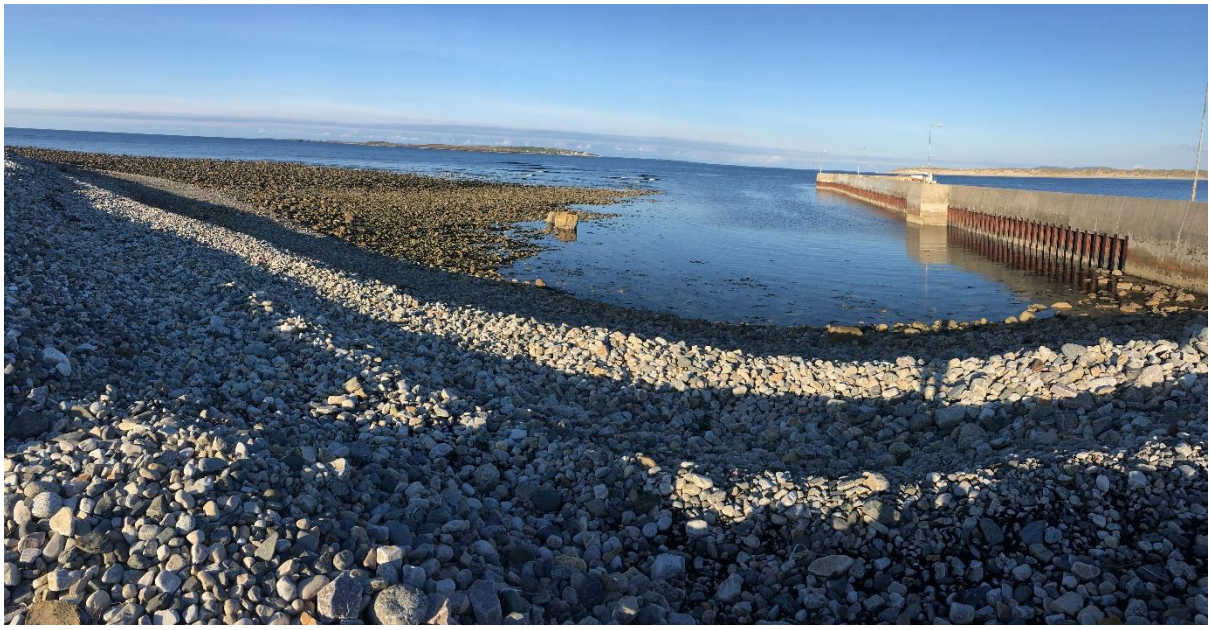
Inishowen Technology Limited
Umricam,
Buncrana,
County Donegal,
Republic of Ireland F93 P8H0

VAT number: IE6591695S

Side Scan Report
for
Magheroraty Approaches



Inishowen Technology Limited is incorporated in the Republic of Ireland since 1992.
Company Number 191695

Telephone : +353 74 9363104
E-Mail: sales@iotech.ie

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1. Summary

This report is intended to fulfil the requirements for side survey as specified in the tender documents "Magheraroarty Approach Channel Survey", October 2019. It is one of a family of four reports.

1. Final/Interpretative Report
2. Bathymetric Report for Magheraroraty Approaches
3. Side Scan Report for Magheraroraty Approaches (this report)
4. Magnetometry Report for Magheraroraty Approaches

This report is a summary only and is accompanied by high resolution copies of all figures and data extracts as specified below.

Donegal County Council requirements were specified as:

1. A mosaic of the search box with anomalies and features identified.

The following deliverables were specified:

1. A summary and interpretive report.
2. A georeferenced mosaic of the survey area compensated for layback with labelled features and anomalies.
3. A georeferenced chart showing survey lines.
4. Raw data files of each survey line with anomalies flagged.

The following standards were specified

1. Survey standards generally to IHO order 1b.

The measurements specified above are carried out in the context of the Works Requirements, Description of Works for this project.

"*Access to Magheraroarty pier has ever more been challenging due to the shallow approach and continuous siltation within the berthing area of the pier. Annual dredging is required to maintain navigable depths at the pier, however, there is also a difficulty on the final approach to the pier where Donegal Co. Council would now like to obtain an accurate profile of the approach channel.*

It is proposed to carry out a number of surveys to determine the most suitable approach route and from this provide Aids to Navigation. Donegal Co. Council would also like to determine the profile and make-up of the sea bed in this area to establish whether or not it is possible to dredge the access channel to make the pier accessible at all levels of tide".

2. Digital Terrain Model (DTM)

Figure 1 shows a DTM extracted from the accompanying Bathymetry Report.

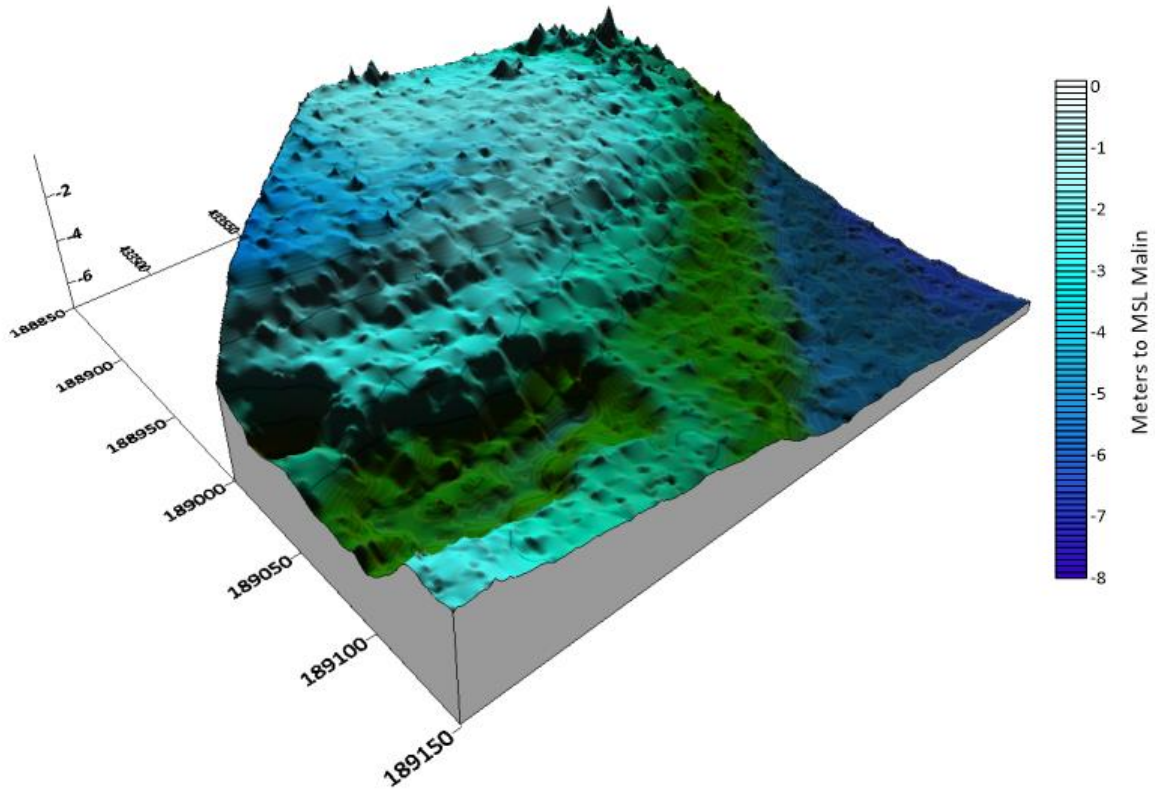


Figure 1. A 3D view from south-east with Z axis exaggerated

3. Survey Activity

Lines were taken over two days with 100% coverage each day, leading to two separate data set.

17th of October 2020, data set R005, 18 lines, 100% overlap

18th of October 2020, data set R007, 18 lines, 100% overlap

The side-scan transducer was transom mounted so there is no layback calculation.

4. Particle Size Definitions per ISO 14688-1:2002

Large Boulder (LBo)	>630 mm	
Boulder (Bo)	200–630 mm	
Cobble (Co)	63-200 mm	
Gravel	2-63 mm	ISO 14688-1:2002 subdivides into three grades
Sand	0.0063-2 mm	ISO 14688-1:2002 subdivides into three grades
Silt	0.002-0.0063 mm	ISO 14688-1:2002 subdivides into three grades

5. Mosaic

Figure 2 shows a mosaic of the survey area. Although larger boulders are visible in the north west of the area adjacent to box corner A, the area is characterised by smaller features which are not easily discriminated at this scale. An analysis of individual lines will follow.

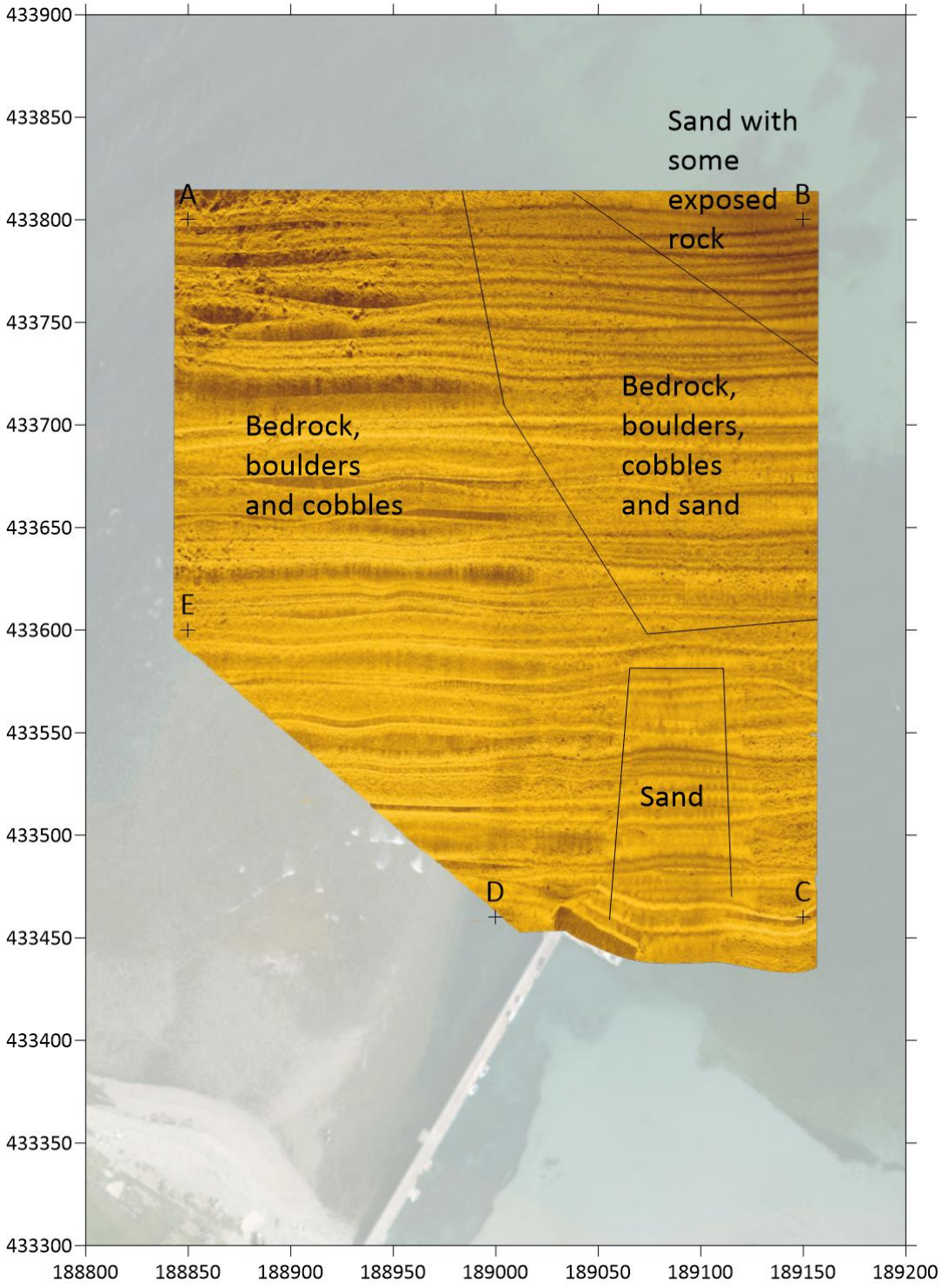


Figure 2. An annotated mosaic of the survey area

6. Analysis of Lines

Line R007A

Bedrock exposed and large boulders to the west.

There are boulders and cobbles in the middle of the line on the slope.

Sand is exposed in the east of the line, with visible ripples and this sand area is also visible in the aerial photographs used as base maps.

In the east, there is some exposed rock in the sand and a linear drag mark caused by an anchor or pots.

The approaches are to the east of this area.

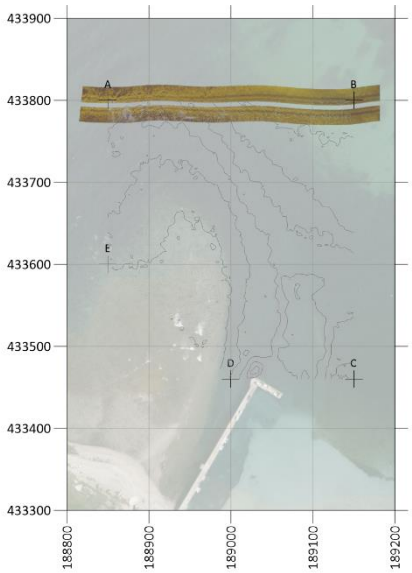




Figure 3. Side scan line R007A

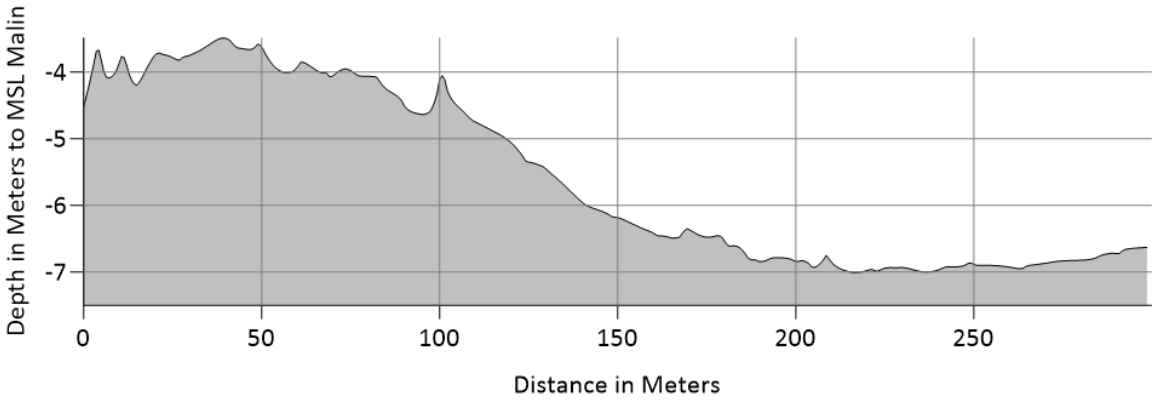


Figure 4. East-west depth profile for the centre of line R007A

Line R007B

This line overlaps with R007A to the north.

Bedrock is exposed and there are large boulders to the west.

There are boulders and cobbles in the middle of the line on the slope.

Sand is exposed in the east of the line, with visible ripples.

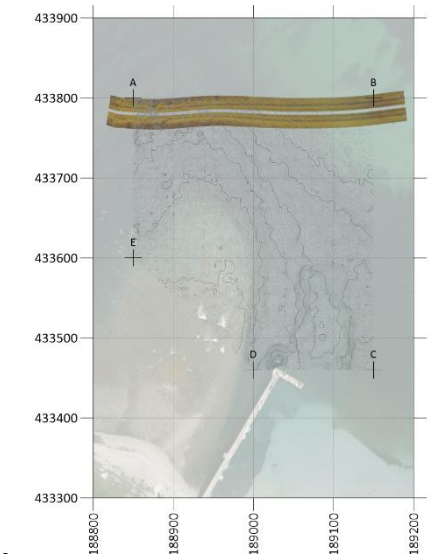




Figure 5. Side scan line R007B

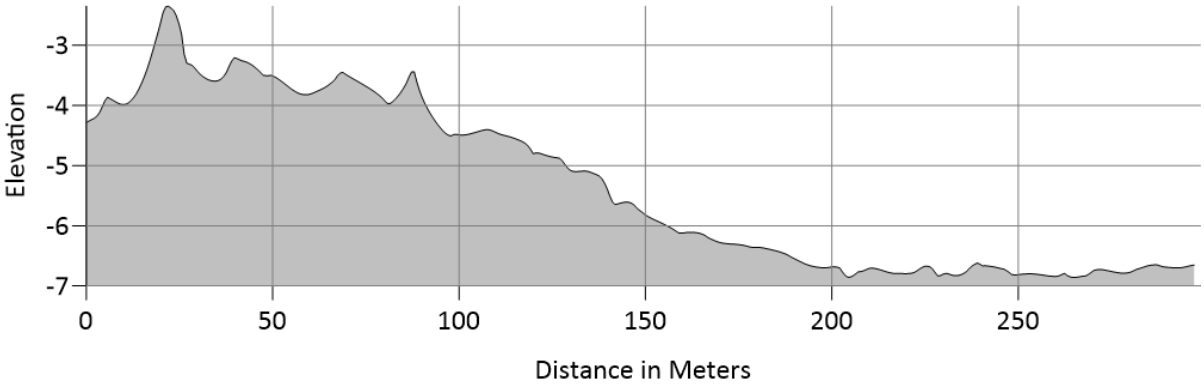


Figure 6. East-west depth profile for the centre of line R007B

Line R007C

This line overlaps with R007B to the north.

Bedrock is exposed and there are large boulders to the west.

There are boulders and cobbles in the middle of the line on the slope.

Sand is exposed in the east of the line, with visible ripples. The sandy area reduces progressively eastwards as the survey lines move southwards.

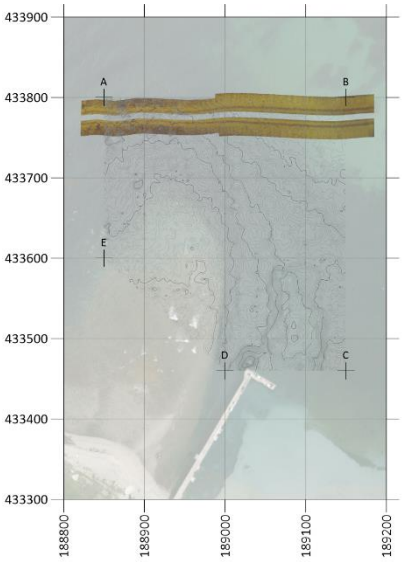




Figure 7. Side scan line R007C

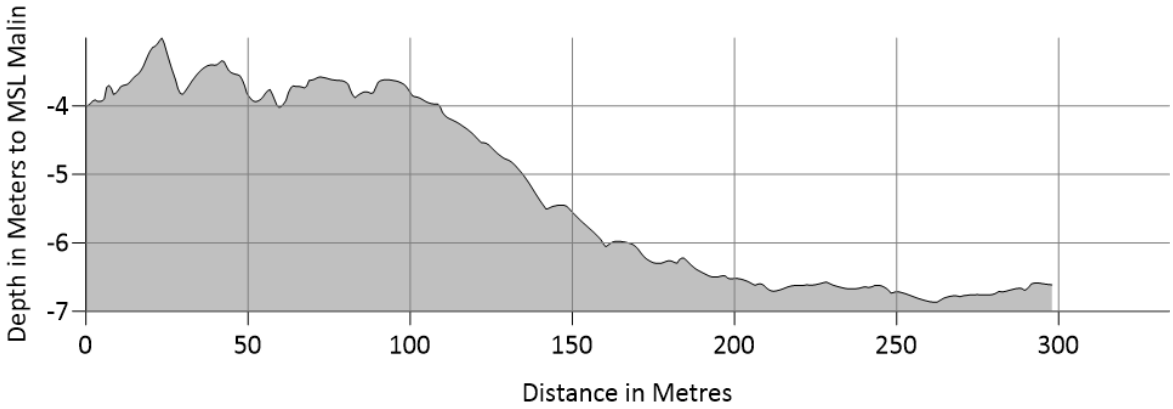


Figure 8. East-west depth profile for the centre of line R007C

Line R007D

This line overlaps with R007C to the north.

Bedrock is exposed and there are large boulders to the west.

There are boulders and cobbles in the middle of the line on the slope.

Sand is exposed in the east of the line, with visible ripples. The sandy area reduces progressively eastwards as the survey lines move southwards.

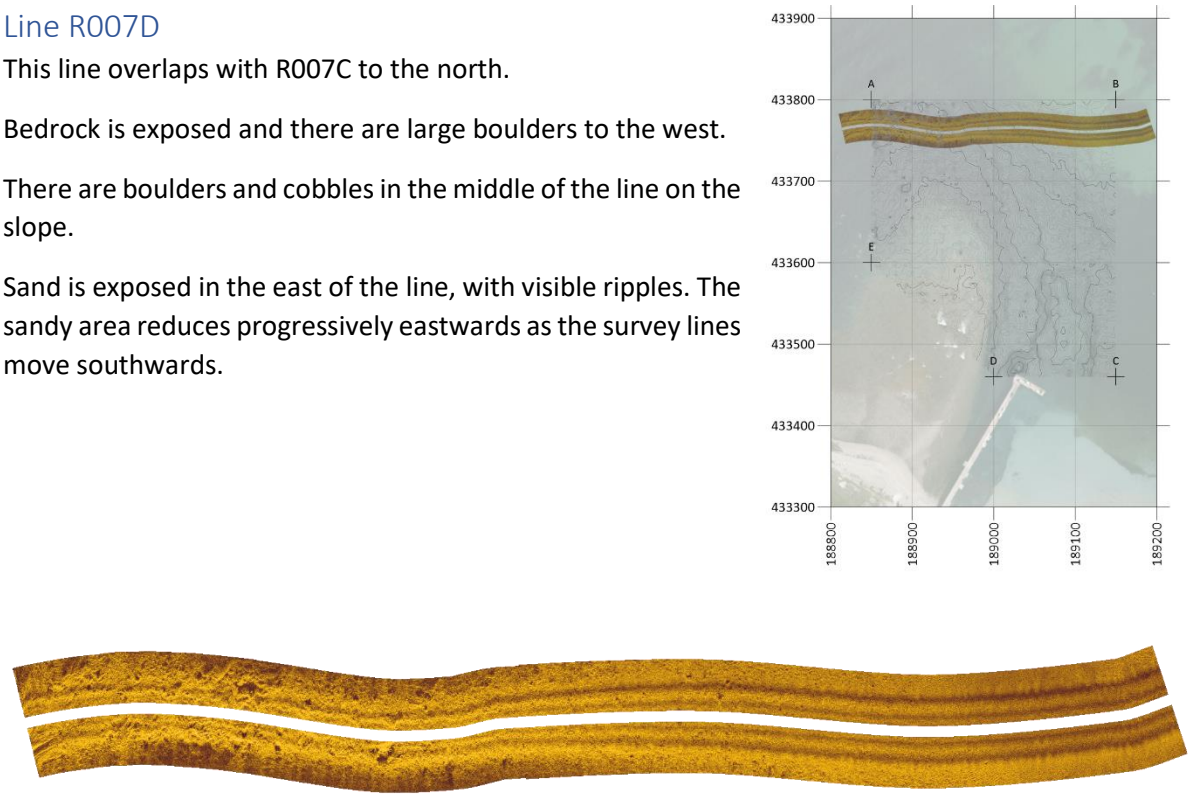


Figure 9. Side scan line R007D

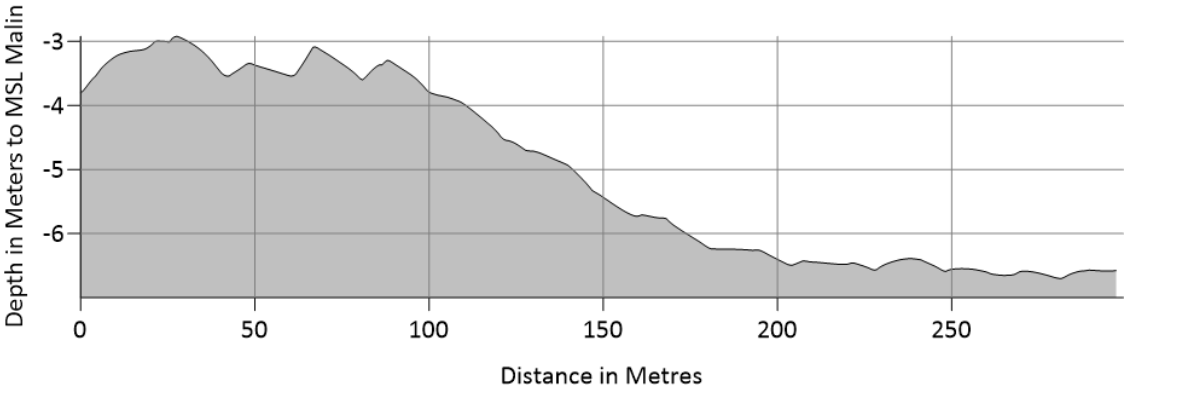


Figure 10. East-west depth profile for the centre of line R007D

Line R007E

This line overlaps with R007D to the north.

Bedrock is exposed just outside the survey area and there are large boulders to the west.

There are boulders and cobbles in the middle of the line on the slope.

Sand is exposed in the east of the line, with visible ripples. The sandy area reduces progressively eastwards as the survey lines move southwards; on this line the sand is close to the survey area boundary.

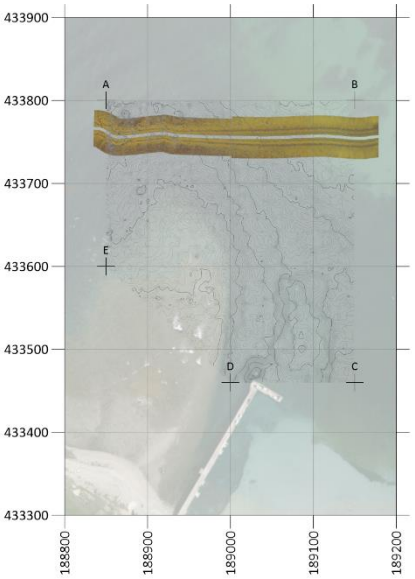




Figure 11. Side scan line R007E

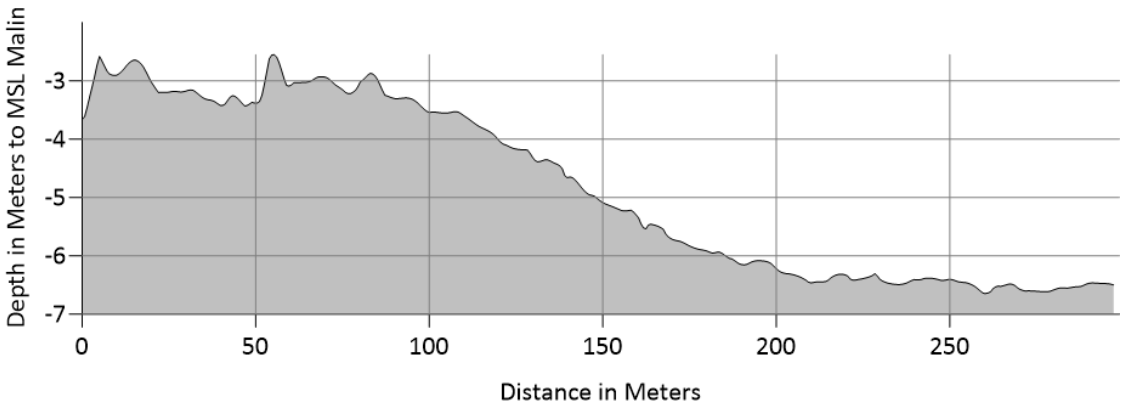


Figure 12. East-west depth profile for the centre of line R007E

Line R007F

This line overlaps with R007E to the north.

There are still large boulders to the west, but few.

There are boulders and cobbles from the middle of the line on the slope.

Sand is exposed in the east of the line, with visible ripples. The sandy area reduces progressively eastwards as the survey lines move southwards; on this line the sand is close to the survey area boundary.

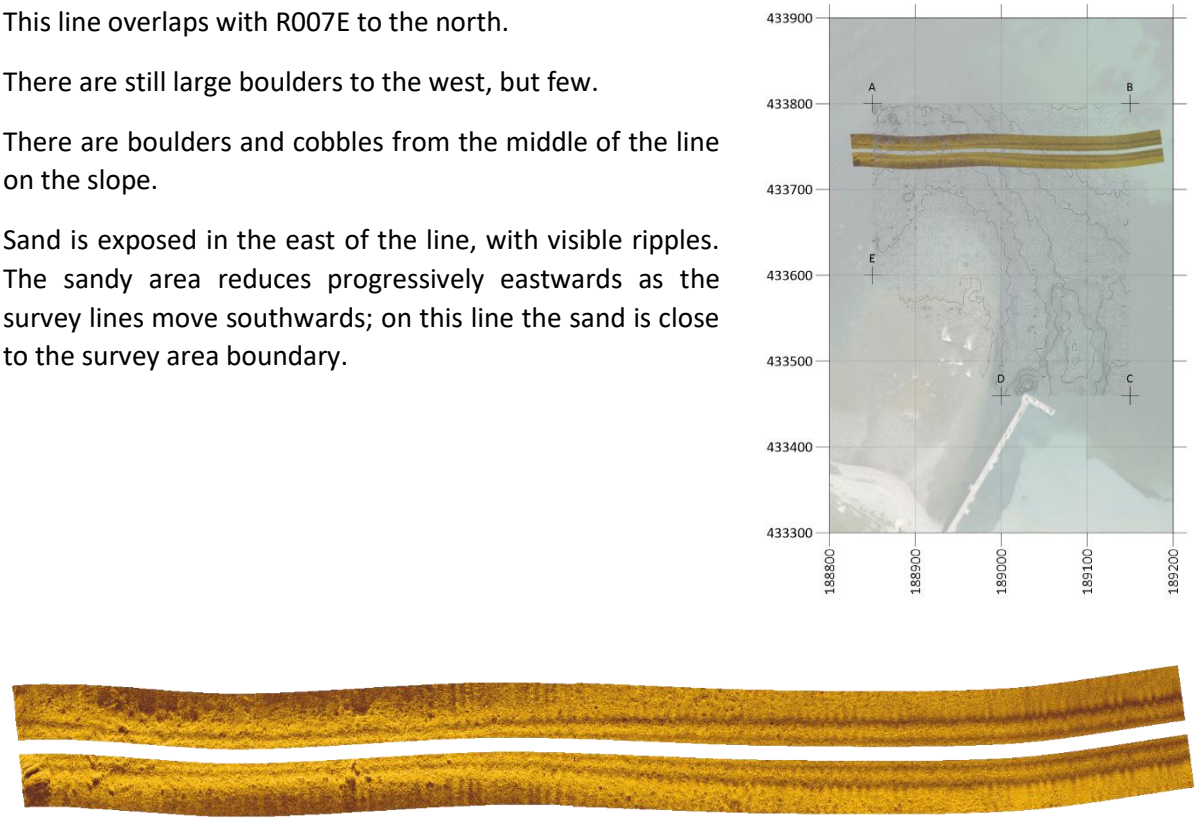


Figure 13. Side scan line R007F

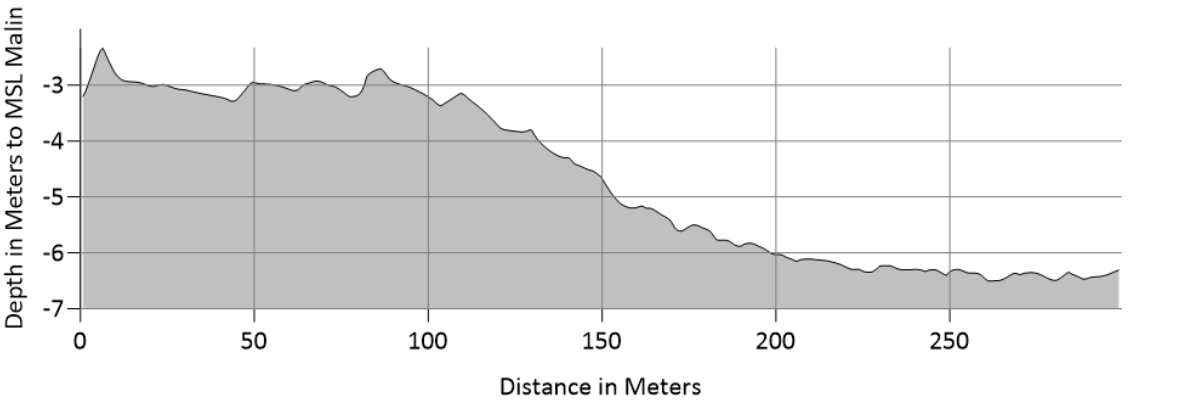


Figure 14. East-west depth profile for the centre of line R007F

Line R007G

This line overlaps with R007F to the north.

There are few large boulders to the west and the slope of the reef is more pronounced as the survey line approaches LAT/CD. The reef has attained the familiar hump shape visible at low tide.

There are boulders and cobbles from the middle of the line on the slope.

Sand is exposed in the east of the line, with visible ripples, but on the north trace only. On the south trace, sand is still visible but outside the survey area. Cobbles and gravel now extend to the east end of the survey area.

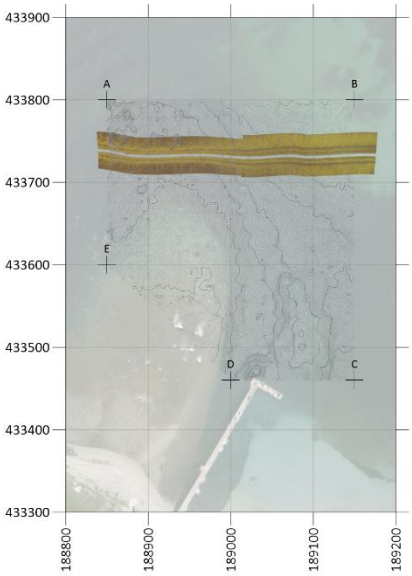




Figure 15. Side scan line R007G

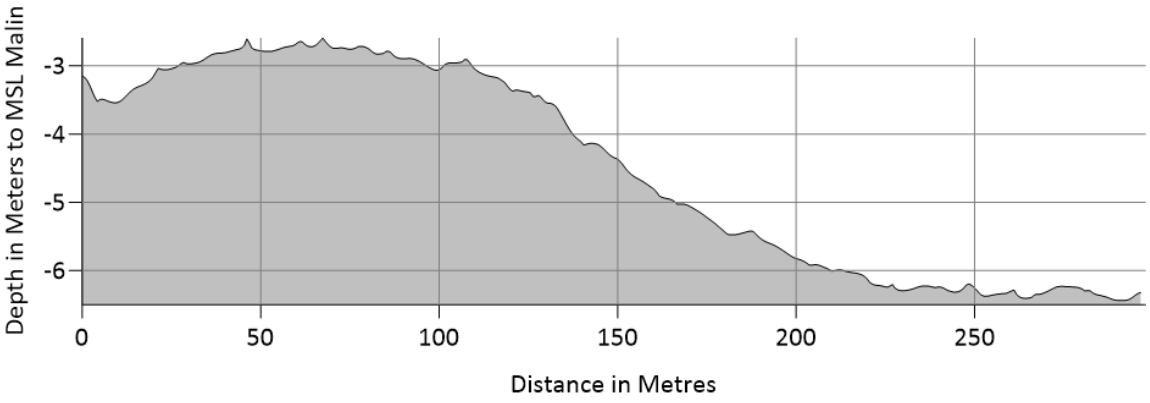


Figure 16. East-west depth profile for the centre of line R007G

Line R007H

This line overlaps with R007G to the north.

To the west, the reef approaches LAT/CD and flattens, with cobbles and some exposed bedrock, but with no larger boulders.

To the east, it is still possible to identify sand and ripples at the end of the survey line, but outside the survey area. Cobbles and gravel extend to the east end of the survey area.

The approaches are to the east and still in deep water centred c. 240m in Figure 18, -6m MSL or around -4m to LAT/CD.

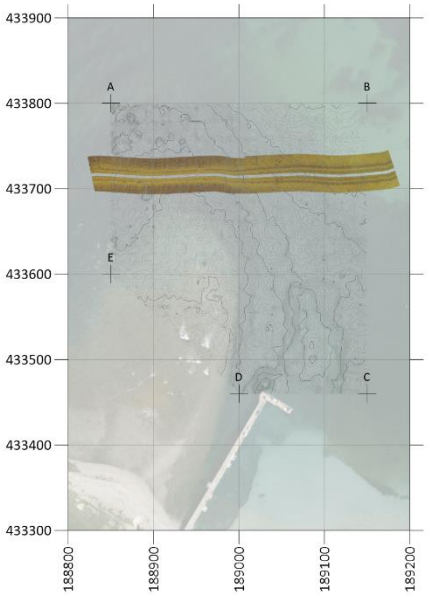




Figure 17. Side scan line R007H

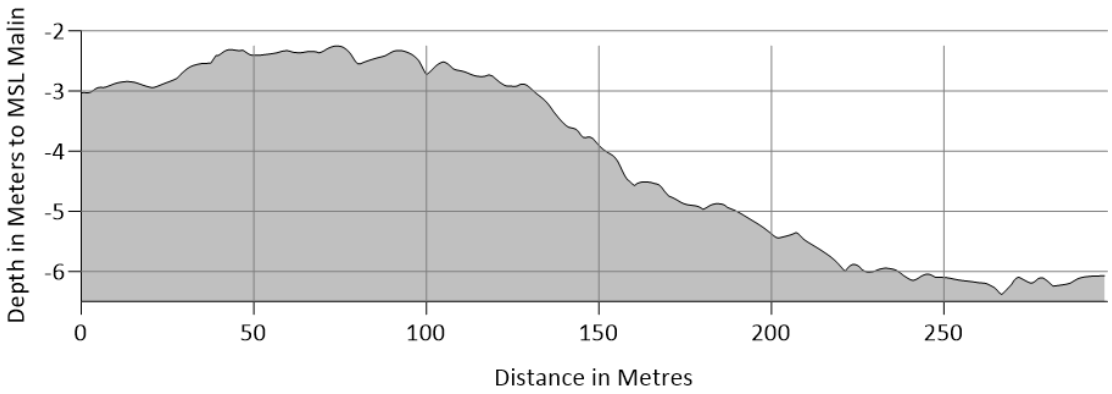


Figure 18. East-west depth profile for the centre of line R007H

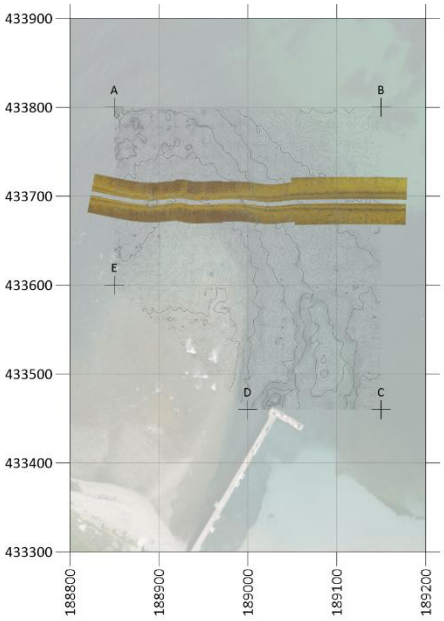
Line R007I

This line overlaps with R007H to the north.

To the west, the reef flattens and becomes featureless undifferentiated cobbles and small boulders, with some trapped sand. This part of the reef is exposed at low water springs and the side scan is becoming less effective due to the very shallow water.

From around the -1m contour, vegetation becomes sparser.

Cobbles and gravel now extend to the east end of the survey area. The approaches are to the east and still in deep water centred c. 240m in Figure 20, -5.5m MSL or around -3.5m to LAT/CD.



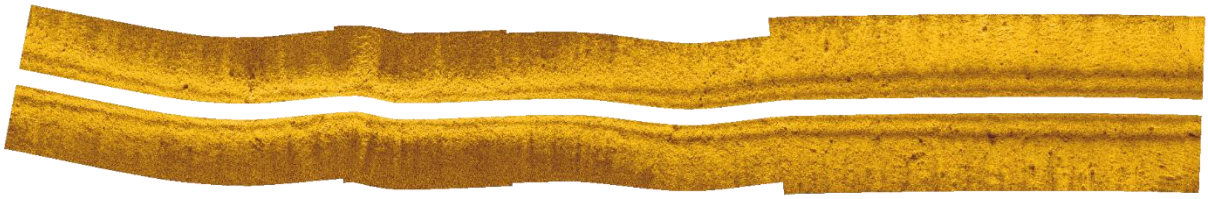


Figure 19. Side scan line R007I

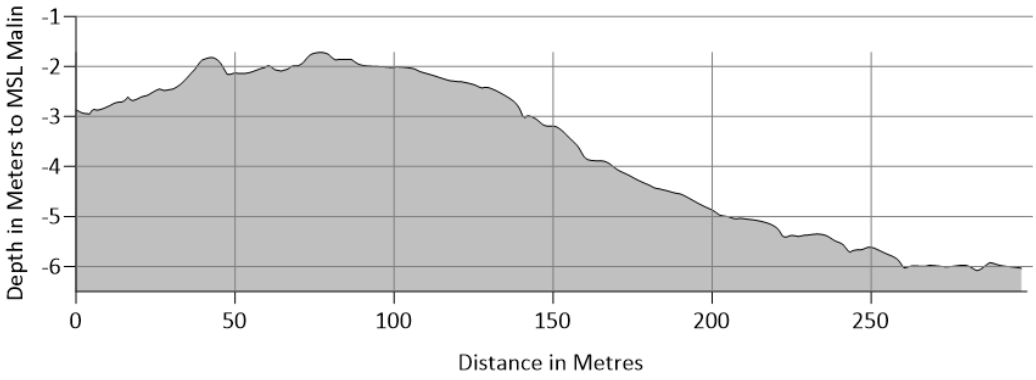


Figure 20. East-west depth profile for the centre of line R007I

Line R007J

This line overlaps with R007I to the north.

To the west, the reef has flattened as featureless undifferentiated cobbles and small boulders, with some trapped sand. This part of the reef is exposed at low water and the side scan is less effective due to the very shallow water.

From the around the -1m contour, vegetation has become sparser.

Cobbles and gravel extend to the east end of the survey area. The approaches are to the east and continue to shallow, centred c. 240m in Figure 22, -5m MSL or around -3m to LAT/CD.

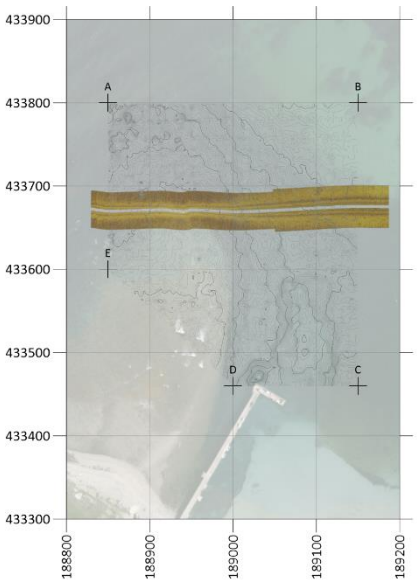




Figure 21. Side scan line R007J

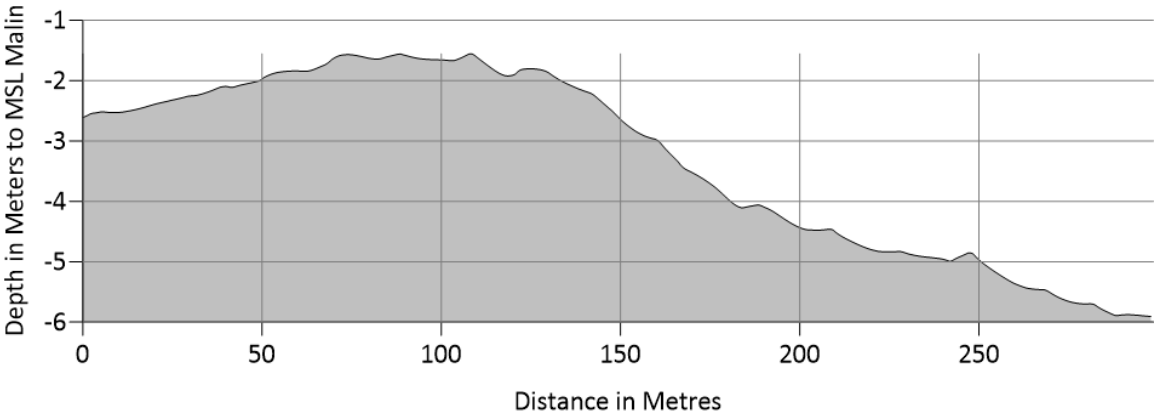


Figure 22. East-west depth profile for the centre of line R007J

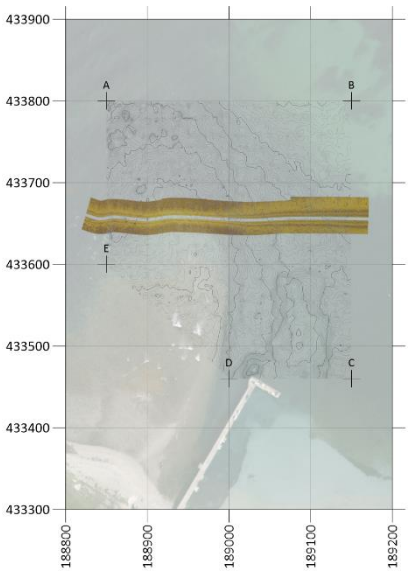
Line R007K

This line overlaps with R007J to the north.

To the west, the reef is flat and featureless undifferentiated cobbles and small boulders, with some trapped sand. This part of the reef is exposed at low water and the side scan is less effective due to the very shallow water.

From the around the -1m contour, vegetation has become sparser.

Cobbles and gravel extend to the east end of the survey area. The approaches are to the east and continue to shallow, centred c. 240m in Figure 24, -4.5m MSL or around -2.5m to LAT/CD.



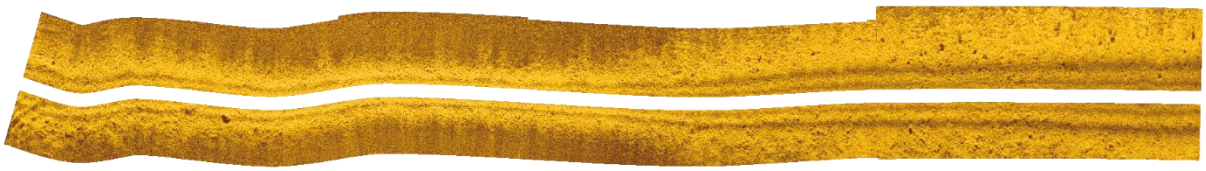


Figure 23. Side scan line R007K

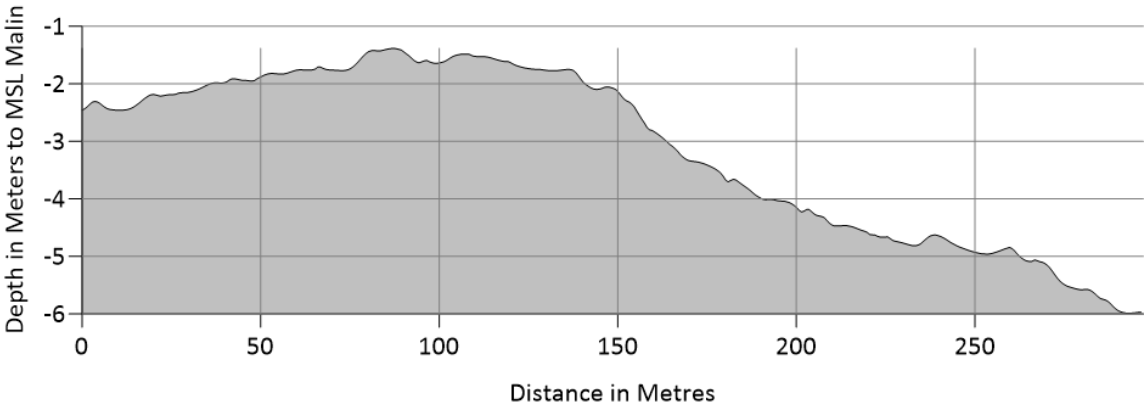


Figure 24. East-west depth profile for the centre of line R007K

Line R007L

This line overlaps with R007K to the north.

To the west, the reef is flat and featureless undifferentiated cobbles and small boulders, with some trapped sand. This part of the reef is exposed at low water and the side scan is less effective due to the very shallow water.

From the around the -1m contour, vegetation has become sparser.

Cobbles and gravel extend to the east end of the survey area. The approaches are to the east and continue to shallow, centred c. 240m in Figure 26, -4.5m MSL or around -2.5m to LAT/CD.

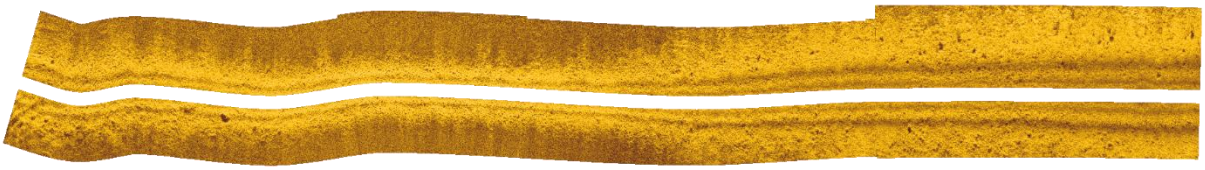


Figure 25. Side scan line R007L

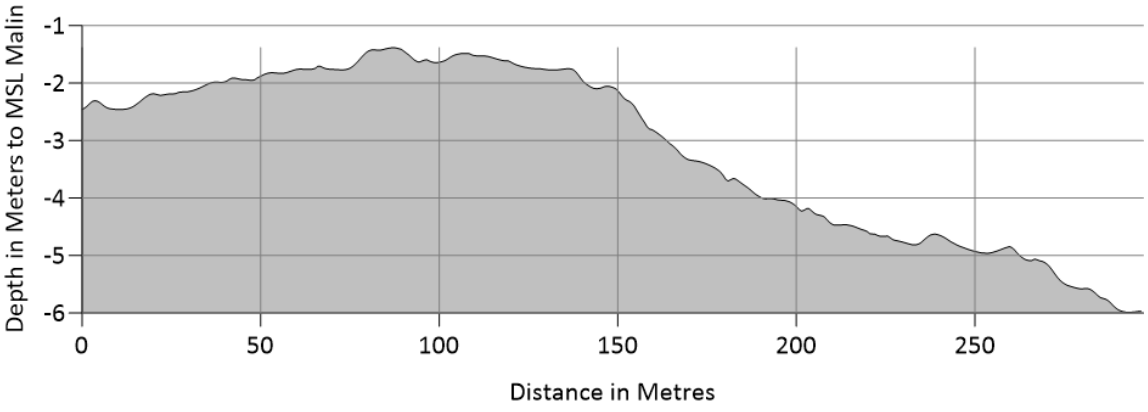


Figure 26. East-west depth profile for the centre of line R007L

Line R007M

This line overlaps with R007L to the north.

To the west, the reef is flat and featureless undifferentiated cobbles and small boulders, with some trapped sand. There are some small boulders to the west just outside the survey area. This part of the reef is exposed at low water and the side scan is less effective due to the very shallow water.

From the around the -1m contour, vegetation has become sparser.

Cobbles and gravel extend to the east end of the survey area and just outside the survey area, bedrock is visible. The approaches are to the east and continue to shallow, centred c. 240m in Figure 28, -4m MSL or around -2m to LAT/CD. This is shallowest part of the approaches.

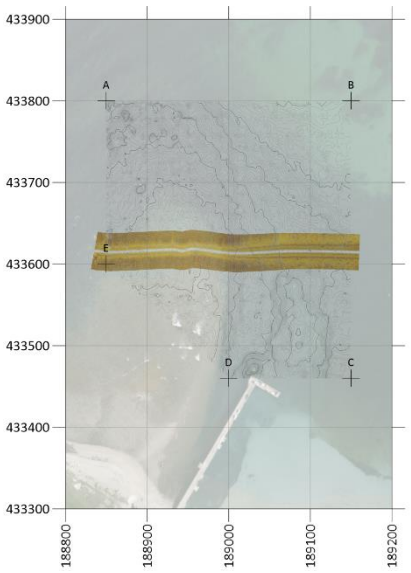




Figure 27. Side scan line R007M

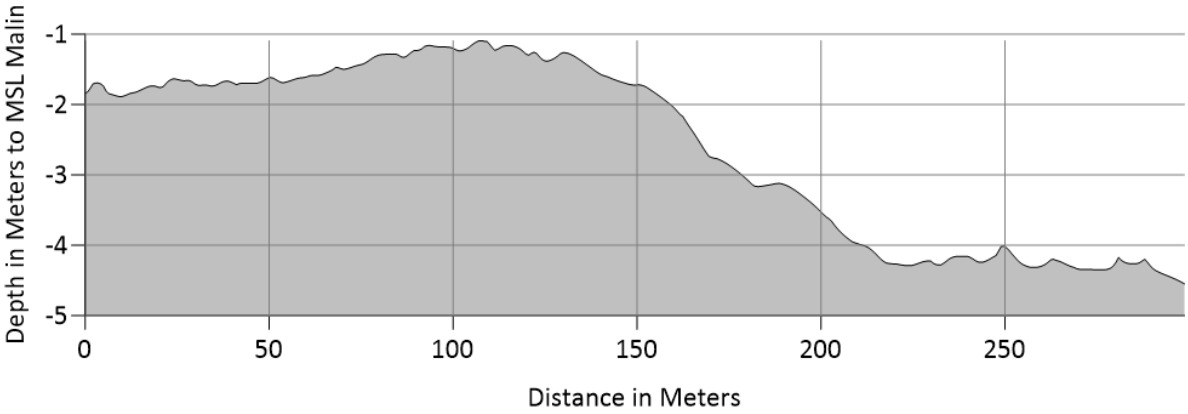
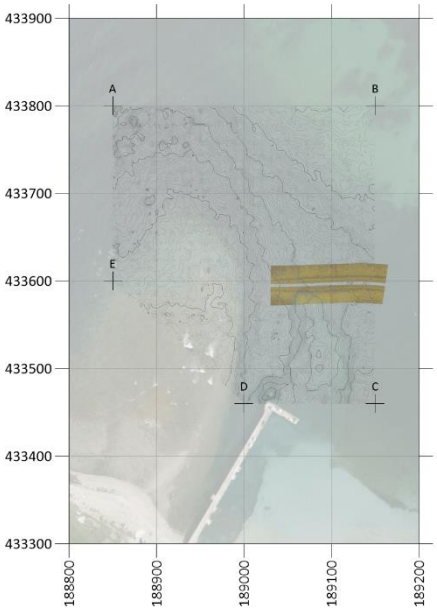


Figure 28. East-west depth profile for the centre of line R007M

Line R007N

This line overlaps with R007M to the north.



To the west, the reef is flat and featureless undifferentiated cobbles and small boulders, with some trapped sand. This part of the reef is exposed at low water and the side scan is less effective due to the very shallow water. The survey box begins to constrict eastwards from this line onward. Figure 29 does not include this segment, although the entire line is included in the high-resolution files accompanying this report.

The 150m to the east is the most significant line segment on the side scan survey, it marks the transition between the shallow rocky ridge and the deeper sandy approaches. The high-resolution files clearly show the sandy areas correspond with the north of the approaches channel.

Cobbles and gravel extend to the east end of the survey area and some bedrock is visible. The approaches are to the east remain shallow, centred c. 240m in Figure 30, -4m MSL or around -2m to LAT/CD. Along with the area covered by Line M, these are the shallowest parts of the approaches.

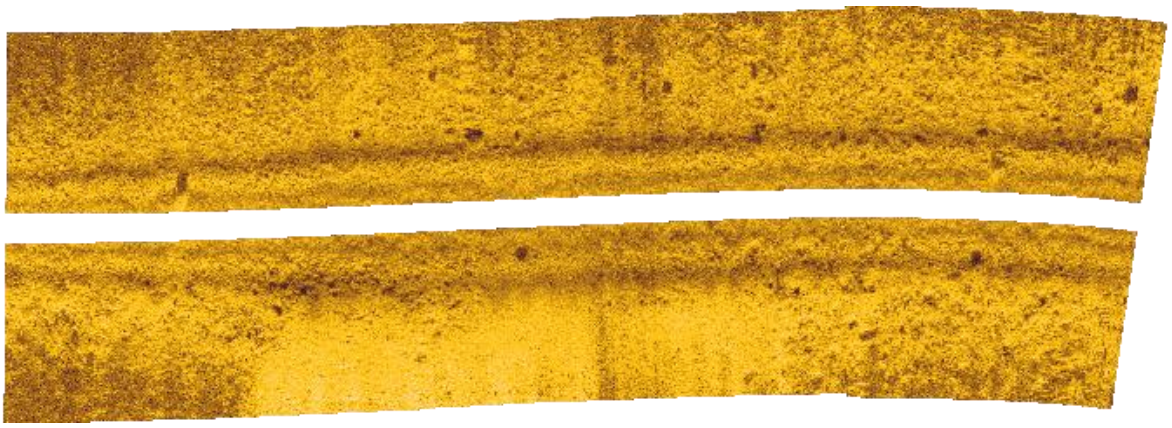


Figure 29. Side scan segment of line R007N

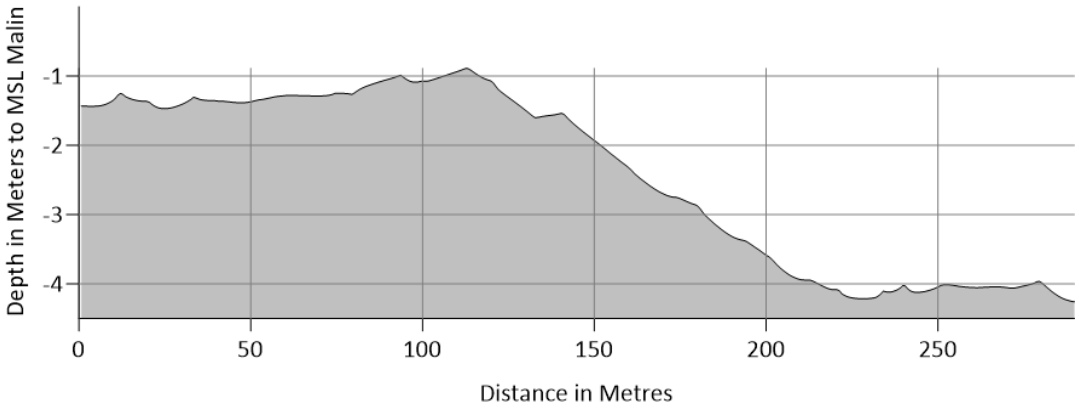
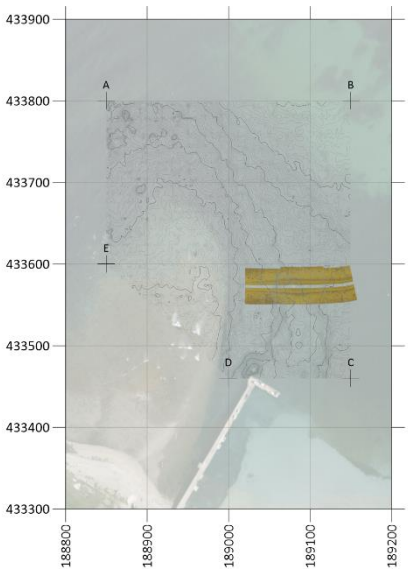


Figure 30. East-west depth profile for the centre of line R007N

Line R007O



This line overlaps with R007M to the north.

To the west, the reef is flat and featureless undifferentiated cobbles and small boulders, with some trapped sand. This part of the reef is exposed at low water and the side scan is less effective due to the very shallow water. The survey box begins to constrict eastwards from this line onward. Figure 29 does not include this segment, although the entire line is included in the high-resolution files accompanying this report.

The 150m to the east is the most significant line segment on the side scan survey, it marks the transition between the shallow rocky ridge and the deeper sandy approaches. The high-resolution files clearly show the sandy areas correspond with the north of the approaches channel. The approaches have rapidly deepened, centred c. 190m in Figure 34, -5.5m MSL or around -3.5m to LAT/CD.

On the southern segment in Figure 31, rock can be see encroaching from either side and this is independently confirmed in the bathymetry charts of the channel. This is the narrowest point on the approaches, between 189079, 433554 and 189091, 433557 the -5m to MSL channel is c. 12m wide.

Cobbles and gravel extend to the east end of the approaches and some bedrock is visible.



Figure 31. Side scan segment of line R007O

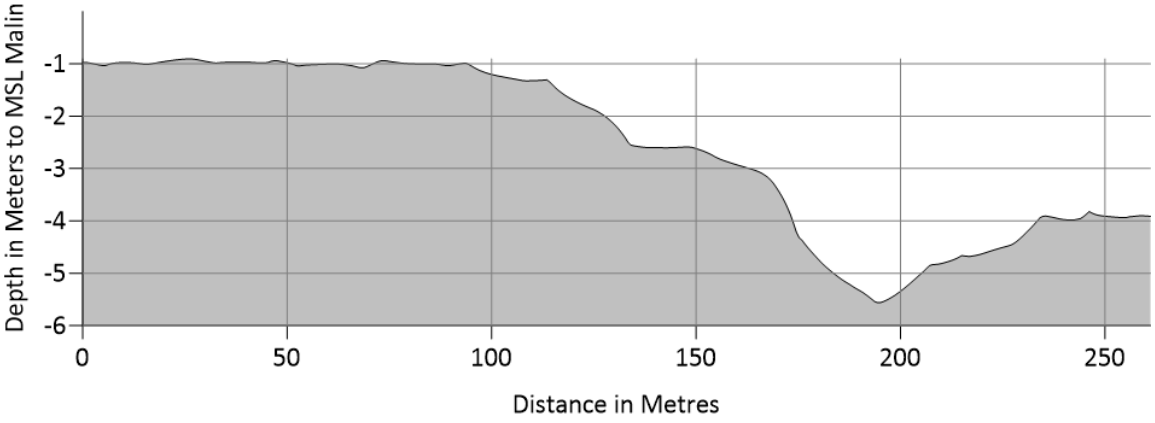


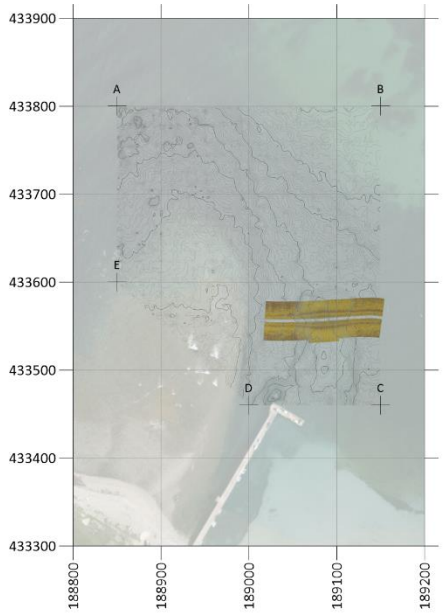
Figure 32. East-west depth profile for the centre of line R007O

Line R007P

This line overlaps with R007O to the north.

The reef is flat and featureless undifferentiated cobbles and small boulders, with some trapped sand.

The 150m to the east is the most significant line segment on the side scan survey. Rock can be seen on either side of the approaches and the sandy areas correspond with the approaches channel, see Figure 33. The approaches remain deep, centred c. 180m, -5.5m MSL or around -3.5m to LAT/CD. However, at the centre point of this line, the channel is very narrow.



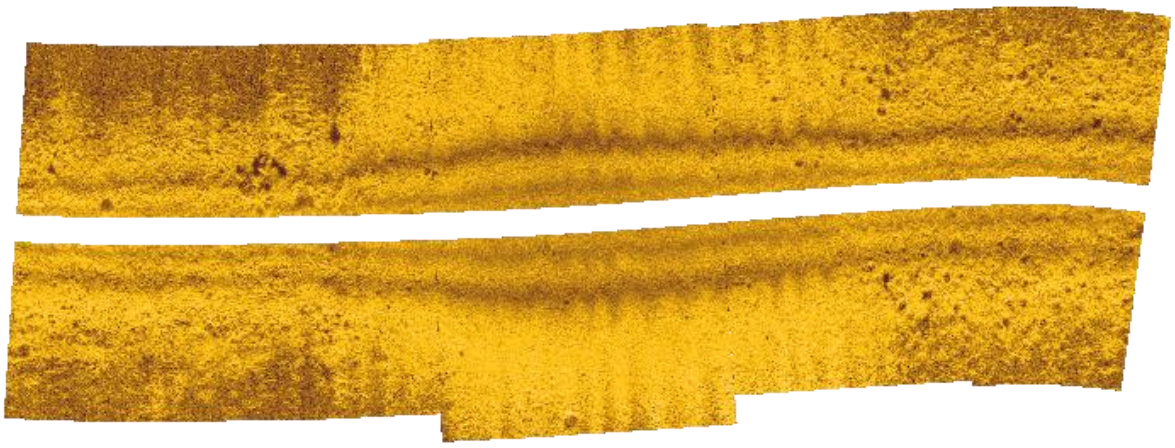


Figure 33. Side scan segment of line R007P

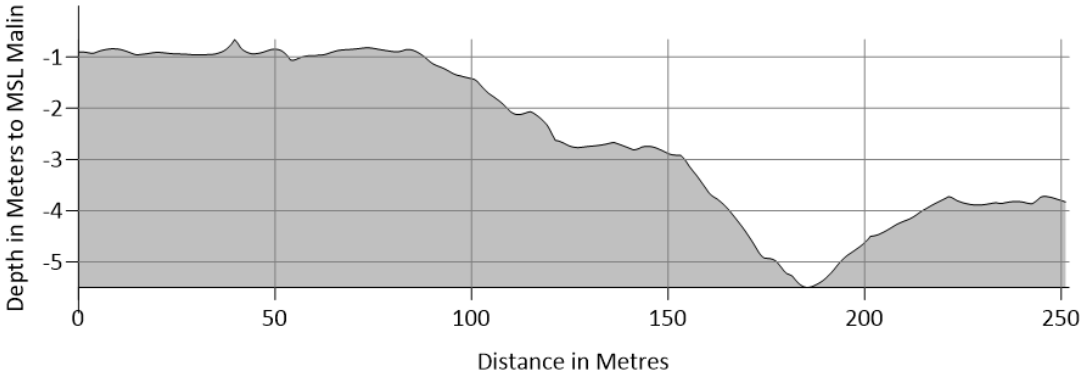


Figure 34. East-west depth profile for the centre of line R007P

Line R007Q

This line overlaps with R007P to the north.

The reef is flat and featureless undifferentiated cobbles and small boulders, with some trapped sand.

The segment to the east includes the approach channel. Rock can be seen on either side of the approaches and the sandy areas correspond with the approaches channel, see Figure 35. The approaches remain deep and has widened to 30m centred c. 170m, -5m MSL or around -3m to LAT/CD as shown in Figure 36.

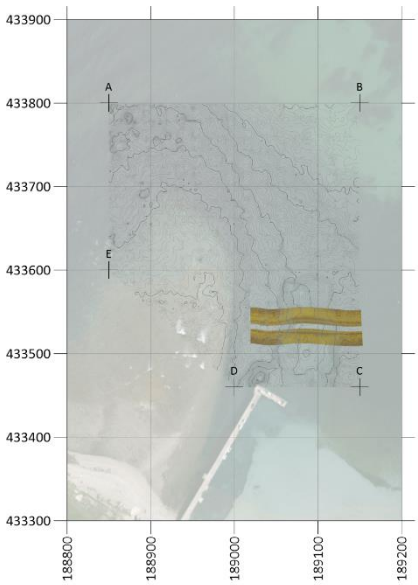




Figure 35. Side scan segment of line R007Q

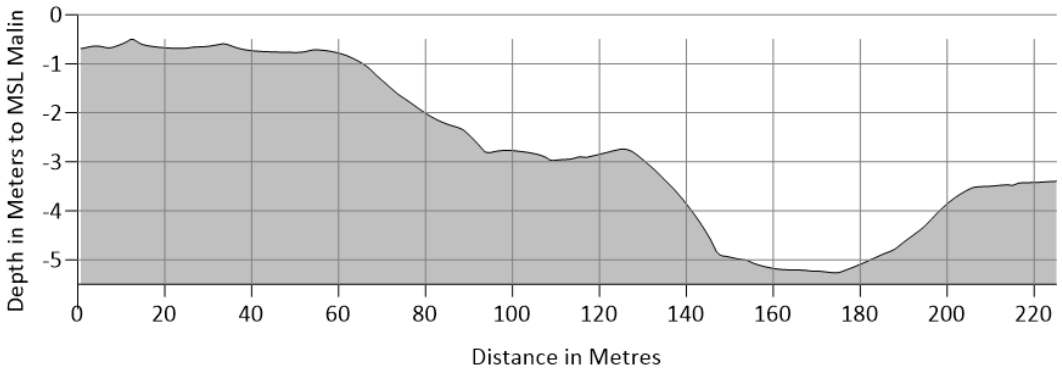


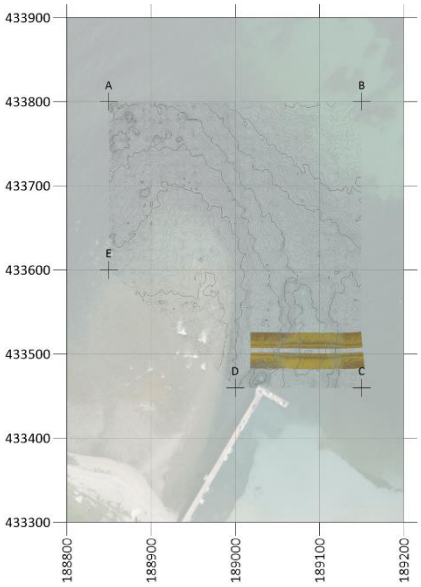
Figure 36. East-west depth profile for the centre of line R007Q

Line R007R

This line overlaps with R007Q to the north.

The reef is flat and featureless undifferentiated cobbles and small boulders; however, the survey box now includes the reef for only c. 30m.

The segment to the east includes the approach channel. Rock can be seen on either side of the approaches and the sandy areas correspond with the approaches channel, see Figure 37. The approaches remain deep but are shallowing and widening, still 30m centred c. 135m, c. -5m MSL or around -3m to LAT/CD as shown in Figure 38.



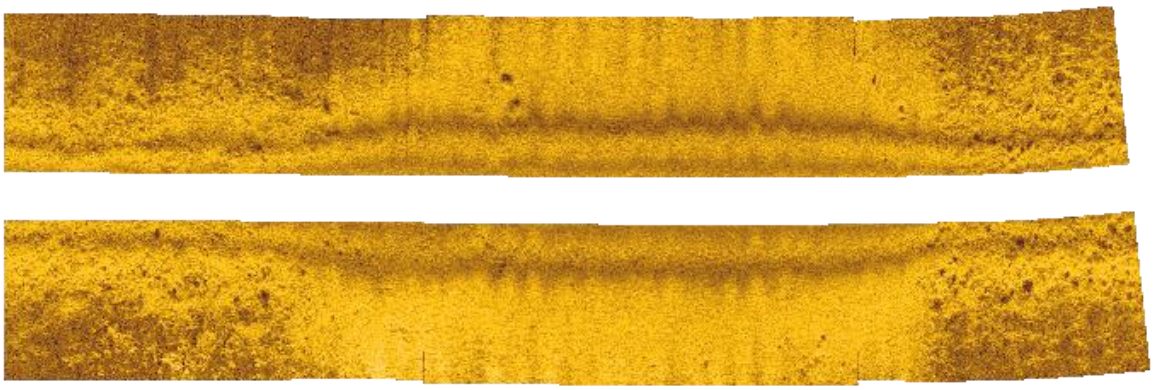


Figure 37. Side scan segment of line R007R

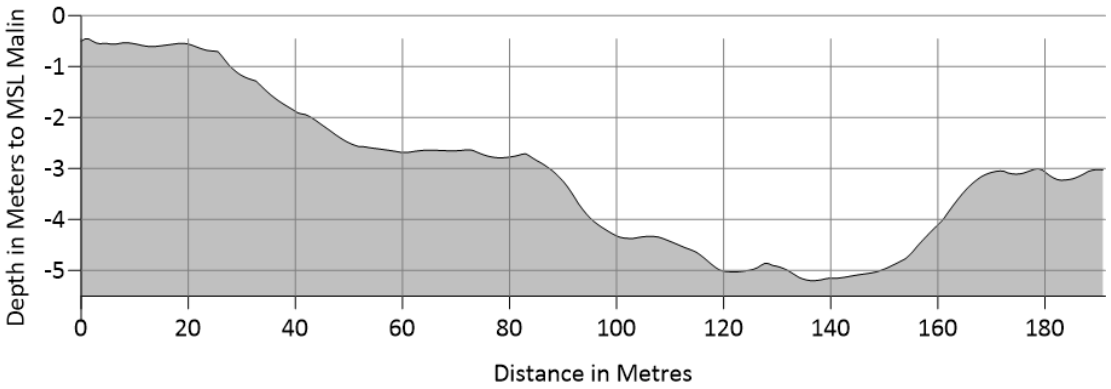


Figure 38. East-west depth profile for the centre of line R007R

Line R007S

This line overlaps with R007Q to the north.

The reef is flat and featureless undifferentiated cobbles and small boulders however the survey box only now includes the slope of the reef.

The segment to the east includes the approach channel. Rock can be seen on either side of the approaches and the sheet-piles of the north-west corner of the pier are visible on the lower trace, see Figure 39. The sandy areas correspond with the approaches channel.

The approaches remain deep but are shallowing and widening, still 30m centred around 105m, c. -5m MSL or around -3m to LAT/CD as shown in Figure 40.

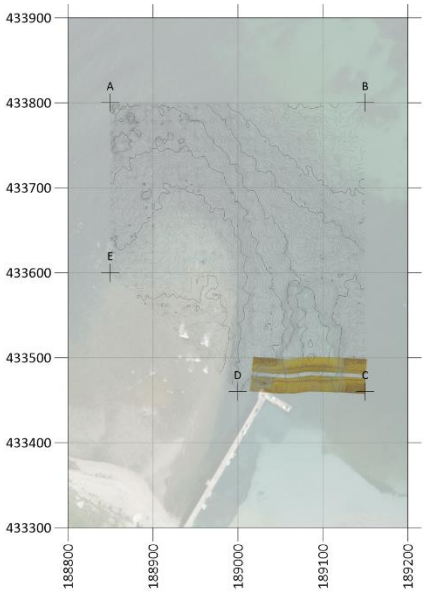




Figure 39. Side scan segment of line R007S

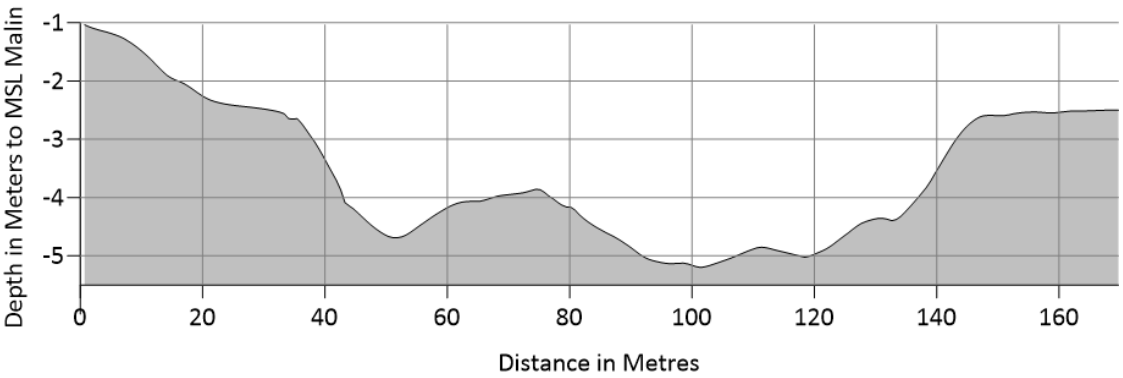


Figure 40. East-west depth profile for the centre of line R007S

References

[1] ISO 14688-1:2002