road pavement sections located along the proposed Arklow Bank Wind Farm cable route, Arklow, Co. Wicklow in order to determine the pavement construction detail for use in the project design.

2.1 Survey Objectives

The objective of the investigation was:

- To determine the pavement construction detail.

2.2 Site Background

The geophysical investigation was carried out with Ground Penetrating Radar (GPR) on the 22nd October 2020, along the near side wheel path in Lane 1 in both carriageway directions at the following seven locations:

SITE 1. L6179 - Kilbride Road (1027 m).

SITE 2. Unnamed Local Road (576.5 m).

SITE 3. L2180 - Beech Road (250.75 m).

SITE 4. R772 - Dublin Road 1b (186 m).

SITE 5. R772 - Dublin Road 1a (176 m).

SITE 6. L95115 (83 m).

SITE 7. R750 - Coast Road (260 m).

The combined length of the investigation is 5118 m. The locations of investigation Sites 1 to 7 are shown below in Figure 2.1



Fig 2.1: Site Location map (GPR Pavement Investigation sections marked in Red).

2.3 Survey Rationale

GPR is effective at determining accurate layer thickness within pavement construction (see chapter 3: Detailed Methodology).

The process of interpreting the GPR signals to determine the layer thickness data involves identification of planar reflectors, assignment of material types and the computation of layer velocities using published records or data correlation / calibration from a program of direct investigation.

The Investigation was carried out in accordance with the guidelines outlined in (Transport Infrastructure Ireland 2015; 'National Road Authority Design Manual for Roads and Bridges' AM-PAV-06050, Vol.7, Section 3, Part 4, NRA HD 31/15).

3. DETAILED METHODOLOGY

An investigation using Ground Penetrating Radar (GPR) was commissioned to investigate the site.

3.1 Ground Penetrating Radar (GPR)

GPR is effective at determining the presence of layer detail within pavement construction by assessing the amplitude and phase of reflected signals from internal boundaries. The amount of reflected energy varies when there is a discontinuity caused by separation or the presence of a different material type. Changes in material type and/or the presence of discontinuities significantly alters the reflected energy.

GPR Pavement investigation is effective at resolving material boundaries (manmade or geological) but is limited in the determination of the exact nature of the boundaries. When combined with a targeted coring program any ambiguities on layer type can be resolved and an accurate longitudinal cross section can be generated.

3.2 Principles

GPR is a reflective electro-magnetic technique that involves the transmission of high frequency radio waves (typically 100 to 1000MHz) into the ground and recording the subsequent reflections.

These pulses are transmitted with a high repetition rate as the antenna is moved along the ground and the reflected pulses build up a cross section (time series) of the sub-surface. Partial reflections of the electromagnetic pulse occur at the boundaries of materials with different dielectric properties.

By understanding the material types under investigation, specifically the electromagnetic pulse velocity, it is possible to convert the reflected time series to an accurate depth section, using:

$$\text{Depth [m]} = \text{Velocity [m/ns]} * \text{Reflected Time} * 0.5$$

The velocity and depth of penetration of the GPR signal depends on the electrical properties of the material with highly conductive materials showing a low penetration due to high absorption rates. Clay-rich and water saturated materials have a lower penetration than gravelly and dry soils. Signal penetration and resolution limits are also governed by the centre frequency of the transmitted electromagnetic pulse. High frequencies give good resolution and shallow penetration. Lower frequencies give lower resolution and deeper penetration.

Reinforced concrete will often act as a barrier to GPR signals (independent of frequency) and in such cases the resolution of deeper layers of subbase / subgrade may not be possible.

3.3 Data Collection

The GPR data were collected in accordance with the 'National Road Authority Design Manual for Roads and Bridges', AM-PAV-06050, Vol.7, Section 3, Part 4, NRA HD 31/15, Transport Infrastructure Ireland 2015.

Twelve 500MHz and 1.6GHz GPR profiles were collected across the specified pavement sections. The use of these frequencies enables accurate resolution of the shallow, bound material layers, as well as providing good penetration into the deeper subbase and subgrade.

Data collection was controlled by an Electronic Distance Measuring (EDM) system linked to the hub of the survey vehicle. This enables a highly accurate, independent measuring system to be used to ensure data are collected at the specified intervals. A distance calibration is carried out on the EDM on site prior to data collection. Data were collected at 0.25m centres along the Near Side Wheel Path (NSWP) for all carriageways.

Surface markers are set out on the carriageway at predefined locations to determine the extents of the sections to be investigated. These markers are subsequently digitally marked on the data during data collection in addition to dGPS recording of the data collection track.

3.4 Data Processing

GPR data were collected as continuous longitudinal profiles as described above. The processing and location of subsurface features was achieved by using a proprietary processing software (ReflexWin V.8.5).

The following processing was applied to the data:

1. Spatial relocation (data merge with surveyed positions)
2. Temporal relocation (depth correction)
3. Amplitude recovery gain (time dependant gain)
4. Frequency band pass filtering
5. Noise removal (background removal)

3.5 Calibration

Calculation of accurate thickness of different materials requires precise determination of the GPR velocity through the material.

The velocity of the interpreted layers in this report are taken from published records. A GPR wave velocity of 0.12 m/ns were used in the determination of thickness measurements of interpreted bituminous material within the pavement and a velocity of 0.1 - 0.11 m/ns were used in the determination of thickness measurements of granular subbase material.

Verification of the interpretation of planar reflectors and calibration of thickness measurements may be achieved by correlating the GPR data to direct investigation, targeted at selected locations on the GPR.

Analysis of the GPR arrivals with respect to pavement coring information allows calibration of the GPR velocity for the bituminous layer.

Analysis of the GPR arrivals with respect to Trial Pit/ Slit trench information allows calibration of the GPR velocity for the subbase layer.

4. FINDINGS

4.1 Description

The findings from the investigation are presented in a series of pavement construction charts (Appendix A) and pavement construction summary tables (Appendix B):

- SITE 1. L6179 - Kilbride Road, Lane 1 Eastbound.
- SITE 1. L6179 - Kilbride Road, Lane 1 Westbound.

- SITE 2. Unnamed Local Road, Lane 1 Northbound.
- SITE 2. Unnamed Local Road, Lane 1 Southbound.

- SITE 3. L2180 - Beech Road, Lane 1 Eastbound.
- SITE 3. L2180 - Beech Road, Lane 1 Westbound.

- SITE 4. R772 - Dublin Road 1b, Lane 1 Northbound.
- SITE 4. R772 - Dublin Road 1b, Lane 1 Southbound.

- SITE 5. R772 - Dublin Road 1a, Lane 1 Northbound.
- SITE 5. R772 - Dublin Road 1a, Lane 1 Southbound.

- SITE 6. L95115, Lane 1 Eastbound.
- SITE 6. L95115, Lane 1 Westbound.

- SITE 7. R750 - Coast Road, Lane 1 Northbound.
- SITE 7. R750 - Coast Road, Lane 1 Southbound.

Features resolved in the GPR data include the bituminous material thickness, Internal Bituminous Layers, Construction changes in the pavement and sub-base material thickness. A description of the interpreted layers is given in Section 4.2: Chart Legend.

4.2 Pavement Construction Chart Legend

Below is a chart example (not from this investigation) to describe the layers used in the Pavement Construction Charts.

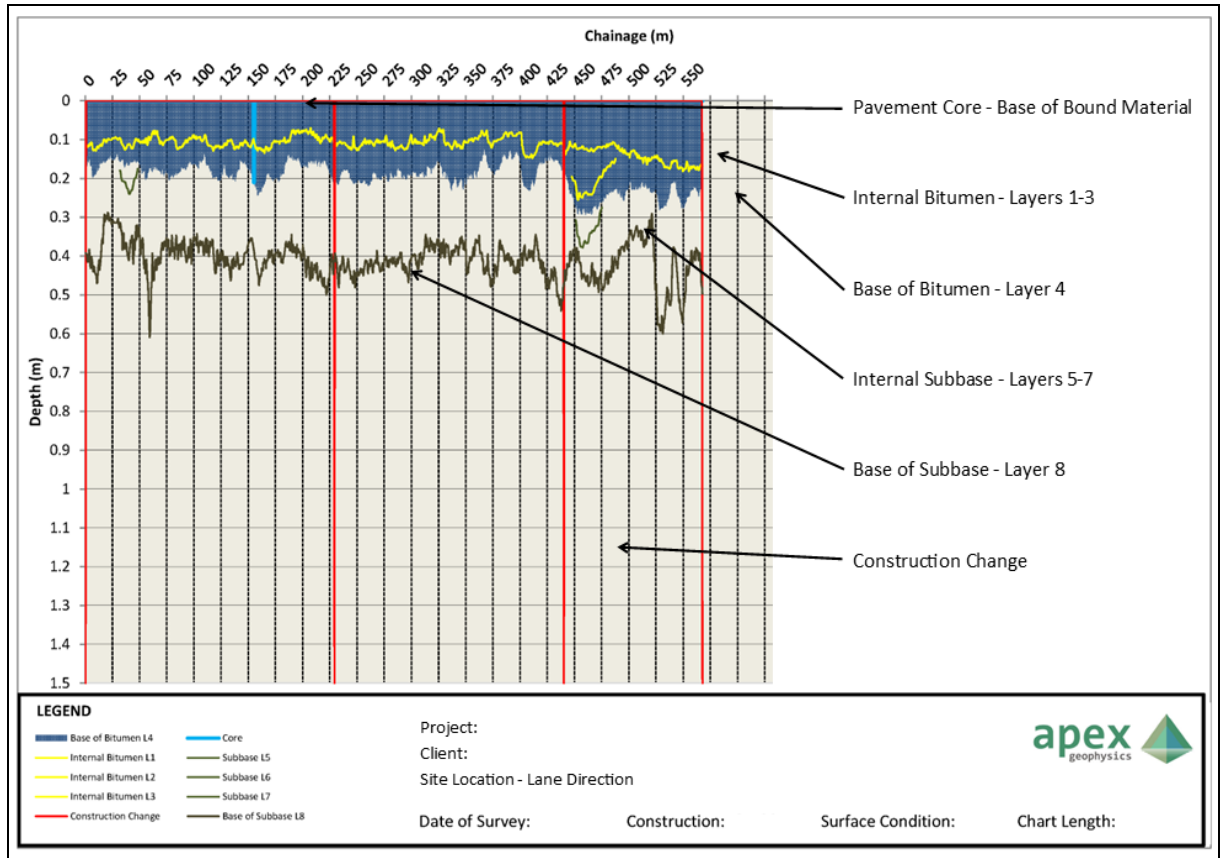


Fig 4.1: Example of pavement construction chart legend.

4.3 Data Examples

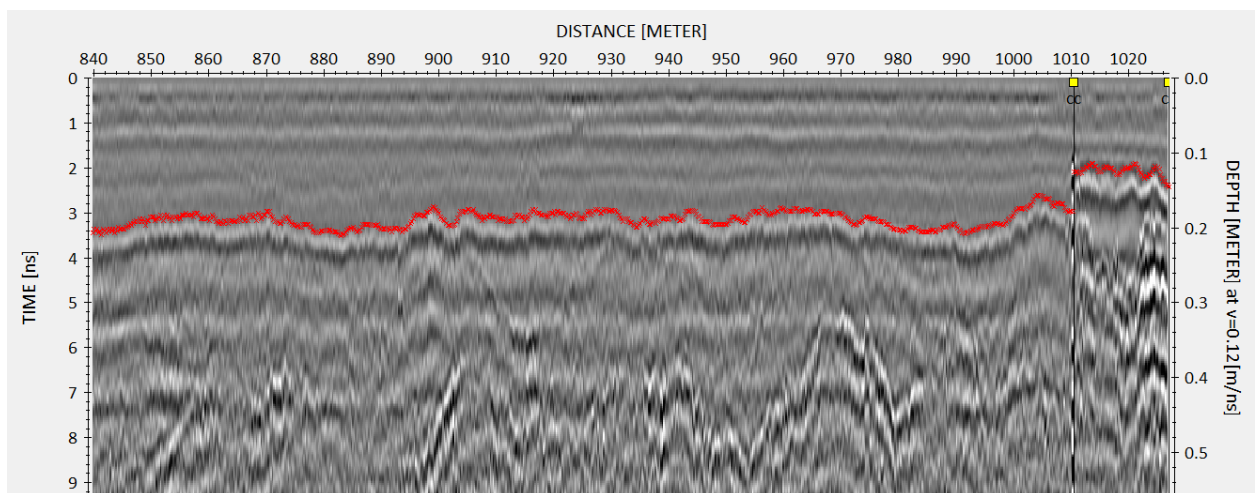
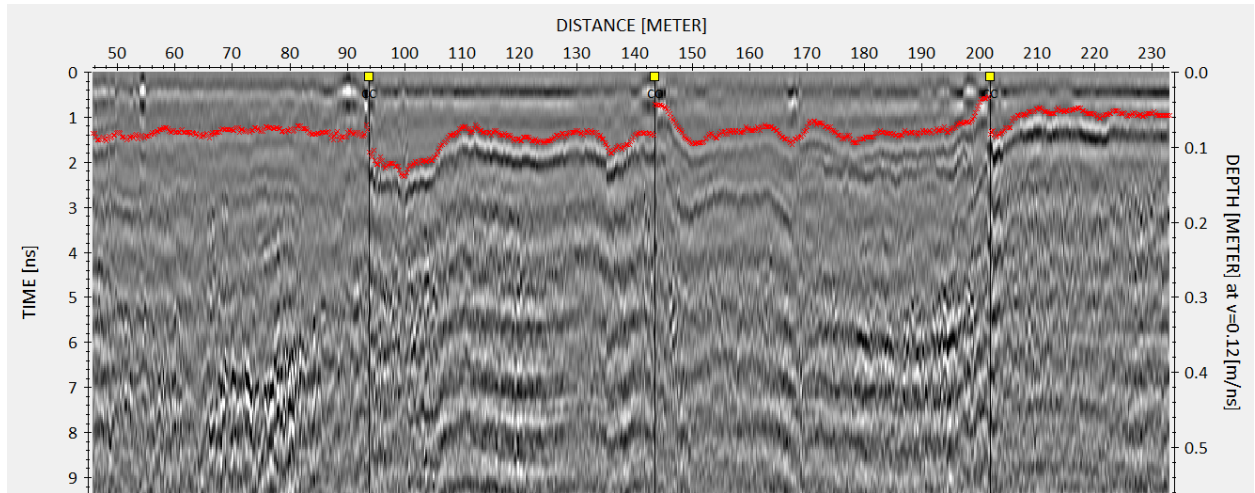


Fig 4.2: Example of 1.5 GHz data recorded at Site 1 – L6179 - Kilbride Road L1WB (Chainage 50 m - 230 m and 840 m - 1020 m). Construction changes along the pavement section are shown as vertical black lines. The interpreted base of bitumen is shown as a red line.

5. RECOMMENDATIONS

The findings of the GPR investigation should be reviewed following any further direct investigations. Targeted investigation locations can be provided should any intrusive works be undertaken.

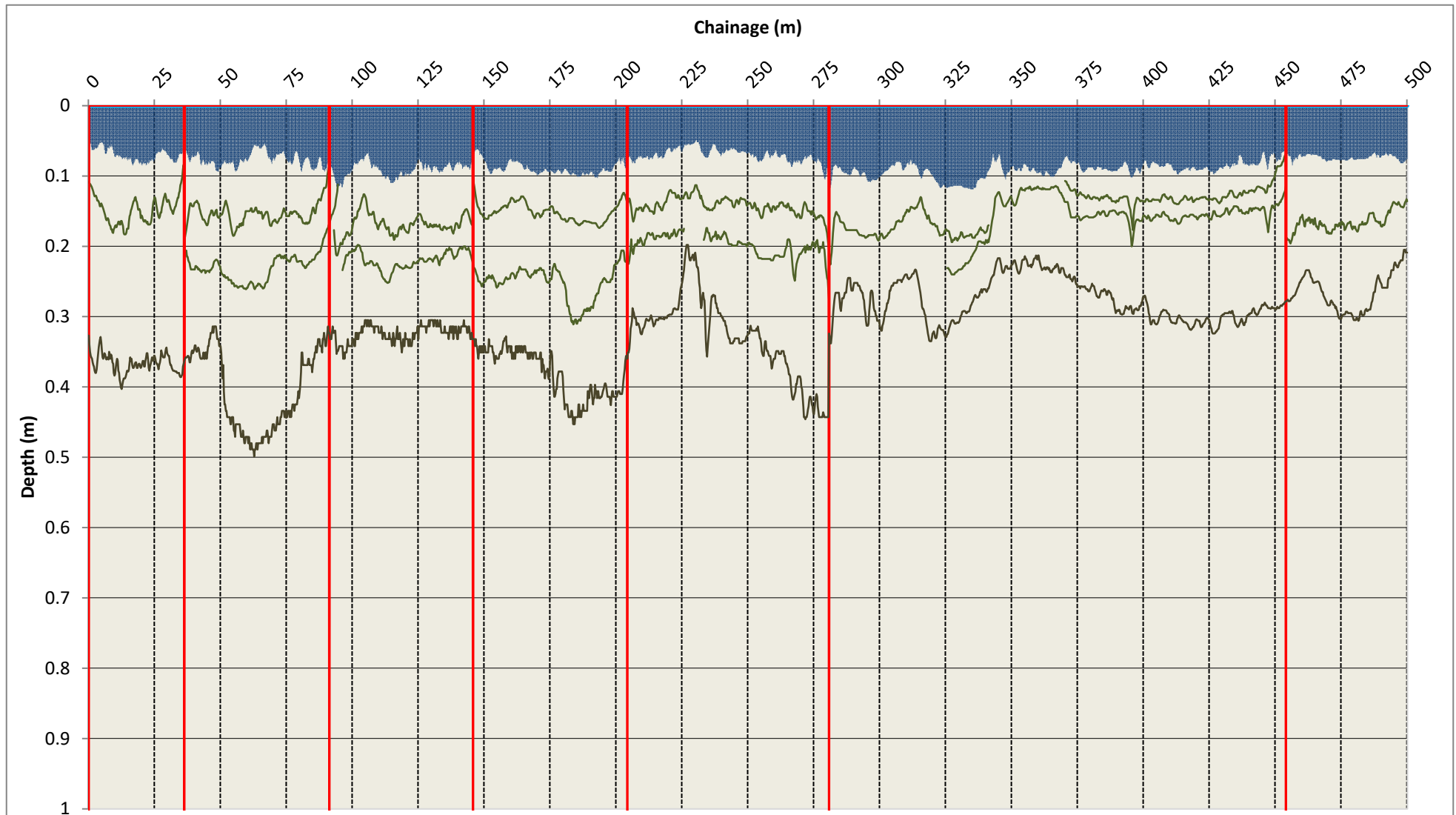
REFERENCES

Transport Infrastructure Ireland 2015;
'National Road Authority Design Manual for Roads and Bridges'
AM-PAV-06050, Vol.7, Section 3, Part 4, NRA HD 31/15

Harry M. Jol 2009;
'Ground Penetrating Radar: Theory & Applications'

Reflex-Win v.8.5 2017;
'Sandmeier Geophysical Research'

6. APPENDIX A: PAVEMENT CONSTRUCTION CHARTS



LEGEND

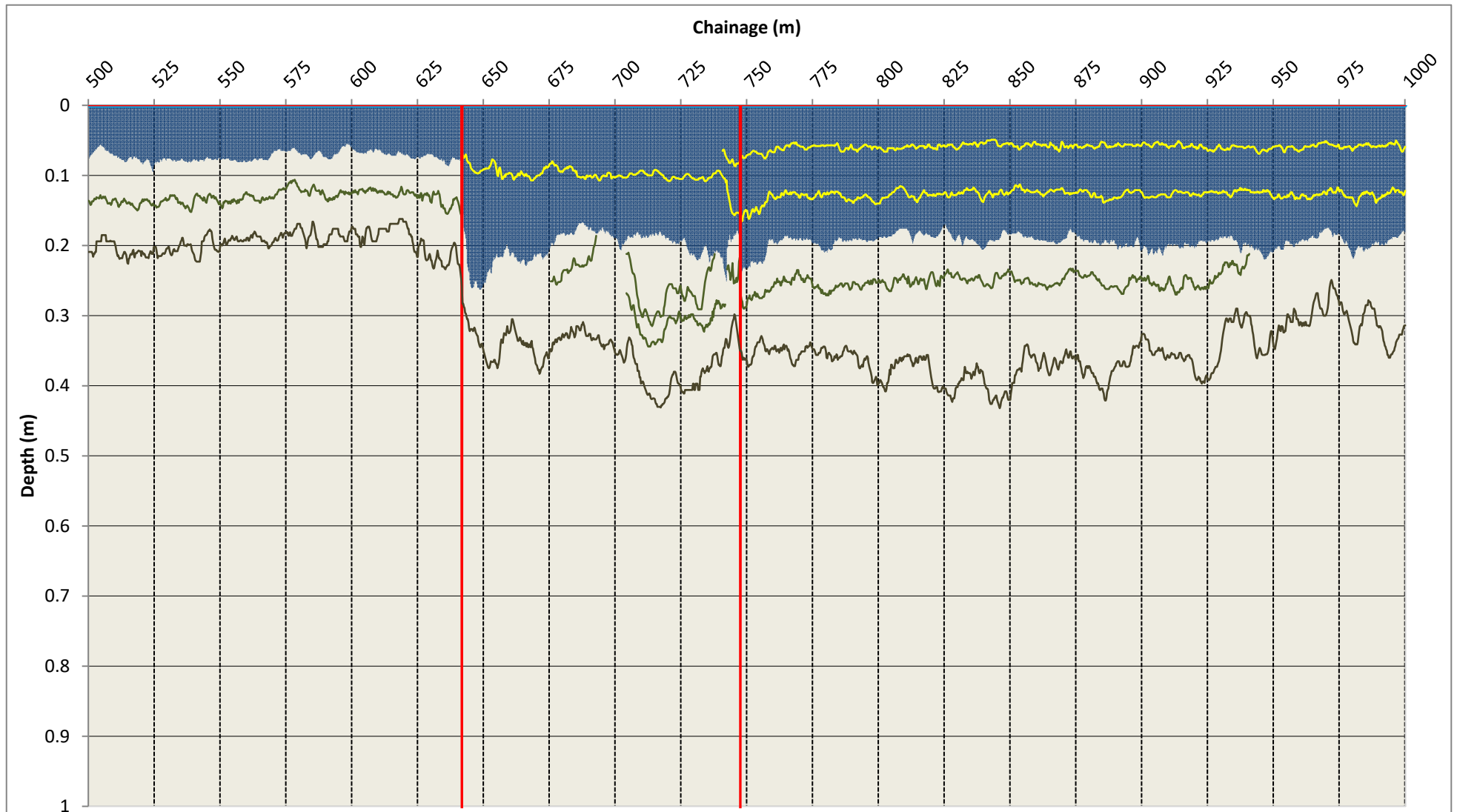
- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 2012 Arklow Bank Pavement Assessment
Site 1 - L6179
Lane 1 Eastbound

Client: Scantech
0 - 500m



Date of Survey: 22.10.20 Construction: Flexible Surface Condition: Dry Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 1 - L6179
Lane 1 Eastbound

Client: Scantech

500 - 1000m

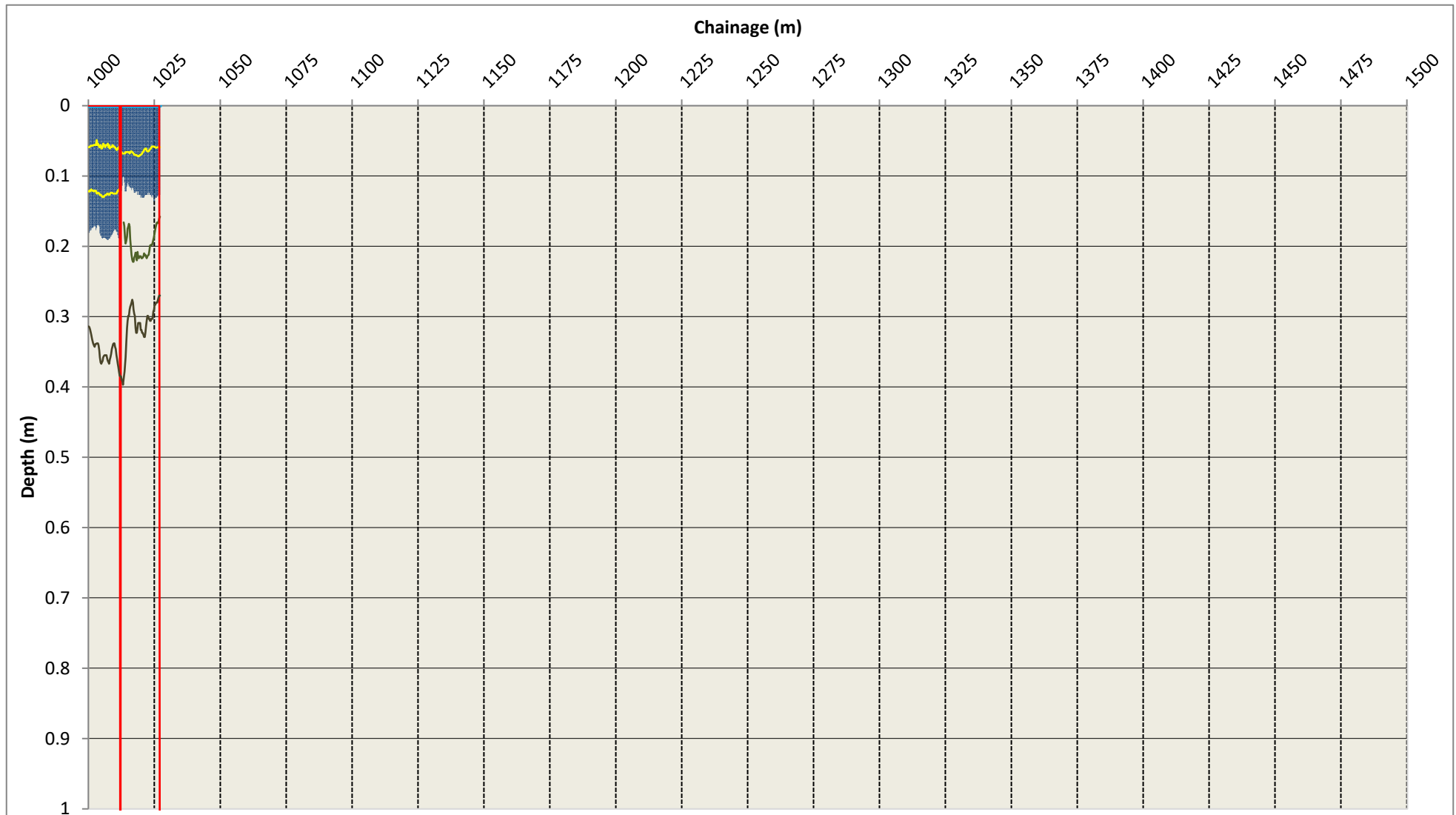


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 2012 Arklow Bank Pavement Assessment
Site 1 - L6179
Lane 1 Eastbound

1000 - 1027 m

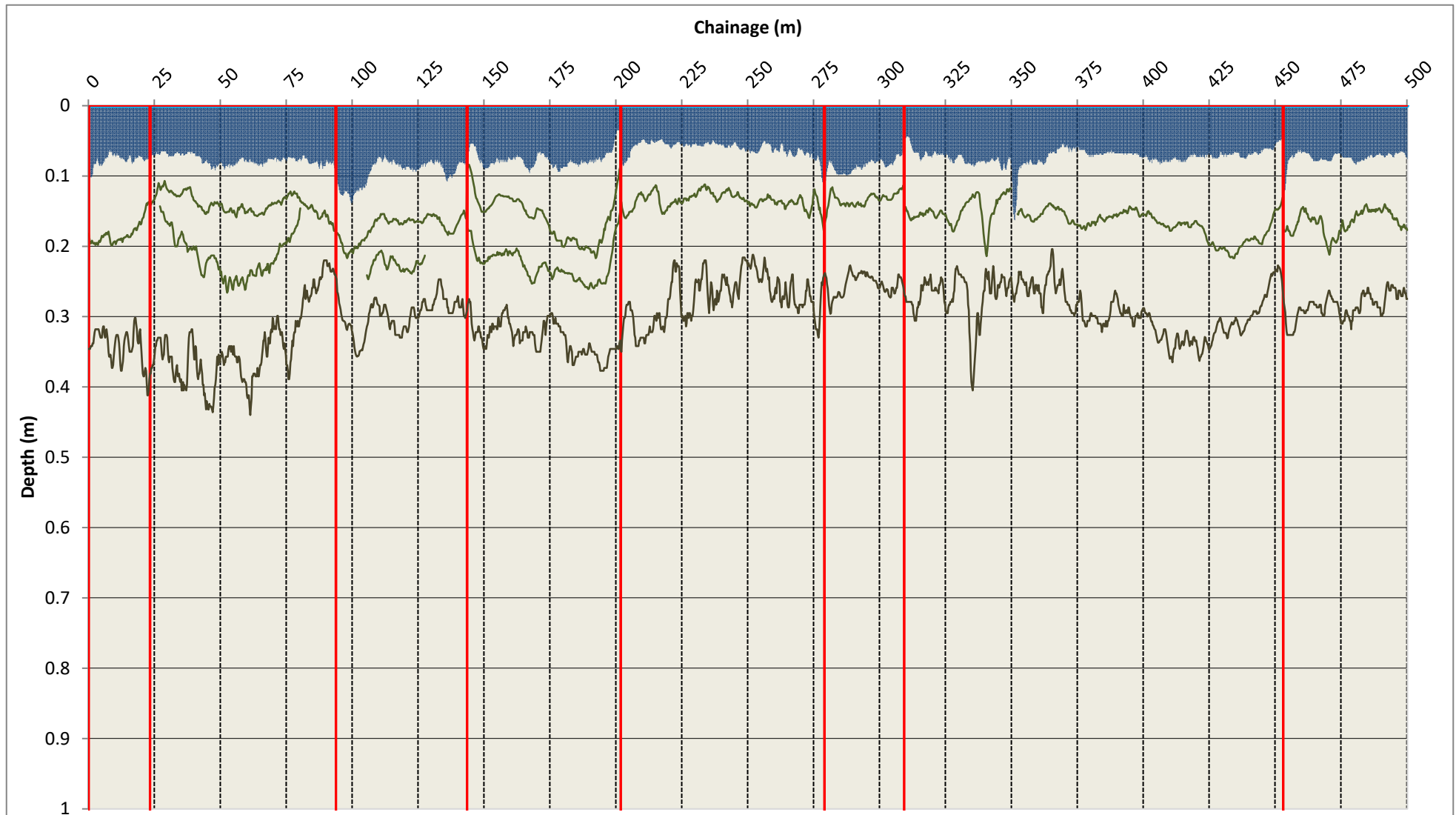


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

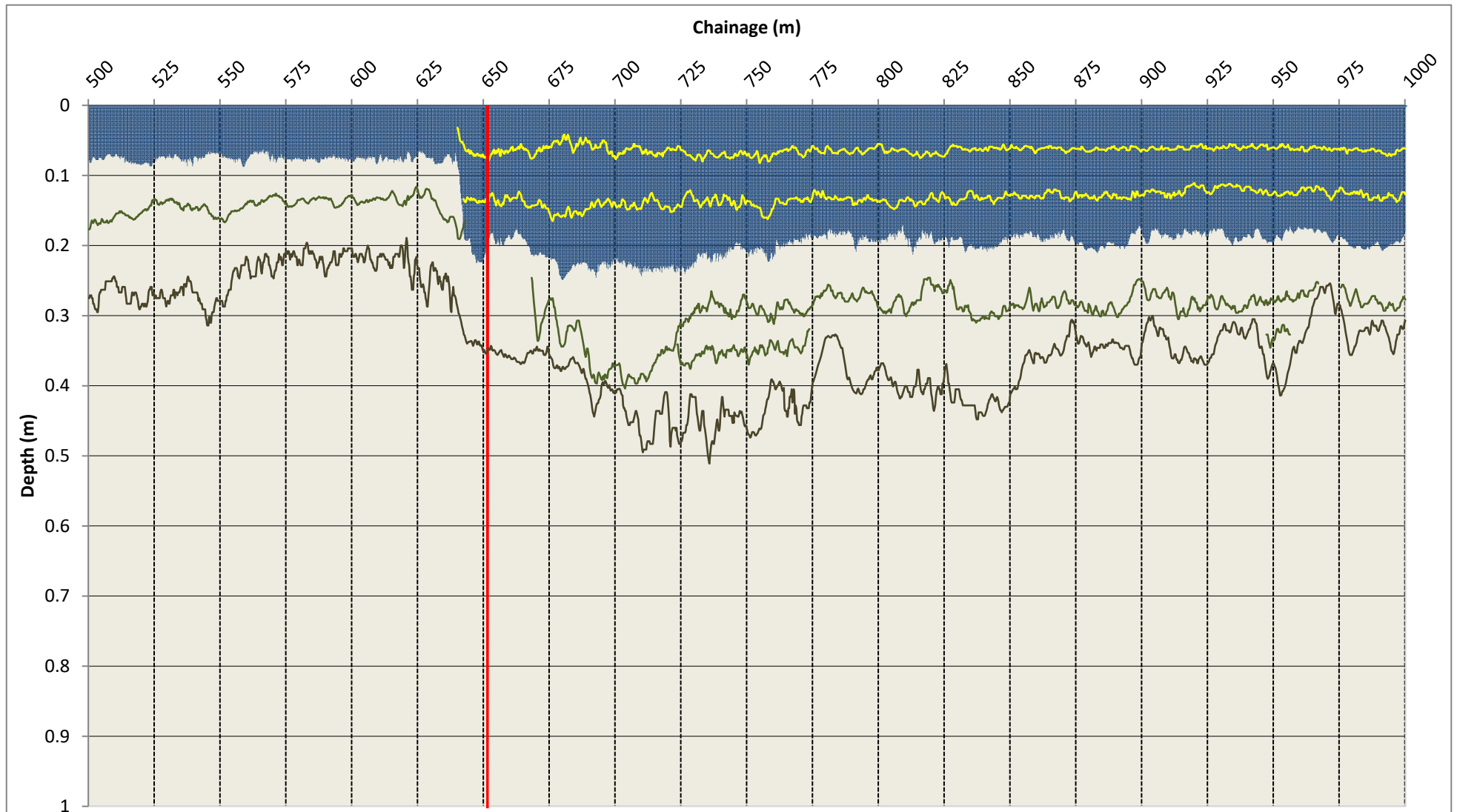
- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 2012 Arklow Bank Pavement Assessment
Site 1 - L6179
Lane 1 Westbound

Client: Scantech
0 - 500m



Date of Survey: 22.10.20 Construction: Flexible Surface Condition: Dry Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 1 - L6179
Lane 1 Westbound

Client: Scantech
500 - 1000m

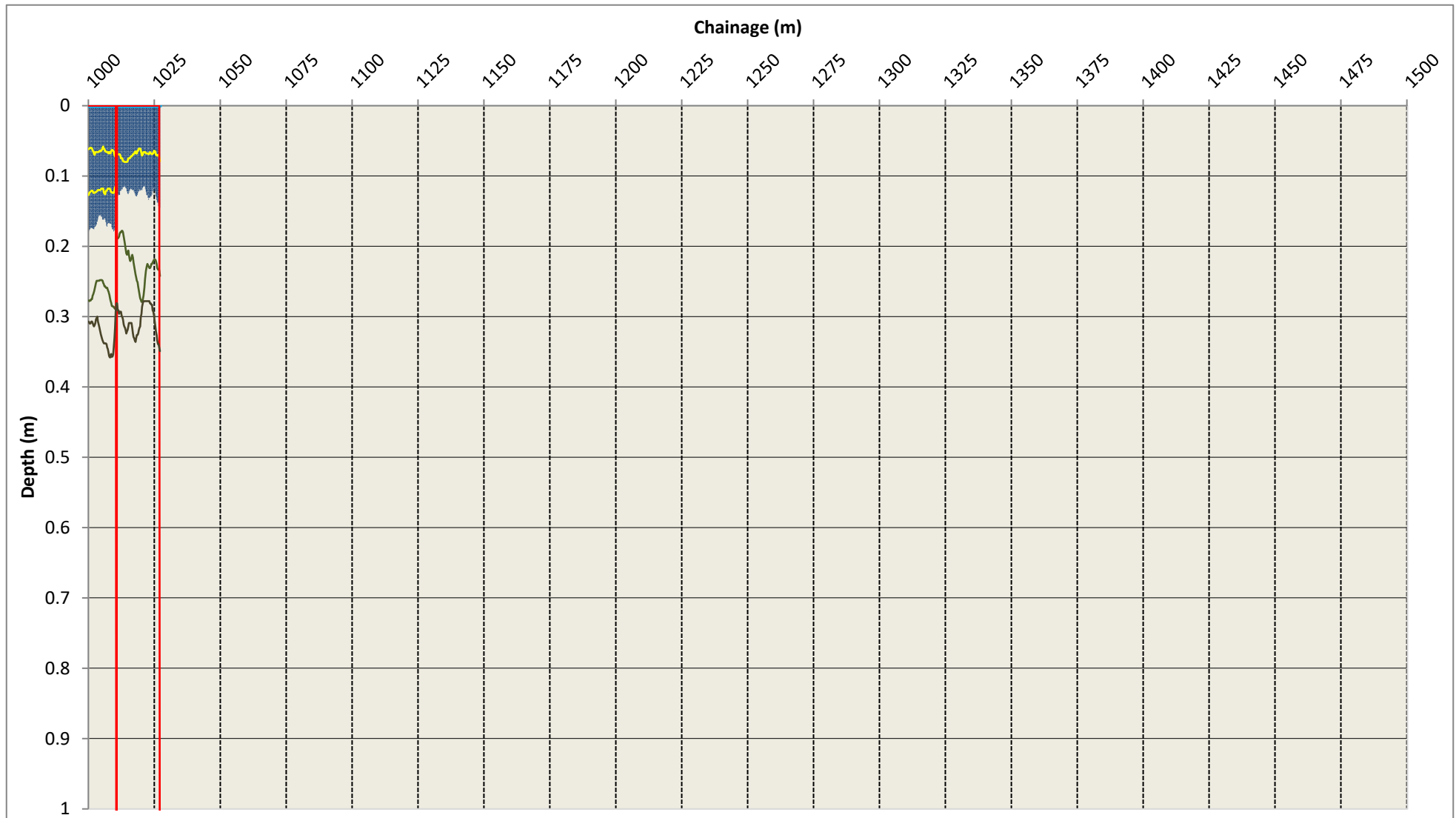


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 2012 Arklow Bank Pavement Assessment
Site 1 - L6179
Lane 1 Westbound

1000 - 1027 m

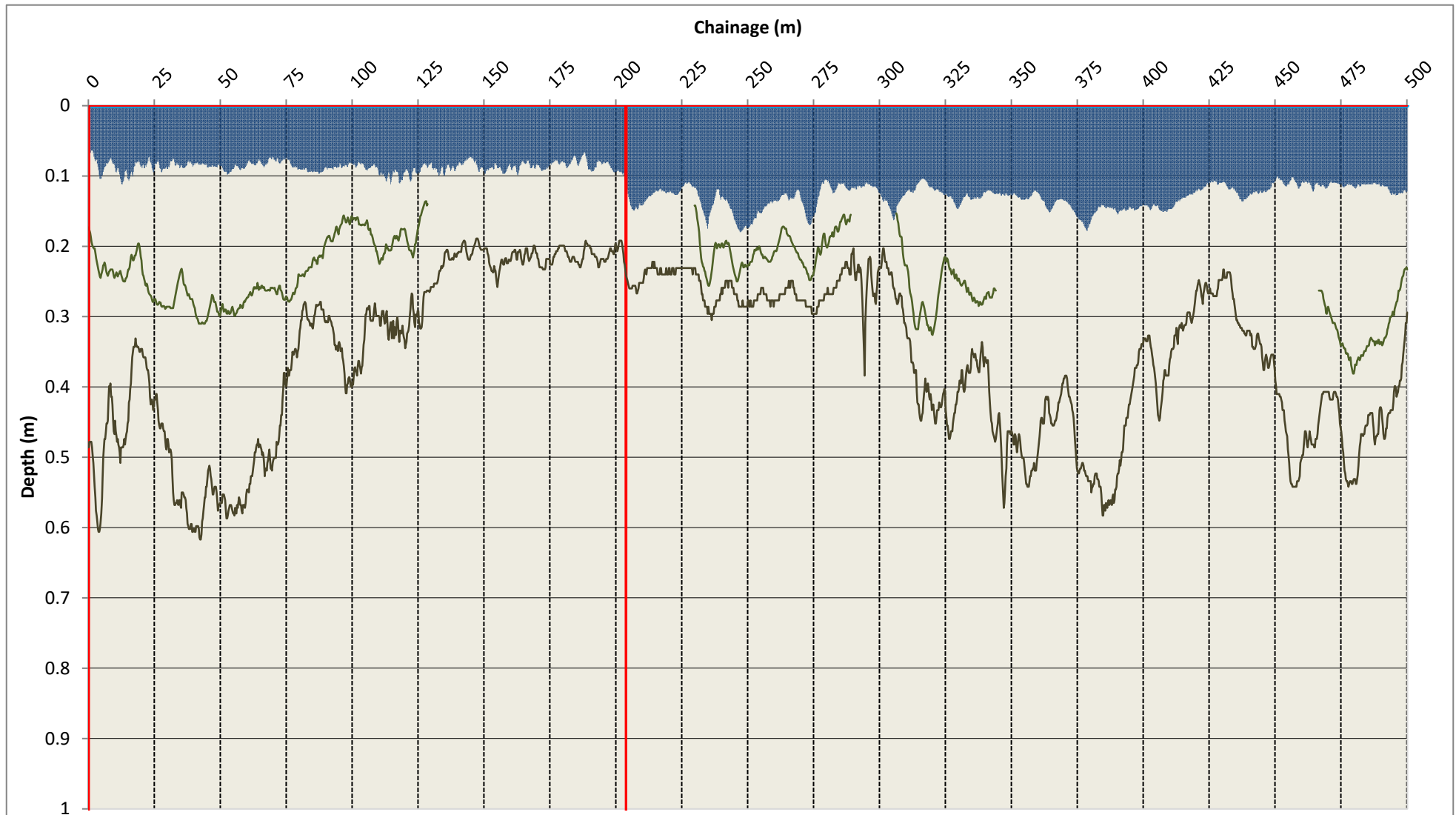


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 2012 Arklow Bank Pavement Assessment
Site 2 - Unnamed Local Road
Lane 1 Northbound

Client: Scantech

0 - 500m

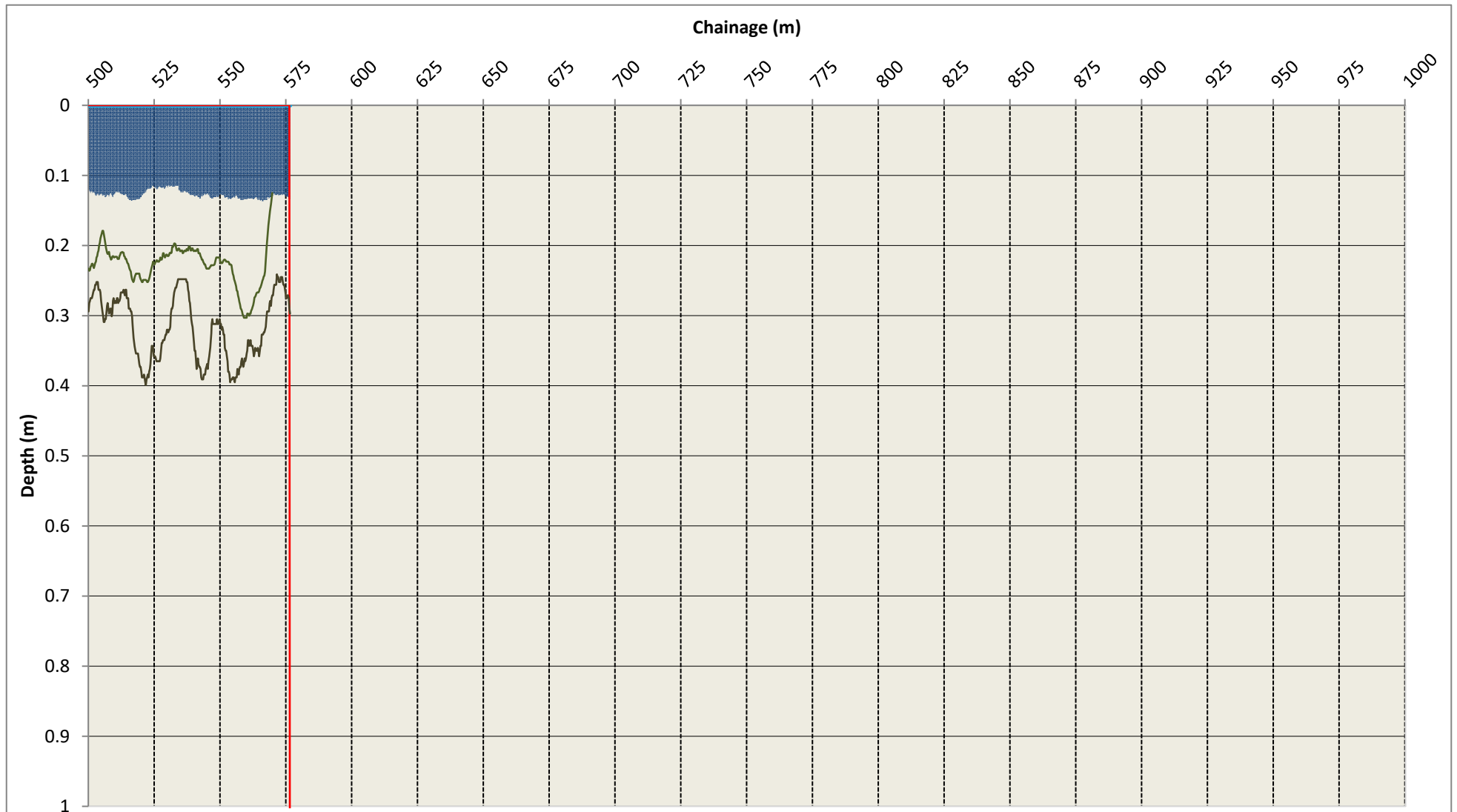


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 2 - Unnamed Local Road
Lane 1 Northbound

Client: Scantech

500 - 576.5m

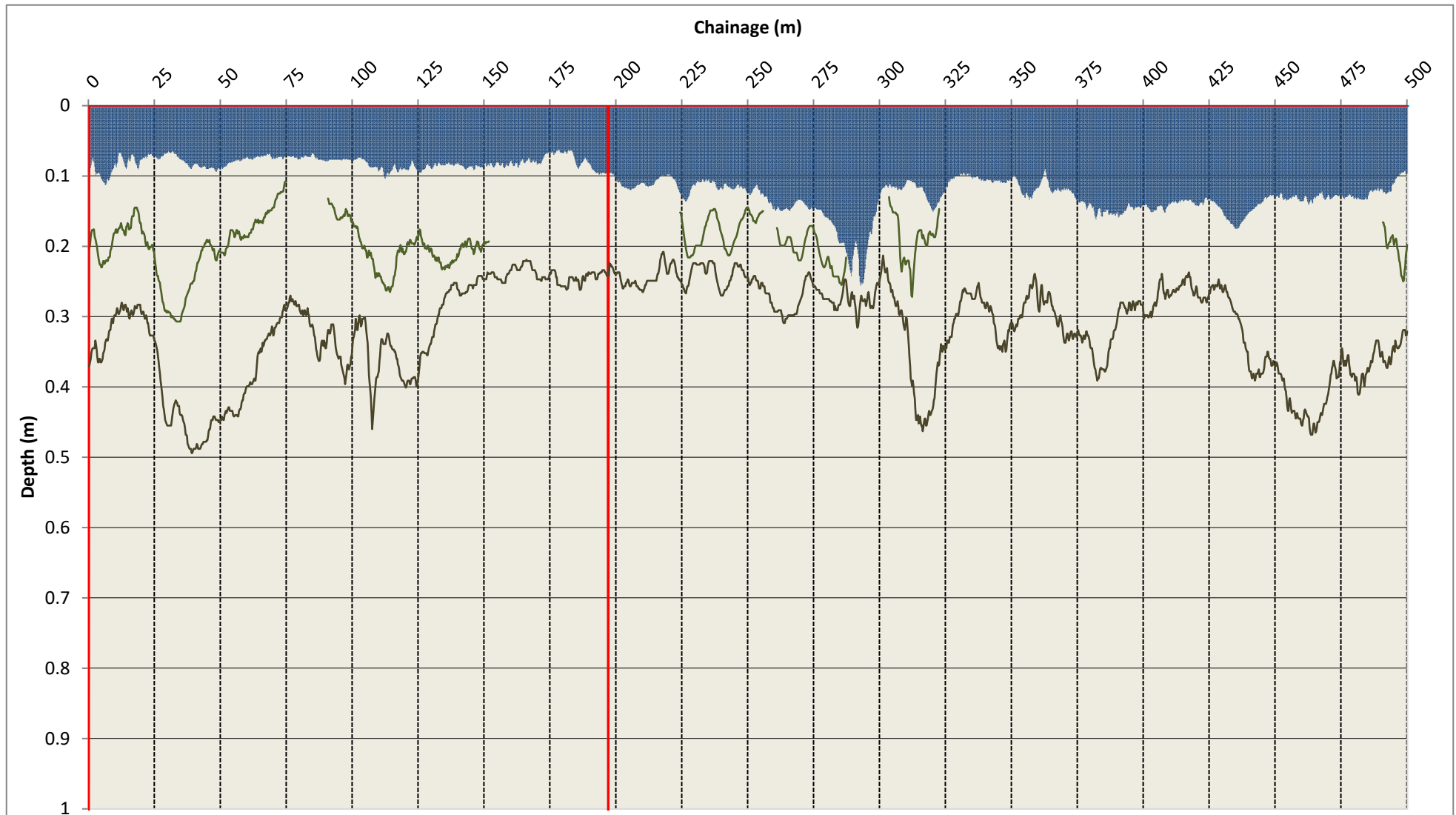


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 2012 Arklow Bank Pavement Assessment
Site 2 - Unnamed Local Road
Lane 1 Southbound

Client: Scantech

0 - 500m

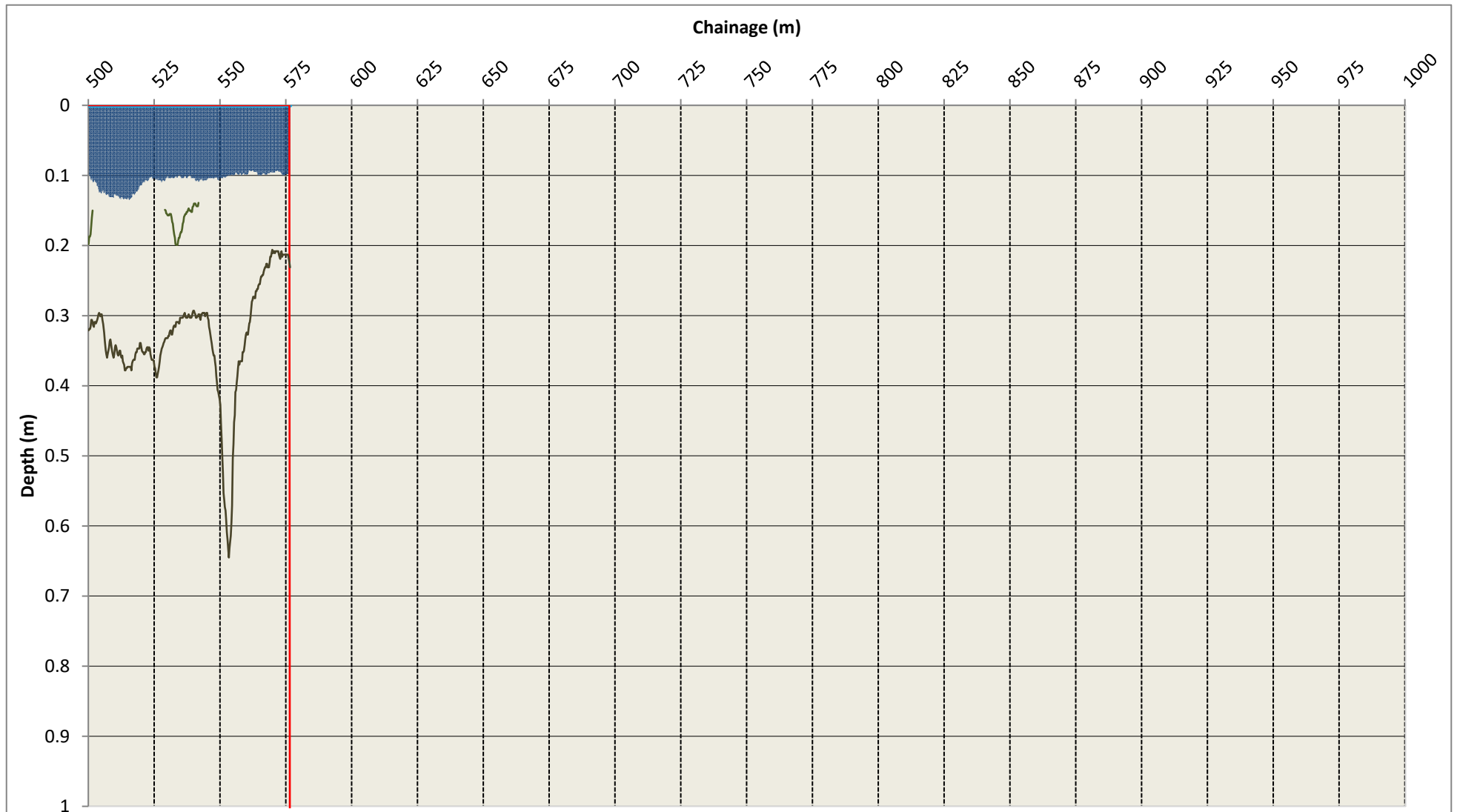


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 2 - Unnamed Local Road
Lane 1 Southbound

Client: Scantech

500 - 576.5m

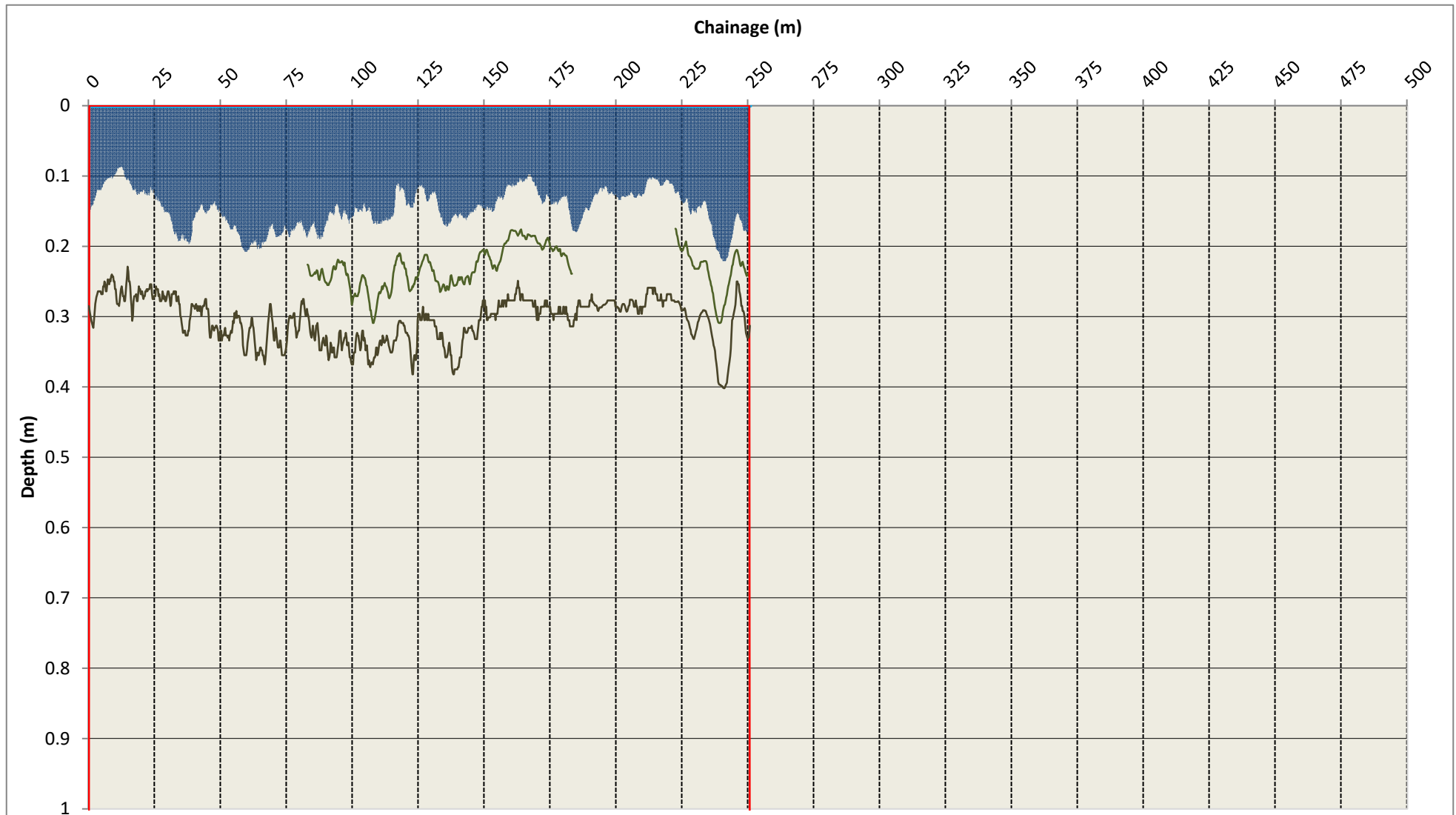


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 2012 Arklow Bank Pavement Assessment
Site 3 - L2180
Lane 1 Eastbound

Client: Scantech

0 - 250m

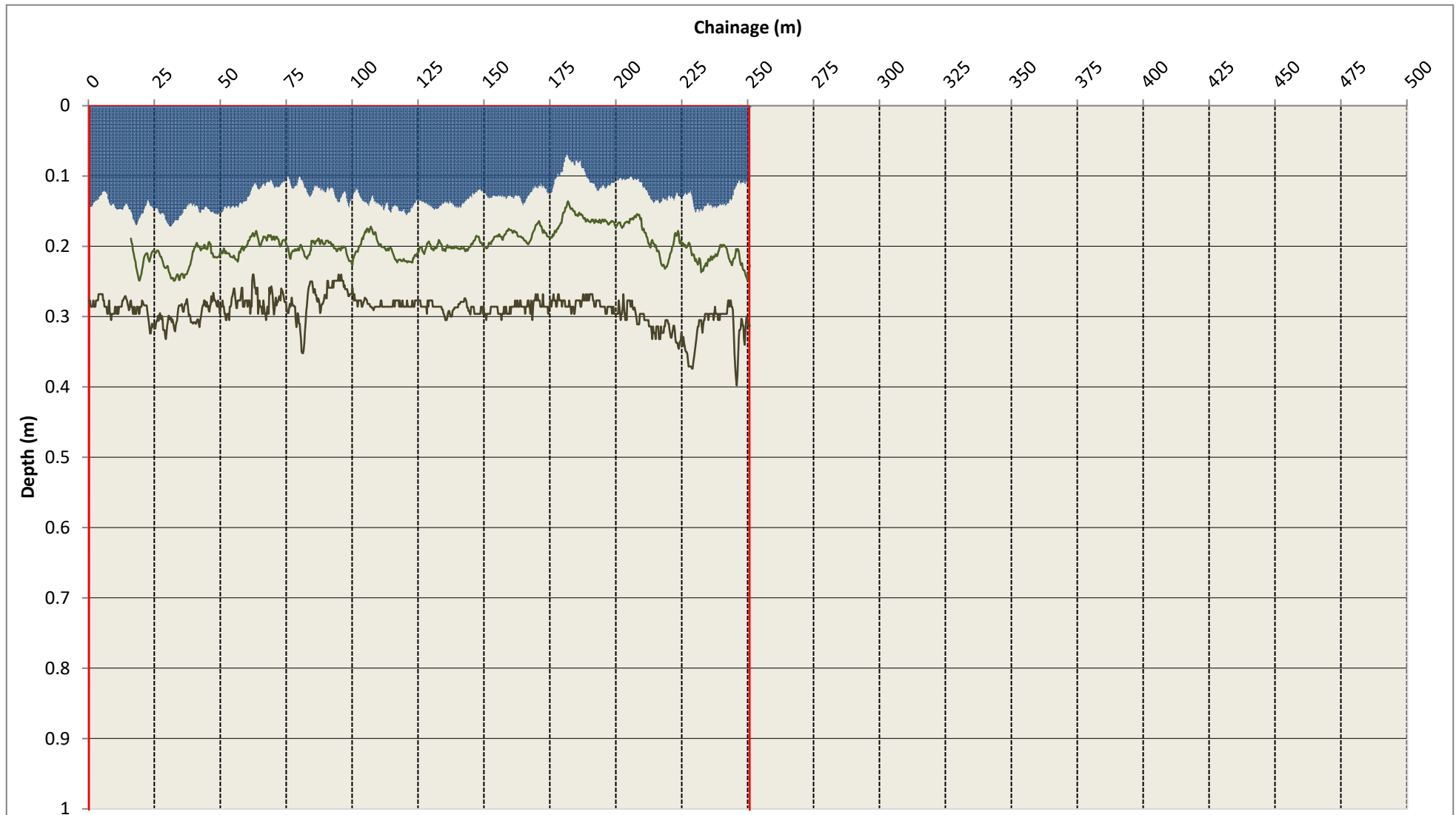


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 2012 Arklow Bank Pavement Assessment
Site 3 - L2180
Lane 1 Westbound

Client: Scantech

0 - 250m

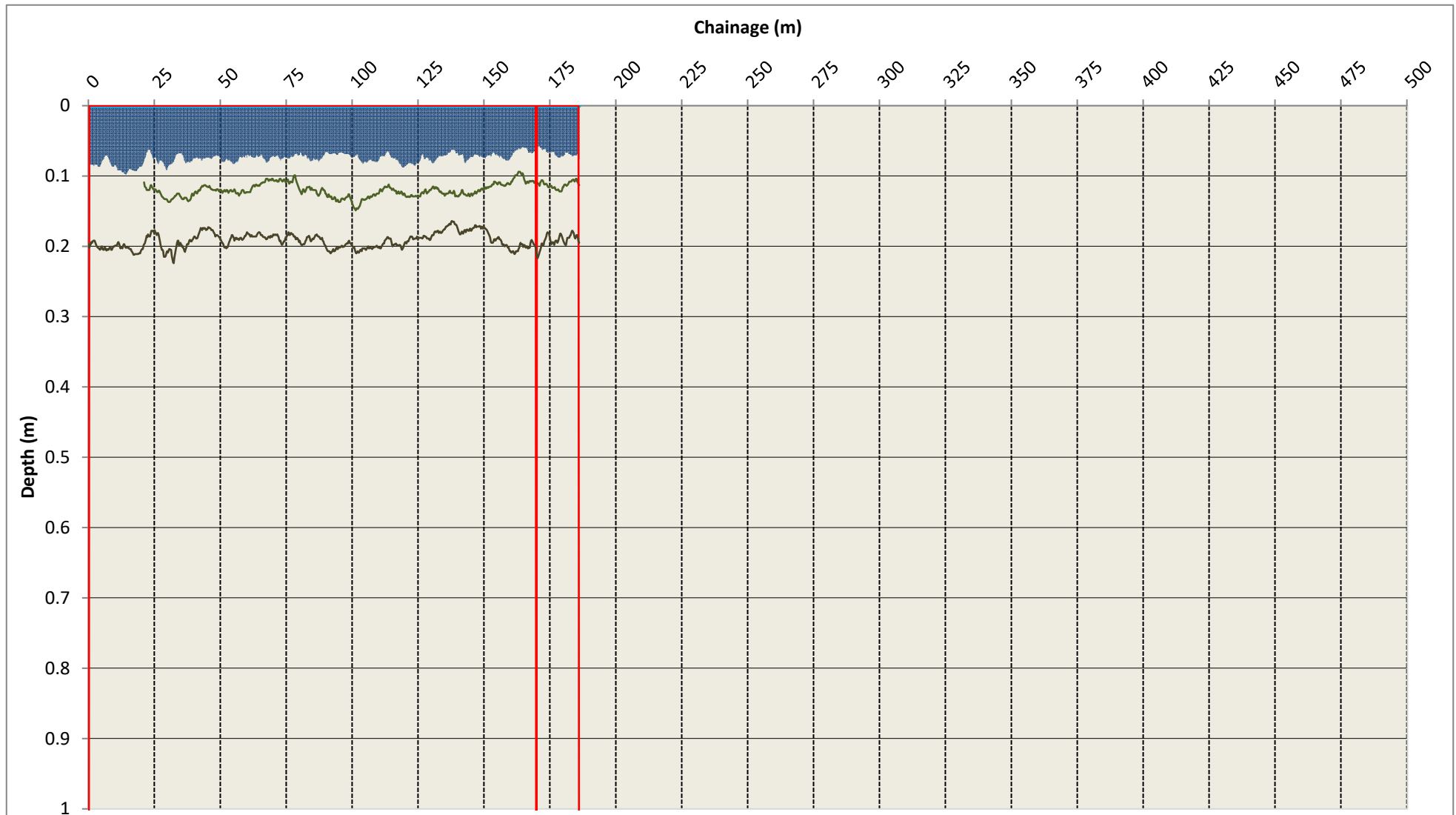


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 4 - R772
Lane 1 Northbound

Client: Scantech
0 - 186m

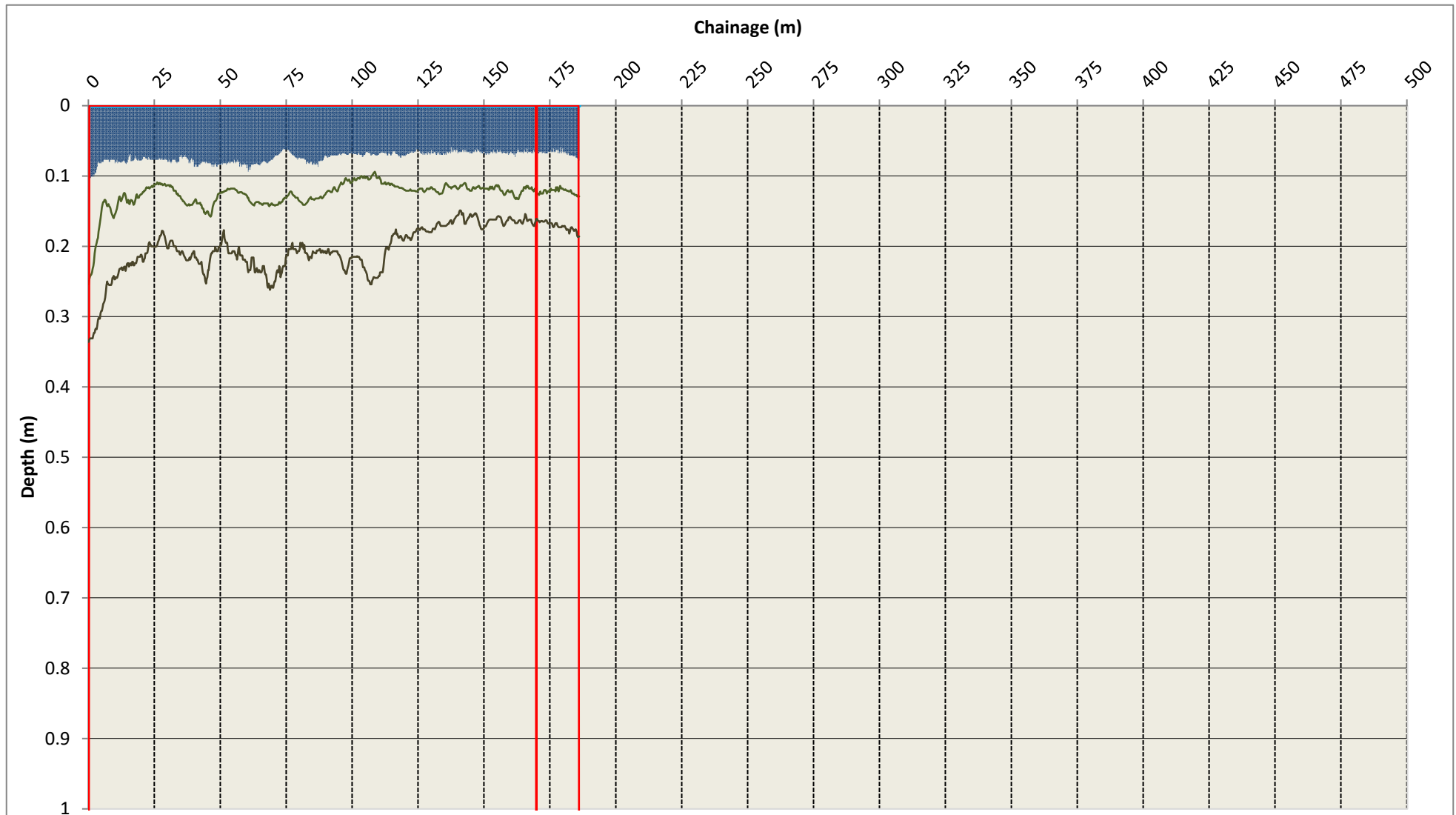


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 4 - R772
Lane 1 Southbound

Client: Scantech
0 - 186m

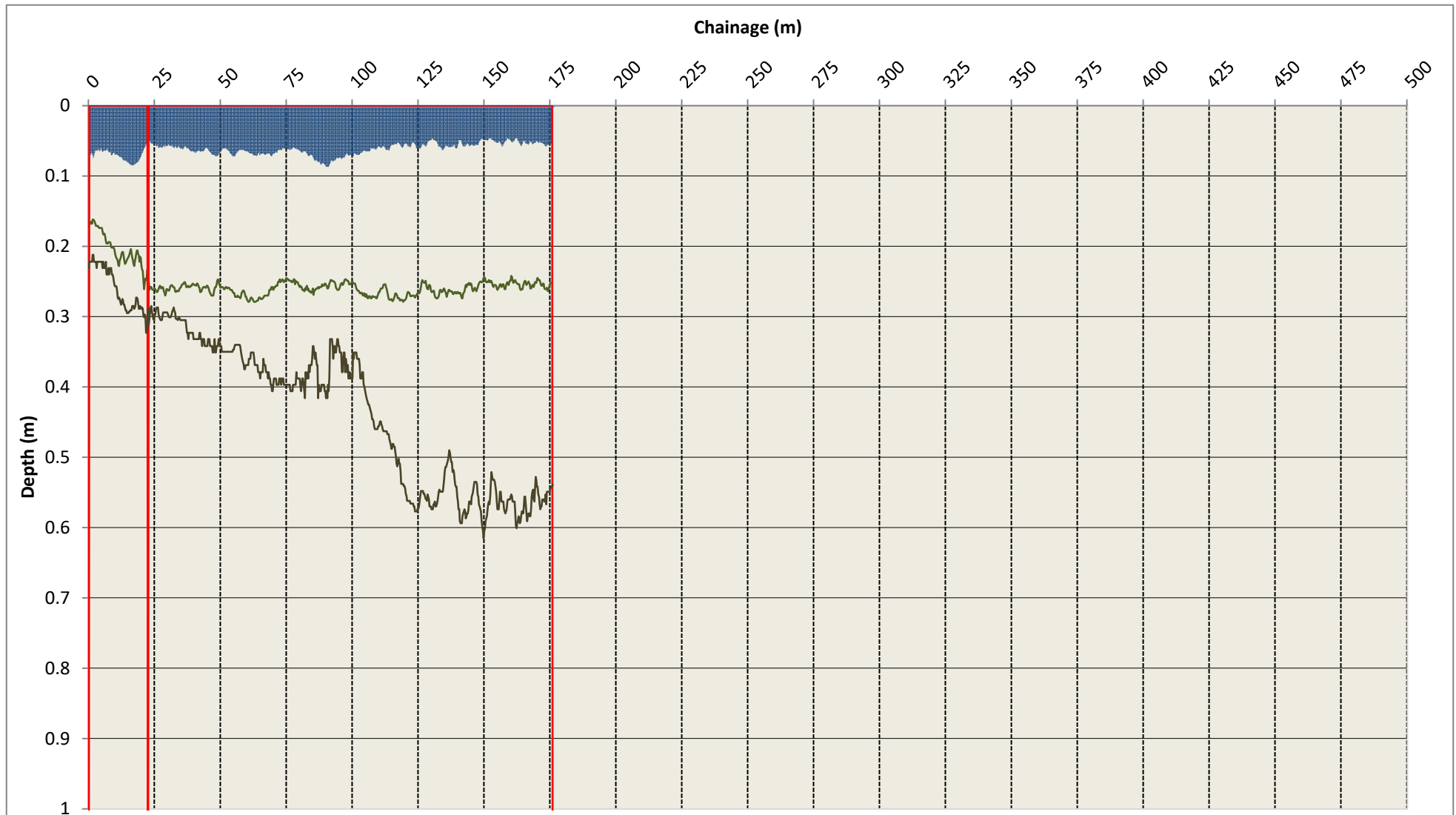


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

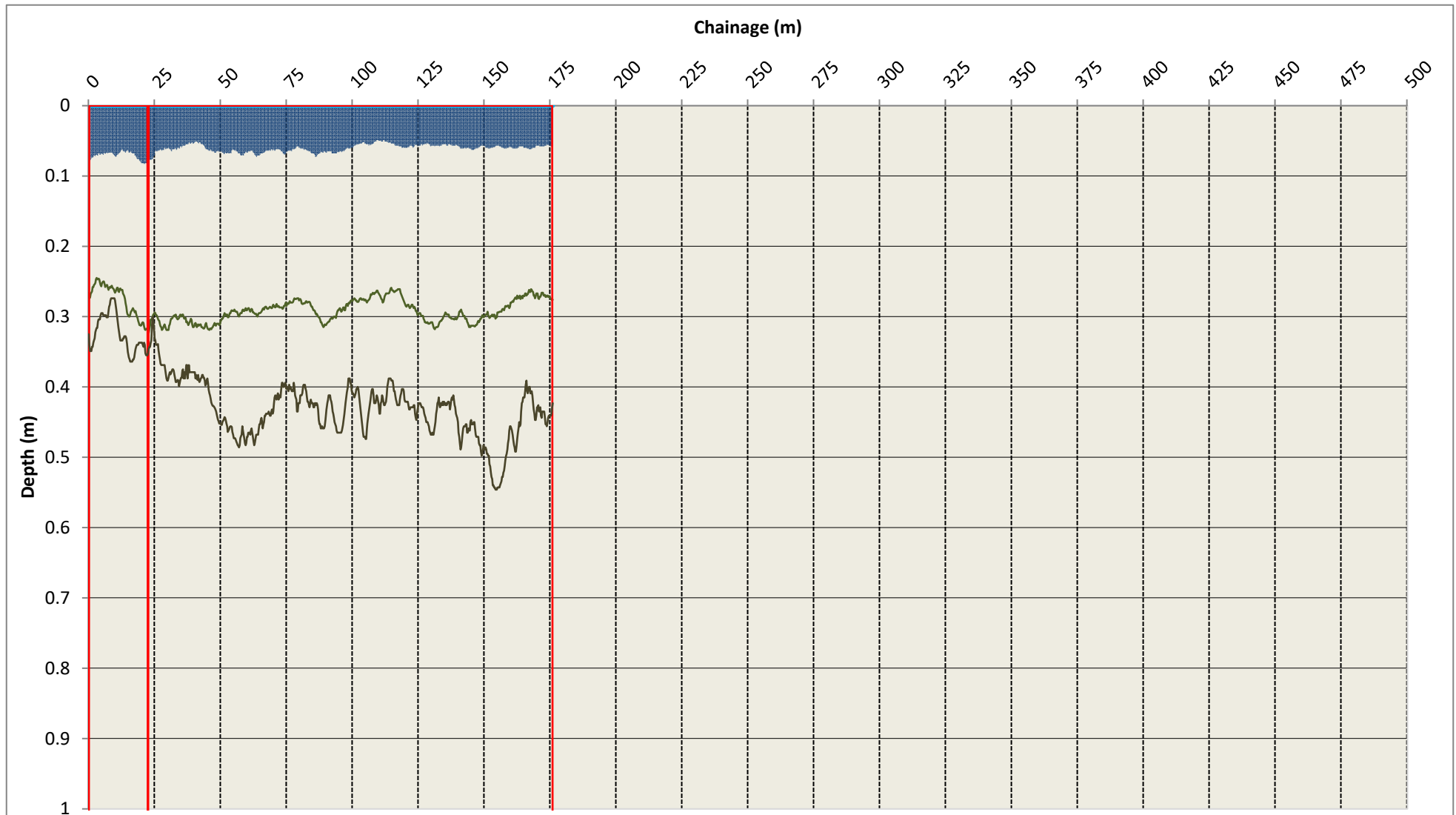
- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 5 - R772
Lane 1 Northbound

Client: Scantech
0 - 176m



Date of Survey: 22.10.20 Construction: Flexible Surface Condition: Dry Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 5 - R772
Lane 1 Southbound

Client: Scantech
0 - 176m

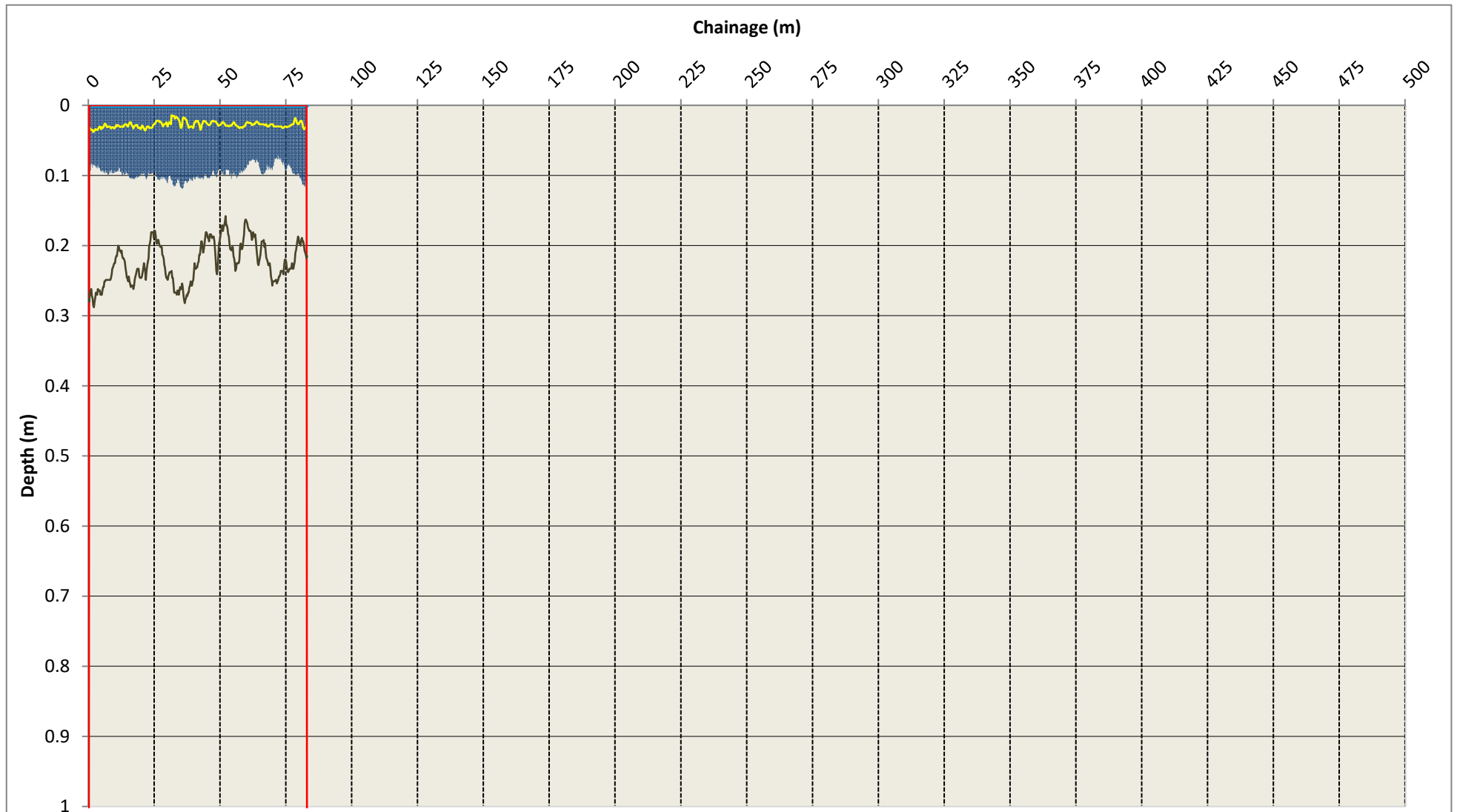


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 6 - L95115
Lane 1 Eastbound

Client: Scantech
0 - 83m

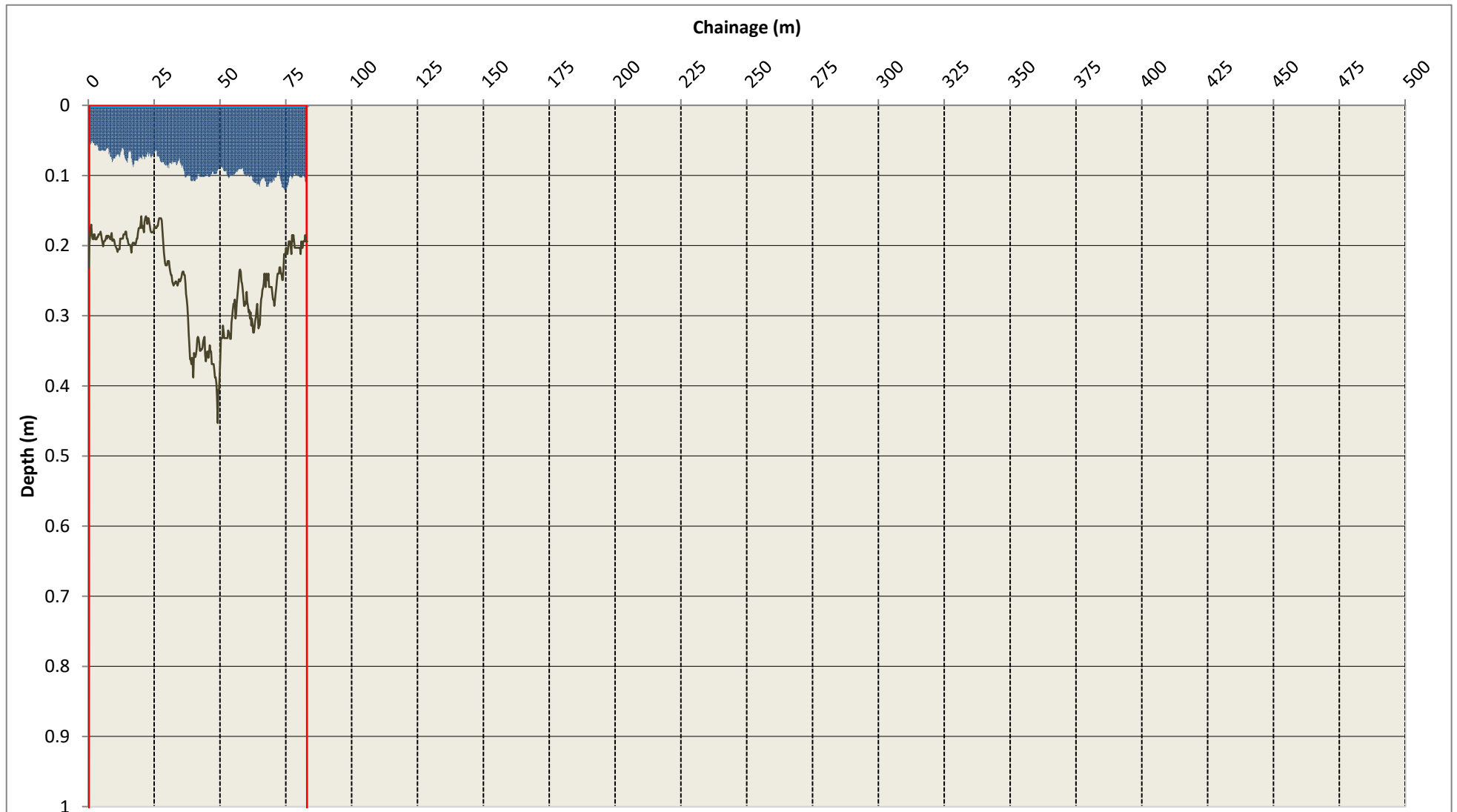


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m

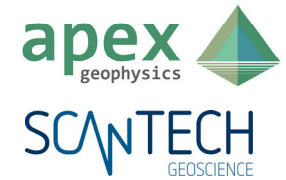


LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 6 - L95115
Lane 1 Westbound

Client: Scantech
0 - 83m

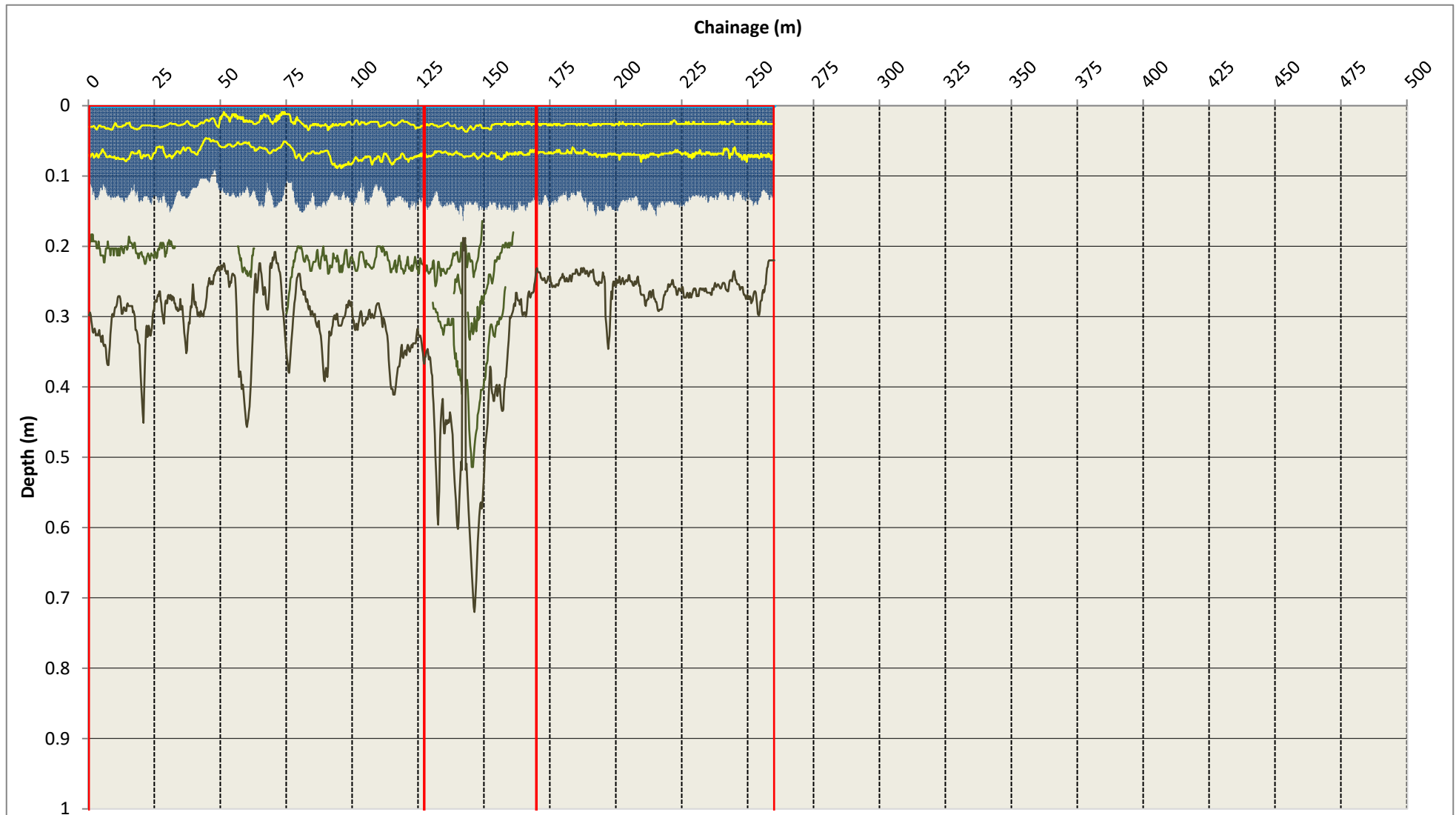


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 7 - R750
Lane 1 Northbound

Client: Scantech
0 - 260m

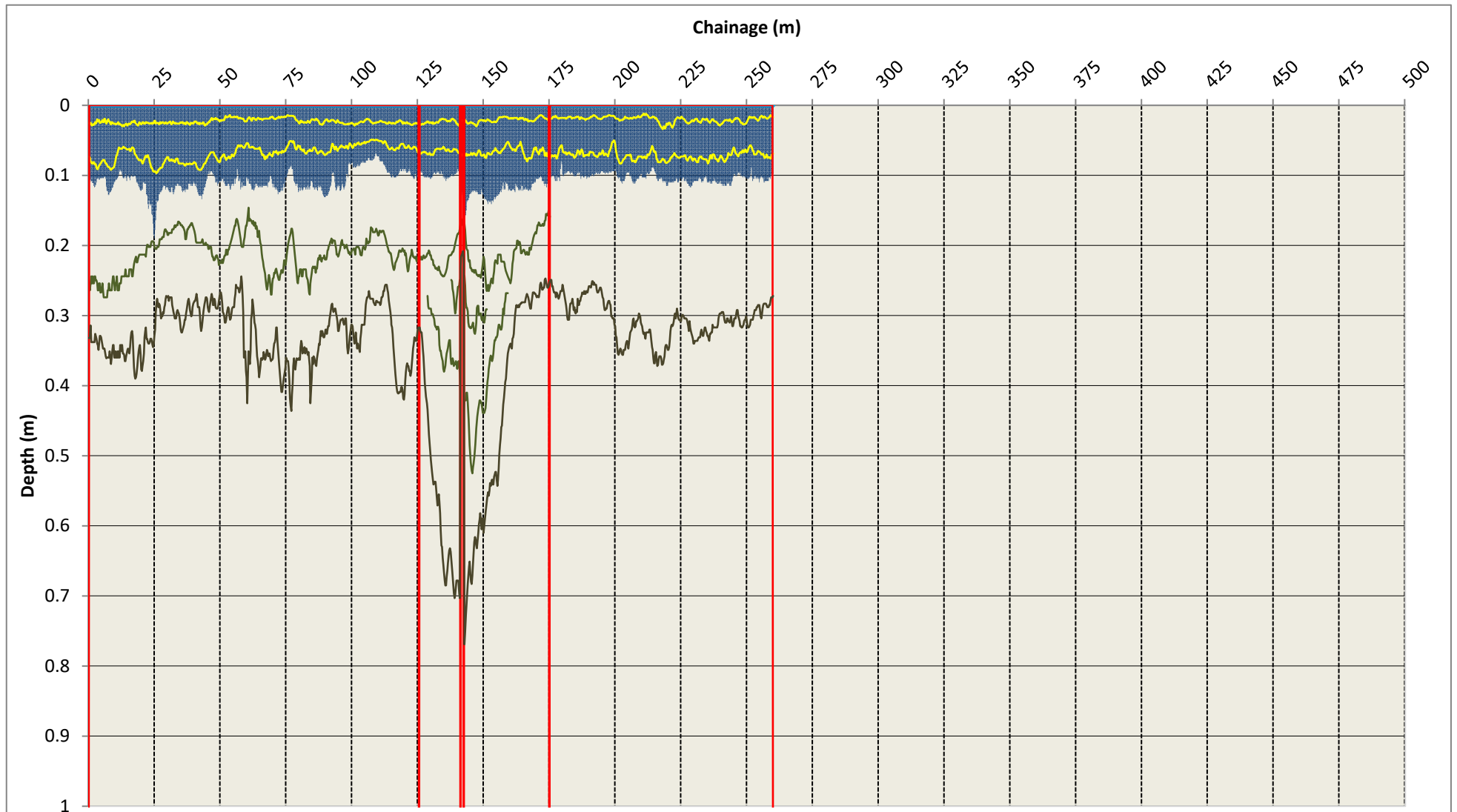


Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m



LEGEND

- Base of Bitumen L4
- Internal Bitumen L1
- Internal Bitumen L2
- Internal Bitumen L3
- Construction Change
- Core
- Subbase L5
- Subbase L6
- Subbase L7
- Base of Subbase L8

Project: 20212 Arklow Bank Pavement Assessment
Site 7 - R750
Lane 1 Southbound

Client: Scantech

0 - 260m



Date of Survey: 22.10.20

Construction: Flexible

Surface Condition: Dry

Chart Length: 500m

7. APPENDIX B: PAVEMENT CONSTRUCTION SUMMARY TABLES

SITE 1. L6179 - Kilbride Road, Lane 1 Eastbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	722654.51	675090.60						
0	36.25	722673.11	675121.51	0.041	0.085	0.070	0.327	0.403	0.367
36.25	91.25	722692.76	675172.87	0.054	0.094	0.077	0.314	0.499	0.405
91.25	145.75	722726.72	675213.75	0.067	0.121	0.091	0.305	0.360	0.325
145.75	204.25	722783.56	675220.01	0.062	0.103	0.089	0.328	0.453	0.381
204.25	280.75	722850.22	675183.33	0.049	0.105	0.070	0.198	0.446	0.330
280.75	454	722994.40	675087.27	0.063	0.120	0.092	0.213	0.338	0.277
454	641.75	723150.89	674983.55	0.055	0.147	0.073	0.162	0.306	0.213
641.75	747.5	723239.22	674925.41	0.147	0.263	0.202	0.258	0.431	0.356
747.5	1012	723492.69	674873.15	0.170	0.239	0.194	0.249	0.432	0.354
1012	1027	723507.68	674873.68	0.101	0.189	0.126	0.270	0.397	0.313

SITE 1. L6179 - Kilbride Road, Lane 1 Westbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	722654.51	675090.60						
0	23.25	722667.62	675109.73	0.063	0.102	0.078	0.302	0.412	0.343
23.25	93.75	722693.70	675175.19	0.065	0.095	0.078	0.220	0.440	0.342
93.75	143.5	722724.75	675212.66	0.070	0.139	0.095	0.244	0.357	0.298
143.5	201.75	722781.13	675220.59	0.032	0.096	0.077	0.275	0.377	0.331
201.75	279	722848.79	675184.33	0.048	0.111	0.061	0.212	0.350	0.274
279	309.25	722873.84	675167.37	0.045	0.111	0.086	0.227	0.296	0.255
309.25	453	722993.56	675087.82	0.044	0.163	0.073	0.204	0.405	0.289
453	651.5	723159.05	674978.22	0.063	0.225	0.082	0.189	0.354	0.260
651.5	1010.5	723491.19	674873.10	0.125	0.249	0.198	0.254	0.511	0.377
1010.5	1027	723507.68	674873.68	0.115	0.145	0.124	0.278	0.349	0.305

SITE 2. Unnamed Local Road, Lane 1 Northbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	723309.37	674897.60						
0	203.75	723465.24	674992.72	0.064	0.115	0.087	0.189	0.617	0.349
203.75	576.5	723417.82	675337.71	0.101	0.180	0.129	0.203	0.583	0.351

SITE 2. Unnamed Local Road, Lane 1 Southbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	723309.37	674897.60						
0	197	723462.46	674986.56	0.063	0.113	0.081	0.219	0.494	0.325
197	576.5	723417.82	675337.71	0.090	0.256	0.127	0.206	0.645	0.310

SITE 3. L2180 - Beech Road, Lane 1 Eastbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	724287.21	675429.12						
0	250.75	724477.52	675266.03	0.087	0.221	0.147	0.229	0.402	0.305

SITE 3. L2180 - Beech Road, Lane 1 Westbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	724287.21	675429.12						
0	250.75	724477.52	675266.03	0.070	0.172	0.130	0.240	0.398	0.290

SITE 4. R772 - Dublin Road 1b, Lane 1 Northbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	724908.86	675183.21						
0	169.75	724944.99	675348.82	0.059	0.098	0.075	0.164	0.224	0.192
169.75	186	724947.68	675364.84	0.058	0.076	0.068	0.178	0.217	0.192

SITE 4. R772 - Dublin Road 1b, Lane 1 Southbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	724908.86	675183.21						
0	169.75	724944.99	675348.82	0.059	0.103	0.074	0.149	0.336	0.206
169.75	186	724947.68	675364.84	0.059	0.078	0.068	0.161	0.187	0.171

SITE 5. R772 - Dublin Road 1a, Lane 1 Northbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	724993.49	675625.54						
0	22.5	724997.52	675647.67	0.053	0.085	0.071	0.212	0.323	0.261
22.5	176	725036.99	675795.76	0.046	0.087	0.061	0.285	0.615	0.441

SITE 5. R772 - Dublin Road 1a, Lane 1 Southbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	724993.49	675625.54						
0	22.5	724997.52	675647.67	0.062	0.083	0.071	0.274	0.364	0.324
22.5	176	725036.99	675795.76	0.049	0.079	0.061	0.301	0.546	0.432

SITE 6. L95115, Lane 1 Eastbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	726828.24	676965.70						
0	166	726889.55	676910.11	0.072	0.119	0.097	0.158	0.288	0.224

SITE 6. L95115, Lane 1 Westbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	726828.24	676965.70						
0	166	726889.72	676909.95	0.051	0.121	0.090	0.158	0.453	0.247

SITE 7. R750 - Coast Road, Lane 1 Northbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	727101.21	677118.24						
0	127.25	727181.46	677215.18	0.091	0.152	0.129	0.208	0.457	0.305
127.25	169.75	727199.12	677253.66	0.122	0.164	0.142	0.188	0.720	0.424
169.75	260	727230.73	677337.92	0.120	0.157	0.135	0.220	0.346	0.257

SITE 7. R750 - Coast Road, Lane 1 Southbound

CHAINAGE		COORDINATES		BITUMINOUS MATERIAL			SUBBASE MATERIAL		
start (m)	end (m)	easting ITM	northing ITM	min. depth (m)	max. depth (m)	avg. depth (m)	min. depth (m)	max. depth (m)	avg. depth (m)
	0	727101.21	677118.24						
0	125.5	727180.35	677213.37	0.069	0.190	0.109	0.244	0.436	0.327
125.5	141.25	727187.83	677227.23	0.091	0.116	0.100	0.231	0.703	0.553
141.25	142.5	727188.41	677228.34	0.116	0.151	0.128	0.208	0.231	0.217
142.5	175	727200.95	677258.31	0.101	0.159	0.122	0.220	0.769	0.428
175	260	727230.73	677337.92	0.080	0.117	0.103	0.249	0.372	0.305