Appendix 10 - Hydromaster Sediment Plume Report

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Dublin Bay Sediment
Plume Monitoring Report

March 2020

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NOTES

Survey date	The 14th,16th,17th,18th,19th,25th and 27th of March
Report date	15/05/2020
Location	Dublin Bay
Coordinate system	Geographic WGS84 and ITM
Report Revision	Final revision 11/06/2020
Prepared by	DL
Check by	MT/BS

Hydromaster Ltd.
7 Howley Court,
Dublin Road
Oranmore
Co. Galway, Ireland

Tel: +353-86-0891047
E-mail: bsmith@hydromaster.ie

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Contents

1. Introduction 5
2. Survey equipment and methodology 6
3. Localised environmental conditions 8
4. Results 9
4.1. Vessel track and Turbidity data (surface and mid-water) 9
4.2. Turbidity depth comparison 40
4.3. Turbidity vertical profiles 59
5. Conclusion 68
6. Appendices 69
6.1. Appendix A – Equipment specs 69
- Appendix A1 (Swiftplus – Midwater turbidity and Vertical turbidity profiles) 69
- Appendix A2 (Hyperion – surface turbidity) 69
- Appendix A3 (VS330 –GNSS position) 69
6.2. Appendix B – Vertical turbidity profiles 69
- Appendix B1 (Dump 356) 69
- Appendix B2 (Dump 357) 69
- Appendix B3 (Dump 360) 69
6.3. Appendix C - Turbidity data along tracklines Charts 69
6.4. Appendix D - Turbidity data (excel format) 69

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Tables

Table 1: Dates and times of survey plumes measured 7
Table 2: Wave, Wind, Tidal and Turbidity data at Dublin Dumpsite associated to survey time .....
Table 3: Average, minimum and maximum turbidity values recorded per dump 58
Table 4:Average, minimum and maximum turbidity values recorded per vertical profiles - DUMP 356. 65
Table 5:Average, minimum and maximum turbidity values recorded per vertical profiles - DUMP 357. 66
Table 6: Average, minimum and maximum turbidity values recorded per vertical profiles - DUMP 360. 67

EPA Export 28-04-2021:02:38:33

Figures

Figure 1: Dublin Bay licensed dredging dumpsite location with bathymetry. 5
Figure 2: Monitoring vessel setup 6
Figure 3: An example of a plume survey track with NTU displayed. 7
Figure 4: Dump 231 Survey track with mid water turbidity [NTU] 9
Figure 5: Dump 254 Survey track with mid water turbidity [NTU] 10
Figure 6: Dump 266 Survey track with surface turbidity [NTU] 11
Figure 7: Dump 266 Survey track with mid water turbidity [NTU] 12
Figure 8: Dump 267 Survey track with surface turbidity [NTU] 13
Figure 9: Dump 267 Survey track with mid water turbidity [NTU] 14
Figure 10: Dump 268 Survey track with surface turbidity [NTU] 15
Figure 11: Dump 268 Survey track with mid water turbidity [NTU] 16
Figure 12: Dump 280 Survey track with surface turbidity [NTU] 17
Figure 13: Dump 280 Survey track with mid water turbidity [NTU] 18
Figure 15: Dump 281 Survey track with surface turbidity [NTU].
Figure 15: Dump 282 Survey track with surface turbidity [NTU] 20
Figure 16: Dump 282 Survey track with mid water turbidity [NTU] 21
Figure 17: Dump 283 Survey track with surface turbidity [NTU] 22
Figure 18: Dump 283 Survey track with mid water turbidity [NTU] 23
Figure 19: Dump 284 Survey track with surface turbidity [NTU] 24
Figure 20: Dump 284 Survey track with mid water turbidity [NTU] 25
Figure 21: Dump 285 Survey track with surface turbidity [NTU] 26
Figure 22: Dump 286 Survey track with surface turbidity [NTU] 27
Figure 23: Dump 286 Survey track with mid water turbidity [NTU] 28
Figure 24: Dump 287 Survey track with surface turbidity [NTU] 29
Figure 25: Dump 287 Survey track with mid water turbidity [NTU] 30
Figure 26: Dump 288 Survey track with surface turbidity [NTU] 31
Figure 27: Dump 288 Survey track with mid water turbidity [NTU] 32
Figure 28: Dump 359 Survey track with surface turbidity [NTU] 33
Figure 29: Dump 373 Survey track with surface turbidity [NTU] 34
Figure 30: Dump 373 Survey track with mid water turbidity [NTU] 35
Figure 31: Dump 374 Survey track with surface turbidity [NTU] 36
Figure 32: Dump 374 Survey track with mid water turbidity [NTU] 37
Figure 33: Dump 375 Survey track with surface turbidity [NTU] 38
Figure 34: Dump 375 Survey track with mid water turbidity [NTU] 39
Figure 35: Comparison of Surface and mid water turbidity values recorded during dump 231. 40
Figure 36: Mid water turbidity values recorded during dump 254. 41
Figure 37: Comparison of Surface and mid water turbidity values recorded during dump 267. 43
Figure 38: Comparison of Surface and mid water turbidity values recorded during dump 268. 44
Figure 39: Comparison of Surface and mid water turbidity values recorded during dump 280. 45
Figure 40 Surface turbidity values recorded during dump 281. 46
Figure 41: Comparison of Surface and mid water turbidity values recorded during dump 282. 47
Figure 42: Comparison of Surface and mid water turbidity values recorded during dump 283. 48
Figure 43: Comparison of Surface and mid water turbidity values recorded during dump 284. 49

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Figure 44: Surface turbidity values recorded during dump 285. 50
Figure 45: Comparison of Surface and mid water turbidity values recorded during dump 286. 51
Figure 46: Comparison of Surface and mid water turbidity values recorded during dump 287. 52
Figure 47: Comparison of Surface and mid water turbidity values recorded during dump 288. 53
Figure 48: Surface turbidity values recorded during dump 359. 54
Figure 49: Comparison of Surface and mid water turbidity values recorded during dump 373. 55
Figure 50: Comparison of Surface and mid water turbidity values recorded during dump 374. 56
Figure 51: Comparison of Surface and mid water turbidity values recorded during dump 375. 57
Figure 52: Dump 356 Survey track with surface turbidity [NTU] and vertical turbidity profile positions 60
Figure 53: Dump 357 Survey track with surface turbidity [NTU] and vertical turbidity profile positions 61
Figure 54: Dump 360 Survey track with surface turbidity [NTU] and vertical turbidity profile positions 62
Figure 55: Vertical turbidity profile 12 collected during dump 356 63
Figure 56: Vertical turbidity profile 40 collected during dump 357 63
Figure 57: Vertical turbidity profile 76 collected during dump 360 64

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1. Introduction

Dublin Port Company (DPC) was granted a Dumping at Sea Permit (S0024-01) by the Environmental Protection Agency (EPA) on 13th September 2016 for the loading and dumping at sea of dredged material arising from capital dredging as part of the Alexandra Basin Redevelopment (ABR) Project. The permit sets out in detail the conditions under which DPC will carry out loading and dumping at sea.

One of the conditions of the EPA license to dump at sea is Condition 4.11, which states that '*the permit holder shall carry out sediment plume monitoring in the vicinity of the dumping activity during the first dumping campaign and thereafter as may be required by the Agency.'*

Therefore DPC are required to provide sediment plume monitoring in the vicinity of the dumping activity. One of the means by which this has been carried out is the deployment of 'real time' monitoring buoys placed within the dumping location. Whilst these buoys give a long term view of the location and conditions at set depths, the directionality and dispersal of the sediment plume cannot be ascertained in this way. Therefore as part of the sediment dispersal model validation Hydromaster were contracted to conduct turbidity surveys during the dredging/dumping campaign to track and measure the extent of the sediment plume.

Hydromaster undertook turbidity surveys across 7 days in March 2020 (the 14th, 16th, 17th, 18th, 19th, 25th and 27th), at the dredging dumpsite area in Dublin Bay. The survey was repeated across multiple days throughout the lunar cycle in order to capture the range of different tidal regimes.

The dumpsite location is 5.3 nautical miles East from Dublin harbour (Figure 1). Coordinates of its centre are latitude 053°19.625'N and longitude 006°02.402'W. The area is 1330m by 1675m.

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Figure 1: Dublin Bay licensed dredging dumpsite location with bathymetry.

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2. Survey equipment and methodology

To provide a detailed picture of the sediment plume Hydromaster deployed two turbidity monitors (Nephelometers), one was mounted on a pole at the bow of the survey vessel, just under the surface, and the second instrument was towed approximately 20m behind the vessel at a depth of 6 meters (Figure 2). The spec sheets for the two turbidity devices can be viewed in Appendix A.

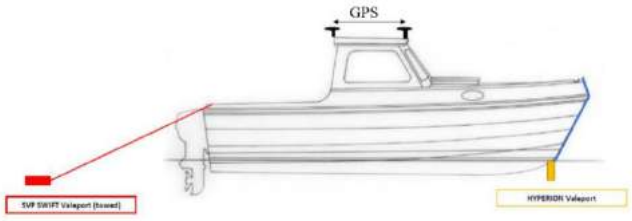

Figure 2: Monitoring vessel setup

This device allows the calculation of the reflection of light from a known source through a liquid or a gas. Suspended particles inside this liquid or gas, absorb and scatter the light which is then sensed by light sensors arranged inside the tube, at 90 degrees from the light source. The turbidity of a fluid is given in nephelometric turbidity unit (NTU). The vessel also had a highly accurate GPS VS330 Hemisphere mounted, allowing a location fix of up to 10 mm. This location was applied to the data along with the offset for the towed device.

The survey vessel waited on location at the dump site for the dredge vessel (the Shoalway) to approach. Once the Shoalway was in position and getting ready to dump the sediment, the crew of the Shoalway notified the survey vessel, the survey vessel would then begin recording turbidity data.

The survey vessel would then track back and forth across the plume that was visible from the turbidity data, tracking back in the opposite direction when the turbidity data indicated that the vessel had left the area of the plume. This allowed the vessel to track the dispersal of the plume over the site.

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Figure 3 below shows an example of the survey vessels track line. The coloured data on the track line represents turbidity data (in NTU) logged and the black line represents the Dredger position at the time of the dump. The colour scale is essentially a “heatmap” with highest turbidity values (plume) represented by red and lowest turbidity values represented by blue. The start time of the turbidity monitoring was recorded and the time at which the plume was no longer being tracked was noted as the ‘end time’ of the survey. The direction and strength of the current associated with each dump was calculated from the observed progress of the plume. These details have been included in the charts below. It was observed that the current moved the plume to the North during flood tides and to the South on Ebb tides.

In order to measure the plume vertically, an additional survey method was used. The turbidity was measured from surface to seabed in a series of vertical profiles and recorded as depth/turbidity. These profiles were taken during slack tides or low current events to enable more accurate tracking of the plume core but otherwise the profile survey followed the progress of the plume in the same way as the horizontal survey. The instrument recorded turbidity data every second. This data provided details

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of the vertical distribution of the turbidity plume. The surface nephelometer was still used to record continuous data at the surface.

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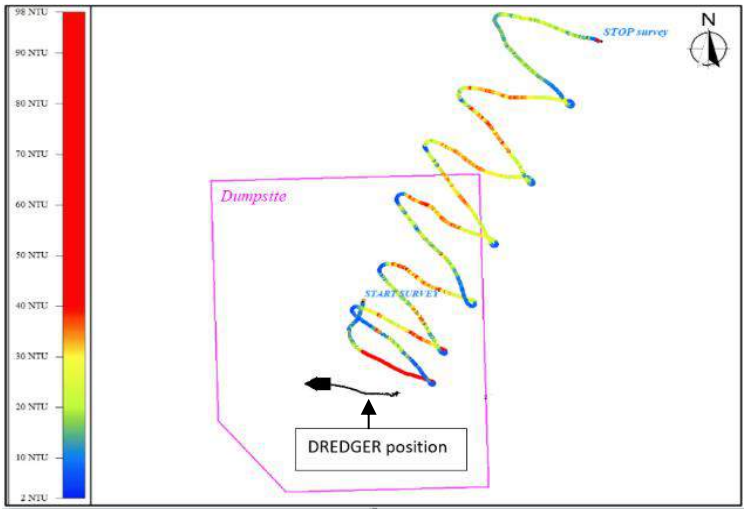

Figure 3: An example of a plume survey track with NTU displayed.

Table 1 below shows the dates and dump number of the turbidity data collected during the survey periods:

Table 1: Dates and times of survey plumes measured

DATE	DUMP #	Monitoring Start time	Monitoring Stop time	Shoalway Starts Dumping	Shoalway Ends Dumping	Quantity Dumped TDS
14/03/2020	**231**	**17:44:42**	**18:09:10**	17:42	17:53	1022
16/03/2020	**254**	**11:07:52**	**11:33:42**	10:58	11:15	1250
17/03/2020	**266**	**09:18:20**	**10:00:13**	09:17	09:30	1148
	267	**10:57:09**	**11:39:42**	10:52	11:08	1122
	268	**12:40:12**	**13:15:38**	12:38	12:55	1202
18/03/2020	**280**	**08:42:53**	**09:37:22**	08:34	08:49	1062
	281	**10:22:01**	**11:04:20**	10:15	10:28	1075
	282	**12:16:22**	**13:03:07**	11:50	12:04	1108
	283	**13:41:42**	**14:51:09**	13:34	13:53	1182
19/03/2020	**284**	**08:42:05**	**09:25:29**	08:18	08:35	1168
	285	**10:00:24**	**11:10:37**	09:57	10:10	1129
	286	**11:51:01**	**12:27:56**	11:41	11:59	1124
	287	**14:12:02**	**15:15:44**	13:56	14:10	1047
	288	**16:29:44**	**17:43:51**	16:28	16:47	890
25/03/2020	**356**	**10:36:15**	**11:41:29**	10:15	10:26	1112
	357	**12:08:52**	**12:58:45**	12:07	12:21	1075
	360	**17:46:03**	**18:21:48**	17:44	18:01	1110
27/03/2020	**373**	**15:08:51**	**15:49:06**	15:02	15:26	1150
	374	**17:02:36**	**18:16:53**	17:00	17:26	1169
	375	**19:03:41**	**19:50:53**	19:02	19:16	1139

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Turbidity data was collected at both surface and midwater for all of the dump activities listed in table one, except for on two occasions. Unfortunately, due to a minor issue with the instrument, during dump 254, no surface data was recorded. During dump 281, 285 and 359 no midwater data was recorded.

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3. Localised environmental conditions

Table 2 below summarises the localised environmental conditions observed during the different survey periods. Marine monitoring buoy data was collected from monitoring buoy 2 located in the dumping zone (Latitude 53.32745° Longitude -6.041085°).

Table 2: Wave, Wind, Tidal and Turbidity data at Dublin Dumpsite associated to survey time

		Marine monitoring Buoy turbidity [NTU]			Dublin bay Buoy data				Tidal Data		
DUMP #	Timestamp	Surface	Mid water	Seabed	Wave height [m]	Wind direction [°]	Wind speed [kts]	wave period [s]	Tidal range [m]	Tidal cycle stage	Hours after HW Dublin
231	2020-03-14 17:45:31 UTC	8.72	9.25	10.18	0.8	170	16	4	3.79	Ebb	02:37
	2020-03-14 18:05:31 UTC	8.51	9.2	9.65							
254	2020-03-16 11:05:30 UTC	5	5.71	9.34	0.4	220	16	3	2.63	Flood	06:38
	2020-03-16 11:45:30 UTC	4.68	5.68	6.86							
266	2020-03-17 09:25:31 UTC	5.26	5.35	6.21	0.3	218	9	3	2.39	Ebb	03:53
	2020-03-17 09:45:30 UTC	5.51	6.13	17.97							
	2020-03-17 10:05:31 UTC	0	0	0							
267	2020-03-17 11:05:31 UTC	4	4.9	5.35	0.6	175	17	3	2.39	Low water slack	05:33
	2020-03-17 11:25:30 UTC	3.64	4.29	4.49							
268	2020-03-17 12:45:31 UTC	0	0	0	0.75	174	21	3	2.39	Flood	07:13
	2020-03-17 13:05:30 UTC	5.83	6.98	11.34							
	2020-03-17 13:25:30 UTC	5.7	6.79	9.87							
280	2020-03-18 08:45:30 UTC	9.29	24.71	36.7	0.2	270	8	3	2.21	Ebb	01:54
	2020-03-18 09:05:30 UTC	4.7	6.33	12.7							
	2020-03-18 09:25:30 UTC	5.5	6.66	7.48							
281	2020-03-18 11:05:31 UTC	7.65	13.91	29.36	0.2	283	8	3	2.21	Ebb	04:14
282	2020-03-18 12:05:31 UTC	3.83	3.85	3.66	0.2	300	9	3	2.21	Ebb	05:14
	2020-03-18 12:25:31 UTC	4.51	5.21	4.24							
	2020-03-18 13:25:30 UTC	0	0	0							
283	2020-03-18 13:45:31 UTC	3.21	4.49	6.31	0.2	306	10	3	2.21	Flood	06:54
	2020-03-18 14:25:31 UTC	3.09	3.07	14.01							
	2020-03-18 14:45:30 UTC	2.82	3.85	6.79							
284	2020-03-19 08:45:30 UTC	2.99	3.01	9.57	0.1	307	8	3	2.26	High water slack	00:38
	2020-03-19 09:05:30 UTC	2.94	3.07	5.34							
	2020-03-19 09:25:30 UTC	3.1	3.41	3.81							
285	2020-03-19 10:05:30 UTC	3.52	4.02	4.87	0.2	323	6	3	2.26	Ebb	01:58
	2020-03-19 10:25:31 UTC	3.75	4.22	6.21							
	2020-03-19 10:45:31 UTC	3.62	4.12	4.21							
	2020-03-19 11:05:31 UTC	4.62	4.72	5.5							
286	2020-03-19 11:45:31 UTC	3.6	3.99	4.01	0	42	9	3	2.26	Ebb	03:38
	2020-03-19 12:25:31 UTC	3.01	3.24	3.81							
287	2020-03-19 14:25:30 UTC	2.43	2.51	2.88	0.2	44	9	3	2.26	Low water slack	06:18
	2020-03-19 14:45:31 UTC	2.48	2.69	2.9							
	2020-03-19 15:25:31 UTC	2.31	2.86	3.71							
288	2020-03-19 16:25:31 UTC	2.54	3.38	5.01	0.2	41	7	3	2.26	Flood	08:18
	2020-03-19 16:45:30 UTC	2.57	3.54	17.14							
	2020-03-19 17:25:30 UTC	3.24	3.89	4.47							
	2020-03-19 17:45:30 UTC	3.02	3.62	4.41							
356	2020-03-25 10:35 UTC	7.35	19.67	44.14	0.5	161	15	3	3.43	Flood	10:26
357	2020-03-25 12:04 UTC	4.32	7.17	8.69						HWS	0
359	2020-03-25 15:49 UTC	5.31	5.81	6.25						Ebb	03:32
360	2020-03-25 17:45 UTC	4.23	3.71	3.96						LWS	05:28
373	2020-03-27 15:30 UTC	5.05	5.46	6.88	0.3	26	13	3	3.43	Ebb	02:11
374	2020-03-27 17:45 UTC	5.91	7.87	8.68	0.3	39	15	3	3.43	Ebb	04:26
375	2020-03-27 19:30 UTC	2.98	3.07	3.38	0.6	38	15	3	3.43	LWS	06:11

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4. Results

4.1. Vessel track and Turbidity data (surface and mid-water)

The following figures display the track of the survey vessel with turbidity data overlaid, the current direction and speed is also displayed:

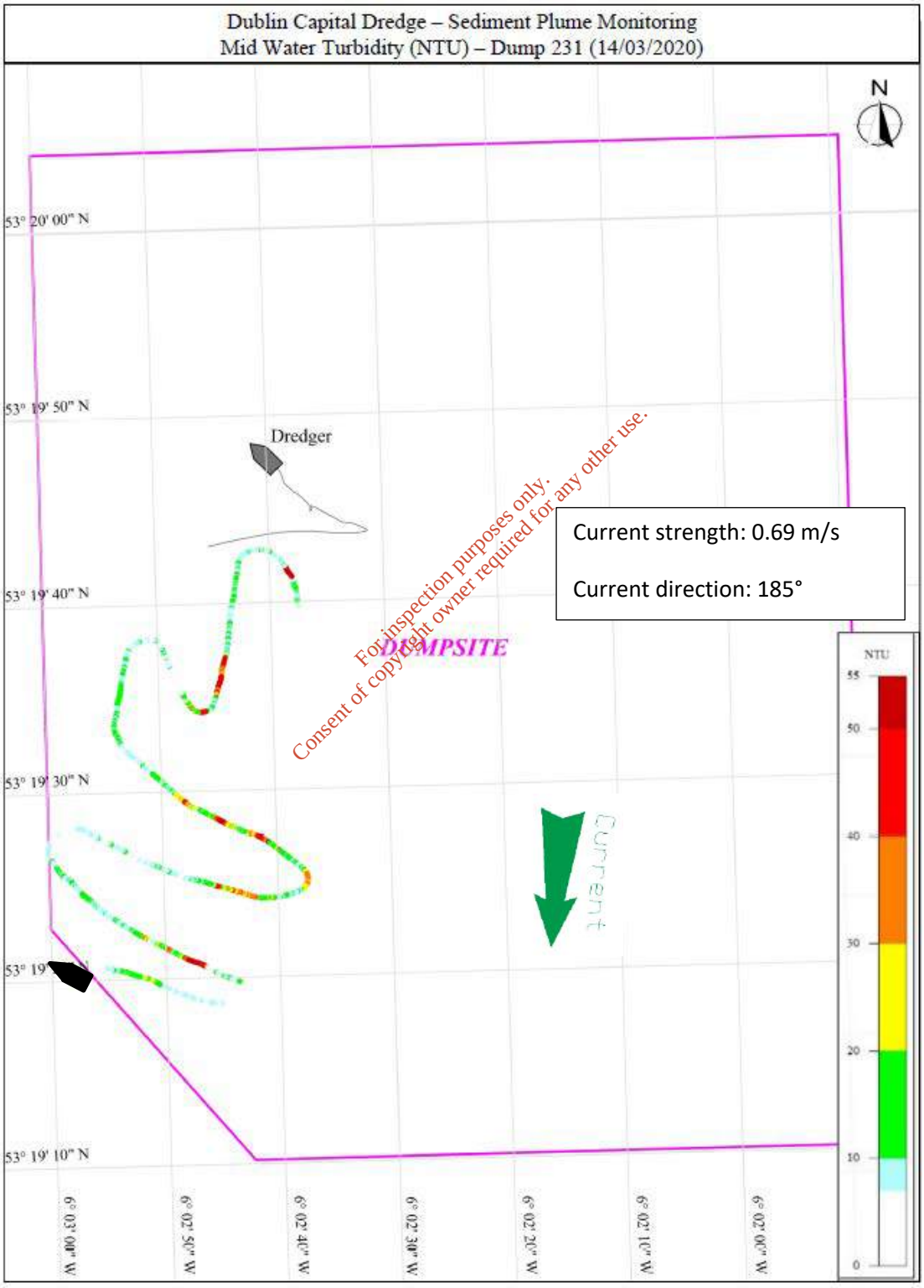

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Figure 4: Dump 231 Survey track with mid water turbidity [NTU]

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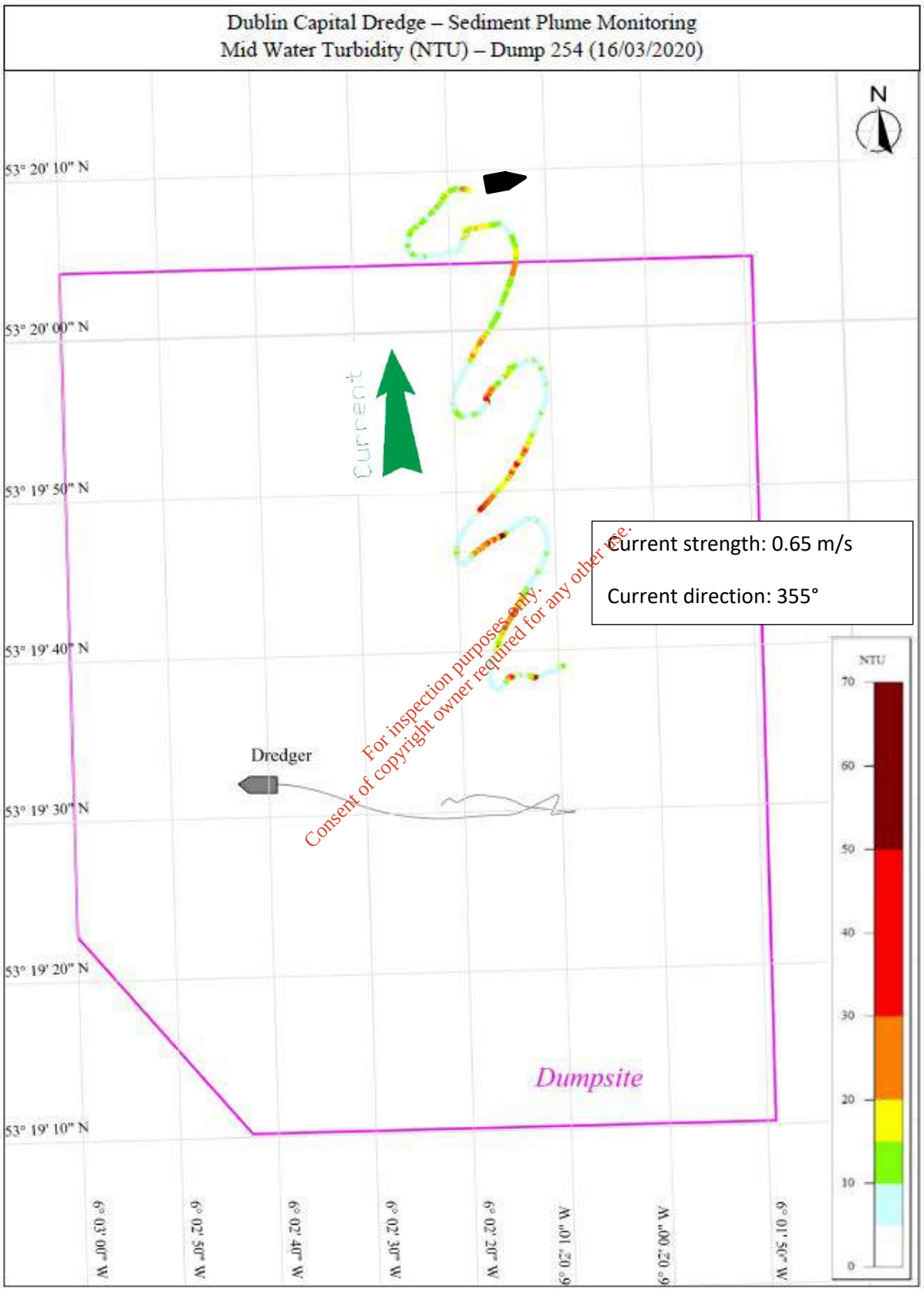

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Figure 5: Dump 254 Survey track with mid water turbidity [NTU]

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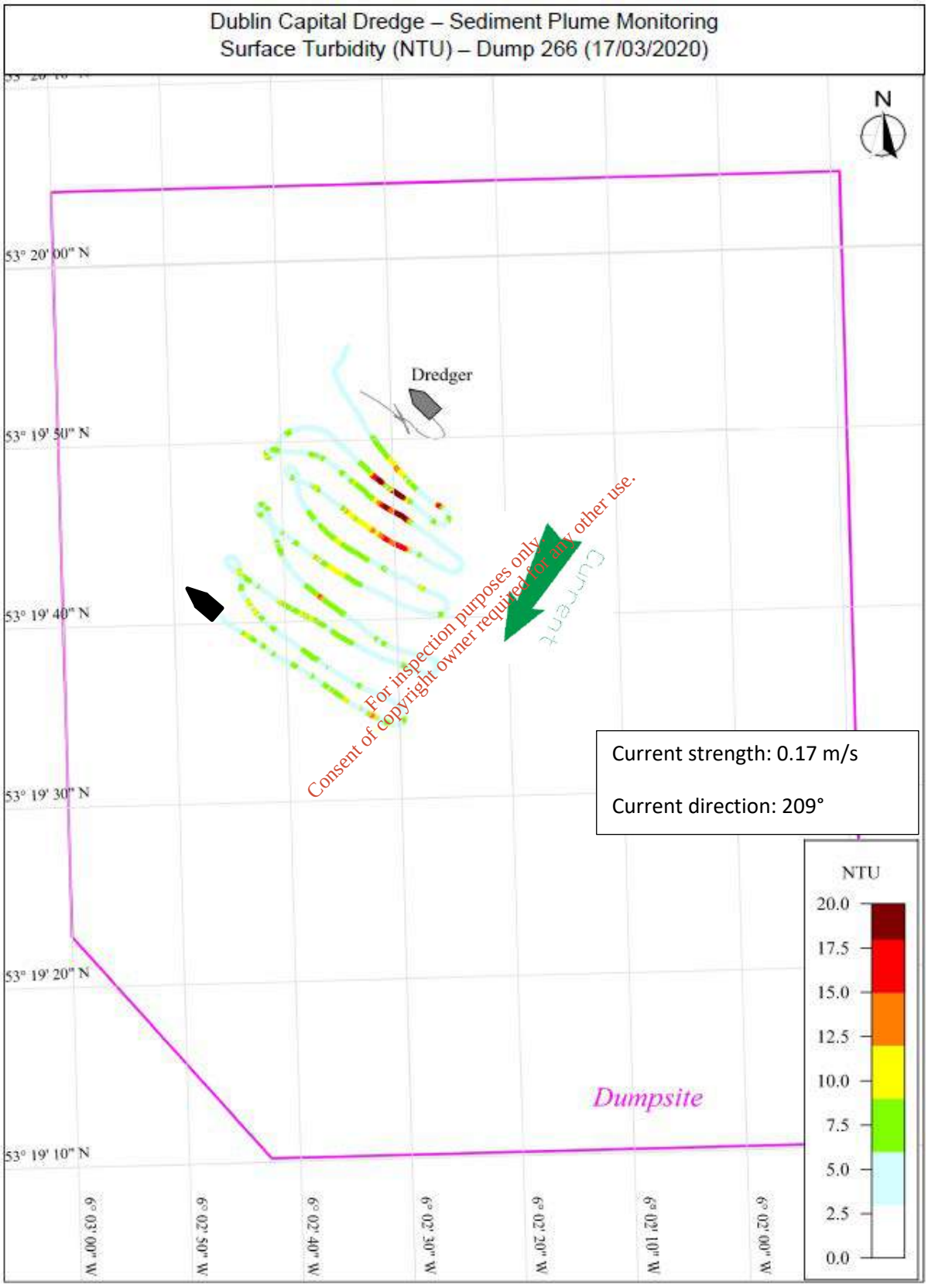

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Figure 6: Dump 266 Survey track with surface turbidity [NTU]

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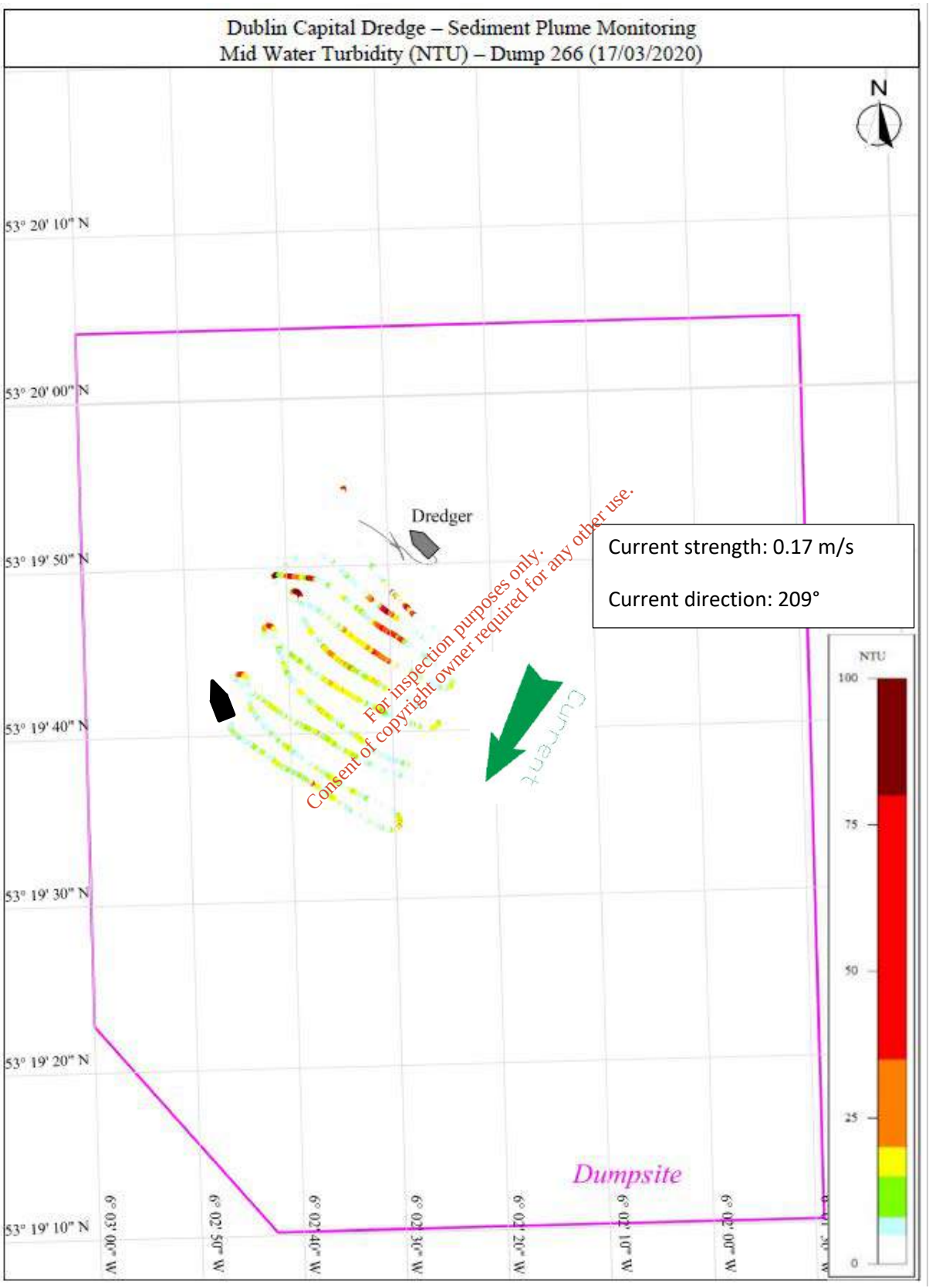

Figure 7: Dump 266 Survey track with mid water turbidity [NTU]

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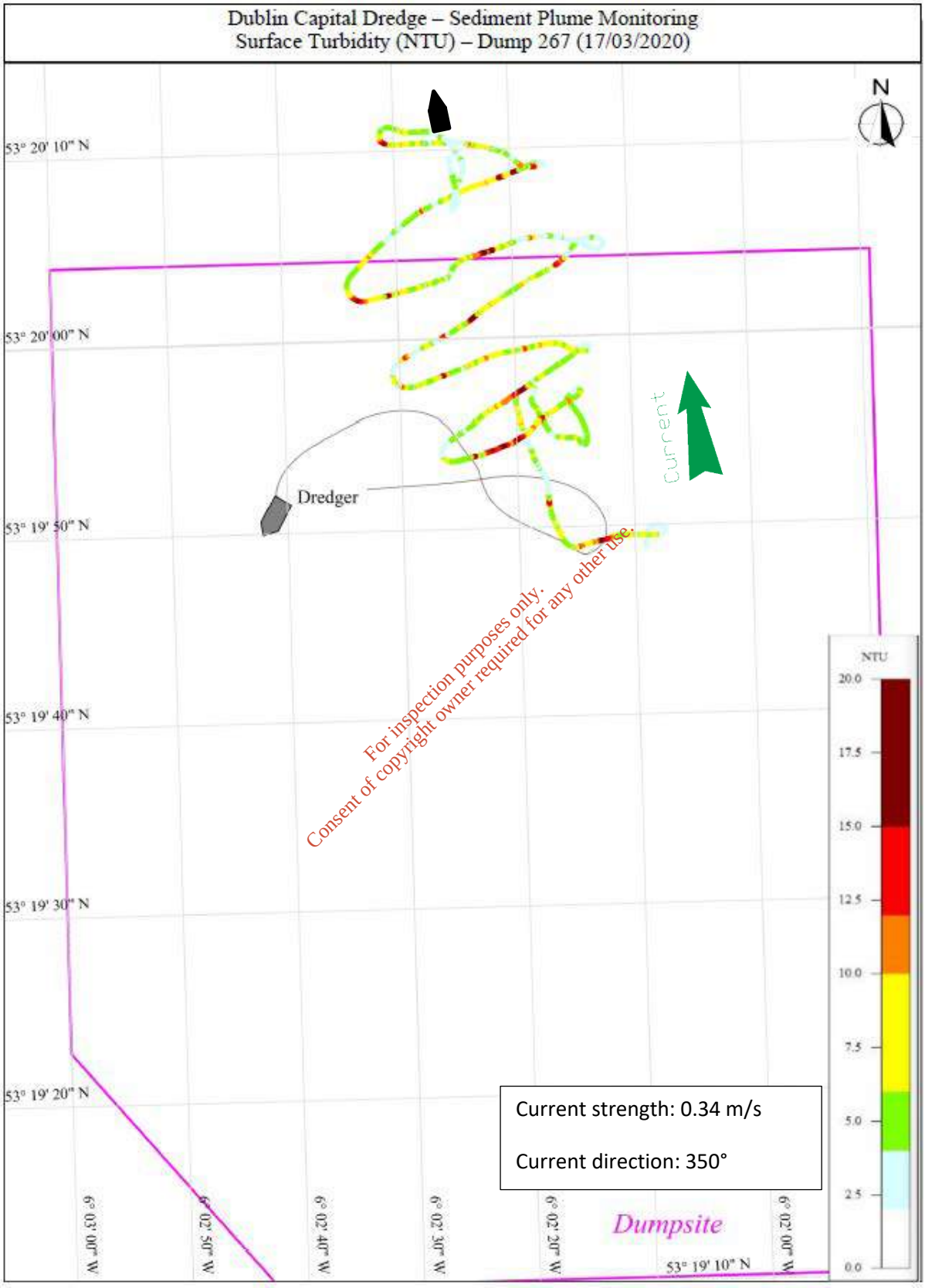

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Figure 8: Dump 267 Survey track with surface turbidity [NTU]

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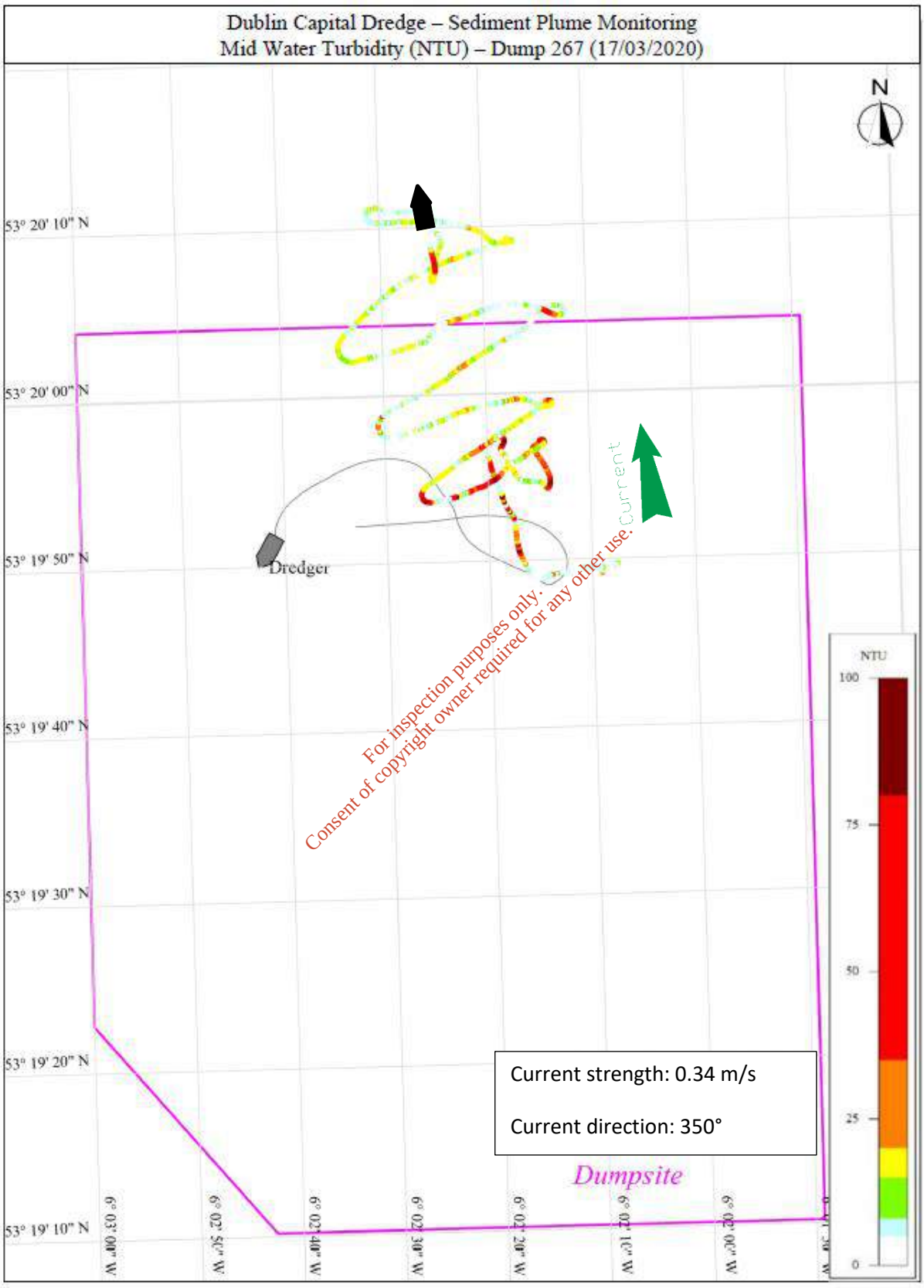

Figure 9: Dump 267 Survey track with mid water turbidity [NTU]

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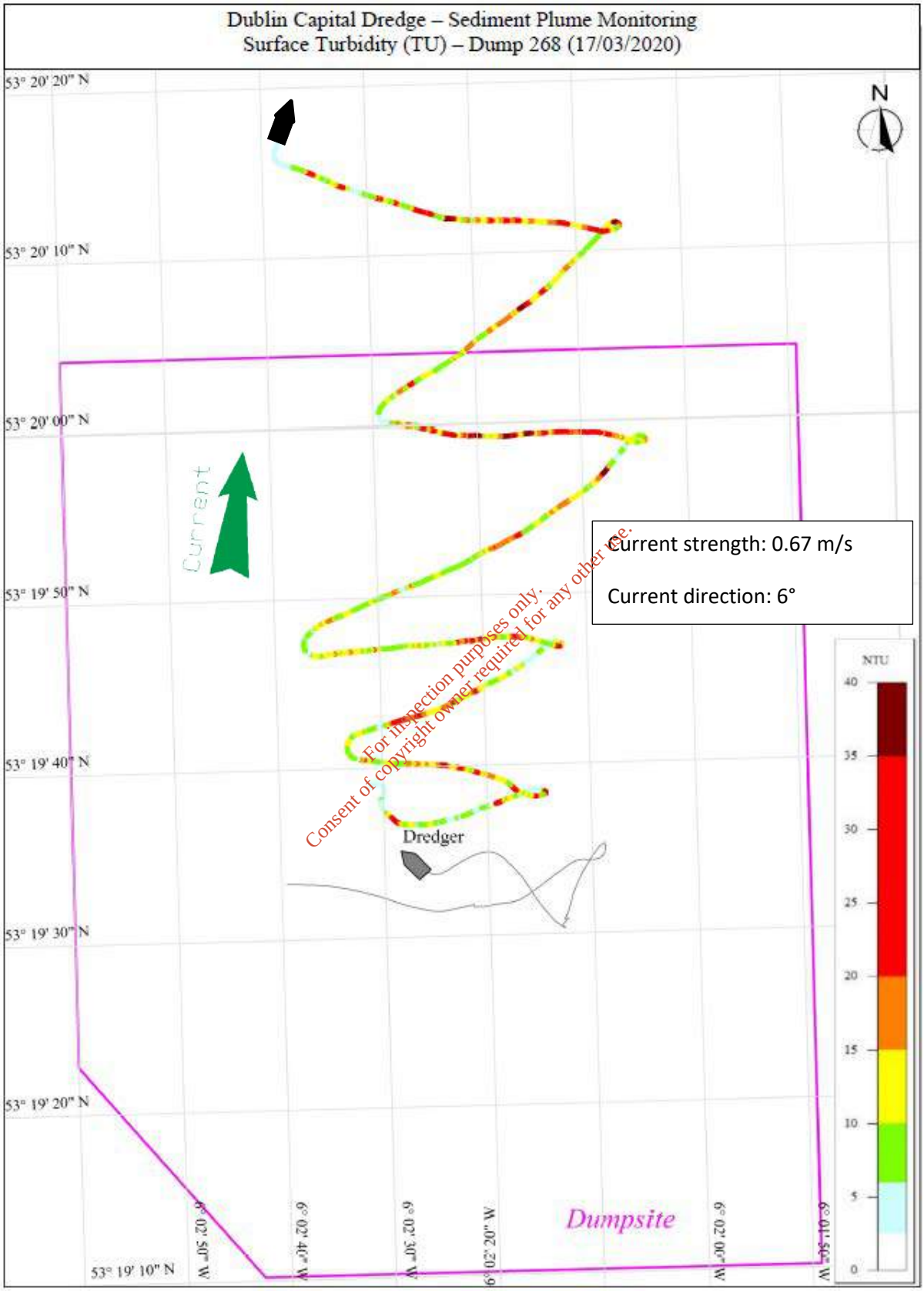

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Figure 10: Dump 268 Survey track with surface turbidity [NTU]

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Figure 11: Dump 268 Survey track with mid water turbidity [NTU]

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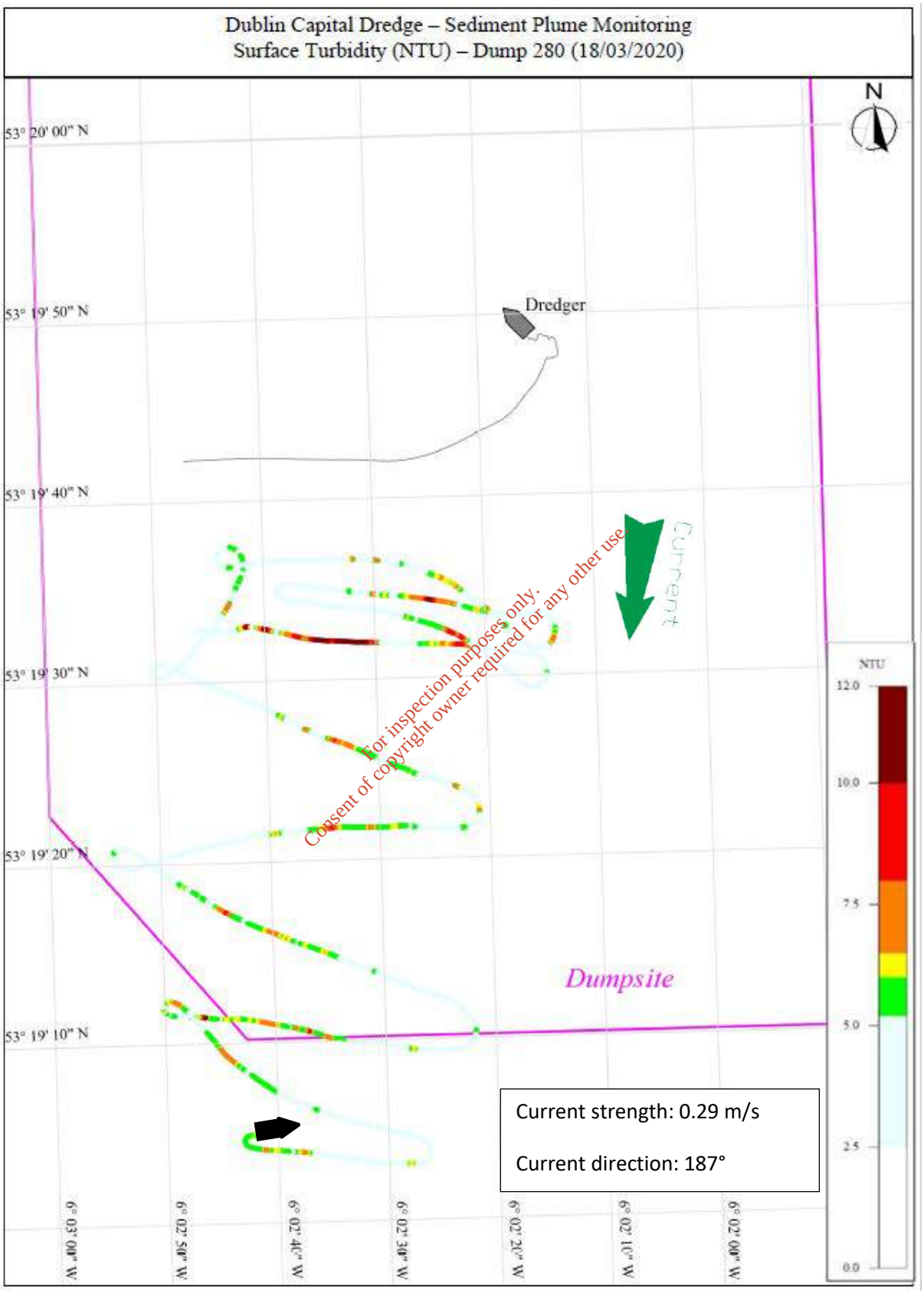

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Figure 12: Dump 280 Survey track with surface turbidity [NTU]

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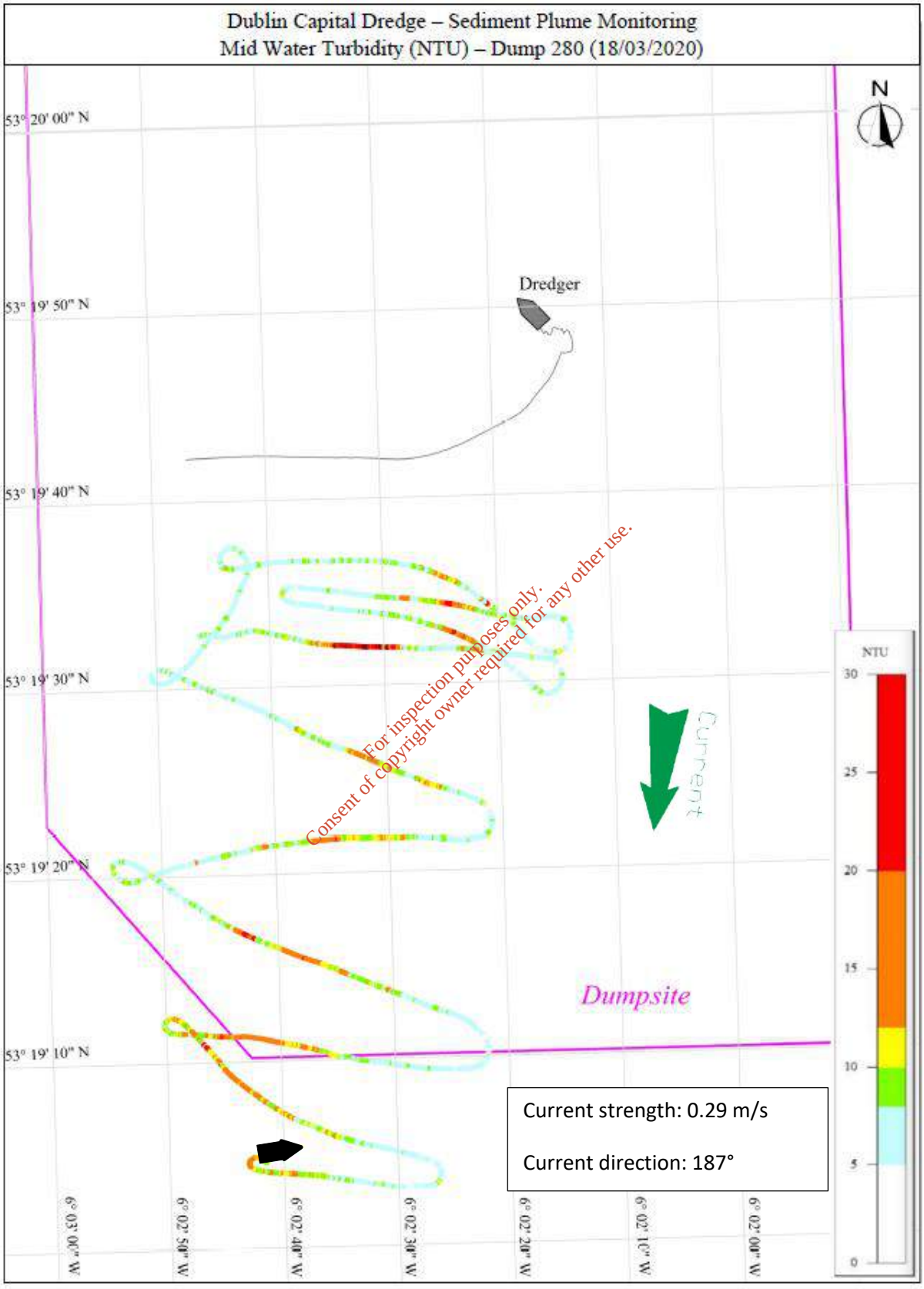

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Figure 13: Dump 280 Survey track with mid water turbidity [NTU]

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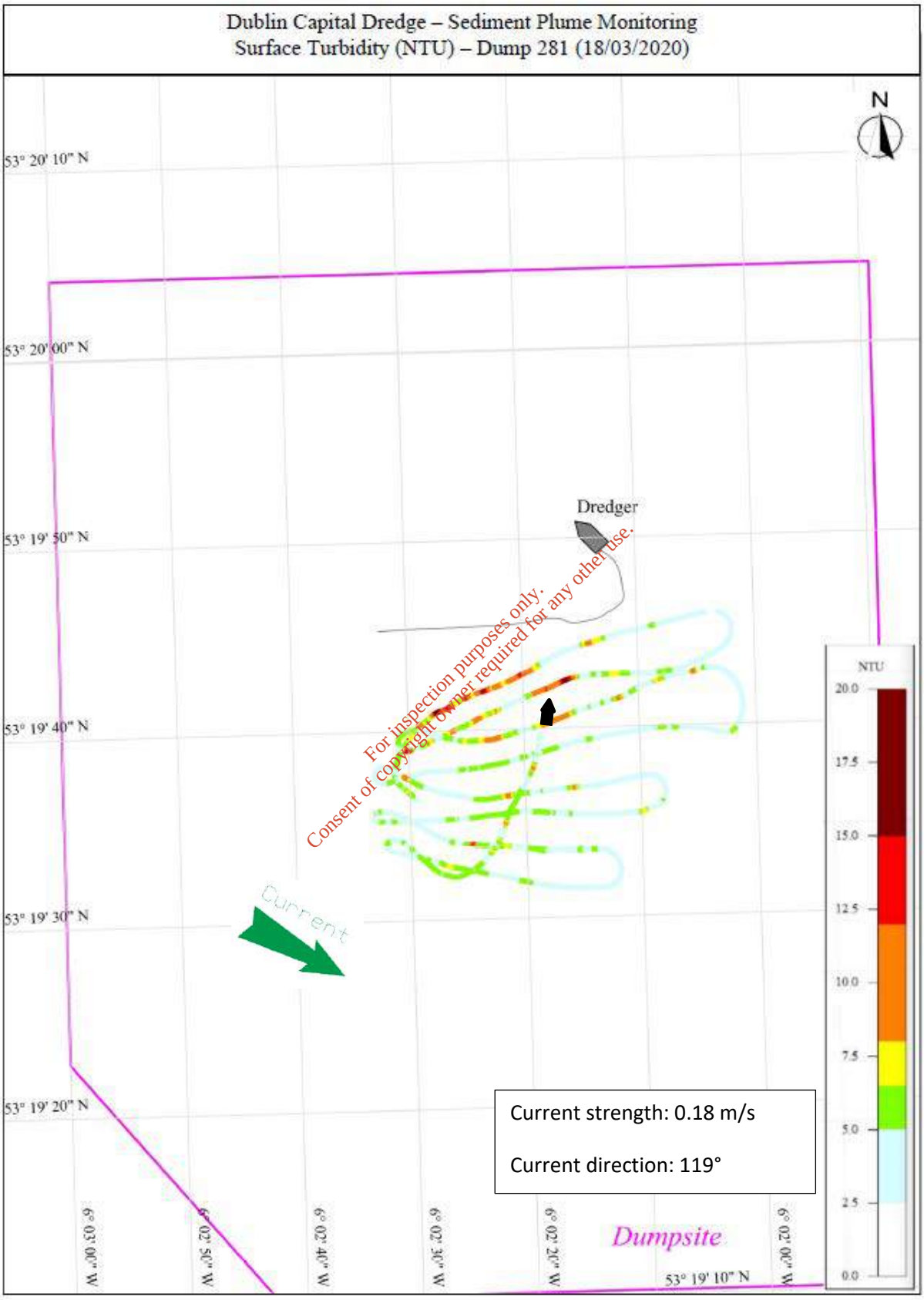

Figure 14: Dump 281 Survey track with surface turbidity [NTU].

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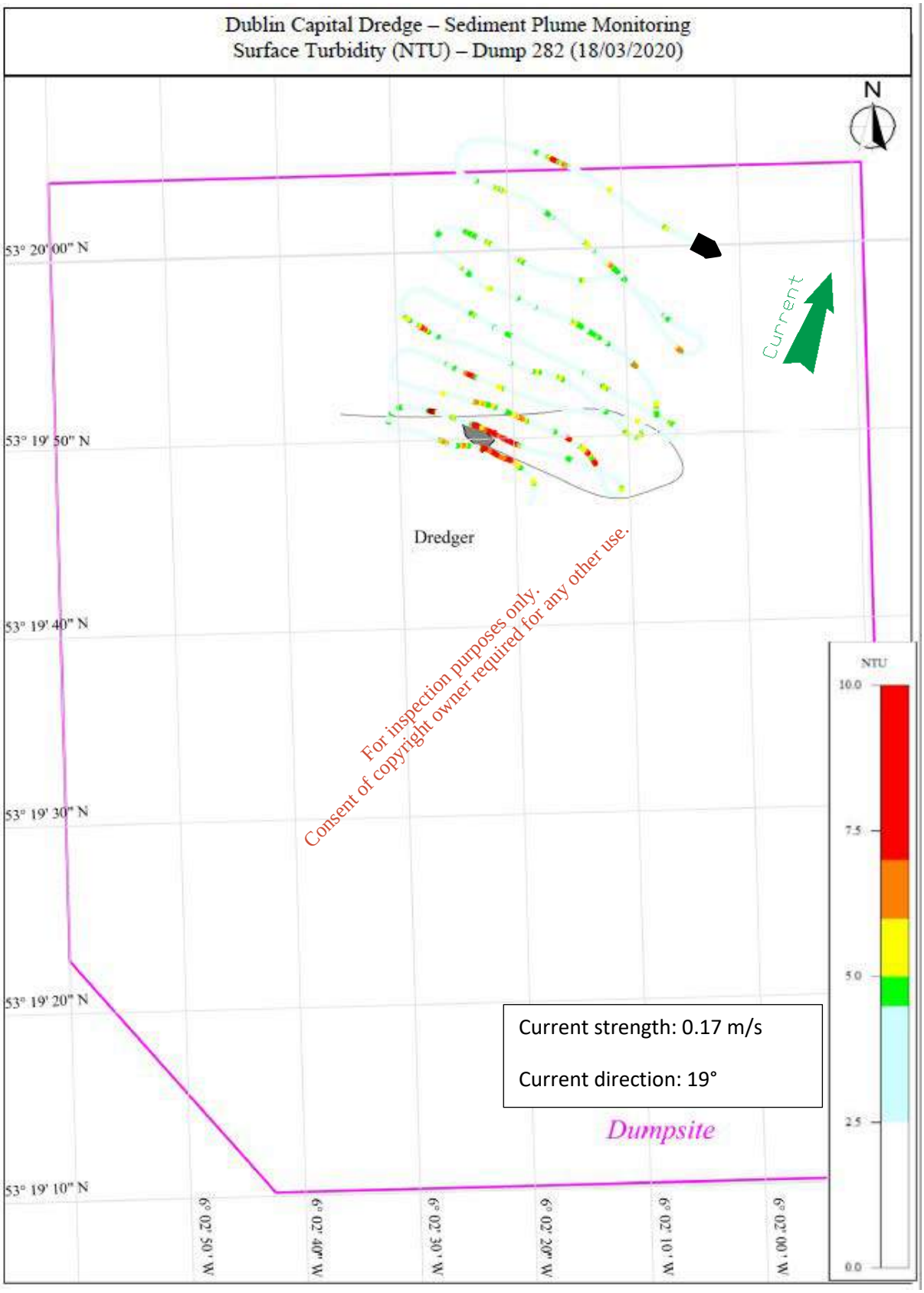

Figure 15: Dump 282 Survey track with surface turbidity [NTU]

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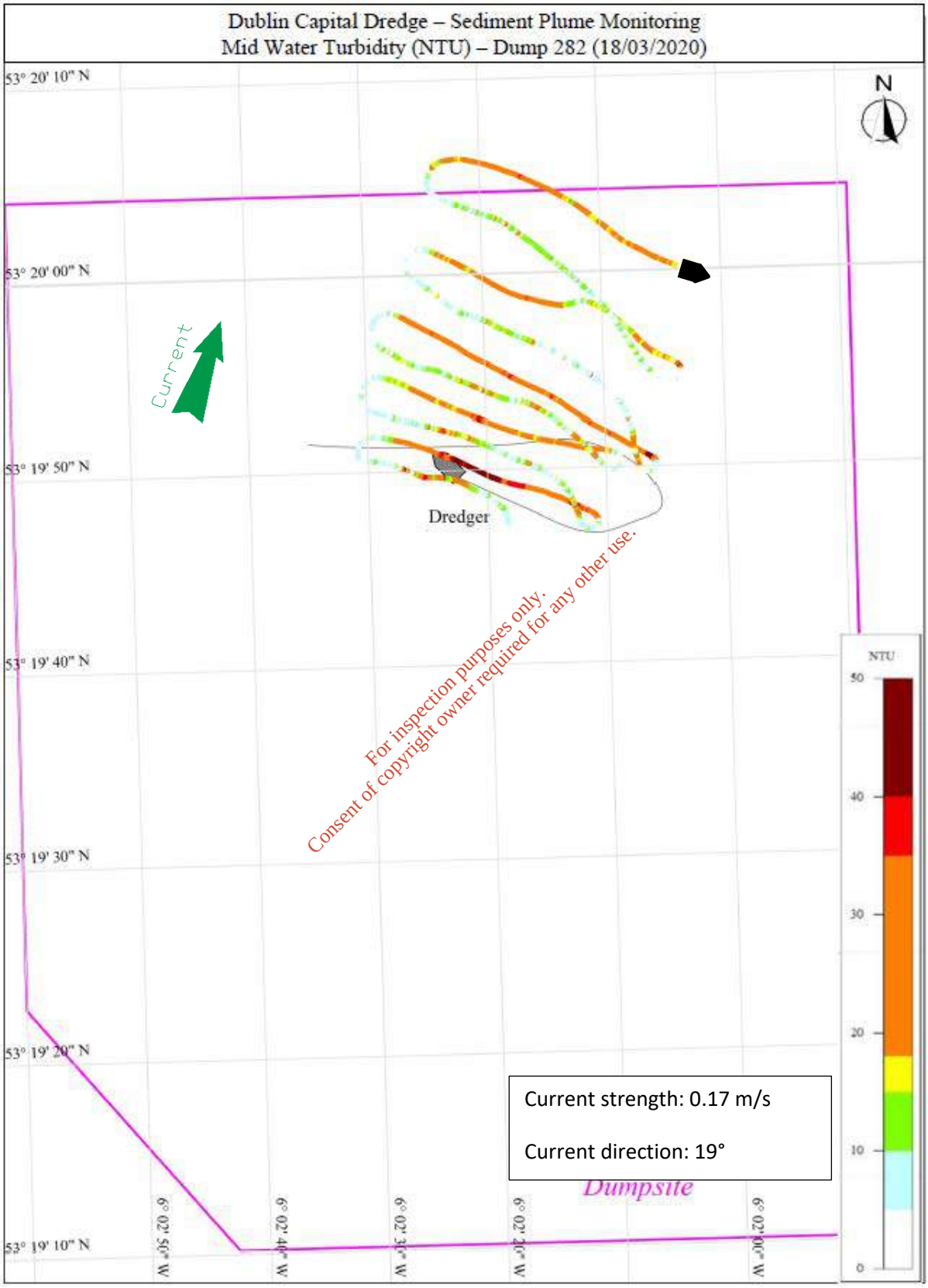

Figure 16: Dump 282 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:34

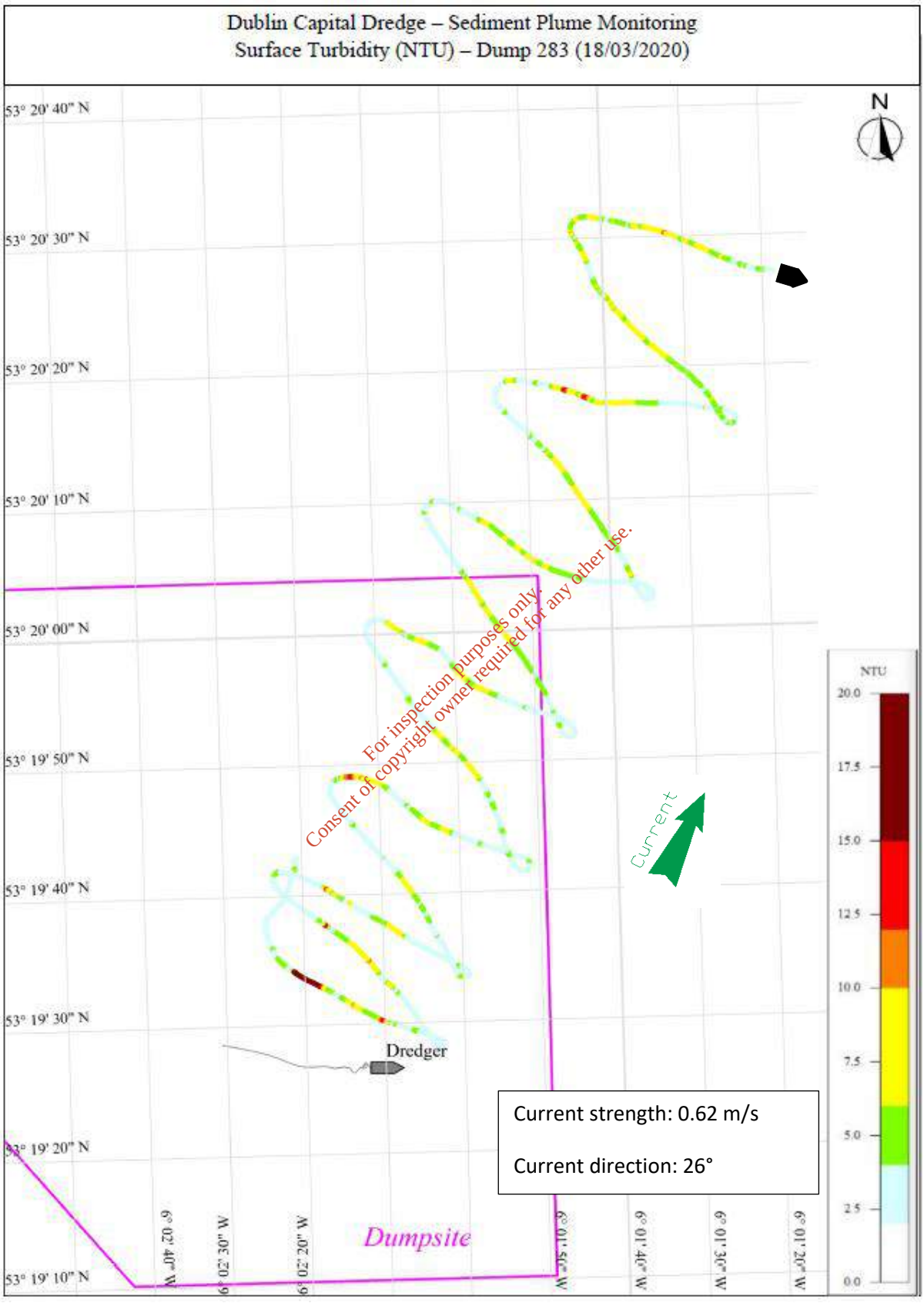

Figure 17: Dump 283 Survey track with surface turbidity [NTU]

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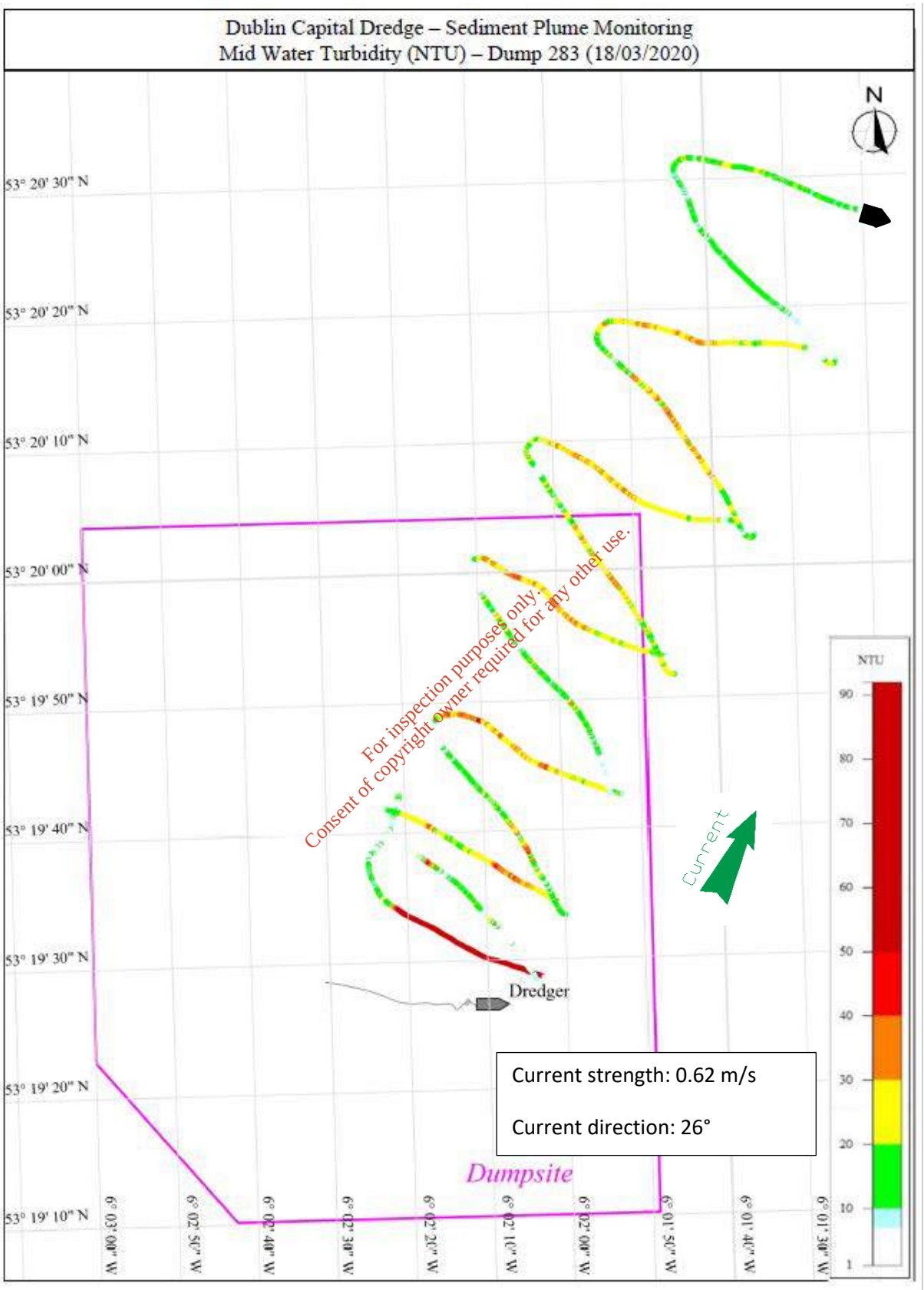

Figure 18: Dump 283 Survey track with mid water turbidity [NTU]

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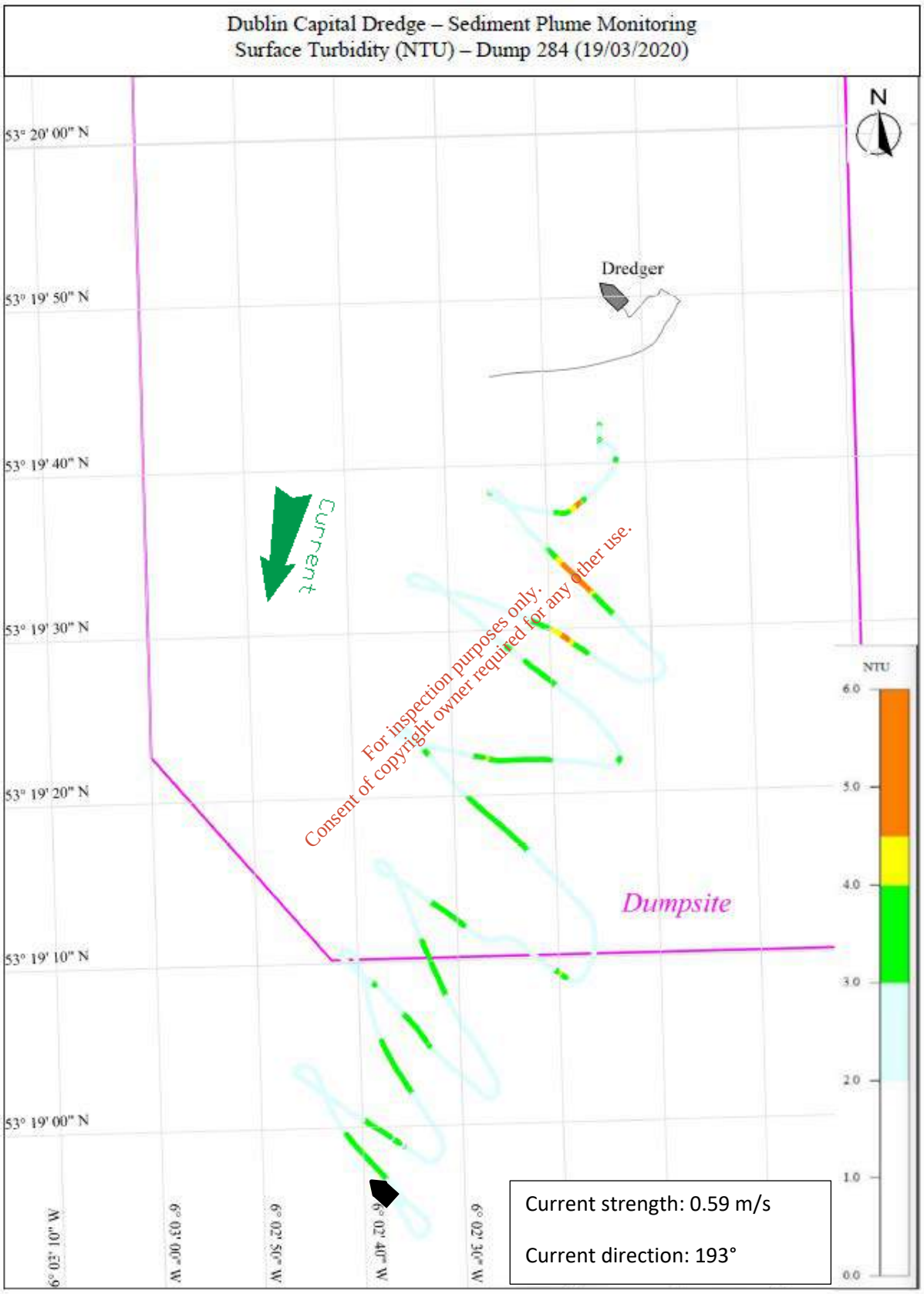

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Figure 19: Dump 284 Survey track with surface turbidity [NTU]

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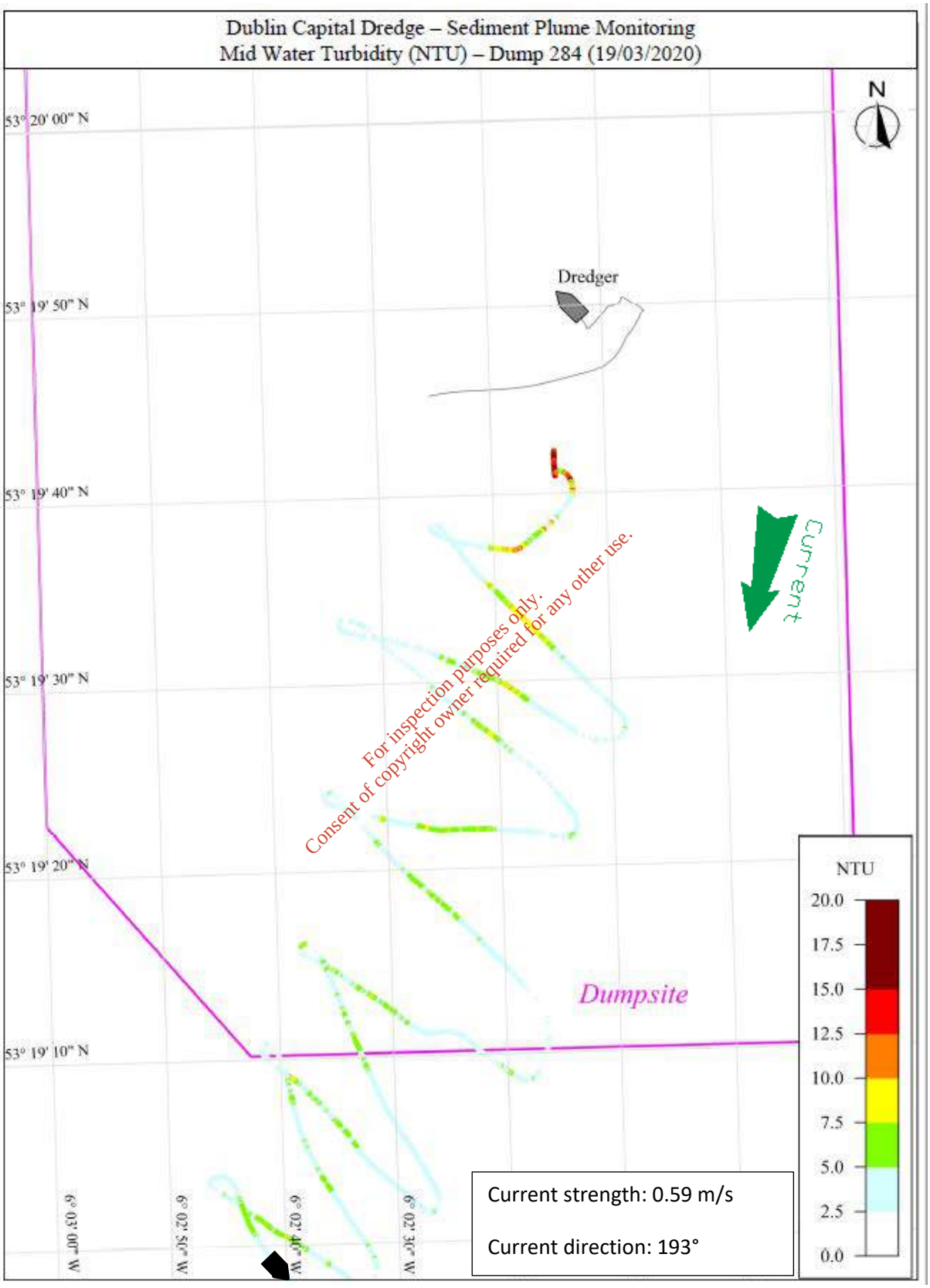

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Figure 20: Dump 284 Survey track with mid water turbidity [NTU]

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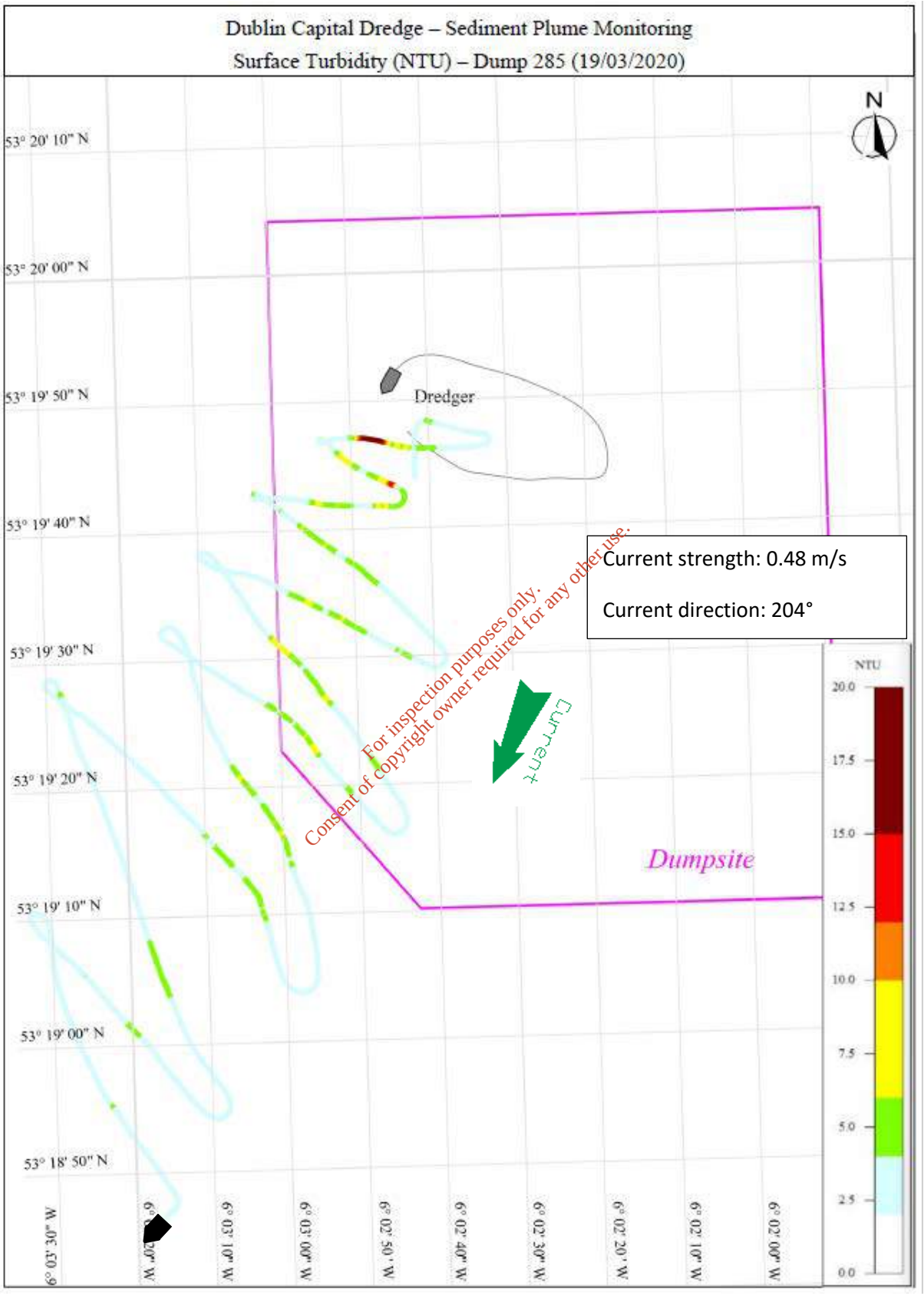

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Figure 21: Dump 285 Survey track with surface turbidity [NTU]

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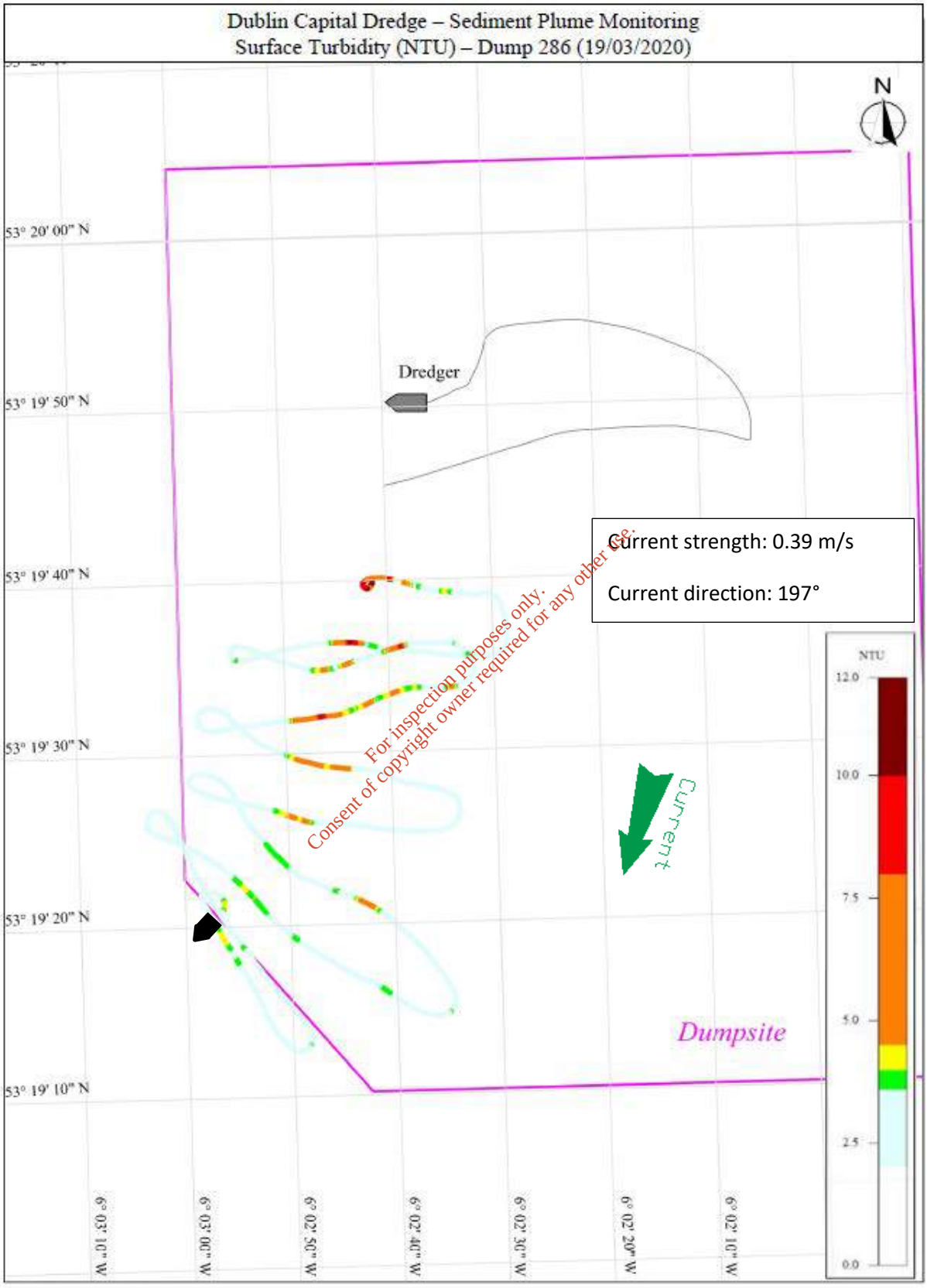

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Figure 22: Dump 286 Survey track with surface turbidity [NTU]

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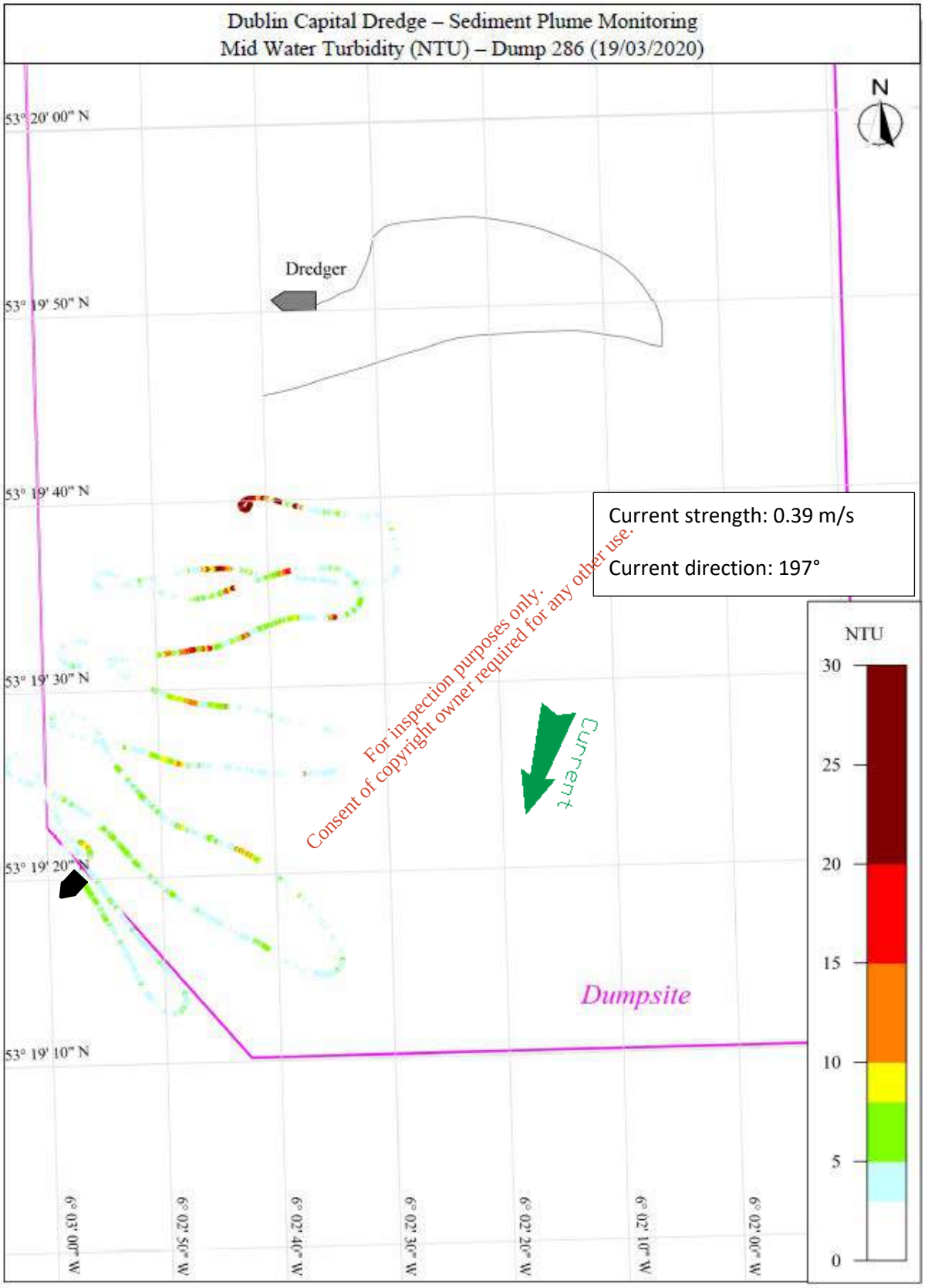

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Figure 23: Dump 286 Survey track with mid water turbidity [NTU]

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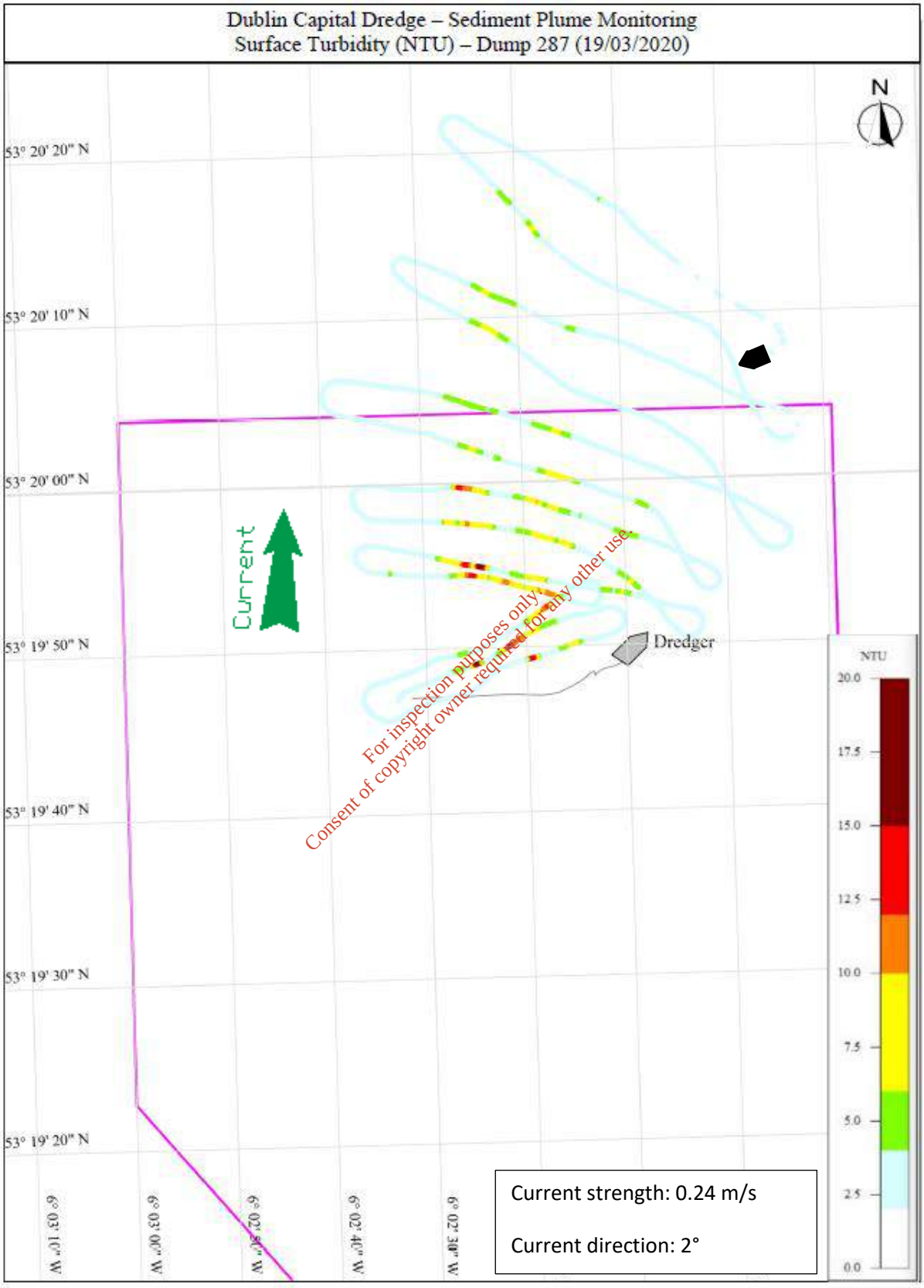

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Figure 24: Dump 287 Survey track with surface turbidity [NTU]

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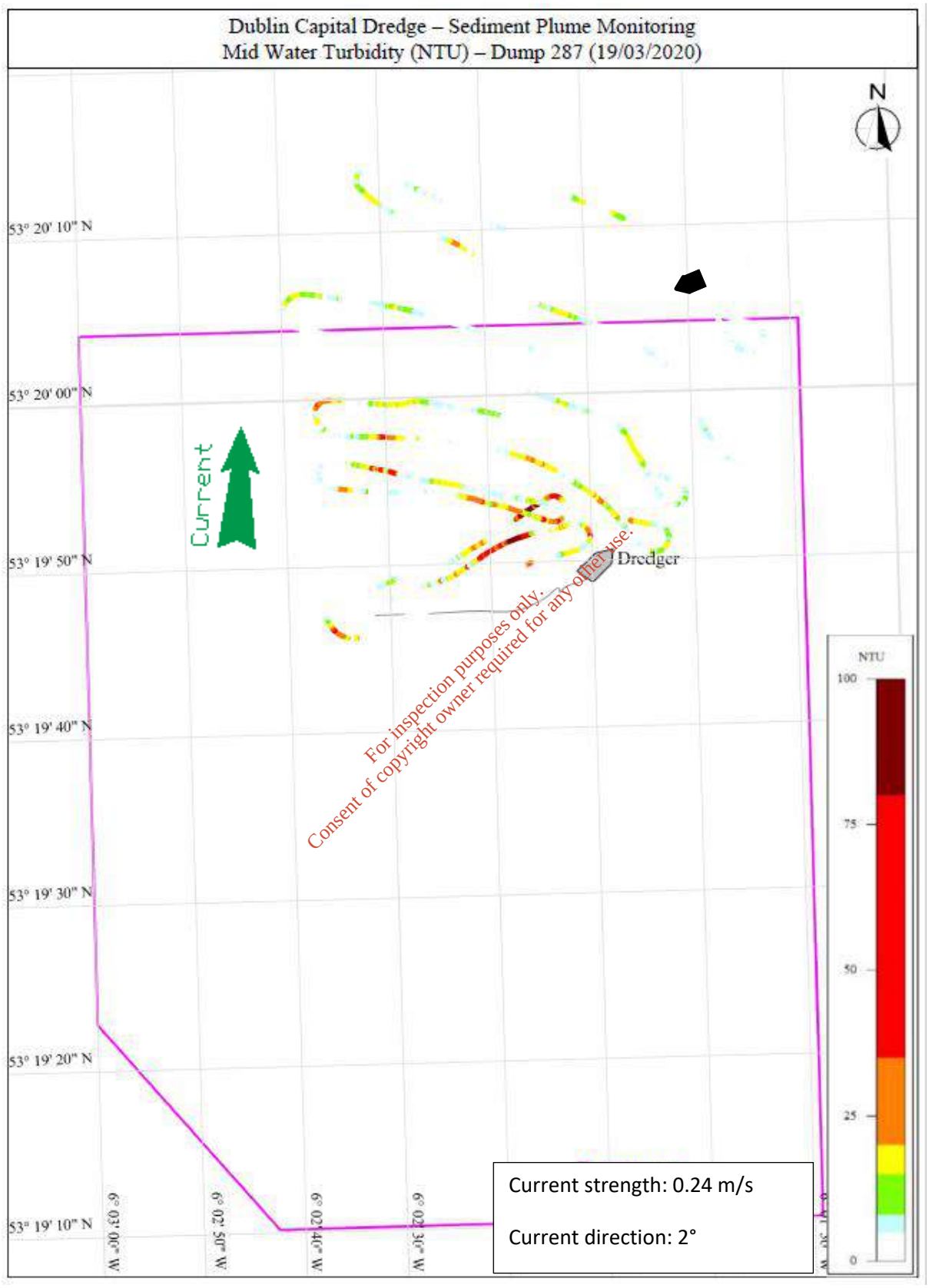

Figure 25: Dump 287 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:34

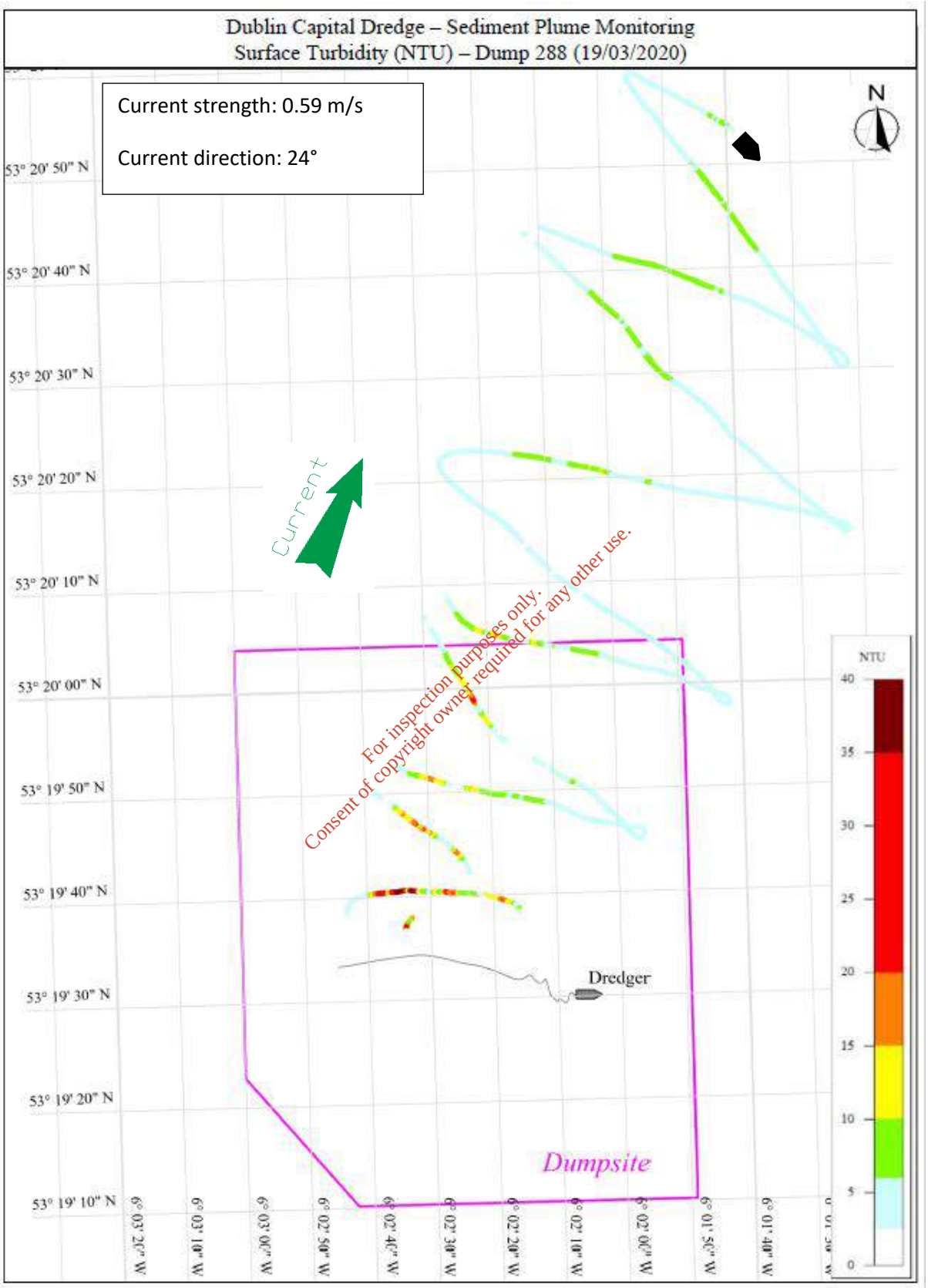

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Figure 26: Dump 288 Survey track with surface turbidity [NTU]

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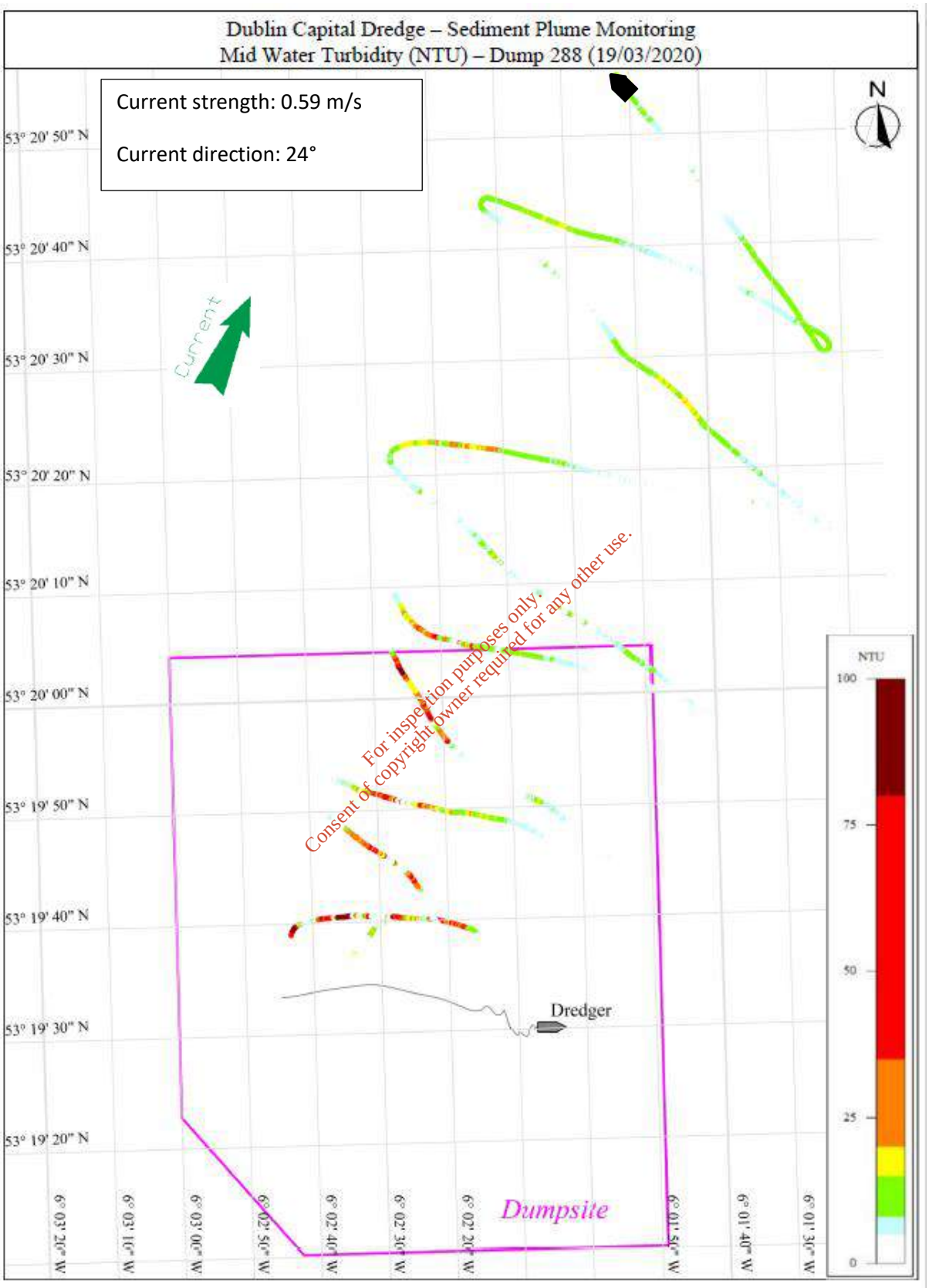
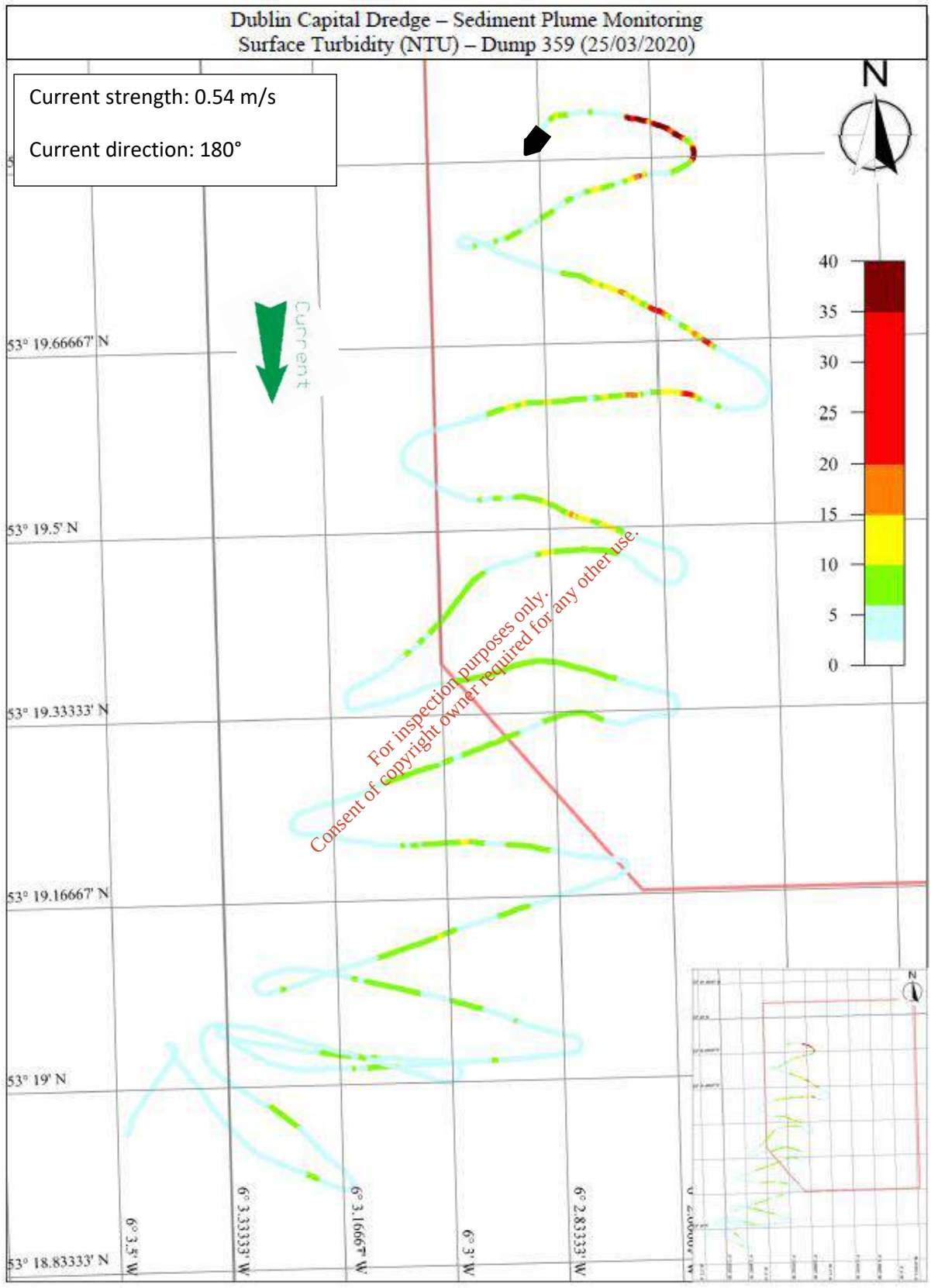


Figure 27: Dump 288 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:34



100

Figure 28: Dump 359 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:34

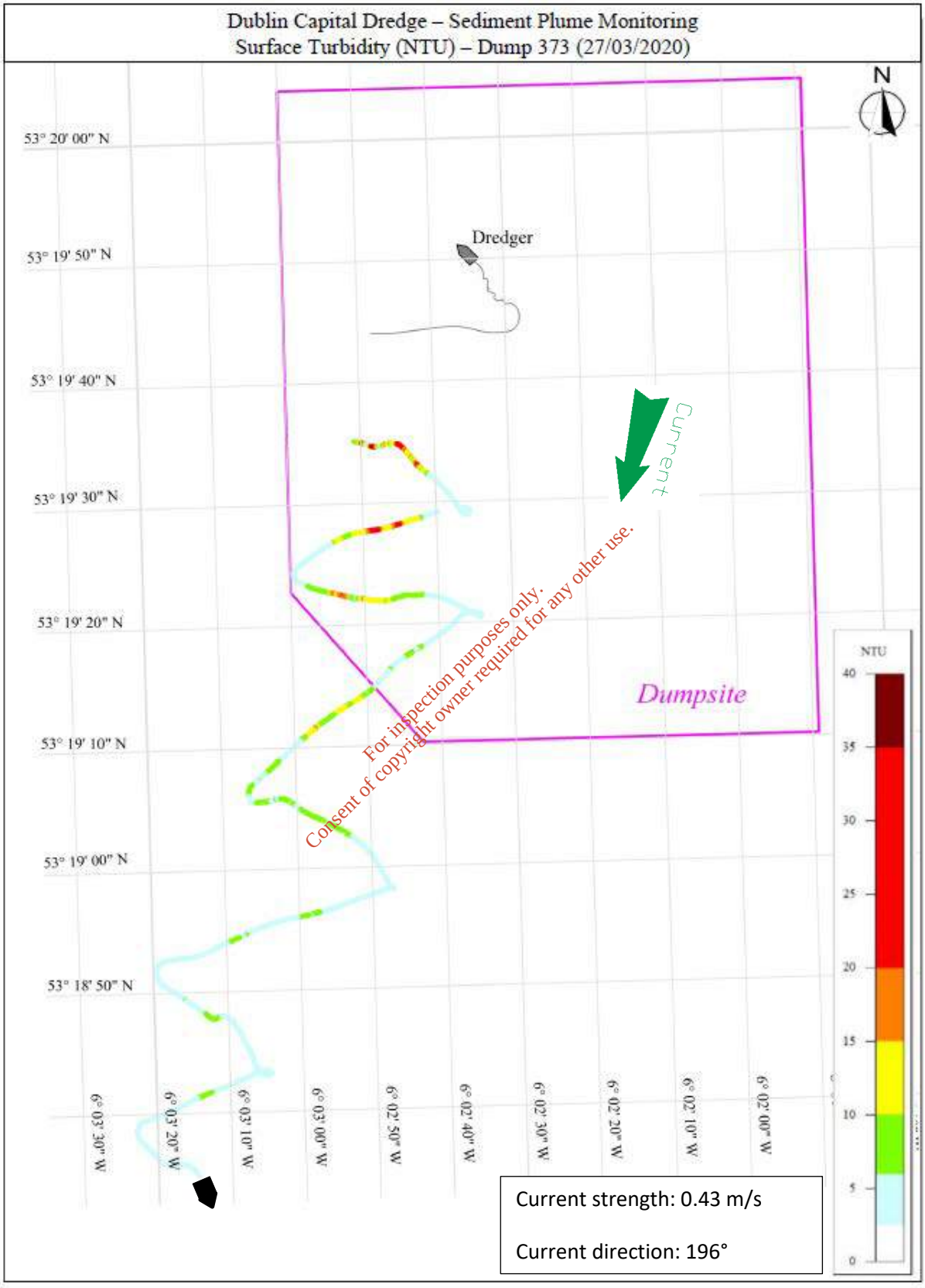


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Figure 29: Dump 373 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:34

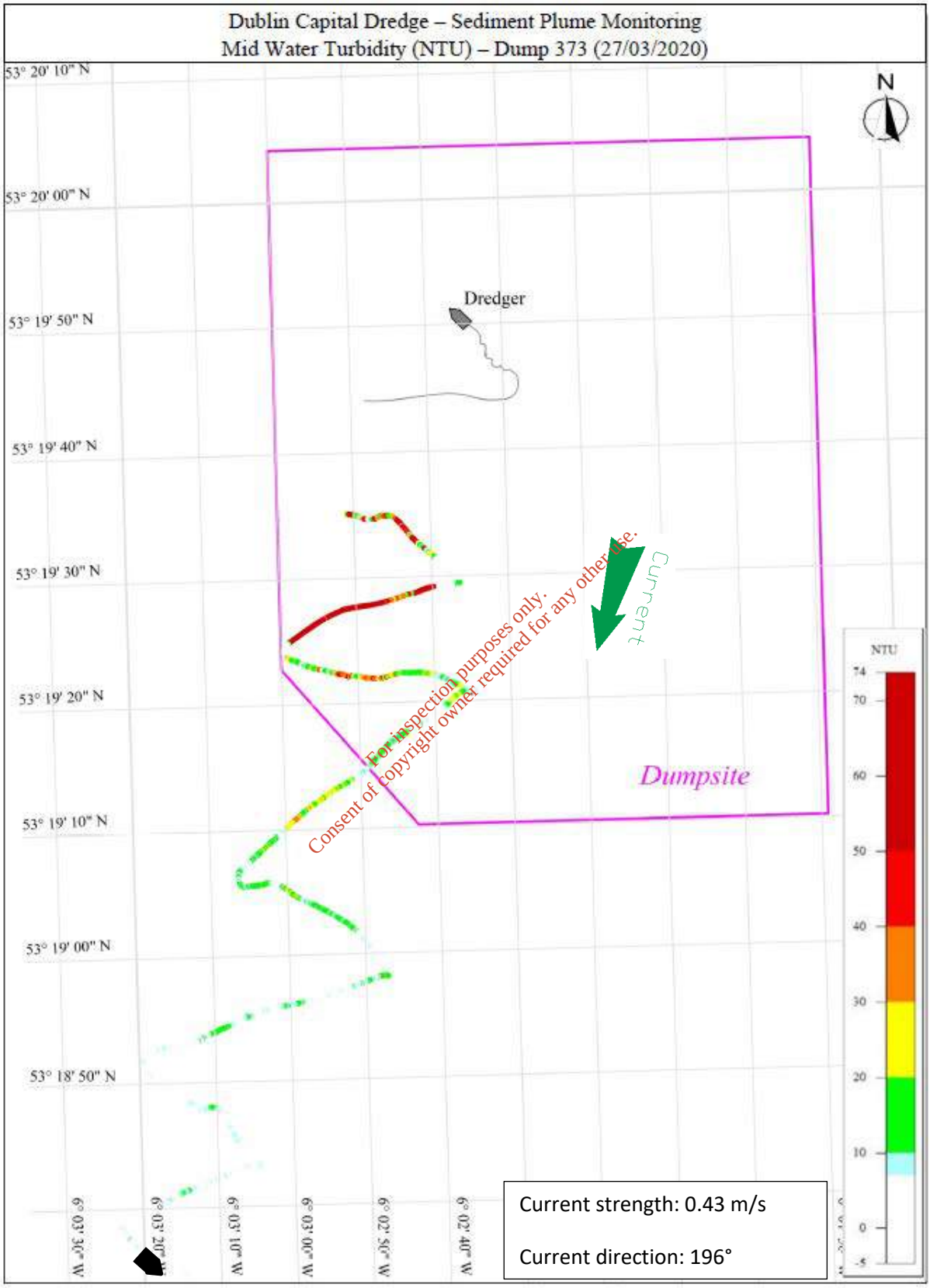

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Figure 30: Dump 373 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:34

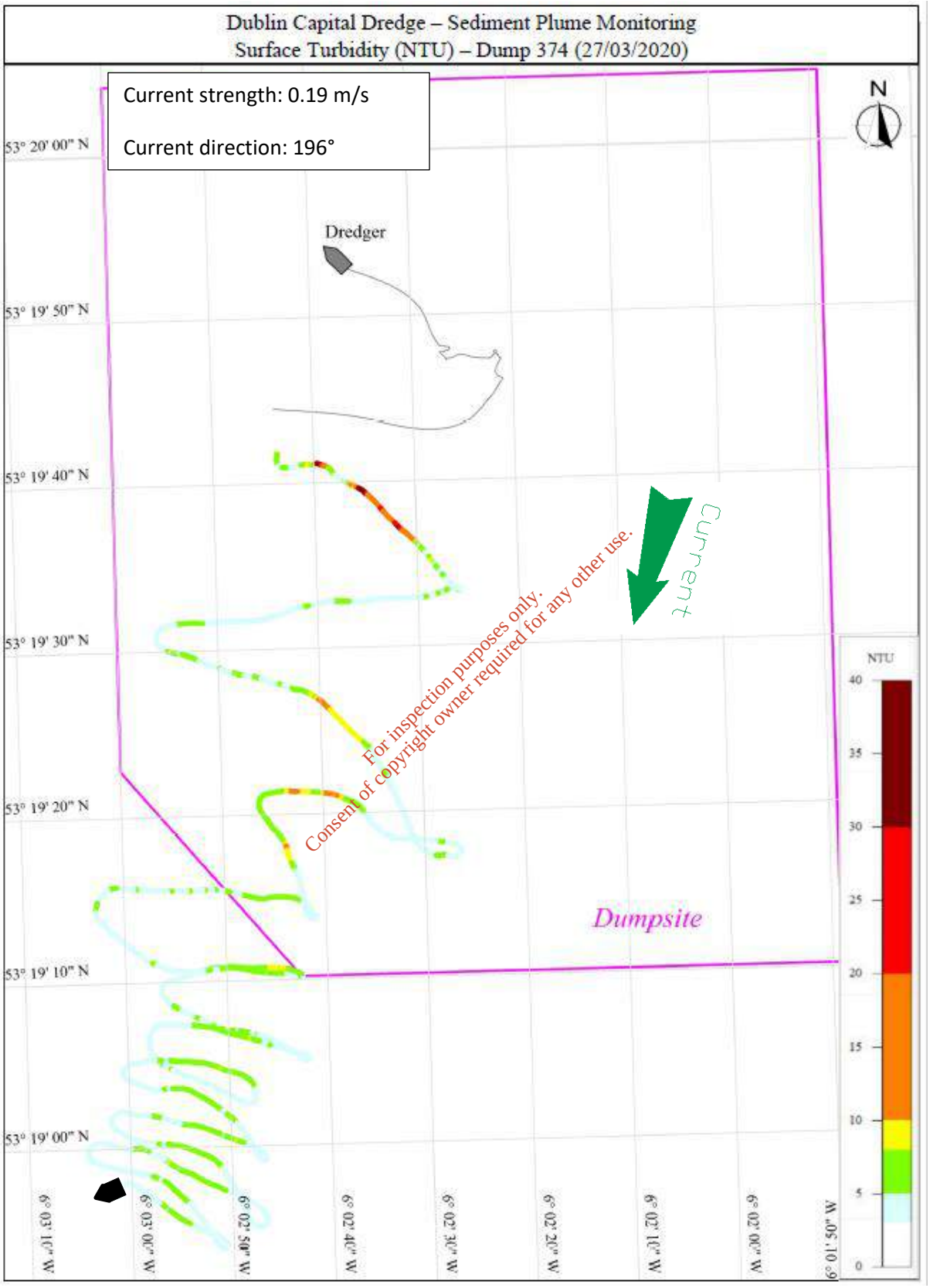

Figure 31: Dump 374 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:34

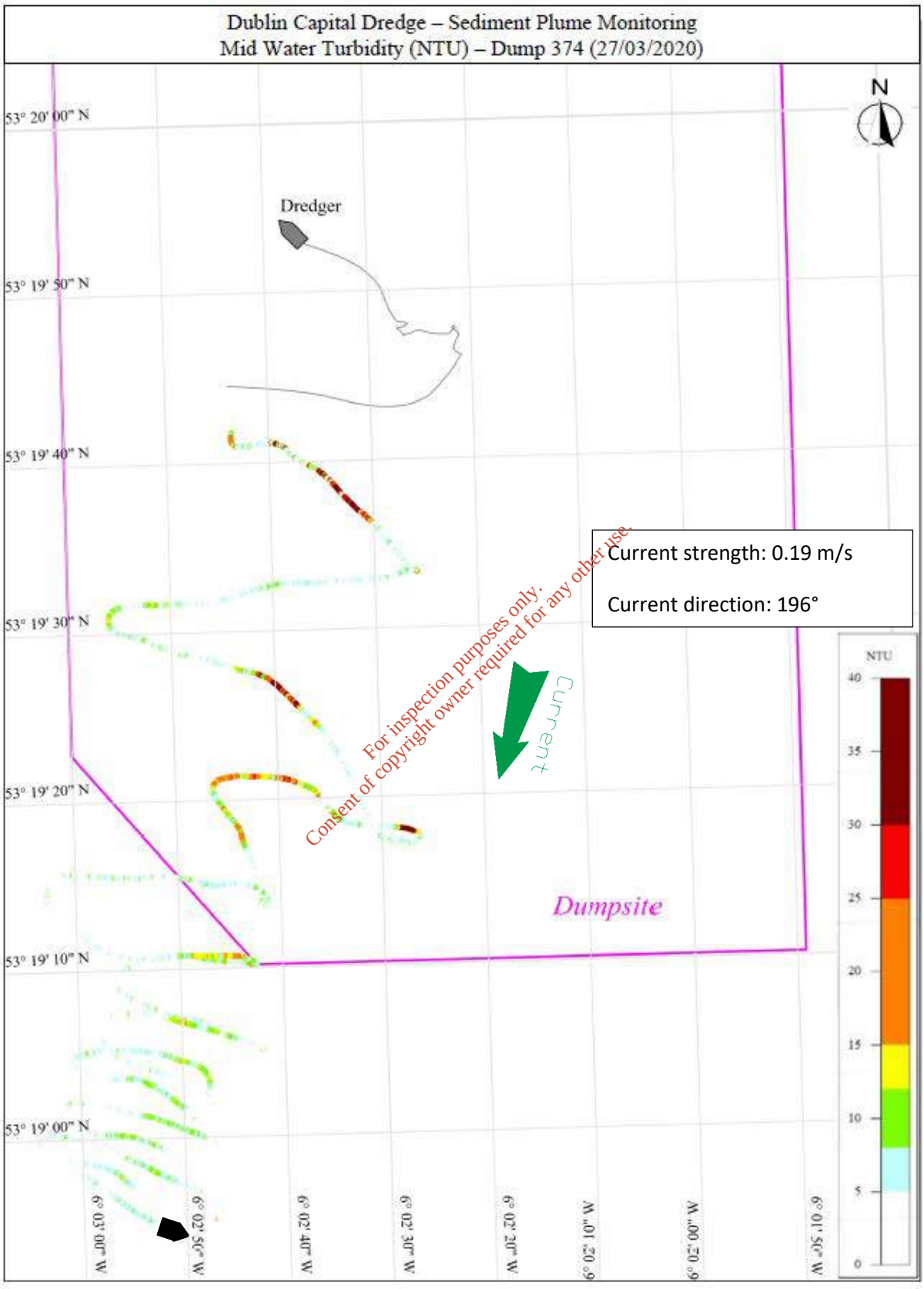

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Figure 32: Dump 374 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:34

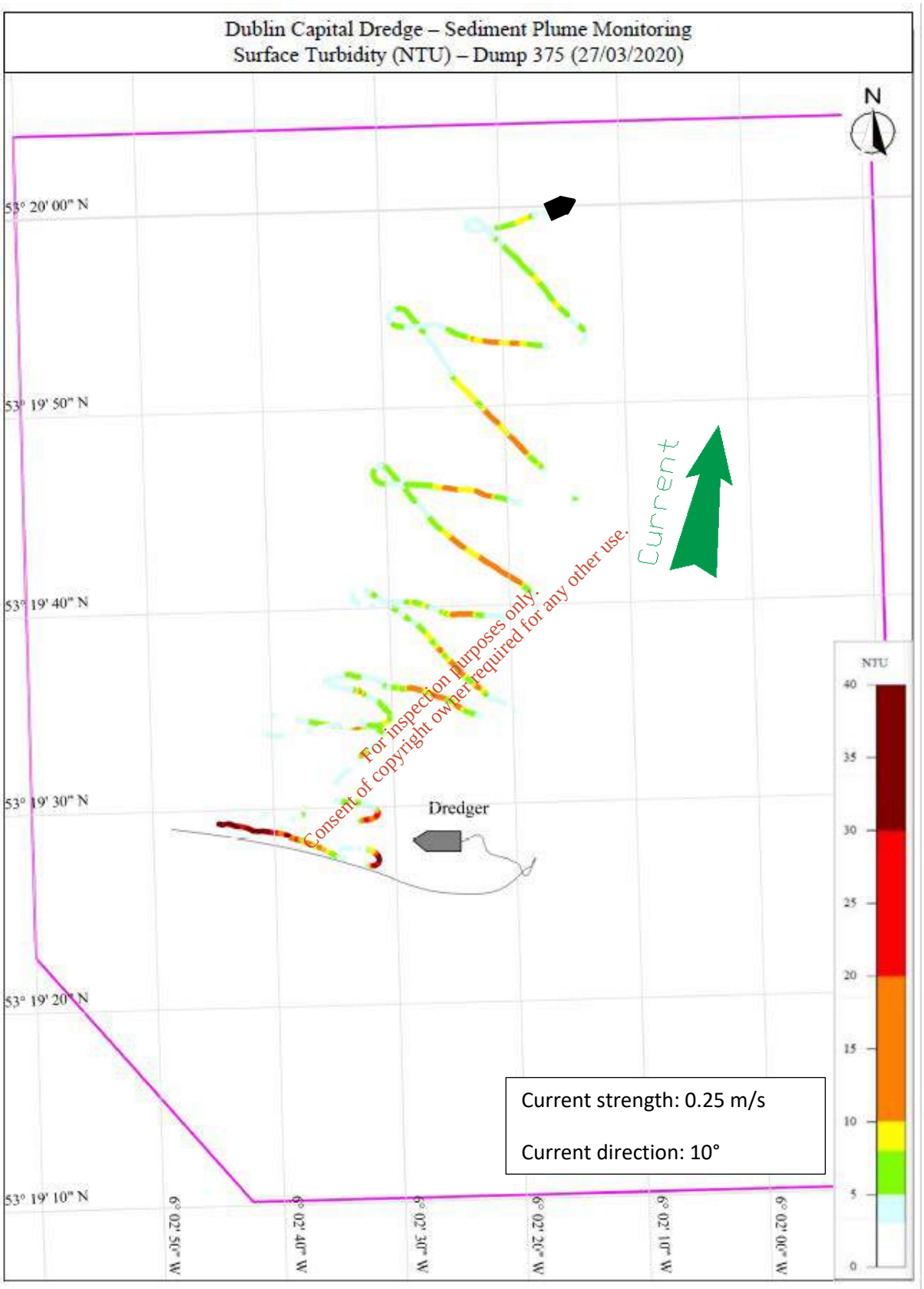

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Figure 33: Dump 375 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:34

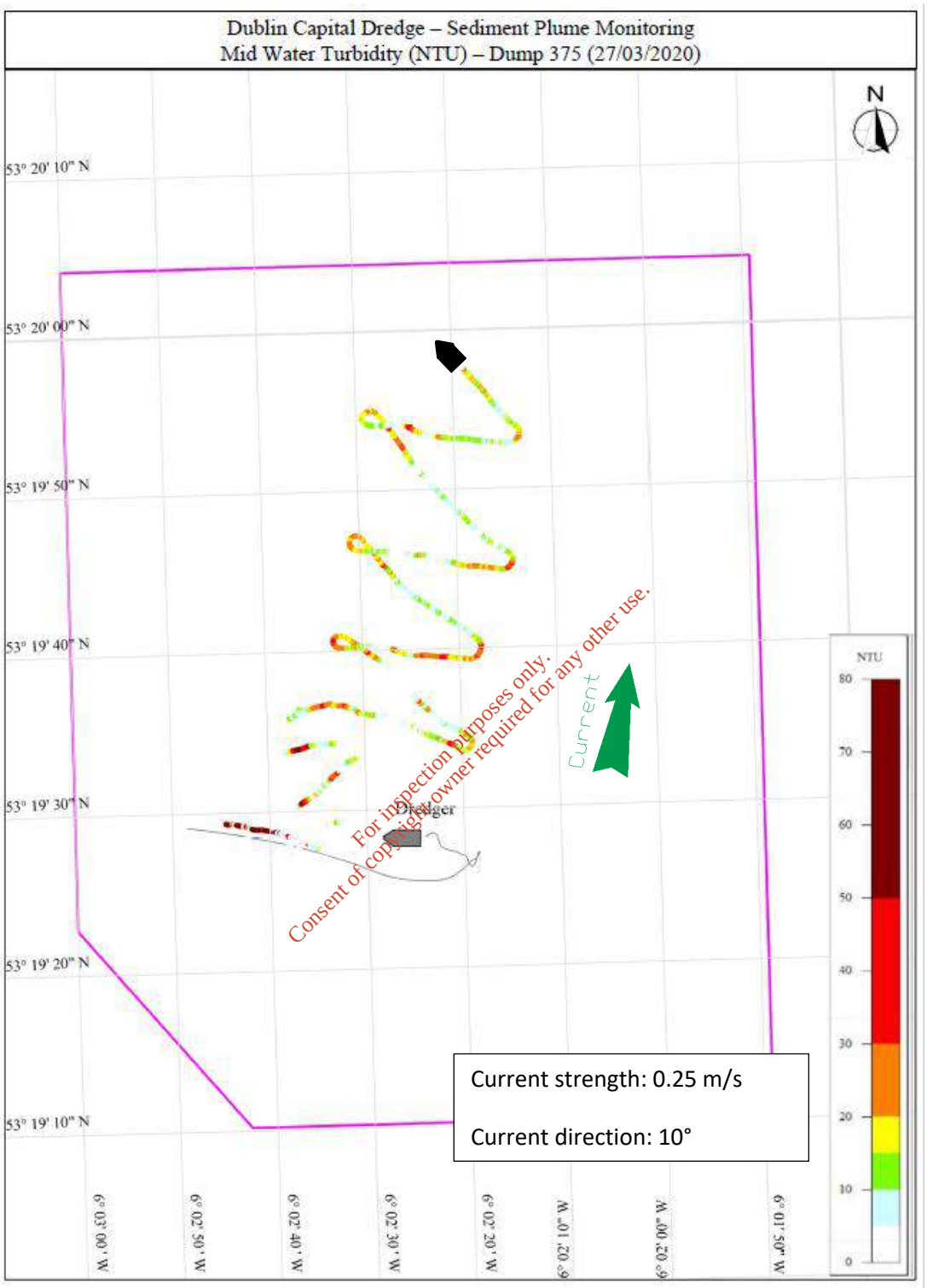

Figure 34: Dump 375 Survey track with mid water turbidity [NTU]

As can be clearly seen from Figure 4 to Figure 34 the survey vessel was able to very clearly track the plume. The plume can be seen to dissipate very quickly and except on very few occasions the plume dissipates prior to moving outside of the dumping location.

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4.2. Turbidity depth comparison

To better view the data collected at both depths, the data for both sensors was analysed and inter comparison graphs created. These are shown on the following figures (figure 36 to figure 49. The relative period of time the dredger Shoalway was dumping has also been indicated by a black line on the x axis.

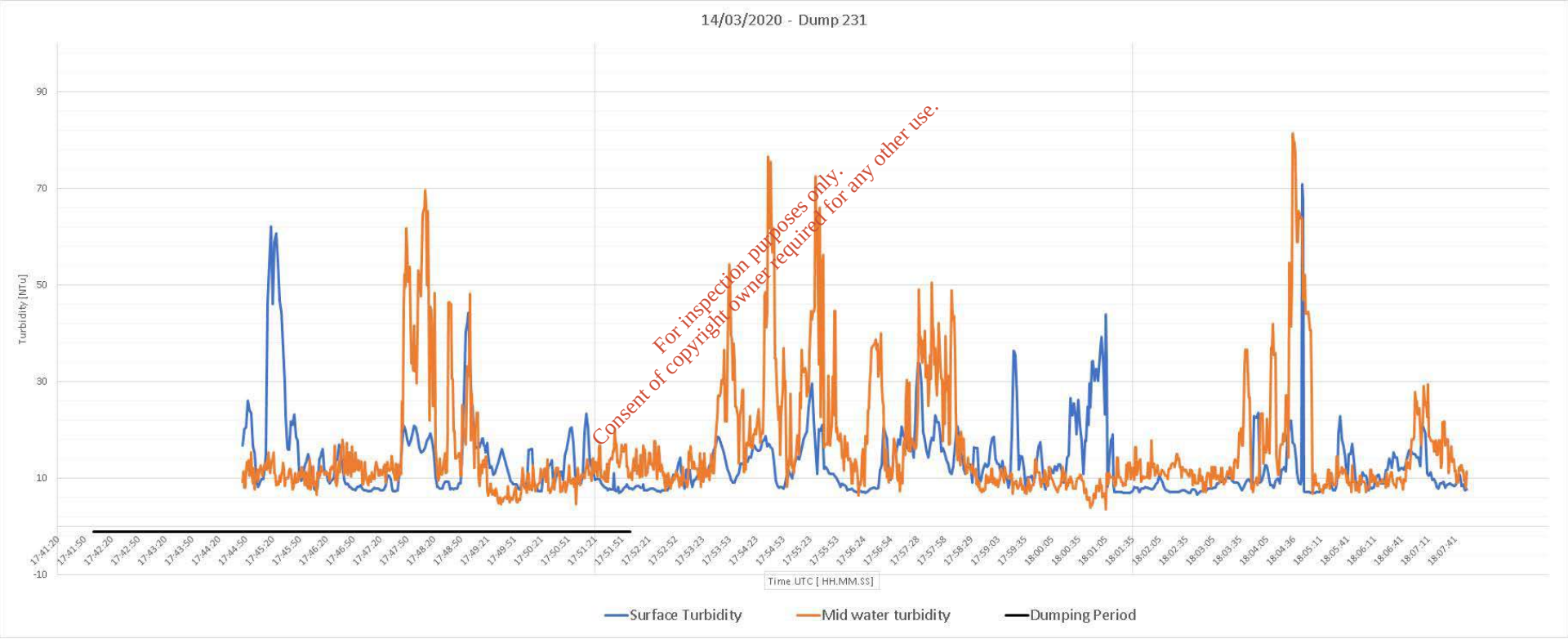

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Figure 35: Comparison of Surface and mid water turbidity values recorded during dump 231.

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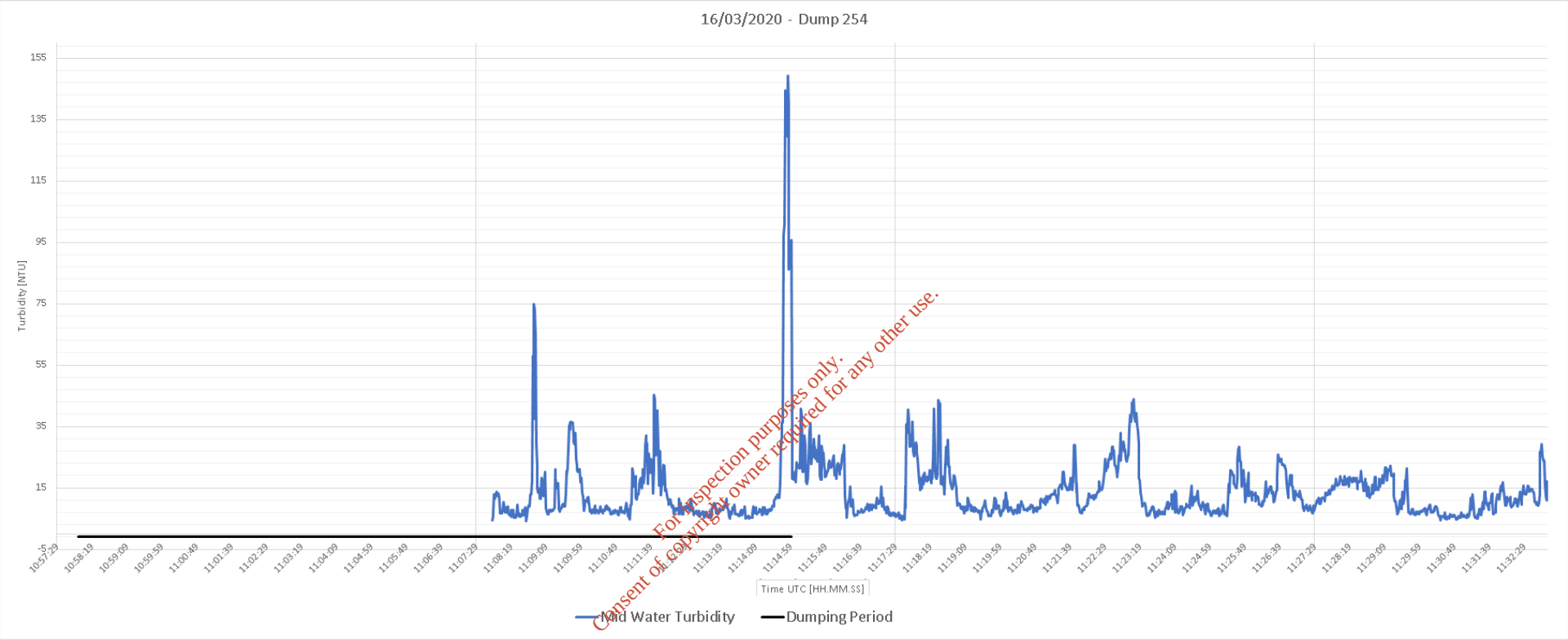

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Figure 36: Mid water turbidity values recorded during dump 254.

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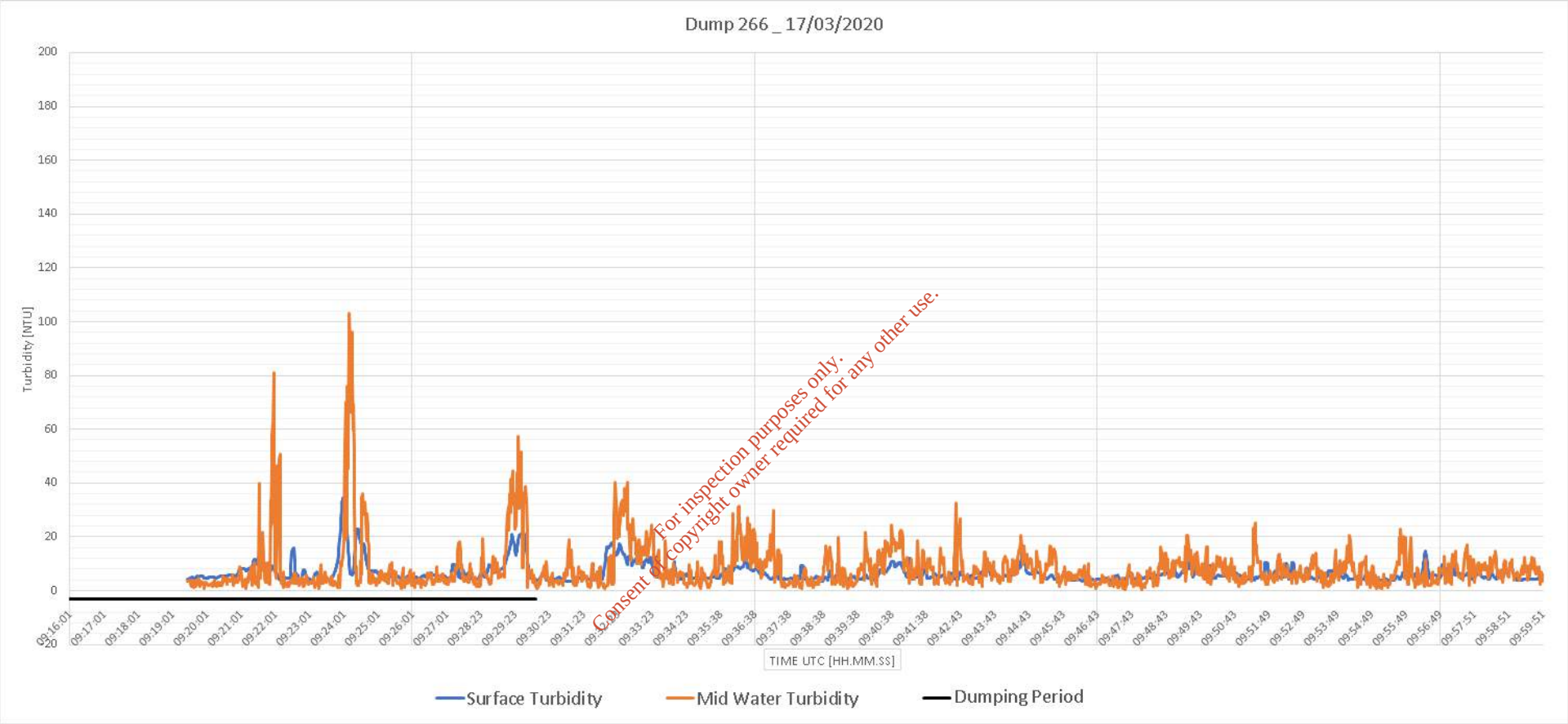

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Figure 38: Comparison of Surface and mid water turbidity values recorded during dump 266.

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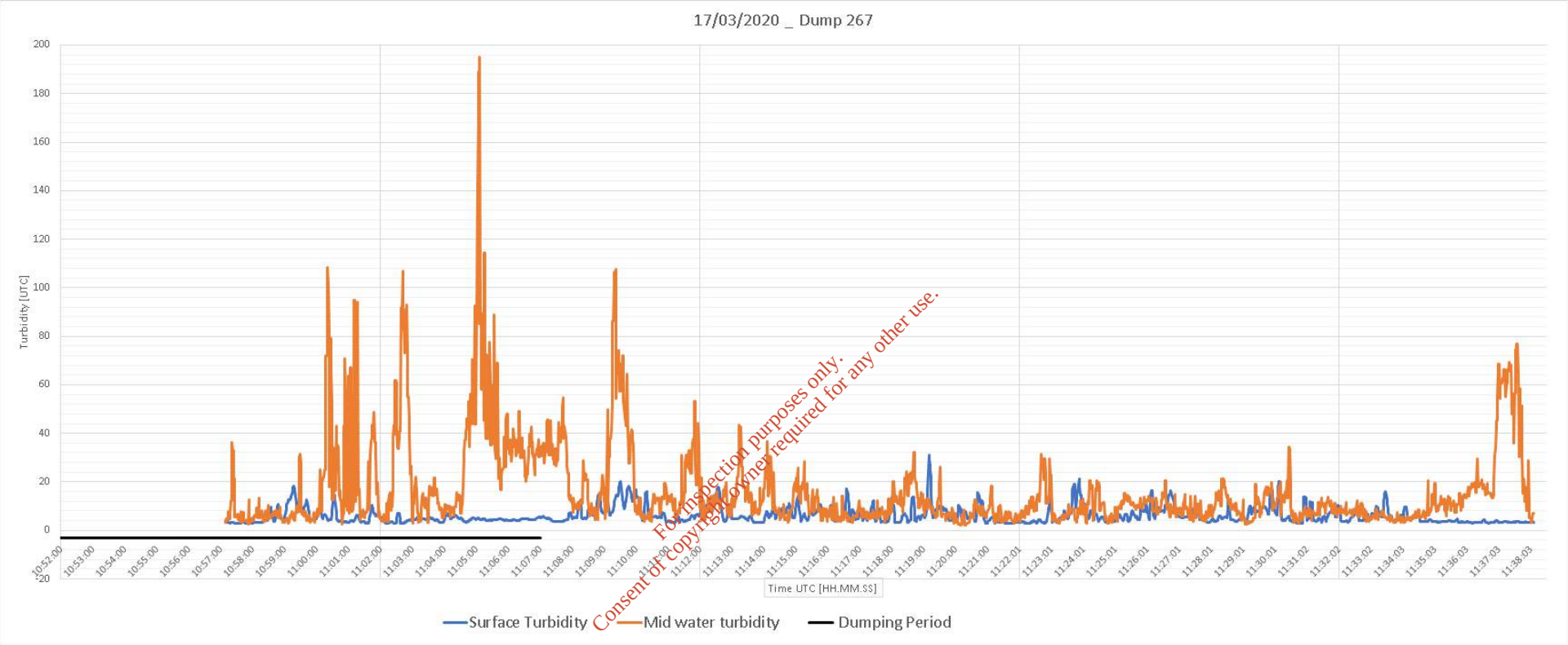

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Figure 37: Comparison of Surface and mid water turbidity values recorded during dump 267.

EPA Export 28-04-2021:02:38:34

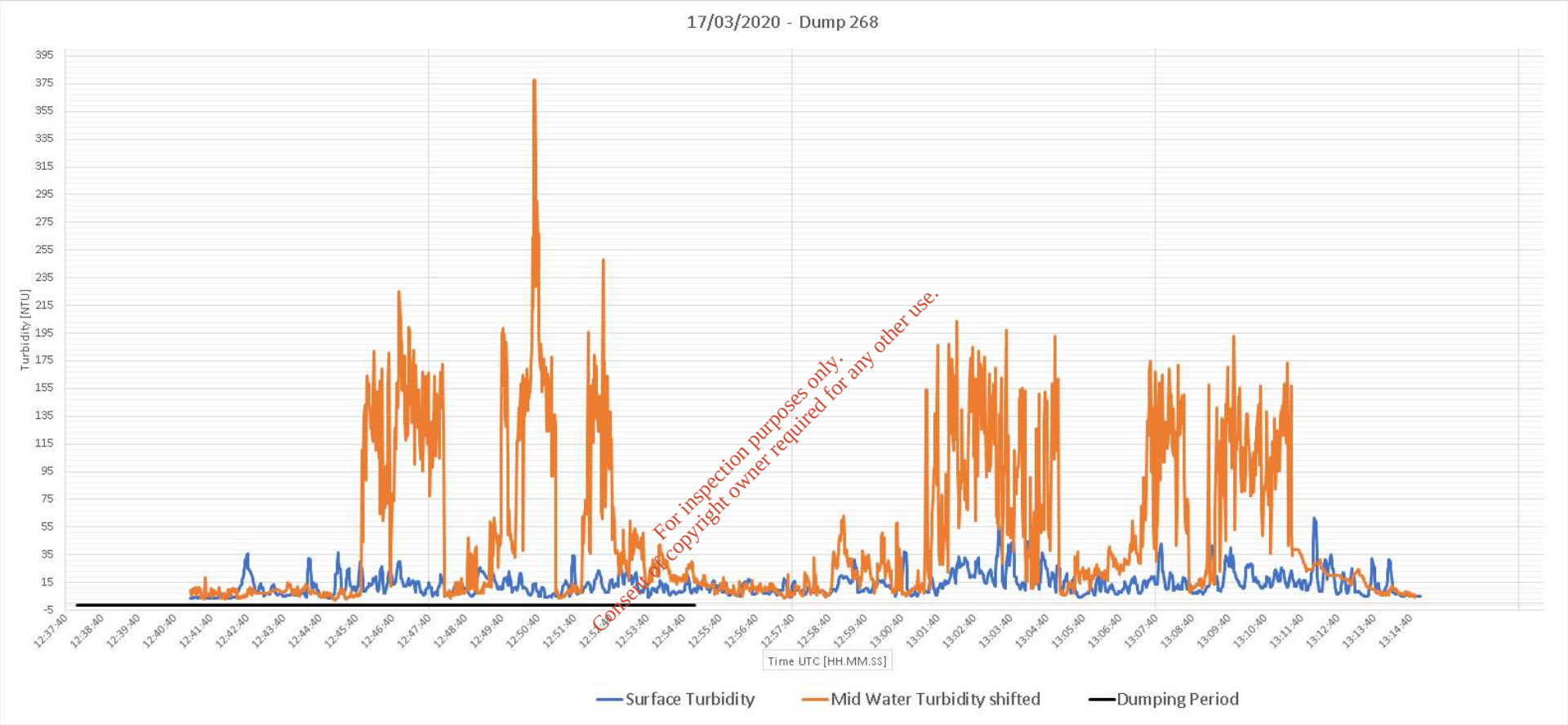

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Figure 38: Comparison of Surface and mid water turbidity values recorded during dump 268.

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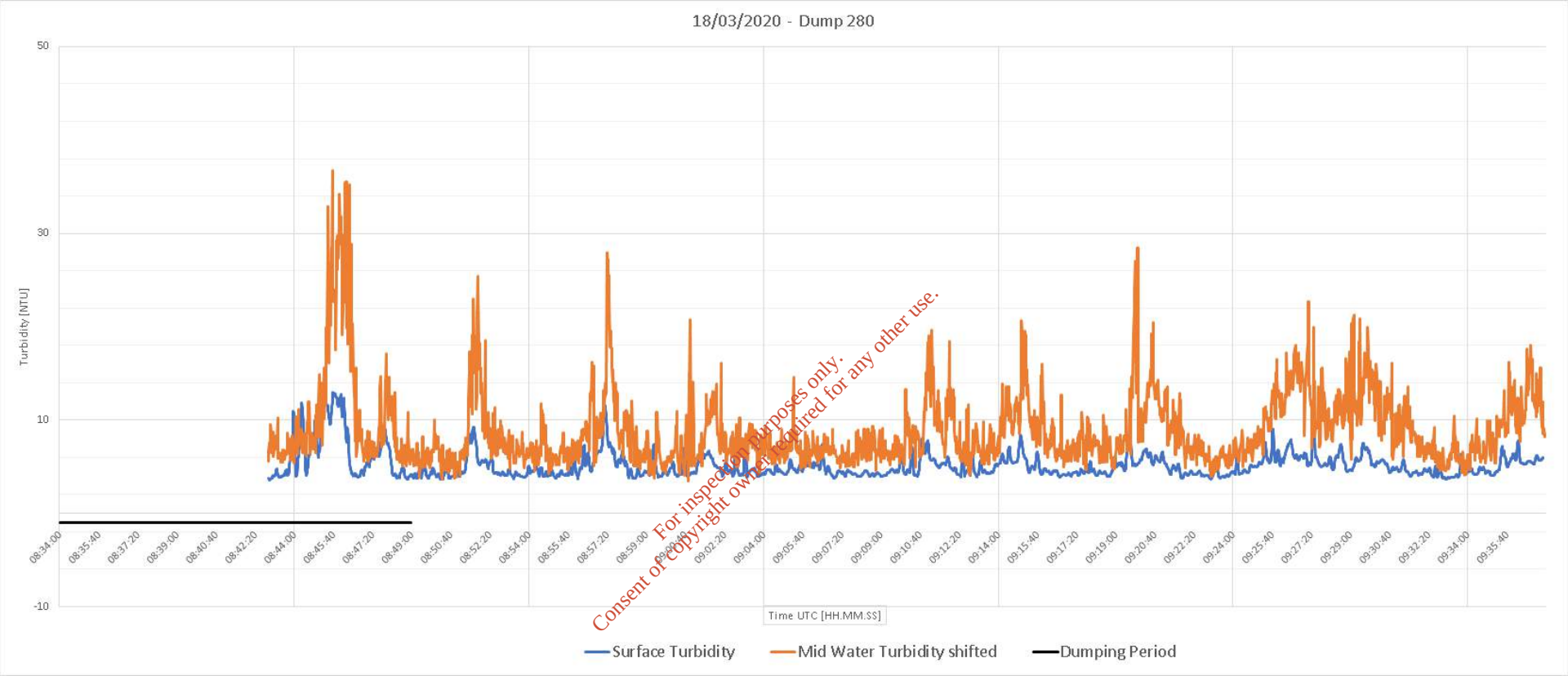

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Figure 39: Comparison of Surface and mid water turbidity values recorded during dump 280.

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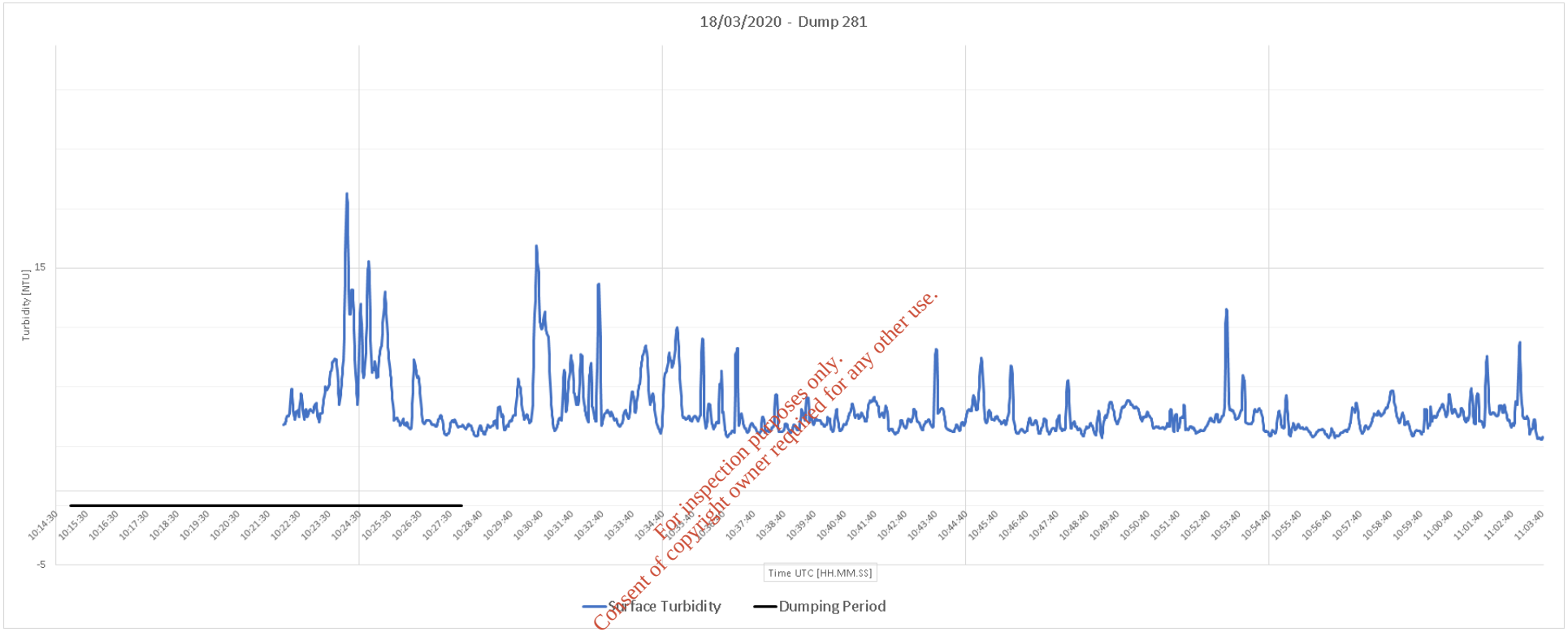

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Figure 40 Surface turbidity values recorded during dump 281.

EPA Export 28-04-2021:02:38:34

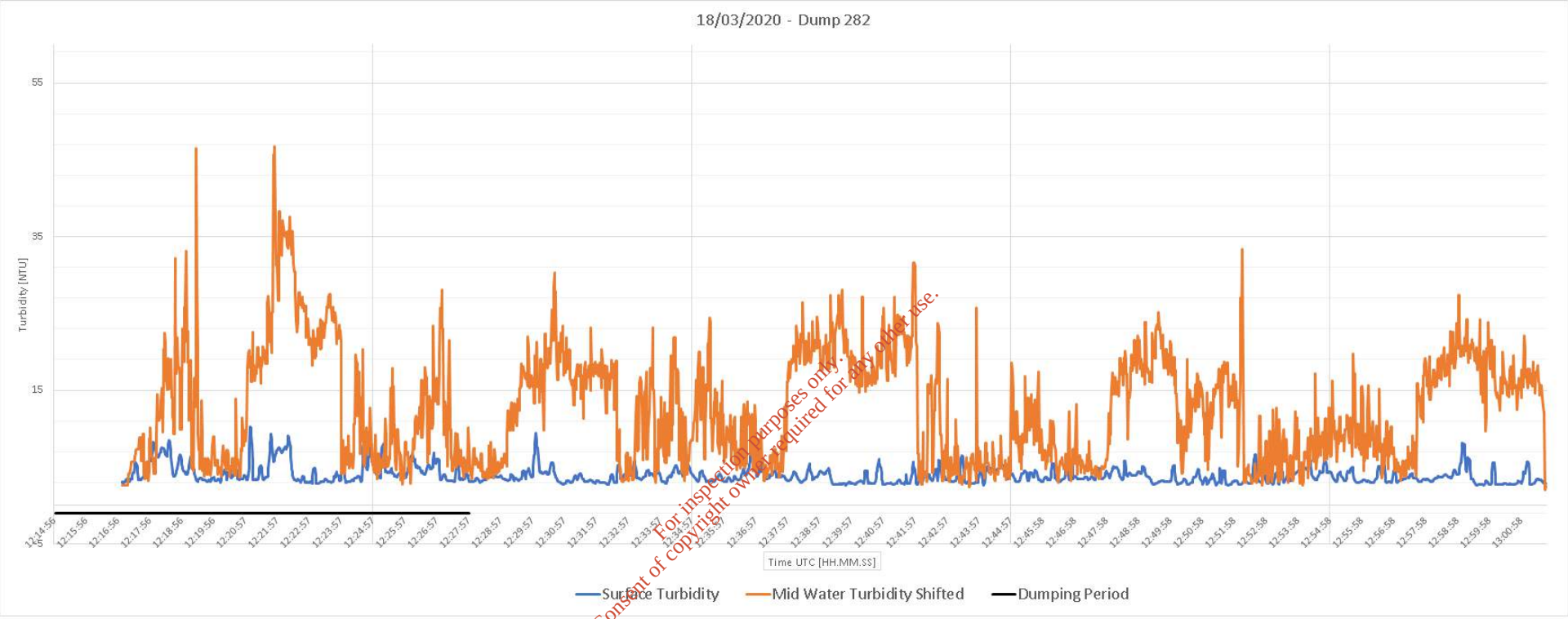

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Figure 41: Comparison of Surface and mid water turbidity values recorded during dump 282.

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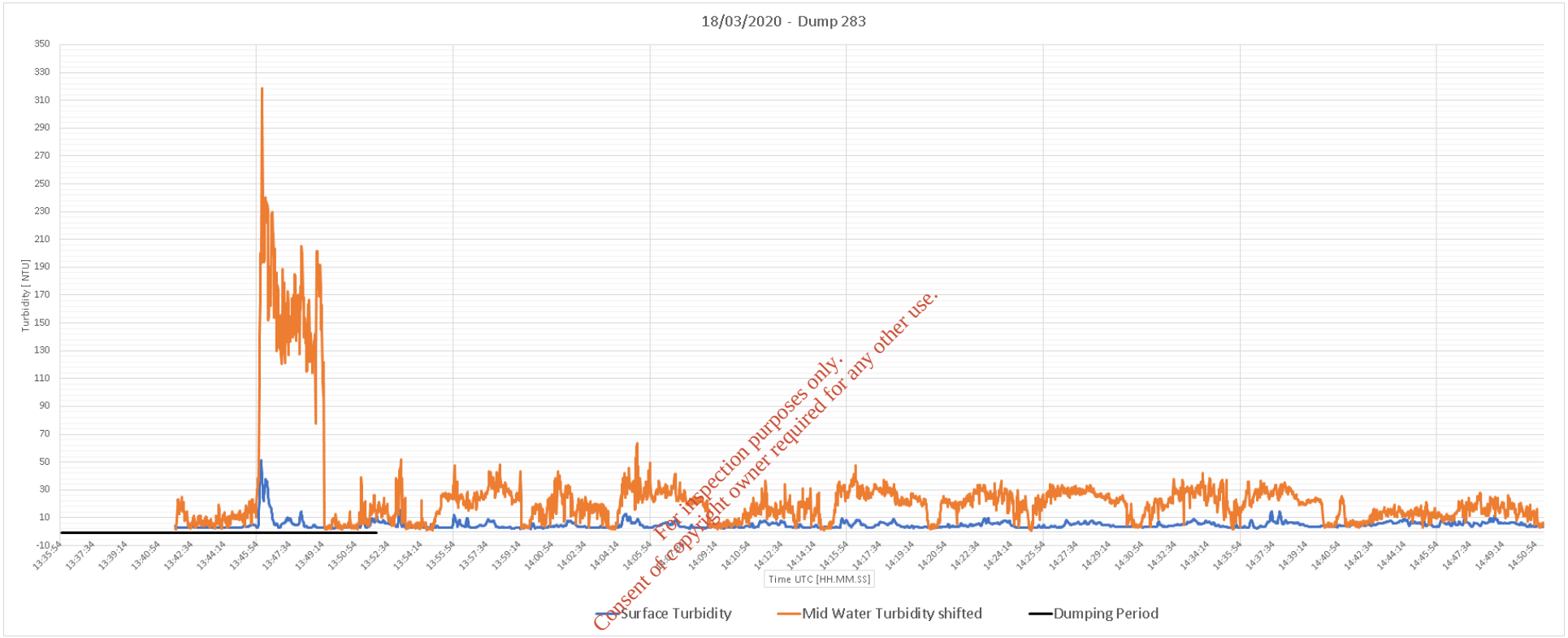

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Figure 42: Comparison of Surface and mid water turbidity values recorded during dump 283.

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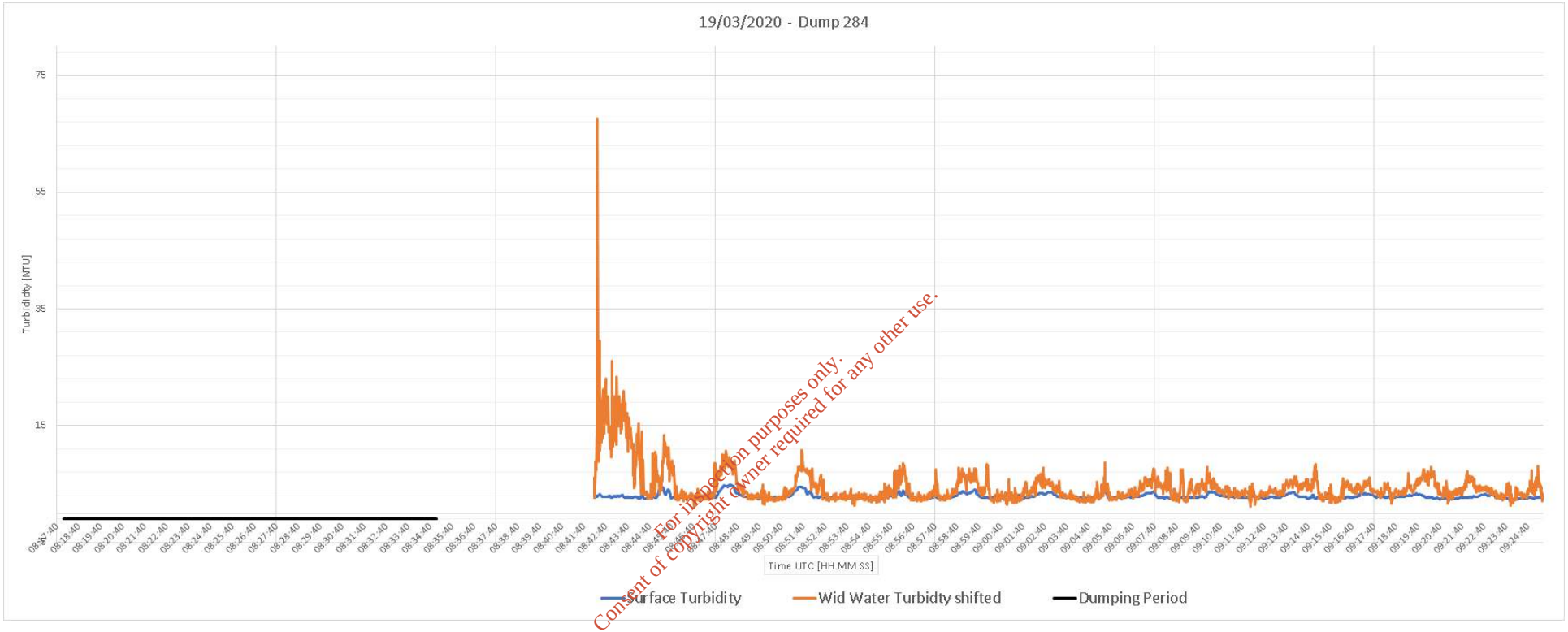

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Figure 43: Comparison of Surface and mid water turbidity values recorded during dump 284.

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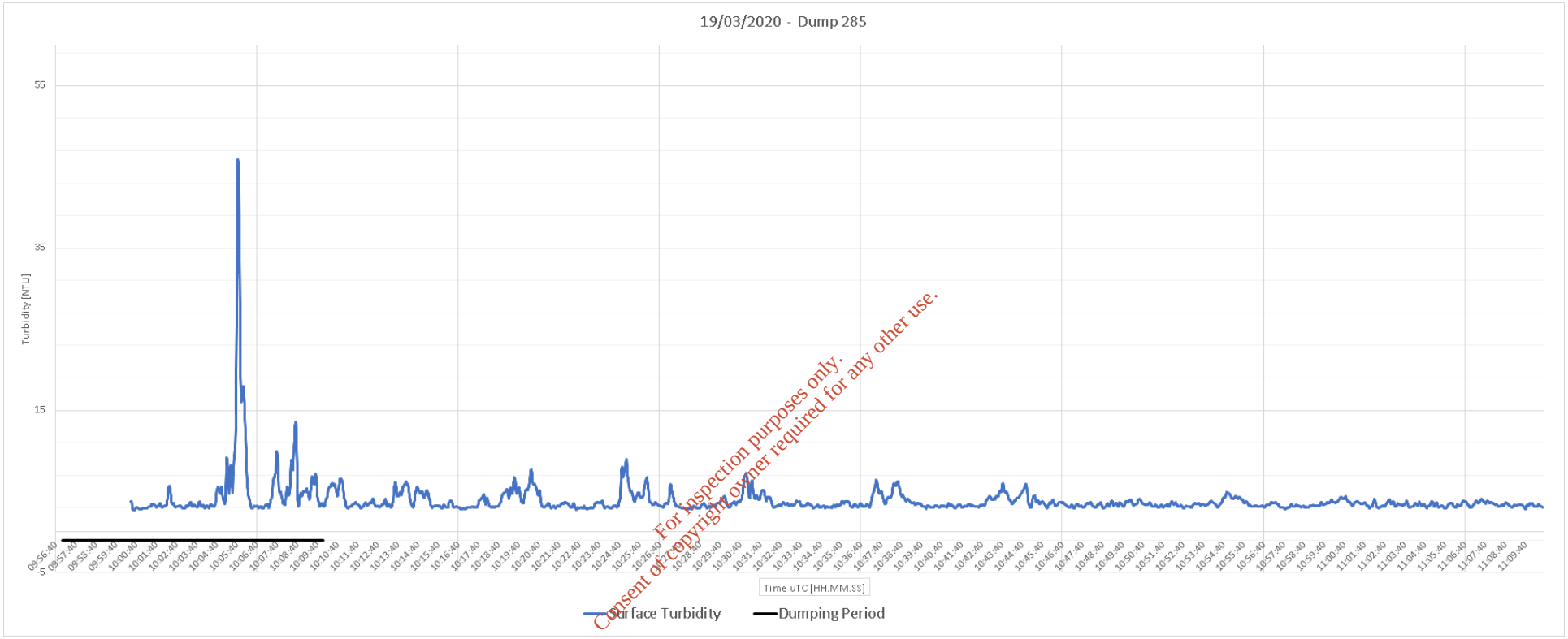

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Figure 44: Surface turbidity values recorded during dump 285.

EPA Export 28-04-2021:02:38:34

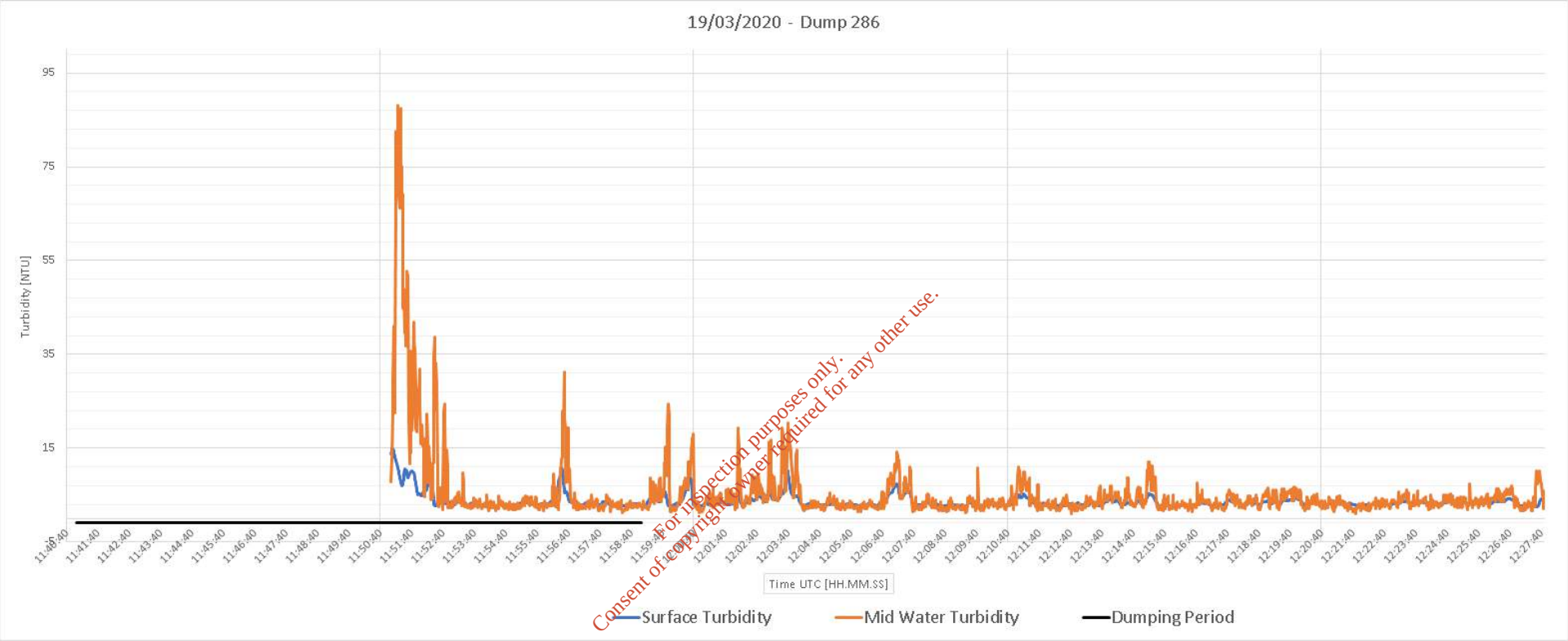

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Figure 45: Comparison of Surface and mid water turbidity values recorded during dump 286.

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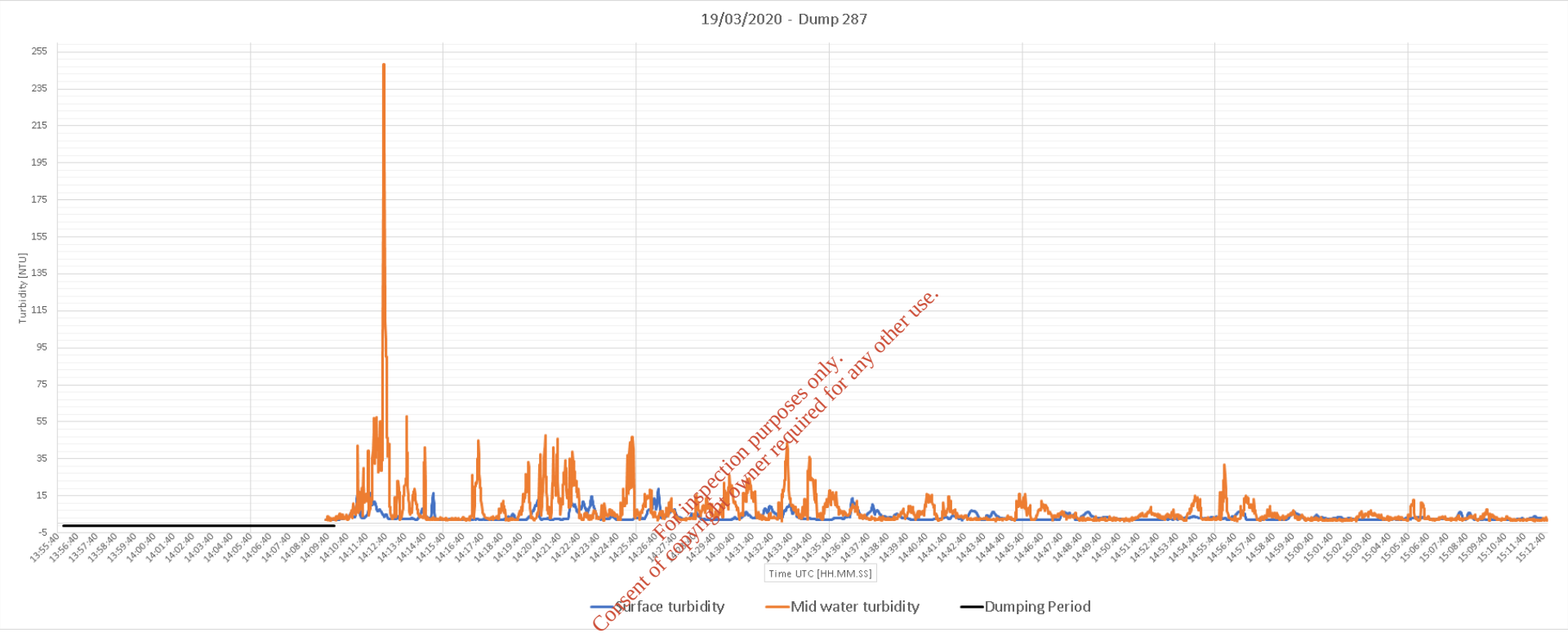

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Figure 46: Comparison of Surface and mid water turbidity values recorded during dump 287.

EPA Export 28-04-2021:02:38:34

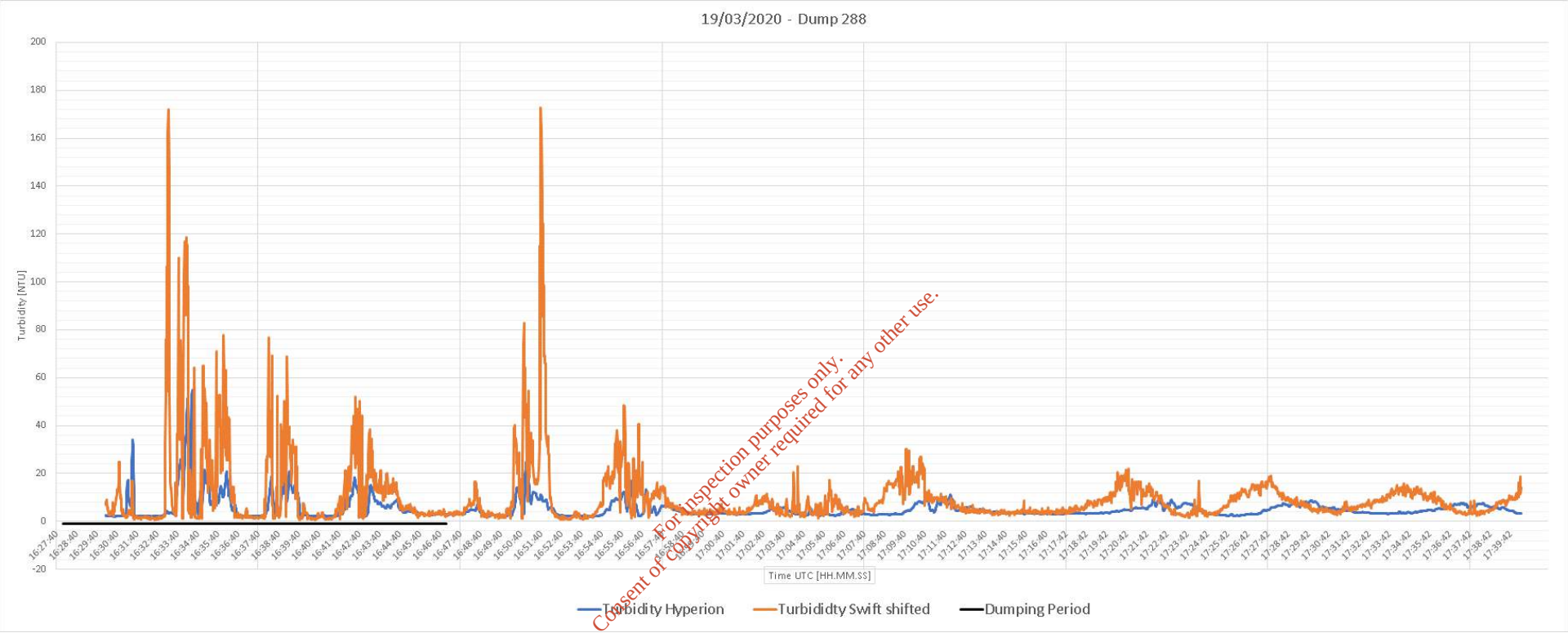

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Figure 47: Comparison of Surface and mid water turbidity values recorded during dump 288.

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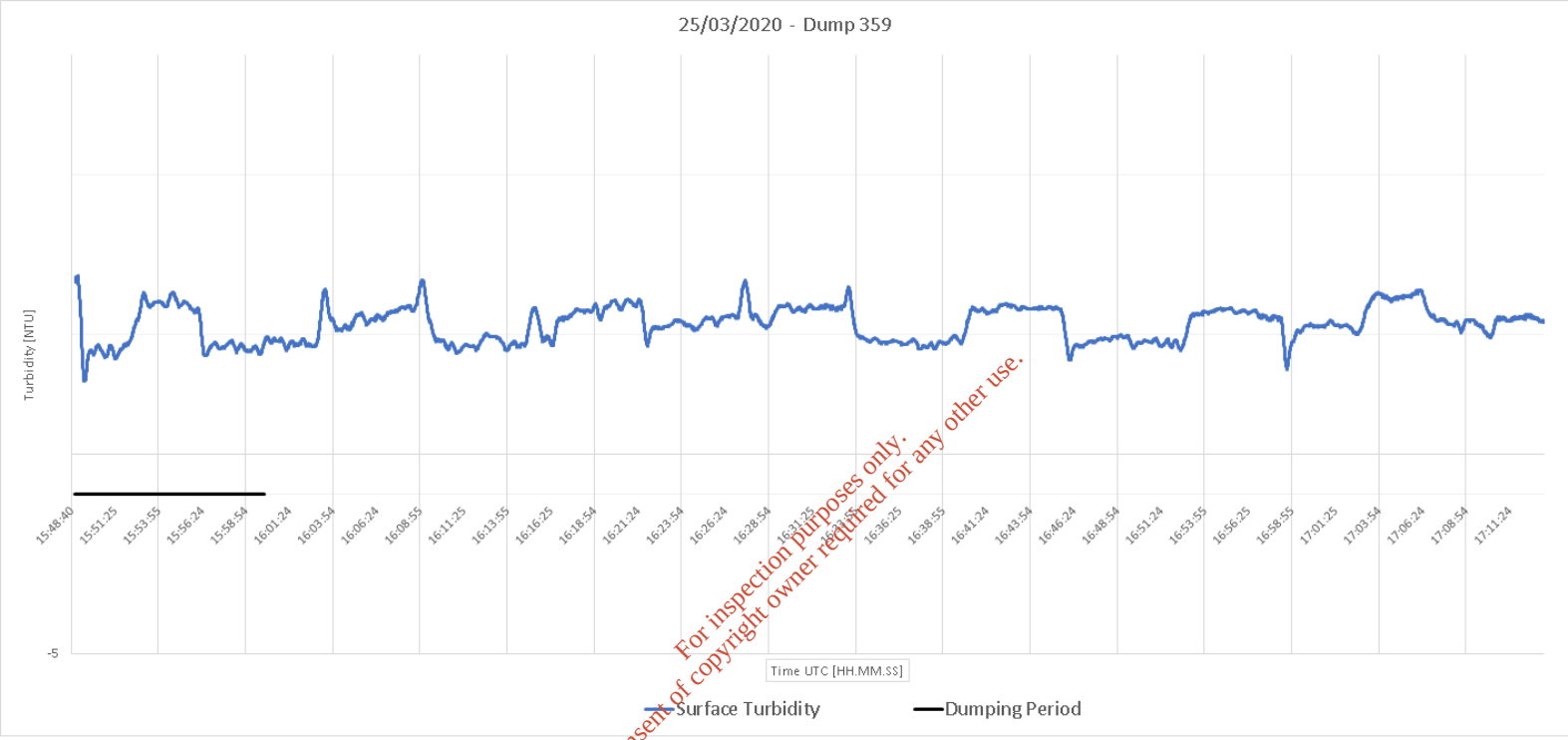

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Figure 48: Surface turbidity values recorded during dump 359.

EPA Export 28-04-2021:02:38:34

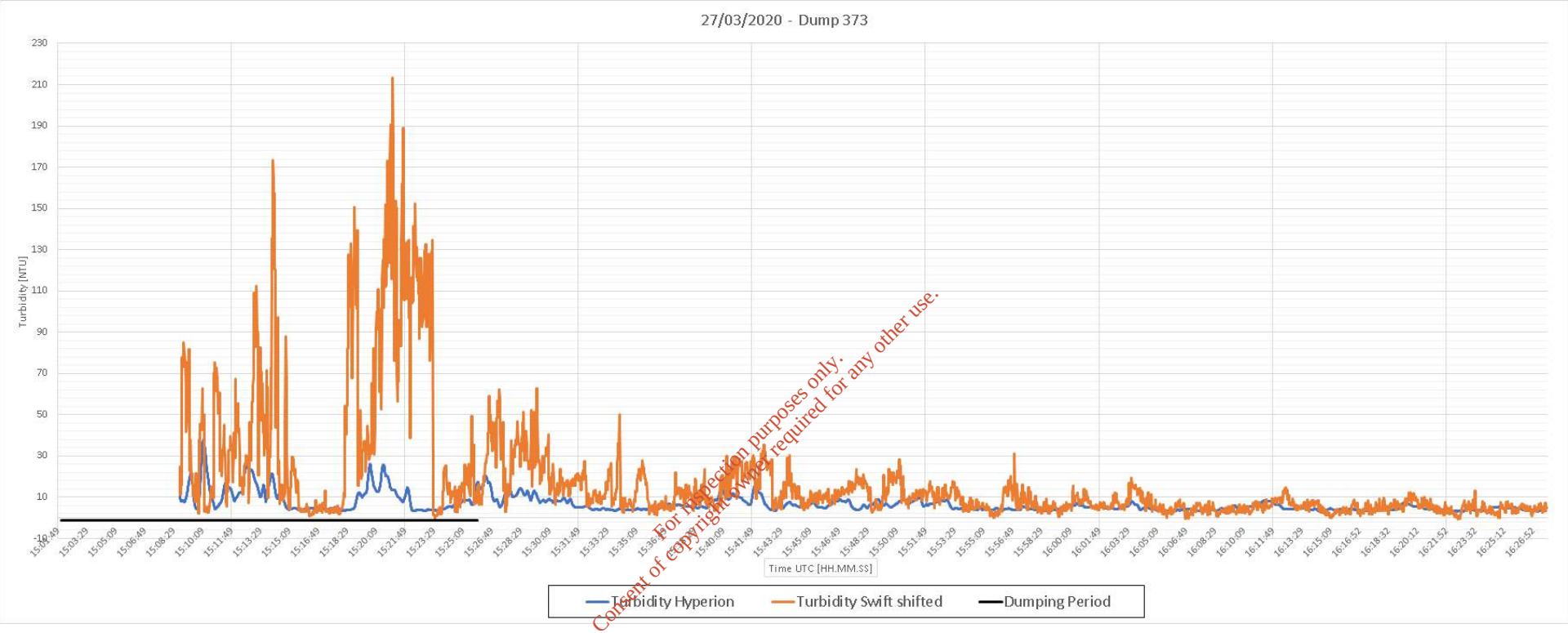

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Figure 49: Comparison of Surface and mid water turbidity values recorded during dump 373.

EPA Export 28-04-2021:02:38:34

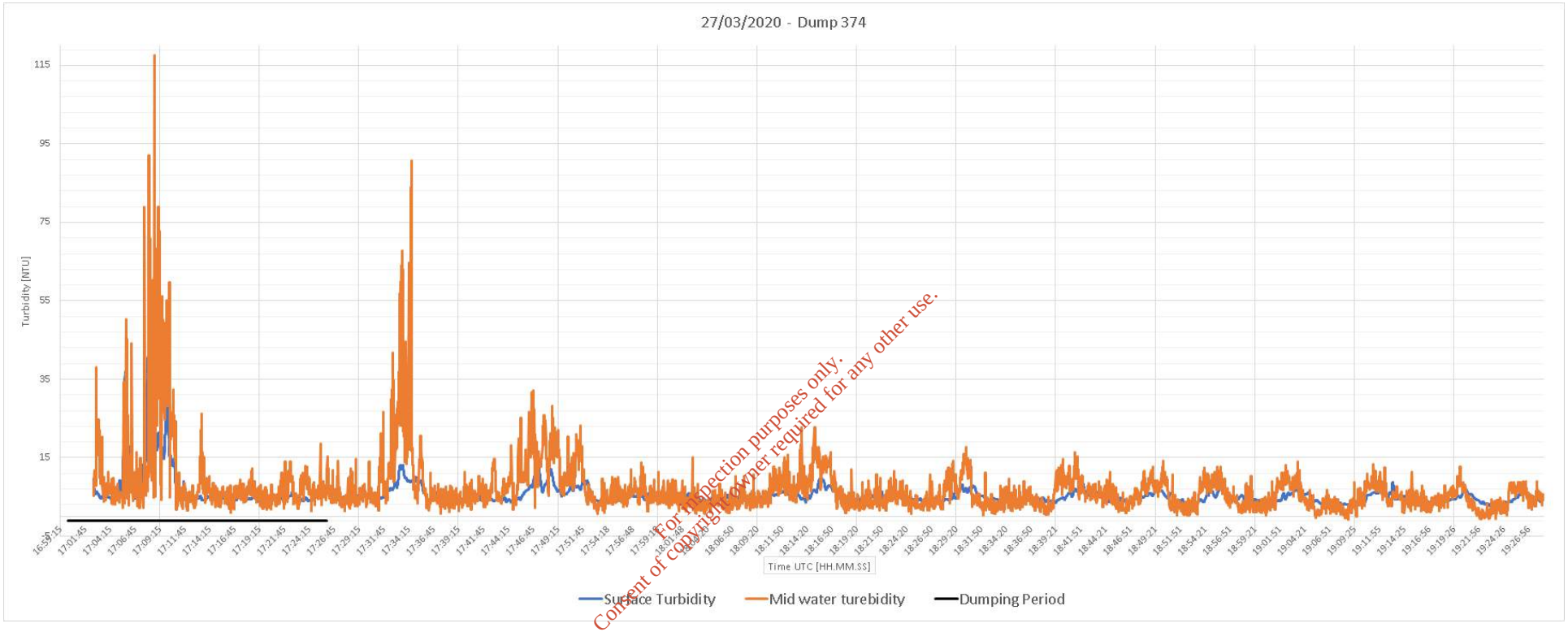

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Figure 50: Comparison of Surface and mid water turbidity values recorded during dump 374.

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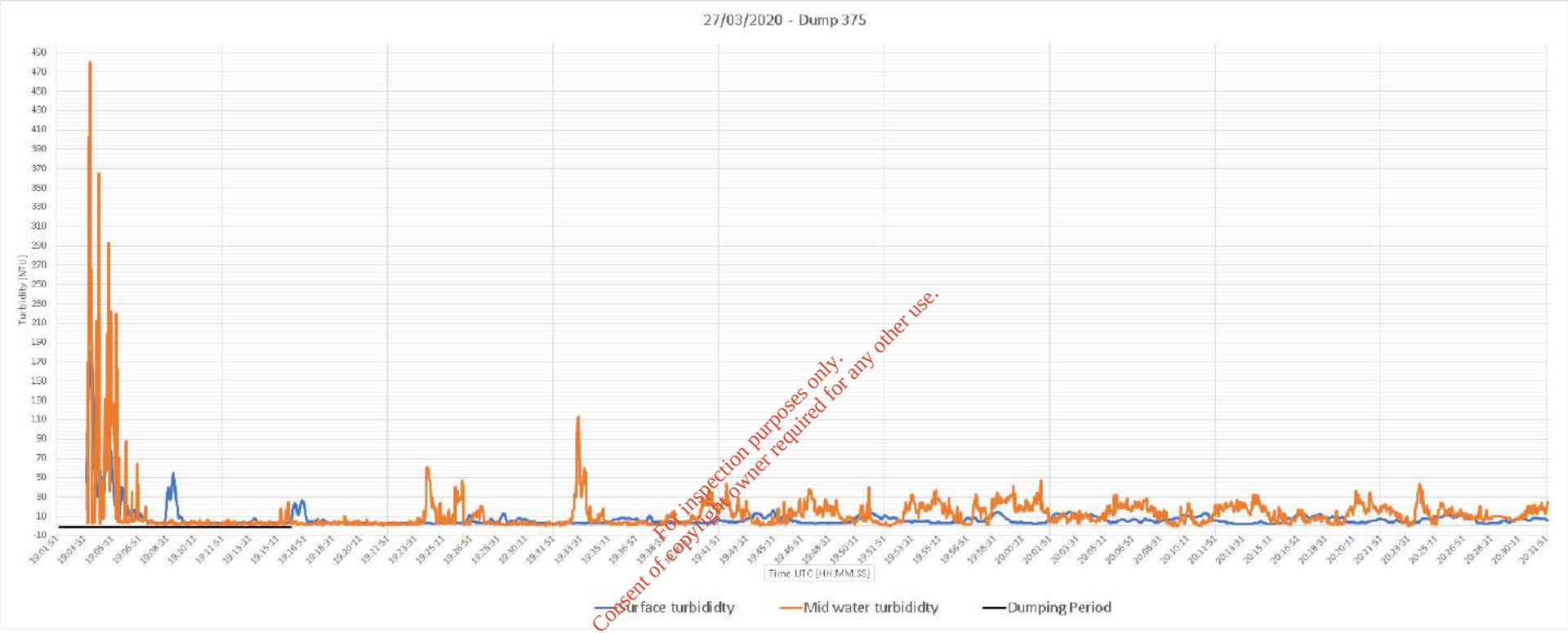

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Figure 51: Comparison of Surface and mid water turbidity values recorded during dump 375.

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The graphs clearly show large spikes in turbidity levels, when the survey is initiated, with occasional, lower peaks seen as the survey vessel travels back over the plume. However gradual flattening of the peaks occurs over time with turbidity levels dropping to background levels at both depths, indicating that the plume is dissipating.

This is further shown when the data is broken down into Average, minimum and maximum turbidity values per dump (Table 3).

Table 3: Average, minimum and maximum turbidity values recorded per dump.

	Surface turbidity [NTU]			Mid water turbidity [NTU]		
Dump #	**Average**	**Minimum**	**Maximum**	**Average**	**Minimum**	**Maximum**
231	13.7	6.7	131.1	16.5	1.9	231.8
254	N/A	N/A	N/A	13.9	4.1	149.2
266	6.4	3.4	34.6	10.5	0.5	222.2
267	6.1	2.8	31.0	16.6	1.6	194.4
268	13.8	3.6	61.5	50.8	2.6	378.0
280	5.2	3.6	12.9	9.0	3.5	36.7
281	5.4	3.4	20.0	N/A	N/A	N/A
282	4.0	2.6	10.2	12.7	2.0	46.7
283	4.9	2.4	51.2	25.1	1.2	318.6
284	2.9	2.4	4.9	4.6	1.0	67.6
285	3.9	2.7	45.9	49.1	1.3	276.2
286	3.6	2.5	14.9	5.1	1.0	88.1
287	3.4	1.8	18.8	7.5	1.0	247.9
288	5.2	12.0	55.0	9.9	0.8	172.6
373	6.7	3.1	38.1	18.4	0.1	213.2
374	5.5	2.9	41.7	6.9	0.1	117.2
375	7.0	2.2	181.3	13.1	0.5	478.0
Overall	6.2	1.8	181.3	16.9	0.1	478.0

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It can clearly be seen that the mid water turbidity readings were higher than the surface readings. This is to be expected due to the sediment dispersal and sinking immediately after the dumping activity.

Whilst very high turbidity values were recorded at both the surface (181.29 NTU) and mid water (479.94 NTU) these values were recorded close to the dredger very shortly after the sediment was dumped. It is clear to see from the subsequent data (seen in Figure 51) that the turbidity values very quickly return to background levels.

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4.3. Turbidity vertical profiles

On the 25th of March, another survey method was used. The bow mounted nephelometer was still used to record continuous data at the surface but the second nephelometer was no longer towed.

The second nephelometer was used to record turbidity data from the surface to the seabed (vertical profiles). 20 or more profiles were recorded at locations within the sediment plume. These locations were identified at intervals of no longer than 5 minutes and at sites recording levels of >10 NTU.

Figure 52 to Figure 54 on the following pages show the survey vessel track lines with the surface turbidity values represented by colour. The vertical turbidity profile locations are represented by the numbered points placed along the track lines. Some examples of these profiles are discussed in the next section.

The entirety of the vertical turbidity profiles collected are provided in Appendix B. Please note that charts on the Appendix B are interactive, by holding 'Ctrl' and clicking on any profile number you will be automatically redirected to the profile required in the Appendices folder. Due to the large size of the appendices folders, the Appendices folder is available for transfer upon request.

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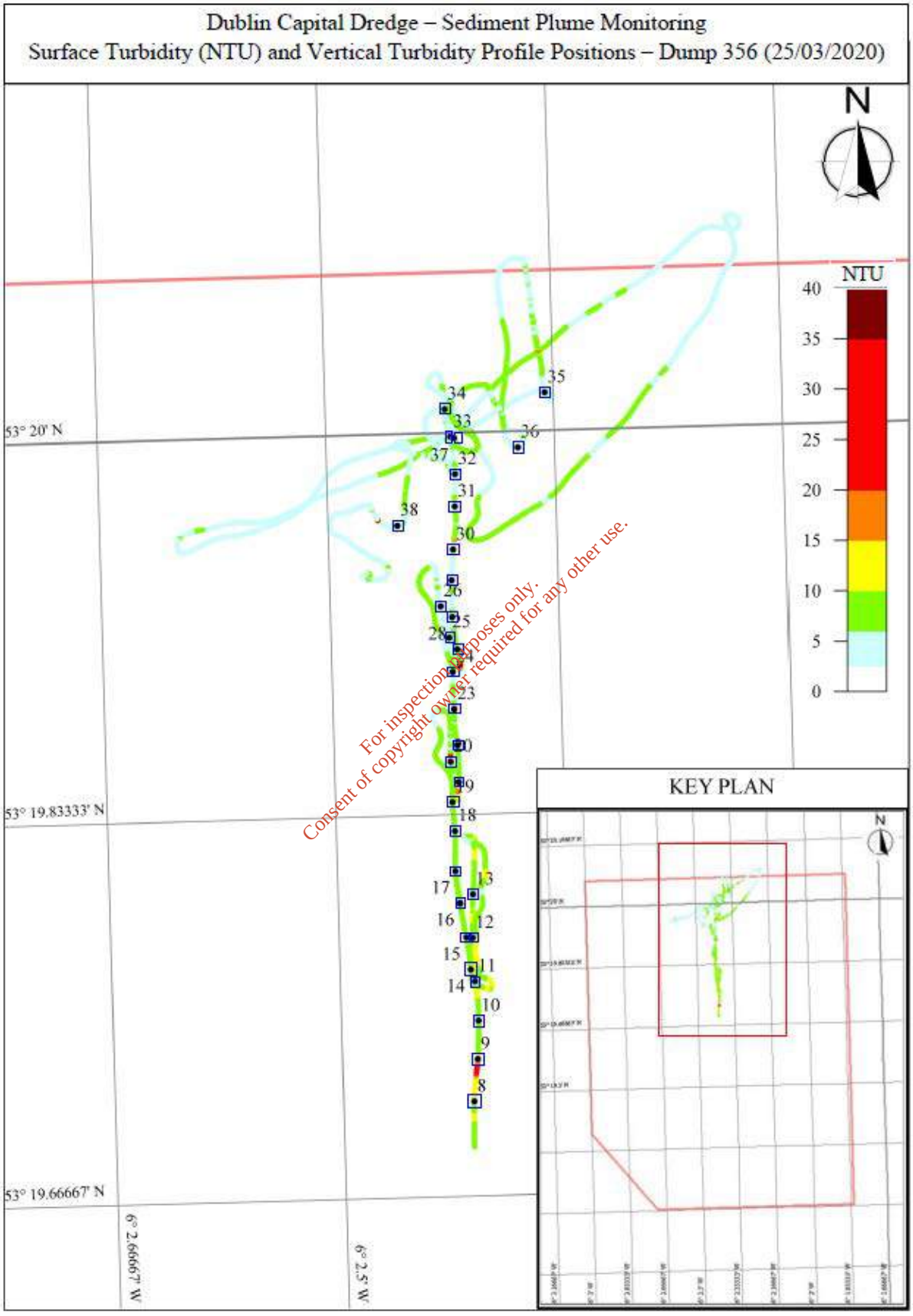

Figure 52: Dump 356 Survey track with surface turbidity [NTU] and vertical turbidity profile positions

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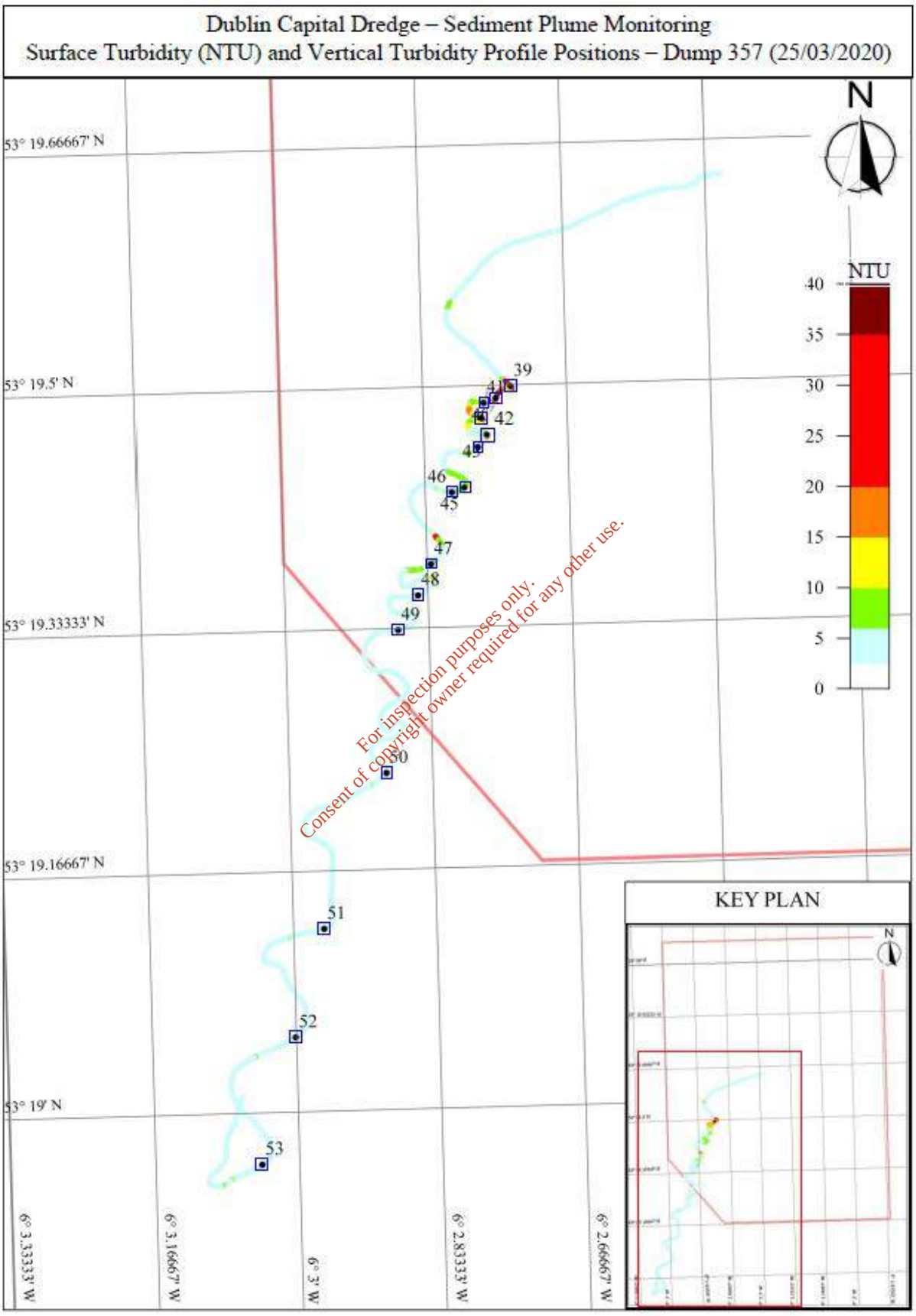

Figure 53: Dump 357 Survey track with surface turbidity [NTU] and vertical turbidity profile positions

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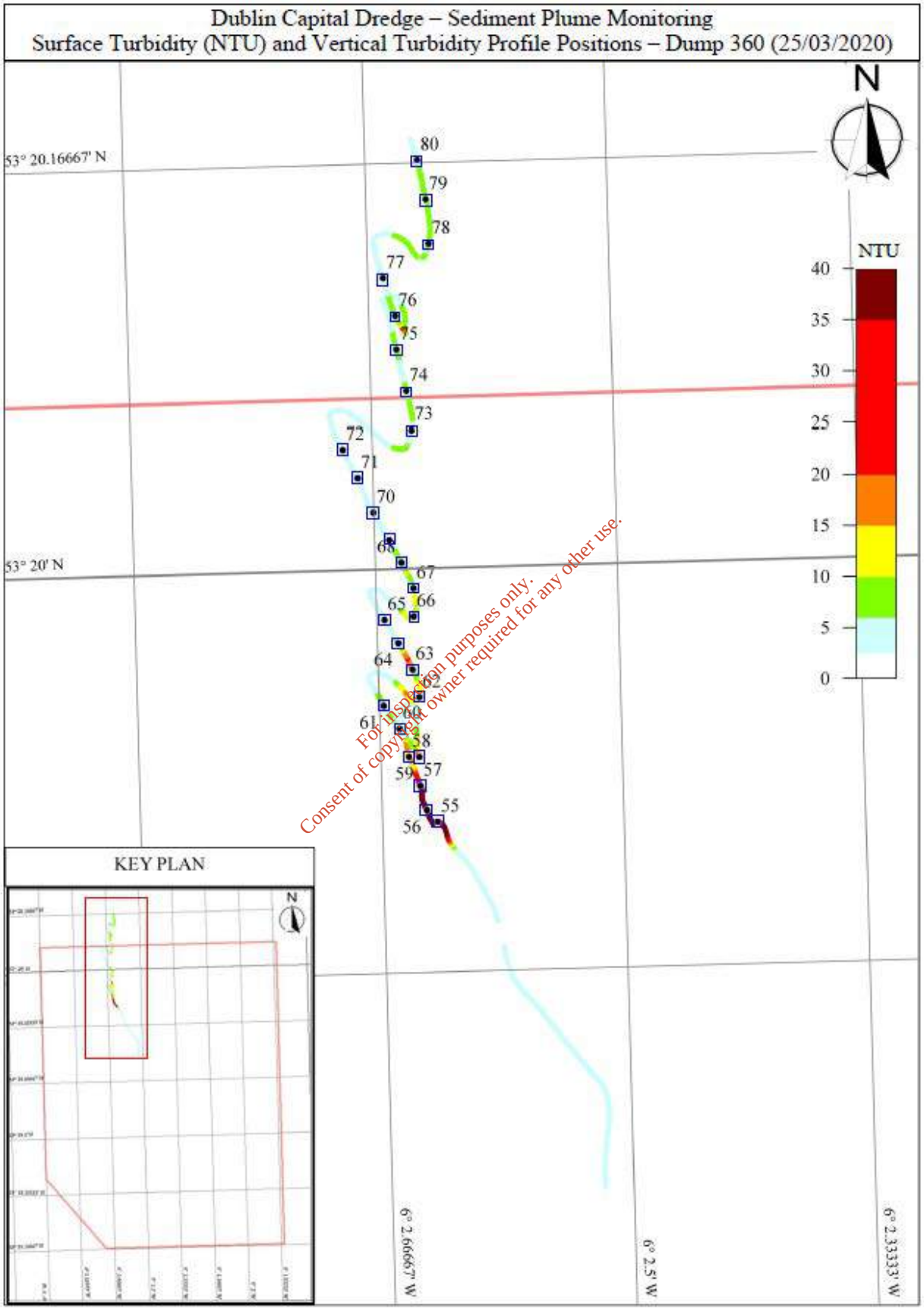

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Figure 54: Dump 360 Survey track with surface turbidity [NTU] and vertical turbidity profile positions

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The following three figures have been selected to give a representation of the 70+ profiles recorded on the 25th of March.

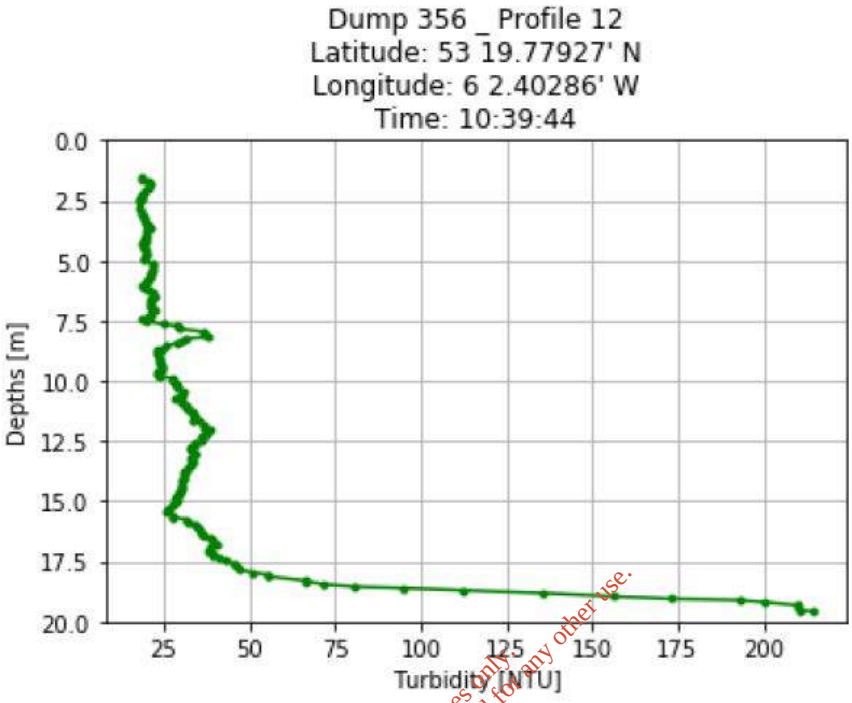

Figure 55: Vertical turbidity profile 12 collected during dump 356

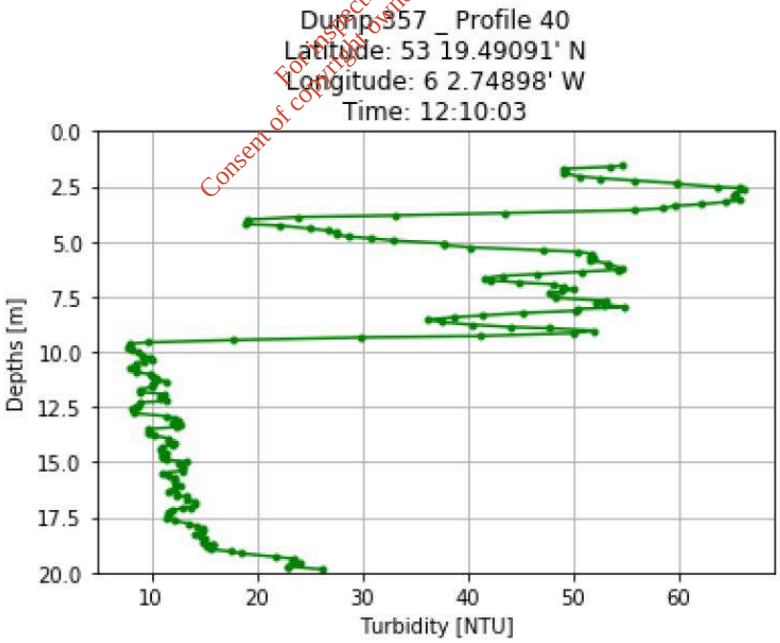

Figure 56: Vertical turbidity profile 40 collected during dump 357

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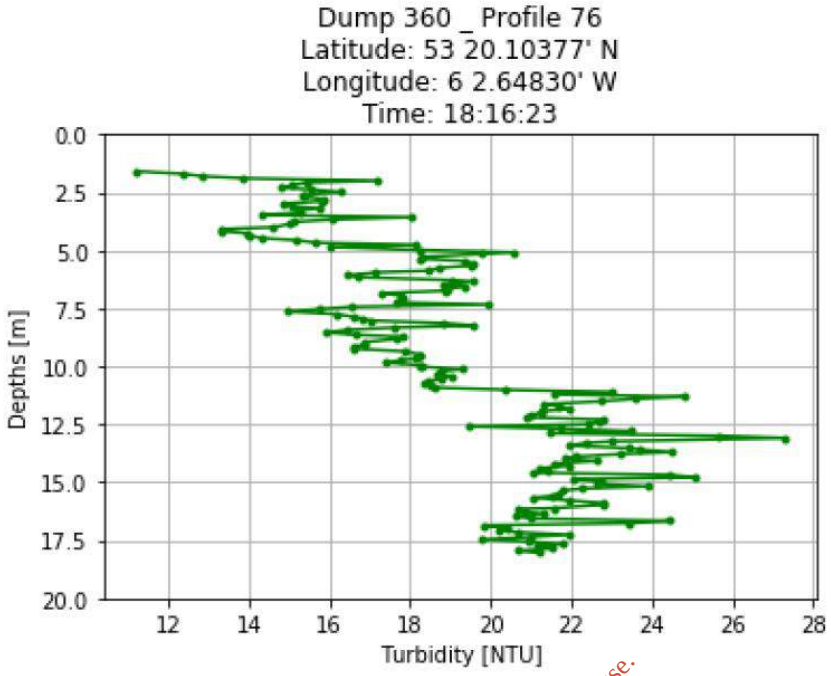

Figure 57: Vertical turbidity profile 76 collected during dump 360

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As can be seen from the figures above the turbidity varies greatly at different depths across the different dumps and times. The large 'spikes' in turbidity clearly indicate the location of the turbidity plume in the water column and shows that the turbidity plume is sinking to the seabed, with some sediment fractions sinking at a different rate (due to sediment size/weight distribution) however all indications of the plume and its visibility do dissipate over time and depth indicating that the plume is dispersing and sinking as expected.

Below, Table 4, 5 and 6 are presenting the average, minimum and maximum turbidity values per vertical profiles for dump 356, 357 and 360.

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Table 4: Average, minimum and maximum turbidity values recorded per vertical profiles - DUMP 356.

Profile #	Dump#	Average	Minimum	Maximum
8	356	95.8	15.2	327.5
9	356	45	17.3	83.3
10	356	35.1	14.5	94
11	356	42.9	17.2	190.4
12	356	37.4	17.8	214.6
13	356	64.6	16.3	337.7
14	356	51.0	22.5	296.4
15	356	34.3	18.6	118.6
16	356	32	18.2	85.8
17	356	30	14.9	105.9
18	356	29.2	13.8	92.4
19	356	39.3	11.7	124.4
20	356	27.8	2.9	72.1
21	356	24.7	19.2	71.4
22	356	21.3	13.1	60.8
23	356	32.4	14.1	56.7
24	356	22.6	11.2	34
25	356	13.4	10.2	18.1
26	356	19.4	9.4	33.3
27	356	26.7	14.7	47.3
28	356	23.1	11.8	72.7
29	356	14.7	5	21.8
30	356	19.8	13.8	34.5
31	356	26.5	11.9	59.7
32	356	28.8	9.9	85.2
33	356	19.5	9.4	30.5
34	356	22.8	8.9	43.1
35	356	17.3	6.7	42.6
36	356	17.4	10.9	37.9
37	356	15	10.9	22.7
38	356	15.1	9.4	25.4
Overall		94.9	18.1	337.7

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Table 5: Average, minimum and maximum turbidity values recorded per vertical profiles - DUMP 357.

Profile #	Dump#	Average	Minimum	Maximum
38	357	15.1	9.4	25.3
39	357	16.4	7.2	61.7
40	357	27.9	7.7	66.2
41	357	21.7	8.7	39.7
42	357	16.1	6.6	28.9
43	357	21.3	8.6	30.6
44	357	13.2	6.6	23.4
45	357	22.7	8.3	25.9
46	357	13.2	7.7	26.5
47	357	14.1	8.5	21.1
48	357	13.4	7.8	23.8
49	357	13.0	5.1	28.5
50	357	9.5	7.4	17.5
51	357	10.8	7.4	21.4
52	357	17.9	5.6	34.1
Overall		16.4	5.1	66.2

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Table 6: Average, minimum and maximum turbidity values recorded per vertical profiles - DUMP 360.

Profile #	Dump#	Average	Minimum	Maximum
54	360	11.5	9.3	20.1
56	360	75.7	5.6	139.9
57	360	58.4	6.7	98.2
58	360	11.2	5.5	31.7
59	360	35.6	21.3	52.5
60	360	41.0	6.1	57.8
61	360	35.7	12.0	66.7
62	360	21.1	8.6	63.7
63	360	37.8	19.1	46.1
64	360	24.0	8.7	38.2
65	360	10.3	5.8	25.6
66	360	31.1	21.8	50.6
67	360	25.6	10.6	43.5
68	360	28.1	13.3	38.6
69	360	15.7	6.4	35.1
70	360	16.2	6.2	24.4
71	360	10.4	5.9	21.7
72	360	9.5	5.8	16.9
73	360	21.5	11.4	38.9
74	360	23.2	13.2	47.1
75	360	20.0	7.2	38.9
76	360	18.8	9.5	27.3
77	360	13.3	6.3	22.3
78	360	14.5	11.5	21.0
79	360	22.7	27.7	27.7
80	360	18.2	28.2	8.4
Overall		25.1	5.5	139.9

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5. Conclusion

The data collected provides evidence that the dumping of the sediment at the dump location had no measurable long term effect on turbidity outside the dumpsite or even within the dump site within a very short time period of the dredger releasing its load.

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6. Appendices

Appendices are in a folder sent separately from this report. Due to the large size of the folder, it is available for transfer upon request.

6.1. Appendix A – Equipment specs

- Appendix A1 (Swiftplus – Midwater turbidity and Vertical turbidity profiles)
- Appendix A2 (Hyperion – surface turbidity)
- Appendix A3 (VS330 –GNSS position)

6.2. Appendix B – Vertical turbidity profiles

- Appendix B1 (Dump 356)
- Appendix B2 (Dump 357)
- Appendix B3 (Dump 360)

6.3. Appendix C - Turbidity data along tracklines Charts

- Appendix C1 (Midwater turbidity along tracklines - CHARTS)
- Appendix C2 (surface turbidity along tracklines - CHARTS)

6.4. Appendix D - Turbidity data (excel format)

- Appendix D1 (Surface and Mid-water turbidity -continuous data)
- Appendix D2 (Vertical turbidity profile data)

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Appendix 11 - RPS Plume Validation Report

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ALEXANDRA BASIN REDEVELOPMENT (ABR) PROJECT

CAPITAL DREDGING PROGRAMME

Sediment Plume Validation Modelling

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IBE1686 Sediment Plume
Validation Modelling
Final
9 September 2020

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REPORT

Document status

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Final	Circulation to OEE	KC	AKB	AGB	09/09/2020

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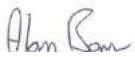
Dr A G Barr  9 September 2020

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Prepared by:

RPS

Kristopher Calder BSc (Hons) MSc C.Sci MCIWEM C.WEM AMICE
Associate - Water Environment and Flood Risk Management

Elmwood House
74 Boucher Road, Belfast
Co. Antrim BT12 6RZ

T +44 2890 667 914
E kristopher.calder@rpsgroup.com

Prepared for:

Dublin Port Company

Eamon McElroy
Port Engineer

Dublin Port Centre
Alexandra Road, Dublin 1

T 01 8876000
E emcelroy@dublinport.ie

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Contents

1 INTRODUCTION 1
1.1 Background 1
1.1.1 Review of Sediment Plume Monitoring undertaken during the First Winter Capital Dredging Campaign (October 2017 – March 2018) in Dublin Bay 1
1.1.2 Change in Scope – Proposed Sediment Plume Monitoring within the inner Liffey channel 2
1.1.3 Sediment Plume Monitoring undertaken during the Third Winter Capital Dredging Campaign (October 2019 – March 2020) within the inner Liffey channel 3

2 OVERVIEW OF THE DUMPING AT SEA CAMPAIGN 4
2.1 Dredging programme 4
2.2 Equipment 4

3 OVERVIEW OF SEDIMENT PLUME MONITORING PROGRAMME 5
3.1 Measuring Turbidity 6

4 COMPUTATIONAL MODELS 9
4.1 Modelling Overview 9
4.2 Computational Models and Data Sources 9
4.3 Characterisation of Dumping Material 11

5 REVIEW OF PARAMETERS USED FOR THE ABR ENVIRONMENTAL ASSESSMENT 12

6 OUTPUT FROM SEDIMENT PLUME MODELLING 16
6.1 Sediment Plume Envelopes 16

7 CONCLUSIONS 25

8 REFERENCES 26

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Appendices

Appendix A Hydromaster Survey Monitoring Tracks and Comparison with Model Simulations

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1 INTRODUCTION

1.1 Background

Dublin Port Company (DPC) was granted a Dumping at Sea Permit (S0024-01) by the Environmental Protection Agency (EPA) on 13th September 2016 for the loading and dumping at sea of dredged material arising from capital dredging as part of the Alexandra Basin Redevelopment (ABR) Project. The permit sets out in detail the conditions under which DPC will carry out loading and dumping at sea operations and the required monitoring programmes.

Condition 4.11 of the Dumping at Sea Permit sets out the sediment plume monitoring at the dump site required to enable the horizontal and vertical extent of the sediment plume generated by the permitted dumping activity at different stages of the tide to be measured.

> *"The permit holder shall carry out sediment plume monitoring in the vicinity of the dumping activity during the first dumping campaign and thereafter as may be required by the Agency."* Condition 4.11.1
>
> *Furthermore, "The results of the sediment plume monitoring, together with the results of the hydrographic monitoring, shall be used to validate the sediment transport model presented in Appendix C: Coastal Process Modelling to the Natura Impact Statement submitted as part of the application."* Condition 4.11.3

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In response to this statutory requirement, DPC commissioned Techworks Marine Ltd to undertake a comprehensive sediment plume monitoring programme and RPS to undertake a modelling validation study during the first winter dredging campaign (October 2017 to March 2018). The results of this study are presented in the Dumping at Sea Permit S0024-01 Annual Environmental Report 2017.

1.1.1 Review of Sediment Plume Monitoring undertaken during the First Winter Capital Dredging Campaign (October 2017 – March 2018) in Dublin Bay

The first winter dredging capital dredging campaign commenced on 22nd October 2017 and Techworks Marine Ltd undertook their first sediment plume monitoring survey on 27th October 2017 whilst loading and dumping activity was taking place.

The survey was undertaken in full compliance with methodology agreed with the EPA. Turbidity was measured close to the water surface using a meter attached to a small craft (RIB). The location of the turbidity transects were designed to record the full extent of the dredge plume, beyond the footprint of the dump site.

The recorded turbidity levels at 1m below the surface did not differ within the dumping area and in adjacent areas outside the dumping site or at a background site. The results therefore showed that the released dredge spoil did not create a significant dredge plume within the surface waters. This suggests that the dredged material fell rapidly towards the seabed.

All loading and dumping activity during the first winter capital dredging season was confined to one section of the navigation channel and fairway within Dublin Bay (AER 2017, Appendix 2.2). The dredged material is predominately fine sand throughout the dredge area so the behaviour of any sediment plume arising from the dumping operations was expected to be similar for all loading and dumping trips.

Based on the results of the first sediment plume monitoring survey, it was clear that that the monitoring programme needed to be adapted in order to gain a better understanding of the dispersion and fate of marine sediments during dumping operations.

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Techworks Marine Ltd therefore designed an adapted dredge plume monitoring programme that measured in-situ turbidity depth profiles at nine locations in the vicinity of the dump site and at a control site. A survey based on this technique took place on 4th December 2017 during loading and dumping operations.

Again, the recorded turbidity levels were low and no significant differentiation could be made between turbidity levels recorded at the dump site and at the background, control site. Techworks Marine Ltd concluded that sediment appears to settle rapidly and proximally to the release point within the dumping site.

At this point, RPS undertook model simulations of the dredge trips that coincided with the dredge plume monitoring surveys. The results are reported in the Annual Environmental Report (AER) 2017 (pages 75 – 84). The model simulations showed that the sediment was predicted to settle rapidly and proximally to the release point within the dumping site in agreement with the survey results.

Techworks Marine Ltd determined that there was no further scientific value in undertaking further plume monitoring surveys during the first winter capital dredging season. This was because that the dredging operations were confined to one section of the navigation channel and fairway within Dublin Bay and the dredged material was predominately a fine sand throughout the dredge area. As such, the behaviour of any sediment plume arising from the dumping operations was expected to be similar for all loading and dumping trips.

1.1.1.1 Conclusions

The following conclusions can be drawn from the review of Sediment Plume Monitoring undertaken during the First Winter Capital Dredging Campaign (October 2017 – March 2018):

- A sediment plume monitoring programme was established in full compliance to the monitoring protocols agreed with the EPA.
- The results of the first sediment plume monitoring survey showed that the released dredge spoil did not create a significant dredge plume within the surface waters. This suggests that the dredged material fell rapidly towards the seabed.
- Based on the results of the first sediment plume monitoring survey, it was clear that that the monitoring programme needed to be adapted in order to gain a better understanding of the dispersion and fate of marine sediments during dumping operations.
- An adapted dredge plume monitoring programme was developed which measured in-situ turbidity depth profiles at nine locations in the vicinity of the dump site and at a control site. Again, the recorded turbidity levels were low and no significant differentiation could be made between turbidity levels recorded at the dump site and at the background, control site. The sediments appear to settle rapidly and proximally to the release point within the dumping site.
- Model simulations of the dredge trips that coincided with the dredge plume monitoring surveys showed that the sediment was predicted to settle rapidly and proximally to the release point within the dumping site in agreement with the survey results.
- There was no further scientific value in undertaking further plume monitoring surveys during the first winter capital dredging season, given the dredging operations were confined to one section of the navigation channel and fairway within Dublin Bay. In addition, the dredged material was predominately a fine sand throughout the dredge area so the behaviour of any sediment plume arising from the dumping operations was expected to be similar for all loading and dumping trips.

1.1.2 Change in Scope – Proposed Sediment Plume Monitoring within the inner Liffey channel

Schedule B.2.4 of the Dumping at Sea Permit requires the Permit Holder to undertake sediment plume monitoring during the first dumping campaign and thereafter as may be required by the Agency.

The AER 2017 sets out the results of the sediment plume monitoring undertaken during the first dumping campaign. The results, as summarised above, demonstrate that for loading and dumping activity within Dublin Bay, sediments settle rapidly and proximally to the release point within the dumping site. This is consistent with the findings of computational modelling (Section 10.6 of the AER 2017).

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Based on the results of the sediment plume monitoring undertaken during the first dumping campaign, DPC believes that further sediment plume monitoring for loading and dumping of sediments sourced from the navigation channel and fairway within Dublin Bay would be of no additional scientific value.

DPC however proposed that further sediment plume monitoring and model validation would be undertaken when dredging commenced within the inner Liffey channel. The material to be dredged in this area contains a highly silt content and model simulations showed that the silts where expected to be dispersive in nature during dumping operations.

In accordance with Condition 4.4 of Dumping at Sea Permit S0024-01, DPC proposed this amendment to the scope of the sediment plume monitoring requirements to the EPA, which was subsequently accepted.

1.1.3 Sediment Plume Monitoring undertaken during the Third Winter Capital Dredging Campaign (October 2019 – March 2020) within the inner Liffey channel

Capital dredging within the inner Liffey channel (Dublin Harbour) took place in February - March 2020 during third winter dredging capital dredging campaign (October 2019 – March 2020).

DPC appointed Hydromaster Ltd to undertake a comprehensive sediment plume monitoring survey during the dumping operations (March 2020). Hydromaster's monitoring report is presented separately (Hydromaster, 2020).

DPC appointed RPS to undertake a modelling validation study using the results of the sediment plume monitoring survey undertaken by Hydromaster.

This technical report describes the numerical modelling programme undertaken using results of the sediment plume monitoring, together with the results of hydrographic monitoring, to validate the sediment transport model presented in Appendix C: Coastal Process Modelling to the Natura Impact Statement submitted as part of the application.

The location of the licenced offshore dump site at the approaches to Dublin Bay, west of the Burford Bank is where permitted dumping activities took place is presented in Figure 1.1.

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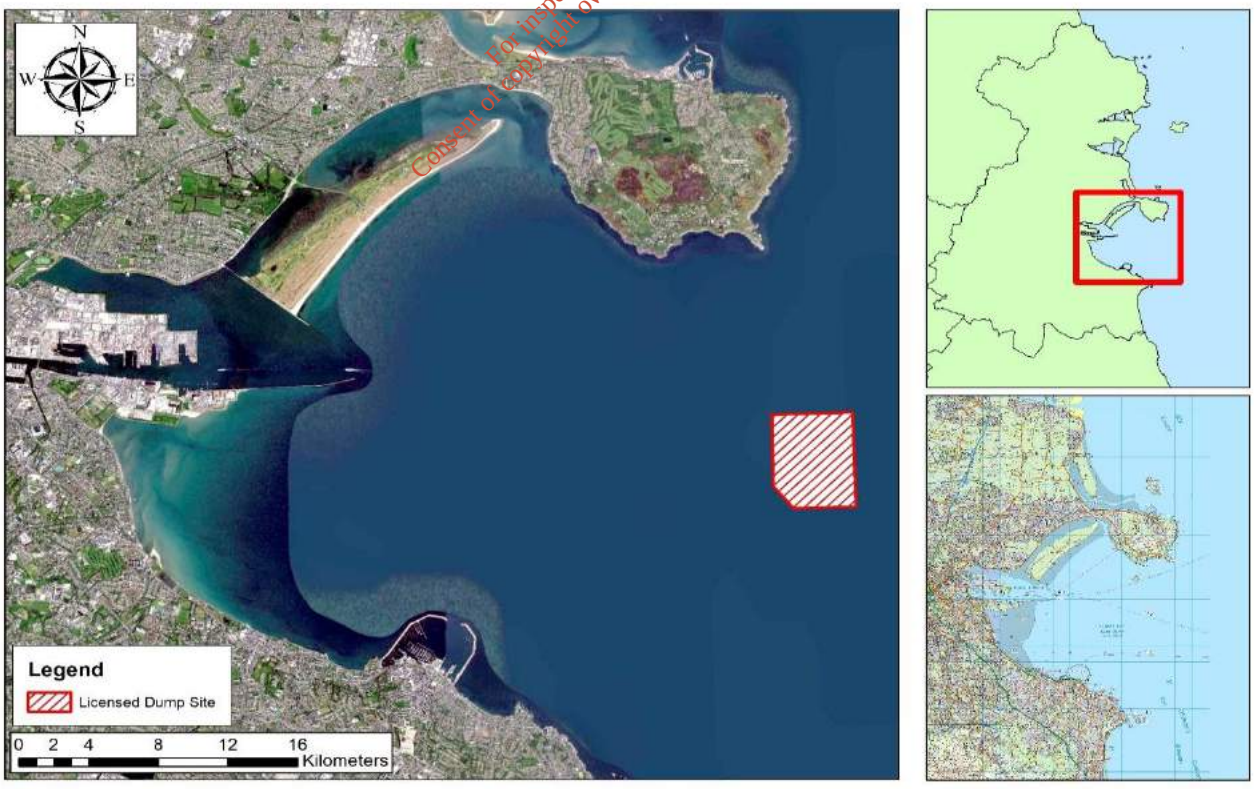

Figure 1.1: Location of the licenced offshore dump site at the approaches to Dublin Bay, west of the Burford Bank

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2 OVERVIEW OF THE DUMPING AT SEA CAMPAIGN

2.1 Dredging programme

Based on detailed loading and dumping logs provided by the dredging contractor, the capital dredging campaign in March 2020 comprised 210 individual trips between 09/03/2020 – 28/03/2020 and involved the loading and dumping of 218,686 Total Dry Solids. The quantity of material disposed of per trip averaged 1,041T TDS (*n* =210, *SD* =126 TDS). No overspill of dredged material was permitted within the inner Liffey channel.

Owing to the turbulent nature of the dredging process it was not possible to d characterise and quantity the composition of dredge material during each trip. However, it was reported that the dredge material was generally dominated by silt and sand material with a smaller fraction of gravel.

2.2 Equipment

The dredging and disposal activities under Dumping at Sea Permit S0024-01 were undertaken by Irish Dredging a subsidiary of Royal Boskalis Westminster N.V. The vessel used was the purpose built 4,500m^3 trailing suction hopper dredger "Shoalway" which is illustrated in Figure 2.1 below. This 90m vessel was specifically designed for dredging operations within harbour environments.

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Figure 2.1: The trailing suction hopper dredger "*Shoalway*" used for the March 2020 capital dredging campaign within the inner Liffey channel

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3 OVERVIEW OF SEDIMENT PLUME MONITORING PROGRAMME

DPC commissioned Hydromaster Ltd to undertake a detailed sediment plume monitoring programme to gather robust data, representative of a range of tidal conditions, which could be used to validate computational plume simulations of the dumping activity. A total of 20 trips were monitored by Hydromaster as summarised in Table 3.1.

Table 3.1: Summary of the 20 dumping trips monitored by Hydromaster between 14th March and 27th March 2020

Date	Dump Trip	Start of Dump Activity	Dump Duration (min)	Turbidity Survey data available?	Corresponding detailed dredge log data available?
14/03/2020	231	17:44:42	11	✓	✓
16/03/2020	254	11:07:52	17	Mid layer data only	✓
17/03/2020	266	09:18:20	13	✓	✓
	267	10:57:09	16	✓	✓
	268	12:40:12	17	✓	✓
18/03/2020	280	08:42:53	15	✓	✓
	281	10:22:01	13	Surface layer data only	✓
	282	12:16:22	14	Surface layer data only	✓
	283	13:41:42	19	✓	✓
19/03/2020	284	08:42:05	17	✓	✗
	286	11:51:01	18	✓	✗
	287	14:12:02	14	✓	✗
	288	16:29:44	19	✓	✗
25/03/2020	356	10:36:15	11	✓	✗
	357	12:08:52	14	✓	✗
	360	17:46:03	17	✓	✗
27/03/2020	373	15:08:51	24	✓	✓
	374	17:02:36	26	✓	✓
	375	19:03:41	14	✓	✓

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Note: Only the total dredge quantity per trip was available for 19th and 25th March 2020.

It should be noted that the turbidity measurements show how cloudy/clear the seawater is and is measured in Nephelometric Turbidity Units (NTU). An assessment of sediment samples taken from the inner Liffey channel and Dublin Bay identified a clear relationship between the Total Suspended Solids (TSS) within the seawater and Turbidity (NTU) (RPS, 2018). As shown in Figure 3.1, this assessment found that seawater dominated by silts and sands had a NTU to TSS conversion factor of *c.* 2.5 and 1.5 respectively.

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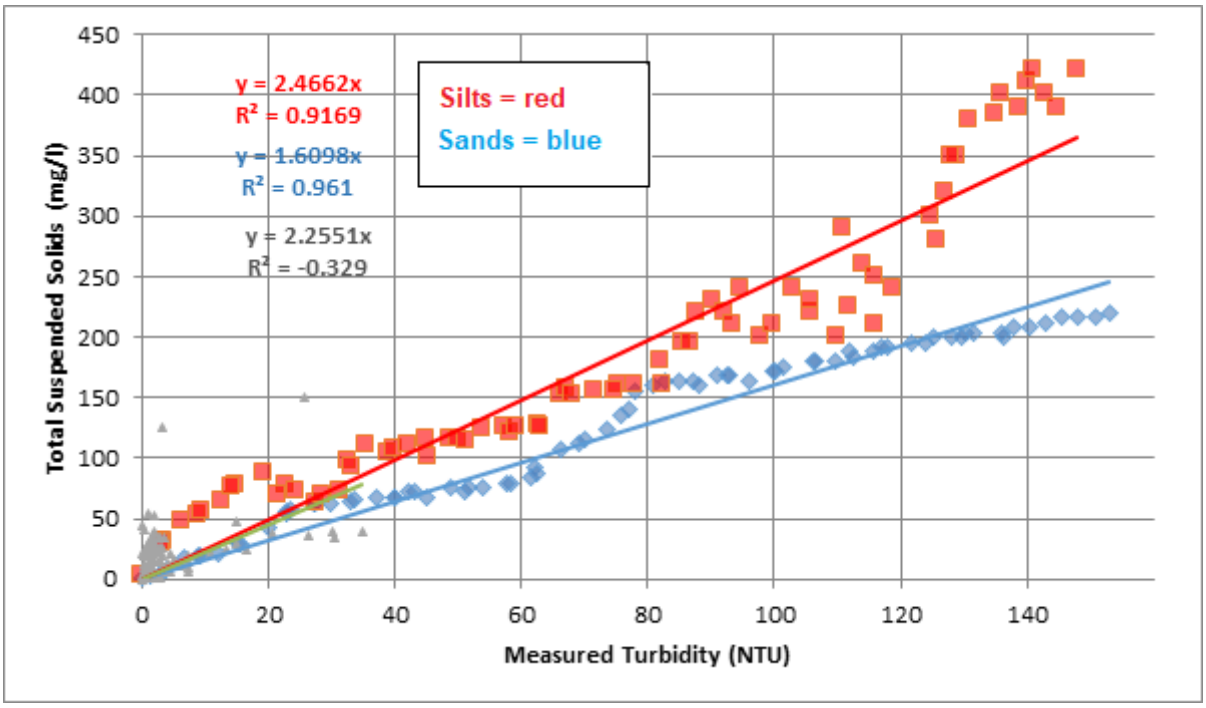

Figure 3.1: Relationship between TSS and NTUs for sand and silt dominated seawater within the Inner Liffey Channel and Dublin Bay (RPS, 2018)

3.1 Measuring Turbidity

Hydromaster utilised a vessel equipped with two turbidity monitors to track sediment plumes arising from the dumping of dredged spoil from the inner Liffey channel.

The survey vessel tracked back and forth across the plume until the turbidity monitors indicated background levels. This enabled the vessel to record spatial and temporally varying data across the plume envelope and produce turbidity tracks similar to the one presented in Figure 3.2 overleaf. The colour scale represents a "heatmap" with highest turbidity values (plume) shown by red and lowest turbidity values shown by blue.

Turbidity data was recorded at the surface and mid-point of the water column for most of the events summarised in Table 3.1 except for event 254 during which an instrumentation failure meant data could only be recorded at the mid-point. No mid layer data was recorded for events 281 and 285 due to a similar issue. Using this approach it was possible to produce plots to show the range of turbidity values between the surface and mid-points of the water column as shown in Figure 3.3.

It is important to note that each data point within this plot represents a turbidity measurement at a different location and at a different moment of time. The data is however very useful in showing the movement and rate of dispersion of the sediment plume.

This data was supported by turbidity measurements recorded at four fixed monitoring buoy locations as shown in Figure 3.4 where turbidity was recorded close to the surface, at mid-depth and close to the seabed.

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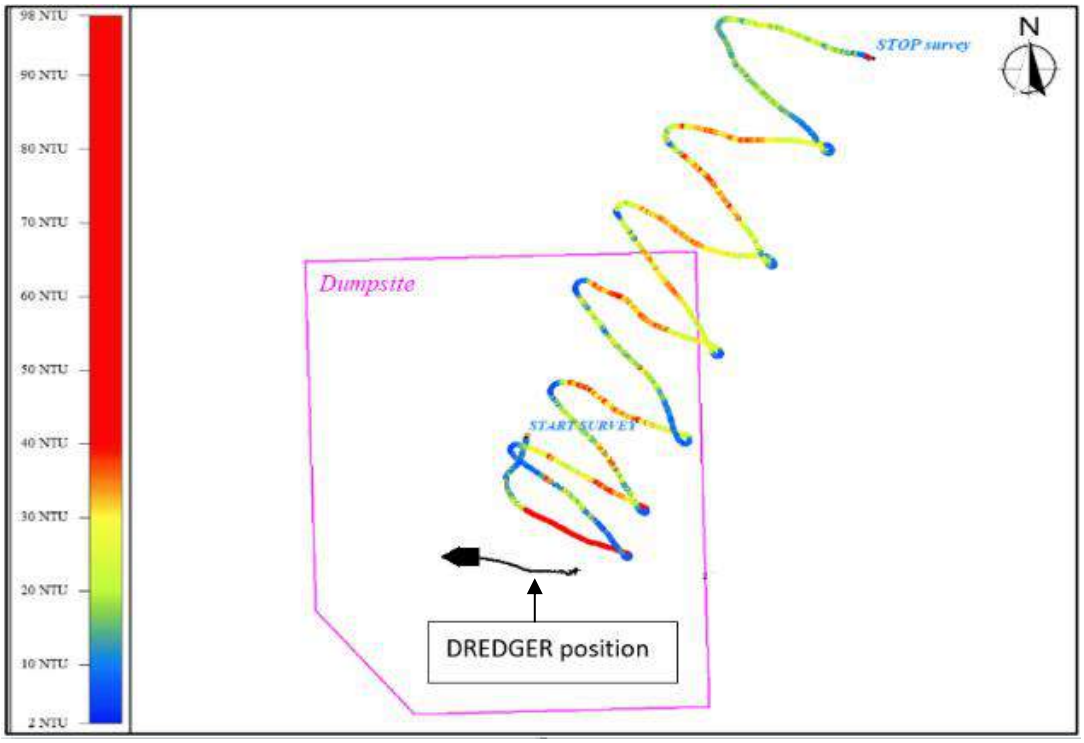

Figure 3.2: Example of a plume survey track with turbidity displayed as NTUs

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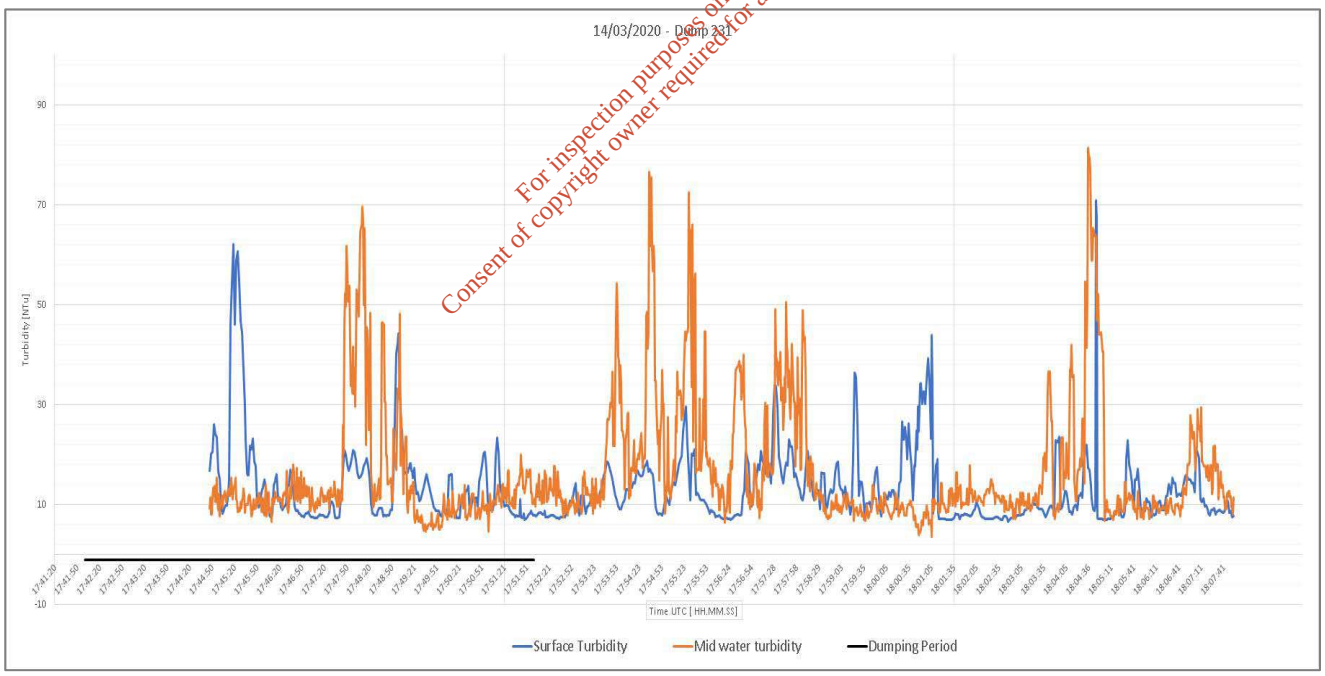

Figure 3.3: Example turbidity readings at the surface and mid-point of the water column during Dump Trip 231

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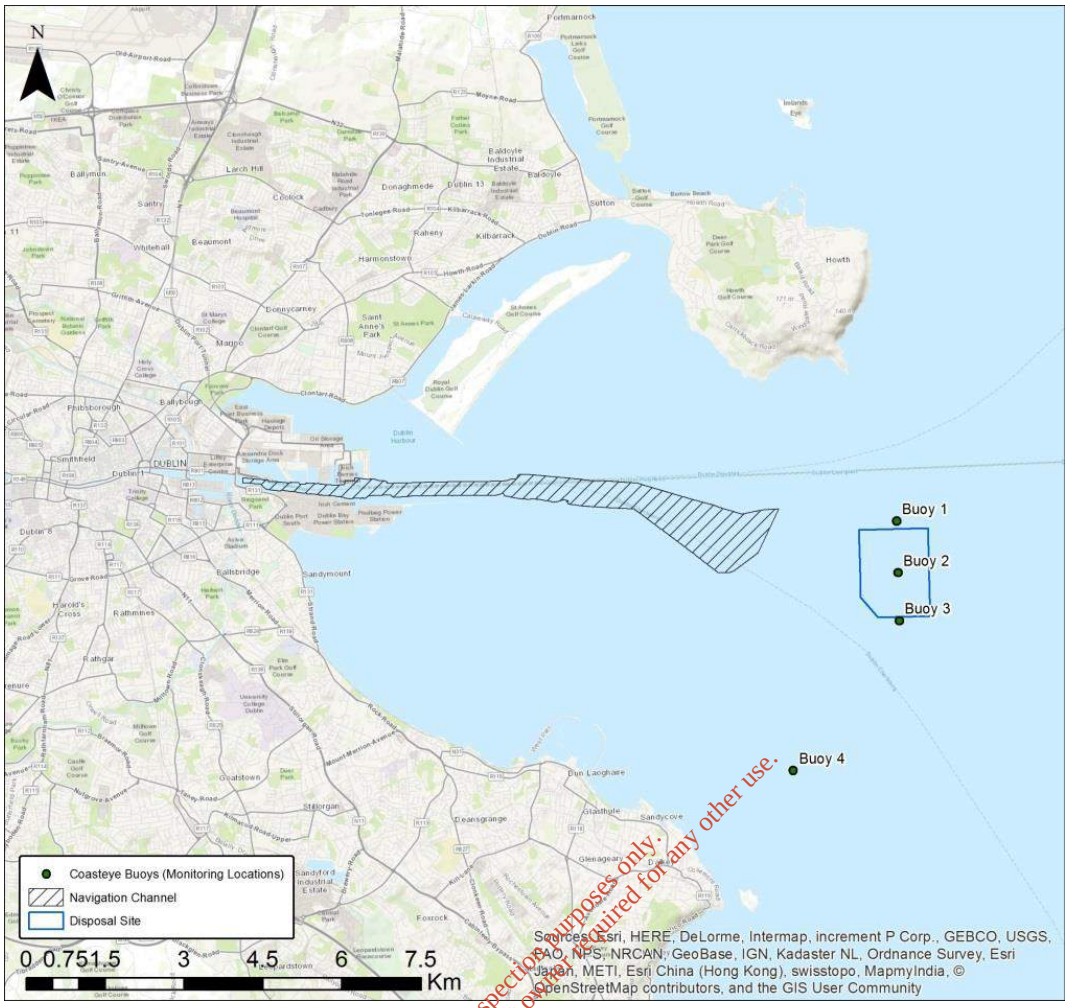

Figure 3-4: Locations of the Monitoring Buoys at the Dump Site

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4 COMPUTATIONAL MODELS

4.1 Modelling Overview

RPS used the MIKE 21 hydrodynamic numerical modelling software package developed by DHI, to undertake the sediment plume simulations presented in Appendix C: Coastal Process Modelling to the Natura Impact Statement submitted as part of the application. The same models were used in the model validation process.

The MIKE system is a state of the art, industry standard, modelling system, based on a flexible mesh approach. This software was developed for applications within oceanographic, coastal and estuarine environments.

A brief synopsis of the MIKE system and modules used for this assessment is outlined below:

- **MIKE 21 FM system** - Using this flexible mesh modelling system, it was possible to simulate the mutual interaction between currents, waves and sediment transport by dynamically coupling the relevant modules in two dimensions.
  - **The Hydrodynamic (HD) module** - This module is capable of simulating water level variations and flows in response to a variety of forcing functions in lakes, estuaries and coastal regions. The HD Module is the basic computational component of the MIKE 21 Model system providing the hydrodynamic basis for the Sediment Transport and Spectral Wave modules. The Hydrodynamic module solves the two-dimensional incompressible Reynolds averaged Navier-Stokes equations subject to the assumptions of Boussinesq and of hydrostatic pressure. Thus the module consists of continuity, momentum, temperature, salinity and density equations. In the horizontal domain both Cartesian and spherical coordinates can be used.
  - **The Sediment Transport module** - The Sediment Transport Module simulates the erosion, transport, settling and deposition of cohesive sediment in marine and estuarine environments and includes key physical processes such as forcing by waves, flocculation and sliding. The module can be used to assess the impact of marine developments on erosion and sedimentation patterns by including common structures such as jetties, piles or dikes. Point sources can also be introduced to represent localised increases in current flows as a result of outfalls or ship movements etc.

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4.2 Computational Models and Data Sources

RPS' model of Dublin Bay was created using flexible mesh technology to provide detailed information on the coastal processes around the licenced dump site and Dublin Port as well as the wider Dublin Bay area. The model uses mesh sizes varying from 250,000m^2 (equivalent to 500m x 500m squares) at the outer boundary of the model down to a very fine 225 m^2 (equivalent to 15m x 15m squares) in Dublin Port and around the licenced dump site. The extent, mesh structure and bathymetry of this model is presented in Figure 4.1.

The bathymetry of this model was developed using data gathered from hydrographic surveys of Dublin Port, the Tolka estuary and the dump site since 2017 to present. This resource was supplemented by data from the Irish National Seabed Survey, INFOMAR and other local surveys collated by RPS for the Irish Coastal Protection Strategy Study (RPS, 2003).

Tidal boundaries for the Dublin Bay model shown in Figure 4.1 were taken from the Irish Coastal Protection Strategy Study (ICPSS) tidal surge mode. This mode was developed using flexible mesh technology with the mesh size varying from *c.* 24km along the offshore Atlantic boundary to *c.* 200m around the Irish coastline. This validated model is run three times daily on behalf of the Office of Public Works (OPW) to provide detailed tidal information around the coast of Ireland. The extent and bathymetry of this model is illustrated in Figure 4.2

Boundary conditions used to represent the mean annual river flows for the Liffey, Dodder and Tolka were set at 15.6, 2.3 and 1.4m^3/s respectively.

It should that the same computational models used to support the environmental assessment of the Alexandra Basin Redevelopment project (RPS, 2014) were used for this technical assessment. A previous calibration and validation exercise that utilised recorded data from throughout Dublin Bay concluded that the Dublin Bay model performed very well and provided a very good representation of the coastal processes in the Dublin Port and Dublin Bay.

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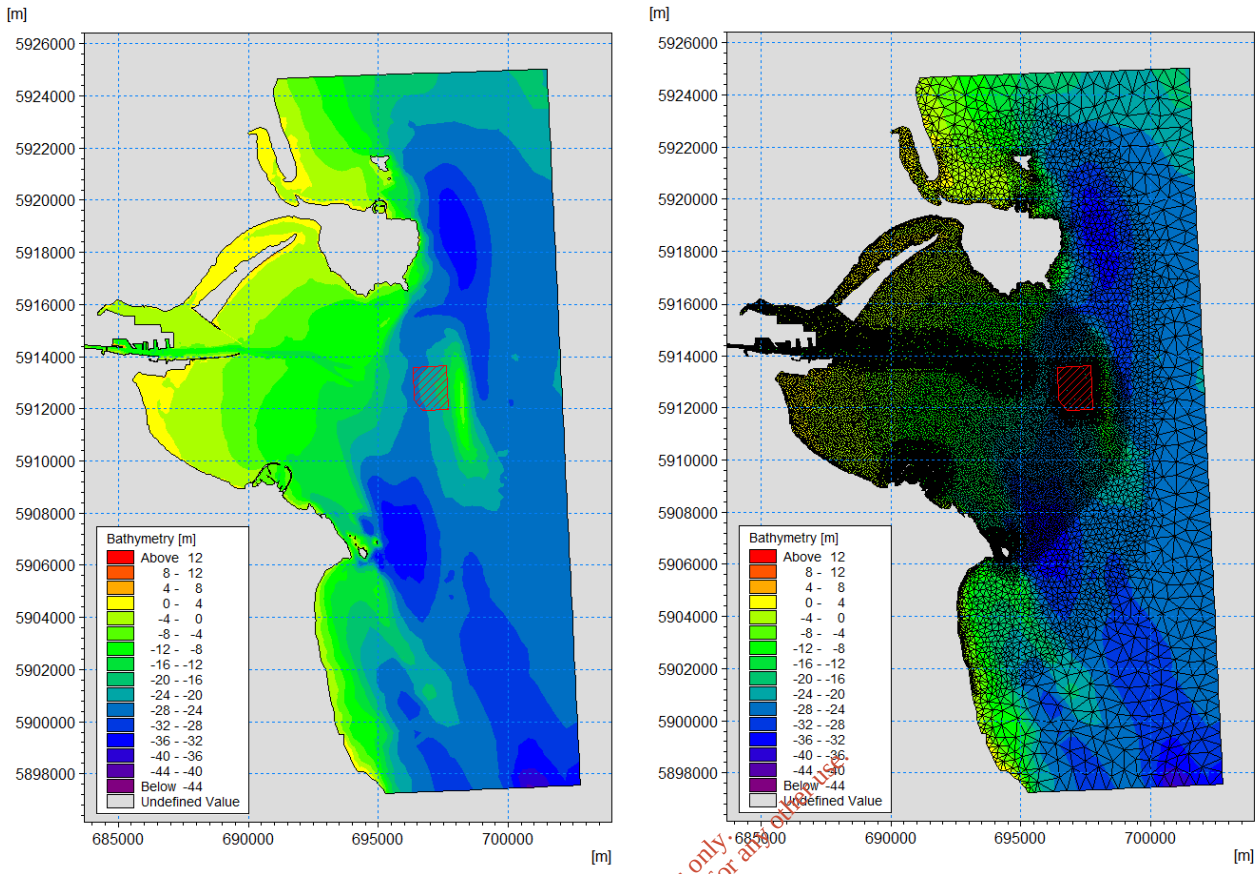

Figure 4.1: Extent and bathymetry (left) and mesh structure (right) of the Dublin Bay model. Location of the licenced dump site shown by red hatch area.

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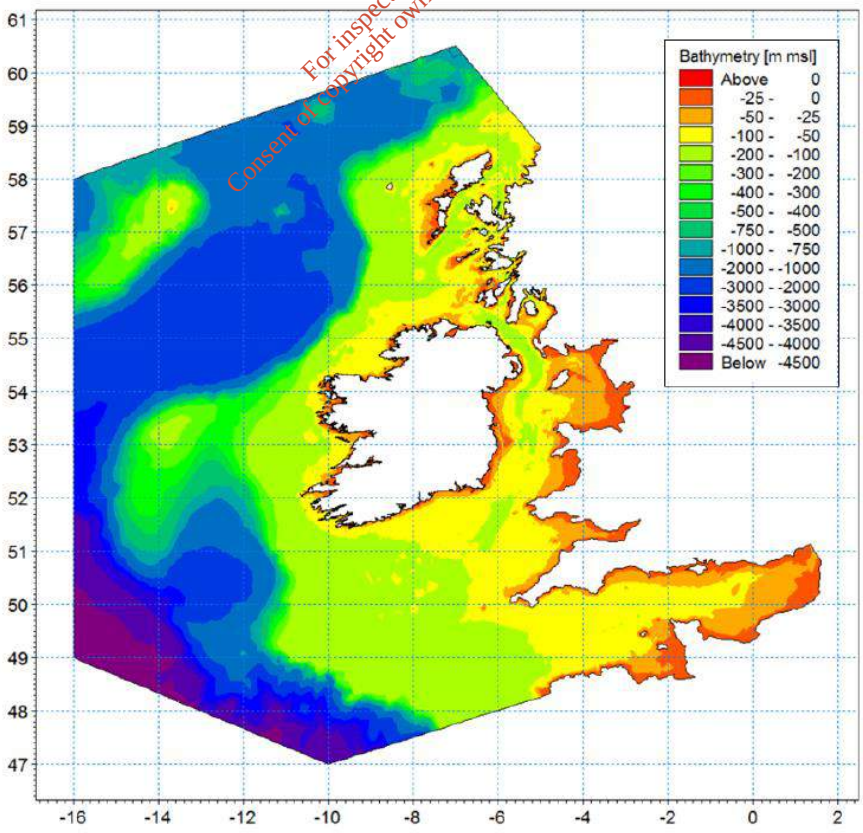

Figure 4.2: Extent and bathymetry of Irish Seas Tidal and Storm Surge model

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4.3 Characterisation of Dumping Material

Simulations were undertaken to determine the concentration and distribution of sediment lost to the water column during the dumping events at the licenced offshore dump site. As described in the following Section, the sediment material was first characterised by a number of different mixtures with different sand and silt fractions. Upon identification of the most suitable mixture type and composition, these parameters were used to simulation all 210 dredging trip undertaken in March 2020. It should be noted that all dumping events were assessed using a single simulation so that sediment plumes from previous dumping events were fully accounted for.

The coupled MIKE 21 sediment transport model was used to simulate the fate of the silt released from the barges over the dump site by moving a sediment source along the track that the barge would take as it transversed the dump site area during the disposal operation. The model then simulated the dispersion, settlement and re-erosion of each fraction of the dredged material in response to the tidal currents throughout the model area.

The spill rate and the dump co-ordinates for each dumping event was specified using information from detailed dredge logs provided by the dredging contractor. Given the duration of the dredging and disposal campaign, simulations were run for using a range of spring and neap tidal conditions. These models also included for the effect of wind driven currents.

An example of the dredge track used to specify the location of the sediment source in the models is presented in Figure 4.3 below.

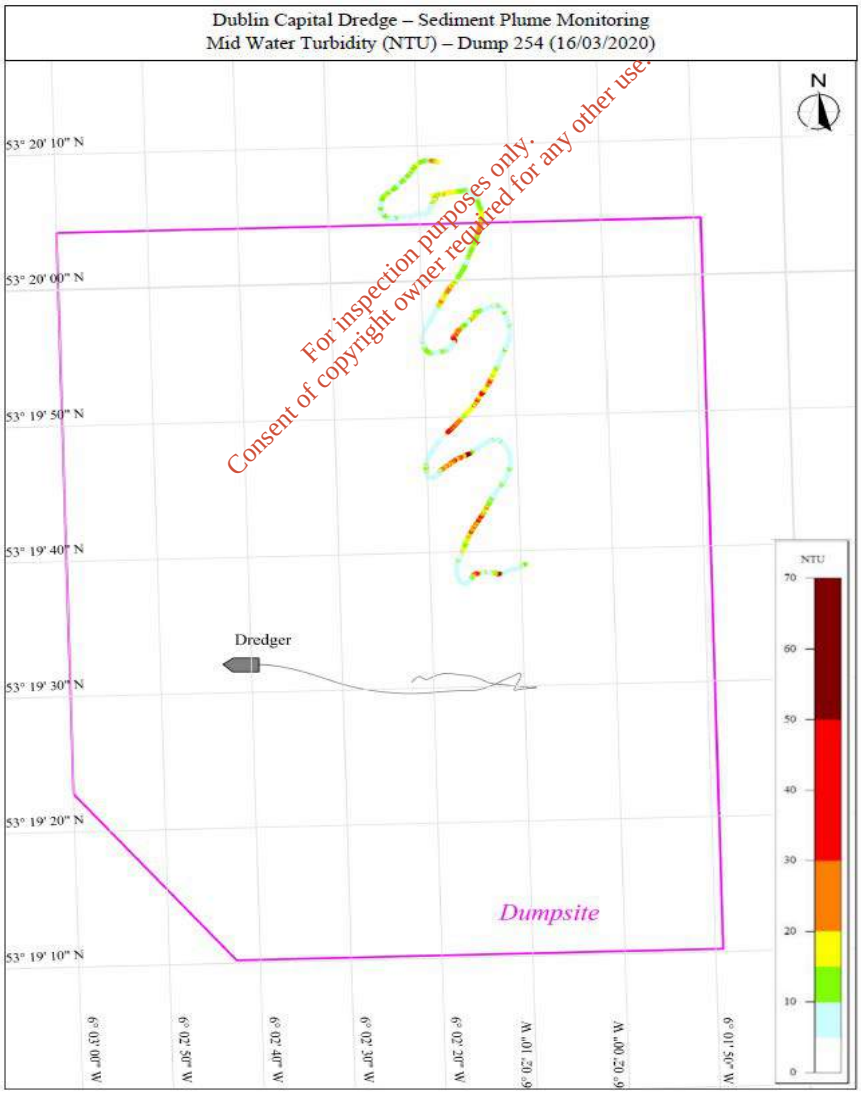

Figure 4.3: Example of the dredge track used to specify the coordinates of the sediment source in the numerical model runs

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5 REVIEW OF PARAMETERS USED FOR THE ABR ENVIRONMENTAL ASSESSMENT

The numerical modelling work undertaken in support of the Alexandra Basin Redevelopment (ABR) Project (RPS, 2014) specified sediment material as being characterised by three discrete fractions with mean diameters of 200µm, 20µm and 3µm with each fraction constituting 1/3 of the total volume dredge material (Mixture 1 in Figure 5.1 below). This specification was based on Particle Size Distributions (PSDs) of sediment samples collected from the Harbour area (RPS, 2014).

In order to validate this parameter RPS ran a series of sediment plume models for dump event 231 using a range of different sediment material characteristics. Dump event 231 was chosen for this analyses as it was the first event that Hydromaster collected detailed survey data for. The four different mixture types used for this assessment are summarised in Figure 5.1 and were comprised of various fine sand to fine silt fractions.

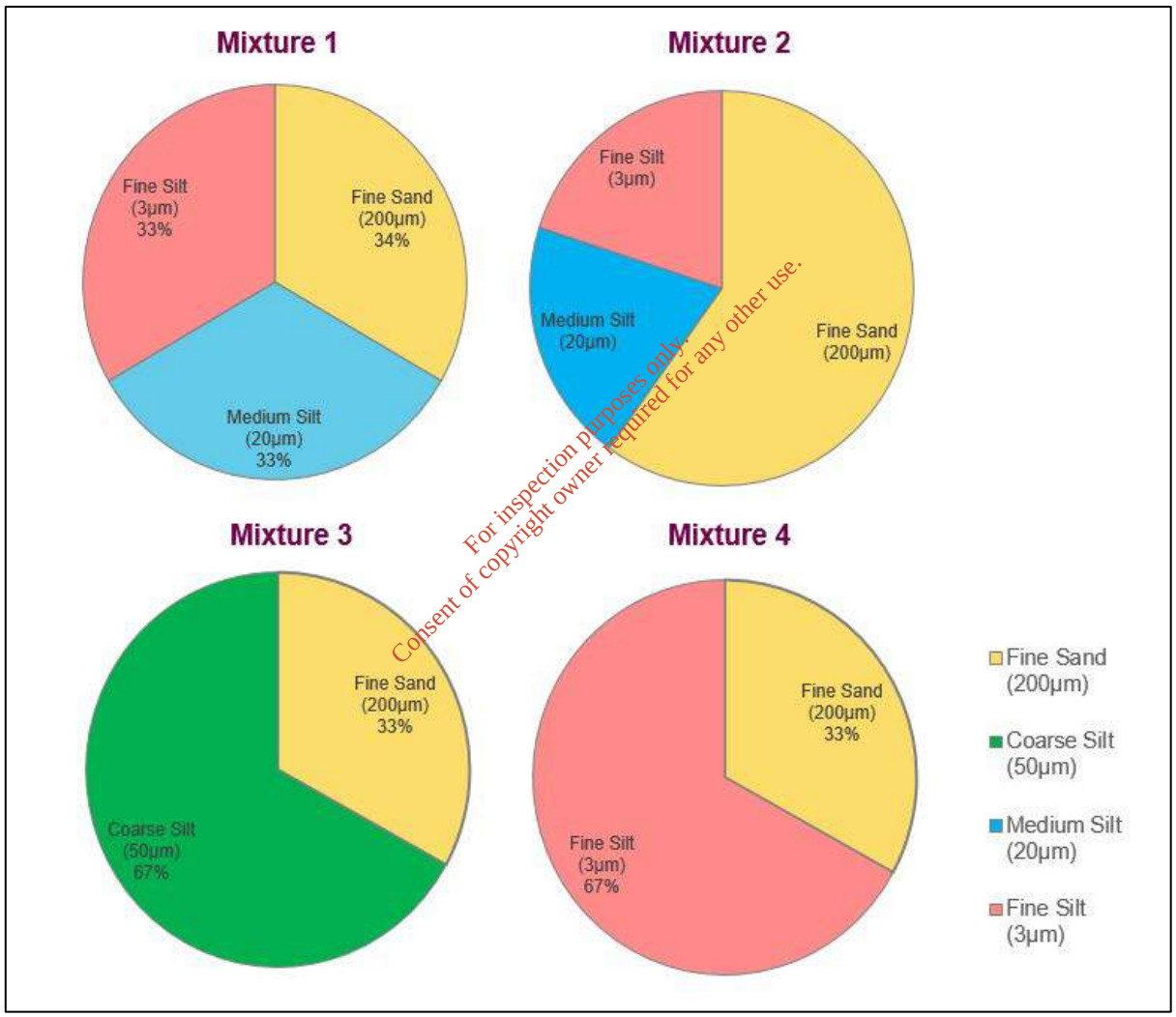

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Figure 5.1: Composition of sediment mixtures used to represent the dredge material dumped at the dump site

The output from these simulations are presented in Figure 5.2 to Figure 5.5 for Mixtures 1 – 4 respectively. As demonstrated by these plots, the sediment plumes generated by these mixtures correspond well to recorded data. However, as summarised in Table 5.1 Mixture 1 was found to agree best with recorded turbidity levels with simulated turbidity levels falling within the recorded surface and mid-point measurements 79% of the time.

Based on this information it can be concluded that the sediment was specified correctly in Appendix C: Coastal Process Modelling to the Natura Impact Statement submitted as part of the application. All subsequent model simulations in this study were therefore undertaken using sediment parameters reflective of mixture 1.

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Table 5.1: Summary of sediment mixtures and % agreement with actual turbidity levels recorded during dump event 231

Sediment	Composition [%]			
	Mixture 1	Mixture 2	Mixture 3	Mixture 4
Fine Sand (200µm)	33	60	33	33
Coarse Silt (50µm)	n/a	n/a	67	n/a
Medium Silt (20µm)	33	20	n/a	n/a
Fine Silt (3µm)	33	20	n/a	67
Agreement with recorded Turbidity levels during event 231 [%]	79.22	61.66	63.15	68.47

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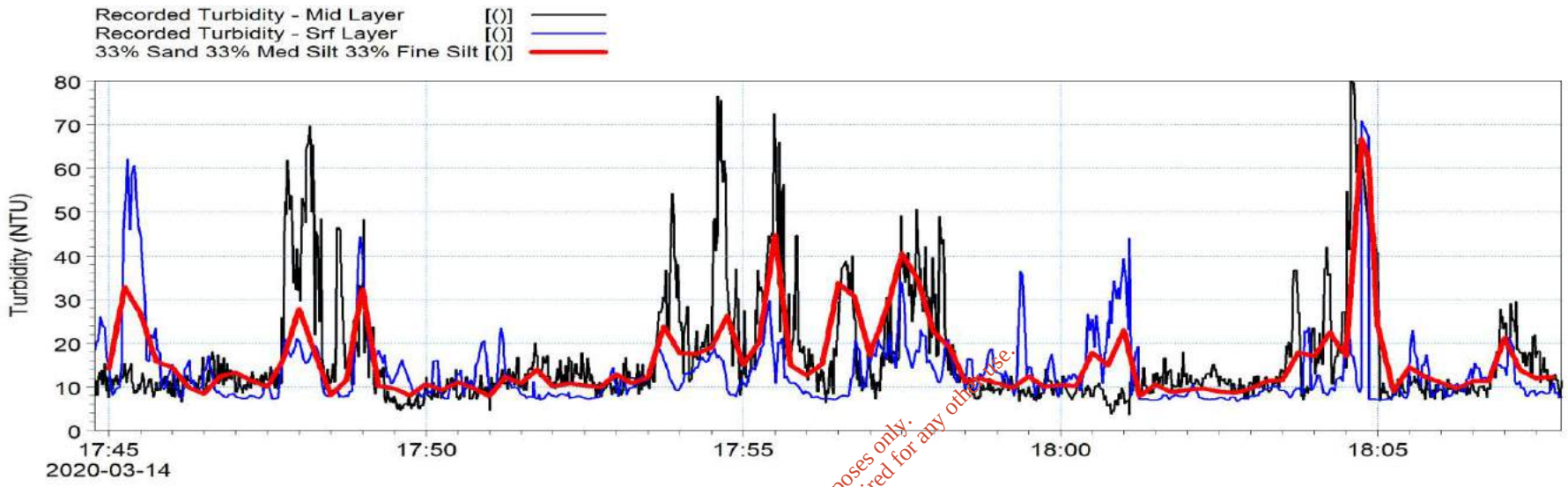

Figure 5.2: Comparison of recorded and simulated turbidity levels during dump event 231 – Mixture 1 (33% fine sand; 33% medium silt; 33% fine silt)

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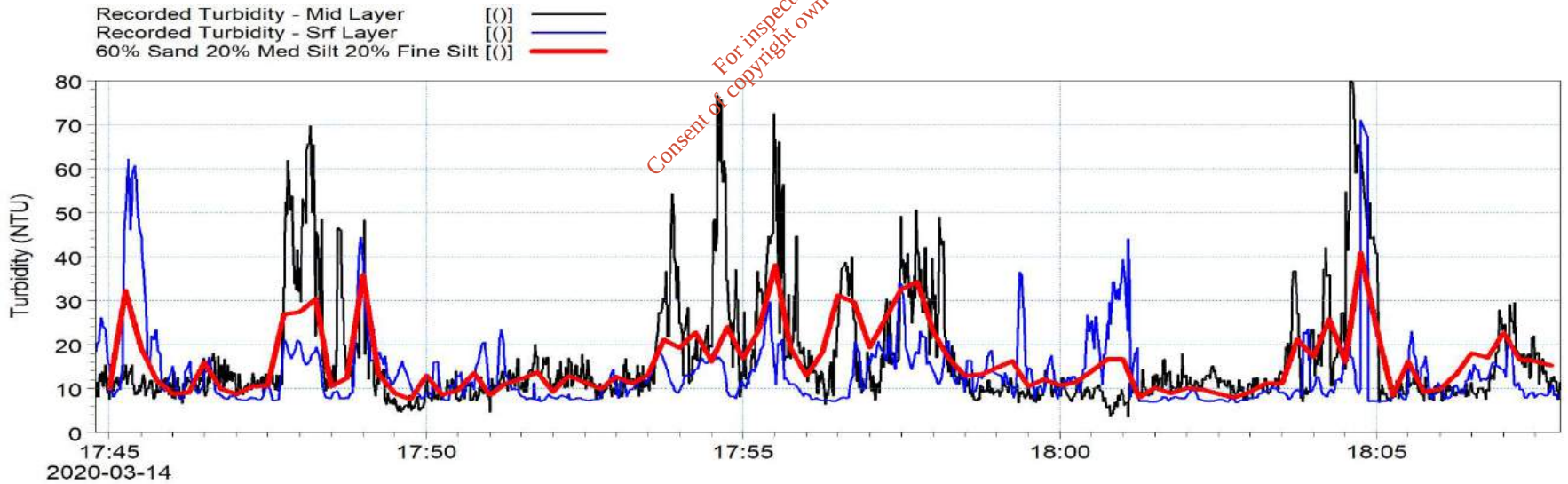

Figure 5.3: Comparison of recorded and simulated turbidity levels during dump event 231 – Mixture 2 (60% fine sand; 20% medium silt; 20% fine silt)

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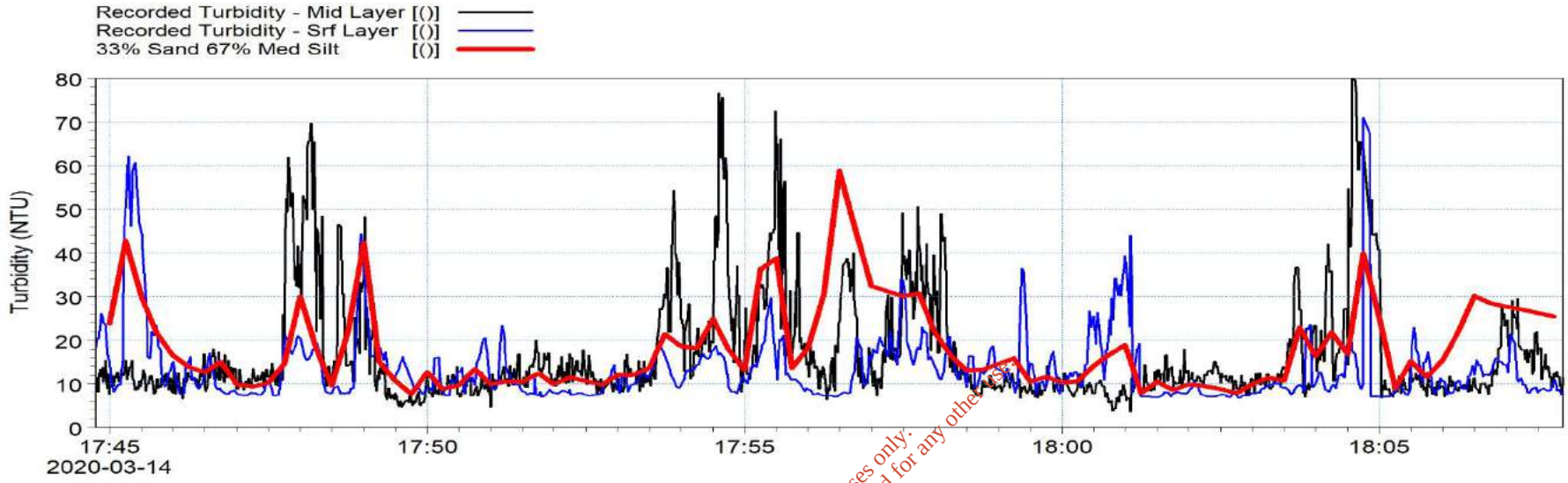

Figure 5.4: Comparison of recorded and simulated turbidity levels during dump event 231 – Mixture 3 (33% fine sand; 67% medium silt)

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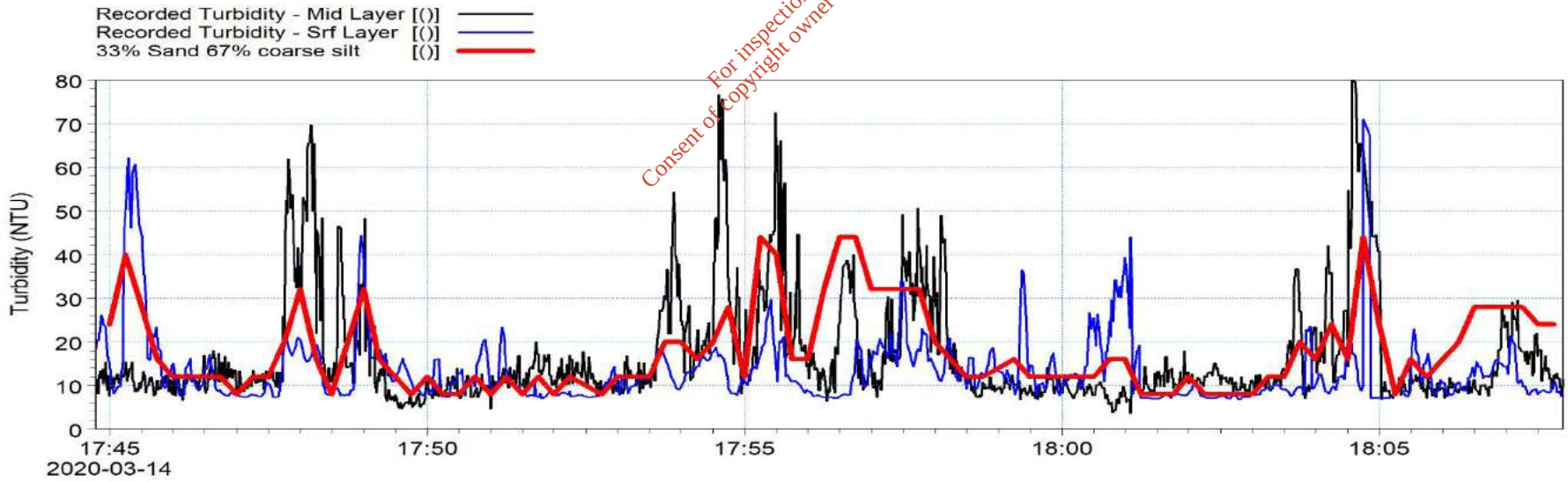

Figure 5.5: Comparison of recorded and simulated turbidity levels during dump event 231 – Mixture 4 (33% fine sand; 67% coarse silt)

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6 OUTPUT FROM SEDIMENT PLUME MODELLING

Having determined suitable specifications for the sediment material (see Section 5), RPS produced a series of figures that compares simulated and recorded turbidity levels at the Dump Site.

- To determine the spatial accuracy of the model used, each figure illustrates the extent and concentration of the sediment plume for one time-step relative to the recorded survey tracks.
- The temporal accuracy of the model is demonstrated by time series plots that compare 2D depth averaged simulated turbidity concentration levels with recorded data. These plots remove the spatial element of the data so that a direct comparison of concentrations can be easily made.

As it was not practical to produce a sediment plume plot for every time-step and dump event, RPS instead provided time-series plots for each dump event for which there was suitable data (see Table 3.1 in Section 3).

In total, this equated to 12 individual events across a range of typical spring and neap tidal conditions. Environmental conditions were also varying with dumping events regularly occurring during windy spells with notable wave action from different directions. The results which are presented in Appendix A demonstrate that the computational models accurately simulate the temporal and spatial dispersion of sediment plumes during the dumping activities to a very high degree of accuracy.

6.1 Sediment Plume Envelopes

RPS has produced sediment plume plots for a number of representative dump events presented in Table 6.1 below.

The ***spatial accuracy*** of the numerical model is demonstrated by comparing the spatial extent of the simulated sediment plumes illustrated in the 2D plots and survey tracks in Figure 6.1 to Figure 6.8**.** It will be seen that the general plume envelope size and direction of transport is very similar to the corresponding survey track.

A comprehensive demonstration of the ***temporal accuracy*** of the numerical models is provided by means of time-series plots that compare simulated and recorded data in Figure 6.1 to Figure 6.8**.** These plots show that the 2D depth averaged simulated turbidity concentration usually falls within the envelope of values recorded at the surface and mid water column points.

Importantly, the model accurately represents the dredge plumes from the time of initial release to the point whereby the sediment plume reduces to below background levels, i.e. becomes fully dispersed.

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Table 6.1: Index of sediment plume plots across a range of typical tidal conditions

Tidal Phase	Dump #	Figure No.	Time after initial release
Mid-ebb	**231**	Figure 6.1	**19min**
Low water	**254**	Figure 6.2	**21min**
Mid-ebb	**266**	Figure 6.3	**6min**
Low Water	**267**	Figure 6.4	**15min**
Mid-flood	**268**	Figure 6.5	**30min**
Mid-ebb	**280**	Figure 6.6	**28min**
Mid ebb	**281**	Figure 6.7	**31min**
Mid-flood	**283**	Figure 6.8	**1hr 2min**

The numerical model utilised by RPS accurately simulates the dispersion of sediment across a range of tidal events and environmental conditions to a very high degree of accuracy. It can therefore be concluded that the model is well calibrated and fit for purpose.

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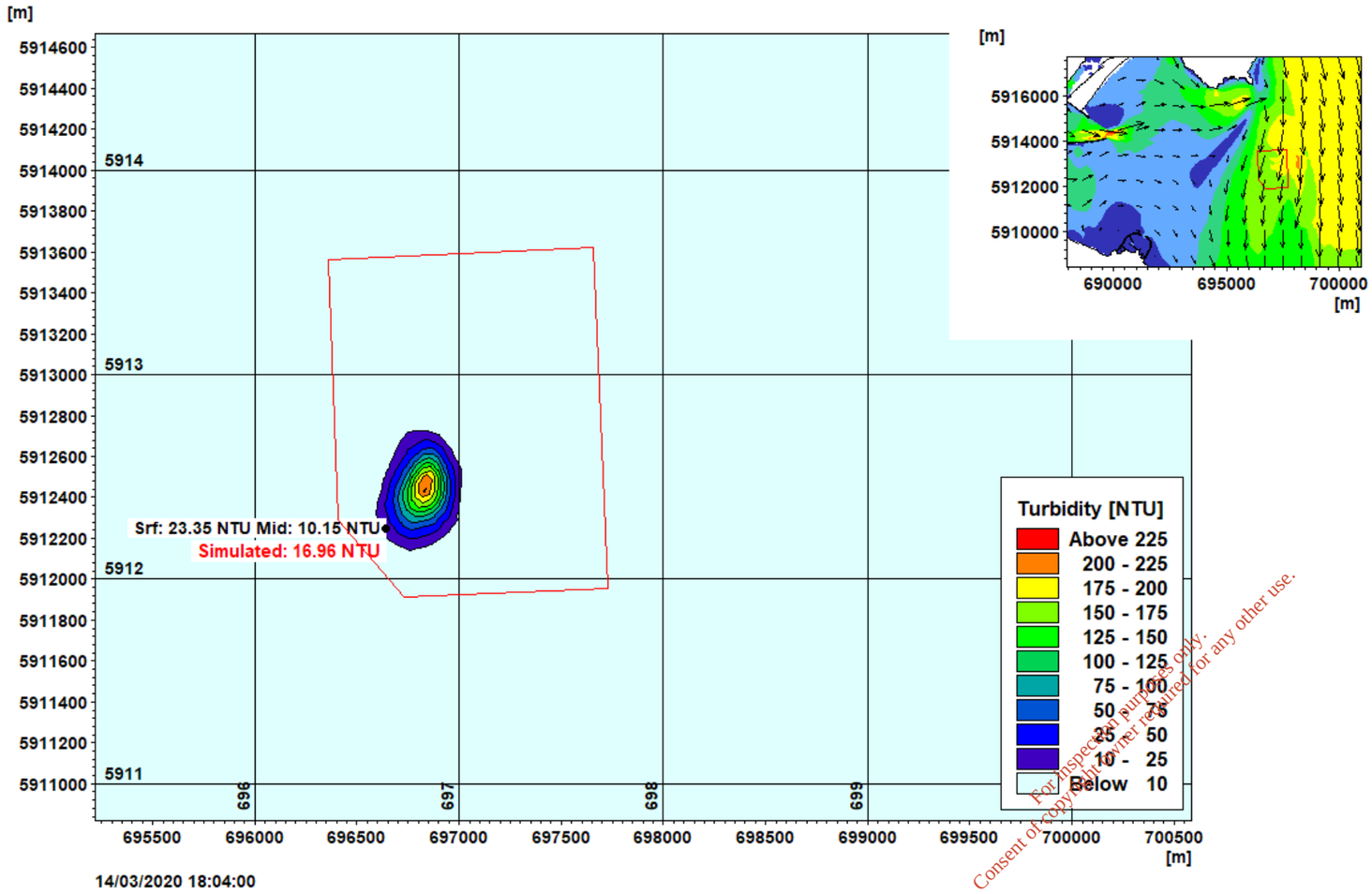

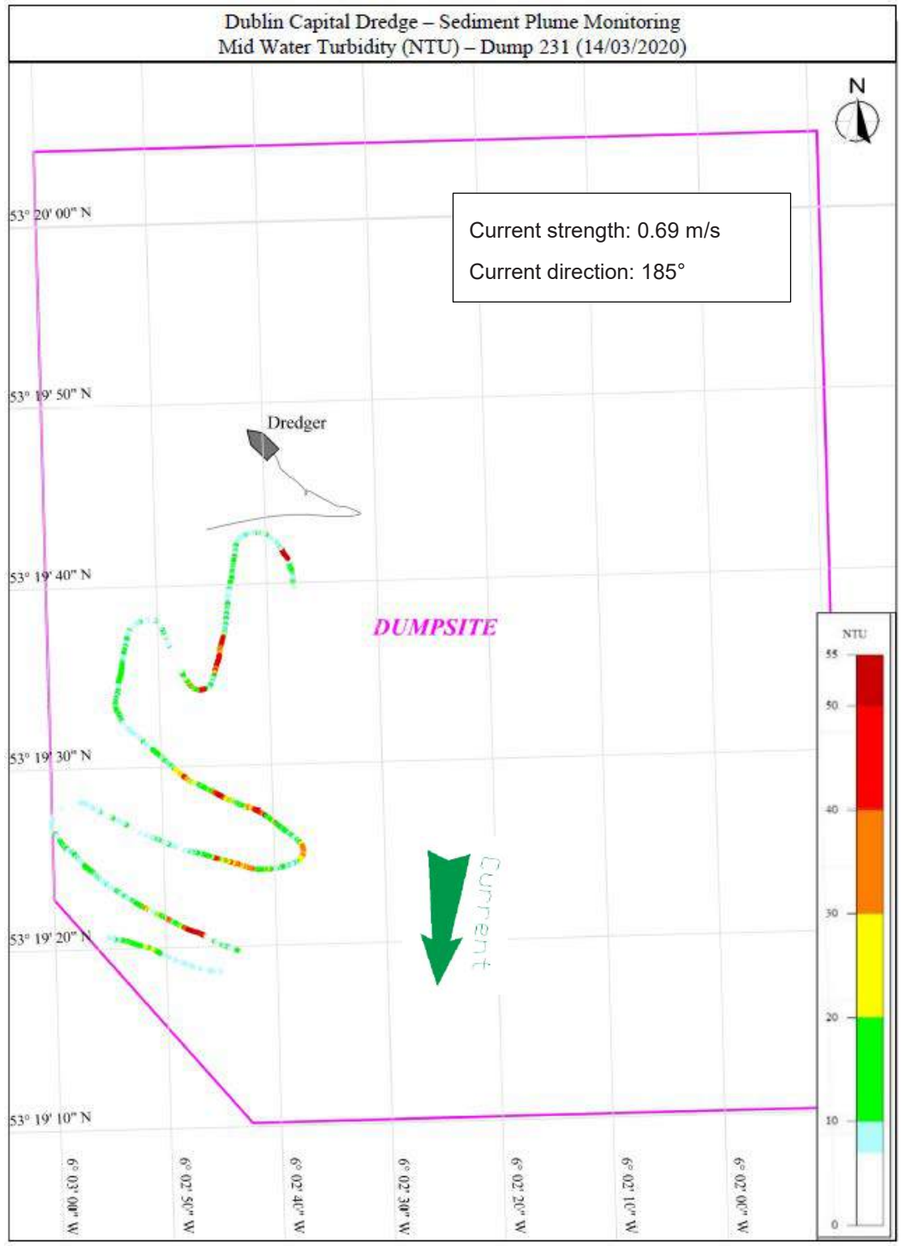

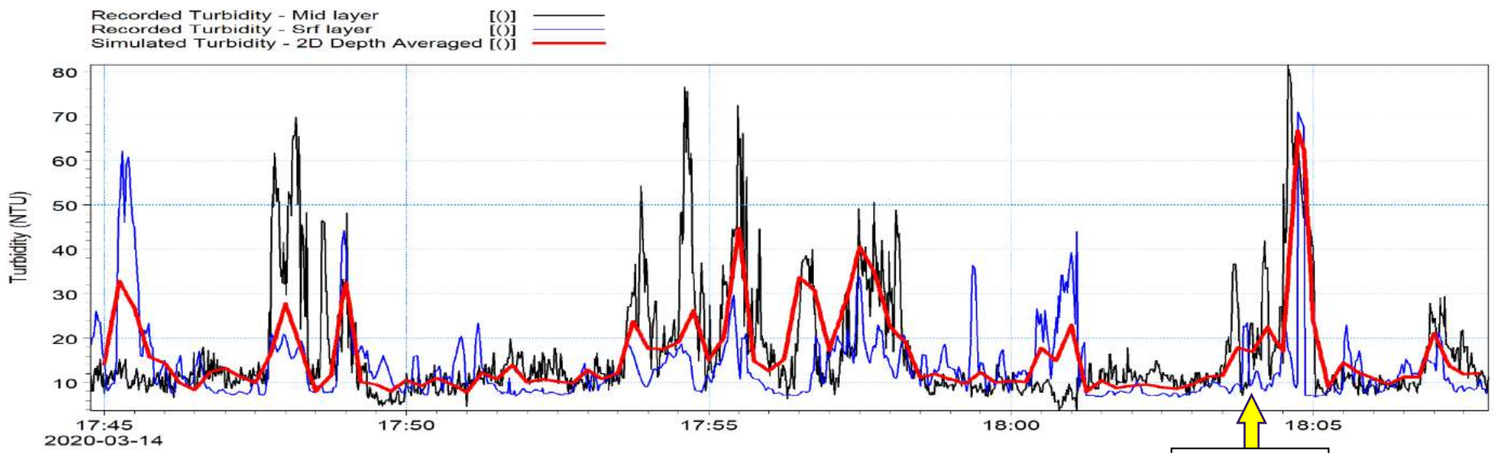

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Figure 6.1: Event 231. 2D Sediment plume envelope *c.* 19min after initial sediment release with current speed and direction insert (top left). Extent of survey data (top right) and comparison with simulated data (bottom left)

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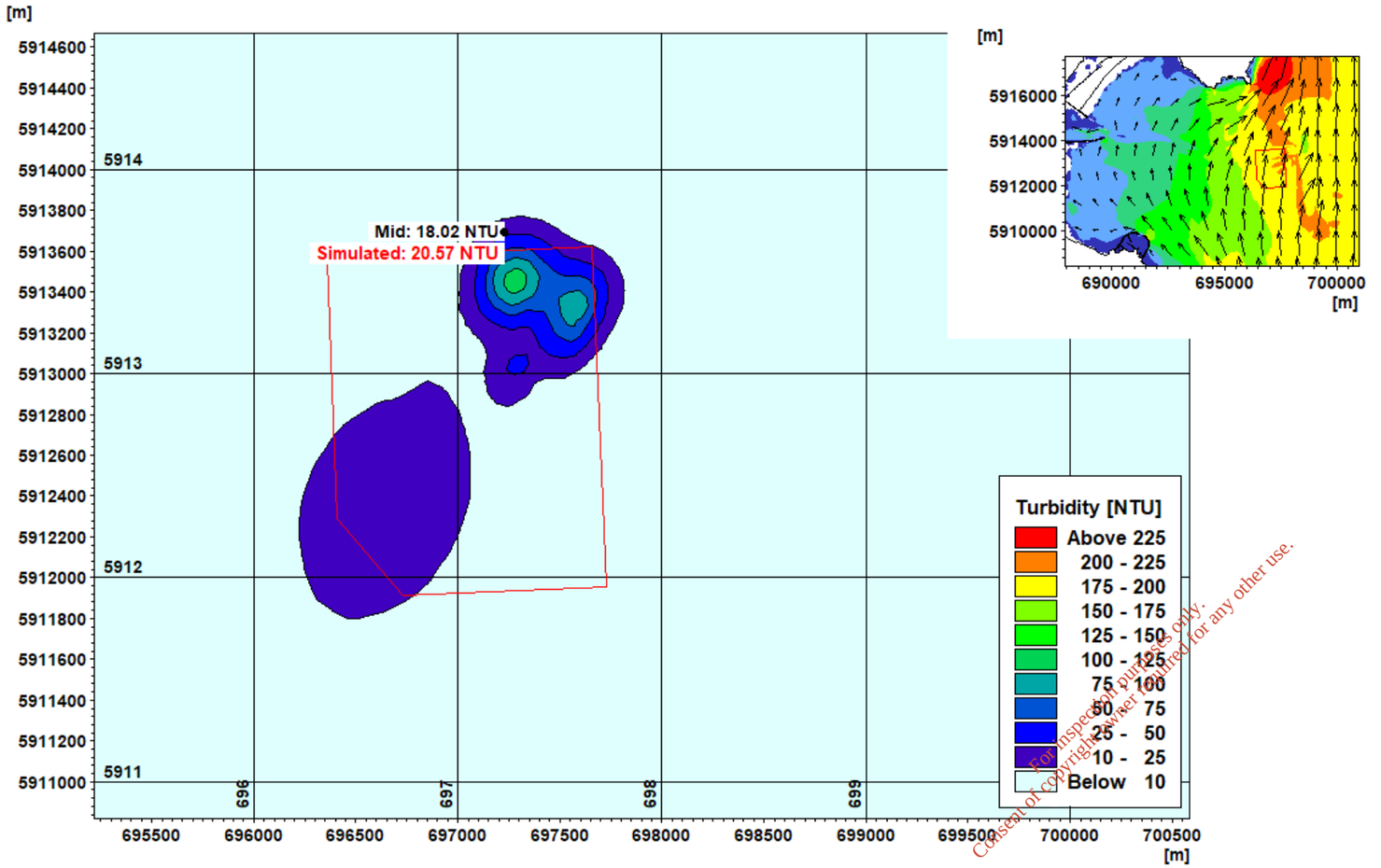

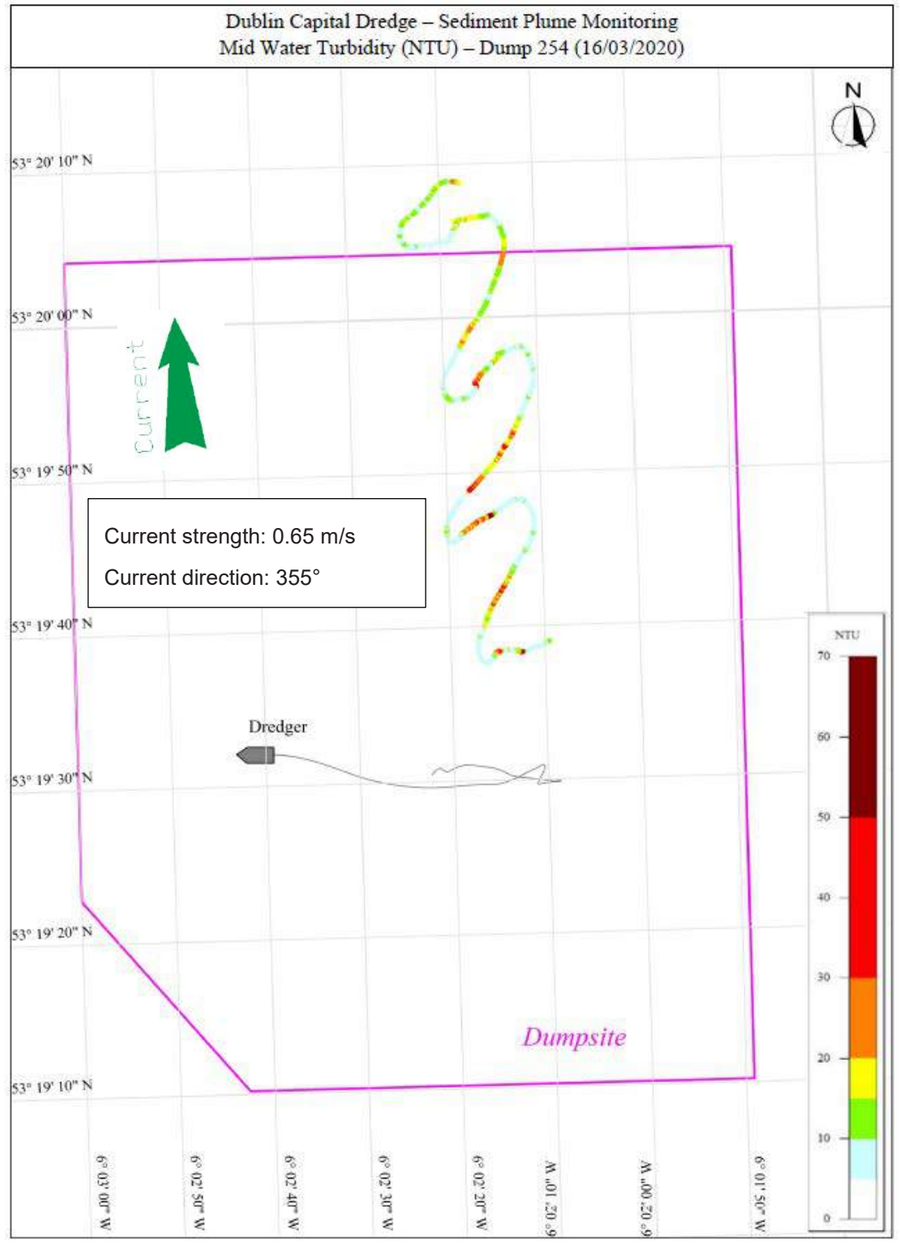

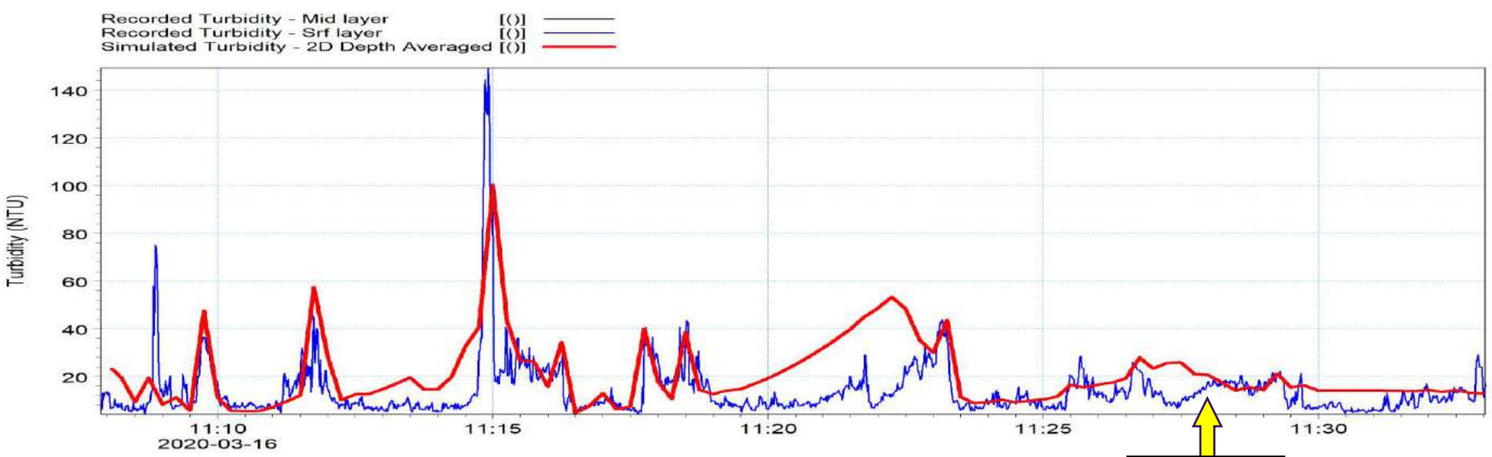

Figure 6.2 Event 254. 2D Sediment plume envelope *c.* 21min after initial sediment release with current speed and direction insert (top left). Extent of survey data (top right) and comparison with simulated data (bottom left)

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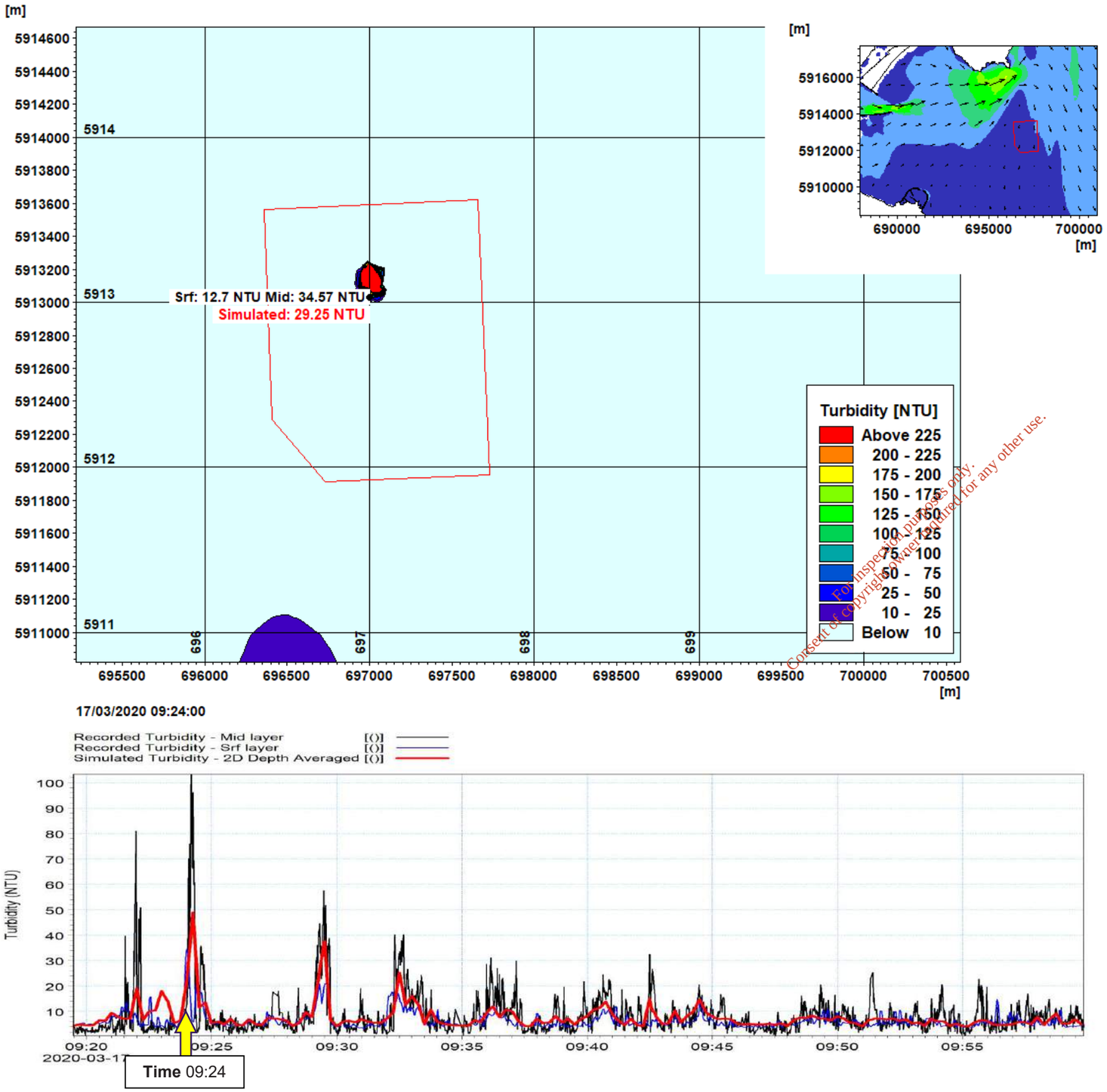

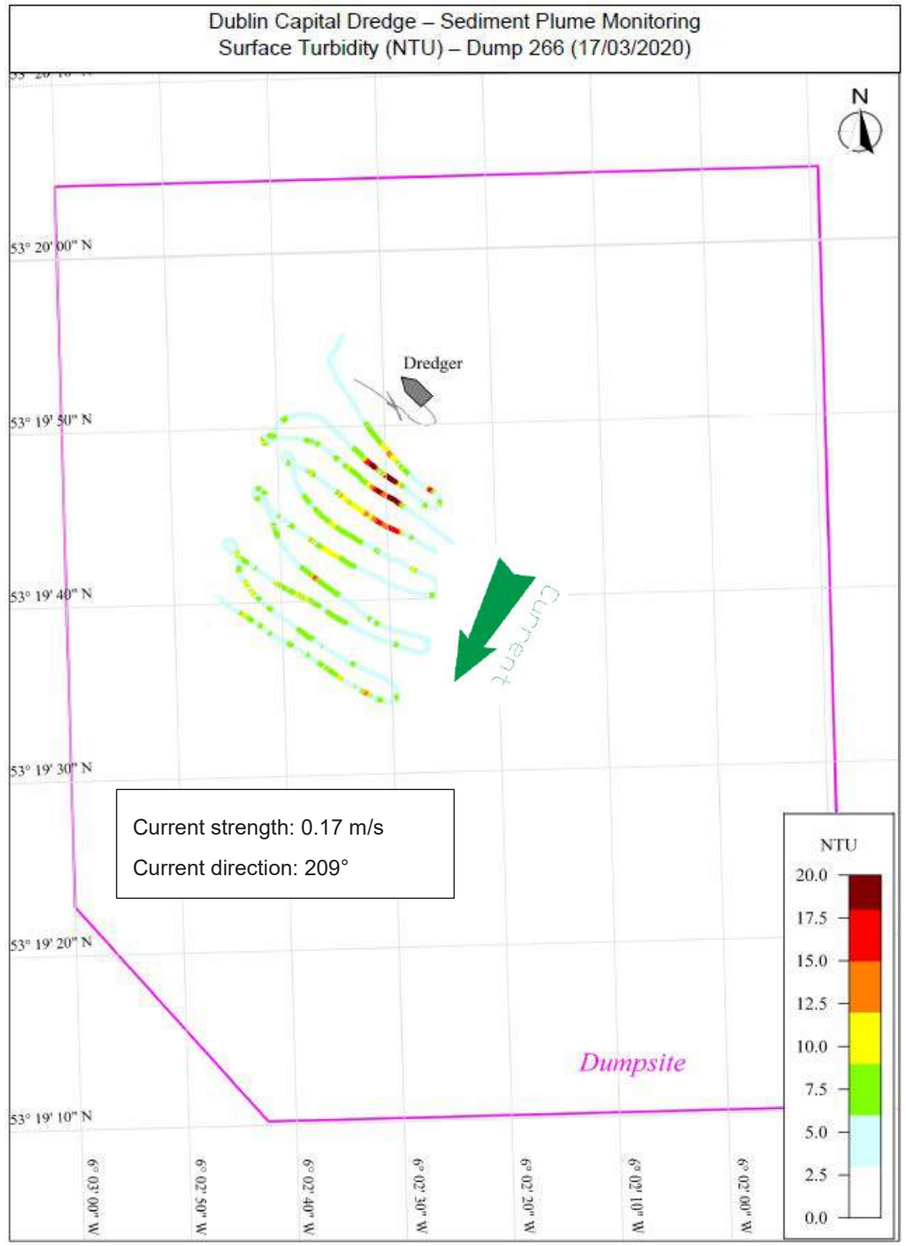

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Figure 6.3 Event 266. 2D Sediment plume envelope *c.* 6min after initial sediment release with current speed and direction insert (top left). Extent of survey data (top right) and comparison with simulated data (bottom left)

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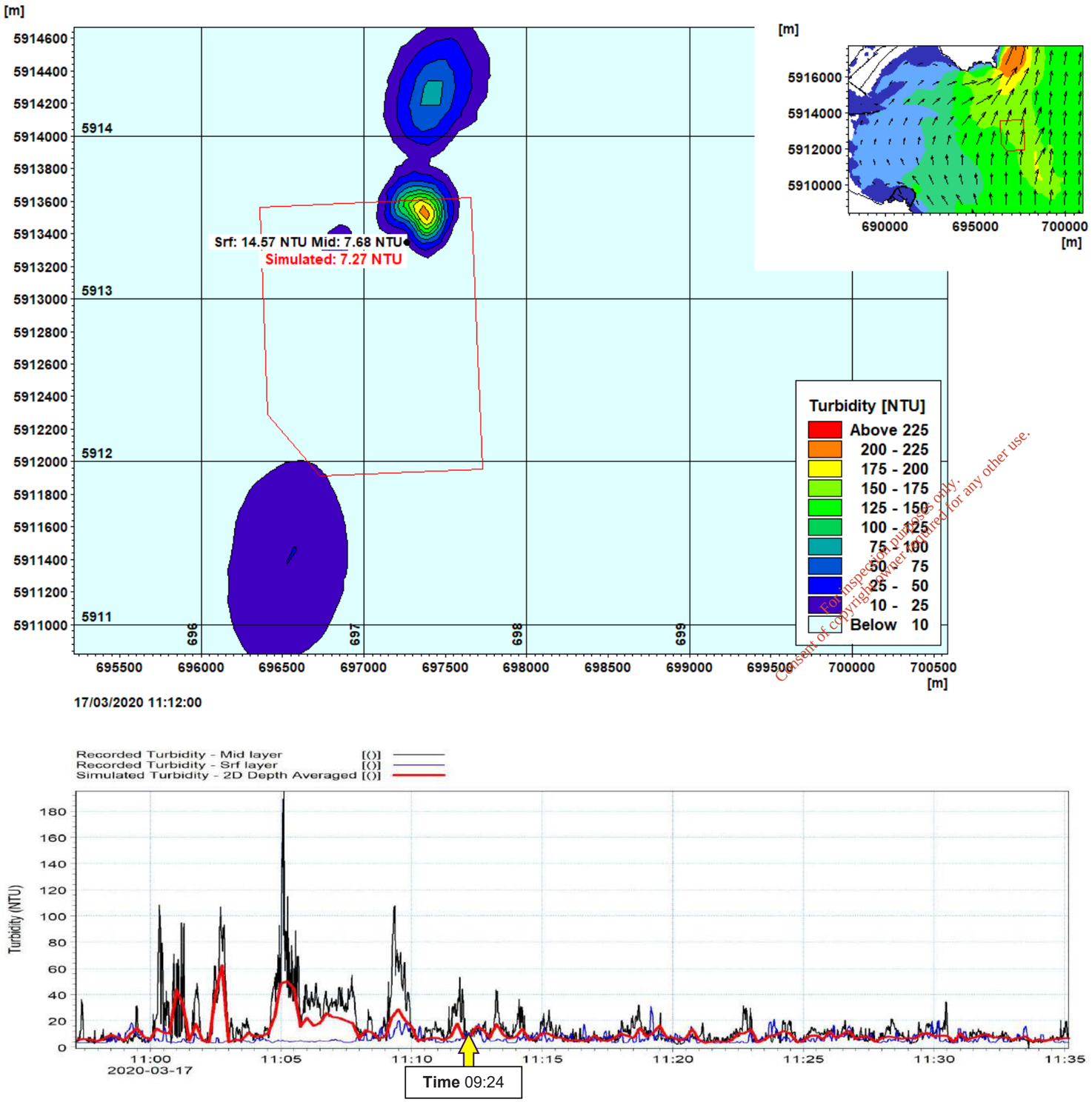

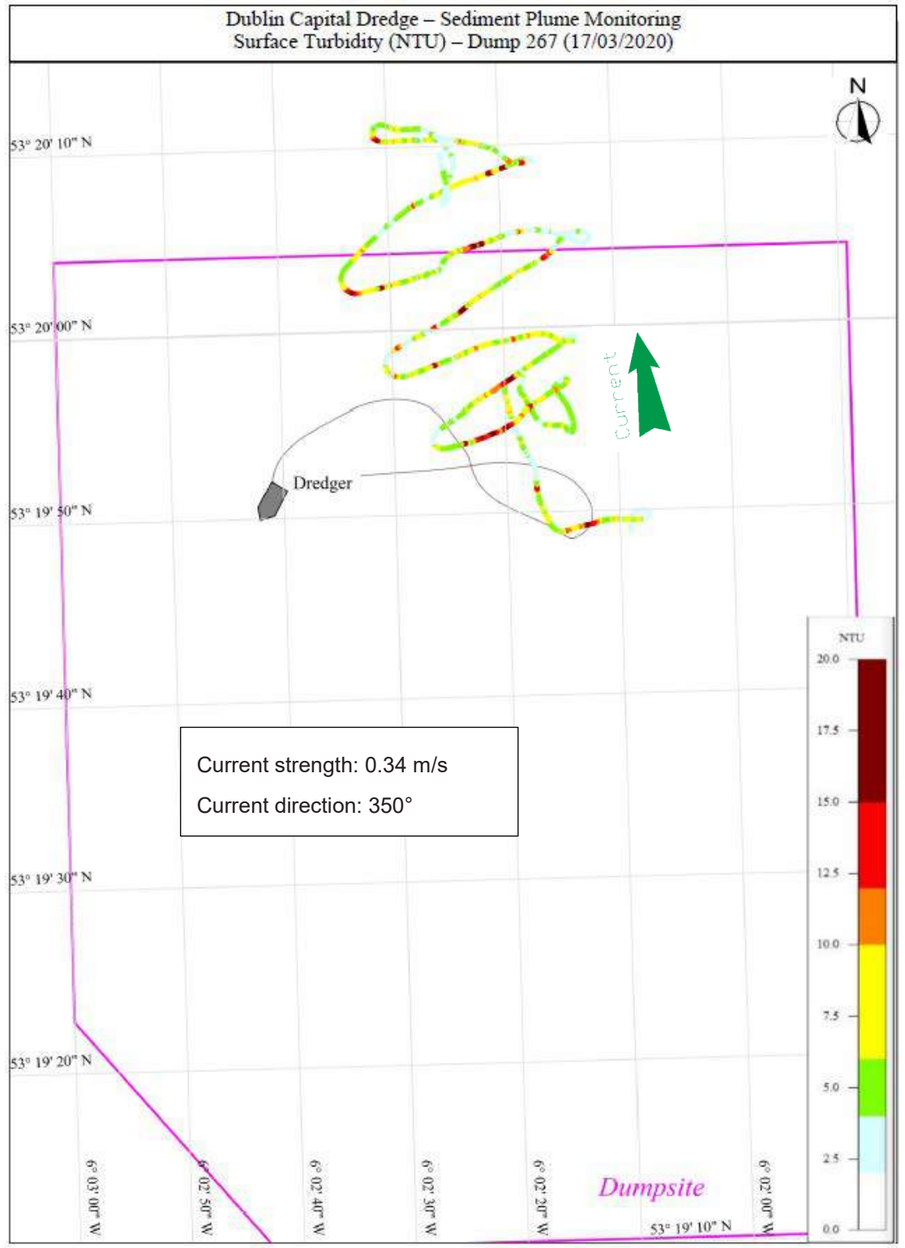

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Figure 6.4 Event 267. 2D Sediment plume envelope *c.* 15min after initial sediment release with current speed and direction insert (top left). Extent of survey data (top right) and comparison with simulated data (bottom left)

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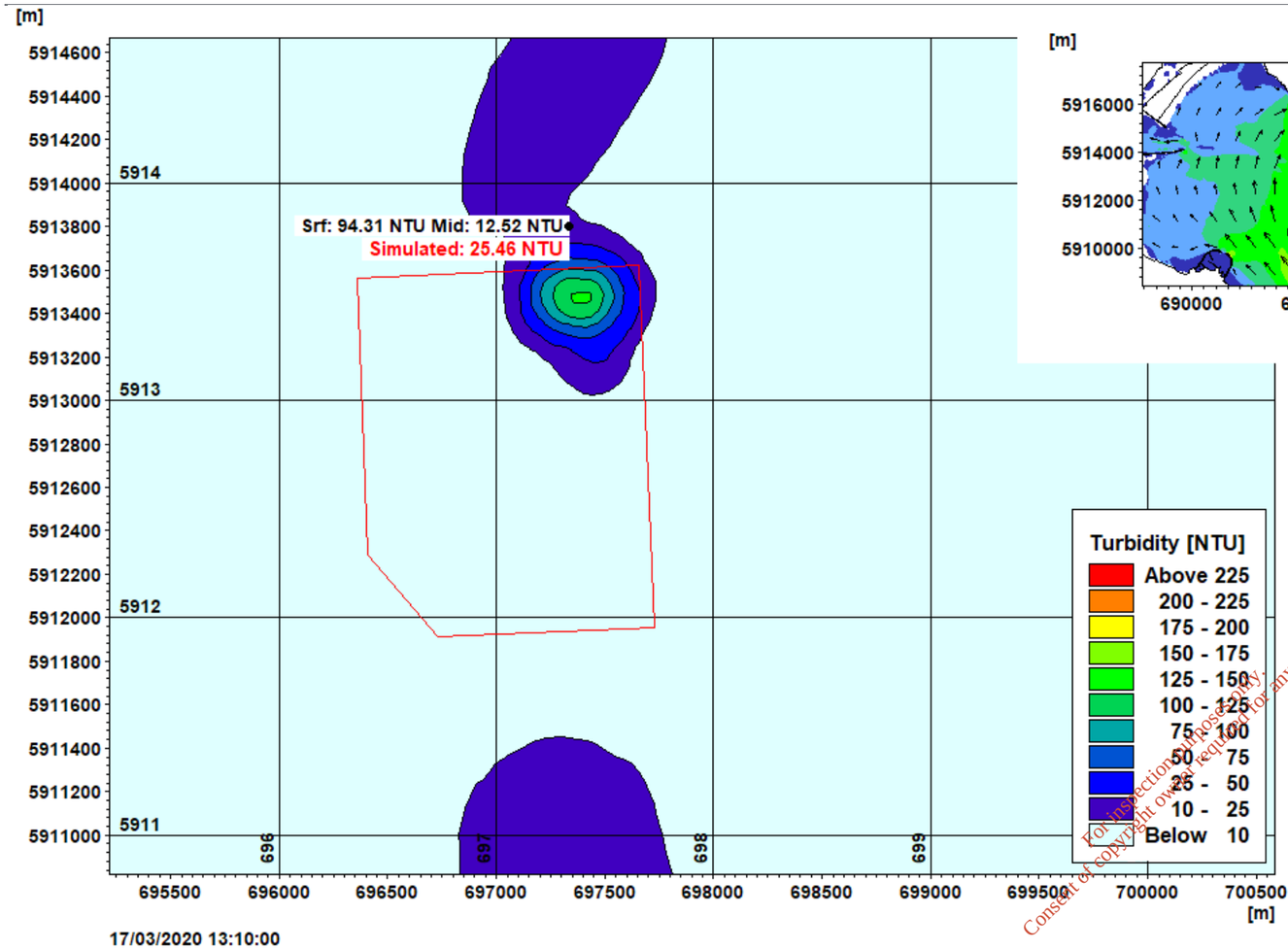

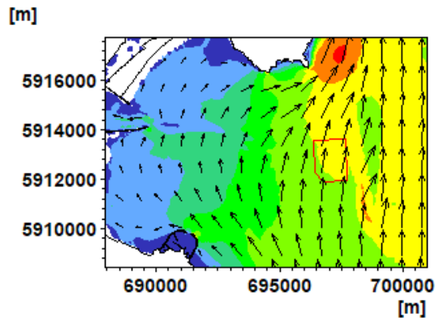

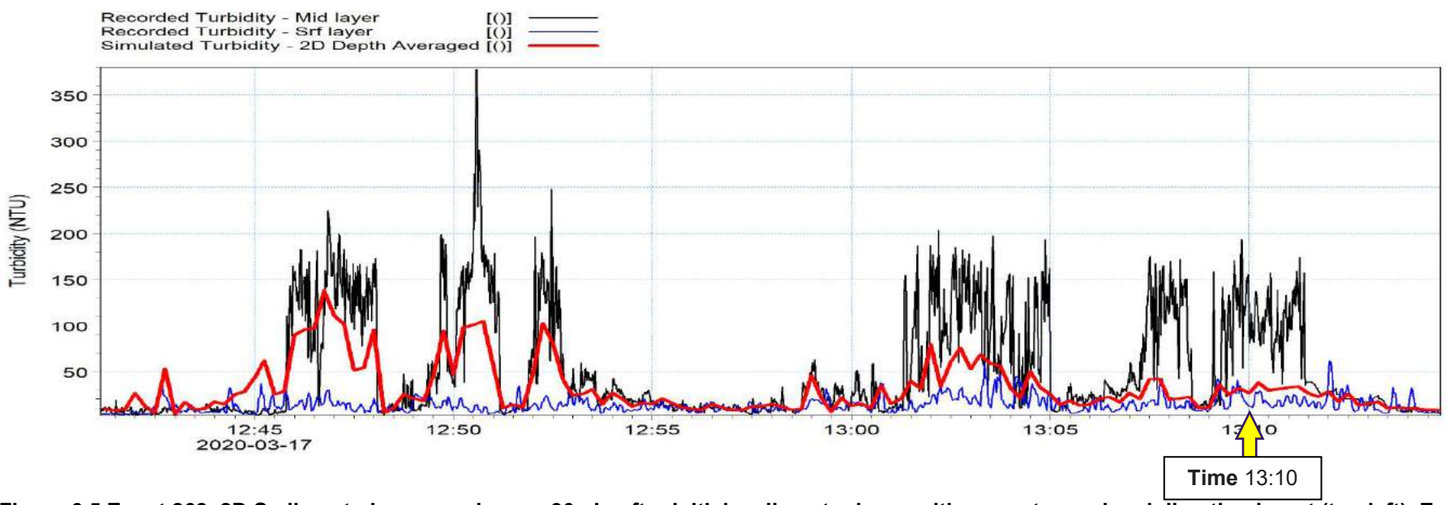

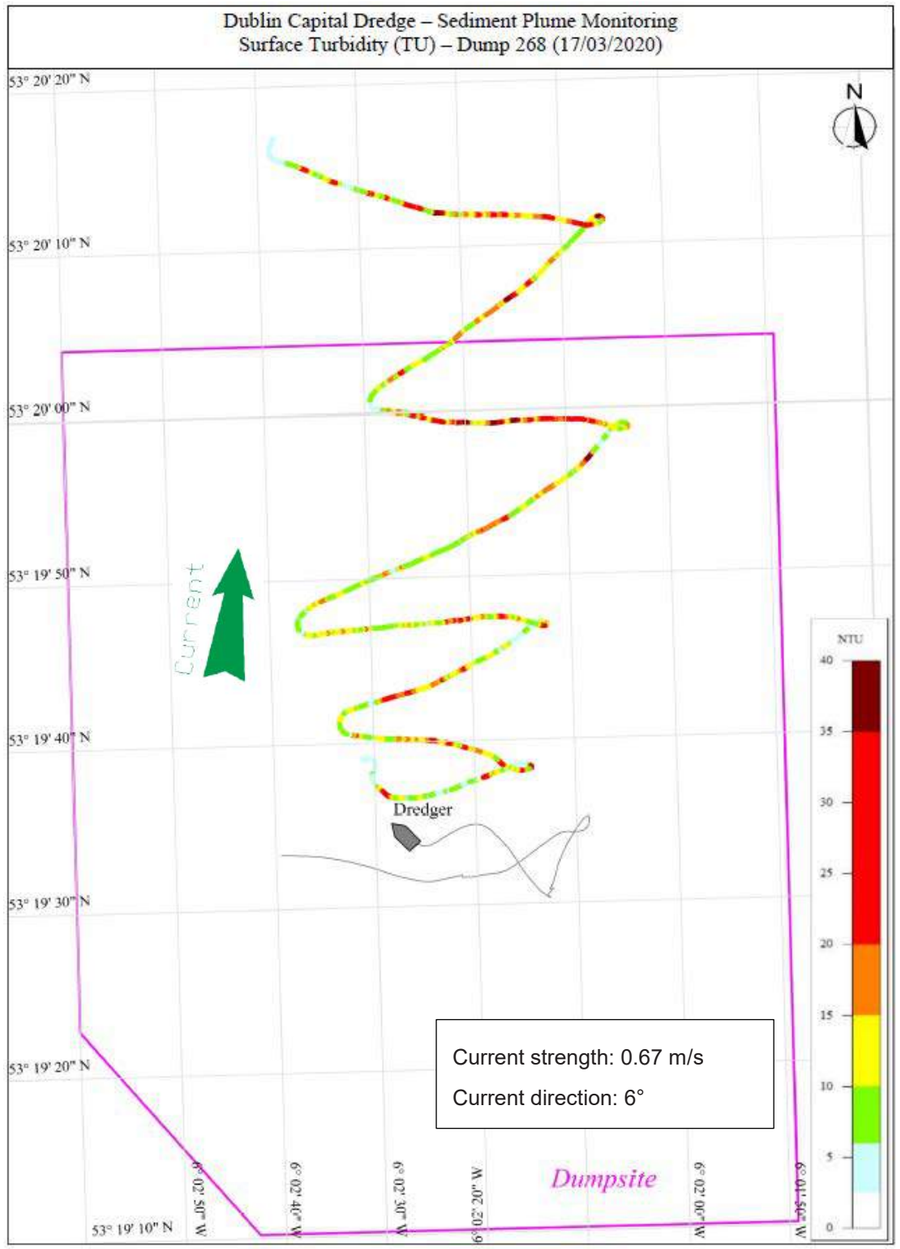

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Figure 6.5 Event 268. 2D Sediment plume envelope *c.* 30min after initial sediment release with current speed and direction insert (top left). Extent of survey data (top right) and comparison with simulated data (bottom left)

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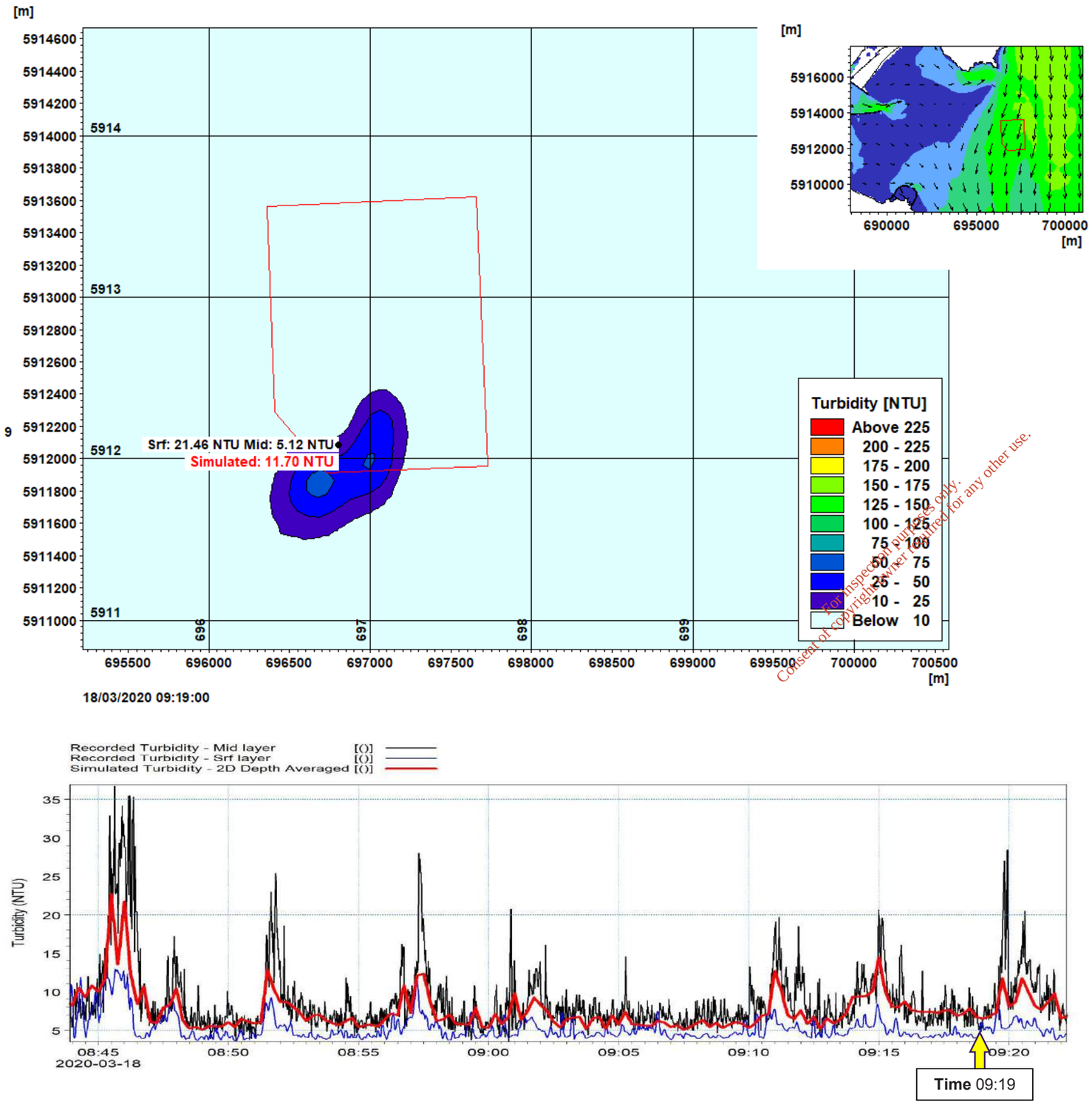

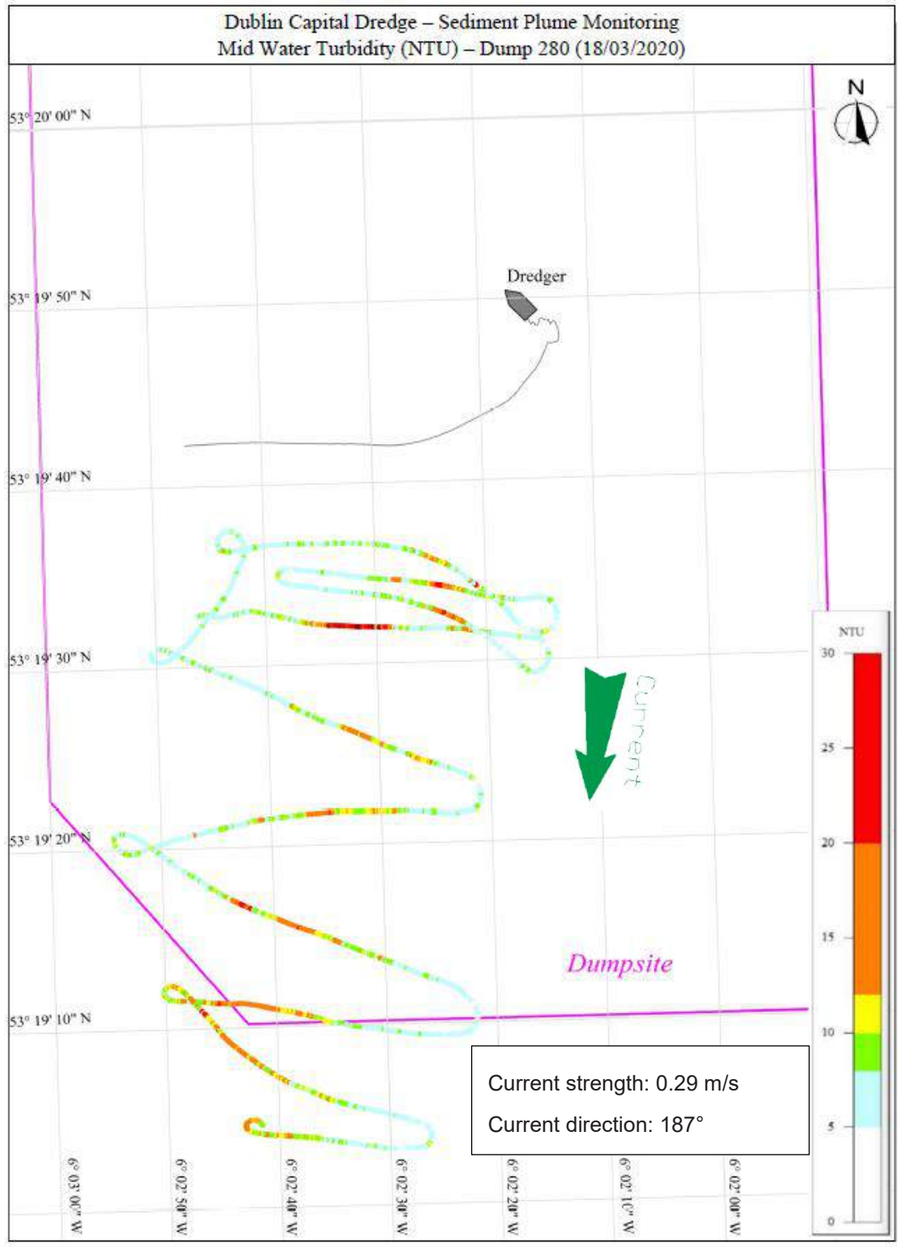

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Figure 6.6 Event 280. 2D Sediment plume envelope *c.* 28min after initial sediment release with current speed and direction insert (top left). Extent of survey data (top right) and comparison with simulated data (bottom left)

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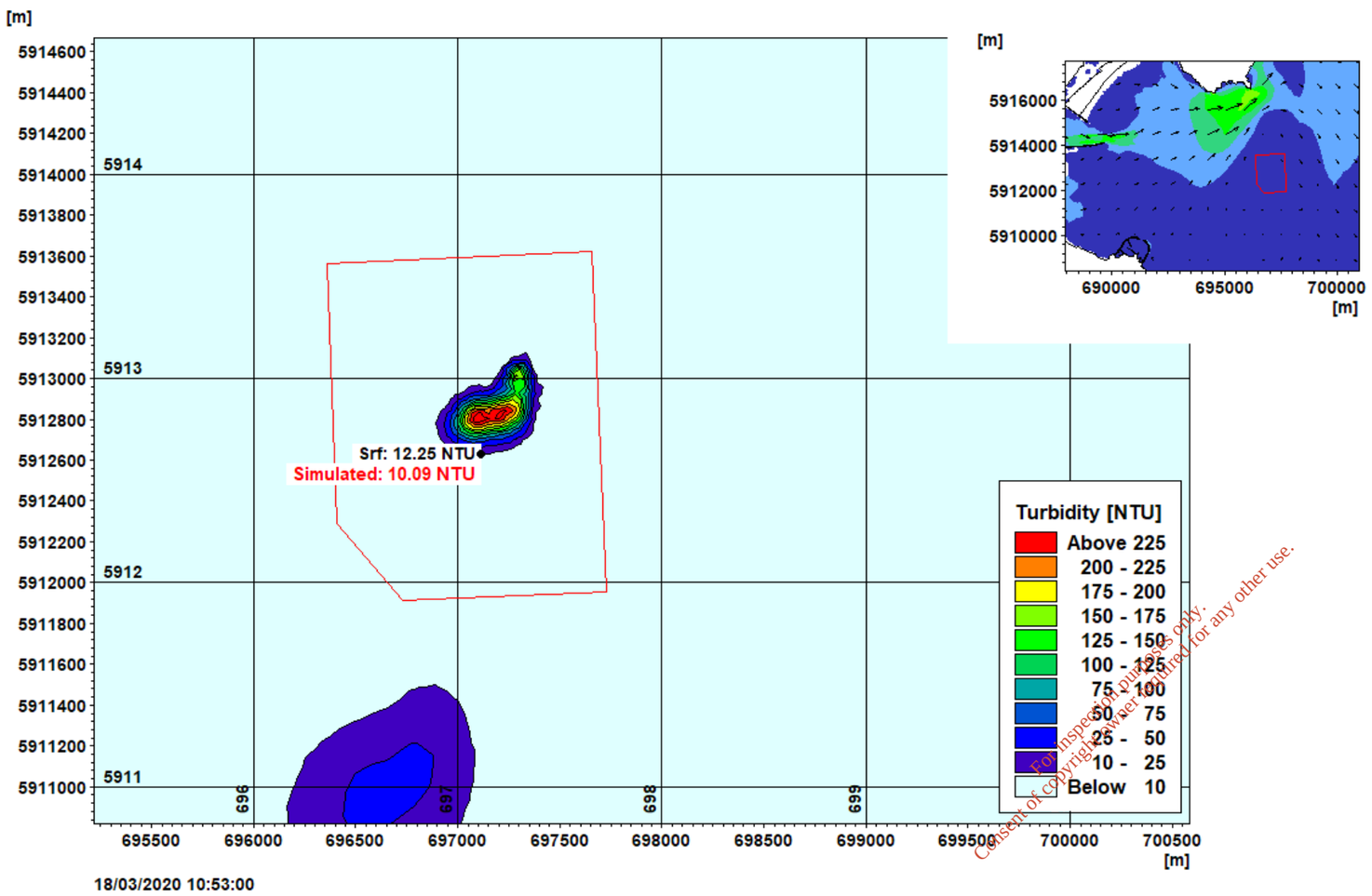

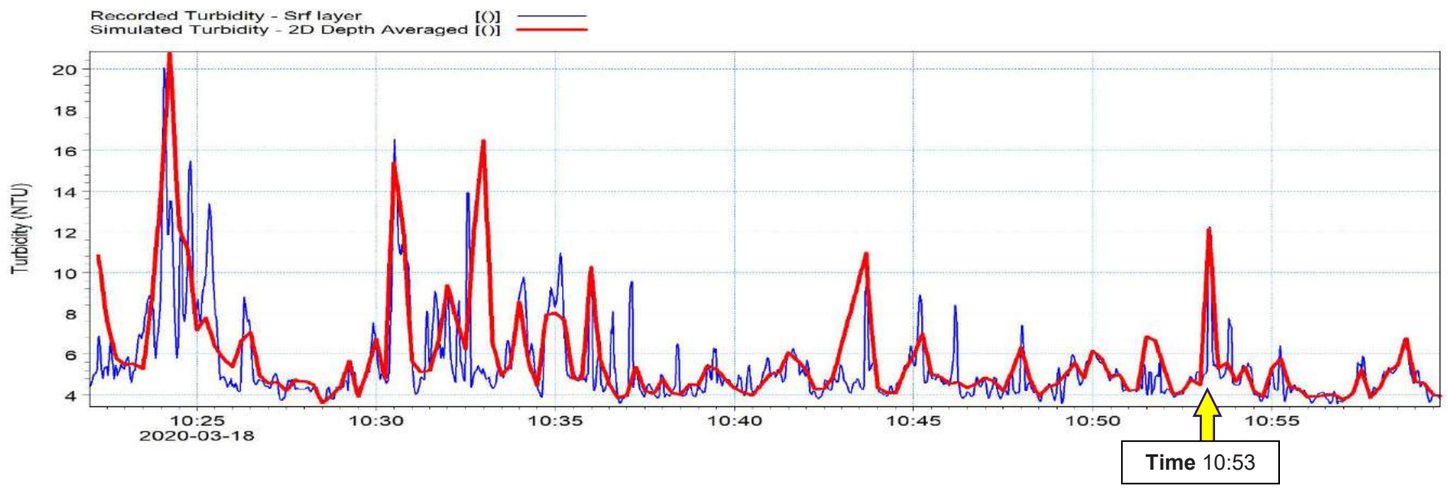

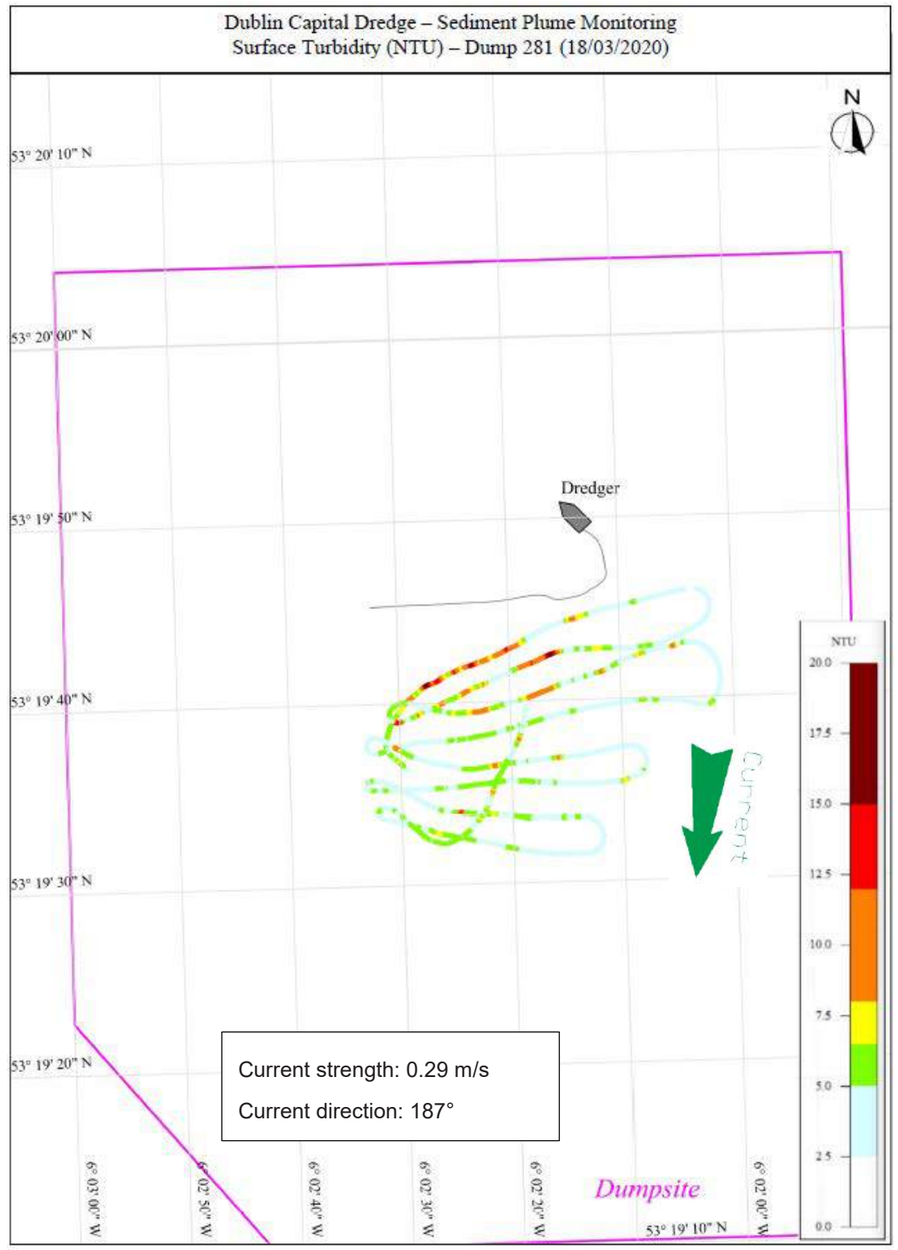

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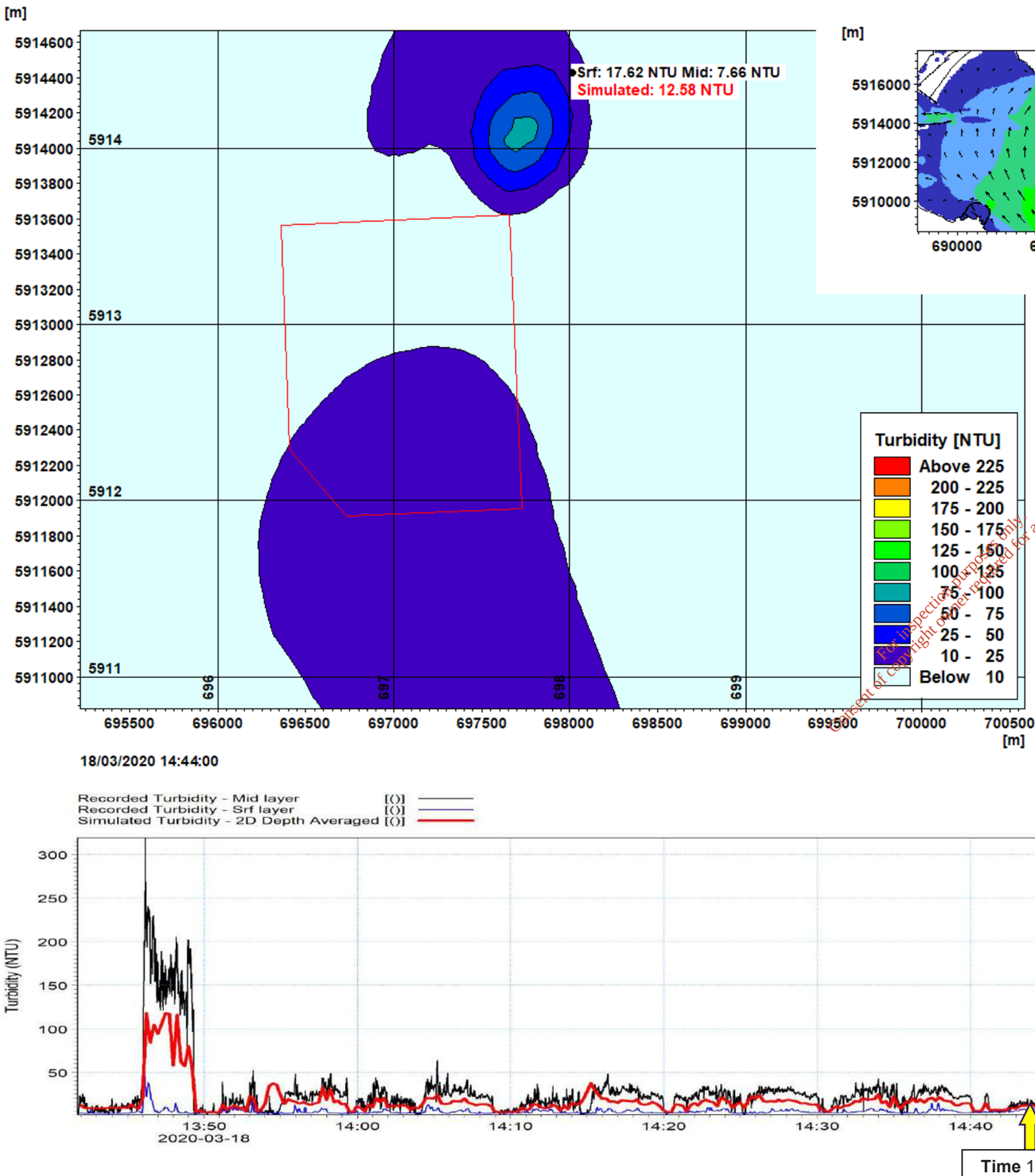
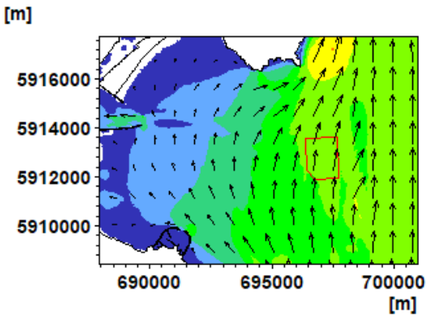
Figure 6.7 Event 281. 2D Sediment plume envelope *c.* 31min after initial sediment release with current speed and direction insert (top left). Extent of survey data (top right) and comparison with simulated data (bottom left)

EPA Export 28-04-2021:02:38:35





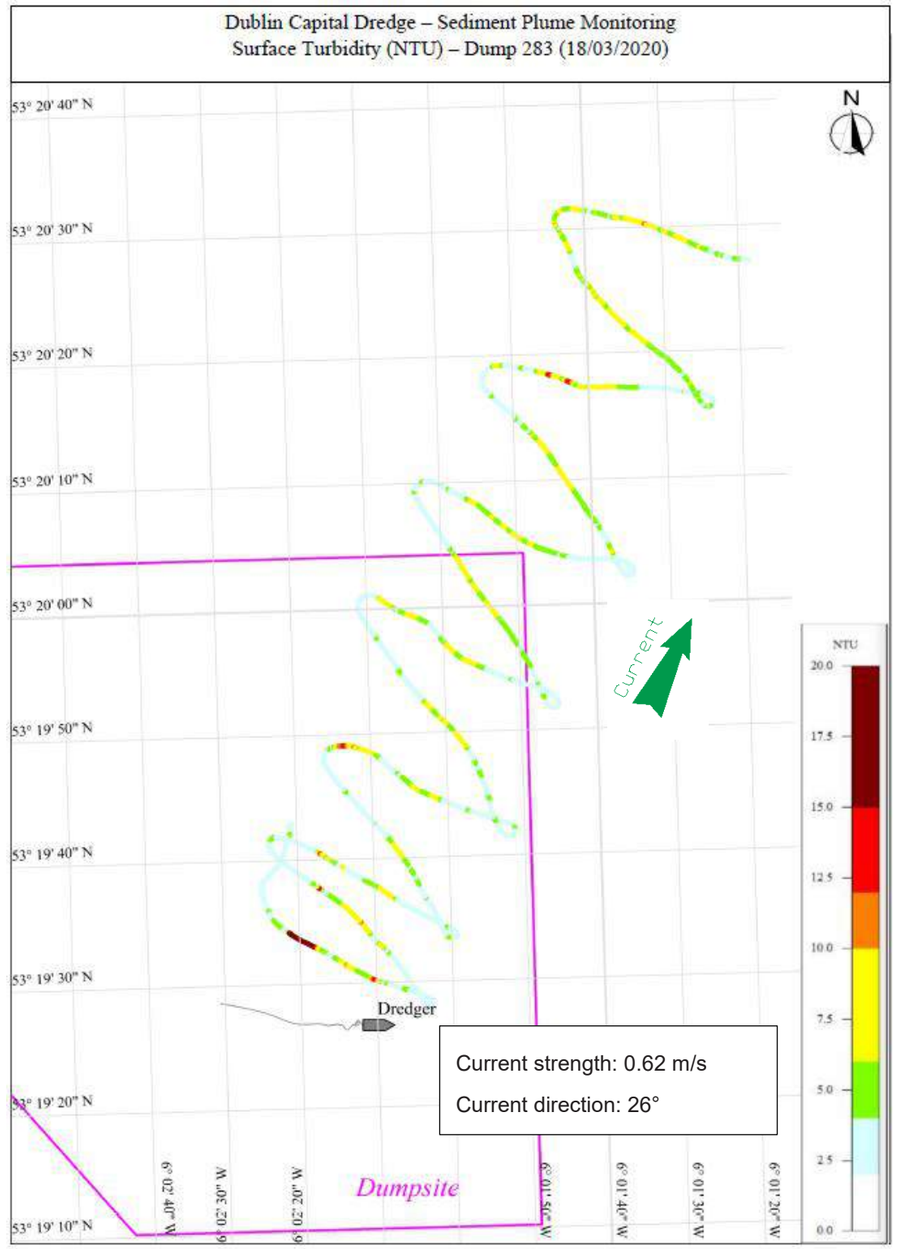


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Figure 6.8 283: Event 283. 2D Sediment plume envelope *c.* 1hr 2min after initial sediment release with current speed and direction insert (top left). Extent of survey data (top right) and comparison with simulated data (bottom left)

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7 CONCLUSIONS

Dublin Port Company (DPC) was granted a Dumping at Sea Permit (S0024-01) by the Environmental Protection Agency (EPA) on 13th September 2016 for the loading and dumping at sea of dredged material arising from capital dredging as part of the Alexandra Basin Redevelopment (ABR) Project. The permit sets out in detail the conditions under which DPC will carry out loading and dumping at sea.

In order to satisfy Condition 4.11 of this permit RPS undertook an extensive modelling programme to validate the numerical modelling parameters used in Appendix C: Coastal Process Modelling to the Natura Impact Statement submitted as part of the application.

- This was achieved using project specific monitoring data collected by Hydromaster (Hydromaster, 2020).
- Produce sediment plume plots for dumping events of the March 2020 campaign during which dredging took place within the inner Liffey channel over a range of spring and neap tidal conditions.

In summary, this assessment found that:

- The sediment was specified correctly in Appendix C: Coastal Process Modelling to the Natura Impact Statement submitted as part of the application and that the numerical modelling parameters used for this technical assessment were valid and fit for purpose.
- Simulated turbidity levels were generally found to be well within the surface and mid-point envelope of recorded turbidity levels for all dump events.
- Turbidity levels beyond the immediate vicinity of the dump site did not generally exceed the background turbidity levels recorded when there was no dumping. This is confirmed by the Hydromaster survey tracks presented in Appendix A.
- Sediment plumes did not disperse into the inner Dublin Bay area.
- The tidal conditions at the dump site are fully dispersive for material dominated by silt.

Based on the findings of this technical assessment it can be concluded that the dispersion, fate of sediment plumes arising from the dredging and disposal operations associated with the ABR Project will not significantly impact water quality in Dublin Bay or beyond.

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8 REFERENCES

Hydromaster. (2020). Dublin Bay Sediment Plume Monitoring Report.

RPS. (2003). Irish Coastal Protection Strategy Study.

RPS. (2014). Alexandra Basin Redevelopment Project - Environmental Impact Statement (Vol. 1).

RPS. (2014). Appendix C: Coastal Process Modelling to the Natura Impact Statement submitted as part of the Dumping at Sea Permit application.

RPS. (2018). Alexandra Basin Redevelopment Project - Construction Environmental Management Plan.

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Appendix A Hydromaster Survey Monitoring Tracks and Comparison with Model Simulations

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A.1 Vessel track and Turbidity data (surface and mid-water)

The following Figures have been taken from (Hydromaster, 2020) and display the track of the survey vessel with turbidity data overlaid, the current direction and speed is also displayed:

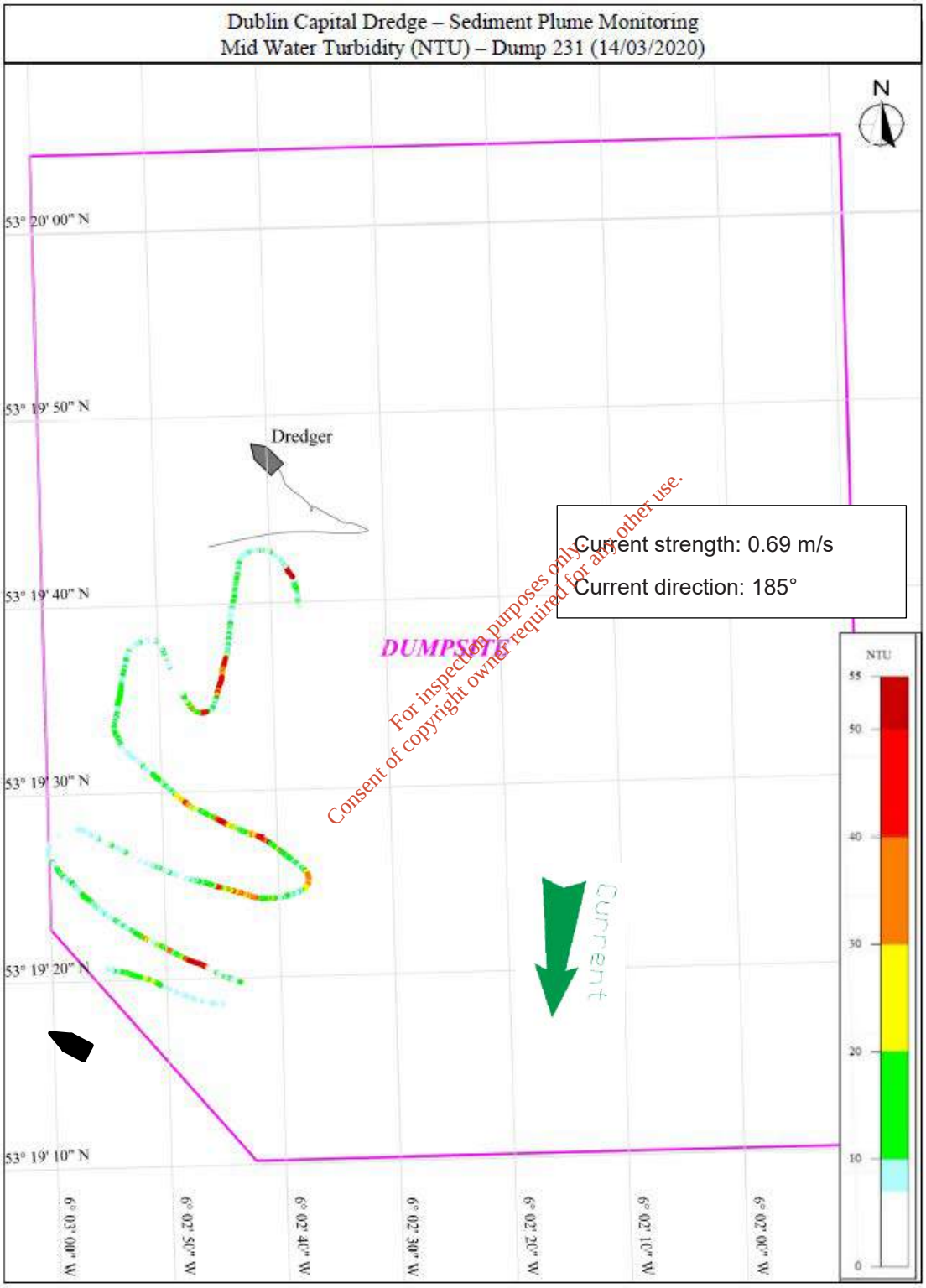

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Figure 8.1: Dump 231 Survey track with mid water turbidity [NTU]

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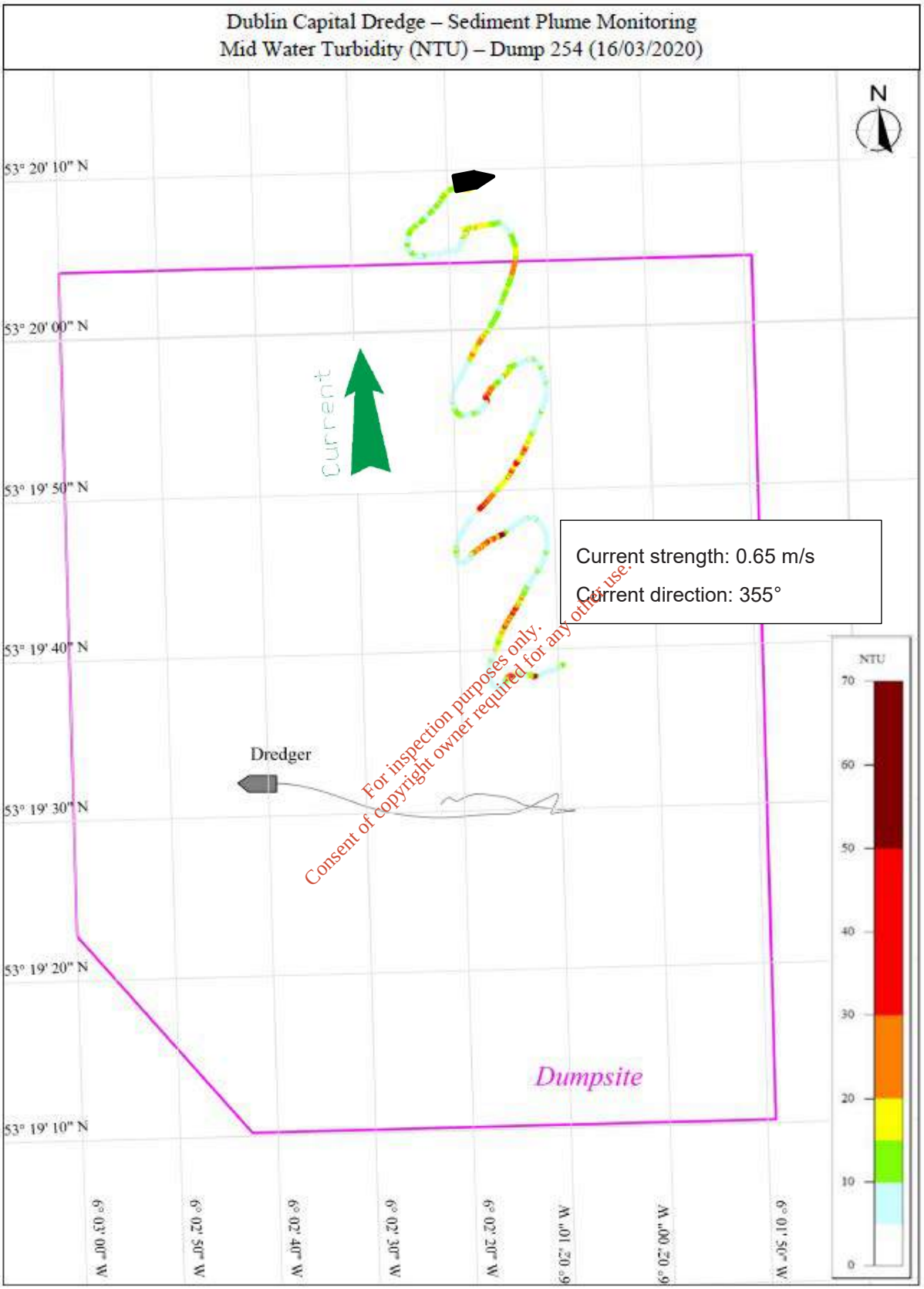

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Figure 8.2: Dump 254 Survey track with mid water turbidity [NTU]

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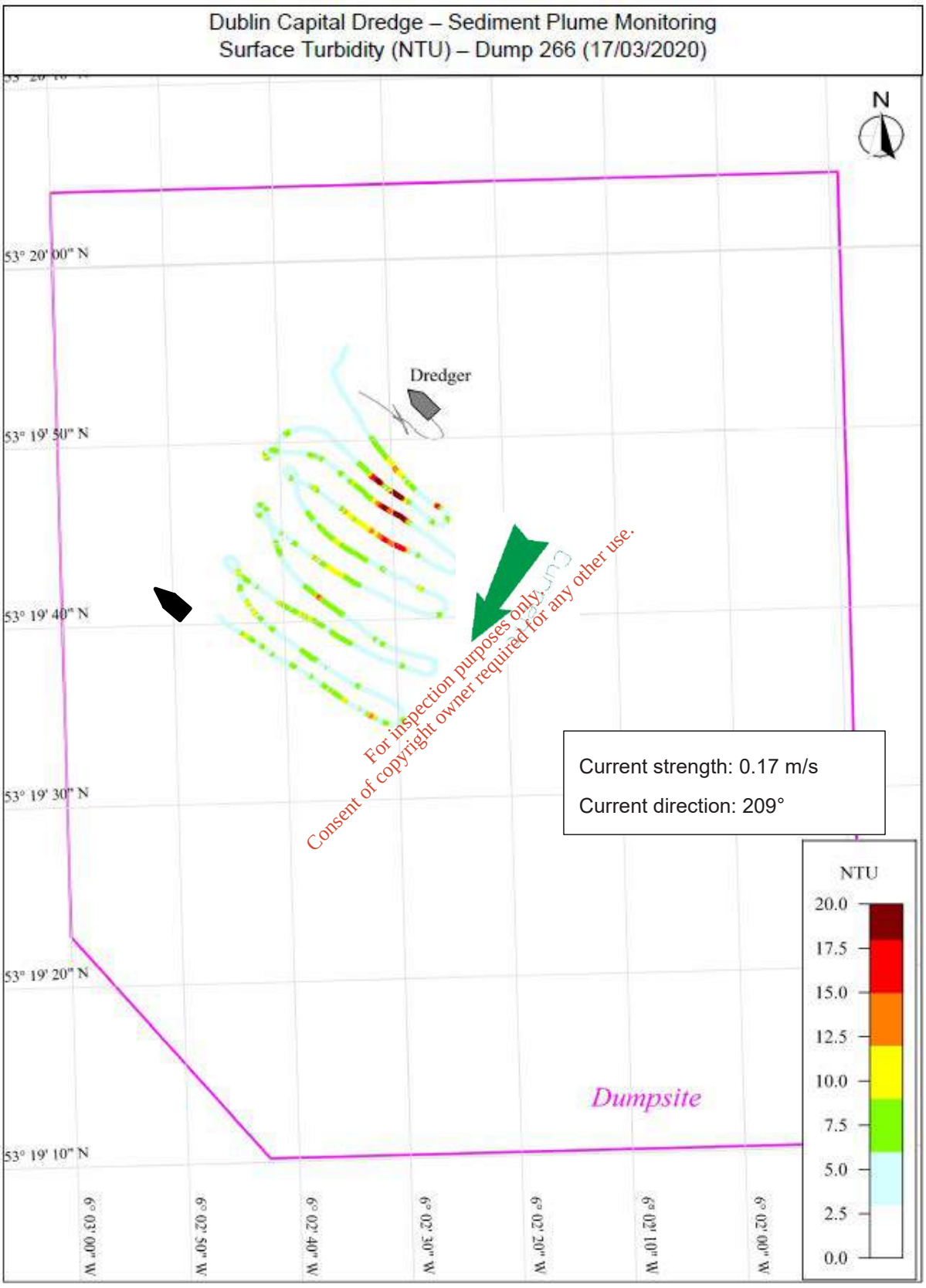

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Figure 8.3: Dump 266 Survey track with surface turbidity [NTU]

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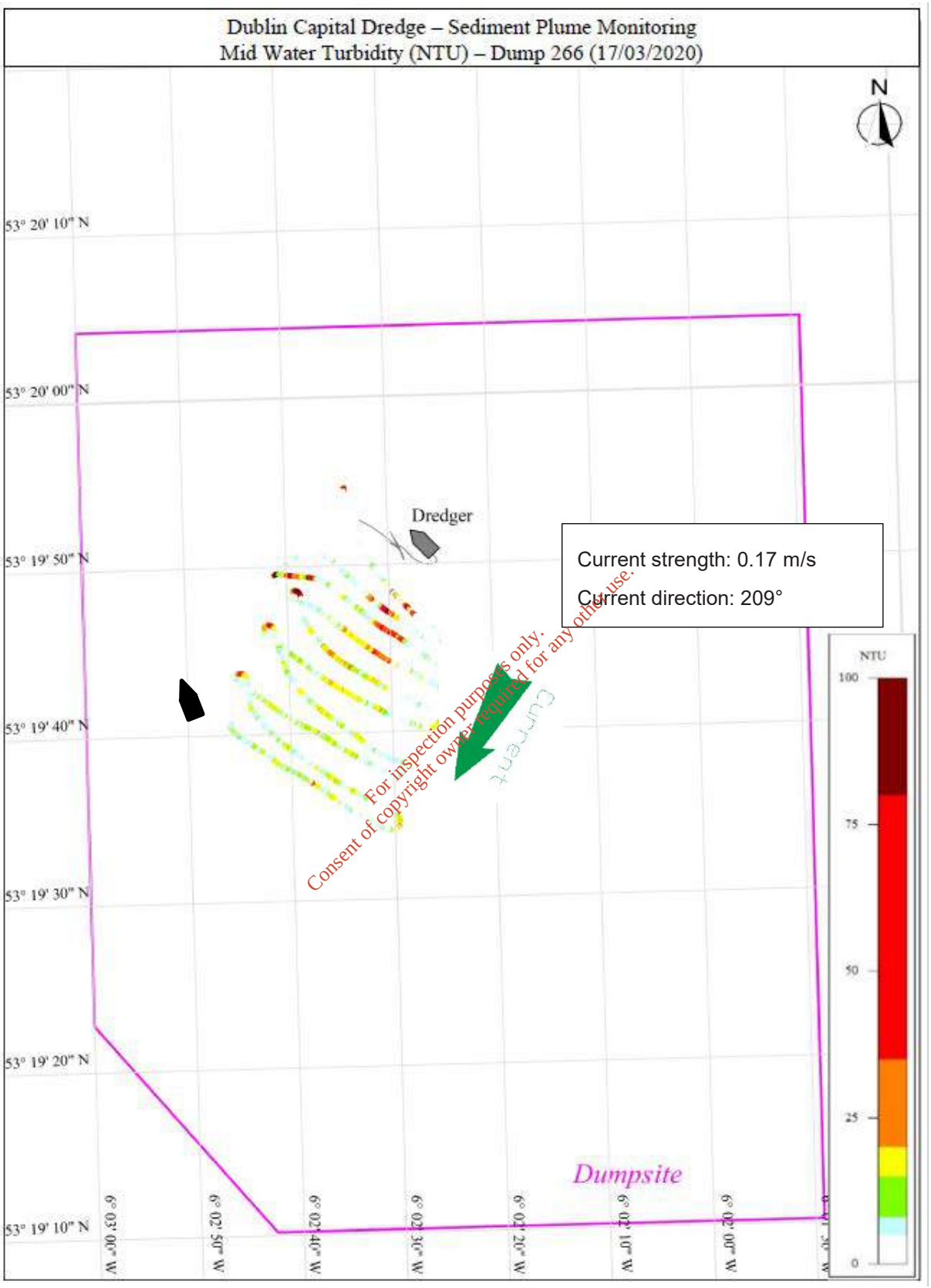

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Figure 8.4: Dump 266 Survey track with mid water turbidity [NTU]

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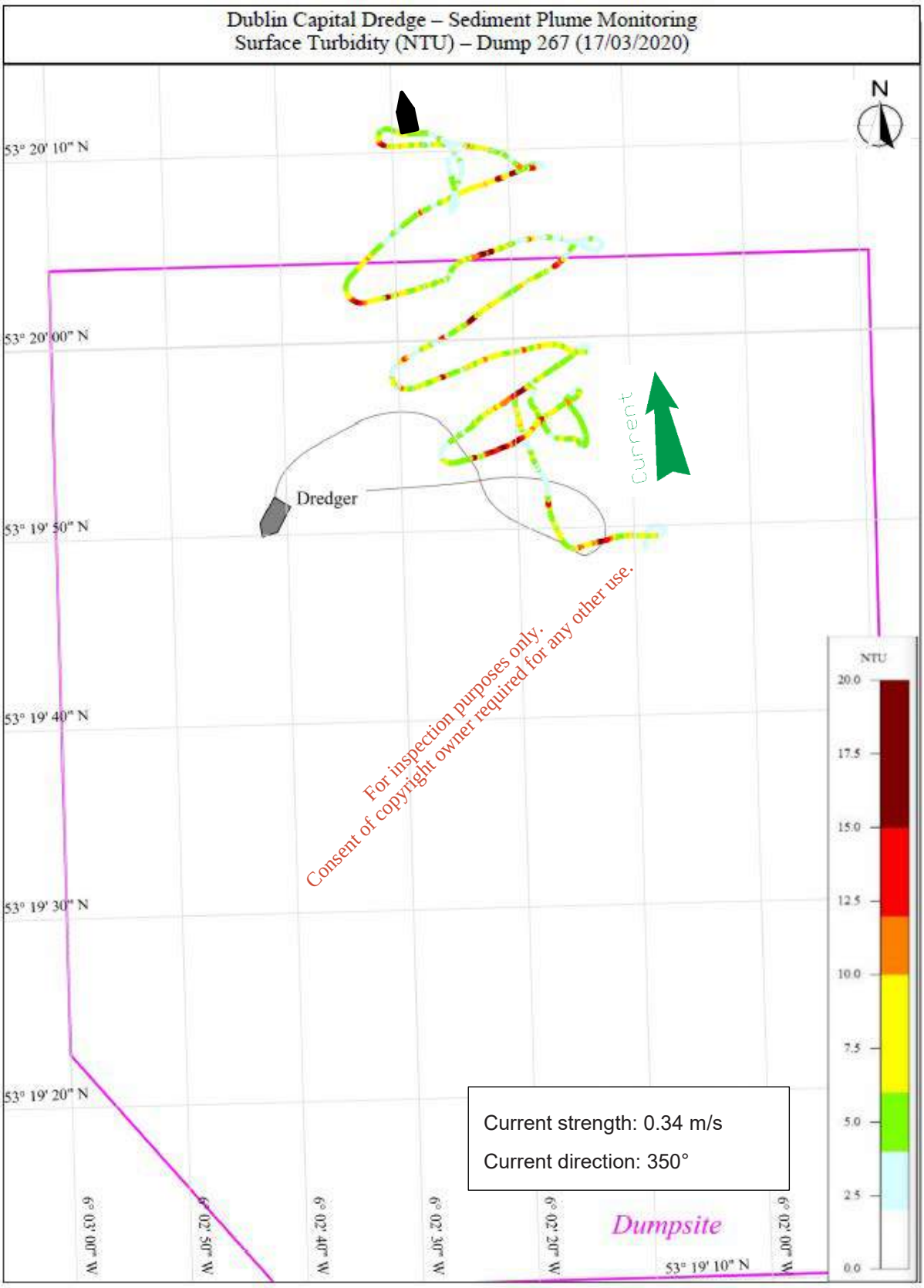

Figure 8.5: Dump 267 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:35

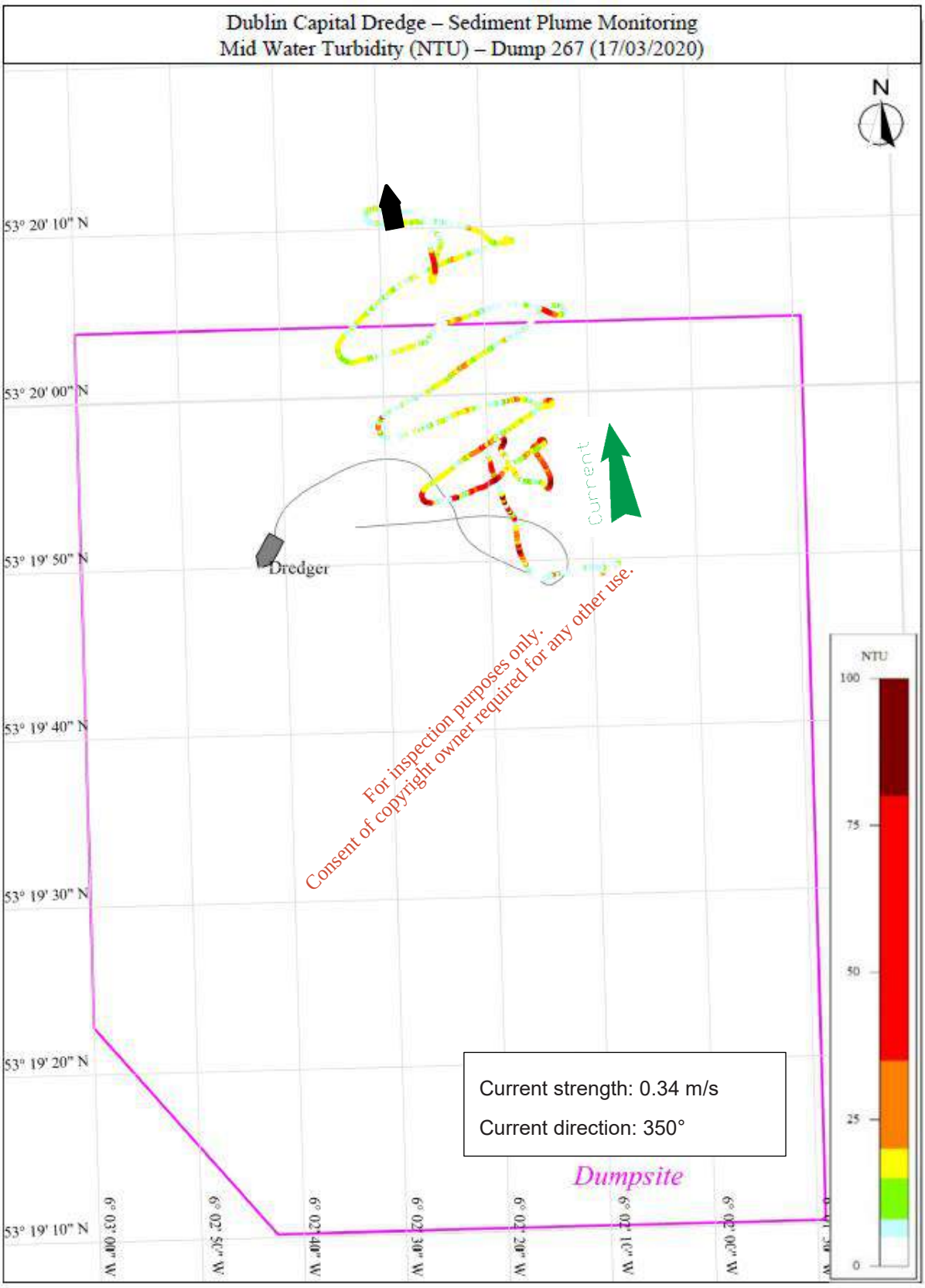

Figure 8.6: Dump 267 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:35

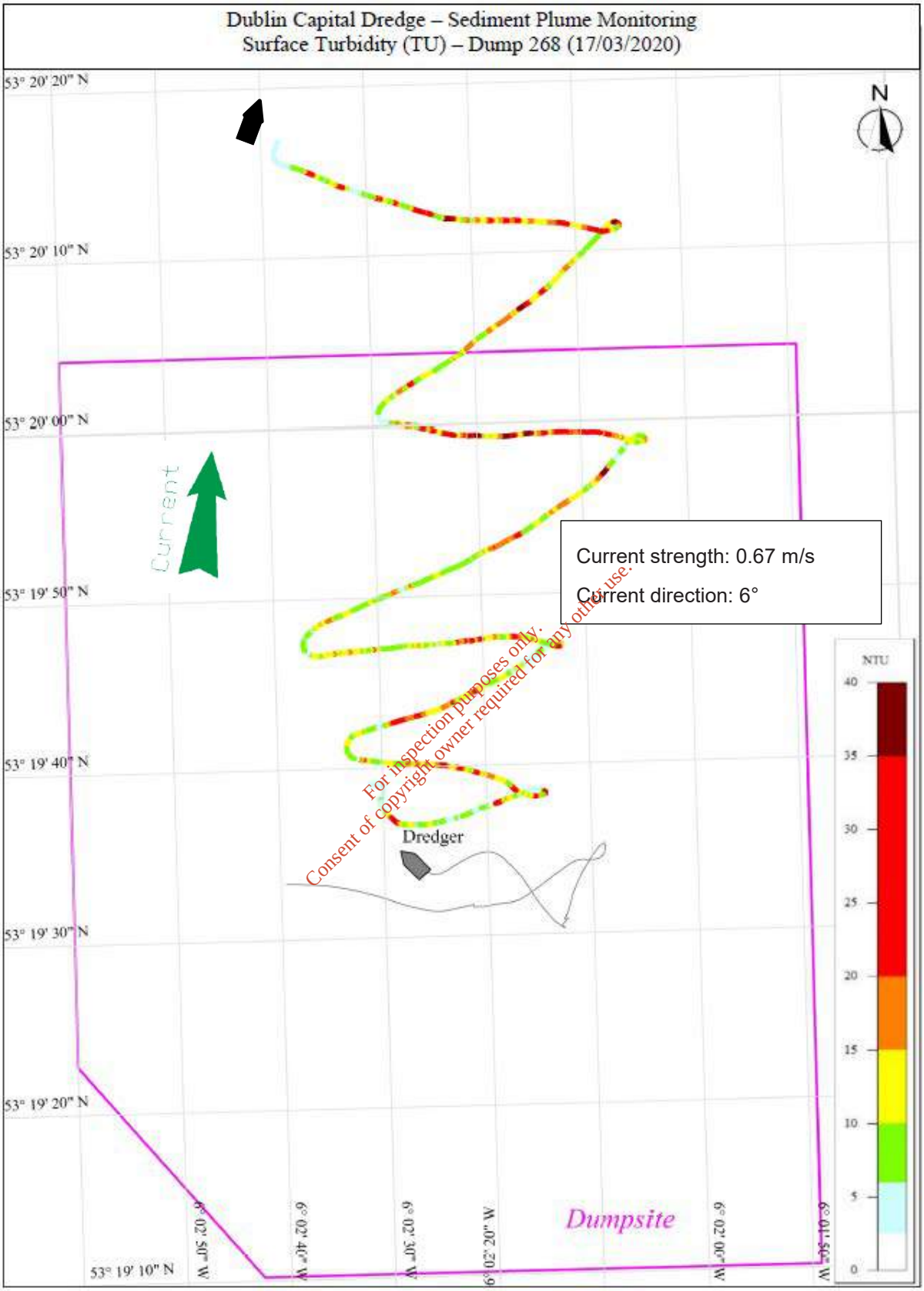

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Figure 8.7: Dump 268 Survey track with surface turbidity [NTU]

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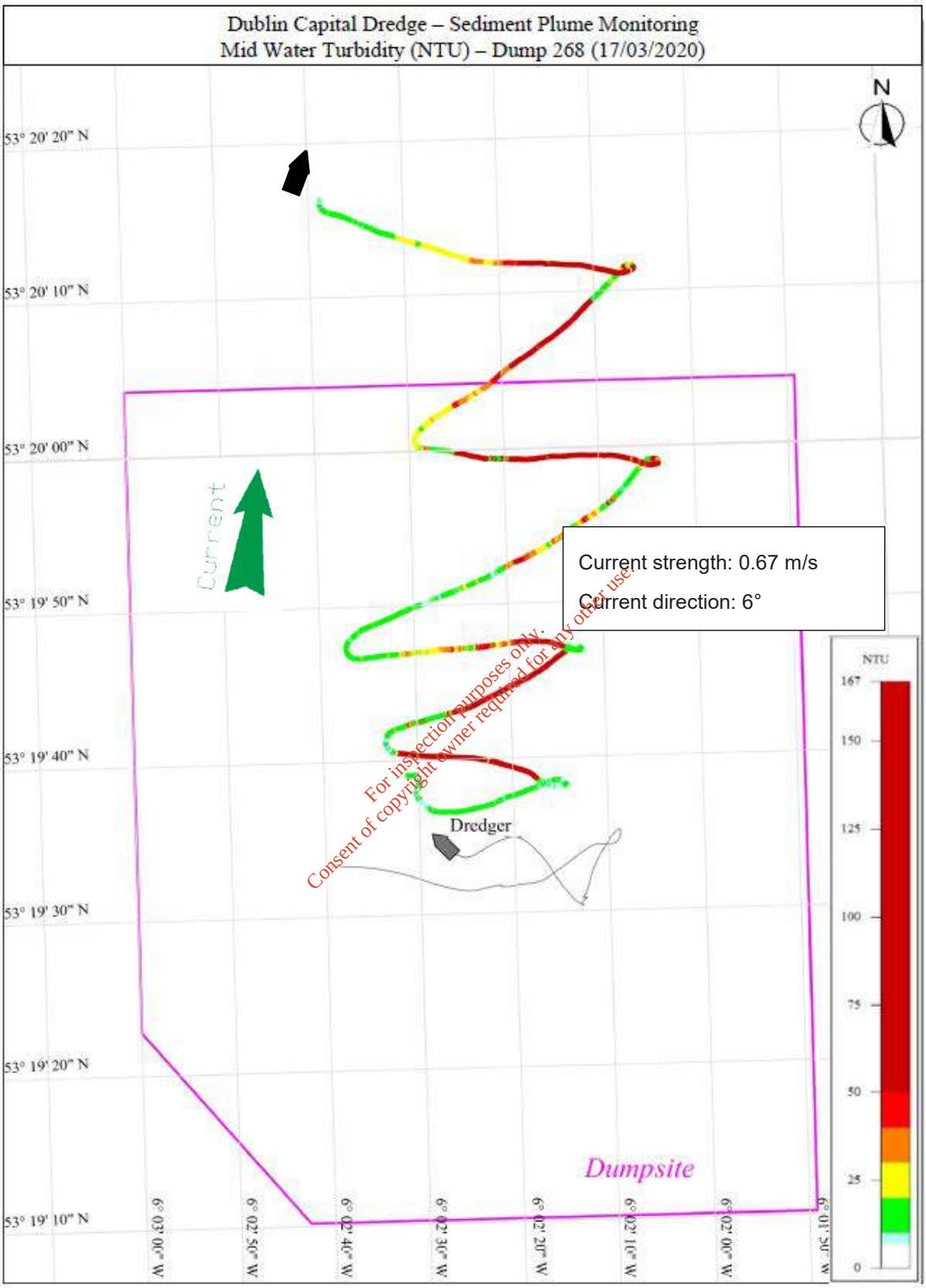

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Figure 8.8: Dump 268 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:35

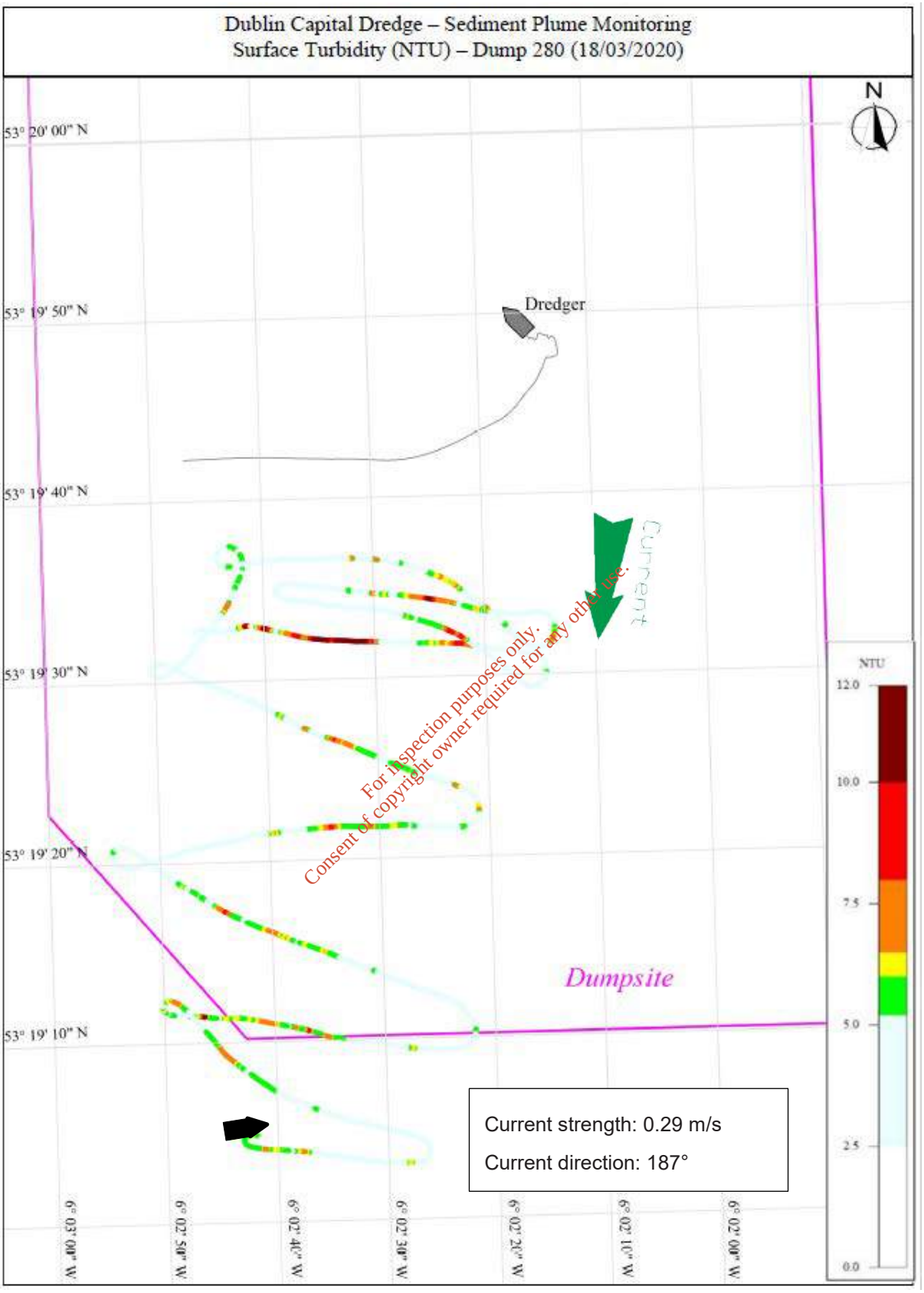

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Figure 8.9: Dump 280 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:35

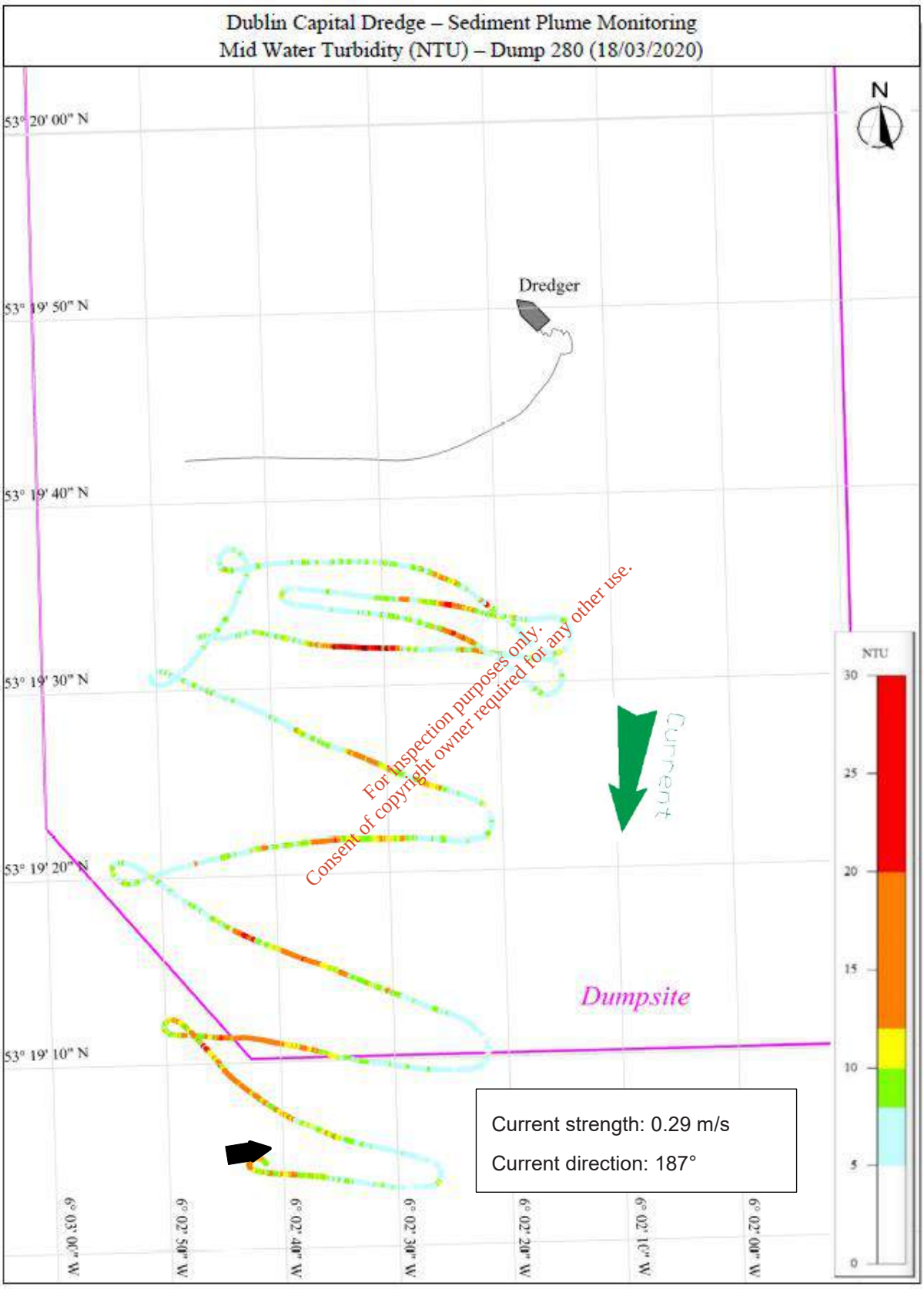

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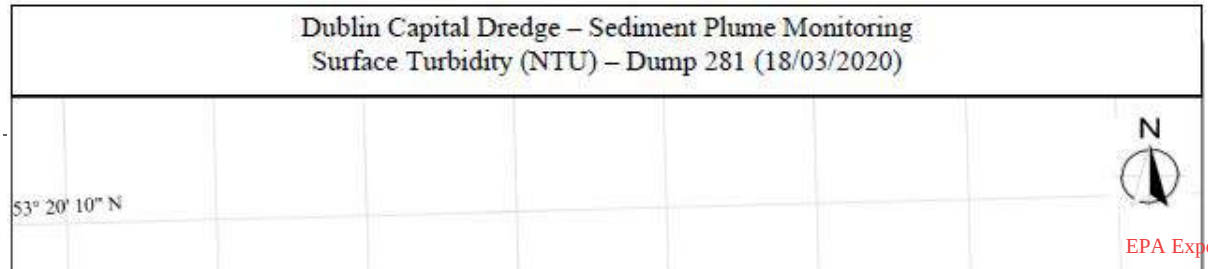
Figure 8.10: Dump 280 Survey track with mid water turbidity [NTU]



EPA Export 28-04-2021:02:38:35

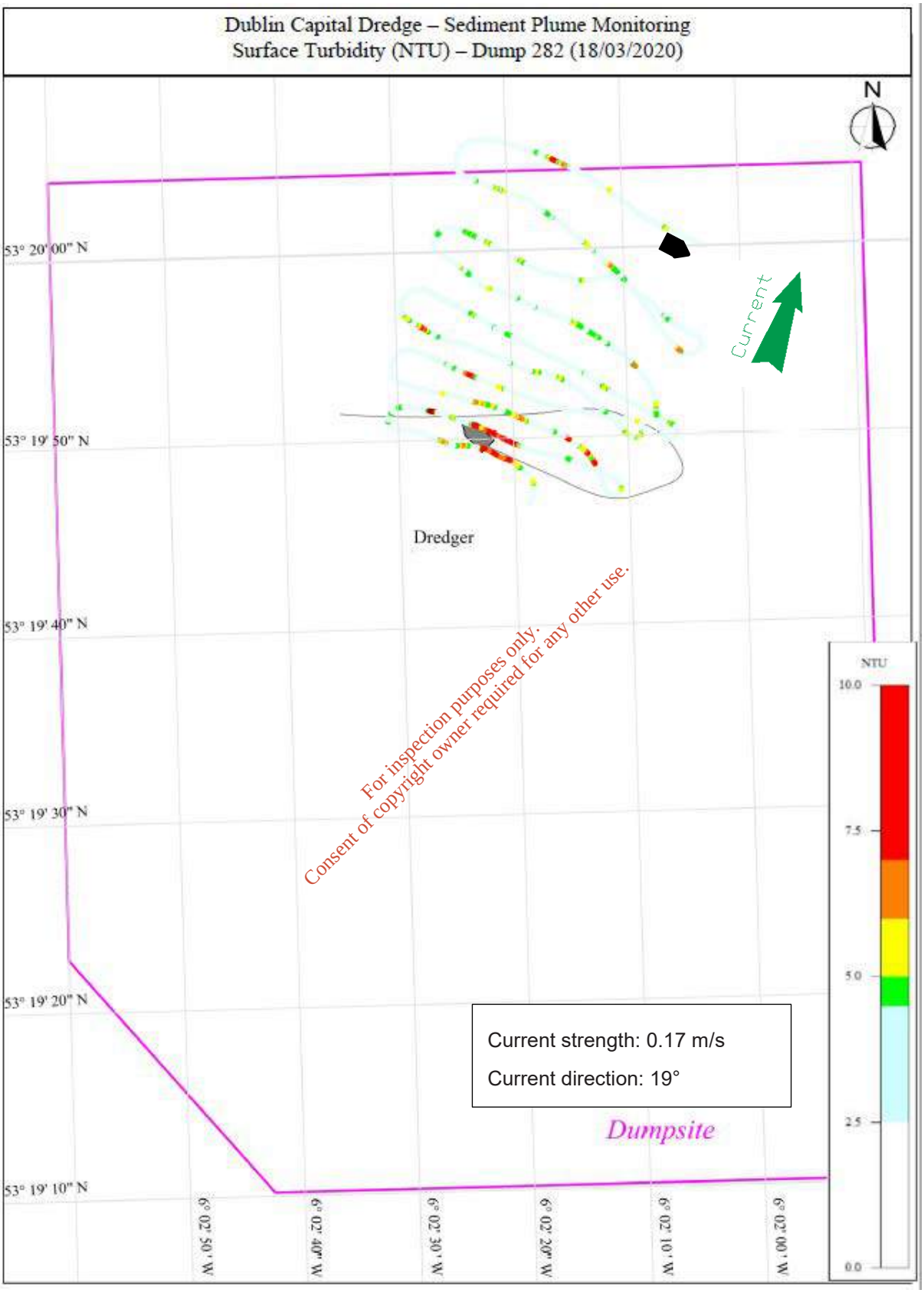


Figure 8.12: Dump 282 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:35

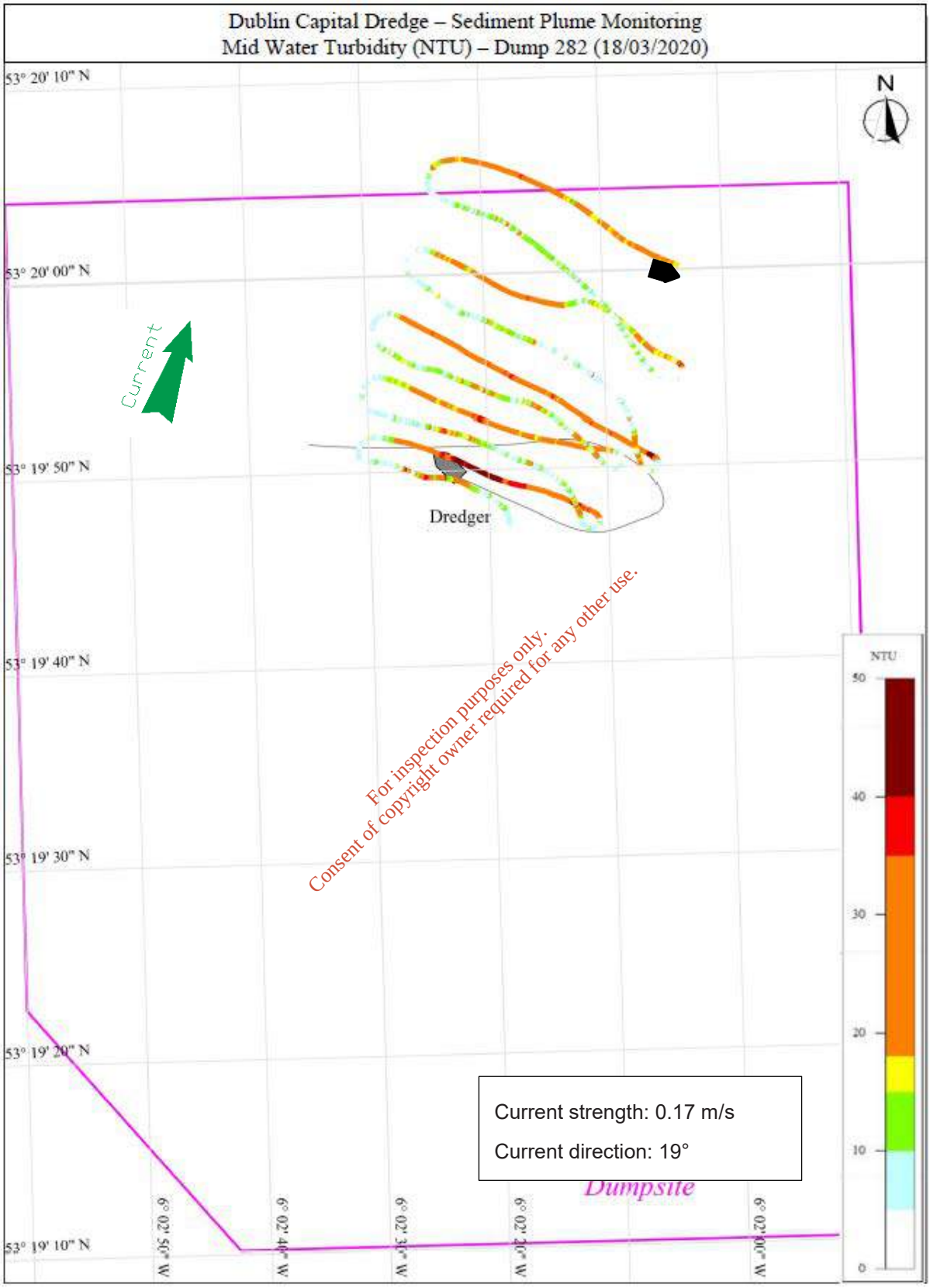


Figure 8.13: Dump 282 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:35

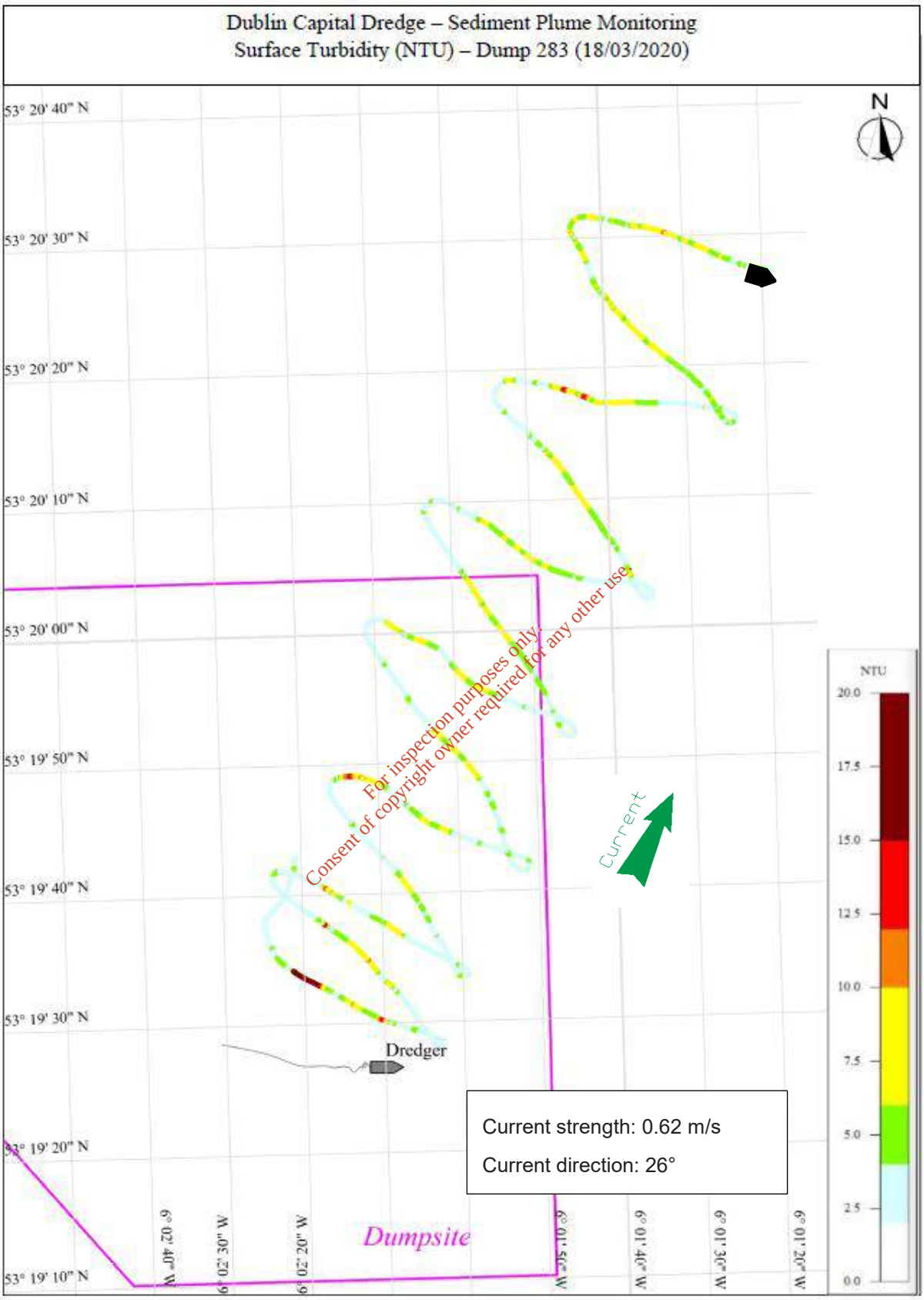


Figure 8.14: Dump 283 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:35

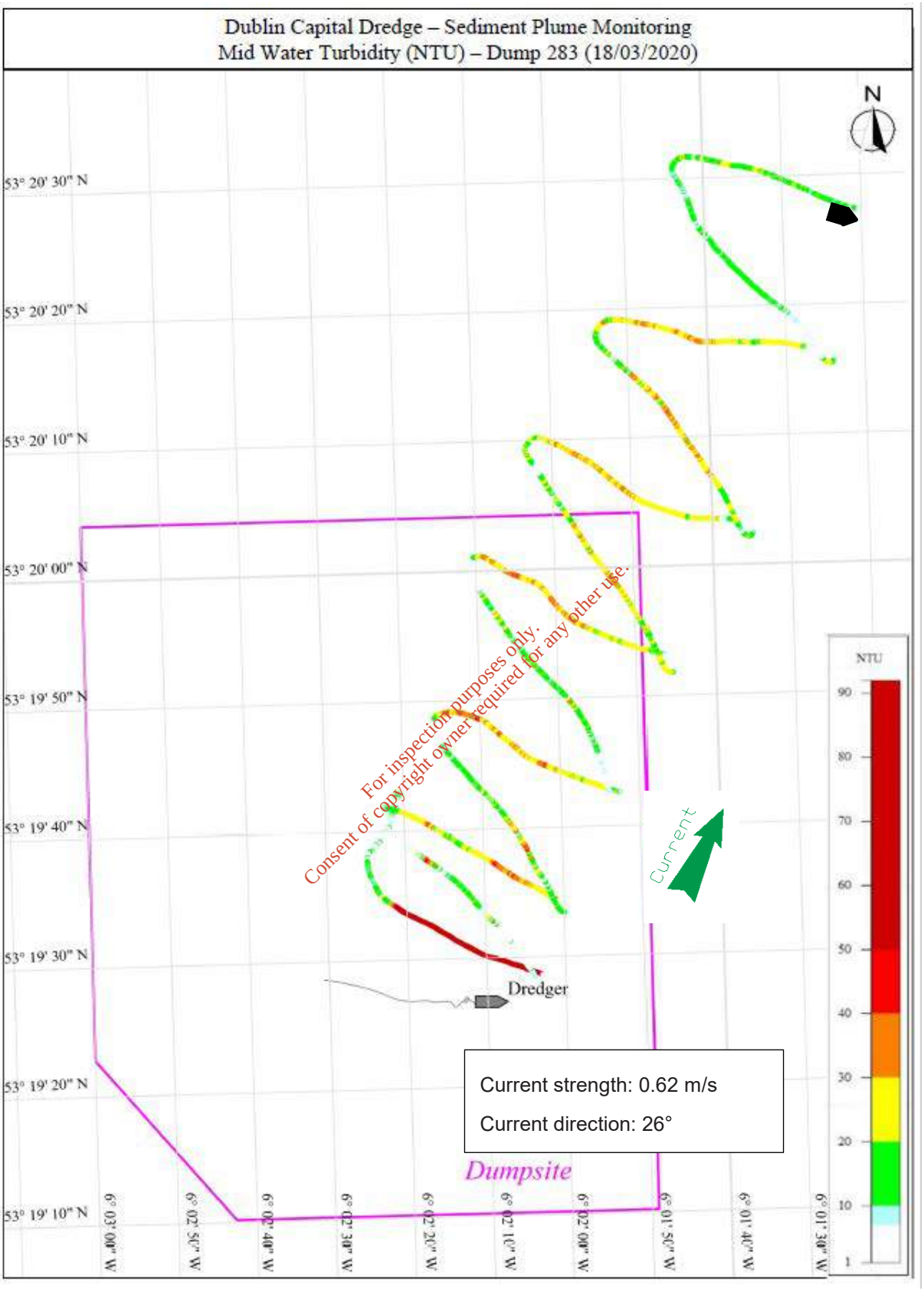


Figure 8.15: Dump 283 Survey track with mid water turbidity [NTU]

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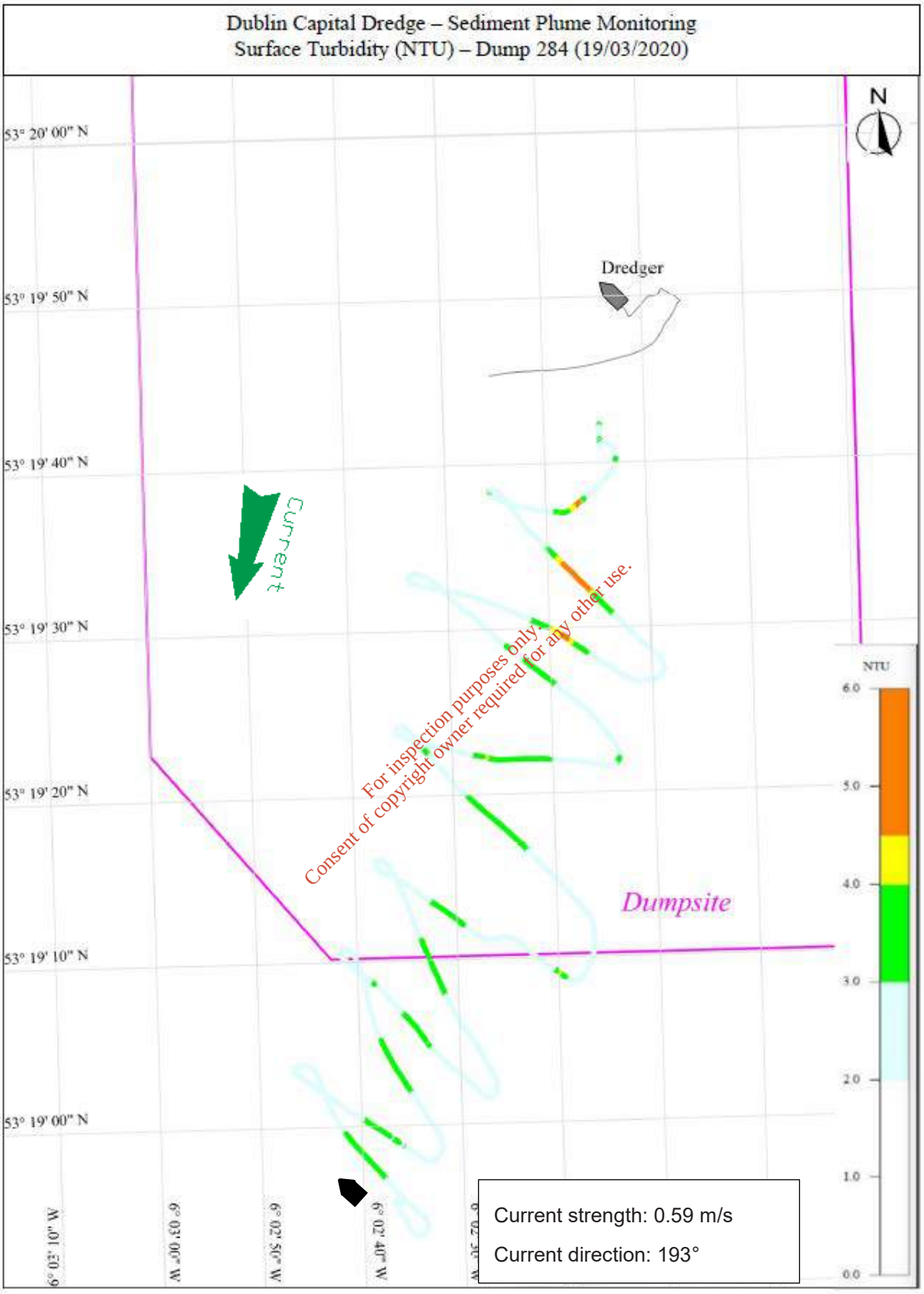

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Figure 8.16: Dump 284 Survey track with surface turbidity [NTU]

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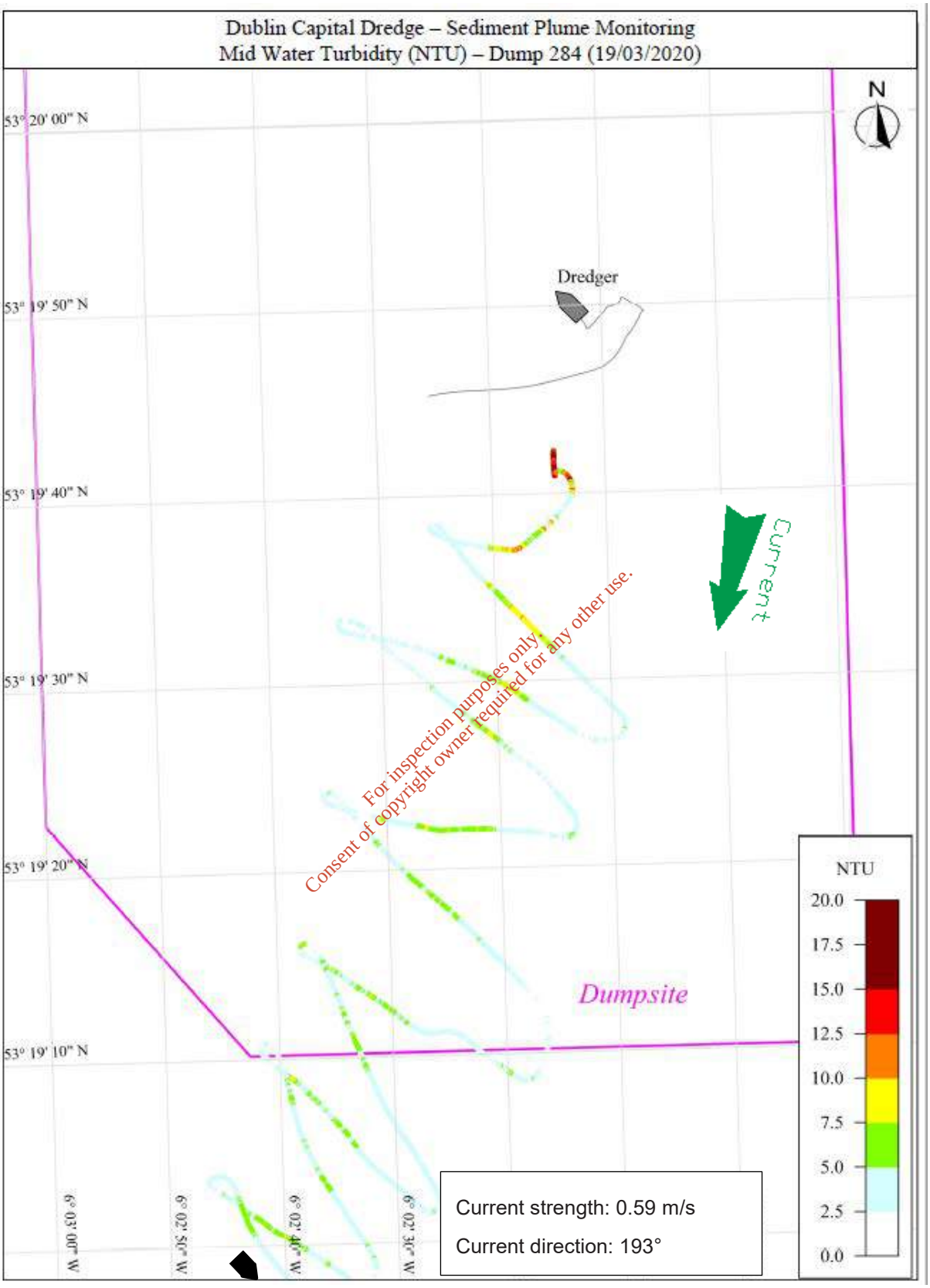

Figure 8.17: Dump 284 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:35

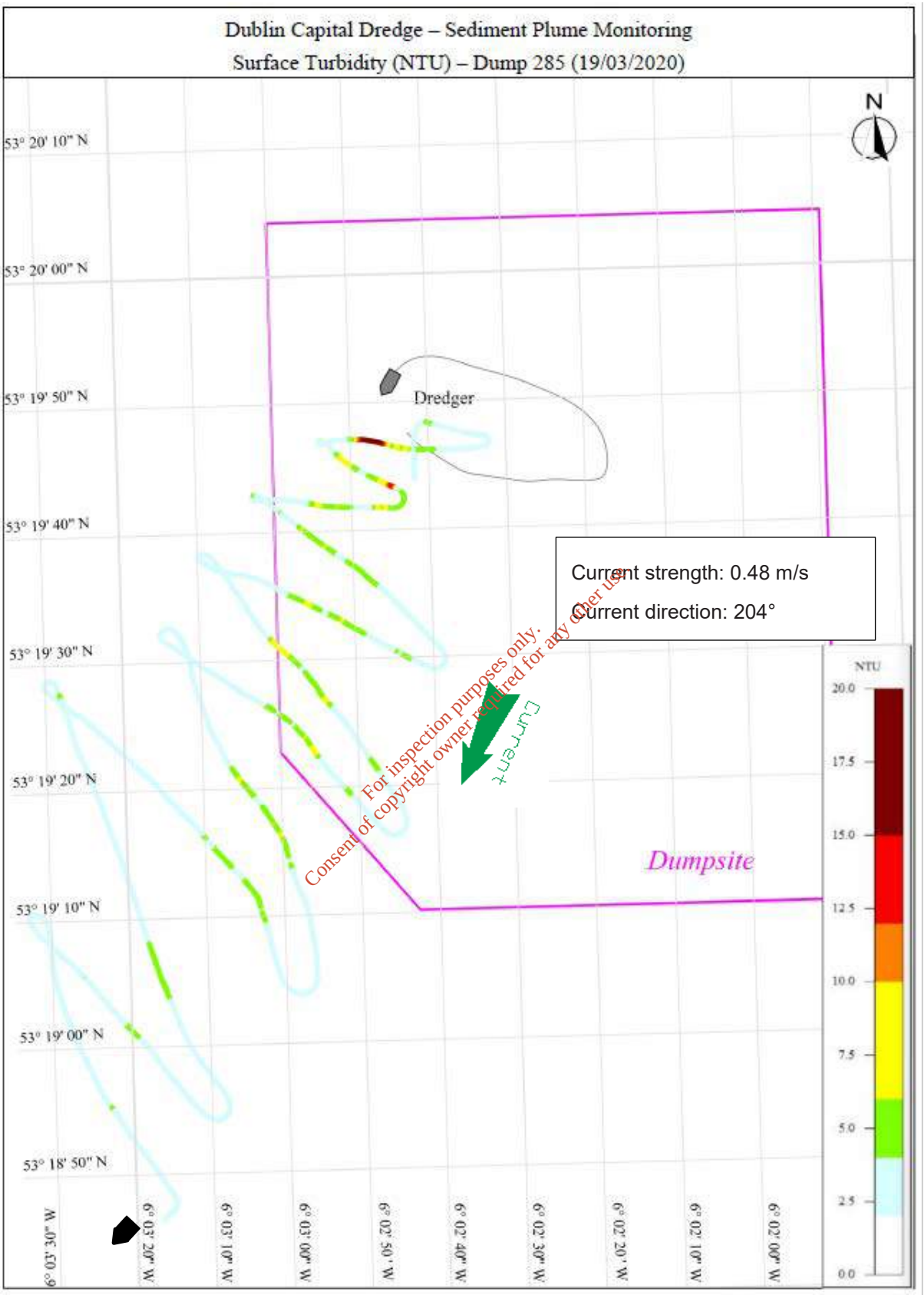

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Figure 8.18: Dump 285 Survey track with surface turbidity [NTU]

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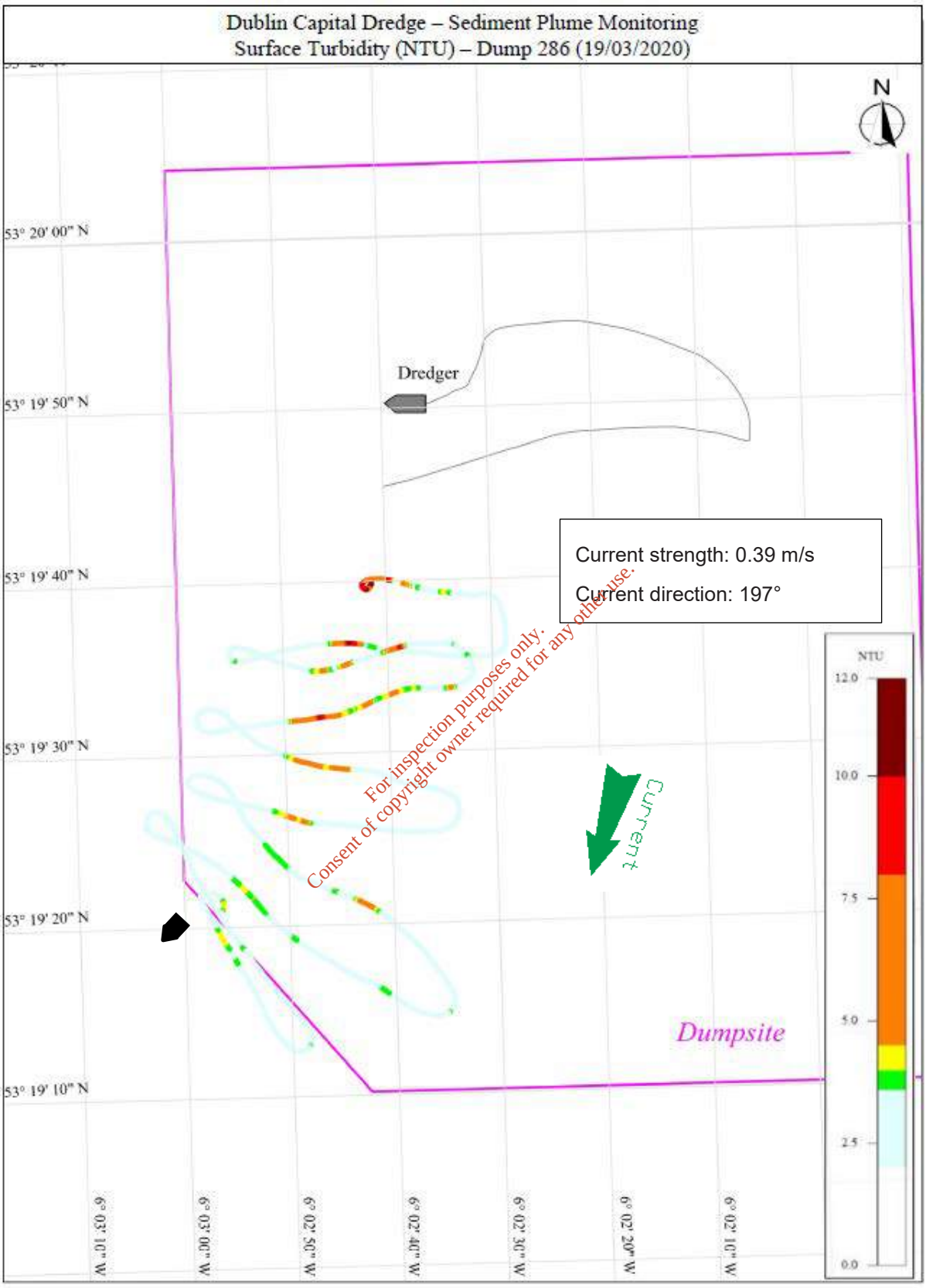

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Figure 8.19: Dump 286 Survey track with surface turbidity [NTU]

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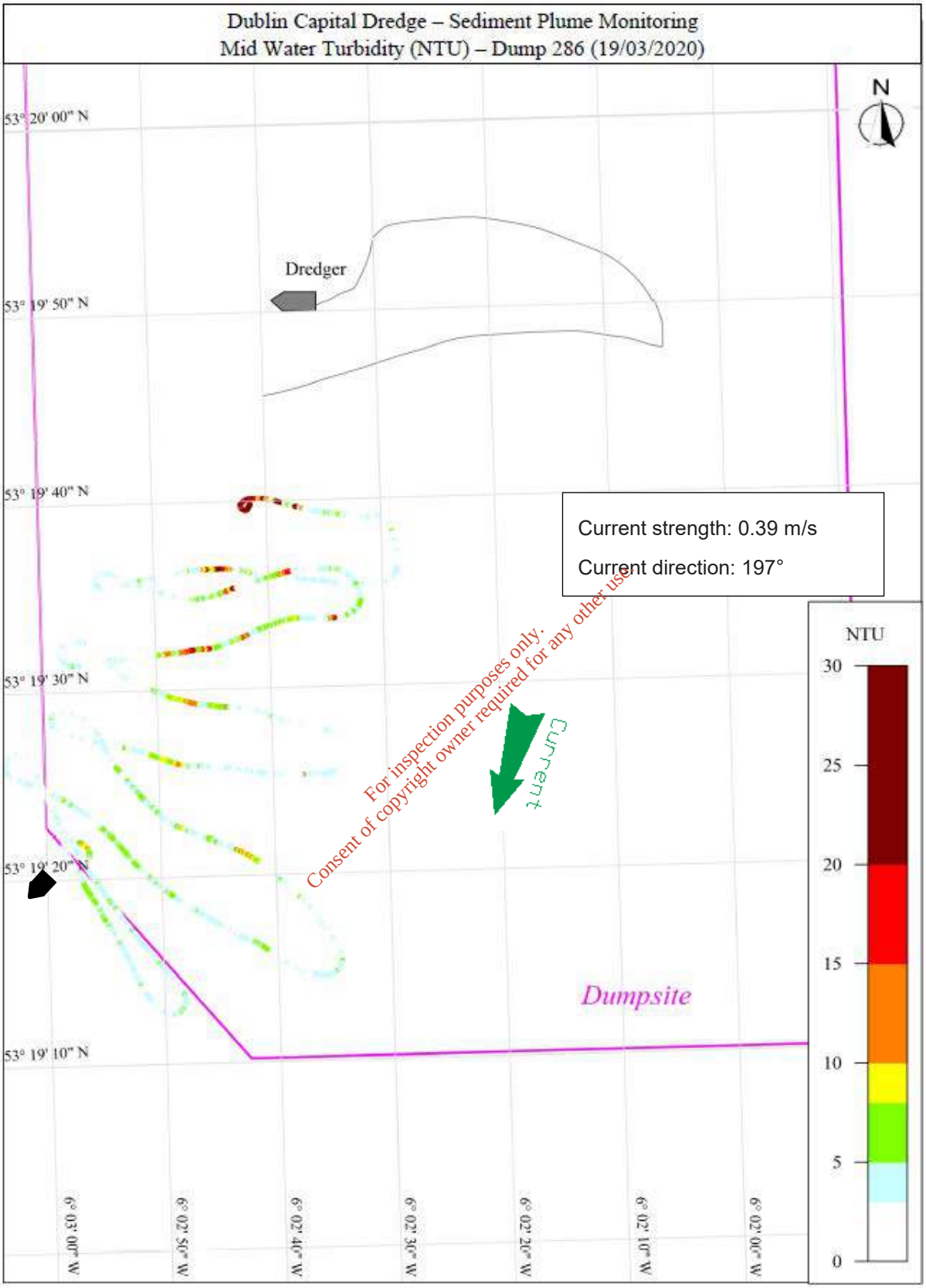

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Figure 8.20: Dump 286 Survey track with mid water turbidity [NTU]

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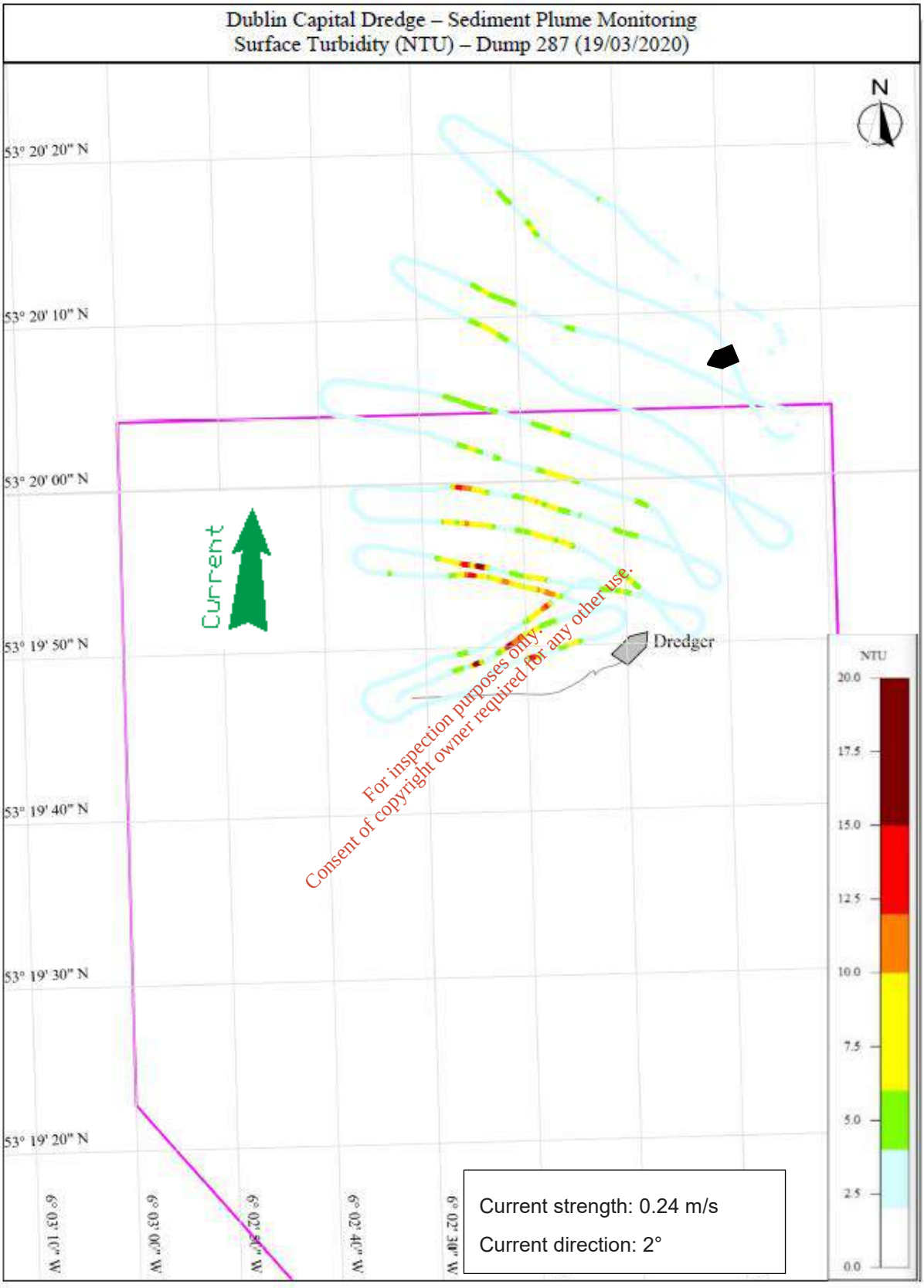

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Figure 8.21: Dump 287 Survey track with surface turbidity [NTU]

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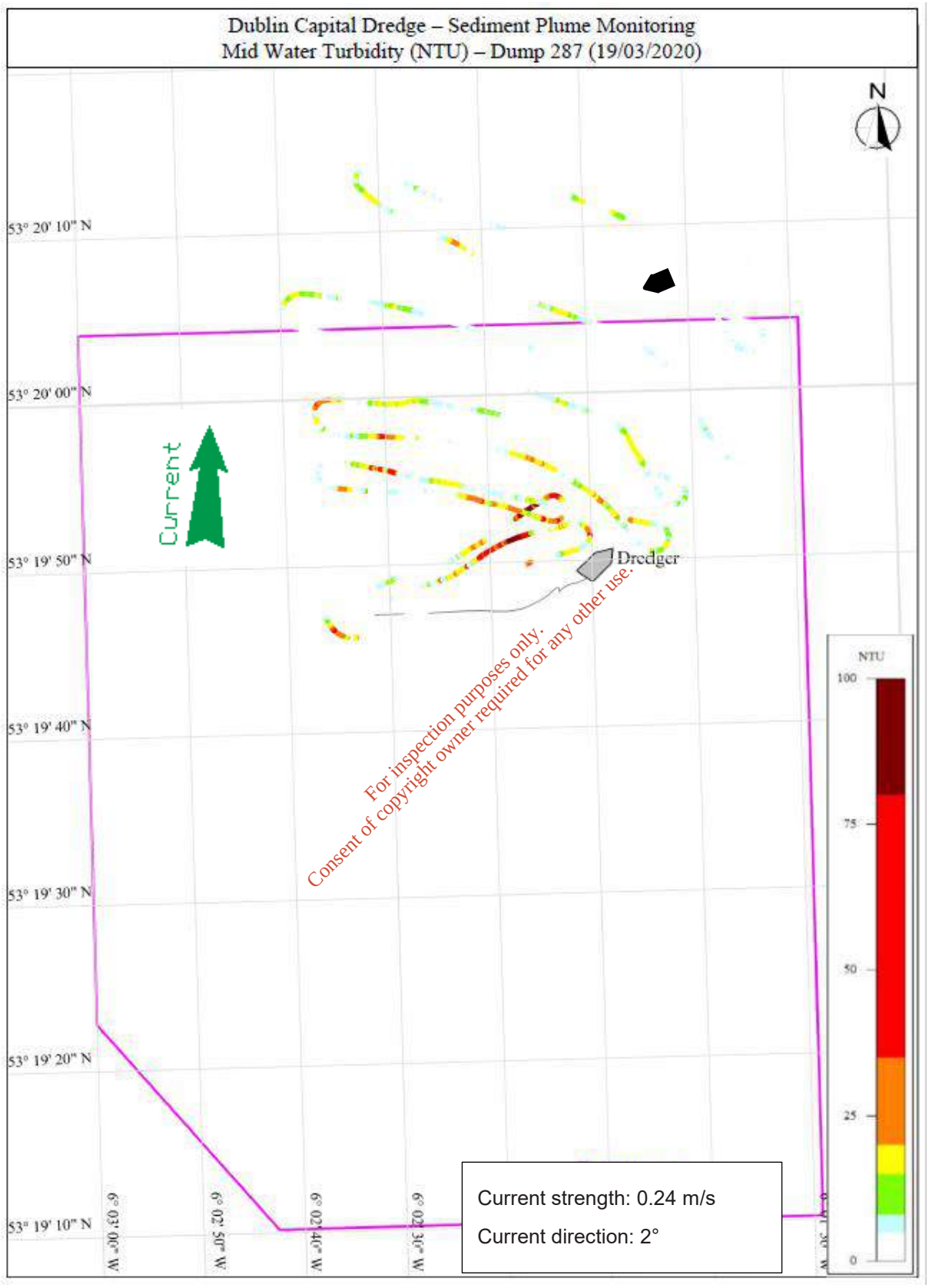

Figure 8.22: Dump 287 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:35

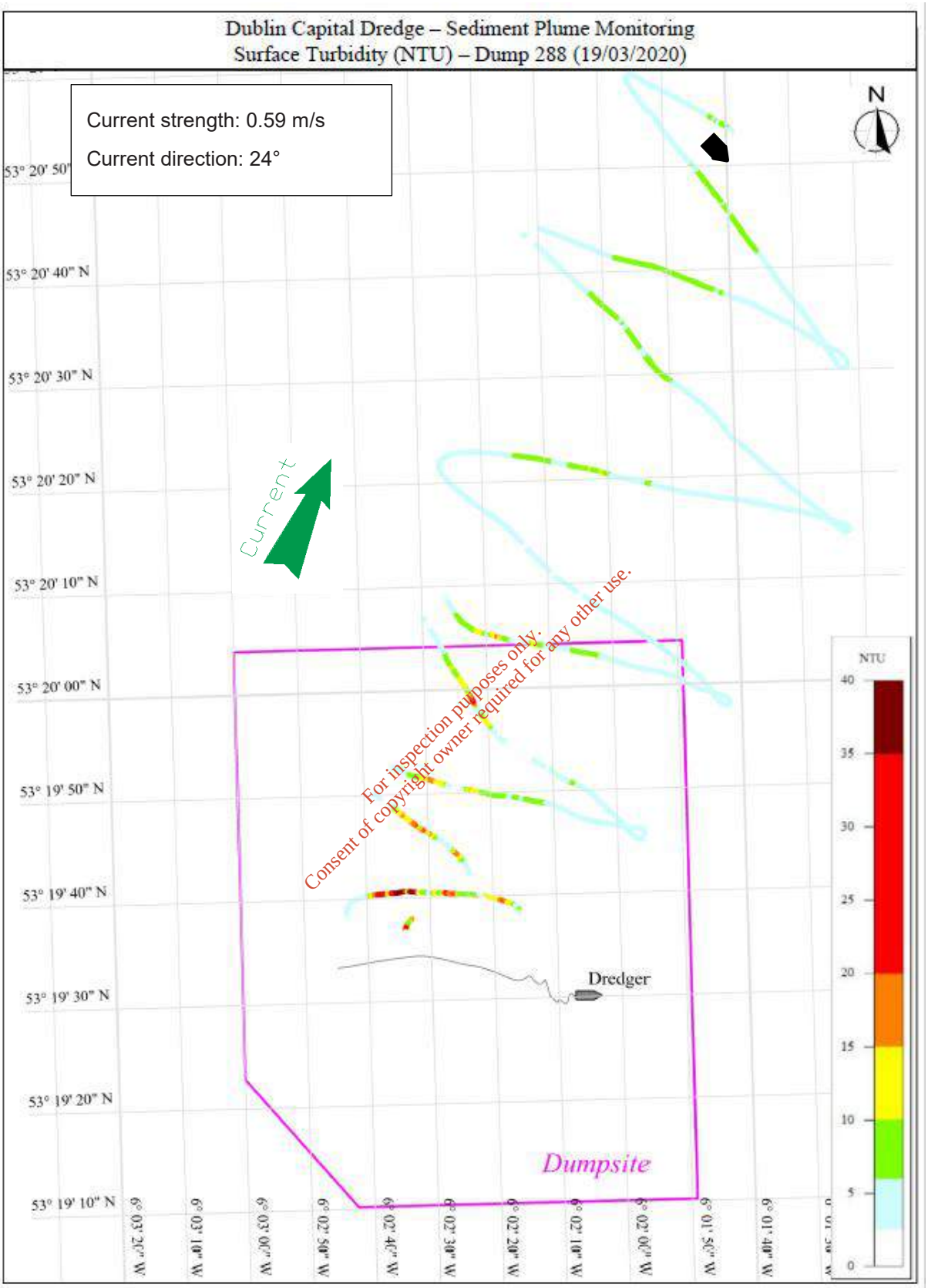

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Figure 8.23: Dump 288 Survey track with surface turbidity [NTU]

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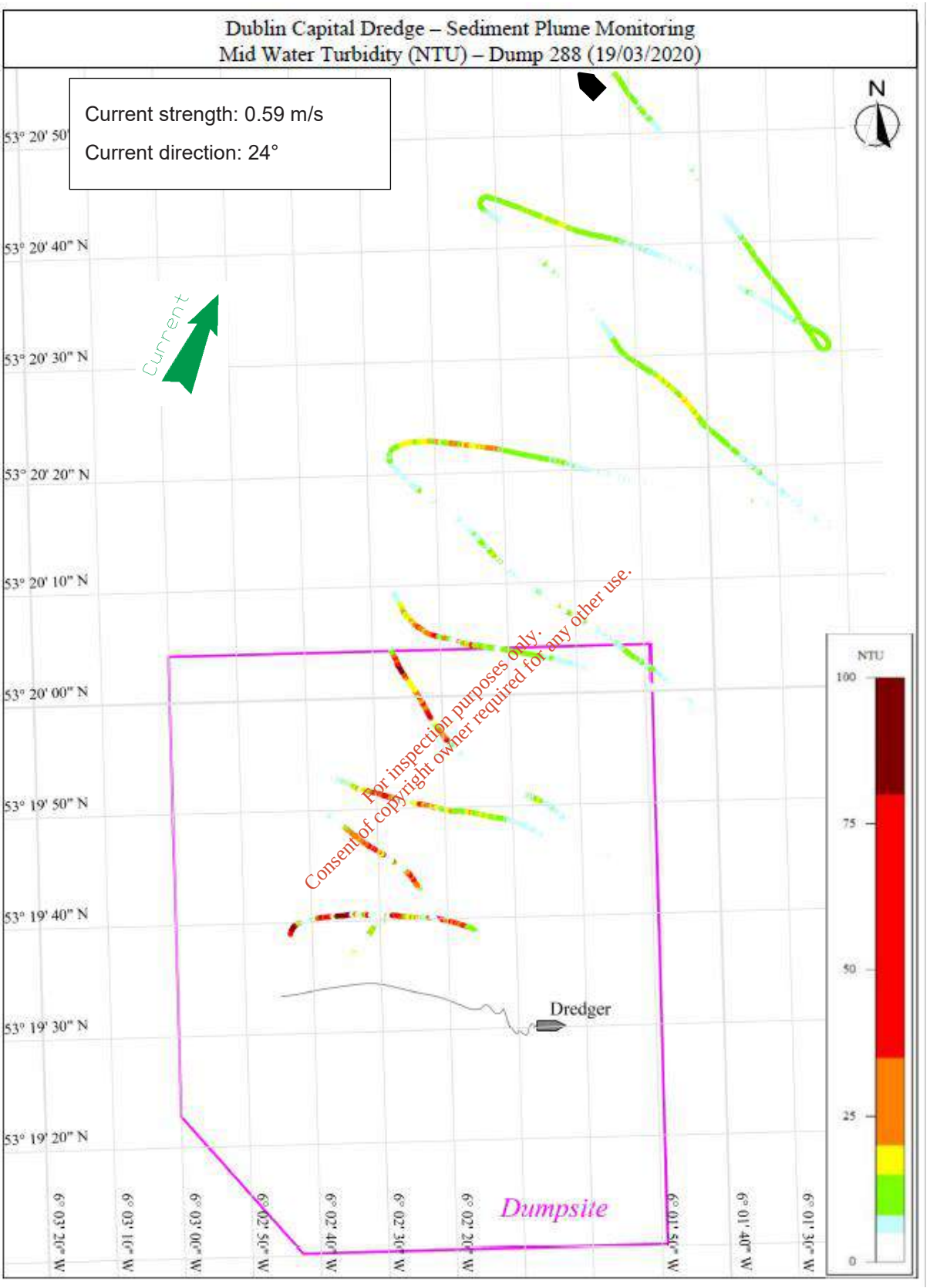
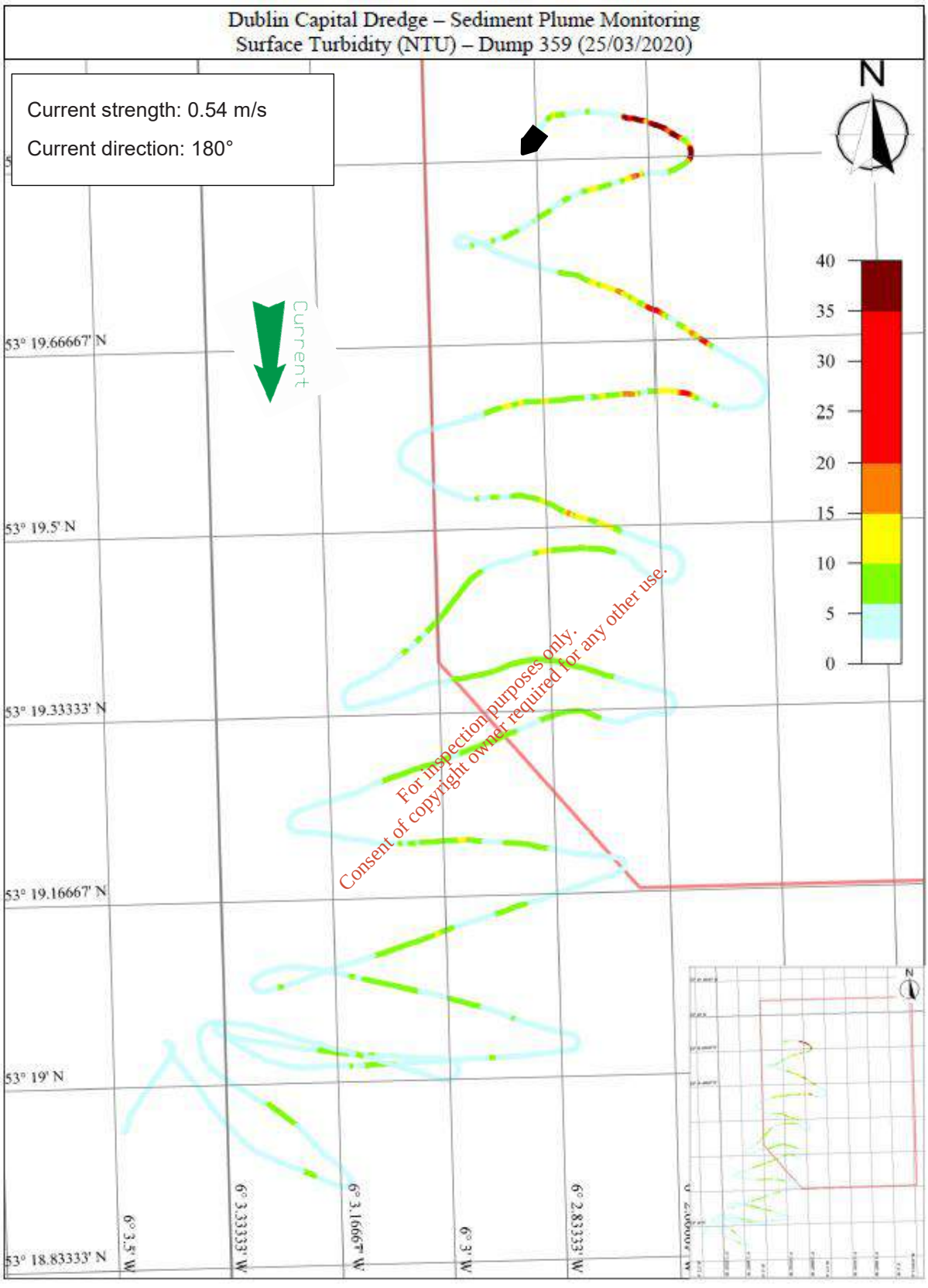


Figure 8.24: Dump 288 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:36



100

Figure 8.25: Dump 359 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:36

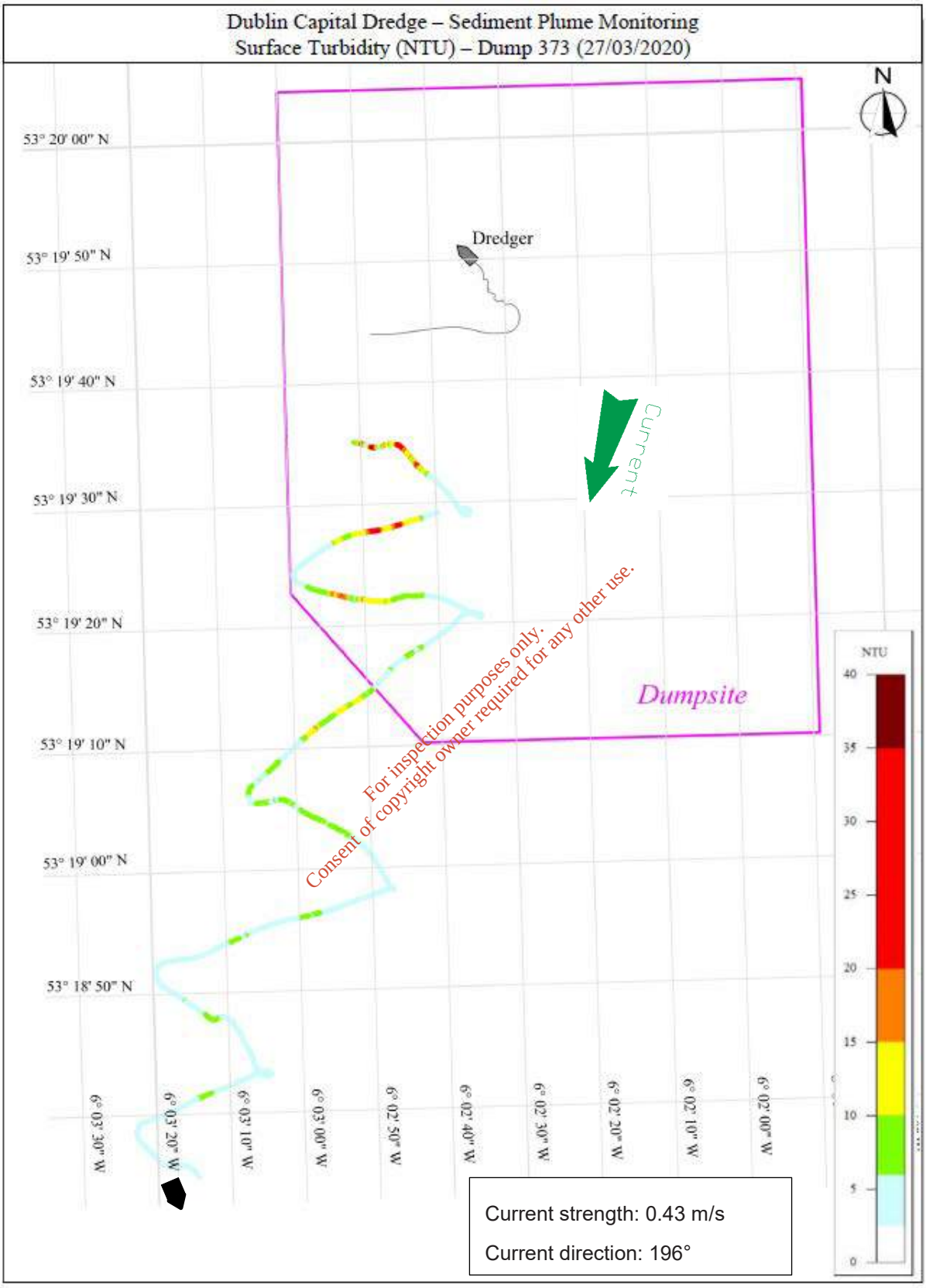


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Figure 8.26: Dump 373 Survey track with surface turbidity [NTU]

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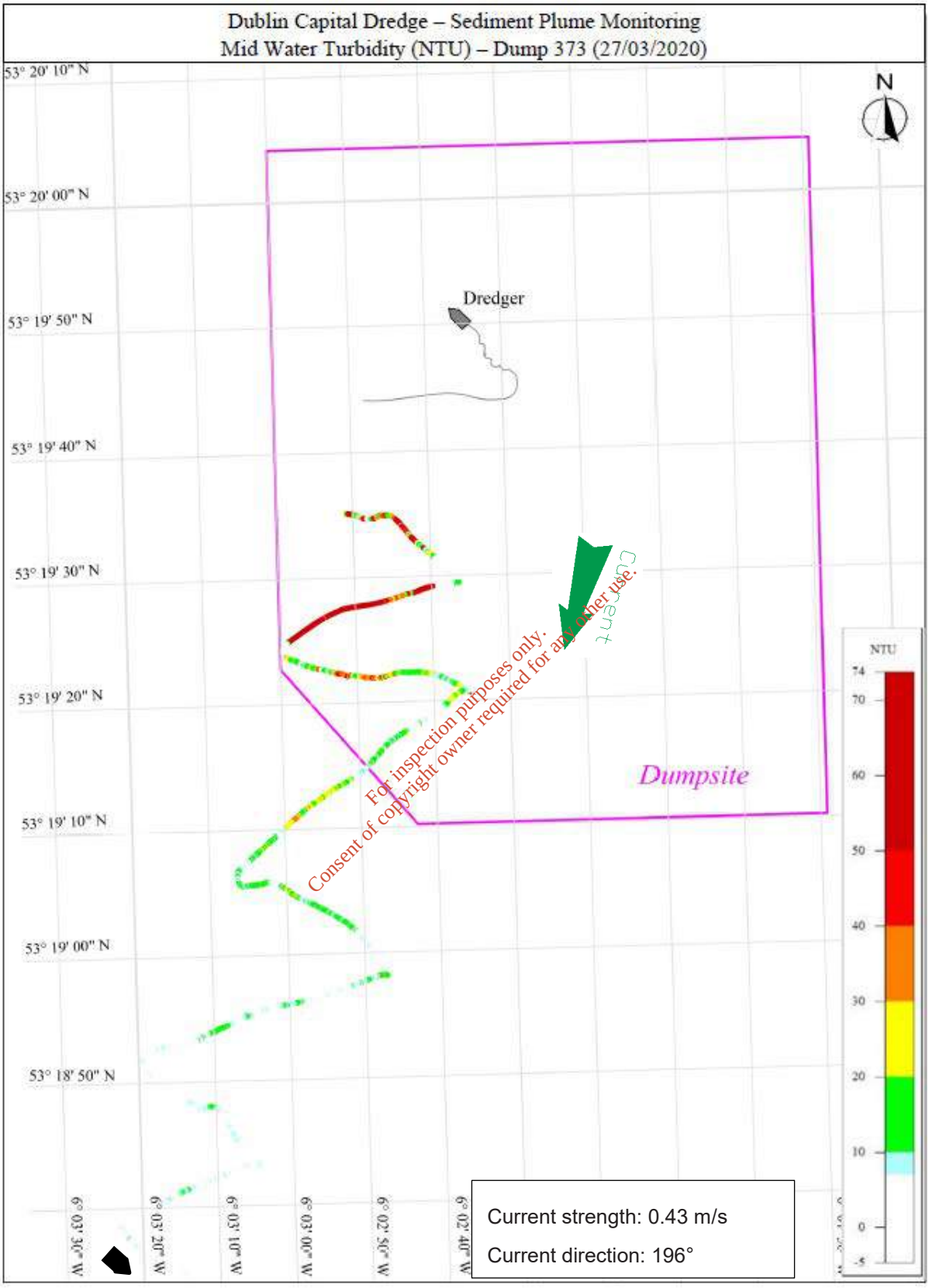

Figure 8.27: Dump 373 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:36

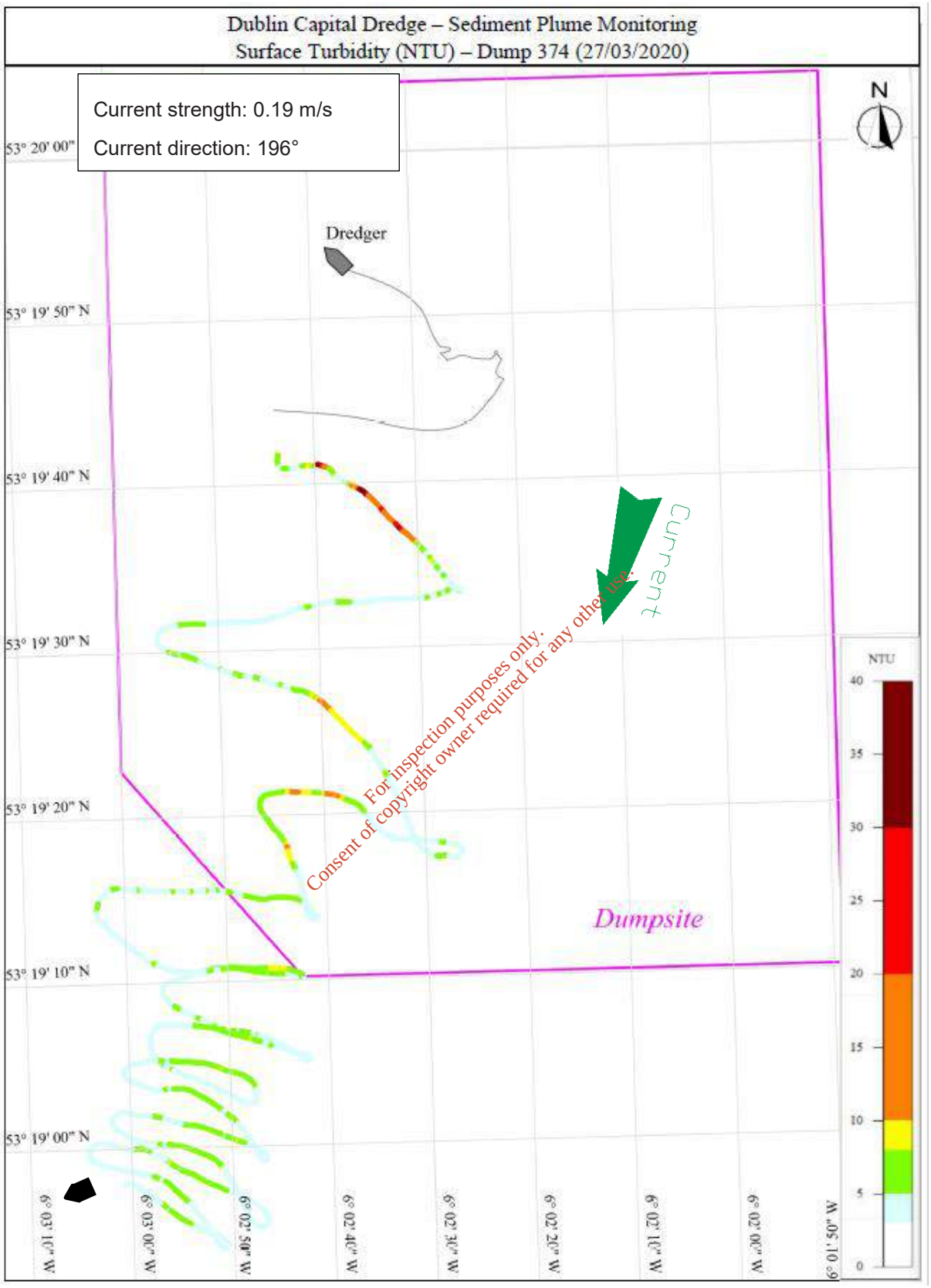

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Figure 8.28: Dump 374 Survey track with surface turbidity [NTU]

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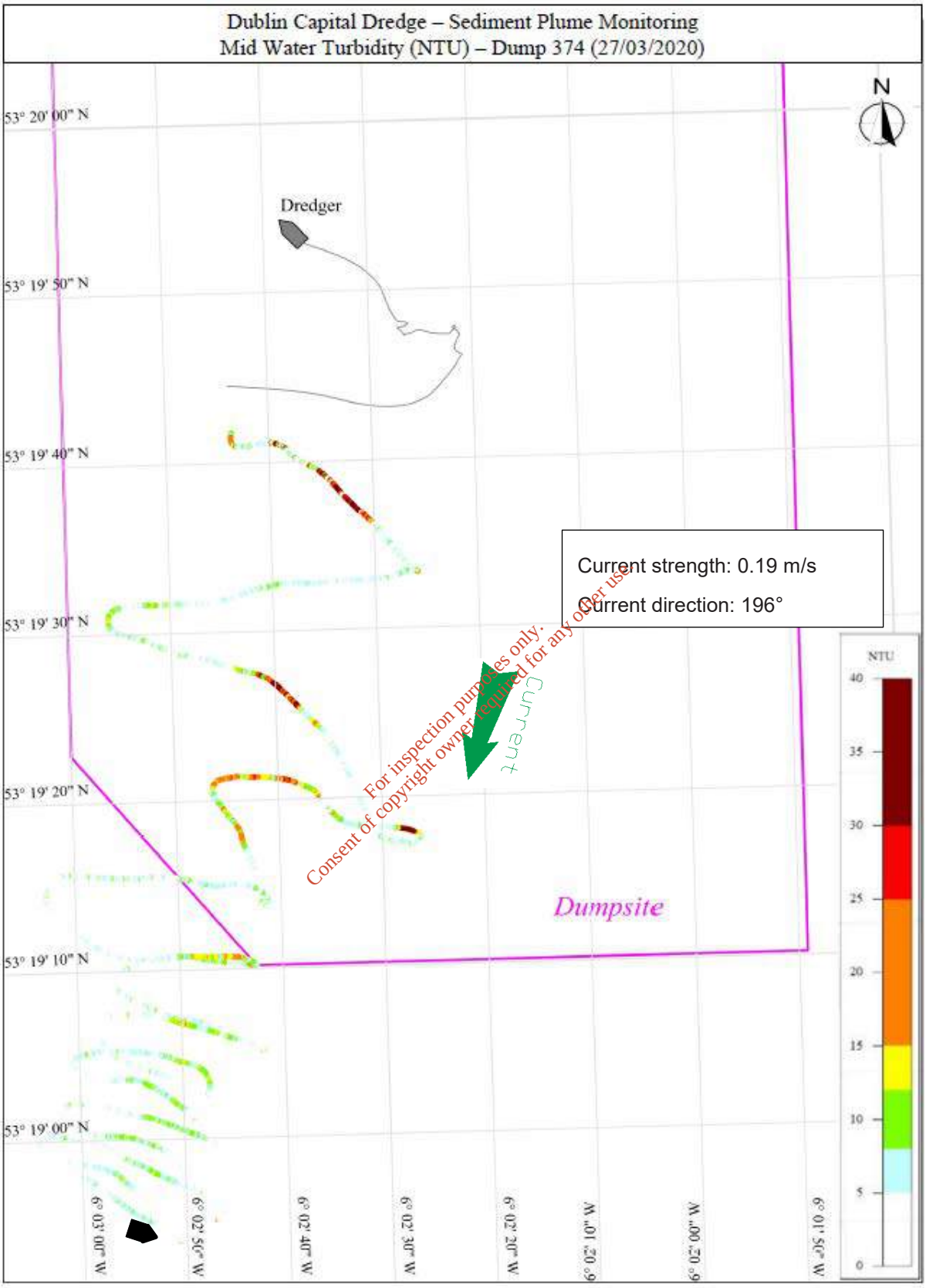

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Figure 8.29: Dump 374 Survey track with mid water turbidity [NTU]

EPA Export 28-04-2021:02:38:36

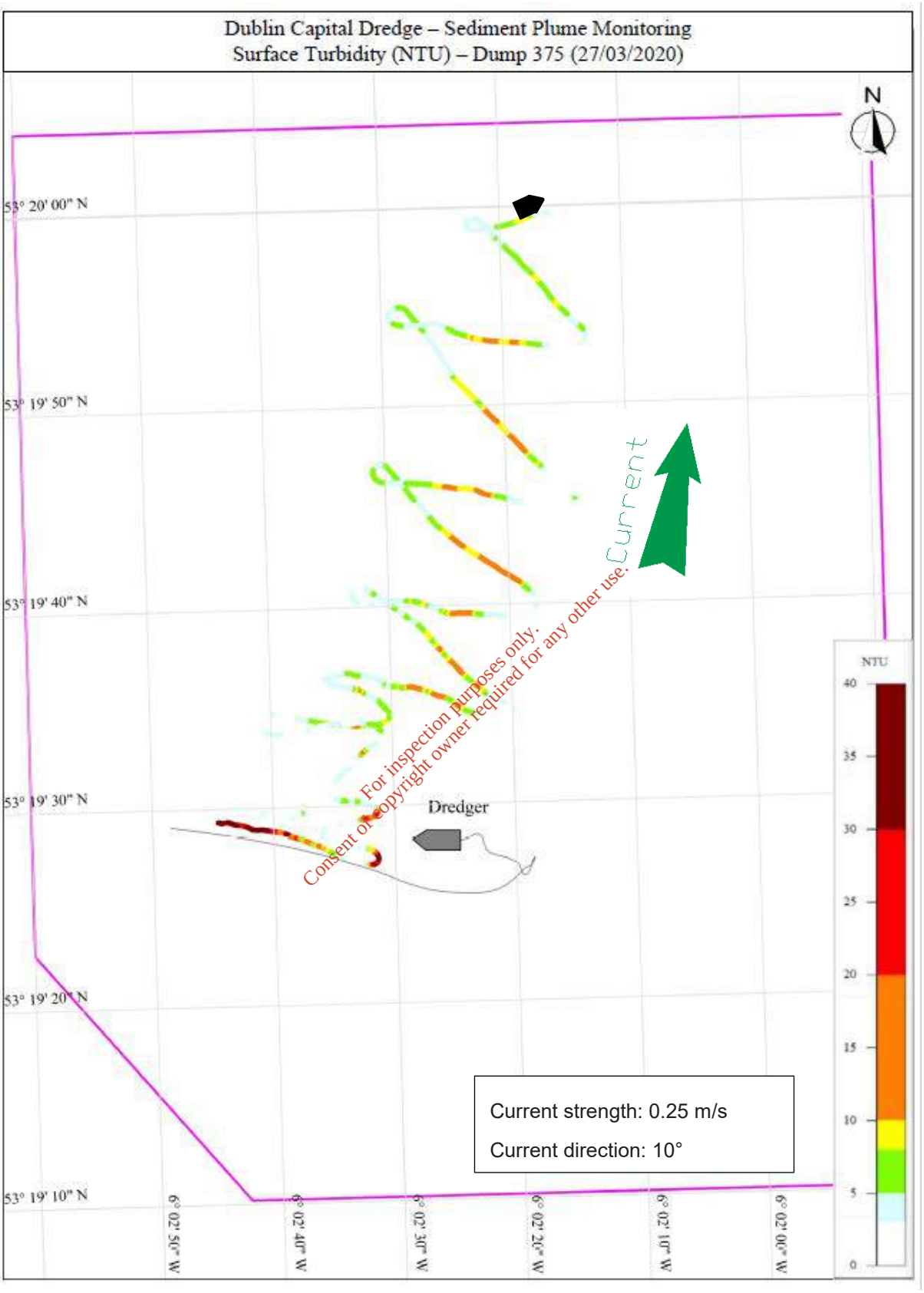

Figure 8.30: Dump 375 Survey track with surface turbidity [NTU]

EPA Export 28-04-2021:02:38:36

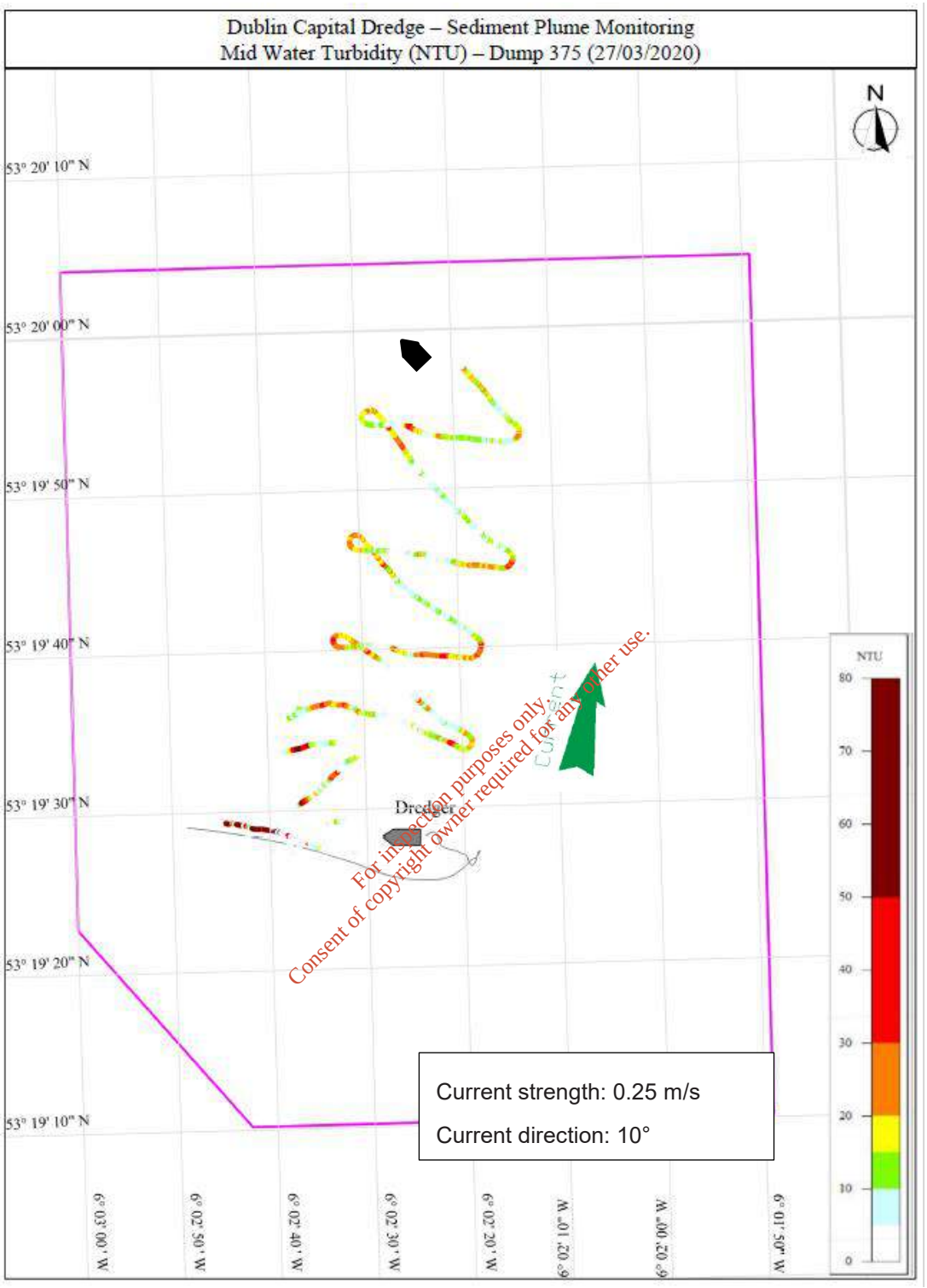

Figure 8.31: Dump 375 Survey track with mid water turbidity [NTU]

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A.2 Comparison of Simulated and Recorded Data

In order to supplement the results presented in Section 6.1 and further validate the numerical modelling programme, RPS have produced 1D validation plots for all relevant dump events.

These plots illustrate the depth averaged simulated turbidity levels and actual turbidity levels recorded at the surface and mid-point of the water column as recorded by Hydromaster. It should be noted that each data in these plots have a unique spatial coordinate (i.e. as the survey vessel traversed the dump site) but this element has been omitted so data could be easily presented in one dimensional time series plots.

Table 8.1: Index of sediment plume validation plots for dump events 231 – 375

Date	Dump #	Figure No.
14/03/2020	231	Figure 8.32
16/03/2020	254	Figure 8.33
17/03/2020	266	Figure 8.34
	267	Figure 8.35
	268	Figure 8.36
18/03/2020	280	Figure 8.37
	281	Figure 8.38
	282	Figure 8.39
	283	Figure 8.40
27/03/2020	373	Figure 8.41
	374	Figure 8.42
	375	Figure 8.43

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As demonstrated in Figure 8.32 to Figure 8.43, the computational models accurately simulate the temporal and spatial dispersion of sediment plumes during the dumping activities to a very high degree of accuracy.

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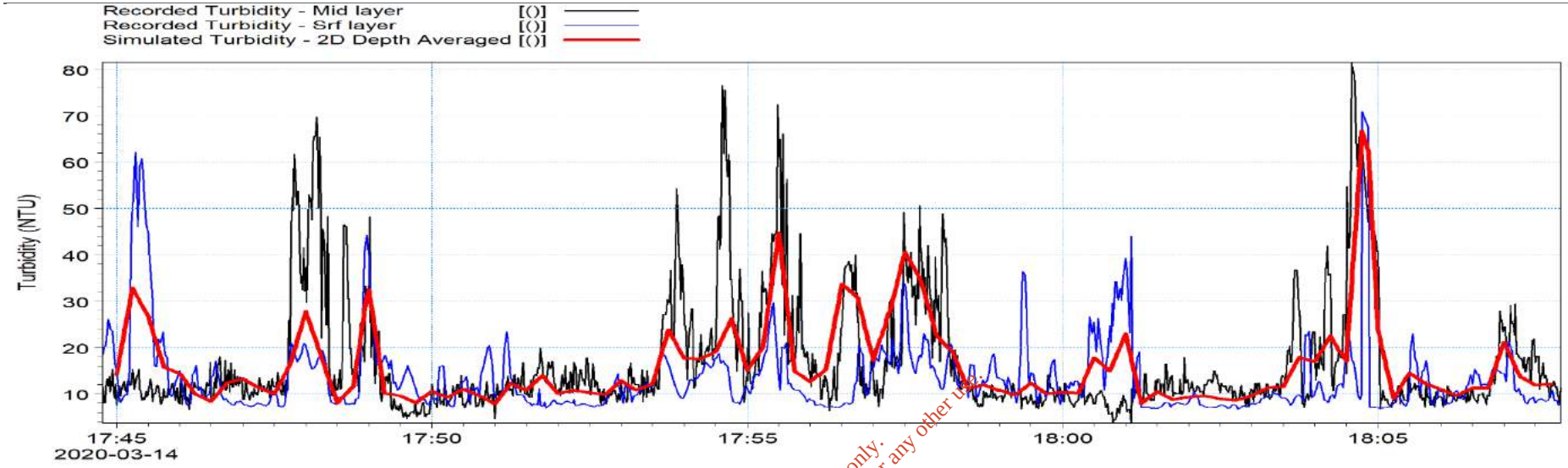

Figure 8.32: Comparison of recorded and simulated turbidity measurements across the dump site during Event 231

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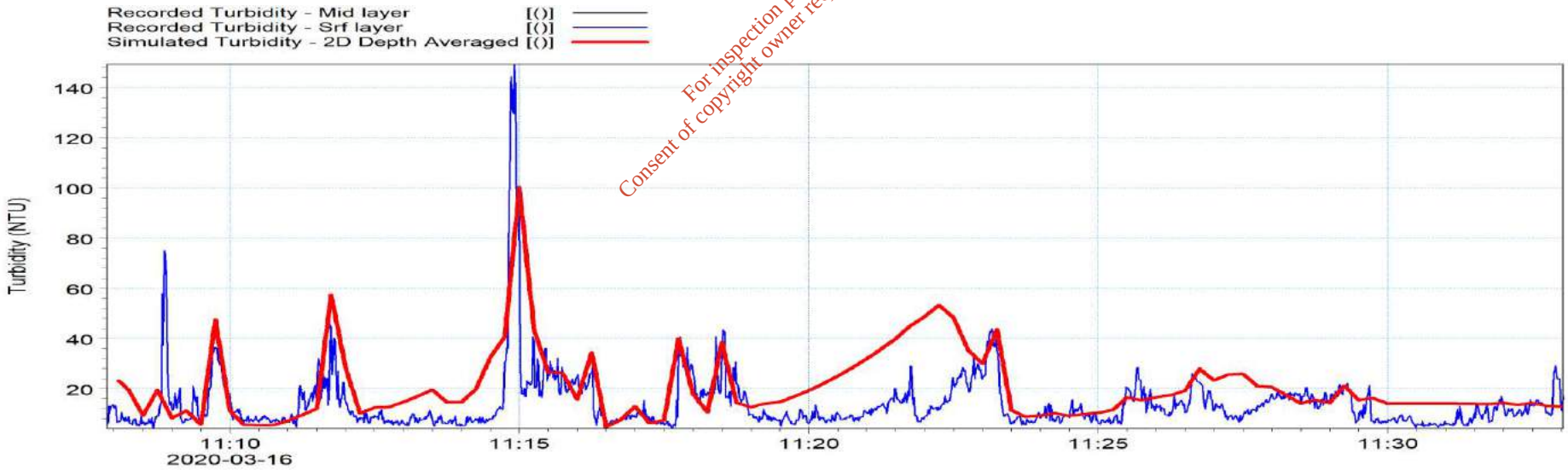

Figure 8.33: Comparison of recorded and simulated turbidity measurements across the dump site during Event 254

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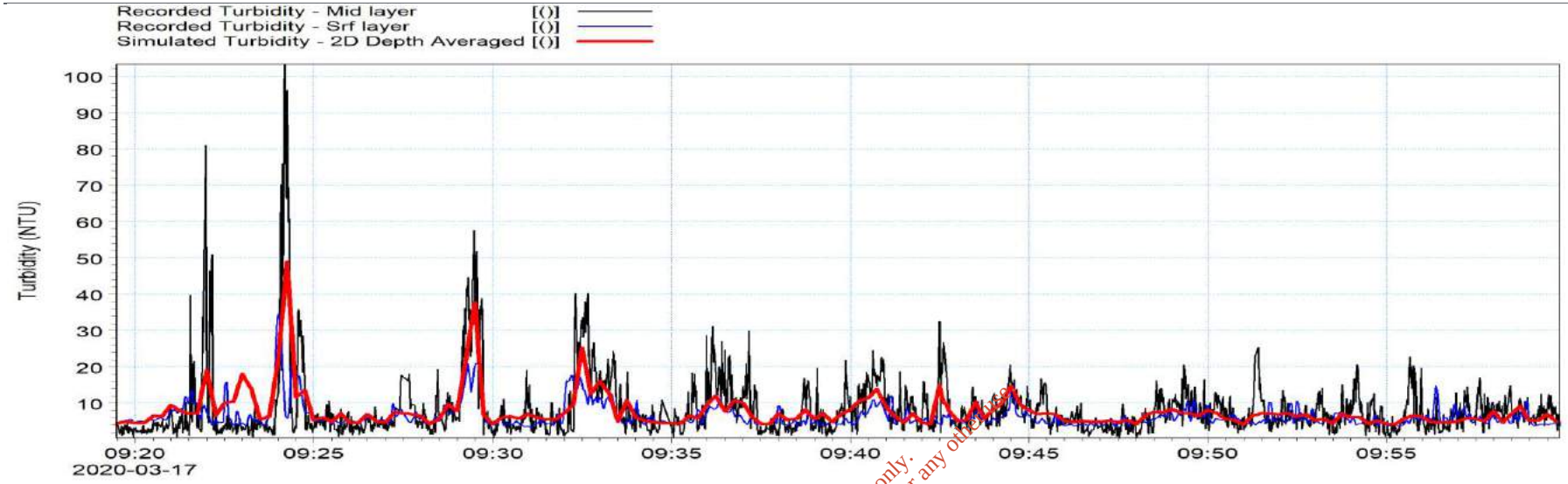

Figure 8.34: Comparison of recorded and simulated turbidity measurements across the dump site during Event 266

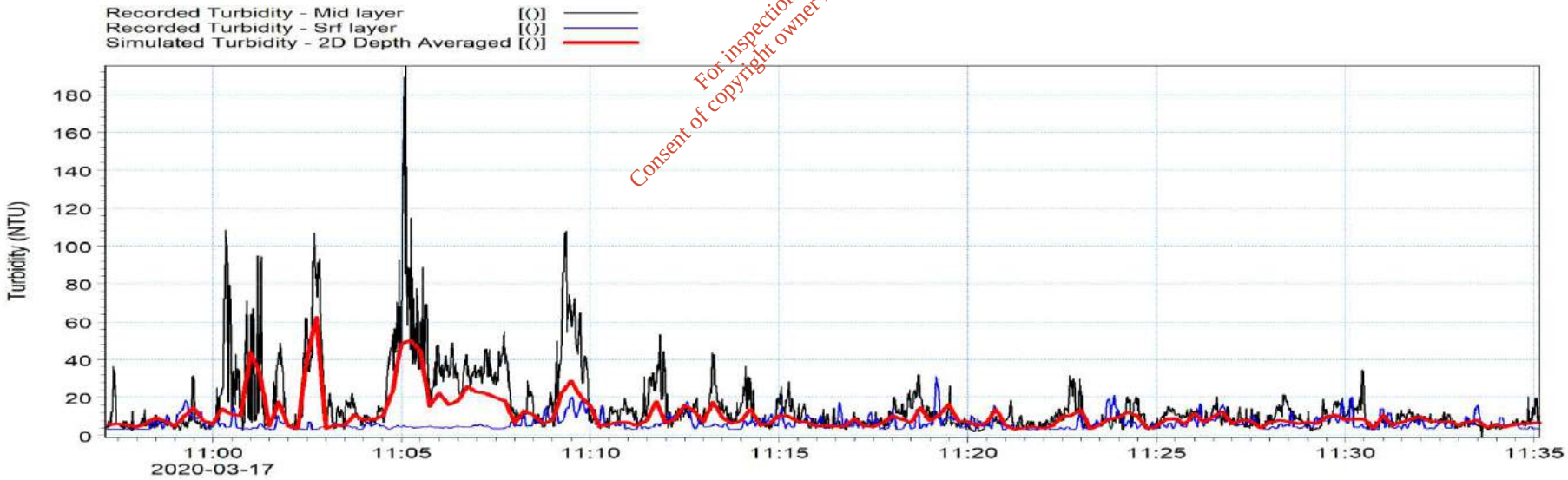

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Figure 8.35: Comparison of recorded and simulated turbidity measurements across the dump site during Event 267

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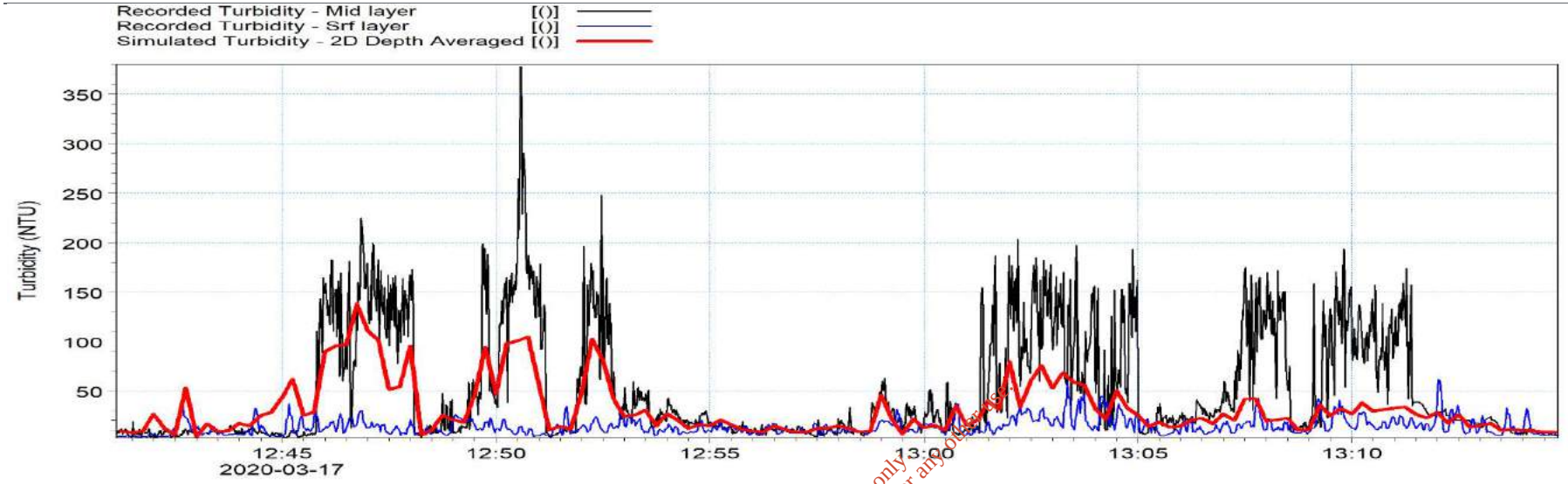

Figure 8.36: Comparison of recorded and simulated turbidity measurements across the dump site during Event 268

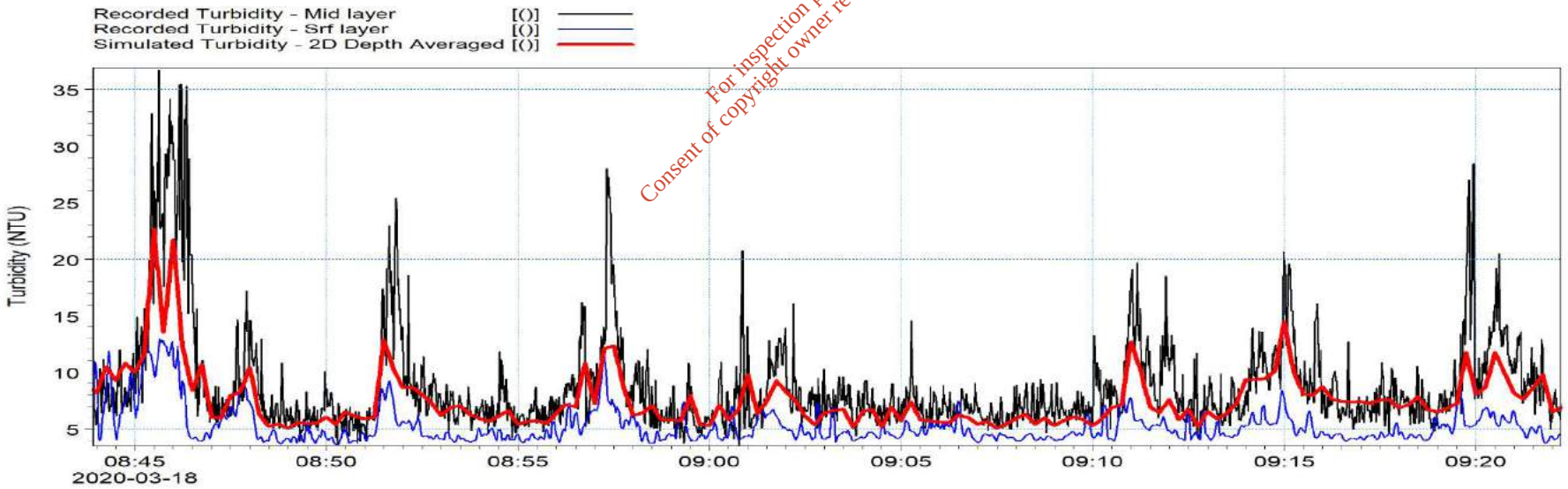

Figure 8.37: Comparison of recorded and simulated turbidity measurements across the dump site during Event 280

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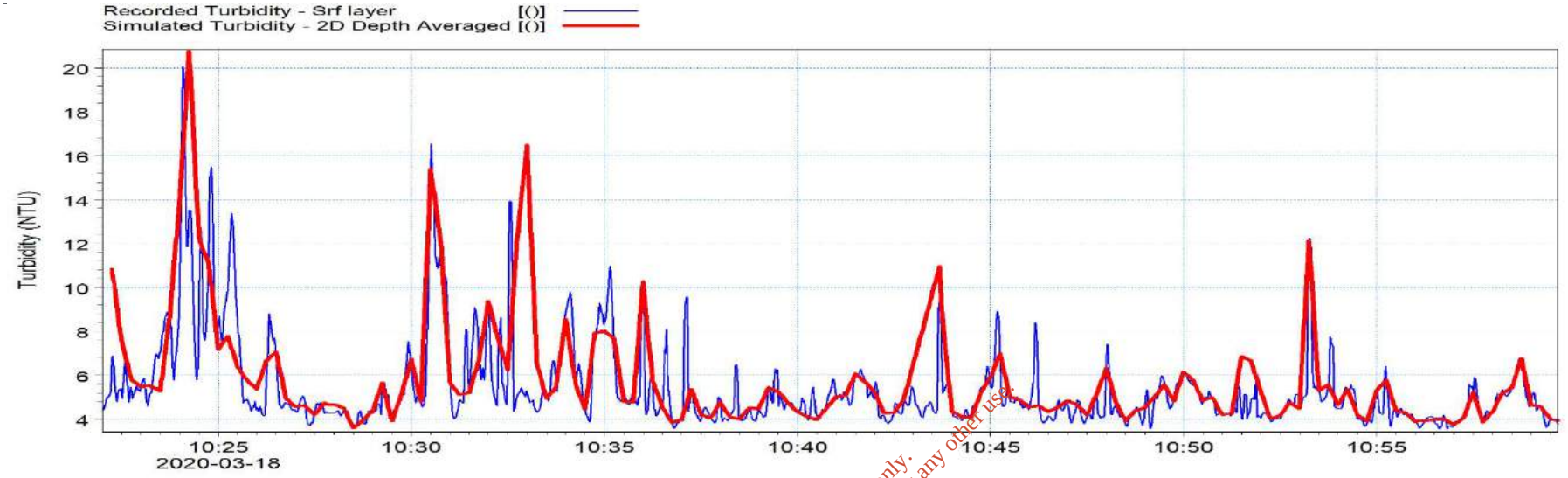

Figure 8.38: Comparison of recorded and simulated turbidity measurements across the dump site during Event 281

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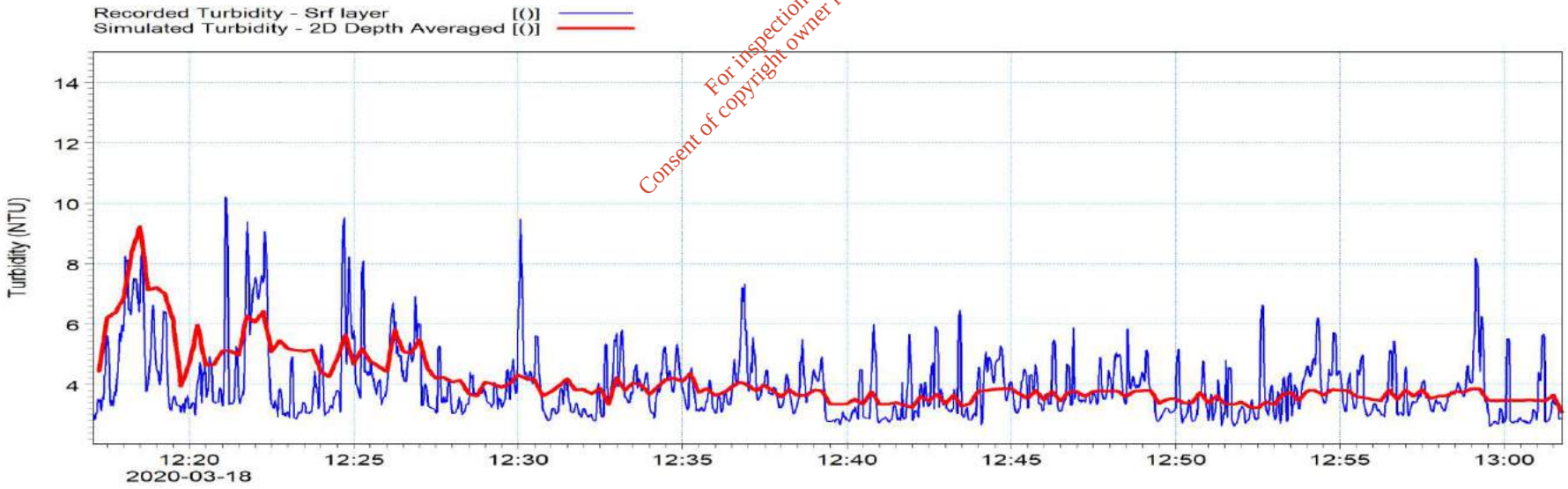

Figure 8.39: Comparison of recorded and simulated turbidity measurements across the dump site during Event 282

EPA Export 28-04-2021:02:38:36

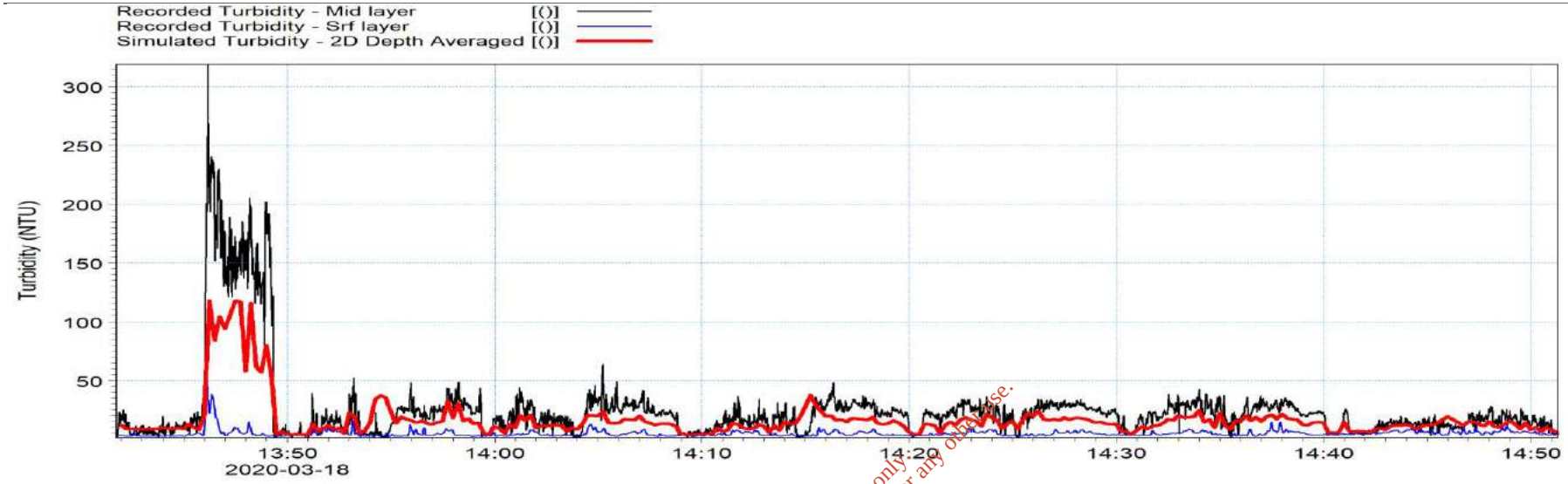

Figure 8.40: Comparison of recorded and simulated turbidity measurements across the dump site during Event 283

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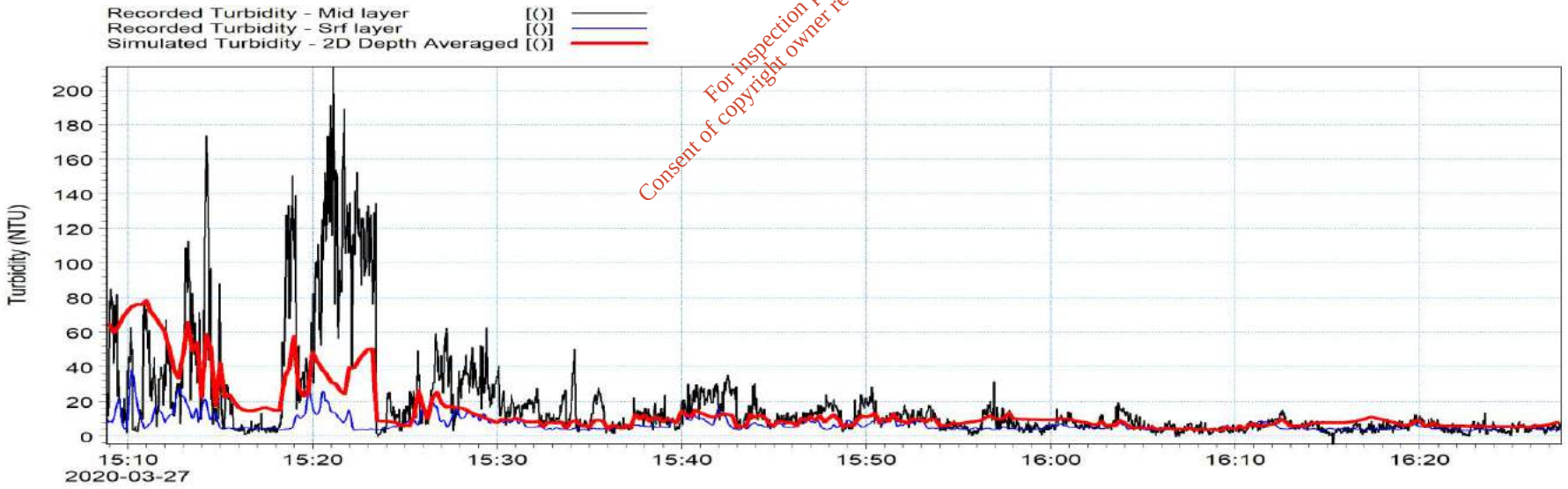

Figure 8.41: Comparison of recorded and simulated turbidity measurements across the dump site during Event 373

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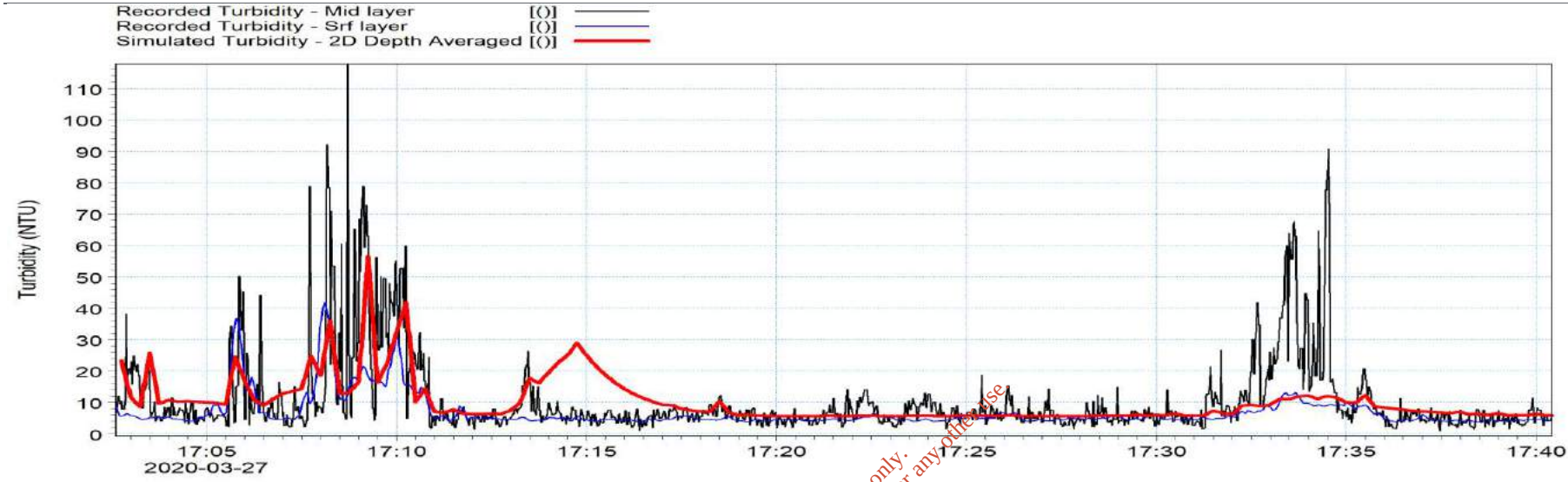

Figure 8.42: Comparison of recorded and simulated turbidity measurements across the dump site during Event 374

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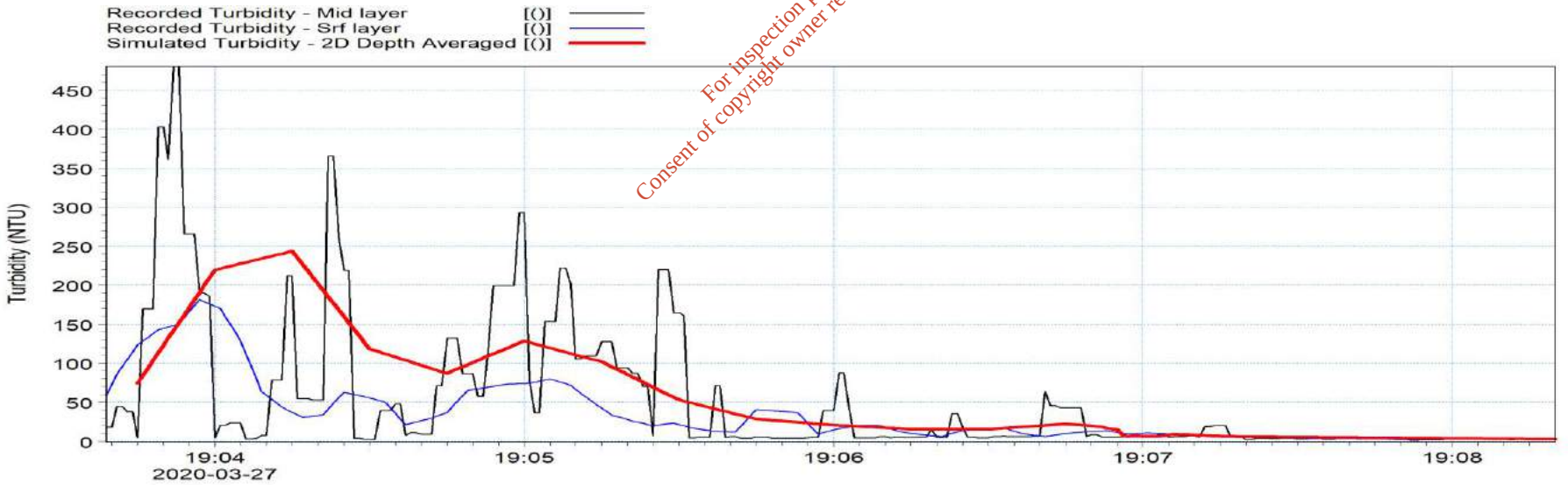

Figure 8.43: Comparison of recorded and simulated turbidity measurements across the dump site during Event 375

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Appendix 12 - Benthic and Fisheries

12.1 Species List

ANIMALIA Eggs

CNIDARIA

Actinaria sp.
Campanulariidae sp.
Hydrallmania falcata

PLATYHELMINTHES

Platyhelminthes sp

NEMERTEA

Nemertea sp.

NEMATODA

Nematoda sp.

ENTOPROCTA

Loxosomella sp.
Pedicellina nutans

ANNELIDA

Tubificinae
Tubificoides sp.1
Tubificoides benedii
Tubificoides pseudogaster agg.
Pholoe baltica
Sigalionidae Juvenile
Pisione remota
Sigalion mathildae
Sthenelais limicola
Glycera tridactyla
Eunereis longissima
Syllidae
Eteone cf. longa
Eumida sp.
Paranaitis kosteriensis
Phyllodoce groenlandica
Phyllodoce mucosa
Nephtys sp.
Nephtys hombergii
Ophryotrocha
Capitella sp.
Capitella Eggs
Heteromastus filiformis
ediomastus fragilis
Notomastus sp.
Euclymene oerstedii agg.
Scalibregma inflatum
Malacoceros vulgaris
Polydora cornuta
Prionospio sp.
Prionospio fallax
Pygospio elegans
Spio sp.
Spiophanes bombyx
Caulleriella sp.
Chaetozone christiei
Chaetozone gibber
Cirratulus sp.
Cirriformia tentaculata
Protocirrineris
Tharyx sp.
Tharyx killariensis
Tharyx robustus
Melinna palmata
Lagis koreni
Lanice conchilega
Spiobranchus lamarcki
Galathowenia sp.

ARTHROPODA

Thoracica sp.
Balanus crenatus
Iphinoe trispinosa
Nototropis swammerdamei
Ampelisca brevicornis
Ampelisca tenuicornis
Harpinia antennaria
Gammarus sp.
Microprotopus maculatus
Crangon crangon
Corystes cassivelaunus
Carcinus maenas
ocarcinus sp.

INSECTA

Insect larvae

MOLLUSCA

Onchidoridae
Bivalvia indet
Acanthocardia Juvenile
Donax vittatus
Abra sp.
Abra alba
Fabulina fabula
Kurtiella bidentata
Thyasira flexuosa
Mytilidae Juvenile
Nucula sp.
Nucula hanleyi
Nucula nitidosa
Chamelea striatula
Dosinia sp.
Thracia sp.

BRYOZOA

Bugulidae
Electra monostachys
Electra pilosa
Alcyonidium diaphanum
Amathia sp.

ECHONDERMATA

Amphiura filiformis
Ophiothrix fragilis
Ophiura sp.

CHORDATA

Ascideacea indet.
Ascidiella aspersa

CILIOPHORA

Folliculinidae

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12.2 Species / Abundance Matrix – Dublin Bay 2020.

	Dub S01	Dub S02	Dub S03	Dub S04	Dub S05	Dub S06	Dub S07	Dub S08	Dub S09	Dub S10	Dub S11	Dub S12	Dub S13	Dub S14	Dub S15
ANIMALIA Eggs	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-
ACTINIARIA	-	1	-	-	-	-	-	-	-	1	-	-	-	-	14
Campanulariidae	-	P	-	-	-	-	-	-	-	P	P	-	-	-	-
Hydrallmania falcata	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-
PLATYHELMINTHES	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
NEMERTEA	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-
NEMATODA	-	11	-	-	-	-	-	-	-	-	1	-	-	-	2
ENTOPROCTA	-	P	-	-	P	-	P	P	-	-	-	-	-	-	-
Loxosomella	-	-	-	-	P	-	-	P	-	-	-	-	-	-	-
Pedicellina nutans	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-
Tubificinae	-	44	-	-	-	-	-	-	15	-	90	19	4	-	-
Tubificoides sp.1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Tubificoides benedii	-	39	-	-	-	-	-	-	1	-	-	-	-	-	32
Tubificoides pseudogaster.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Pholoe baltica	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Sigalionidae Juvenile	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Pisione remota	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Sigalion mathildae	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-
Sthenelais limicola	-	-	-	1	1	-	6	-	-	-	-	-	-	-	-

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	Dub S01	Dub S02	Dub S03	Dub S04	Dub S05	Dub S06	Dub S07	Dub S08	Dub S09	Dub S10	Dub S11	Dub S12	Dub S13	Dub S14	Dub S15
Glycera tridactyla	-	3	-	2	-	-	-	1	-	-	-	-	-	-	-
Eunereis longissima	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Syllidae	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Eteone cf. longa	-	1	9	-	10	-	-	-	-	-	-	2	-	-	-
Eumida	-	-	3	5	-	-	-	-	-	-	-	-	-	-	-
Paranaitis kosteriensis	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Phyllodoce groenlandica	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Phyllodoce mucosa	-	1	2	-	-	-	-	-	-	1	-	-	-	-	-
Nephtys	-	-	-	-	1	-	3	1	-	-	-	-	-	-	-
Nephtys hombergii	2	-	-	-	1	-	-	1	-	-	1	-	-	-	-
Ophryotrocha	-	8	1	-	1	-	-	-	-	4	-	-	-	-	-
Capitella	-	955	19	-	4	-	-	-	-	12	-	-	-	-	153
Capitella Eggs	-	P	-	-	P	-	-	-	-	-	-	-	-	-	-
Heteromastus filiformis	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Mediomastus fragilis	-	15	1	-	-	-	-	-	-	-	-	2	1	-	6
Notomastus	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Euclymene oerstedii agg.	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-
Scalibregma inflatum	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Malacoceros vulgaris	-	8	-	-	-	-	-	-	-	-	-	-	-	-	3
Polydora cornuta	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-
Prionospio	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Prionospio fallax	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-

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	Dub S01	Dub S02	Dub S03	Dub S04	Dub S05	Dub S06	Dub S07	Dub S08	Dub S09	Dub S10	Dub S11	Dub S12	Dub S13	Dub S14	Dub S15
Pygospio elegans	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Spio	-	-	1	-	2	-	1	-	-	-	-	-	-	-	-
Spiophanes bombyx	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Caulleriella	-	37	-	-	-	-	-	-	-	33	-	-	-	-	10
Chaetozone christiei	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
Chaetozone gibber	-	2	1	-	1	-	2	-	2	-	-	2	-	-	-
Cirratulus	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-
Cirriformia tentaculata	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Protocirrineris	-	-	-	-	1	-	-	-	4	-	-	2	-	-	-
Tharyx	1	15	-	-	-	-	-	-	7	-	-	-	-	-	-
Tharyx killariensis	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Tharyx robustus	2	47	1	-	-	-	-	-	60	-	5	10	-	-	47
Melinna palmata	-	-	-	-	-	-	-	-	7	-	-	2	-	-	-
Lagis koreni	-	-	2	1	-	-	-	-	-	-	-	1	-	1	-
Lanice conchilega	-	-	-	1	-	-	2	1	-	-	-	-	-	-	-
Spirobranchus lamarcki	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-
Galathowenia	-	-	-	-	1	-	15	-	-	-	-	-	-	-	-
THORACICA	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-
Balanus crenatus	-	-	-	-	-	9	-	-	-	1	-	-	-	-	-
Iphinoe trispinosa	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-
Nototropis swammerdamei	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-

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	Dub S01	Dub S02	Dub S03	Dub S04	Dub S05	Dub S06	Dub S07	Dub S08	Dub S09	Dub S10	Dub S11	Dub S12	Dub S13	Dub S14	Dub S15
Ampelisca brevicornis	-	-	-	2	2	-	1	-	-	-	-	-	-	-	-
Ampelisca tenuicornis	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-
Harpinia antennaria	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Gammarus	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-
Microprotopus maculatus	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Crangon crangon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Corystes cassivelaunus	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-
Carcinus maenas	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Liocarcinus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
INSECTA larvae	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Onchidoridídae	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
BIVALVIA	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Acanthocardia Juvenile	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Donax vittatus	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Abra	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Abra alba	-	-	-	1	-	-	22	-	1	-	-	-	-	5	-
Fabulina fabula	-	-	-	-	6	-	3	4	-	-	-	-	-	-	-
Kurtiella bidentata	-	-	-	-	4	-	1	1	-	-	-	-	-	-	-
Thyasira flexuosa	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Mytilidae Juvenile	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Nucula	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-
Nucula hanleyi	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-

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	Dub S01	*Dub S02*	*Dub S03*	*Dub S04*	*Dub S05*	*Dub S06*	*Dub S07*	*Dub S08*	*Dub S09*	*Dub S10*	*Dub S11*	*Dub S12*	*Dub S13*	*Dub S14*	*Dub S15*
Nucula nitidosa	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-
Chamelea striatula	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Dosinia	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Thracia	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
Bugulidae	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
Electra monostachys	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-
Electra pilosa	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-
Alcyonidium diaphanum	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-
Amathia	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-
Amphiura filiformis	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Ophiothrix fragilis	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Ophiura	-	-	-	-	-	-	2	1	-	-	1	-	-	-	-
ASCIDIACEA	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Ascidiella aspersa	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Folliculinidae	-	-	-	-	-	P	-	-	-	-	P	-	-	-	-

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12.3 Trawl Images – Dublin Bay 2020.

Plate 1: T1 – Full trawl contents.

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Plate 2: T2 – Full trawl contents.

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Plate 3: T2 – All fish less thornback ray.

Plate 4: T3 – Full trawl contents.

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Plate 5: T 4 - Shell gravel with mud from Trawl 4.

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Plate 6: T5 – Green crabs collected in Trawl 5.

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Plate 7: T6 – Fish taxa from Trawl 6.

Plate 8: T8 - Full trawl contents.

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Plate 9: T9 – Full trawl contents.

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Include turb plume plots @ 6 weeks (conc and position) in AER

Include bathy pre and post diffs in AER

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Appendix 13 - Accident Prevention Plan

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Boskalis
Irish Dredging

Project Safety, Health and Environmental Plan

DOCUMENT NUMBER: **BWL-270**

PROJECT NAME: **Dublin Port - Capital Dredge Works 2019-2020 Season No. 3**
PROJECT NUMBER: **372-10235**

CLIENT NAME: **Dublin Port Company**
CLIENT REFERENCE: **CP1501_017_03**

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Boskalis
Irish Dredging

aa

DOCUMENT CONTROL

Controlled Copy Distribution List			
No	**Company**	**Function**	**Name**
01	IDC	Project Manager	Richard Cope
02	IDC	Superintendent	Richard Chester
03	IDC	Chief Surveyor	Aled Jones
04	IDC	Captain Freeway	Willy Hofman / Henk Kuiper

General document data	
Document Title:	Project Safety, Health and Environmental Plan
Document Number:	BWL-270
Project Name:	Dublin Port - Capital Dredge Works 2019-2020 Season No. 3
Project Number:	372-10235
Client Name:	Dublin Port Company
Client Reference:	CP1501_017_02
Client Revision Number:	1.0
Boskalis Entity:	Irish Dredging Company

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Revision status		
Revision Number:	Rev. 1.0	
Revision Date:	16-Oct-2019	
Approval Status:	Approved for issue	
Prepared By:	Richard Chester	Role: SHE-Q Officer
Reviewed By:	Richard Cope	Role: Project Manager
Approved By:	Richard Cope	Role: Project Manager

Change log		
Revision	**Section**	**Change**
Rev. 1.0	All	New issue
Rev. 2.0		

TABLE OF CONTENTS

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Boskalis
Irish Dredging

1.	INTRODUCTION	4
2.	OUTLINE PROJECT	5
3.	SAFETY	9
4.	HEALTH	13
5.	ENVIRONMENT	13
6.	RESPONSIBILITIES	16
7.	SHE MANAGEMENT SYSTEM	18
8.	CONTRACTUAL & LEGAL SHE REQUIREMENTS	18
9.	SHE RISK MANAGEMENT	19
10.	TRAINING AND INDUCTION	21
11.	COMMUNICATION	23
12.	INSPECTIONS AND AUDITS	24
13.	EMERGENCY RESPONSE	25
14.	REFERENCES, ABBREVIATIONS, DEFINITIONS	26
15.	ATTACHMENTS	28

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Irish Dredging

1. INTRODUCTION

The Project Safety, Health and Environmental Plan covers the SHE planning and implementation framework for the execution of the project. Boskalis, subcontractors, suppliers, employees and all others involved are required to adhere to this plan. It forms an integral part of the project, and is the primary document for project safety, health and environmental activities.

The plan sets out the specific policies, practices, resources and activities relevant to the project; to ensure that the contractual requirements, applicable regulatory requirements as well as Boskalis requirements are met, and to encourage high standards of safety, health and environmental standards amongst all employees.

This document forms part of the Boskalis Way of Working, the integrated quality management system applicable to all operations in Boskalis. The Boskalis Way of Working is structured around four Phases as pictured below. This Project SHE Plan is typically prepared in the PLAN Phase, where the main implementation is taking place in the EXECUTION Phase.

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More detailed information about the Boskalis Way of Working can be found in the Group Manual and the User Guide. A dedicated website with all supporting materials is available at wow.boskalis.com.

1.1. Plan ownership, change management, approval and distribution

The Project Manager is the document owner and is responsible for the contents of the Project SHE Plan, ensuring the content is up to date and that only authorised and updated versions are in circulation. The Project SHE Plan is a dynamic document and reviews may take place and updates prepared as and when required.

Revision to the Project SHE Plan can be initiated by the following processes:

- Changes in legislation
- Changes in design and/or work methods
- Major scope and schedule changes
- Results from risk assessments
- Results from audits (external & internal)
- Results from management reviews
- Results from Client inspections/reviews
- Changes in the Boskalis Way of Working

Any resultant changes will be issued, and agreed upon, by all parties concerned.

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2. OUTLINE PROJECT

The Alexandra Basin Re-development (ABR) project is the most significant infrastructural development planned by the Dublin Port Company (DPC) in the past 100 years and includes the construction of new quays and jetties within the Alexandra Basin, along with the seabed remediation and capital dredging to deepen the area to -10m CD, and the development of Alexandra Basin West
The ABR project also includes for deepening of the Fairway and approaches to Dublin Port increasing the ruling depth from -7.8m CD to -10.0m CD, of which the 2018-19 season is the second of a number of planned campaigns.
The capital dredging will be executed within the terms of the foreshore licence and EPA Dumping at Sea permit, which prevents any dredging below -10m CD and confines the loading and discharge activities to the winter months (October – March), with a maximum permitted volume of 1,046,818m³, which is also subject to maximum monthly volumes.

Planned dates for the dredging campaign for session 2
Mid October 2019 through to End November 2019
Mid December 2019 through to Mid-January 2020
Start-February 2020 through to end-March 2020

2.1. Project Identification

Project	
Details	**Description**
Project Name	Dublin Capital Dredging Campaign 2019-20
Project Scope	The work to be undertaken is the capital dredging of a section of the Harbour Navigation Channel and the Outer Navigation Channel. The first section to be focused on will be from the breakwaters to bouy No.1 and the secondary Inner Harbour Area will be from the RoRo berth 49 to the breakwaters. Both areas are to be dreged to a depth of -9.6m. Channel side slopes will be dredged to a 1:16 gradient, with all dredging restricted to within the works boundary. The all dredged material will be deposited within the ports licensed disposal area.
Project Location	Dublin, Ireland
Project Number	372-10235
Client Project Number	CP1501_017_02

Client	
Details	**Description**
Name Client	Dublin Port Company
Address Client	Port Centre,Alexandra Road Dublin 1, Ireland
Contact details	Eamon McElroy - Port Engineer

Consultant	
Details	**Description**
Name	Anthony D Bates Partnership

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Consultant	
Details	**Description**
Address	Laburnham Farm Upper Weare Somerset BS26 2LE
Contact details	Colm Sheehan - 01934 732380

Principal Contractor	
Details	**Description**
Name	Irish Dredging Company Ltd
Address	Pembroke House, Pembroke Street Cork, Ireland
Other details	-

Designer(s)	
Details	**Description**
Name	N.A.
Address	N.A.
Other details	N.A.

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Contractor(s)	
Details	**Description**
Name	N.A.
Address	N.A.
Other details	N.A.

(other consultants)	
Details	**Description**
Name	RPS (Alan G Barr)
Address	Elmwood House, 74 Boucher Road, Belfast
Other details	Environmental Consultant of DPC

2.2. Existing Records, Plans and Information - Dredge Areas

The IDC scope of works for the 2018-2019 Season 2 are the 2 sections of the Outer Navigation Channel

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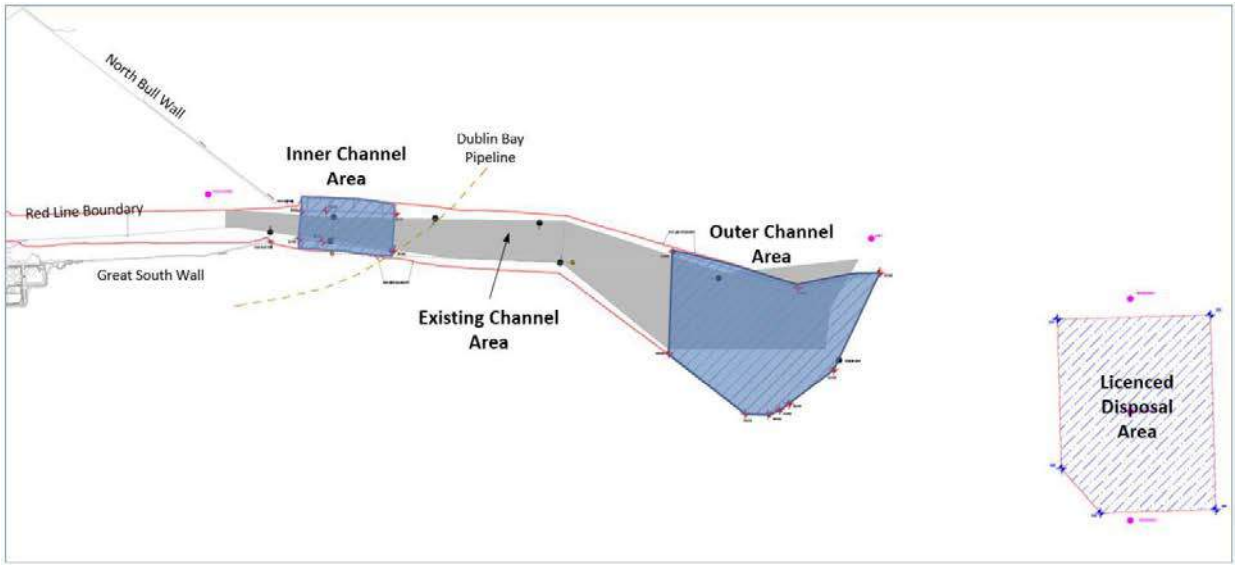
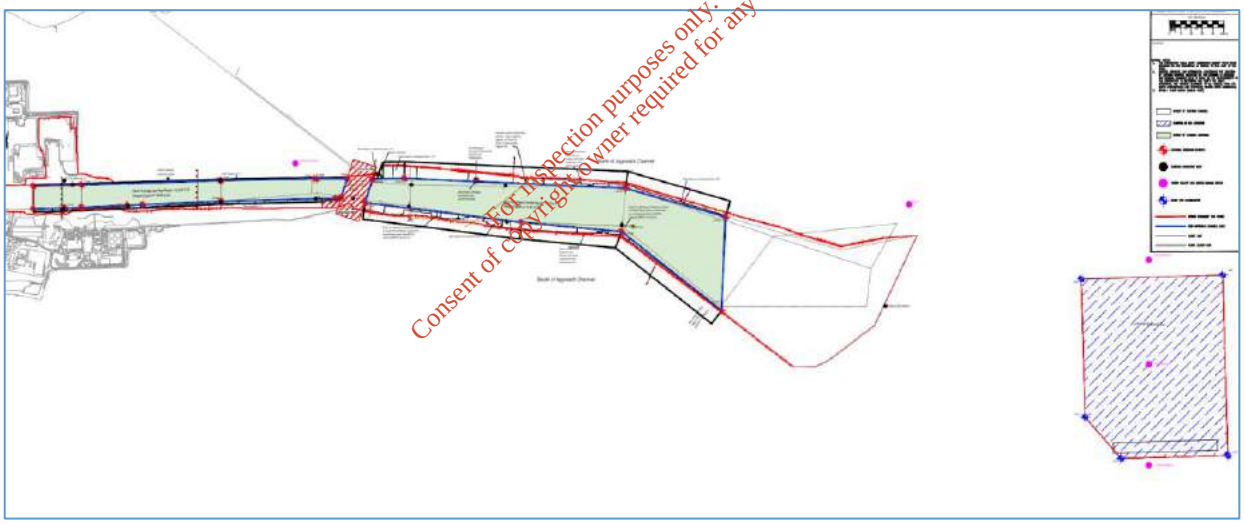
and the Inner Channel areas.



The IDC scope of works for the 2019-2020 Season 3 are the sections of the Harbour Navication Channel, From Berth 49 to the breakwaters, and Outer Navigation Channel, form the breakwaters to the Bouy No.1.



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Updated from the Season 2 campaign, the mercury hotspot has been removed and the Dublin Bay Pipeline position has been revised.

2.3. Significant Risks Identified During Design

The project management will take account of the following assumptions and/or risks, as outlined in the pre-construction information, and develop SHE Risk Assessment control measures accordingly:

Persons at risk of falling in to water while working on dredger or vessel transfer: -
Boskalis operate a mandatory requirement that lifejackets are worn when working within 2m of water, unless within the confines of handrails, lifejackets worn for vessel transfers, mooring /unmooring operations.
Visitors or inexperienced personnel will be closely assisted when undertaking crew change operations.
Whenever possible undertake vessel transfer when dredger is fully loaded (reducing climb) when using pilot ladder.

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Good communication between the dredger bridge and the crew tender is the key to any vessel transfer operations.
Weather and sea conditions are always monitored, should tender or dredger deem it unsafe to transfer operations will stop until weather or sea conditions are safe to proceed.

Risk Collision with other vessels /craft whilst operating: -
NINA onboard Kick off provision of relevant environmental and safety information for the works this will include traffic routes.
Trained competent Master and crew who will maintain a suitable watch and monitor the ships radio and radar.
The Master will establish and maintain close co-operation with Dublin Port Harbour Master, such that safe navigation mechanisms are operated to the highest standards.
Regular contact with Dublin VTS regards to dredging and shipping information.
Awareness of local shipping movements (ferries, commercial vessels and pleasure craft)
Maintain radio contact with vessels / craft in close proximity ensuring that they are aware of the dredging operations and limitations to manoeuvrability.
Monitor weather and sea conditions, in extreme adverse weather seek shelter to ensure safety of the crew and vessel.
On board vessel emergency procedures and regular emergency drills are undertaken to ensure that the vessel Master and crew are prepared for all eventualities.

Risk Major fuel spill / release: -
would most likely be caused by a significant collision event within the navigation channel (See collision with Vessels or craft whilst operating)
In the unlikely event of a major fuel spill during dredging operations, the vessel Master will take immediate actions on board the vessel to limit the spill. This will involve following the vessel's
Isolating the cause of the leak and closing scuppers to prevent further egress.
Stop all cargo and bunkering operations, and close manifold valves; sound the emergency alarm, and initiate the relevant emergency response procedures, and inform the loading master / bunkering personnel about the incident, if necessary.
Utilise the Shipboard Oil Pollution Emergency Plan (SOPEP) equipment (such as spill kits, booms, etc).
Notify Dublin Port VTS and Harbour Master, the IDC Project Manager, the Irish Coast Guard and the Boskalis fleet management office.

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Dredging and dumping activities impact to flora and fauna, air and climate, and other receptors:-
To limit the degree of turbidity from overflowing, Boskalis trailer dredgers will use 'green valve' technology such that turbid plumes will be smaller, of shorter duration, and mostly confined to the lower parts of the water column where currents have less power for sediment dispersion, and where they are less visible.

Provision of a Marine Mammal Observer(s) (MMO) by the Client.
The dredging activities have been confined to the winter months (1st October to 31st March) to negate any potential impact on Harbour Porpoise, salmonid migration and summer bird feeding. IDC will take note of the Dumping at Sea Permit Part III Conditions, in making the necessary provisions to assist Dublin Port Company in fulfilling their permit obligations.
This will include timely notifications, reports concerning the execution of the works.
Undertake suitable planning for the limiting of the requirement for vessel sailings to reduce producing exhaust fumes into the atmosphere.

Risk Dumping of spoil in incorrect location: -
Kick off meeting held onboard identifying all necessary requirements of the Dumping at Sea Permit.
Dredger operates the "dredge view" system which allows the plotting and records vessel movements and dumping. The dump area and dredge areas will be programmed into the system which allow the vessel to see its location to the dredge area and dump areas allowing pin point accuracy.

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The dredge spoil will be spread as evenly as possible over the whole disposal site, minimising concentrations in limited areas and facilitating a more rapid recovery of benthic communities in the dump area.

3. SAFETY

3.1. Safety, Health and Environmental Policy

The Boskalis Way of Working Policy Statement is our integrated policy document, in which our Board of Management declares our ambition with regard to SHE-Q. Irish Dredging Company Ltd (IDC) has incorporated this policy into the SHE-Q Policy Statement (Attachment 05).

We care for the safety, security and health of everyone involved in our activities, at the same time realising sustainable solutions and minimising our potential adverse impact on society and the environment. Our policy statement reinforces our commitment to the prevention of incidents.

3.2. NINA Safety Programme

The Way of Working Policy Statement underlies our Safety Programme NINA (No Injuries No Accidents) (www.boskalis-nina.com). NINA aims to embed the desired safety culture in our organisation and make safety a fully integrated part of working behaviour. The key statement in our NINA programme reads:
"People are our most valuable assets, making safety a core value. Our goal is: No Injuries No Accidents. This is embedded in our company's culture and supported through Values and Rules. All employees, including our sub-contractors, are expected to take these values and rules to heart".

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3.2.1. Safety Values and Rules

The NINA Safety Programme is supported by five Values and five Rules that have been developed to provide guidance to all employees, including those of Subcontractors, both with regard to expected behaviour and risk management.

3.3. Safety on the Project

To give substance to the NINA Programme at project level, the following actions are taken:
- NINA Kick-off Meeting;
- Onboard Kick off meetings;
- Identify NINA goals;
- NINA Workboxes / toolbox talks;
- Incorporate Dublin Port Company – Capital Project Safety Essentials.

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3.4. Shore Transfer

Shore transfers will be carried out by using either the survey / plough vessel, in a vessel-to-vessel transfer with the dredger. The Vessel Master will make best endeavours to facilitate transfers at the designated times of shift change, although consideration should be given to transferring when the dredger is at full hopper load (to avoid or minimise the use of a pilot ladder). The Vessel Master will provide the necessary PPE, supervision and assistance during transfers.
Given these best endeavours, the provision of shore transfers for MMO and Marine Archaeologist personnel is considered the most significant foreseen safety risk for the works.

3.5. Marine Mammal Observer (MMO)

The project will provide personal protective equipment (PPE), instructions on PPE use, food and welfare facilities on board the dredger. The vessel Master will provide a vessel safety induction on first arrival on board for all visitors. In exercising our duty of care, we require the MMO and Marine Archaeologist personnel to have completed an accredited STCW Personal Survival Techniques (PST) 1 Day course.

3.6. Archaeological Monitoring

The Project Manager will undertake to assist Dublin Port Company in the monitoring of underwater archaeology in the navigation channel: as detailed in the CEMP Table 2.1-1 and Archaeology Management Plan (AMP) should the need arise.

3.7. Capital Projects Safety Essentials

As part of the Dublin Port Company's Capital Projects continuous improvement process the Capital Projects Safety Essentials have been developed. These essential rules have been derived from project risk registers, experience, lessons learned, as well as from accident investigations conducted across the Construction Industry.
To purpose of these rules is to:

- Clearly explain the basic rules that everyone should know and apply.
- Strengthen prevention by encouraging people to step in whenever they see something being done wrong.
- Stop work if the risk is not being properly managed.
- The rules are non-negotiable and will be incorporated into our own Safety Programme for this project as applicable.

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3.8. Project Safety Objectives and KPI's

Project Safety Objectives

	B: Divisional / BUM Objectives
B1.	**Safety:** Revitalize the core values and rules of our NINA program within your area of responsibility.
B2.	**Quality:** Embed the Boskalis Way of Working Program within your area of responsibility.

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	C: BWL SHE-Q Objectives
C1.	Non-Conformity Costs (NCC): Collect and analyse NCC for selected projects and report output quarterly.
C2.	Local WoW Tools: Include additional Tools during WoW implementation, to better facilitate our site activities in a construction / civil engineering environment (CDM 2015) and local legislation.
C3.	Introduce the WoW programme and system to one new tender and to one existing project by January 2018 and every new tender and project by Q2-2018
C4.	Client satisfaction / understanding our clients: Continue to achieve an 80% overall score from client satisfaction feedback.
C5.	Training Tracker: Achieve 80% completion of 'BWL Site Safety Training Scheme' for all applicable user (International and UK staff) by January 2018 and maintain that level throughout the year.
C6.	Expand on the Trainer Tracker program to also capture and manage the CDM 2015 and CSCS-card requirements.
C7.	Suppliers and Subcontractors: Continue the subcontractor management process developments as introduced during 2016. Wherever possible, include Subcontractors in NINA Workbox and WoW program sessions.
C8.	Chartered in equipment: On or before arriving at the project / contract, equipment shall be assessed by inspection or audit under the guidance of the BWL SHE-Q Department.

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The following leading and lagging Safety KPI's are agreed for this project;

Project Safety, Health and Environmental KPI's
Leading KPI's SHE Inductions Toolboxes / Safety Meetings SHE Inspections /visits/audits Near Misses Safety Hazard Observation Cards (SHOC's) Job Hazard Analysis (JHA) Permit to Work (PtW)

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Lagging KPI's
Lost Time Incident reports (LTI)
Restricted Work Case reports (RWC)
Medical Treatment Case reports (MTC)
First Aid Case reports (FAC)
Damage reports
Environmental Incident reports

4. HEALTH

4.1. Health Management

Safeguarding healthy working conditions for the project team is a precondition for sustainable employment. Reference is made to the Boskalis Way of Working / SHE-Q Policy Statement, Group Manual and the latest annual CSR report for more information on health management at Group level.

4.2. Health on the Project

Consider the following topics to give substance to the project health approach as part of the SHE Plan:

- Medical care on projects and vessels
  - Seek expert advice of the Travel Clinic of the Harbour Hospital ('Havenziekenhuis') in Rotterdam, the Netherlands when relevant
  - Seek advice from the Emergency Response Team (ERT) when a rapid response in the event of a health crisis is necessary. The team comprises employees from our SHE-Q and HR departments and doctors from the above-mentioned Travel Clinic.
  - Seek advice from the two local Hospitals are avaible in Dublin (Beaumont Hospital & Mater Hospital)
- Fit for Duty (see 4.3 below)
- Food management
- Prevention of occupational and other diseases
- Noise
- Hazardous substances

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4.3. Welfare Facilities

Provision will be made for suitable and sufficient welfare facilities, such as lighting, heating, ventilation, washrooms, toilets,Fire fighting, First Aid, changing rooms, rest rooms, eating areas.
All Boskalis fleet vessels are designed and built with appropriate welfare facilities onboard for the crew These facilities are regularly inspected by the vessel master to ensure they are fit for purpose.
Detailed guidance is contained within BWL-350c-A1 Site Preparation – Site General.

4.4. Fit for Duty

Our fifth rule of the NINA Safety Programme relates to being Fit for Duty. In part, this NINA rule in practice means that all employees should be made aware of, and comply with, the BWL Drug & Alcohol Policy (Attachment 05).

5. ENVIRONMENT

5.1. Environmental Management

Boskalis aims to be the distinguished provider of sustainable solutions and mitigate and where possible avoid (potential) adverse impacts on the environment. Reference is made to the Boskalis Way of Working Policy Statement, Group Manual and the latest annual CSR report for more information on environmental management at Group level.

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5.2. Environmental approach on the Project

Within the CSR domain the environmental impact of our operations is assessed in a 'materiality analysis' to gain insight into the relevance and importance of environmental themes for Boskalis on the one hand and stakeholders on the other. Reference is made to the materiality matrix in the latest annual CSR report.

5.3. Harbour Porpoise and Seals:

The MMO will conduct scans of the surrounding area prior to the commencement of dredging and dumping activities, in accordance with CEMP Risk Analysis for Dredging Operations, Risk Id 13. Reports to the National Parks and Wildlife Service (NPWS) shall be made should marine mammals enter the immediate (<50m) works area. The MMO will maintain a record of monitoring throughout the works, that will be provided to the NPWS on completion. (Acoustic monitoring devices will be deployed to detect the presence of marine mammals, in accordance with CEMP mitigations). In the event of discovering a marine mammal requiring rescue or urgent attention, the project team will seek help from the Irish Whale and Dolphin Group, www.iwdg.ie, 086 8657 633, or Seal Rescue Ireland, www.sealrescueireland.org 087 1955 393, as applicable.

5.4. Dumping at Sea Permit

The Dumping at Sea Permit requires the provision of a Marine Mammal Observer(s) (MMO) by the client and loading and dumping activities confined to the winter months (1st October to 31st March) to negate any potential impact on salmonid migration and summer bird feeding. The Project Manager will assist Dublin Port Company in fulfilling their permit obligations.
Such provisions will include timely notifications, records, reports and other written or electronic information concerned with the execution of dredging operations (e.g. location plotting, quantities dredged, dates and times, etc) strictly in accordance with permit requirements.
Reference to Clause 212 of the Technical Specification, IDC will "facilitate the Employers preparation of the Annual Environmental Report for submission to the EPA" in providing "a full copy of the dredge records to the Employer for the dredging and disposal carried out during the period of 1st October - 31st December 2018 by 15th January 2019. Dredging and disposal records for the period of 1st January – 31st March 2019 shall be submitted to the Employer by 15th April 2019."

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The Project Manager will ensure that daily and weekly summary records for submission to the clients Engineer. The activity of each vessel/plant shall be itemised as below and any other pertinent information which the Engineer may require shall be supplied. The daily and weekly records shall be submitted in a spreadsheet format (digitally in an unlocked, unprotected, editable Microsoft Excel format) and shall include the following:

Daily records:

- Name of vessel
- Date
- Area or areas of dredging & type of material dredged (include grid co-ordinates of start and end points and digital plots/tracks of route of dredger during loading operations)
- Cycle number
- Time at start of loading
- Time at end of loading
- Time and location (include grid co-ordinates) at start of discharge at disposal site
- Time and location (include grid co-ordinates) at end of discharge at disposal site
- Digital plot/tracks (screen shot) of route of dredger during the disposal operations at offshore dump site (showing perimeter of disposal site), to be provided in chronological order
- Summary of working hours each day

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- The weather, including wind strength and direction, sea-state and tidal set throughout each disposal operation and loading operation
- Nature and quantity of each substance for disposal
- The course and speed throughout each disposal operation
- Total hopper load in cubic metres
- Total weight of hopper contents in tonnes
- The density inputs to the TDS system
- Total in-situ cubic metres
- Total TDS
- Dredging production rates throughout loading and cycle time for each load
- Times of start and finish of stoppages and reason
- The initials / identification of the Master
- Details of environmental occurrences (e.g. MMO stoppages)

Weekly Summaries:

- Total hopper tonnes
- Total dredging hours
- Total in situ volume (as calculated by survey)
- Total hours sailing empty
- Total hours sailing loaded
- Total effective hours (theoretical and stoppages)

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5.5. Marine Mammal Observer (MMO)

The project will provide personal protective equipment (PPE), instructions on PPE use, food and welfare facilities on board the dredger.
The vessel Master will provide a vessel safety induction on first arrival on board for all visitors.
In exercising our duty of care, we require the MMO and Marine Archaeologist personnel to have completed an accredited STCW Personal Survival Techniques (PST) 1 Day course.

Environmental aspects and impacts identified within section 2 and subsequent project planning will be addressed through the SHE Risk Management process (section 9) and other controls in respect of the following, as applicable:

- Habitats, fish, marine mammals, birds, etc
- Pollution prevention and oil spill response
- Historic environment and archaeology
- Waste
- Applicable consents and licenses

Environmental best practices to be implemented:

- Set reasonable times for working hours when working close to residential areas;
- Reduce travelling distances from plant parking compound to the work site;
- Avoid revving or idling plant engines unnecessarily – and switch off when not in use;
- Use modern and well-maintained plant and low emission fuels;
- Keep noise levels to a minimum when unloading goods on site;
- Lighting should be turned off when not required;
- Should be directed in the position of the works and not create unnecessary nuisance to the local environment or habitats.

Dust, odours and waste:

- Keep fuelling areas away from the public and habitats;
- Maintain good housekeeping;
- Arrange regular collection of wastes by licensed waste carrier;
- Use covered waste containers and do not overfill;

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6. RESPONSIBILITIES

6.1. General

The responsibility for safety, health and environment is founded in the Boskalis management structure. This responsibility is promulgated to project sites and vessels via subsequent management levels [CDM]. The responsibilities outlined below are supplemented with tasks resulting from the SHE Risk Assessment, and as defined by the NINA Safety Programme.

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6.2. Project Manager

Although some tasks may be delegated, the Project Manager is ultimately responsible for all safety, health and environmental aspects of the Project.
The Project Manager shall:

- Liaise with the Client's Representative and other contractors on site to establish Site Safety Rules and the exchange of design information
- Define Project NINA approach (organise NINA Kick-off Meeting; define NINA goals, conduct NINA Workboxes, etc)
- Perform a SHE Risk Assessment prior to commencement of the works
- Ensure the SHE Plan meets contractual, legal and local authority requirements
- Ensure the employment of sufficiently qualified and trained personnel, including subcontractors
- Ensure that employees understand the SHE Plan and their SHE responsibilities
- Discuss the SHE Plan with vessel officers before starting work
- Make sure that emergency preparedness and response is adequately planned
- Arrange periodic SHE inspections and meetings
- Develop and implement safety, health and environmental measures to minimise personnel risks
- Review the effectiveness of the safety, health and environmental measures on the Project
- Report incidents (referring to "Incident Reporting and Follow-up")
- Report SHE actions such as inspections, audits and toolbox meetings
- Ensure that suitable personal protective equipment (PPE) is provided to all project personnel
- Communicate the project SHE instructions to all employees including suppliers / subcontractors
- Set and implement SHE targets for the project
- Ensure there are trained First Aiders, First Aid equipment and facilities in place
- Prepare and control a site waste management plan, if/when necessary
- Preparation for, attendance at and follow-up of regular scheduled progress meetings.
- Preparation for, attendance at and follow-up of other meetings relating to the envisaged scope of work.
- Coordination and preparation of all pre-campaign activities (e.g. vessel mobilisation, coordination with VTS for berth availability, port activities & pilot requirements, initiate security clearance procedures, licence amendments, etc.)
- Supervision of activities during dredging campaigns (e.g. vessel planning, port movements, project reporting, etc.)

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- Coordination and preparation of all post-campaign activities (e.g. vessel demobilisation. survey sign-off, campaign reporting, etc.)
- Ensure sampling of materials as specified by EPA under the conditions of the disposal licence.

Tasks which should not be delegated by the Project Manager are:

- Monthly safety, health and environmental site inspections
- Participation in the investigation and analysis of any serious incident or High Potential Near Miss
- Chairing the SHE meetings with supervisory personnel

6.3. Supervisory Personnel

Supervisory project personnel (Works Manager, Operations Manager, Technical Manager, Survey Manager, Superintendent, Foreman, Captain, Vessel Master) in charge of works and project employees, have the responsibility to supervise and where relevant enforce the SHE requirements accompanying those works. This includes amongst others:

- Report dangerous situations, incidents and accidents
- Correct unsafe behaviour
- Make sure that all personnel can work safely, and implement the Job Hazard Analysis and Permit to Work systems where relevant
- Make sure that emergency preparedness and response equipment for safety, health and environmental incidents is suitable, sufficient and effective
- Conduct a safety inspection of the work activities on site
- Organise and conduct toolbox meetings
- Ensure drills are executed

6.4. SHE-Q Manager

Unless the Project Manager takes up this position, a SHE-Q Manager may be appointed with the following responsibilities:

- Advise and support management and supervisory personnel on SHE issues, such as SHE Risk Assessments and related control measures, etc.
- Define SHE-Q tasks based on requirements of the Client, legislation and BWL's 'Way of Working'
- Induct, instruct and keep records of new project personnel, subcontractors, suppliers, visitors and third parties
- Perform random project (vessel) spot-checks, site audits and inspections to verify compliance with the SHE Plan
- Advise and support the Project Manager in reporting and investigating accidents, damages, environmental losses and near misses
- Administer and regularly review the SHE Plan
- Record, review and report the SHE performances achieved on the Project
- Assessment of subcontractors and suppliers to verify compliance with applicable project requirements
- Administer and review regularly the Project Emergency Plan, including procedures and documents such as the Emergency Contact List

6.5. Project Personnel

All project personnel are responsible to comply with the SHE-Q Policy, Site Safety Rules and project specific SHE instructions:

- Behave and work according to the Site Safety Rules
- Use equipment, machines, vehicles and tools in a safe and proper manner
- Use and maintain PPE and rescue equipment in a safe and proper manner
- Attend and participate in toolbox and SHE meetings
- Report instantly to supervisory personnel, any noticeable (possible) dangers

All project personnel are permitted to stop work if any possible danger poses a direct threat that may lead to a severe incident.

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7. SHE MANAGEMENT SYSTEM

7.1. Project SHE Management

The SHE management system of Boskalis is part of the Boskalis Way of Working and has been developed to assure a high level of control of safety, health and environmental aspects during the PLAN and EXECUTE phase of projects. Reference is made to the Way of Working Group Manual, which details how SHE aspects are managed in tenders and projects.

The Boskalis Way of Working consists of a set of process descriptions, detailing activities, tasks and related supporting tools, one of which being this Project SHE Plan.

Depending on the project particulars and the SHE Risk Assessment, this plan may be supported with related sub-plan(s), e.g. Project Emergency Plan, Attachment 03.

For on-site activities, Safe Operating Procedures (BWL-350c-series) are available to be used as follows:

- As SHE instructions and guideline procedures for all relevant BWL work processes and activities
- As a foundation for establishing control measures with regard to section 2 of GT-350: SHE Risk Assessment

7.2. Vessel SHE Management

Additional to the Project SHE system, separate Plant Management Systems (PMS) are implemented in the Boskalis Fleet Management organisations to ensure, amongst others, a safe operation of the fleet. The Plant Management Systems are based on International Codes and Conventions for the safe operation of ships and for the protection of the environment and are certified accordingly.

The most important elements of these PMS are:

- Onshore organisation, with designated persons for individual vessels
- Onboard organisation, management of crew and training
- Communication onshore, onboard and ship-shore
- Standing orders and emergency preparedness

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8. CONTRACTUAL & LEGAL SHE REQUIREMENTS

8.1. Contractual

In addition to the standard Boskalis SHE requirements, the following contractual SHE requirements apply to the Project:

Contractual Requirements	
Requirement	**Description**
Dublin Port Company Safety Rules for Contractors	This Standard has been produced by Dublin Port Company for distribution to all Contractors working, or intending to work, in areas controlled by Dublin Port Company.
Dublin Port Company	As part of the Dublin Port Company's Capital Projects continuous improvement process the Capital Projects Safety Essentials have been developed. These essential rules have been derived from project risk registers, experience, lessons learned, as well as from accident investigations conducted across the Construction Industry.

8.2. Legal

In addition to the standard Boskalis SHE requirements, the following legal requirements apply to the Project (and all other legislation derived from it, including codes of practice, which relate to the activities on site):

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Legal Requirements
The Safety, Health and Welfare at Work Act 2005
The Safety, Health and Welfare (Construction) Regulations 2013
The Safety, Health and Welfare at Work (General Application) Act 2017
The Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016
Protection of the Environment Act 2003
Waste Management Act 1996
Dumping at Sea Act 1996 (Amendment) Act 2004
Merchant Shipping (Pollution) Act 2006
Marine Safety Act 2003
Merchant Shipping and Maritime Security Act 1997
Merchant Shipping Act 1995
Merchant Shipping Regulations incorporating International Codes and Conventions, e.g.:
The Merchant Shipping (Maritime Labour Convention) [subject variants] Regulations
The Merchant Shipping (Code of Safe Working Practices) (Amendments and Revocation) Regulations 2015
The Merchant Shipping (Standards of Training, Certification and Watchkeeping) Regulations 2015
The Merchant Shipping (International Safety Management (ISM) Code) Regulations 2014
The Merchant Shipping (Accident Reporting and Investigation) Regulations 2012
The Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008
The Merchant Shipping (Small Workboats and Pilot Boats) Regulations 1998
The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997

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9. SHE RISK MANAGEMENT

9.1. General

Risks are the probability that hazards lead to negative impacts i.e. personal injuries, equipment damages or environmental losses. By applying the available SHE Risk Management tools in the right way, risks are identified, categorised and mitigated in a systematic manner.

SHE Risk Management within Boskalis is a 3-level system, consisting of:

- A Project or Vessel SHE Risk Assessment
- A specific Job Hazard Analysis (JHA) or Risk Assessment Method Statement (RAMS) when preparing individual jobs, or a smaller or specific activity within the overall project
- A Last Minute Risk Assessment (LMRA) just before starting the job (YES scan)

The SHE Risk Management process contains the identification of hazards, assessment of hazards and the implementation of control measures. The assessment includes:

- All routine and non-routine activities (single, as well as their combinations)
- Activities of personnel that have access to the workplace (incl. subcontractors, suppliers & visitors)
- All facilities at the workplace, delivered by Boskalis or other parties

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9.1.1. SHE Risk Assessment

The execution of this first level SHE Risk Assessment is obligatory for every project and on every vessel. Where available, any SHE Risk Assessment resulting from the design stage is taken into account.

The SHE Risk Assessment Matrix (Attachment 06) identifies the known hazards that may occur during the project. For each hazard in the matrix, standard minimum control and mitigation measures are identified to reduce the risk to an acceptable level. These control measures may include amongst others the Permit to Work system.

Specific hazards and additional control measures are to be evaluated by the Project team and the risk assessment will be regularly reviewed and up-dated as necessary.

9.1.2. Job Hazard Analysis or Risk Assessment Method Statement

A JHA is conducted by the work party during the preparation for a specific job. A RAMS is prepared by project management or supervisors to support a Safe System of Work for a smaller or specific activity within the overall project.

The outcome of the SHE Risk Assessment, the JHA or RAMS and an applied Permit to Work system is communicated to all employees involved, e.g. through Toolbox meetings.

9.1.3. Last Minute Risk Assessment

The last-minute risk assessment (LMRA), is performed by the work party just before starting a job. It consists of a final check on the safety of “Yourself, Equipment and Surroundings” (YES scan). Within the Boskalis system, there is no requirement to document the outcome of the LMRA.

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9.2. Review and Management of Change

Once prepared, the SHE Risk Assessment is reviewed by the Project Manager:

- Periodically during longer duration projects
- Whenever new activities start
- When design changes are made
- When operations are modified or schedules change
- When legal requirements change
- When an event occurs that gives cause for reconsideration of the SHE Risk Assessment (for example when indicated as such in a SIRE Incident Report)

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9.3. Safety Hazard Observation Card (SHOC)

The objective of the SHOC system is to continuously improve project safety by reporting hazard observations and improvement suggestions and defining corrective and preventive measures.

Every employee is responsible for reporting hazard observations, and rectifying on the spot if possible and safe to do so.
The project manager is responsible for further investigation, improvements or corrective and preventive actions and provision of feedback to the generator of the SHOC.

Reference is made to the SHOC process description, containing a SHOC Card template and SHOC Register, as available in the Way of Working Group Tool set.

Boskalis

Safety Hazard Observation Card (SHOC)

Date: _____

Reported by: _____

Company name: _____

☐ HAZARD OBSERVATION ☐ IMPROVEMENT SUGGESTION
☐ POSITIVE OBSERVATION

☐ BEHAVIOR ☐ EQUIPMENT ☐ PROCEDURES

Description of hazard/improvement: _____

Have you rectified the hazard? ☐ Yes ☐ No

If yes, how? _____

If no, contact your supervisor before submitting this card.

9.4. Stop Work Authority

Stop work authority (SWA) establishes the responsibility and authority of any individual to stop work when an unsafe condition or act could result in an undesirable event.

The authority and responsibility to initiate a SWA is given to all individuals including subcontractors and suppliers engaged in activities on-board Boskalis vessels, on project sites and offices by the NINA Value "*I take action in case of unsafe operations. If necessary, I will stop the work*".

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10. TRAINING AND INDUCTION

10.1. Training

At corporate and divisional level, the essential basic SHE related training for all employees is managed via training matrices for operational staff and crew that are specified for each Division.
The correct implementation of these training matrices is a joint responsibility of the employee and the corporate / divisional Personnel and Organisation departments.

On a personal level, all Boskalis employees are issued with Safety Instruction Booklets, which must always be observed as the minimum SHE requirements of Boskalis.

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The Project Manager shall ensure, in conjunction with the relevant staff departments, that all prospective employees have appropriate SHE training in order to undertake tasks competently, identify hazards, and take the necessary precautions to safeguard themselves, others and the environment.

10.2. Project Induction

Upon first arrival on the Project, all employees (including subcontractors) attend a SHE induction, including the following topics:

- Dublin Port Company video induction
- SHE Policies, including individual tasks and responsibilities
- Boskalis Way of Working
- NINA Values & Rules (incorporating Dublin Port Company -Capital Projects Safety Essentials)
- Emergency response procedures
- Site Safety Rules
- Project specific hazards
- Site Security arrangements
- Welfare facilities
- Arrangements for First Aid
- Fire Management arrangements
- Safety Arrangements (toolbox talks feedback and sign off RAMS, Start of Shift Meetings)
- Personal Protection Equipment (PPE)
- Project specific Environmental Aspects Impacts and control procedures
- Project specific Waste Management requirements
- Reporting of incidents, safety observations (SHOCs).

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Records of these project inductions are maintained in the Project Master File (PMF).

10.3. Visitors

The Project Manager will ensure that all project visitors receive correct instructions regarding the applicable SHE requirements. Visitors are provided with the required PPE for the visit.

10.4. Vessel staff

Upon arrival, the Project Manager will ensure that every vessel is introduced to the project SHE requirements. As a minimum the following topics are discussed during the on-board kick-off meeting:

- Project Management Plan / Project Preparation Operational Summary (PPOS) and Project SHE Plan
- Local licenses
- Site and vessel security issues
- Site and Vessel Specific Hazards & Risks
- Port Facility Safety, Health & Environmental Requirements

The vessel officers are ultimately responsible to fulfil the project SHE requirements on their vessel or production units, communicating relevant SHE requirements and project particulars to crew and visitors.

10.5. Subcontractors

The Project Manager will ensure that any subcontractors engaged by the company are appropriately appraised with regard to their competence, to carry out the work safely and with due regard to the environment.

Subcontractors are responsible for SHE matters as included in their contracts. Each subcontractor shall appoint a designated employee from their organisation to act on their behalf regarding SHE matters. Throughout the duration of the project, the subcontractor shall:

- Comply with the SHE requirements of the Principal Contractor, and of the subcontract;

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- Ensure that subcontractor personnel have attended a SHE Induction;
- Ensure that subcontractor personnel adhere to agreed safety instructions / control measures;
- Report any accident, damage, environmental loss or near miss to the Project Manager;
- Attend Project SHE-Q meetings.

Dry plant must be fit for purpose, maintained (with records) and operated by trained, competent personnel to encompass safe operation and best environmental practice.

10.6. Personal Protective Equipment (PPE)

Prior to commencement of the works, the appropriate PPE shall be defined and made available to project employees and visitors. The distribution of PPE is recorded using BWL-270b. Applicable PPE must be worn at all times during the execution of the works.

The following project specific minimum PPE requirements apply:

- Hardhat
- High Vis Coat / vest / overalls
- Safety Boots
- Lifejacket when working within 2m of water and crew transfer

Additional PPE as per specific task risk assessment can be

- Safety glasses
- Gloves
- Hearing protection

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11. COMMUNICATION

11.1. Incident Reporting and Investigation

All accidents, damages, environmental losses and near misses, including those involving subcontractors and/or members of the public, are to be investigated and reported to the BWL Head Office using BWL-370a: Incident Report Form or SIRE (System for Integrated Reporting of Events) registration, or Maximo (on relevant vessels). On receipt of a reported incident, the Project Manager will inform the clients representative and or Harbour Master as appropriate.

The process covering the reporting and the investigation of incidents is further described in the Boskalis Way of Working (ref. Incident Reporting and Investigation).

11.2. Site Reporting

SHE issues are addressed in the weekly narrative reports prepared on site.
After such reports have been sent to the Head Office, the SHE-Q department is responsible for adequate follow-up of any SHE-related issues.

11.3. Site SHE-Q & Progress Meetings

During the weekly site meetings, the following matters are discussed:

- Accidents, damages or environmental losses occurred and investigated
- Results of safety inspections and random spot-checks
- Received SHOC cards
- Review of SHE performance
- Major changes in design, planned activities or working conditions (ref. Management of Change)
- Exchange of design and health and safety information between duty holders on site
- Issues from safety committees
- SHE concerns or encountered problems

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11.4. Toolbox meetings

Throughout the duration of the works, supervisory personnel shall initiate toolbox meetings. Daily/Weekly/Monthly toolbox meetings are organised to consult with the workforce and continuously improve the general awareness of employees and sub-contractors with regard to Safety, Health and Environmental issues.

Job specific toolbox meetings are organised whenever new or non-routine tasks are executed, supported by a JHA or RAMS. The purpose of a toolbox meeting is to make employees aware of the risks accompanying the planned activities and to focus on the control measures which have been put in place. Employees are encouraged to give feedback to these toolbox meetings.

Toolbox meetings and their attendees are recorded by means of the registration form available.

11.5. Simultaneous Operations (SIMOPS) meetings

SIMOPS meetings may be held to coordinate the planning and implementation for simultaneous operations between the different parties on the project.

11.6. Safety File

Where applicable, relevant information for the Safety File will be made available during or on completion of the works, including as-built drawings and other information regarding key health and safety risks relevant to any subsequent maintenance work.

The Project Manager shall arrange the gathering of information, to compile the Safety File and hand it over to the client on completion of the work.

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12. INSPECTIONS AND AUDITS

12.1. Inspections

During preparation and execution of the project, regular SHE inspections are organised to verify conformance with the Safety, Health and Environmental requirements:

- Pre-mobilisation Inspections for own and chartered equipment, where relevant
- Monthly SHE Inspections by the Project Manager (not to be delegated)
- Monthly SHE Inspections by Supervisory Personnel
- Project SHE Inspections by Business Unit Management when visiting the project
- Subcontractor(s) and Suppliers

Checklist templates are available to facilitate and register SHE Inspections.

12.2. Audits

An annual audit planning is prepared by the corporate SHE-Q department, detailing the intended internal and external audits for projects and Boskalis Business Units.

The scope of each SHE-Q audit depends on the actual activities on the project or organisation under review, the subject and systems to be audited and the available documentation. Follow up actions of previous audits are verified.

For this specific project, the following internal and/or external audits are foreseen:

- Vessel/ Equipment pre-mobilisation

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13. EMERGENCY RESPONSE

13.1. General

An emergency situation occurs whenever one of the following questions is answered “yes”:

- Are there any fatalities?
- Is the situation (potentially) life-threatening?
- Has serious environmental damage occurred or is it likely to occur?
- Is the situation (potentially) sensitive to the press and/or public opinion?
- Has serious damage to plant occurred or is it likely to occur?

The following response measures are implemented to mitigate escalation in case of an emergency.

13.2. Site Office Evacuation

In the case of fire, basic site office evacuation instructions are provided in Attachment 01.
All site-based project personnel will be informed of emergency evacuation procedures, including equipment supplied for their safety. The Project Manager will ensure that such equipment is suitably inspected at regular intervals and serviced by a competent person.

13.3. Emergency Contact List and Project Emergency Plan

Attachments 02 and 03 provide details for the parties concerned in case an emergency occurs. The Emergency Contact List is made clearly visible at strategic locations throughout the project, including vessels, onshore work areas and project offices.

The Project Manager ensures that employees are familiar with the Emergency Contact List and Project Emergency Plan, and that the documents are updated when necessary incorporating Dublin Ports emergency responders and procedures.

The Project Manager will ensure that suitable communication lines with the port emergency operations centre are established.

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13.4. Vessel Emergency Arrangements

The vessel master has ultimate responsibility for the safety of his vessel and crew. Each vessel has appropriate emergency response arrangement onboard and undertake regular drills along with emergency lifesaving equipment which will be regularly inspected and tested as per the vessels Safety Management Systems (SMS)

13.5. Emergency repatriation

When a possible repatriation situation arises, contact the Travel Clinic of the Dutch “Havenziekenhuis” (Harbour Hospital) in Rotterdam by phone via number:

Office hours NL - +31 10 82 01 120
Emergency 24/7 - +31 10 82 01 121

Following persons in the Travel Clinic are the first point of contact for Boskalis:

- Dr. P. van Genderen;
- Mr. H. Koene;

The Travel Clinic doctor in consultation with the local doctor decides whether repatriation is needed.
Boskalis entered a contract with International SOS Emergency Services (I-SOS) for this service.
In principle, the doctor of “Havenziekenhuis” guides contact with the repatriation service company.

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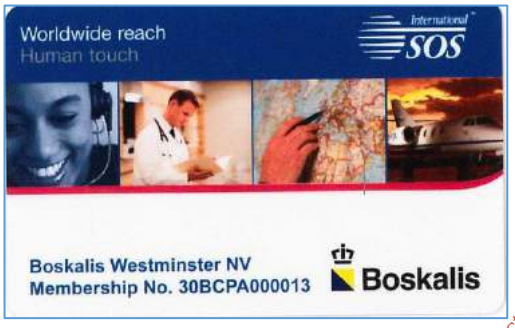
If an emergency repatriation is required, the Project Manager contacts the head of the P&O department and the Business Unit Director. The Boskalis Head Office can be contacted 24 hours a day via telephone number:

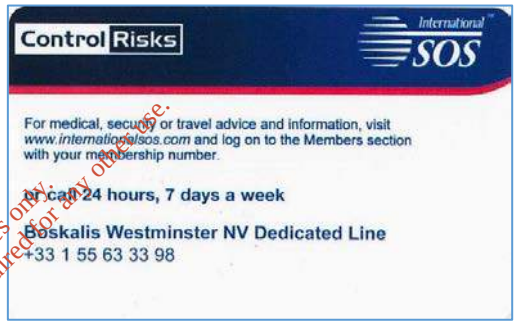
0031 78 69 69 999

13.6. Support from International SOS / Control risks

As a back-up service to individual travellers, Boskalis has partnered with **International SOS / Control Risks** to help ensure the health and safety of all employees before, during and after the project. A guaranteed point of contact is available for security and medical issues - 24 hours a day, 365 days a year - via a network of 24-hour Assistance Centres, as well as via an App.
Contact details below:

London Assistance Centre Nr.:	+44 208 76 2 8008
Dedicated Boskalis Assistance Nr.:	+33 1 55 63 33 98
Boskalis Membership Nr.:	30BCPA000013





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14. REFERENCES, ABBREVIATIONS, DEFINITIONS

14.1. References

Client Documents		
No.	**Document No.**	**Document Title**
…..	…..	…..
…..	…..	…..

Boskalis Documents		
No.	**Document No.**	**Document Title**
	IDC-001	SHE-Q Policy Statement
	BWL-004	Emergency Plan (*Company-level*)
	GT-146	CSR Report (incl. materiality matrix)
	GT-232b	SIMOPS Matrix
	BWL-270a	Project Induction Checklist
	BWL-270b	PPE Receipt Form
	IDC-271	Project Emergency Plan
	BWL-281	Site Waste Management Plan
	GT-350 / BWL-350a	SHE Risk Assessment (and Matrix)

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Boskalis Documents		
No.	**Document No.**	**Document Title**
	BWL-350b	Black and Yellow Safety Booklet
	BWL-350c-series	Safe Operating Procedures
	BWL-350d	Risk Assessment Method Statement (RAMS)
	BWL-350e	COSHH Assessment Form
	GT-351 / BWL-351a	Job Hazard Analysis
	BWL-352	Permit to Work
	GT-353	Toolbox Meetings
	GT-354	Daily Pre-Start Meeting
	GT-356	Management Site Visit Checklist
	GT-370 / BWL-370a	Incident Reporting and Investigation (and Form)
	GT-371	Safety Hazard Observations
	GT-402	Project Organisation Chart
	BWL-424a	Project Manager Vessel Tasks & On Board Kick Off
	GT-510	Pre-mob Inspection Checklist
	GT-660	Safety Flash Library
	BWL-716	SHE-Q Requirements Suppliers & Subcontractors

Supplier / Subcontractor Documents		
No.	**Document No.**	**Document Title**
…..	…..	…..
…..	…..	…..

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14.2. Abbreviations

Abbreviation	Full meaning
IDC	Irish Dredging Company Ltd
BWL	Boskalis Westminster Ltd
COSHH	Control of Substances Hazardous to Health
CSR	Corporate Social Responsibility
JHA	Job Hazard Analysis
MoC	Management of Change
NINA	No Injuries No Accidents
PTW	Permit to Work
RAMS	Risk Assessment Method Statement
SHE-Q	Safety, Health, Environment - Quality
SHOC	Safety Hazard Observation Card
WoW	Way of Working

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14.3. Definitions

Definition	Full meaning
…	…
…	…

15. ATTACHMENTS

- Attachment 01: Site Office Evacuation
- Attachment 02: Emergency Contact List
- Attachment 03: Project Emergency Plan
- Attachment 04: Project Organisation Chart
- Attachment 05: Policy Statements
- Attachment 06: SHE Risk Assessment Matrix
- Attachment 07: Clients Pre-construction Information

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Attachment 01: Site Office Evacuation

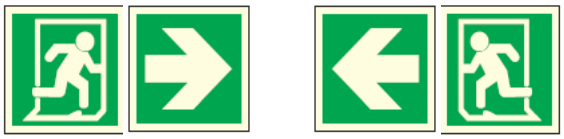
SITE OFFICE EVACUATION

Evacuation of site office staff and visitors to the designated Emergency Assembly Point

IF THE FIRE ALARM SOUNDS:

1. Leave the office through the nearest Emergency Exit

Emergency Exit



Emergency Exit Route

- **Leave your office space and keep door open**
- **If flames and/or smoke are visible, move from that direction**
- **Alert colleagues you pass in corridors or offices and, if safe, "sweep" offices for persons left behind**

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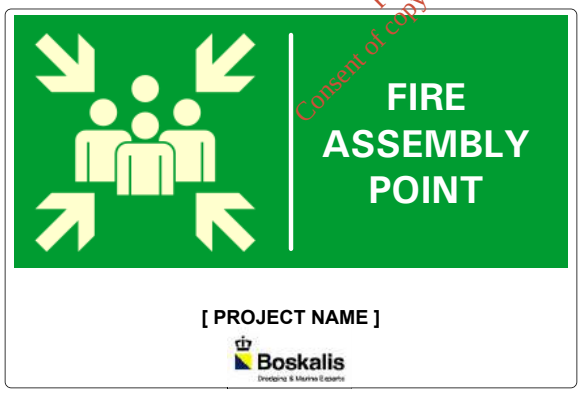
2. Report to the Emergency Assembly Point



Assembly point indication

3. Wait for Instructions from the Fire Warden

The Fire Warden can be recognised by their Red High Visibility Vest

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Project Safety, Health and Environmental Plan

DOCUMENT NUMBER: BWL-270

PROJECT NAME: Dublin 2020-2021 Season No. 4
PROJECT NUMBER: E043785

CLIENT NAME: Dublin Port Company
CLIENT REFERENCE: CP1501_017_03

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DOCUMENT CONTROL

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01	IDC	Project Manager	Gerrit Jan van den Bosch
02	IDC	Superintendent	Richard Chester
03	IDC	Chief Surveyor	Tony Wall
04	IDC	Captain Shoalway	Wolfgang Hollitzer / Andries Kelderhuis

General document data	
Document Title:	Project Safety, Health and Environmental Plan
Document Number:	BWL-270
Project Name:	Dublin 2020-2021 Season No.4
Project Number:	E043785
Client Name:	Dublin Port Company
Client Reference:	CP1501_017_02
Client Revision Number:	2.0
Boskalis Entity:	Irish Dredging Company

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Revision status		
Revision Number:	Rev. 2.0	
Revision Date:	08-Sep-2020	
Approval Status:	Approved	
Prepared By:	Richard Chester	Role: Superintendent
Reviewed By:	Stuart Huth	Role: SHE-Q Officer
Approved By:	Gerrit Jan van den Bosch	Role: Project Manager

Change log		
Revision	**Section**	**Change**
Rev. 1.0	All	New issue
Rev. 2.0	2.0 2.1 2.3 15	Updated dates for maintenance dredging 2020 and 2021 Updated PDSP contact details from Maintenance and Capital works Updated to include reference to collision to structures in Collison Risk, Overdredging/undermining structures and cleaning draghead operations Removed Risk Assessment from attachment as covered in separate document.

EPA Export 28-04-2021:02:38:37

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Irish Dredging

TABLE OF CONTENTS

1.	INTRODUCTION	4
2.	OUTLINE PROJECT	5
3.	SAFETY	10
4.	HEALTH	14
5.	ENVIRONMENT	15
6.	RESPONSIBILITIES	17
7.	SHE MANAGEMENT SYSTEM	20
8.	CONTRACTUAL & LEGAL SHE REQUIREMENTS	20
9.	SHE RISK MANAGEMENT	21
10.	TRAINING AND INDUCTION	23
11.	COMMUNICATION	25
12.	INSPECTIONS AND AUDITS	26
13.	EMERGENCY RESPONSE	27
14.	REFERENCES, ABBREVIATIONS, DEFINITIONS	28
15.	ATTACHMENTS	30

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1. INTRODUCTION

The Project Safety, Health and Environmental Plan covers the SHE planning and implementation framework for the execution of the project. Boskalis, subcontractors, suppliers, employees and all others involved are required to adhere to this plan. It forms an integral part of the project, and is the primary document for project safety, health and environmental activities.

The plan sets out the specific policies, practices, resources and activities relevant to the project; to ensure that the contractual requirements, applicable regulatory requirements as well as Boskalis requirements are met, and to encourage high standards of safety, health and environmental standards amongst all employees.

This document forms part of the Boskalis Way of Working, the integrated quality management system applicable to all operations in Boskalis. The Boskalis Way of Working is structured around four Phases as pictured below. This Project SHE Plan is typically prepared in the PLAN Phase, where the main implementation is taking place in the EXECUTION Phase.

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More detailed information about the Boskalis Way of Working can be found in the Group Manual and the User Guide. A dedicated website with all supporting materials is available at wow.boskalis.com.

1.1. Plan ownership, change management, approval and distribution

The Project Manager is the document owner and is responsible for the contents of the Project SHE Plan, ensuring the content is up to date and that only authorised and updated versions are in circulation. The Project SHE Plan is a dynamic document and reviews may take place and updates prepared as and when required.

Revision to the Project SHE Plan can be initiated by the following processes:

- Changes in legislation
- Changes in design and/or work methods
- Major scope and schedule changes
- Results from risk assessments
- Results from audits (external & internal)
- Results from management reviews
- Results from Client inspections/reviews
- Changes in the Boskalis Way of Working

Any resultant changes will be issued, and agreed upon, by all parties concerned.

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2. OUTLINE PROJECT

The Alexandra Basin Re-development (ABR) project is the most significant infrastructural development planned by the Dublin Port Company (DPC) in the past 100 years and includes the construction of new quays and jetties within the Alexandra Basin, along with the seabed remediation and capital dredging to deepen the area to -10m CD, and the development of Alexandra Basin West.

The ABR project also includes for deepening of the Fairway and approaches to Dublin Port increasing the ruling depth from -7.8m CD to -10.0m CD, of which the 2020-21 season is the fourth of a number of planned campaigns.

The capital dredging will be executed within the terms of the foreshore licence and EPA Dumping at Sea permit, which prevents any dredging below -10m CD and confines the loading and discharge activities to the winter months (October – March), with a maximum permitted volume of 1,046,818m³, which is also subject to maximum monthly volumes.

Planned dates for the capital dredging works session 4

- October 2020 through to March 2021

In addition to the capital works, IDC has also been awarded the maintenance contract for the 2020 - 2021 season.

For the 2020 maintenance campaign, the maintenance areas are to include the berth pockets in the harbour area and the outer navigation channel. The 2021 maintenance areas cover the same as the 2020 campaign, but to also include the inner navigation channel.

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Planned dates for the 2020-2021 maintenance dredging campaign

- September 2020
- April 2021 – 30th September 2021 (Upstream of berth 49a can only be dredged from the 14th May 2021 to 30th September 2021

2.1. Project Identification

Project	
Details	**Description**
Project Name	Dublin 2020-2021 Season No. 4
Project Scope	The work to be undertaken is; 1. Maintenance dredging of pre-selected berth pockets and outer navigation channel – 2020 2. Capital dredging of a section of the inner navigation channel – 2020-2021 3. Maintenance dredging of pre-selected berth pockets, inner navigation channel and outer navigation channel – 2021
Project Location	Dublin, Ireland
Project Number	E043785
Client Project Number	CP1501_017_02

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Client	
Details	**Description**
Name Client	Dublin Port Company
Address Client	Port Centre,Alexandra Road Dublin 1, Ireland
Contact details	Eamon McElroy - Port Engineer

Consultant	
Details	**Description**
Name	Anthony D Bates Partnership
Address	Laburnham Farm Upper Weare Somerset BS26 2LE
Contact details	Colm Sheehan - 01934 732380

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Principal Contractor	
Details	**Description**
Name	Irish Dredging Company Ltd
Address	Pembroke House, Pembroke Street Cork, Ireland
Other details	-

(other consultants)	
Details	**Description**
Name	RPS (Alan G Barr)
Address	Elmwood House, 74 Boucher Road, Belfast
Other details	Environmental Consultant of DPC

PDSP Maintenance	
Details	**Description**
Name	DBFL
Contact	Paul Quigley pquigley@gdgeo.com
Other details	-

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PDSP Capital	
Details	**Description**
Name	GDG
Contact	Liam Brehon liam.brehon@dbfl.ie
Other details	-

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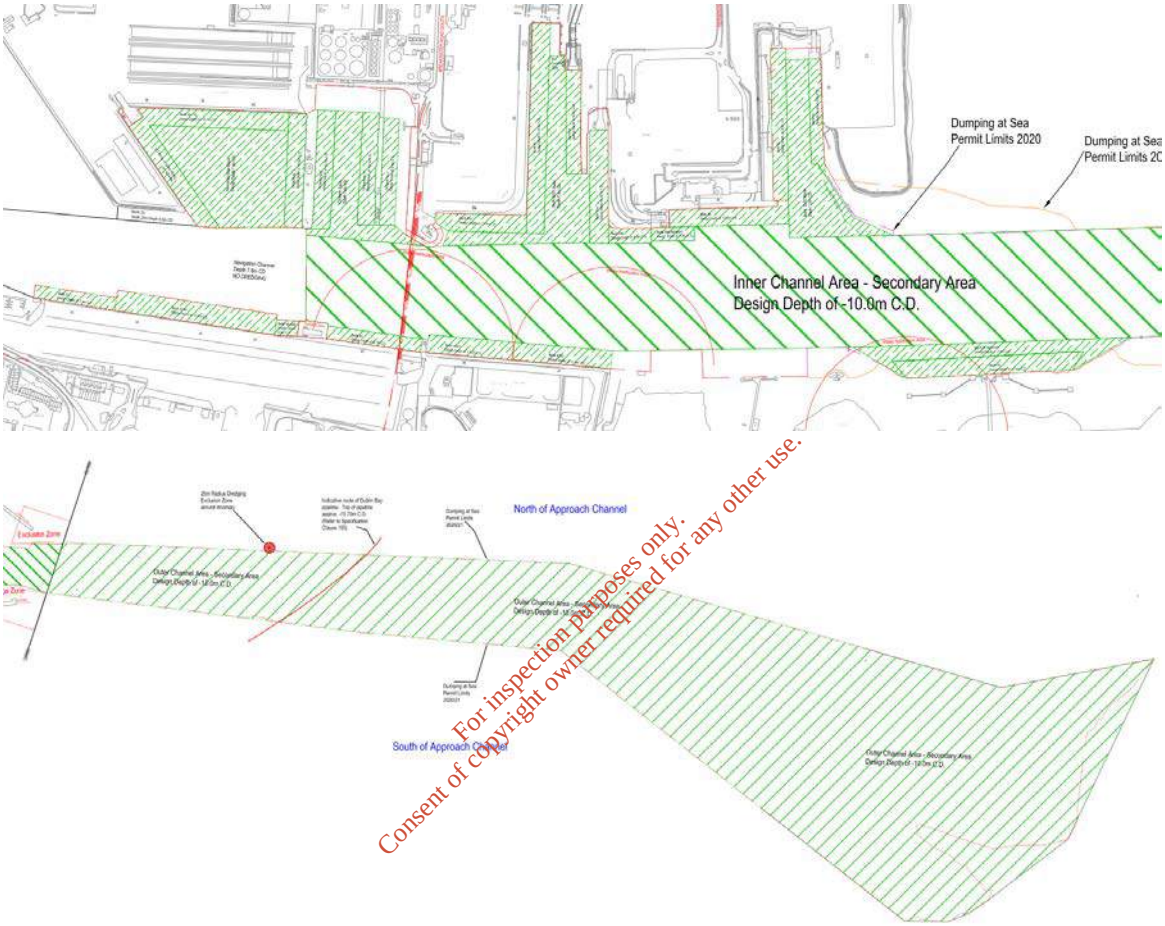
2.2. Existing Records, Plans and Information - Dredge Areas

The IDC scope of works for the maintenance 2020 berth pockets and outer navigation channel area (the close left hand diagonal green hatch).



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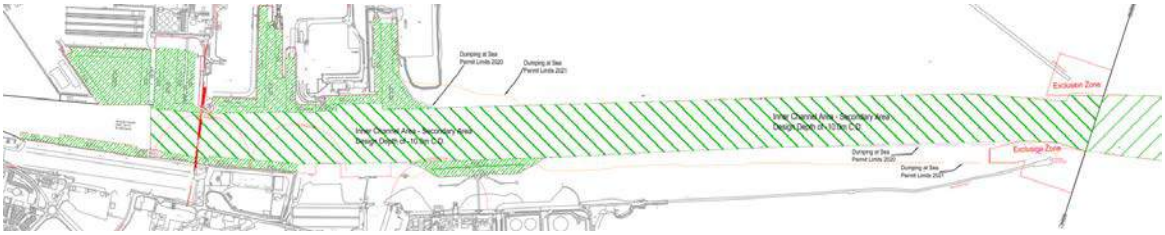
The IDC scope of works for the maintenance 2021 covers the same areas outlined for the maintenance 2020, with the addition of the inner navigational channel (the close left hand diagonal green hatch).



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2.3. Significant Risks Identified During Design

The project management will take account of the following assumptions and/or risks, as outlined in the pre-construction information, and develop SHE Risk Assessment control measures accordingly:

Persons at risk of falling in to water while working on dredger or vessel transfer: -

Boskalis operate a mandatory requirement that lifejackets are worn when working within 2m of water, unless within the confines of handrails, lifejackets worn for vessel transfers, mooring /unmooring operations.
Visitors or inexperienced personnel will be closely assisted when undertaking crew change operations.
Whenever possible, undertake vessel transfer when dredger is fully loaded (reducing climb) when using pilot ladder.
Good communication between the dredger bridge and the crew tender is the key to any vessel transfer operations.
Weather and sea conditions are always monitored, should tender or dredger deem it unsafe to transfer operations will stop until weather or sea conditions are safe to proceed.

Cleaning out the Dredge head if blockage/debris is stuck: -

Draghead shall be in cradle before any debris/blockages are cleared. Only experienced members of the crew shall undertake clearing operations.
Full PPE will be worn while clearing operations are undertaken.
Where possible clearing operations shall be under taken in the harbour break water or at the disposal site, where the vessel can reduce speed/stop.
Cleaning should only be undertaken in the calm conditions.

Risk Collision with other vessels /craft and port structures whilst operating: -

NINA onboard Kick off provision of relevant environmental and safety information for the works this will include traffic routes.
Trained competent Master and crew who will maintain a suitable watch and monitor the ships radio and radar.
The Master will establish and maintain close co-operation with Dublin Port Harbour Master, such that safe navigation mechanisms are operated to the highest standards.
Regular contact with Dublin VTS regards to dredging and shipping information.
Awareness of local shipping movements (ferries, commercial vessels and pleasure craft), as well as port structures
Maintain radio contact with vessels / craft in close proximity ensuring that they are aware of the dredging operations and limitations to manoeuvrability.
Monitor weather and sea conditions, in extreme adverse weather seek shelter to ensure safety of the crew and vessel.
On board vessel emergency procedures and regular emergency drills are undertaken to ensure that the vessel Master and crew are prepared for all eventualities.

Risk Major fuel spill / release: -

would most likely be caused by a significant collision event within the navigation channel (See collision with Vessels or craft whilst operating)
In the unlikely event of a major fuel spill during dredging operations, the vessel Master will take immediate actions on board the vessel to limit the spill. This will involve following the vessel's
Isolating the cause of the leak and closing scuppers to prevent further egress.
Stop all cargo and bunkering operations, and close manifold valves; sound the emergency alarm, and initiate the relevant emergency response procedures, and inform the loading master / bunkering personnel about the incident, if necessary
Utilise the Shipboard Oil Pollution Emergency Plan (SOPEP) equipment (such as spill kits, booms, etc).
Notify Dublin Port VTS and Harbour Master, the IDC Project Manager, the Irish Coast Guard and the Boskalis fleet management office.

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Risk over dredging/undermining port structures: -
Dredging below the design profile within the berths will be closely monitored. The design profile will be on the dredge display indicating the dredge head height in relation to the design profile.
A bed leveller will be utilised to bring material from areas that are close to structures towards areas that are more accessible for the TSHD, in order to minimise the risk of over dredging.

Dredging and dumping activities impact to flora and fauna, air and climate, and other receptors:-
To limit the degree of turbidity from overflowing, Boskalis trailer dredgers will use 'green valve' technology such that turbid plumes will be smaller, of shorter duration, and mostly confined to the lower parts of the water column where currents have less power for sediment dispersion, and where they are less visible.

Provision of a Marine Mammal Observer(s) (MMO) by the Client.
IDC will take note of the Dumping at Sea Permit Part III Conditions, in making the necessary provisions to assist Dublin Port Company in fulfilling their permit obligations.
This will include timely notifications, reports concerning the execution of the works.
Undertake suitable planning for the limiting of the requirement for vessel sailings to reduce producing exhaust fumes into the atmosphere.

Risk Dumping of spoil in incorrect location: -
Kick off meeting held onboard identifying all necessary requirements of the Dumping at Sea Permit.
Dredger operates the "dredge view" system which allows the plotting and records vessel movements and dumping. The dump area and dredge areas will be programmed into the system which allow the vessel to see its location to the dredge area and dump areas allowing pin point accuracy.

The dredge spoil will be spread as evenly as possible over the whole disposal site, minimising concentrations in limited areas and facilitating a more rapid recovery of benthic communities in the dump area.

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3. SAFETY

3.1. Safety, Health and Environmental Policy

The Boskalis Way of Working Policy Statement is our integrated policy document, in which our Board of Management declares our ambition with regard to SHE-Q. Irish Dredging Company Ltd (IDC) has incorporated this policy into the SHE-Q Policy Statement (Attachment 05).

We care for the safety, security and health of everyone involved in our activities, at the same time realising sustainable solutions and minimising our potential adverse impact on society and the environment. Our policy statement reinforces our commitment to the prevention of incidents.

3.2. NINA Safety Programme

The Way of Working Policy Statement underlies our Safety Programme NINA (No Injuries No Accidents) (www.boskalis-nina.com). NINA aims to embed the desired safety culture in our organisation and make safety a fully integrated part of working behaviour. The key statement in our NINA programme reads:
"People are our most valuable assets, making safety a core value. Our goal is: No Injuries No Accidents. This is embedded in our company's culture and supported through Values and Rules. All employees, including our sub-contractors, are expected to take these values and rules to heart".

3.2.1. Safety Values and Rules

The NINA Safety Programme is supported by five Values and five Rules that have been developed to provide guidance to all employees, including those of Subcontractors, both with regard to expected behaviour and risk management.

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3.3. Safety on the Project

To give substance to the NINA Programme at project level, the following actions are taken:

- NINA Kick-off Meeting;
- Onboard Kick off meetings;
- Identify NINA goals;
- NINA Workboxes / toolbox talks;
- Incorporate Dublin Port Company – Capital Project Safety Essentials.

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3.4. Shore Transfer

Shore transfers will be carried out by using either the survey / plough vessel, in a vessel-to-vessel transfer with the dredger. The Vessel Master will make best endeavours to facilitate transfers at the designated times of shift change, although consideration should be given to transferring when the dredger is at full hopper load (to avoid or minimise the use of a pilot ladder). The Vessel Master will provide the necessary PPE, supervision and assistance during transfers.
Given these best endeavours, the provision of shore transfers for MMO and Marine Archaeologist personnel is considered the most significant foreseen safety risk for the works.

3.5. Marine Mammal Observer (MMO)

The project will provide personal protective equipment (PPE), instructions on PPE use, food and welfare facilities on board the dredger. The vessel Master will provide a vessel safety induction on first arrival on board for all visitors. In exercising our duty of care, we require the MMO and Marine Archaeologist personnel to have completed an accredited STCW Personal Survival Techniques (PST) 1 Day course.

3.6. Archaeological Monitoring

The Project Manager will undertake to assist Dublin Port Company in the monitoring of underwater archaeology in the navigation channel: as detailed in the CEMP Table 2.1-1 and Archaeology Management Plan (AMP) should the need arise.

3.7. Capital Projects Safety Essentials

As part of the Dublin Port Company's Capital Projects continuous improvement process the Capital Projects Safety Essentials have been developed. These essential rules have been derived from project risk registers, experience, lessons learned, as well as from accident investigations conducted across the Construction Industry.
To purpose of these rules is to:

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- Clearly explain the basic rules that everyone should know and apply.
- Strengthen prevention by encouraging people to step in whenever they see something being done wrong.
- Stop work if the risk is not being properly managed.
- The rules are non-negotiable and will be incorporated into our own Safety Programme for this project as applicable.

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3.8. Project Safety Objectives and KPI's

Project Safety Objectives

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	C: BWL SHE-Q Objectives		
C1.	Expand on the use of NINA Tools (e.g. YES Scan Toolbox and Workbox etc). Use Safe Mind (NINA movie) as a Toolbox specifically addressing human factors.	NEMA	Ongoing
C2.	Fully Integrate Sospan Dau and Deo Gloria crews into the NINA programme	NEMA	Ongoing
C3.	Conduct at least one GT-356 Management visit each quarter.	Manage -ment	Ongoing
C4.	Continue to achieve an 80% overall score from client satisfaction feedback.	NEMA	Ongoing
C5.	Operational Excellence exercise (part 2 / follow on) to review WoW implementation and follow-up actions.	NEMA	Each quarter
C6.	Conduct WoW Stakeholder Mapping exercise for projects of risk category C or higher.	NEMA	Q4-2020
C7.	Company Fundraising and Donations – monitor and increase these events.	SCRU	Q4-2020
C8.	Engage local educational establishments – develop our interactive virtual reality programme.	SCRU	Q2-2020
C9.	Develop Subcontractor assessment process based on latest PAS91 standard.	NEMA	Q4-2020
	F: BWL – Environmental Objectives		
F1.	Create a carbon neutral Fareham office and establish CO_2 measurements for our other activities.	CSR Working Group	Ongoing
F2.	All project Managers, Works Managers and Superintendents to complete either the CITB Site Environmental Awareness Training Scheme or CIRIA's Environmental Good Practice on Site.	NEMA	Q4-2020

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The following leading and lagging Safety KPI's are agreed for this project;

Project Safety, Health and Environmental KPI's

Leading KPI's
SHE Inductions
Toolboxes / Safety Meetings
SHE Inspections /visits/audits
Near Misses
Safety Hazard Observation Cards (SHOC's)
Job Hazard Analysis (JHA)
Permit to Work (PtW)

Lagging KPI's
Lost Time Incident reports (LTI)
Restricted Work Case reports (RWC)
Medical Treatment Case reports (MTC)
First Aid Case reports (FAC)
Damage reports
Environmental Incident reports

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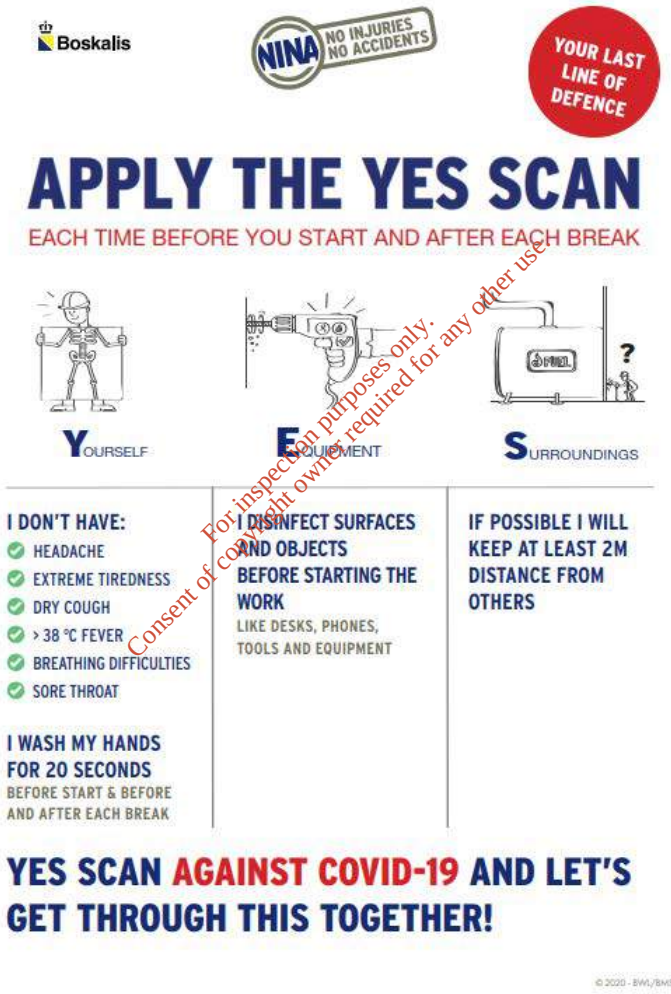
3.9. COVID-19

All personnel on site will follow the Irish Government guidelines with regard to COVID-19, in order to reduce the risk of catching and spreading the virus. This includes the use of face masks when social distancing is not possible and the use of hand sanitiser.

IDC have specific COVID-19 Protocols in place for site operations, in addition to this all vessels shall follow Boskalis COVID-19 vessel procedures, for crew changes and receiving visitors.



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4. HEALTH

4.1. Health Management

Safeguarding healthy working conditions for the project team is a precondition for sustainable employment. Reference is made to the Boskalis Way of Working / SHE-Q Policy Statement, Group Manual and the latest annual CSR report for more information on health management at group level.

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4.2. Health on the Project

Consider the following topics to give substance to the project health approach as part of the SHE Plan:

- Medical care on projects and vessels
  - Seek expert advice of the Travel Clinic of the Harbour Hospital ('Havenziekenhuis') in Rotterdam, the Netherlands when relevant
  - Seek advice from the Emergency Response Team (ERT) when a rapid response in the event of a health crisis is necessary. The team comprises employees from our SHE-Q and HR departments and doctors from the above-mentioned Travel Clinic.
  - Seek advice from the two local Hospitals are avaible in Dublin (Beaumont Hospital & Mater Hospital)
- Fit for Duty (see 4.3 below)
- Food management
- Prevention of occupational and other diseases
- Noise
- Hazardous substances

4.3. Welfare Facilities

Provision will be made for suitable and sufficient welfare facilities, such as lighting, heating, ventilation, washrooms, toilets, firefighting, First Aid, changing rooms, rest rooms, eating areas.
All Boskalis fleet vessels are designed and built with appropriate welfare facilities onboard for the crew These facilities are regularly inspected by the vessel master to ensure they are fit for purpose.
Detailed guidance is contained within BWL-350c-A1 Site Preparation – Site General.

4.4. Fit for Duty

Our fifth rule of the NINA Safety Programme relates to being Fit for Duty. In part, this NINA rule in practice means that all employees should be made aware of, and comply with, the BWL Drug & Alcohol Policy (Attachment 05).

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5. ENVIRONMENT

5.1. Environmental Management

Boskalis aims to be the distinguished provider of sustainable solutions and mitigate and where possible avoid (potential) adverse impacts on the environment. Reference is made to the Boskalis Way of Working Policy Statement, Group Manual and the latest annual CSR report for more information on environmental management at Group level.

5.2. Environmental approach on the Project

Within the CSR domain the environmental impact of our operations is assessed in a 'materiality analysis' to gain insight into the relevance and importance of environmental themes for Boskalis on the one hand and stakeholders on the other. Reference is made to the materiality matrix in the latest annual CSR report.

5.3. Harbour Porpoise and Seals:

The MMO will conduct scans of the surrounding area prior to the commencement of dredging and dumping activities, in accordance with CEMP Risk Analysis for Dredging Operations, Risk Id 13. Reports to the National Parks and Wildlife Service (NPWS) shall be made should marine mammals enter the immediate (<50m) works area. The MMO will maintain a record of monitoring throughout the works, that will be provided to the NPWS on completion. (Acoustic monitoring devices will be deployed to detect the presence of marine mammals, in accordance with CEMP mitigations). In the event of discovering a marine mammal requiring rescue or urgent attention, the project team will seek help from the Irish Whale and Dolphin Group, www.iwdg.ie, 086 8657 633, or Seal Rescue Ireland, www.sealrescueireland.org 087 1955 393, as applicable.

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5.4. Dumping at Sea Permit

The Dumping at Sea Permit requires the provision of a Marine Mammal Observer(s) (MMO) by the client and loading and dumping activities confined to the winter months (1st October to 31st March) to negate any potential impact on salmonid migration and summer bird feeding. The Project Manager will assist Dublin Port Company in fulfilling their permit obligations.

Such provisions will include timely notifications, records, reports and other written or electronic information concerned with the execution of dredging operations (e.g. location plotting, quantities dredged, dates and times, etc) strictly in accordance with permit requirements.

Reference to Clause 212 of the Technical Specification, IDC will "facilitate the Employers preparation of the Annual Environmental Report for submission to the EPA" in providing "a full copy of the dredge records to the Employer for the dredging and disposal carried out during the period of 1st August – 31st December 2020 by 15th January 2021. Dredging and disposal records for the period of 1st January 2021 – 30th September 2021 shall be submitted to the Employer by 15th October 2021."

The Project Manager will ensure that daily and weekly summary records for submission to the clients Engineer. The activity of each vessel/plant shall be itemised as below and any other pertinent information which the Engineer may require shall be supplied. The daily and weekly records shall be submitted in a spreadsheet format (digitally in an unlocked, unprotected, editable Microsoft Excel format) and shall include the following:

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Daily records:

- Name of vessel
- Date
- Area or areas of dredging & type of material dredged (include grid co-ordinates of start and end points and digital plots/tracks of route of dredger during loading operations)
- Cycle number
- Time at start of loading
- Time at end of loading
- Time and location (include grid co-ordinates) at start of discharge at disposal site
- Time and location (include grid co-ordinates) at end of discharge at disposal site
- Digital plot/tracks (screen shot) of route of dredger during the disposal operations at offshore dump site (showing perimeter of disposal site), to be provided in chronological order
- Summary of working hours each day
- The weather, including wind strength and direction, sea-state and tidal set throughout each disposal operation and loading operation
- Nature and quantity of each substance for disposal
- The course and speed throughout each disposal operation
- Total hopper load in cubic metres
- Total weight of hopper contents in tonnes
- The density inputs to the TDS system
- Total in-situ cubic metres
- Total TDS
- Dredging production rates throughout loading and cycle time for each load
- Times of start and finish of stoppages and reason
- The initials / identification of the Master
- Details of environmental occurrences (e.g. MMO stoppages)

Weekly Summaries:

- Total hopper tonnes
- Total dredging hours
- Total in situ volume (as calculated by survey)
- Total hours sailing empty

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- Total hours sailing loaded
- Total effective hours (theoretical and stoppages)

5.5. Marine Mammal Observer (MMO)

The project will provide personal protective equipment (PPE), instructions on PPE use, food and welfare facilities on board the dredger.

The vessel Master will provide a vessel safety induction on first arrival on board for all visitors.
In exercising our duty of care, we require the MMO and Marine Archaeologist personnel to have completed an accredited STCW Personal Survival Techniques (PST) 1 Day course.

Environmental aspects and impacts identified within section 2 and subsequent project planning will be addressed through the SHE Risk Management process (section 9) and other controls in respect of the following, as applicable:

- Habitats, fish, marine mammals, birds, etc
- Pollution prevention and oil spill response
- Historic environment and archaeology
- Waste
- Applicable consents and licenses

Environmental best practices to be implemented:

- Set reasonable times for working hours when working close to residential areas;
- Reduce travelling distances from plant parking compound to the work site;
- Avoid revving or idling plant engines unnecessarily – and switch off when not in use;
- Use modern and well-maintained plant and low emission fuels;
- Keep noise levels to a minimum when unloading goods on site;
- Lighting should be turned off when not required;
- Should be directed in the position of the works and not create unnecessary nuisance to the local environment or habitats.

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Dust, odours and waste:

- Keep fuelling areas away from the public and habitats;
- Maintain good housekeeping;
- Arrange regular collection of wastes by licensed waste carrier;
- Use covered waste containers and do not overfill;

6. RESPONSIBILITIES

6.1. General

The responsibility for safety, health and environment is founded in the Boskalis management structure. This responsibility is promulgated to project sites and vessels via subsequent management levels [CDM].
The responsibilities outlined below are supplemented with tasks resulting from the SHE Risk Assessment, and as defined by the NINA Safety Programme.

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6.2. Project Manager

Although some tasks may be delegated, the Project Manager is ultimately responsible for all safety, health and environmental aspects of the Project.
The Project Manager shall:

- Liaise with the Client's Representative and other contractors on site to establish Site Safety Rules and the exchange of design information
- Define Project NINA approach (organise NINA Kick-off Meeting; define NINA goals, conduct NINA Workboxes, etc)
- Perform a SHE Risk Assessment prior to commencement of the works
- Ensure the SHE Plan meets contractual, legal and local authority requirements
- Ensure the employment of sufficiently qualified and trained personnel, including subcontractors
- Ensure that employees understand the SHE Plan and their SHE responsibilities
- Discuss the SHE Plan with vessel officers before starting work
- Make sure that emergency preparedness and response is adequately planned
- Arrange periodic SHE inspections and meetings
- Develop and implement safety, health and environmental measures to minimise personnel risks
- Review the effectiveness of the safety, health and environmental measures on the Project
- Report incidents (referring to "Incident Reporting and Follow-up")
- Report SHE actions such as inspections, audits and toolbox meetings
- Ensure that suitable personal protective equipment (PPE) is provided to all project personnel
- Communicate the project SHE instructions to all employees including suppliers / subcontractors
- Set and implement SHE targets for the project
- Ensure there are trained First Aiders, First Aid equipment and facilities in place
- Prepare and control a site waste management plan, if/when necessary
- Preparation for, attendance at and follow-up of regular scheduled progress meetings.
- Preparation for, attendance at and follow-up of other meetings relating to the envisaged scope of work.
- Coordination and preparation of all pre-campaign activities (e.g. vessel mobilisation, coordination with VTS for berth availability, port activities & pilot requirements, initiate security clearance procedures, licence amendments, etc.)
- Supervision of activities during dredging campaigns (e.g. vessel planning, port movements, project reporting, etc.)
- Coordination and preparation of all post-campaign activities (e.g. vessel demobilisation. survey sign-off, campaign reporting, etc.)
- Ensure sampling of materials as specified by EPA under the conditions of the disposal licence.

Tasks which should not be delegated by the Project Manager are:

- Monthly safety, health and environmental site inspections
- Participation in the investigation and analysis of any serious incident or High Potential Near Miss
- Chairing the SHE meetings with supervisory personnel

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6.3. Supervisory Personnel

Supervisory project personnel (Works Manager, Operations Manager, Technical Manager, Survey Manager, Superintendent, Foreman, Captain, Vessel Master) in charge of works and project employees, have the responsibility to supervise and where relevant enforce the SHE requirements accompanying those works. This includes amongst others:

- Report dangerous situations, incidents and accidents
- Correct unsafe behaviour
- Make sure that all personnel can work safely, and implement the Job Hazard Analysis and Permit to Work systems where relevant
- Make sure that emergency preparedness and response equipment for safety, health and environmental incidents is suitable, sufficient and effective
- Conduct a safety inspection of the work activities on site
- Organise and conduct toolbox meetings
- Ensure drills are executed

6.4. SHE-Q Manager

Unless the Project Manager takes up this position, a SHE-Q Manager may be appointed with the following responsibilities:

- Advise and support management and supervisory personnel on SHE issues, such as SHE Risk Assessments and related control measures, etc.
- Define SHE-Q tasks based on requirements of the Client, legislation and BWL's 'Way of Working'
- Induct, instruct and keep records of new project personnel, subcontractors, suppliers, visitors and third parties
- Perform random project (vessel) spot-checks, site audits and inspections to verify compliance with the SHE Plan
- Advise and support the Project Manager in reporting and investigating accidents, damages, environmental losses and near misses
- Administer and regularly review the SHE Plan
- Record, review and report the SHE performances achieved on the Project
- Assessment of subcontractors and suppliers to verify compliance with applicable project requirements
- Administer and review regularly the Project Emergency Plan, including procedures and documents such as the Emergency Contact List

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6.5. Project Personnel

All project personnel are responsible to comply with the SHE-Q Policy, Site Safety Rules and project specific SHE instructions:

- Behave and work according to the Site Safety Rules
- Use equipment, machines, vehicles and tools in a safe and proper manner
- Use and maintain PPE and rescue equipment in a safe and proper manner
- Attend and participate in toolbox and SHE meetings
- Report instantly to supervisory personnel, any noticeable (possible) dangers

All project personnel are permitted to stop work if any possible danger poses a direct threat that may lead to a severe incident.

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7. SHE MANAGEMENT SYSTEM

7.1. Project SHE Management

The SHE management system of Boskalis is part of the Boskalis Way of Working and has been developed to assure a high level of control of safety, health and environmental aspects during the PLAN and EXECUTE phase of projects. Reference is made to the Way of Working Group Manual, which details how SHE aspects are managed in tenders and projects.

The Boskalis Way of Working consists of a set of process descriptions, detailing activities, tasks and related supporting tools, one of which being this Project SHE Plan.

Depending on the project particulars, and the SHE Risk Assessment, this plan may be supported with related sub-plan(s), e.g. Project Emergency Plan, Attachment 03.

For on-site activities, Safe Operating Procedures (BWL-350c-series) are available to be used as follows:

- As SHE instructions and guideline procedures for all relevant BWL work processes and activities
- As a foundation for establishing control measures with regard to section 2 of GT-350: SHE Risk Assessment

7.2. Vessel SHE Management

Additional to the Project SHE system, separate Plant Management Systems (PMS) are implemented in the Boskalis Fleet Management organisations to ensure, amongst others, a safe operation of the fleet. The Plant Management Systems are based on International Codes and Conventions for the safe operation of ships and for the protection of the environment and are certified accordingly.

The most important elements of these PMS are:

- Onshore organisation, with designated persons for individual vessels
- Onboard organisation, management of crew and training
- Communication onshore, onboard and ship-shore
- Standing orders and emergency preparedness

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8. CONTRACTUAL & LEGAL SHE REQUIREMENTS

8.1. Contractual

In addition to the standard Boskalis SHE requirements, the following contractual SHE requirements apply to the Project:

Contractual Requirements	
Requirement	**Description**
Dublin Port Company Safety Rules for Contractors	This Standard has been produced by Dublin Port Company for distribution to all Contractors working, or intending to work, in areas controlled by Dublin Port Company.
Dublin Port Company	As part of the Dublin Port Company's Capital Projects continuous improvement process the Capital Projects Safety Essentials have been developed. These essential rules have been derived from project risk registers, experience, lessons learned, as well as from accident investigations conducted across the Construction Industry.

8.2. Legal

In addition to the standard Boskalis SHE requirements, the following legal requirements apply to the Project (and all other legislation derived from it, including codes of practice, which relate to the activities on site):

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Legal Requirements
The Safety, Health and Welfare at Work Act 2005
The Safety, Health and Welfare (Construction) Regulations 2013
The Safety, Health and Welfare at Work (General Application) Act 2017
The Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016
Protection of the Environment Act 2003
Waste Management Act 1996
Dumping at Sea Act 1996 (Amendment) Act 2004
Dangerous Substances (Amendment) Act 1979 and Dangerous Substances Act 1972
Organisation of Working Time Act 1997
Merchant Shipping (Pollution) Act 2006
Marine Safety Act 2003
Merchant Shipping and Maritime Security Act 1997
Merchant Shipping Act 1995
Merchant Shipping Regulations incorporating International Codes and Conventions, e.g.:
The Merchant Shipping (Maritime Labour Convention) [subject variants] Regulations
The Merchant Shipping (Code of Safe Working Practices) (Amendments and Revocation) Regulations 2015
The Merchant Shipping (Standards of Training, Certification and Watchkeeping) Regulations 2015
The Merchant Shipping (International Safety Management (ISM) Code) Regulations 2014
The Merchant Shipping (Accident Reporting and Investigation) Regulations 2012
The Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008
The Merchant Shipping (Small Workboats and Pilot Boats) Regulations 1998
The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997

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9. SHE RISK MANAGEMENT

9.1. General

Risks are the probability that hazards lead to negative impacts i.e. personal injuries, equipment damages or environmental losses. By applying the available SHE Risk Management tools in the right way, risks are identified, categorised and mitigated in a systematic manner.

SHE Risk Management within Boskalis is a 3-level system, consisting of:

- A Project or Vessel SHE Risk Assessment
- A specific Job Hazard Analysis (JHA) or Risk Assessment Method Statement (RAMS) when preparing individual jobs, or a smaller or specific activity within the overall project
- A Last-Minute Risk Assessment (LMRA) just before starting the job (YES scan)

The SHE Risk Management process contains the identification of hazards, assessment of hazards and the implementation of control measures. The assessment includes:

- All routine and non-routine activities (single, as well as their combinations)
- Activities of personnel that have access to the workplace (incl. subcontractors, suppliers & visitors)
- All facilities at the workplace, delivered by Boskalis or other parties

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9.1.1. SHE Risk Assessment

The execution of this first level SHE Risk Assessment is obligatory for every project and on every vessel. Where available, any SHE Risk Assessment resulting from the design stage is taken into account.

The SHE Risk Assessment Matrix (Attachment 06) identifies the known hazards that may occur during the project. For each hazard in the matrix, standard minimum control and mitigation measures are identified to reduce the risk to an acceptable level. These control measures may include amongst others the Permit to Work system.

Specific hazards and additional control measures are to be evaluated by the Project team and the risk assessment will be regularly reviewed and up-dated as necessary.

9.1.2. Job Hazard Analysis or Risk Assessment Method Statement

A JHA is conducted by the work party during the preparation for a specific job. A RAMS is prepared by project management or supervisors to support a Safe System of Work for a smaller or specific activity within the overall project.

The outcome of the SHE Risk Assessment, the JHA or RAMS and an applied Permit to Work system is communicated to all employees involved, e.g. through Toolbox meetings.

9.1.3. Last Minute Risk Assessment

The last-minute risk assessment (LMRA), is performed by the work party just before starting a job. It consists of a final check on the safety of "Yourself, Equipment and Surroundings" (YES scan). Within the Boskalis system, there is no requirement to document the outcome of the LMRA.

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9.2. Review and Management of Change

Once prepared, the SHE Risk Assessment is reviewed by the Project Manager:

- Periodically during longer duration projects
- Whenever new activities start
- When design changes are made
- When operations are modified or schedules change
- When legal requirements change
- When an event occurs that gives cause for reconsideration of the SHE Risk Assessment (for example when indicated as such in a SIRE Incident Report)

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9.3. Safety Hazard Observation Card (SHOC)

The objective of the SHOC system is to continuously improve project safety by reporting hazard observations and improvement suggestions and defining corrective and preventive measures.

Every employee is responsible for reporting hazard observations and rectifying on the spot if possible and safe to do so.
The project manager is responsible for further investigation, improvements or corrective and preventive actions and provision of feedback to the generator of the SHOC.

Reference is made to the SHOC process description, containing a SHOC Card template and SHOC Register, as available in the Way of Working Group Tool set.

Boskalis

Safety Hazard Observation Card (SHOC)

Date: _____

Reported by: _____

Company name: _____

☐ HAZARD OBSERVATION ☐ IMPROVEMENT SUGGESTION
☐ POSITIVE OBSERVATION

☐ BEHAVIOR ☐ EQUIPMENT ☐ PROCEDURES

Description of hazard/improvement: _____

Have you rectified the hazard? ☐ Yes ☐ No

If yes, how? _____

If no, contact your supervisor before submitting this card.

9.4. Stop Work Authority

Stop work authority (SWA) establishes the responsibility and authority of any individual to stop work when an unsafe condition or act could result in an undesirable event.

The authority and responsibility to initiate a SWA is given to all individuals including subcontractors and suppliers engaged in activities on-board Boskalis vessels, on project sites and offices by the NINA Value "*I take action in case of unsafe operations. If necessary, I will stop the work*".

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10. TRAINING AND INDUCTION

10.1. Training

At corporate and divisional level, the essential basic SHE related training for all employees is managed via training matrices for operational staff and crew that are specified for each Division.
The correct implementation of these training matrices is a joint responsibility of the employee and the corporate / divisional Personnel and Organisation departments.

On a personal level, all Boskalis employees are issued with Safety Instruction Booklets, which must always be observed as the minimum SHE requirements of Boskalis.

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The Project Manager shall ensure, in conjunction with the relevant staff departments, that all prospective employees have appropriate SHE training in order to undertake tasks competently, identify hazards, and take the necessary precautions to safeguard themselves, others and the environment.

10.2. Project Induction

Upon first arrival on the Project, all employees (including subcontractors) attend a SHE induction, including the following topics:

- Dublin Port Company video induction
- SHE Policies, including individual tasks and responsibilities
- Boskalis Way of Working
- NINA Values & Rules (incorporating Dublin Port Company -Capital Projects Safety Essentials)
- Emergency response procedures
- Site Safety Rules
- Project specific hazards
- Site Security arrangements
- Welfare facilities
- Arrangements for First Aid
- Fire Management arrangements
- Safety Arrangements (toolbox talks feedback and sign off RAMS, Start of Shift Meetings)
- Personal Protection Equipment (PPE)
- Project specific Environmental Aspects Impacts and control procedures
- Project specific Waste Management requirements
- Reporting of incidents, safety observations (SHOCs)

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Records of these project inductions are maintained in the Project Master File (PMF).

10.3. Visitors

Due to the ongoing COVID-19 pandemic no visitors shall be allowed to site, unless it is absolutely necessary. If a visit is required, The Project Manager will ensure that all project visitors receive correct instructions regarding the applicable SHE requirements. Visitors are provided with the required PPE for the visit.

10.4. Vessel staff

Upon arrival, the Project Manager will ensure that every vessel is introduced to the project SHE requirements. As a minimum the following topics are discussed during the on-board kick-off meeting:

- Project Management Plan / Project Preparation Operational Summary (PPOS) and Project SHE Plan
- Local licenses
- Site and vessel security issues
- Site and Vessel Specific Hazards & Risks
- Port Facility Safety, Health & Environmental Requirements

The vessel officers are ultimately responsible to fulfil the project SHE requirements on their vessel or production units, communicating relevant SHE requirements and project particulars to crew and visitors.

10.5. Subcontractors

The Project Manager will ensure that any subcontractors engaged by the company are appropriately appraised with regard to their competence, to carry out the work safely and with due regard to the environment.

Subcontractors are responsible for SHE matters as included in their contracts. Each subcontractor shall appoint a designated employee from their organisation to act on their behalf regarding SHE matters. Throughout the duration of the project, the subcontractor shall:

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- Comply with the SHE requirements of the Principal Contractor, and of the subcontract;
- Ensure that subcontractor personnel have attended a SHE Induction;
- Ensure that subcontractor personnel adhere to agreed safety instructions / control measures;
- Report any accident, damage, environmental loss or near miss to the Project Manager;
- Attend Project SHE-Q meetings.

Dry plant must be fit for purpose, maintained (with records) and operated by trained, competent personnel to encompass safe operation and best environmental practice.

10.6. Personal Protective Equipment (PPE)

Prior to commencement of the works, the appropriate PPE shall be defined and made available to project employees and visitors. The distribution of PPE is recorded using BWL-270b. Applicable PPE must be worn at all times during the execution of the works.

The following project specific minimum PPE requirements apply:

- Hardhat
- High Vis Coat / vest / overalls
- Safety Boots
- Lifejacket when working within 2m of water and crew transfer

Additional PPE as per specific task risk assessment can be

- Safety glasses
- Gloves
- Hearing protection

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11. COMMUNICATION

11.1. Incident Reporting and Investigation

All accidents, damages, environmental losses and near misses, including those involving subcontractors and/or members of the public, are to be investigated and reported to the BWL Head Office using BWL-370a: Incident Report Form or SIRE (System for Integrated Reporting of Events) registration, or Maximo (on relevant vessels). On receipt of a reported incident, the Project Manager will inform the clients representative and or Harbour Master as appropriate.

The process covering the reporting and the investigation of incidents is further described in the Boskalis Way of Working (ref. Incident Reporting and Investigation).

11.2. Site Reporting

SHE issues are addressed in the weekly narrative reports prepared on site.
After such reports have been sent to the Head Office, the SHE-Q department is responsible for adequate follow-up of any SHE-related issues.

11.3. Site SHE-Q & Progress Meetings

During the weekly site meetings, the following matters are discussed:

- Accidents, damages or environmental losses occurred and investigated
- Results of safety inspections and random spot-checks
- Received SHOC cards
- Review of SHE performance
- Major changes in design, planned activities or working conditions (ref. Management of Change)
- Exchange of design and health and safety information between duty holders on site
- Issues from safety committees
- SHE concerns or encountered problems

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11.4. Toolbox meetings

Throughout the duration of the works, supervisory personnel shall initiate toolbox meetings. Daily/Weekly/Monthly toolbox meetings are organised to consult with the workforce and continuously improve the general awareness of employees and sub-contractors with regard to Safety, Health and Environmental issues.

Job specific toolbox meetings are organised whenever new or non-routine tasks are executed, supported by a JHA or RAMS. The purpose of a toolbox meeting is to make employees aware of the risks accompanying the planned activities and to focus on the control measures which have been put in place. Employees are encouraged to give feedback to these toolbox meetings.

Toolbox meetings and their attendees are recorded by means of the registration form available.

11.5. Simultaneous Operations (SIMOPS) meetings

SIMOPS meetings may be held to coordinate the planning and implementation for simultaneous operations between the different parties on the project.

11.6. Safety File

Where applicable, relevant information for the Safety File will be made available during or on completion of the works, including as-built drawings and other information regarding key health and safety risks relevant to any subsequent maintenance work.

The Project Manager shall arrange the gathering of information, to compile the Safety File and hand it over to the client on completion of the work.

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12. INSPECTIONS AND AUDITS

12.1. Inspections

During preparation and execution of the project, regular SHE inspections are organised to verify conformance with the Safety, Health and Environmental requirements:

- Pre-mobilisation Inspections for own and chartered equipment, where relevant
- Monthly SHE Inspections by the Project Manager (not to be delegated)
- Monthly SHE Inspections by Supervisory Personnel
- Project SHE Inspections by Business Unit Management when visiting the project
- Subcontractor(s) and Suppliers

Checklist templates are available to facilitate and register SHE Inspections.

12.2. Audits

An annual audit planning is prepared by the corporate SHE-Q department, detailing the intended internal and external audits for projects and Boskalis Business Units.

The scope of each SHE-Q audit depends on the actual activities on the project or organisation under review, the subject and systems to be audited and the available documentation. Follow up actions of previous audits are verified.

For this specific project, the following internal and/or external audits are foreseen:

- Vessel/ Equipment pre-mobilisation

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13. EMERGENCY RESPONSE

13.1. General

An emergency situation occurs whenever one of the following questions is answered “yes”:

- Are there any fatalities?
- Is the situation (potentially) life-threatening?
- Has serious environmental damage occurred or is it likely to occur?
- Is the situation (potentially) sensitive to the press and/or public opinion?
- Has serious damage to plant occurred or is it likely to occur?

The following response measures are implemented to mitigate escalation in case of an emergency.

13.2. Site Office Evacuation

In the case of fire, basic site office evacuation instructions are provided in Attachment 01.
All site-based project personnel will be informed of emergency evacuation procedures, including equipment supplied for their safety. The Project Manager will ensure that such equipment is suitably inspected at regular intervals and serviced by a competent person.

13.3. Emergency Contact List and Project Emergency Plan

Attachments 02 and 03 provide details for the parties concerned in case an emergency occurs. The Emergency Contact List is made clearly visible at strategic locations throughout the project, including vessels, onshore work areas and project offices.

The Project Manager ensures that employees are familiar with the Emergency Contact List and Project Emergency Plan, and that the documents are updated when necessary incorporating Dublin Ports emergency responders and procedures.

The Project Manager will ensure that suitable communication lines with the port emergency operations centre are established.

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13.4. Vessel Emergency Arrangements

The vessel master has ultimate responsibility for the safety of his vessel and crew. Each vessel has appropriate emergency response arrangement onboard and undertake regular drills along with emergency lifesaving equipment which will be regularly inspected and tested as per the vessels Safety Management Systems (SMS)

13.5. Emergency repatriation

When a possible repatriation situation arises, contact the Travel Clinic of the Dutch “Havenziekenhuis” (Harbour Hospital) in Rotterdam by phone via number:

Office hours NL - +31 10 82 01 120
Emergency 24/7 - +31 10 82 01 121

Following persons in the Travel Clinic are the first point of contact for Boskalis:

- Dr. P. van Genderen;
- Mr. H. Koene;

The Travel Clinic doctor in consultation with the local doctor decides whether repatriation is needed.
Boskalis entered a contract with International SOS Emergency Services (I-SOS) for this service.
In principle, the doctor of “Havenziekenhuis” guides contact with the repatriation service company.

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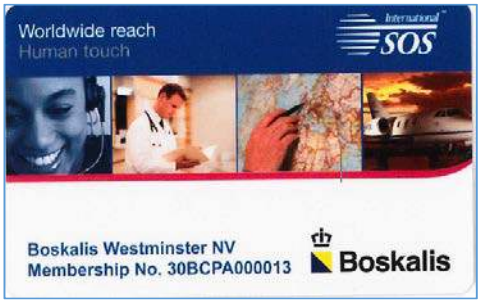
If an emergency repatriation is required, the Project Manager contacts the head of the P&O department and the Business Unit Director. The Boskalis Head Office can be contacted 24 hours a day via telephone number:

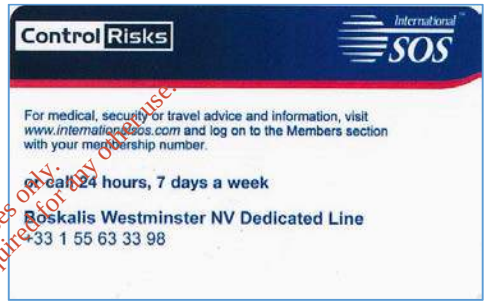
0031 78 69 69 999

13.6. Support from International SOS / Control risks

As a back-up service to individual travellers, Boskalis has partnered with **International SOS / Control Risks** to help ensure the health and safety of all employees before, during and after the project. A guaranteed point of contact is available for security and medical issues - 24 hours a day, 365 days a year - via a network of 24-hour Assistance Centres, as well as via an App.
Contact details below:

London Assistance Centre Nr.:	+44 208 76 2 8008
Dedicated Boskalis Assistance Nr.:	+33 1 55 63 33 98
Boskalis Membership Nr.:	30BCPA000013





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14. REFERENCES, ABBREVIATIONS, DEFINITIONS

14.1. References

Client Documents		
No.	**Document No.**	**Document Title**
…..	MAN-DPC-OPS-002	Dublin Port Co. Emergency Management Plan
…..	IBE1189	Construction Environmental Management Plan (CEMP)
…..	SOP-DPC-H&S-048-F3	Safety Rules for Contractors

Boskalis Documents		
No.	**Document No.**	**Document Title**
	IDC-001	SHE-Q Policy Statement
	BWL-004	Emergency Plan (*Company-level*)
	GT-146	CSR Report (incl. materiality matrix)
	GT-232b	SIMOPS Matrix
	BWL-270a	Project Induction Checklist
	BWL-270b	PPE Receipt Form
	IDC-271	Project Emergency Plan

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Boskalis Documents		
No.	**Document No.**	**Document Title**
	BWL-270	Project SHE Plan
	BWL-281	Site Waste Management Plan
	BWL-301	Project COVID-19 Screening and Monitoring
	BWL-301a	Daily Record of COVID-19 Symptoms
	BWL-301b	COVID-19 Project Screening
	BWL-301c	Land-based Site Protocol COVID-19
	GT-350 / BWL-350a	SHE Risk Assessment (and Matrix)
	BWL-350b	Black and Yellow Safety Booklet
	BWL-350c-series	Safe Operating Procedures
	BWL-350d	Risk Assessment Method Statement (RAMS)
	BWL-350e	COSHH Assessment Form
	GT-351 / BWL-351a	Job Hazard Analysis
	BWL-352	Permit to Work
	GT-353	Toolbox Meetings
	GT-354	Daily Pre-Start Meeting
	GT-356	Management Site Visit Checklist
	GT-370 / BWL-370a	Incident Reporting and Investigation (and Form)
	GT-371	Safety Hazard Observations
	GT-402	Project Organisation Chart
	BWL-424a	Project Manager Vessel Tasks & On Board Kick Off
	GT-510	Pre-mob Inspection Checklist
	GT-660	Safety Flash Library
	BWL-716	SHE-Q Requirements Suppliers & Subcontractors

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Supplier / Subcontractor Documents		
No.	**Document No.**	**Document Title**
…..	…..	…..
…..	…..	…..

14.2. Abbreviations

Abbreviation	Full meaning
IDC	Irish Dredging Company Ltd
BWL	Boskalis Westminster Ltd
COSHH	Control of Substances Hazardous to Health
CSR	Corporate Social Responsibility
JHA	Job Hazard Analysis

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Abbreviation	Full meaning
MoC	Management of Change
NINA	No Injuries No Accidents
PTW	Permit to Work
RAMS	Risk Assessment Method Statement
SHE-Q	Safety, Health, Environment - Quality
SHOC	Safety Hazard Observation Card
WoW	Way of Working

14.3. Definitions

Definition	Full meaning
…	…
…	…

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15. ATTACHMENTS

- Attachment 01: Site Office Evacuation
- Attachment 02: Emergency Contact List
- Attachment 03: Project Organisation Chart
- Attachment 04: Policy Statements
- Attachment 05: List of Clients Pre-construction Information

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Irish Dredging

Attachment 01: Site Office Evacuation

SITE OFFICE EVACUATION

Evacuation of site office staff and visitors to the designated Emergency Assembly Point

IF THE FIRE ALARM SOUNDS:

1. Leave the office through the nearest Emergency Exit

Emergency Exit ***Emergency Exit Route***

- **Leave your office space and keep door open**
- **If flames and/or smoke are visible, move from that direction**
- **Alert colleagues you pass in corridors or offices and, if safe, "sweep" offices for persons left behind**

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2. Report to the Emergency Assembly Point

Assembly point indication

3. Wait for Instructions from the Fire Warden

The Fire Warden can be recognised by their Red High Visibility Vest

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Attachment 02: Emergency Contact List

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Project Emergency Contact list				
Dublin Port 2020-2021		**P0043785**	**Version: 25/08/2020**	
Project Site Office: Irish Dredging Company Ltd, Maintenance and Services Building Port Centre				
Dublin VTS EMERGENCY SERVICES : 999-112	VHF 12/13 - traffic VHF 16 - emergency VHF 12 - pilot VHF 9 - tug	+353 1 8876070		DREDGING WORKING CHANNEL VHF P1, to be checked with Smit Neyland and Norma
Name	**Designation**	**Phone No.**	**Mobile No.**	**E-mail**
PERT (project emergency response team)				
Irish Dredging Company				
Gerrit Jan van den Bosch	Project Manager		+44 7795 821 902	gerrit.jan.vd.bosch@boskalis.com
Richard Chester	Superintendent		+44 7825 633 494	richard.chester@boskalis.com
Tony Wall	Chief Surveyor		+44 7712 842 033	anthony.wall@boskalis.com
Boskalis Westminster Crisis Team				
Boskalis Fareham				
Boskalis Fareham	Head Office General	+44 1489 885933		bwl@boskalis.com
Bob Kidd	Maintenance Business Manager		+44 7712 842 066	bob.kidd@boskalis.com
Chris Cates	Marine Service Business Manager		+44 7866 254 475	chris.cates@boskalis.com
Neil Martin	SHE-Q Manager		+44 7712 842 041	neil.martin@boskalis.com
Medical Facilities				
Name	**Address**	**Phone No.**	**Mobile No.**	
HOSPITAL - Mater Misericordiae University	**Eccles Street 7 , Inns Quay, D07 R2WY**	**+353 1 8032000**		
HOSPITAL - Beaumont	**Beaumont Road, Beaumont, Dublin**	**+353 1 8093000**	**+353 1 8092714**	
Emergency Operation Centre Line 1		**+353 1 8876833**	**+353 1 7040833**	
Emergency Operation Centre Line 2		**+353 1 8876834**	**+353 1 7040834**	
Port Security		**+353 1 8876858**		
East Wall Medical Centre	**145 Church Road, East Wall, D03 X894**	**+353 1 8365505**		
Dentist	**Dublin university hospital**	**+353 1 6127200**		
Boskalis Papendrecht				
Boskalis Papendrecht	Head Office General	+31 78 6969000		
Henrick Keij	Fleet Manager	+31 786 969 405		henrick.keij@boskalis.com
Arjan Mol	Fleet Engineer	+31 786 969 091		arjan.mol@boskalis.com
Arjan Gossije	Operational Manager NW-Europe	+31 786 968 629		arjan.gossije@boskalis.com

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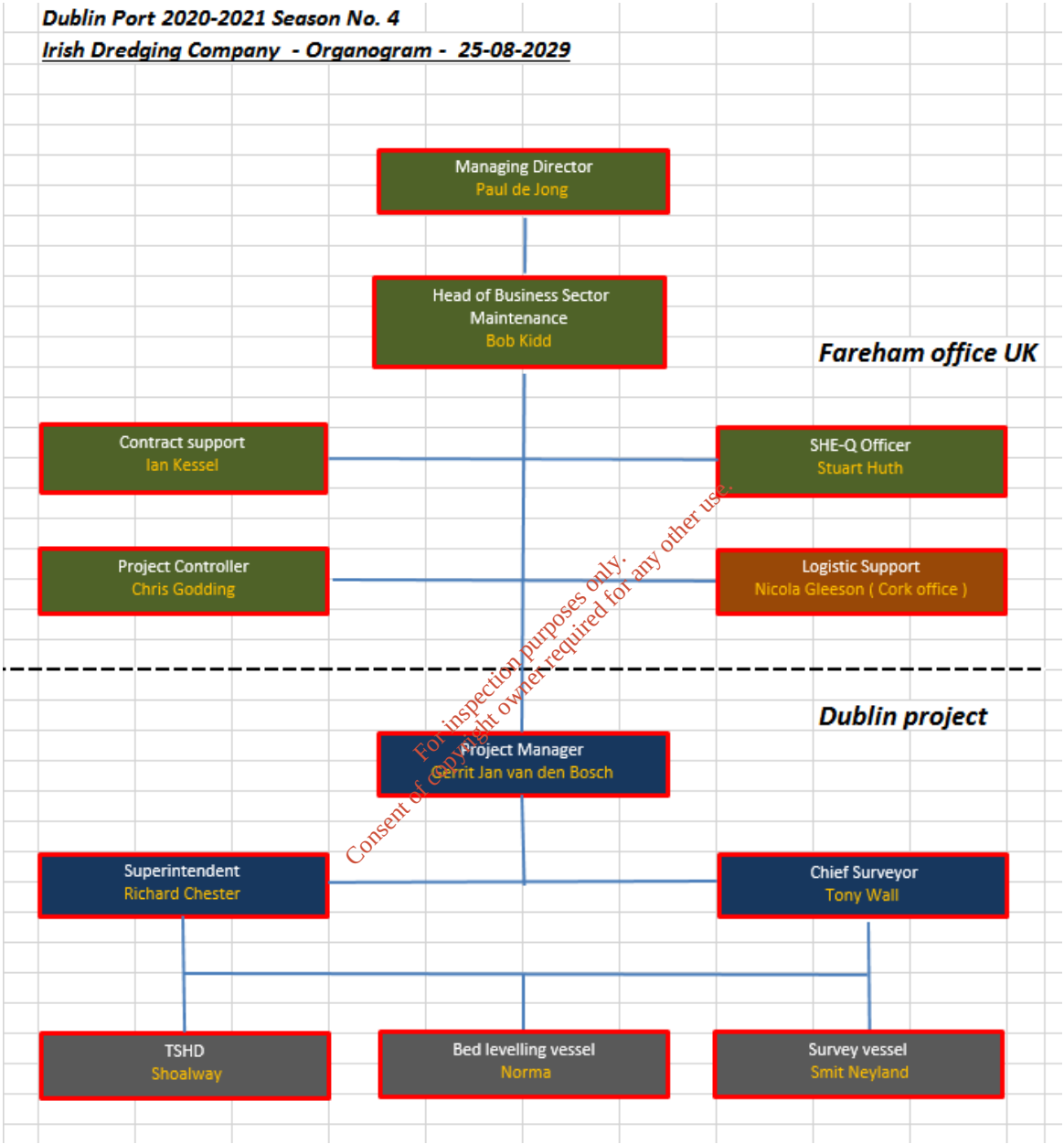
Attachment 04: Project Organisation Chart



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Attachment 05: Policy Statements

Boskalis

Boskalis Way of Working SHE-Q Policy

Boskalis creates new horizons for all its stakeholders. As a leading global dredging and marine contractor and services provider we offer a unique combination of experts, vessels and activities. Maintaining the highest standards of quality, safety and sustainability, we provide innovative and competitive all-round solutions to our clients in the offshore industry and in ports and coastal areas around the world.

The Boskalis Way of Working is our integrated quality management system, designed to give our staff the best possible support in achieving operational excellence. It is aimed at offering a consistent client approach, with a clear focus on providing safe and sustainable solutions. The Boskalis Way of Working management system is compliant with the international OHSAS 18001 (that will be replaced by ISO 45001), ISO 14001 and ISO 9001 standards and is assessed and certified by an independent external auditor. We monitor our compliance and identify opportunities to further improve our performance by conducting regular internal audits, inspections, emergency drills, and management reviews.

The Boskalis Way of Working is based on a number of principles and essentials:

- Requirements & Expectations: full understanding our client, their needs, the contract and the applicable legislation is an essential first step in our Way of Working.
- Delivery Plan & KPIs: by utilizing our Group Delivery Plan and KPIs we ensure a professional approach to contract management and project execution.
- Opportunities & Risks: we identify risks upfront and manage and mitigate these during operations whilst continuously seeking opportunities for further optimization.
- Competences & Teams: with a global presence and diverse network of experts, we build on teamwork, entrepreneurship and professionalism. Illicit use of alcohol, drugs and medicines is not permitted. We motivate employees to take care of their health and be Fit for Duty.
- Equipment & Infrastructure: with a modern, robust fleet and project management skills, we organize and deploy safe, suitable and reliable equipment and create the necessary infrastructure.
- Knowledge & Experience: with a company history of more than a century, we continuously learn and share our expert knowledge.
- Subcontracting & Procurement: we expect our subcontractors and suppliers to commit to the project objectives and adhere to our Supplier Code of Conduct.

We constantly seek to improve our performance by developing and implementing company-wide initiatives like our NINA (No Injuries No Accidents) safety program and the WoW (Way of Working) quality management system.

As the management of Boskalis we recognize our responsibility in terms of:

- Performing our activities in accordance with the Boskalis General Code of Business Conduct.
- Caring for the safety, security and health of everyone involved in our activities, including general public related to our projects, and reinforcing our commitment to the prevention of incidents. Realizing sustainable solutions and minimizing our potential adverse impact on society and the environment, in accordance with our Boskalis CSR strategy.
- The management is responsible for ensuring that this Policy is implemented and reviewed when necessary.

The management of Boskalis stresses that the objectives set out in this Policy Statement can only be met or exceeded with the full commitment of all employees as well as subcontractors and partners in the supply chain.

Dr. P.A.M. Berdowski
Chairman of the Board of Management

Paul M. de Jong
Managing Director Irish Dredging Company Ltd

BOSKALIS WAY OF WORKING

Doc. No: GT-001 Title: Way of Working SHE-Q Policy Rev. 2.0 Nov-2019 1 / 1

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Boskalis
Irish Dredging

(Following is an extract of the current Drug & Alcohol Policy. Refer to the HR &Staff portal for the full document)

Drug & Alcohol Policy	Issue 2017.09.17/01	Page 1 of 7

BOSKALIS WESTMINSTER LIMITED ('the Company')

Drug & Alcohol Policy

Introduction

The Company is committed to maintaining a productive, safe and healthy work environment for its employees and to safeguarding other persons at work places occupied by the Company, whether Contractors or Visitors. As part of its policy of implementing this commitment, the Company has adopted the terms of this Alcohol and Drug Policy.

In recent years, society and industry have become increasingly concerned about the risks attached to alcohol and drug misuse or abuse. The Company has redefined its position to take account of the risks to the public, environment, employees and company and client assets and these are outlined herein.

Alcohol and drug misuse or abuse can have adverse physical, psychological or behavioural effects, which may:-

(a) Impair health
(b) Impair job performance, attendance
(c) Create unsafe work conditions, endanger others and have more accidents
(d) Compromise Company's health, safety, environmental or security arrangements
(e) Render Company or the individual concerned liable to prosecution
(f) Contravene the Terms and Conditions of Client Contracts

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The Policy applies to Company operations and work places in the United Kingdom and on the United Kingdom Continental Shelf.

There are differences between the requirements for onshore and onboard working and these are highlighted in the Policy.

The Company recognises drug and alcohol abuse as treatable health problems. Employees suffering from these types of illnesses are therefore encouraged to seek help either through the Company or their own Doctor. Any request, for advice or treatment will remain confidential and any absence for treatment or rehabilitation will be administered under the terms of the Company Sickness Absence Policy. Queries on any aspects of this Policy should be discussed in the first instance with the individual's Supervisor. Further advice can be obtained from the HR Department.

Scope

The Policy applies to all Company employees and, where stated, to the Contractors and Contractor's personnel carrying out work on behalf of the Company at Company locations, work sites and vessels. Company employees working at locations controlled by other persons (e.g. non-Company operated installations, ship yards) should comply with this Policy and any other related policy issued by the controller of the other location. Where the Policies conflict, Company employees should comply with the most stringent Policy.

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Attachment 07: List of Clients Pre-construction Information

[SOP-DPC-HS-048-F3 Safety Rules for Contractors]
[E.1. CEMP Dredging Risk Assessment]
[E.2. H&S Plan Designers Risk Assessment]
[E.3. Dublin Oil Spill Plan Risk Assessment]

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Appendix 14 - Emergency Response Procedure

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372-10194 Project Emergency Plan

DOCUMENT NUMBER:	**BWL-271**
PROJECT NAME:	**Dublin Port - Capital Dredge Works Seasons No. 2 & 3**
PROJECT NUMBER:	**372-10194**
CLIENT NAME:	**Dublin Port Company**
CLIENT REFERENCE:	**CP1501_017_02**

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DOCUMENT CONTROL

General document data	
Document Title:	372-10194 Project Emergency Plan
Document Number:	IDC-271
Project Name:	Dublin Port - Capital Dredge Works Seasons No. 2 & 3
Project Number:	372-10194
Client Name:	Dublin Port Company
Client Reference:	CP1501_017_02
Client Revision Number:	-
Boskalis Entity:	Irish Dredging Company Ltd

Revision status		
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Prepared By:	Stuart Huth	Role: SHE-Q Officer
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Approved By:	Gerrit Jan van den Bosch	Role: Project Manager

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Change log		
Revision	**Section**	**Change**
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Boskalis
Irish Dredging

TABLE OF CONTENTS

1.	INTRODUCTION	4
2.	EMERGENCY RESPONSE ORGANISATION	5
3.	EMERGENCY CONTACT LIST	6
4.	ASSEMBLY POINTS	6
5.	EMERGENCY SCENARIOS	7
6.	COMMUNICATIONS	8
7.	EMERGENCY DRILLS	8
8.	REFERENCES AND ABBREVIATIONS	9
9.	ATTACHMENTS	9

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1. INTRODUCTION

The Project Emergency Plan provides guidance for project teams in the event of an emergency during the PLAN or EXECUTE Phase of works. A high degree of preparedness shall be maintained at all times, in order to respond and efficiently control any emergency situation in the shortest possible time. This will be ensured through personnel responsibilities, training and periodic emergency drills.

Emergency response procedures are drawn up in order to:
- Safeguard life
- Safeguard the Environment
- Safeguard facilities, vessels and/or other company assets

This document is applicable to the following operational sites and/or activities:
- All Irish Dredging Company Ltd (IDC) onshore activities
- IDC personnel movements to/from the operational sites
- All vessels used by IDC during dredging operations
- Interfaces with third parties during their onshore and offshore operations

For this project, the following emergency scenarios have been identified:
- Fire in the site office or onboard a vessel
- Explosion onboard a vessel
- Collision of one or more vessels in the marine spread
- Personal injury
- Dredging-up unexploded ordinance (UXO)
- Man overboard (MOB)
- Striking underwater obstacles
- Environmental spill

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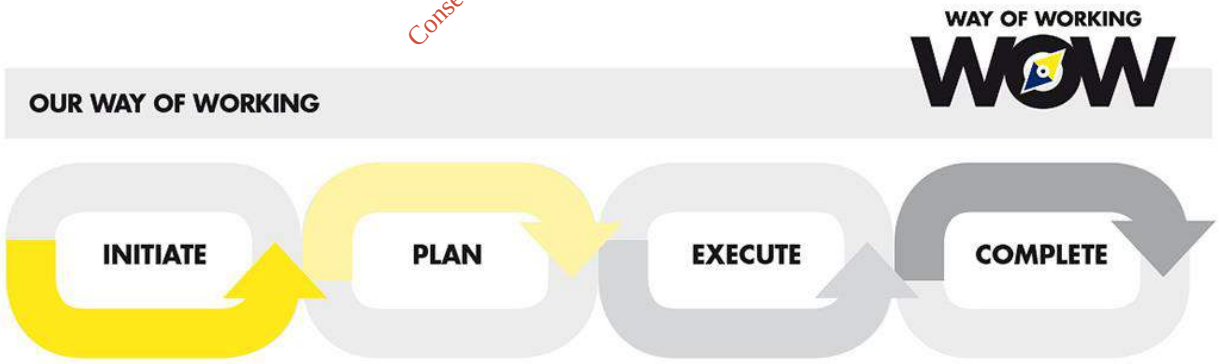
This document forms part of the Boskalis Way of Working, the integrated quality management system applicable to all operations in Boskalis. The Boskalis Way of Working is structured around four Phases as pictured below. This Project Emergency Plan is typically prepared in the PLAN Phase, where the main implementation may take place in the EXECUTION Phase.



More detailed information about the Boskalis Way of Working can be found in the Group Manual and the User Guide. A dedicated website with all supporting materials is available at wow.boskalis.com.

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2. EMERGENCY RESPONSE ORGANISATION

In the event of an emergency occurring during the works, IDC is responsible for co-ordinating the actions between internal parties, and to ensure that all necessary arrangements associated with the emergency are taken and correctly implemented.

The responsibilities of the Project Manager include the correct preparation, updating, distribution and implementation of this Plan. Throughout the PLAN and EXECUTE phases, the Project Manager will be assisted by his project team.

2.1. Project Manager

The Project Manager will be responsible for the co-ordination of all emergency response situations on behalf of IDC. They will ensure that all necessary resources required by this Plan are in place and that all personnel on the project comply with the instructions and follow the guidelines provided.

In the event of escalation, the Project Manager will establish a “Crisis Centre” in the project site office. The Project Manager will lead this centre during the crisis in close co-operation with the BWL Crisis Team and Dublin Port Company Emergency Operations Centre.

2.2. Works Manager / Superintendent

The Works Manager / Superintendent will assist with Project Manager during an emergency situation.

2.3. Vessel Master

The Vessel Master or nominated deputy has overall responsibility for control of the vessel during any emergency. They will assess the situation and initiate emergency procedures in accordance with specific Vessel Emergency Preparedness Manuals.
The Vessel Master is also responsible for:

- Liaison with the Project Manager and/or BWL Crisis Team
- Liaison with Dublin Port Control
- Contact with other project vessels or third-party vessels in the direct vicinity
- Ensuring all personnel on board are aware of the requirements of this Plan
- Ensuring all project vessels follow the guidelines of this Plan
- Ensuring all accidents and incidents are reported in a timely manner

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2.4. Project Emergency Response Team (PERT)

The PERT shall be organised in such a way that it can effectively respond to any emergency. All team members shall be aware of their specific tasks, and exercises / drills shall be conducted at appropriate intervals. The PERT shall maintain an exercise schedule, and a record logbook for any exercise or emergency. The record logbook shall contain all external communication, relevant decisions, events etc. It shall be signed by the Project Manager after each exercise or emergency and can be used as evidence (if required) during an incident investigation.

The PERT is responsible for:

- Assisting and managing any emergency that may arise and providing support for the duration of the emergency period
- Ensuring that timely and effective remedial measures are taken to reduce the chance of escalation
- Informing and liaising with all internal and external parties involved.

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2.5. BWL Crisis Team

The PERT shall immediately inform the BWL Crisis Team. The following is an extract from BWL-004 Emergency Plan:

Following contact with Emergency Services, the vessel or project in distress should contact the Crisis Team – the most appropriate or available person from the table below:

Position	***Office telephone***	***Mobile / Home telephone***
Head of Business Sector Marine Serv.	01489 563621	07866 254475 / -
Head of Business Sector Maintenance	01489 563620	07712 842066 / 01202 732117
Head of Business Sector Capital	01489 563618	07712 842021 / 01329 443264
Managing Director	01489 563610	07810 151747 / -
SHE-Q Manager	01489 563615	07712 842041 / -

In the event that Crisis Team members cannot be reached, contact the Boskalis emergency number: 00 31 78 69 69 999

After contacting the Crisis Team, the PERT shall implement their Project Emergency Plan.

The BWL Crisis Team is responsible for:
- Assisting and providing support to the PERT during the emergency.
- Informing and providing moral support to the families of employees involved in the emergency
- Informing and co-ordinating the required information and requested support from Boskalis Head Office, as appropriate and in accordance with the corporate Emergency Plan.

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3. EMERGENCY CONTACT LIST

The Project Manager is responsible for ensuring that sufficient and effective emergency arrangements are made and that clear communication lines are established within the project and with external organisations such as:
- Accident & Emergency department of the local Hospital
- Police
- Fire and Rescue Service
- Ambulance service
- Dublin Port Company - Emergency Operations Centre
- Subcontractor personnel working on behalf of Boskalis.

The Project Manager shall ensure that all personnel on the project are familiar with the emergency telephone numbers, addresses and assembly points. The Emergency Contact List will be distributed around the site, posted on all vessels and at other strategic locations.

4. ASSEMBLY POINTS

The project has designated Assembly Points and preferred evacuation routes. These evacuation routes, assembly points and firefighting plot plans will be posted at various locations. All personnel will be informed of the above during the project induction.

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5. EMERGENCY SCENARIOS

5.1. Fire or Explosion

In the event of a fire or explosion, personnel shall (when alone) notify the relevant Vessel Master / Works Manager before attempting (without taking any personal risk), to control or extinguish the fire. If accompanied, a colleague can deal with the notifications.

The Vessel Master / Works Manager shall:

- Ensure that all relevant personnel have been informed
- Supervise and co-ordinate the initial firefighting efforts while ensuring that non-essential personnel are directed to the Assembly Point
- Ensure that a 'head-count' is taken as soon as possible
- Ensure that no one is missing and that a designated person has made a sweep of all buildings and rooms
- Inform the Project Manager and other members of the PERT.

Refer to the flowchart in Attachment 01 for dealing with a fire or explosion.

5.2. Personal Injury

In the event of a person becoming injured, (when alone) notify the relevant Vessel Master / Works Manager before attempting (without taking any personal risk) to assist the casualty, until relieved by the emergency services. If accompanied, a colleague can deal with the notifications.

Refer to the flowchart in Attachment 02 for the differences in dealing with major and minor personal injuries.

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5.3. Environmental Spill

It is the responsibility of all personnel on the project to report any material spills, regardless of quantity. A spill shall be notified immediately to the Vessel Master / Works Manager who shall take appropriate action.

A spill response situation is triggered by an actual or likely serious environmental damage event, or serious damage to equipment (that could lead to a serious environmental event).

Attachment 03 contains measures to prevent or mitigate escalation in the event of a spill.

5.4. Unexploded Ordnance (UXO)

In the event of UXO being discovered, the following procedures shall be followed:

- Switch off all machines (if safe to do so)
- Switch off all mobile phones
- No Smoking
- Inform the Vessel Master / Works Manager immediately
- Vessel Master / Works Manager must ensure all operatives within the working area are informed, machines are switched off, personnel moved to the designated safe area and the PERT is informed
- Obtain a brief description of the item found (shape, size, etc.) **without moving it!**
- If it is wet, keep it wet
- Move away to the designated assembly point.

PERT:

- Clear the area of all personnel within a radius of 100m, depending on the site location
- Until the item is confirmed as ordnance, do not evacuate beyond 100m
- Unnecessary disruption could give rise to panic, this should be avoided
- The area must be cordoned off to stop personnel inadvertently entering the area
- Project Manager will inform the Irish Coastguard or Port Control dependant of vessel location.

The Coastguard and other authorities (Dublin Port Company) must be informed immediately.

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The Coastguard will inform the Bomb Disposal Headquarters for further action.

A member of the PERT must be available to meet the Bomb Disposal Team on arrival and brief the commander of the findings. The person who located the item must be in attendance to describe exactly what happened when the item was uncovered.

The Bomb Disposal Team will then take control of the situation until the item is removed or correctly disposed of. It is only permitted to return to your place of work when the Bomb Disposal Team has advised the Project Manager it is safe to do so.

Refer to the flowchart in Attachment 04.

5.5. Remaining Offshore Emergencies

Other emergencies may include:

- Collision of one or more vessels in the marine spread
- Striking underwater obstacles
- Man overboard

Offshore Emergencies on larger (> 500grt) vessels are provided for within their respective Safety Management System.

Due to the various categories of vessels that maybe utilised on the project, i.e. for vessels of <500grt, the procedures in Attachment 05 are applicable.

6. COMMUNICATIONS

Communications during all operations will be arranged via VHF, mobile phone and/or E-mail. In the case of an emergency, ALL contact with the media shall be conducted via the BWL Crisis Team. If any member of the project team is contacted directly, they must direct the enquiry to the BWL Head Office. All project personnel must not to talk to the media or provide them any information in any form.

Media contact representative will be: Bob Kidd (Business Sector Manager)

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7. EMERGENCY DRILLS

Emergency Drills shall be conducted in accordance with project requirements, simulating the actual emergency where practicable, and response / action times confirmed. Drills are an essential part of the project's SHE arrangements, to ensure that everyone fully understands their roles and responsibilities in cases of emergency.

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8. REFERENCES AND ABBREVIATIONS

8.1. References

Client / Authority Documents		
No.	**Document No.**	**Document Title**
Ref 1	SOP-DPC-H&S-048-F3	Safety Rules for Contractors
…..	…..	…..

8.2. Abbreviations

Abbreviation	Full meaning
IDC	Irish Dredging Company Ltd
BWL	Boskalis Westminster Ltd
MOB	Man Overboard
PERT	Project Emergency Response Team
UXO	Unexploded Ordnance

9. ATTACHMENTS

- Attachment 01: Flowchart – Fire or Explosion
- Attachment 02: Flowchart – Personal Injury
- Attachment 03: Flowchart – Environmental Spill
- Attachment 04: Flowchart – Unexploded Ordnance (UXO)
- Attachment 05: Flowchart – Emergencies Offshore

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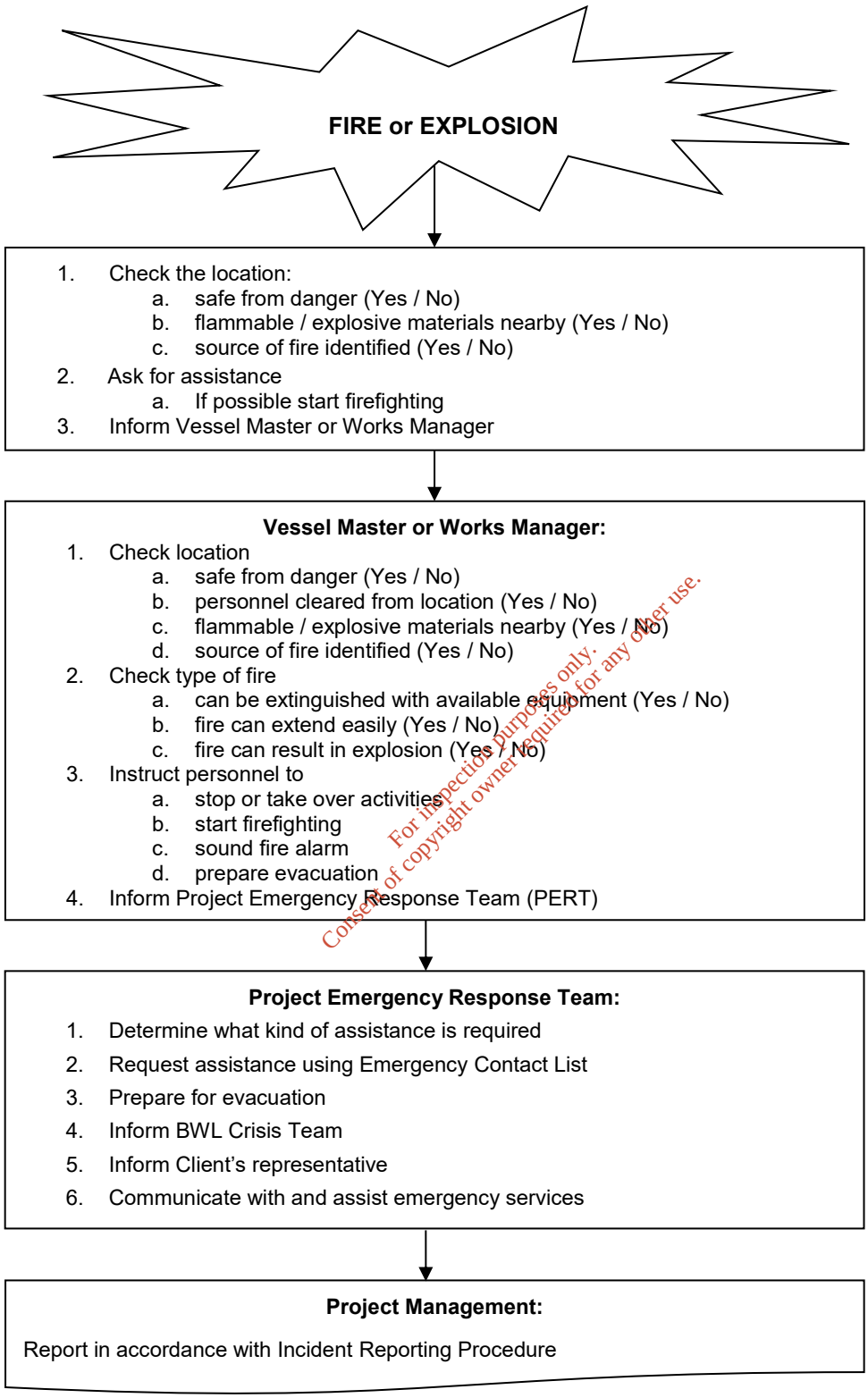
Attachment 01: Flowchart – Fire or Explosion



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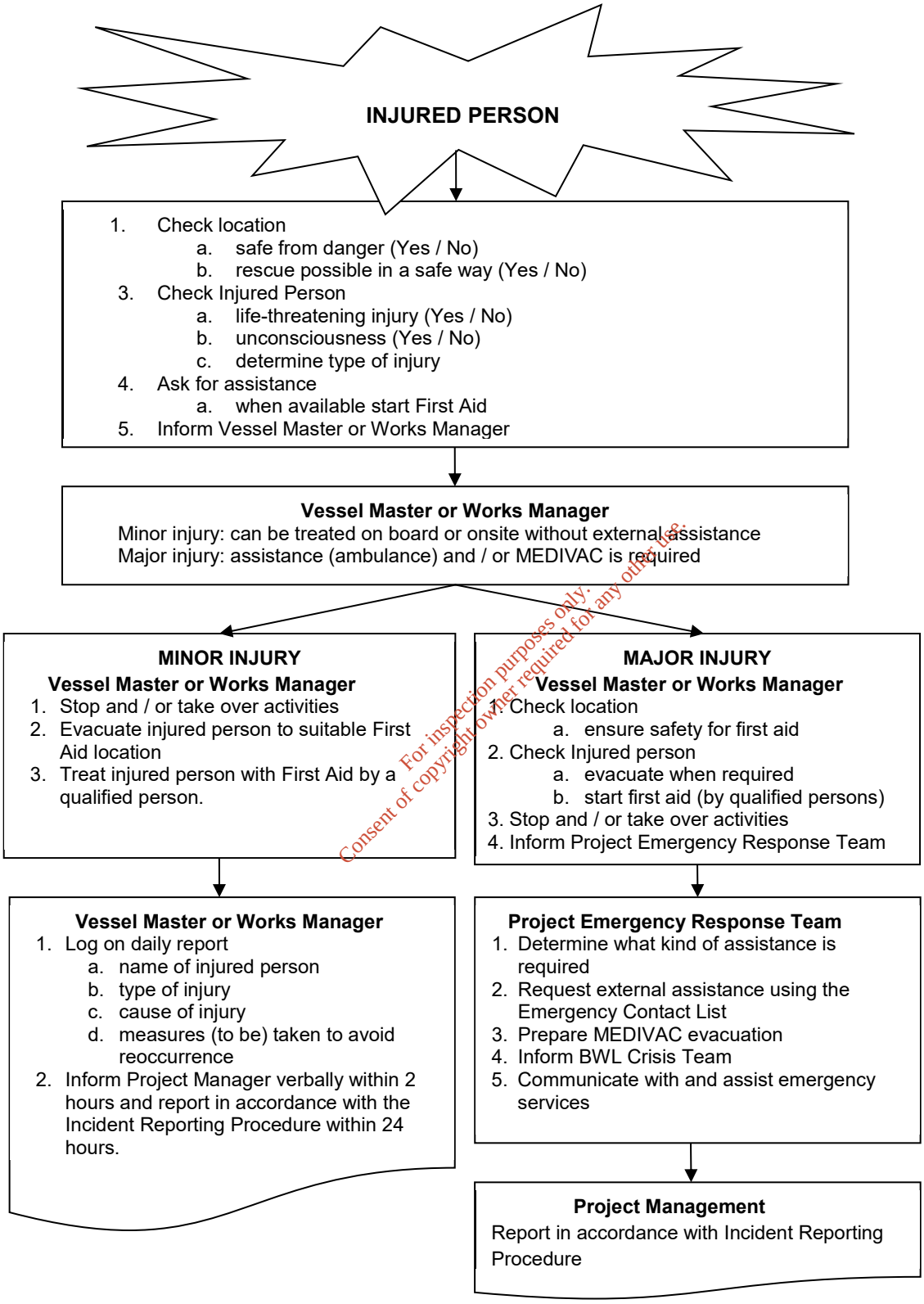
Attachment 02: Flowchart – Personal Injury



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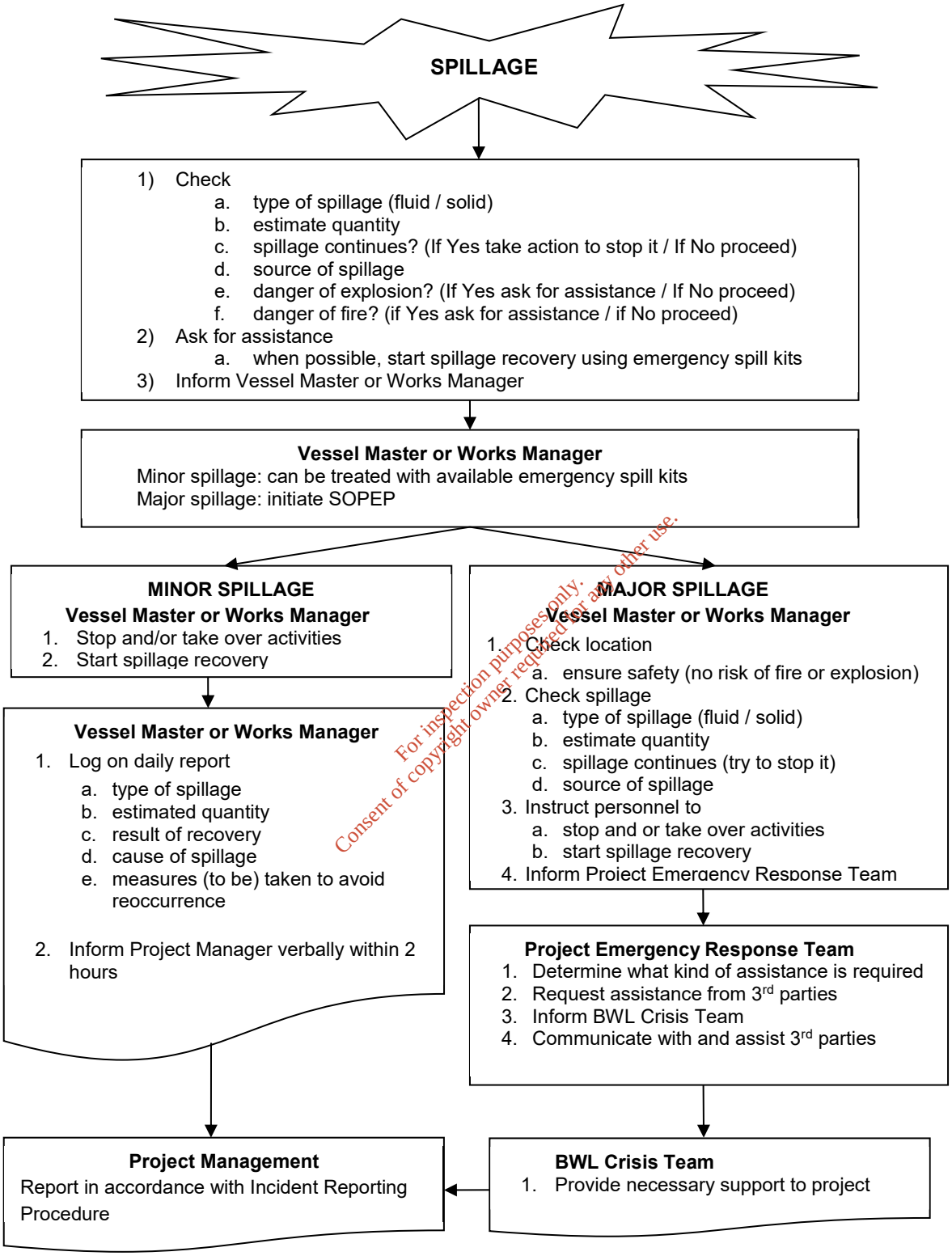
Attachment 03: Flowchart – Environmental Spill



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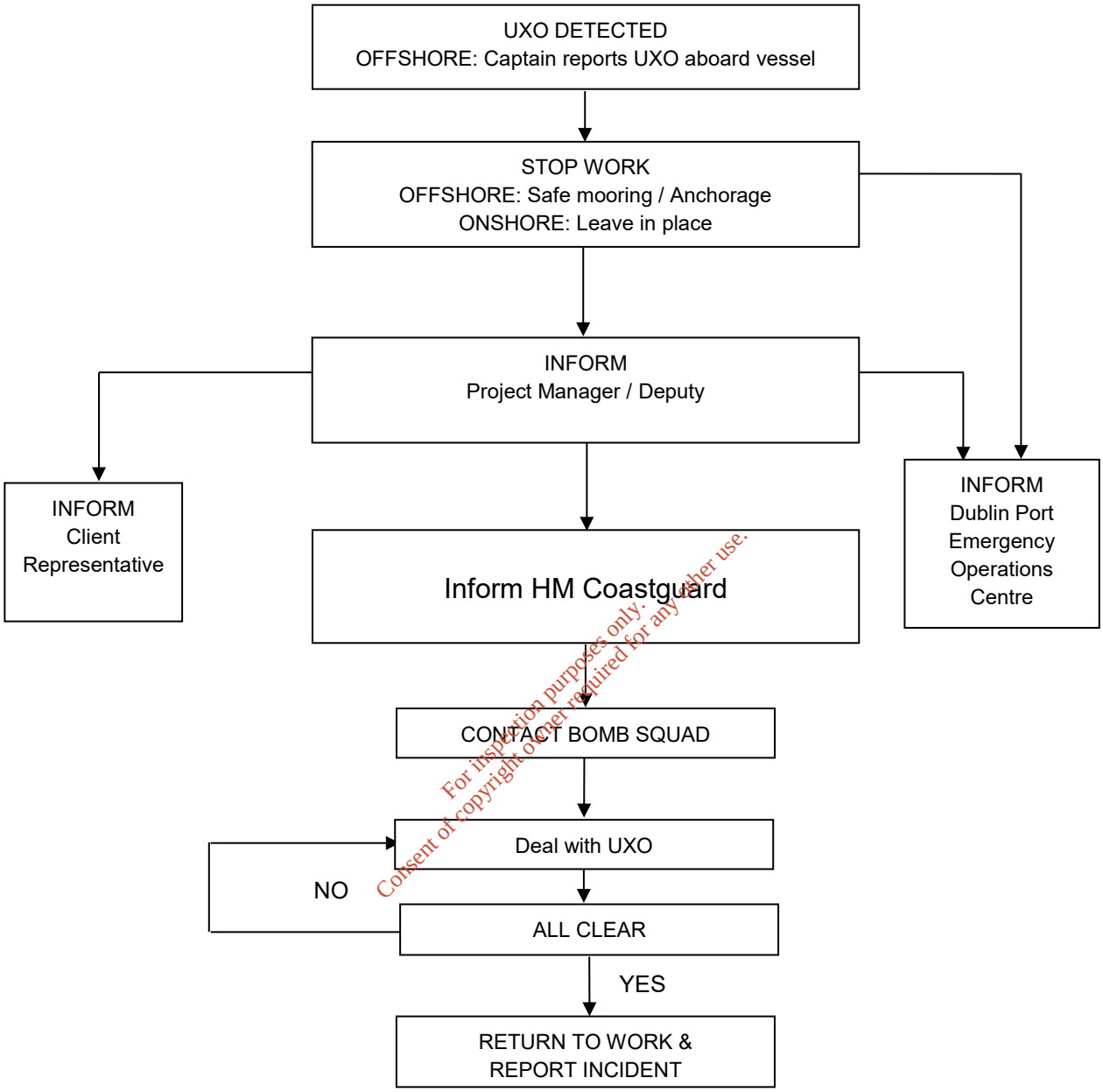
Attachment 04: Unexploded Ordnance (UXO)



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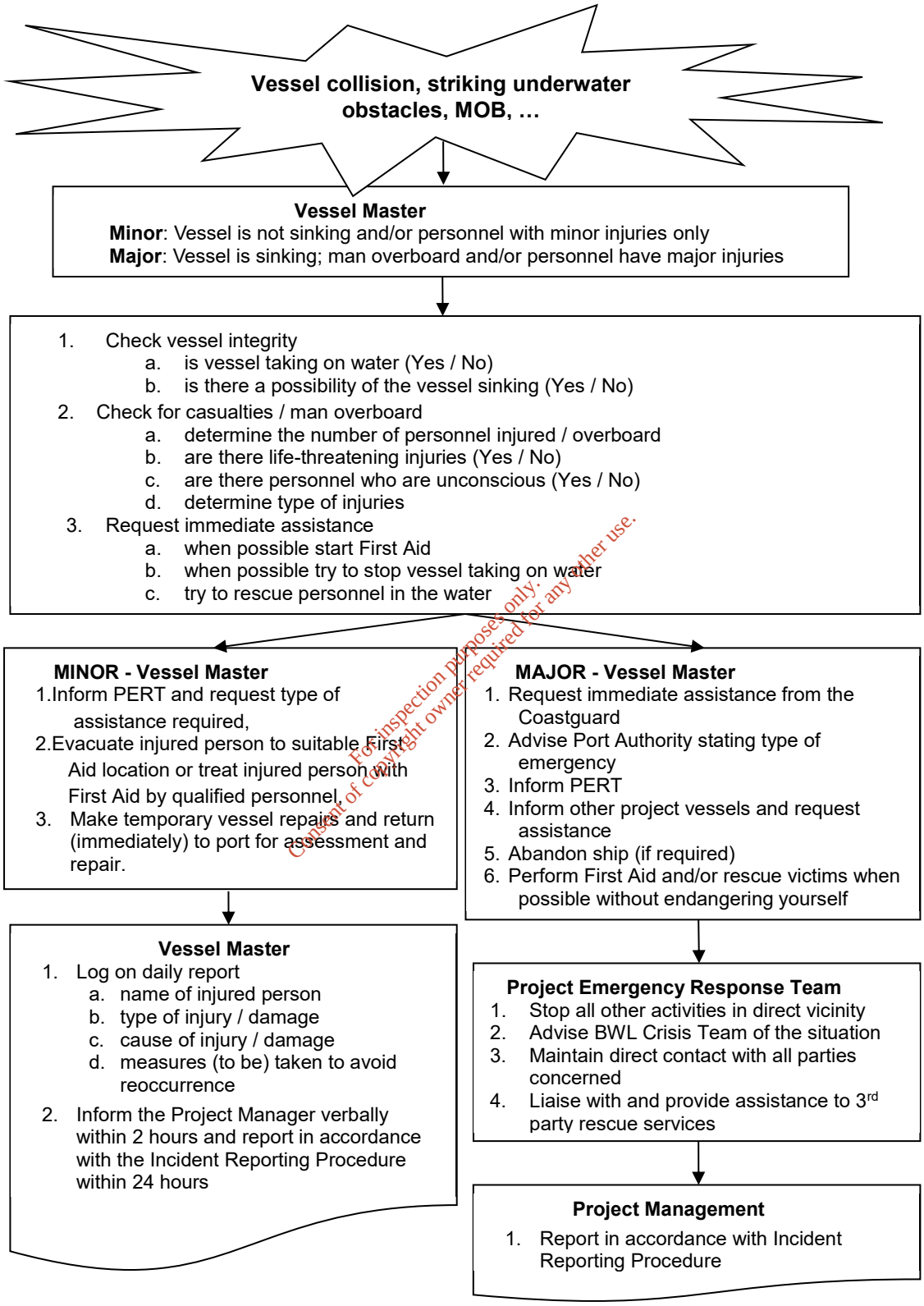
Attachment 05: Emergencies Offshore



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Irish Dredging

Project Emergency Plan

DOCUMENT NUMBER:	**BWL-271**
PROJECT NAME:	**Dublin Port 2020-2021 Season No.4**
PROJECT NUMBER:	**E043785**
CLIENT NAME:	**Dublin Port Company**
CLIENT REFERENCE:	**CP1501_017_03**

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DOCUMENT CONTROL

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Client Reference:	CP1501_017_03
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Prepared By:	Richard Chester	Role: Superintendent
Reviewed By:	Stuart Huth	Role: SHE-Q Officer
Approved By:	Gerrit Jan van den Bosch	Role: Project Manager

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Change log		
Revision	**Section**	**Change**
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TABLE OF CONTENTS

1.	INTRODUCTION	4
2.	EMERGENCY RESPONSE ORGANISATION	5
3.	EMERGENCY CONTACT LIST	6
4.	ASSEMBLY POINTS	6
5.	EMERGENCY SCENARIOS	7
6.	COMMUNICATIONS	8
7.	EMERGENCY DRILLS	8
8.	REFERENCES AND ABBREVIATIONS	9
9.	ATTACHMENTS	9

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1. INTRODUCTION

The Project Emergency Plan provides guidance for project teams in the event of an emergency during the PLAN or EXECUTE Phase of works. A high degree of preparedness shall be maintained at all times, in order to respond and efficiently control any emergency situation in the shortest possible time. This will be ensured through personnel responsibilities, training and periodic emergency drills.

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- IDC personnel movements to/from the operational sites
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- Interfaces with third parties during their onshore and offshore operations

For this project, the following emergency scenarios have been identified:
- Fire in the site office or onboard a vessel
- Explosion onboard a vessel
- Collision of one or more vessels in the marine spread
- Personal injury
- Dredging-up unexploded ordinance (UXO)
- Man overboard (MOB)
- Striking underwater obstacles
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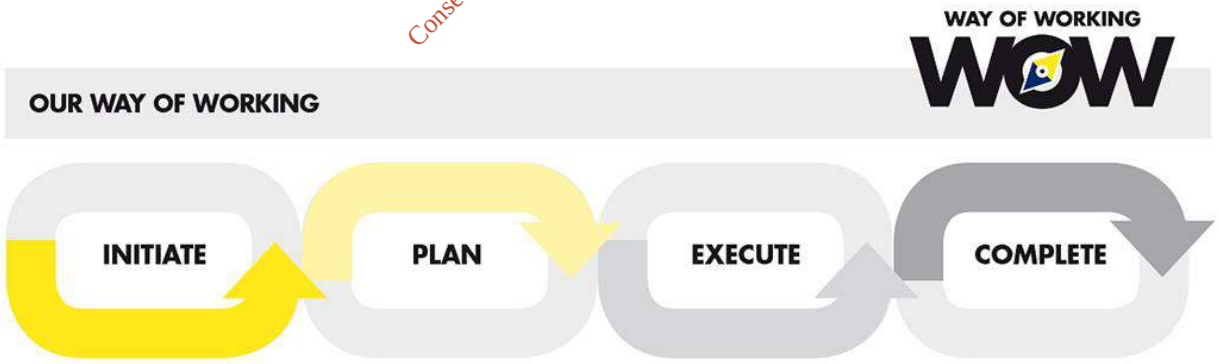

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2. EMERGENCY RESPONSE ORGANISATION

In the event of an emergency occurring during the works, IDC is responsible for co-ordinating the actions between internal parties, and to ensure that all necessary arrangements associated with the emergency are taken and correctly implemented.

The responsibilities of the Project Manager include the correct preparation, updating, distribution and implementation of this Plan. Throughout the PLAN and EXECUTE phases, the Project Manager will be assisted by his project team.

2.1. Project Manager

The Project Manager will be responsible for the co-ordination of all emergency response situations on behalf of IDC. They will ensure that all necessary resources required by this Plan are in place and that all personnel on the project comply with the instructions and follow the guidelines provided.

In the event of escalation, the Project Manager will establish a “Crisis Centre” in the project site office. The Project Manager will lead this centre during the crisis in close co-operation with the BWL Crisis Team and Dublin Port Company Emergency Operations Centre.

2.2. Works Manager / Superintendent

The Works Manager / Superintendent will assist with Project Manager during an emergency situation.

2.3. Vessel Master

The Vessel Master or nominated deputy has overall responsibility for control of the vessel during any emergency. They will assess the situation and initiate emergency procedures in accordance with specific Vessel Emergency Preparedness Manuals.
The Vessel Master is also responsible for:

- Liaison with the Project Manager and/or BWL Crisis Team
- Liaison with Dublin Port Control
- Contact with other project vessels or third-party vessels in the direct vicinity
- Ensuring all personnel on board are aware of the requirements of this Plan
- Ensuring all project vessels follow the guidelines of this Plan
- Ensuring all accidents and incidents are reported in a timely manner

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2.4. Project Emergency Response Team (PERT)

The PERT shall be organised in such a way that it can effectively respond to any emergency. All team members shall be aware of their specific tasks, and exercises / drills shall be conducted at appropriate intervals. The PERT shall maintain an exercise schedule, and a record logbook for any exercise or emergency. The record logbook shall contain all external communication, relevant decisions, events etc. It shall be signed by the Project Manager after each exercise or emergency and can be used as evidence (if required) during an incident investigation.

The PERT is responsible for:

- Assisting and managing any emergency that may arise and providing support for the duration of the emergency period
- Ensuring that timely and effective remedial measures are taken to reduce the chance of escalation
- Informing and liaising with all internal and external parties involved.

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2.5. BWL Crisis Team

The PERT shall immediately inform the BWL Crisis Team. The following is an extract from BWL-004 Emergency Plan:

Following contact with Emergency Services, the vessel or project in distress should contact the Crisis Team – the most appropriate or available person from the table below:

Position	***Office telephone***	***Mobile / Home telephone***
Head of Business Sector Marine Serv.	01489 563621	07866 254475 / -
Head of Business Sector Maintenance	01489 563620	07712 842066 / 01202 732117
Head of Business Sector Capital	01489 563618	07712 842021 / 01329 443264
Managing Director	01489 563610	07810 151747 / -
SHE-Q Manager	01489 563615	07712 842041 / -

In the event that Crisis Team members cannot be reached, contact the Boskalis emergency number: 00 31 78 69 69 999

After contacting the Crisis Team, the PERT shall implement their Project Emergency Plan.

The BWL Crisis Team is responsible for:

- Assisting and providing support to the PERT during the emergency.
- Informing and providing moral support to the families of employees involved in the emergency
- Informing and co-ordinating the required information and requested support from Boskalis Head Office, as appropriate and in accordance with the corporate Emergency Plan.

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3. EMERGENCY CONTACT LIST

The Project Manager is responsible for ensuring that sufficient and effective emergency arrangements are made and that clear communication lines are established within the project and with external organisations such as:

- Accident & Emergency department of the local Hospital
- Police
- Fire and Rescue Service
- Ambulance service
- Dublin Port Company - Emergency Operations Centre
- Subcontractor personnel working on behalf of Boskalis.

The Project Manager shall ensure that all personnel on the project are familiar with the emergency telephone numbers, addresses and assembly points. The Emergency Contact List will be distributed around the site, posted on all vessels and at other strategic locations.

4. ASSEMBLY POINTS

The project has designated Assembly Points and preferred evacuation routes. These evacuation routes, assembly points and firefighting plot plans will be posted at various locations. All personnel will be informed of the above during the project induction.

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5. EMERGENCY SCENARIOS

5.1. Fire or Explosion

In the event of a fire or explosion, personnel shall (when alone) notify the relevant Vessel Master / Works Manager before attempting (without taking any personal risk), to control or extinguish the fire. If accompanied, a colleague can deal with the notifications.

The Vessel Master / Works Manager shall:

- Ensure that all relevant personnel have been informed
- Supervise and co-ordinate the initial firefighting efforts while ensuring that non-essential personnel are directed to the Assembly Point
- Ensure that a 'head-count' is taken as soon as possible
- Ensure that no one is missing and that a designated person has made a sweep of all buildings and rooms
- Inform the Project Manager and other members of the PERT.

Refer to the flowchart in Attachment 01 for dealing with a fire or explosion.

5.2. Personal Injury

In the event of a person becoming injured, (when alone) notify the relevant Vessel Master / Works Manager before attempting (without taking any personal risk) to assist the casualty, until relieved by the emergency services. If accompanied, a colleague can deal with the notifications.

Refer to the flowchart in Attachment 02 for the differences in dealing with major and minor personal injuries.

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5.3. Environmental Spill

It is the responsibility of all personnel on the project to report any material spills, regardless of quantity. A spill shall be notified immediately to the Vessel Master / Works Manager who shall take appropriate action.

A spill response situation is triggered by an actual or likely serious environmental damage event, or serious damage to equipment (that could lead to a serious environmental event).

Attachment 03 contains measures to prevent or mitigate escalation in the event of a spill.

5.4. Unexploded Ordnance (UXO)

In the event of UXO being discovered, the following procedures shall be followed:

- Switch off all machines (if safe to do so)
- Switch off all mobile phones
- No Smoking
- Inform the Vessel Master / Works Manager immediately
- Vessel Master / Works Manager must ensure all operatives within the working area are informed, machines are switched off, personnel moved to the designated safe area and the PERT is informed
- Obtain a brief description of the item found (shape, size, etc.) **without moving it!**
- If it is wet, keep it wet
- Move away to the designated assembly point.

PERT:

- Clear the area of all personnel within a radius of 100m, depending on the site location
- Until the item is confirmed as ordnance, do not evacuate beyond 100m
- Unnecessary disruption could give rise to panic, this should be avoided
- The area must be cordoned off to stop personnel inadvertently entering the area
- Project Manager will inform the Irish Coastguard or Port Control dependant of vessel location.

The Coastguard and other authorities (Dublin Port Company) must be informed immediately.

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The Coastguard will inform the Bomb Disposal Headquarters for further action.

A member of the PERT must be available to meet the Bomb Disposal Team on arrival and brief the commander of the findings. The person who located the item must be in attendance to describe exactly what happened when the item was uncovered.

The Bomb Disposal Team will then take control of the situation until the item is removed or correctly disposed of. It is only permitted to return to your place of work when the Bomb Disposal Team has advised the Project Manager it is safe to do so.

Refer to the flowchart in Attachment 04.

5.5. Remaining Offshore Emergencies

Other emergencies may include:

- Collision of one or more vessels in the marine spread
- Striking underwater obstacles
- Man overboard

Offshore Emergencies on larger (> 500grt) vessels are provided for within their respective Safety Management System.

Due to the various categories of vessels that maybe utilised on the project, i.e. for vessels of <500grt, the procedures in Attachment 05 are applicable.

6. COMMUNICATIONS

Communications during all operations will be arranged via VHF, mobile phone and/or E-mail. In the case of an emergency, ALL contact with the media shall be conducted via the BWL Crisis Team. If any member of the project team is contacted directly, they must direct the enquiry to the BWL Head Office. All project personnel must not to talk to the media or provide them any information in any form.

Media contact representative will be: Bob Kidd (Business Sector Manager)

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7. EMERGENCY DRILLS

Emergency Drills shall be conducted in accordance with project requirements, simulating the actual emergency where practicable, and response / action times confirmed. Drills are an essential part of the project's SHE arrangements, to ensure that everyone fully understands their roles and responsibilities in cases of emergency.

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8. REFERENCES AND ABBREVIATIONS

8.1. References

Client / Authority Documents		
No.	**Document No.**	**Document Title**
Ref 1	SOP-DPC-H&S-048-F3	Safety Rules for Contractors
	MAN-DPC-OPS-002	Dublin Port Co. Emergency Management Plan
	MAN-DPC-OPS-003	Dublin Port Co. Emergency Oil Spill Plan
	IBE1189	Construction Environmental Management Plan (CEMP)
	RA-HBR-OPS-006	Oil Spill Response Plan
	SOP-MS-OPS-026	Minor Chemical Spill Response Rev5

8.2. Abbreviations

Abbreviation	Full meaning
IDC	Irish Dredging Company Ltd
BWL	Boskalis Westminster Ltd
MOB	Man Overboard
PERT	Project Emergency Response Team
UXO	Unexploded Ordnance

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9. ATTACHMENTS

- Attachment 01: Flowchart – Fire or Explosion
- Attachment 02: Flowchart – Personal Injury
- Attachment 03: Flowchart – Environmental Spill
- Attachment 04: Flowchart – Unexploded Ordnance (UXO)
- Attachment 05: Flowchart – Emergencies Offshore
- Attachment 06: Emergency Contact List

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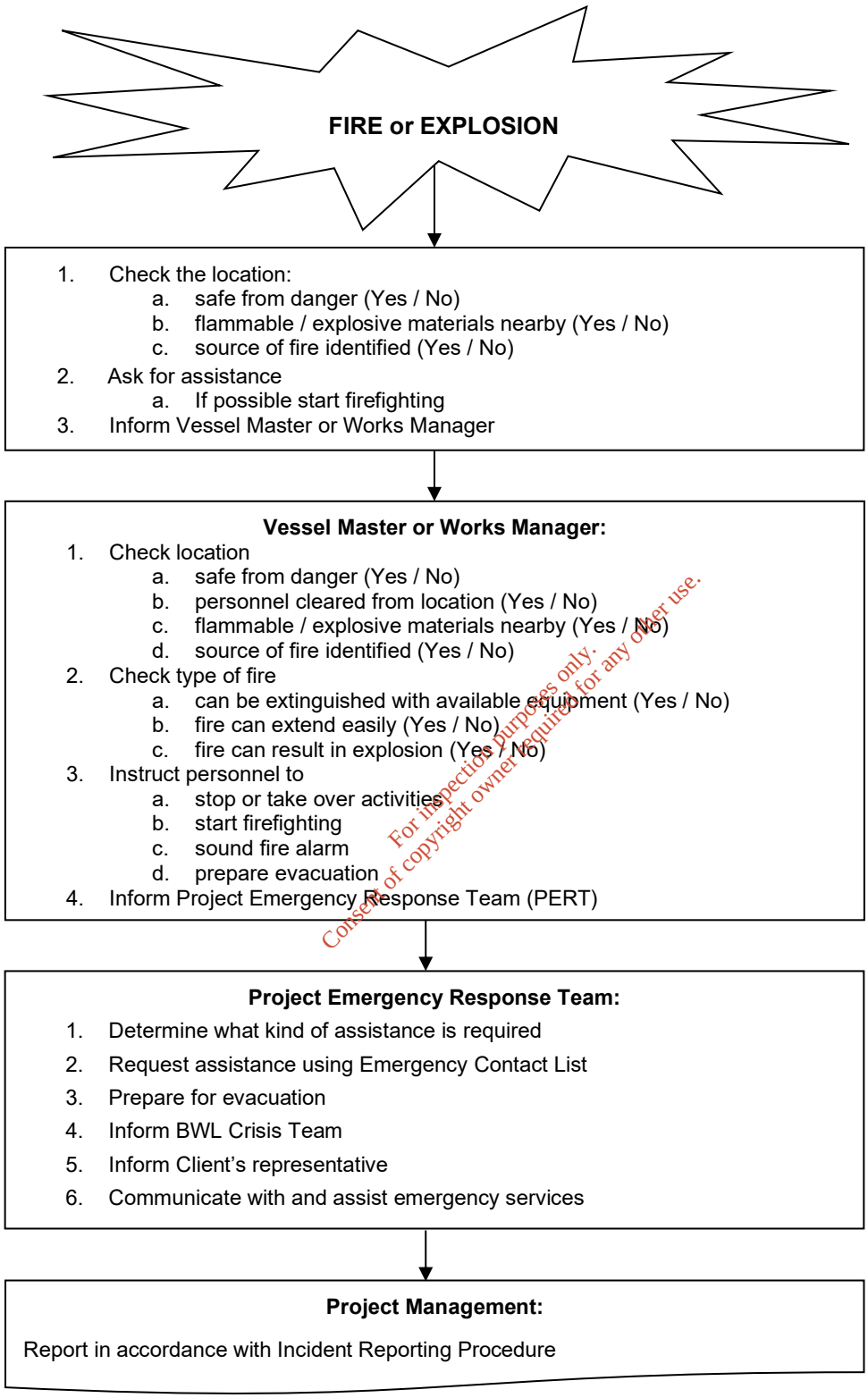
Attachment 01: Flowchart – Fire or Explosion



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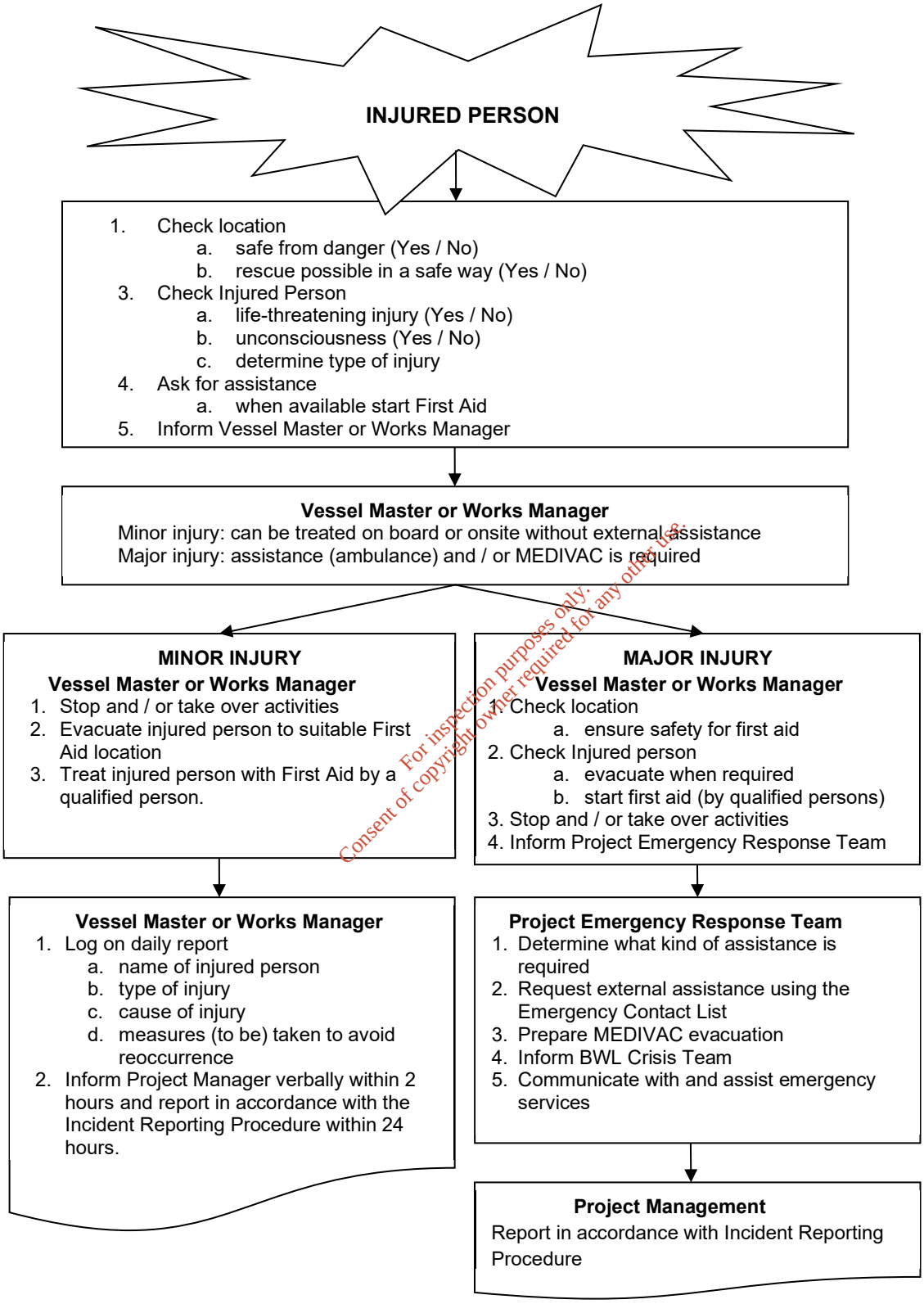
Attachment 02: Flowchart – Personal Injury



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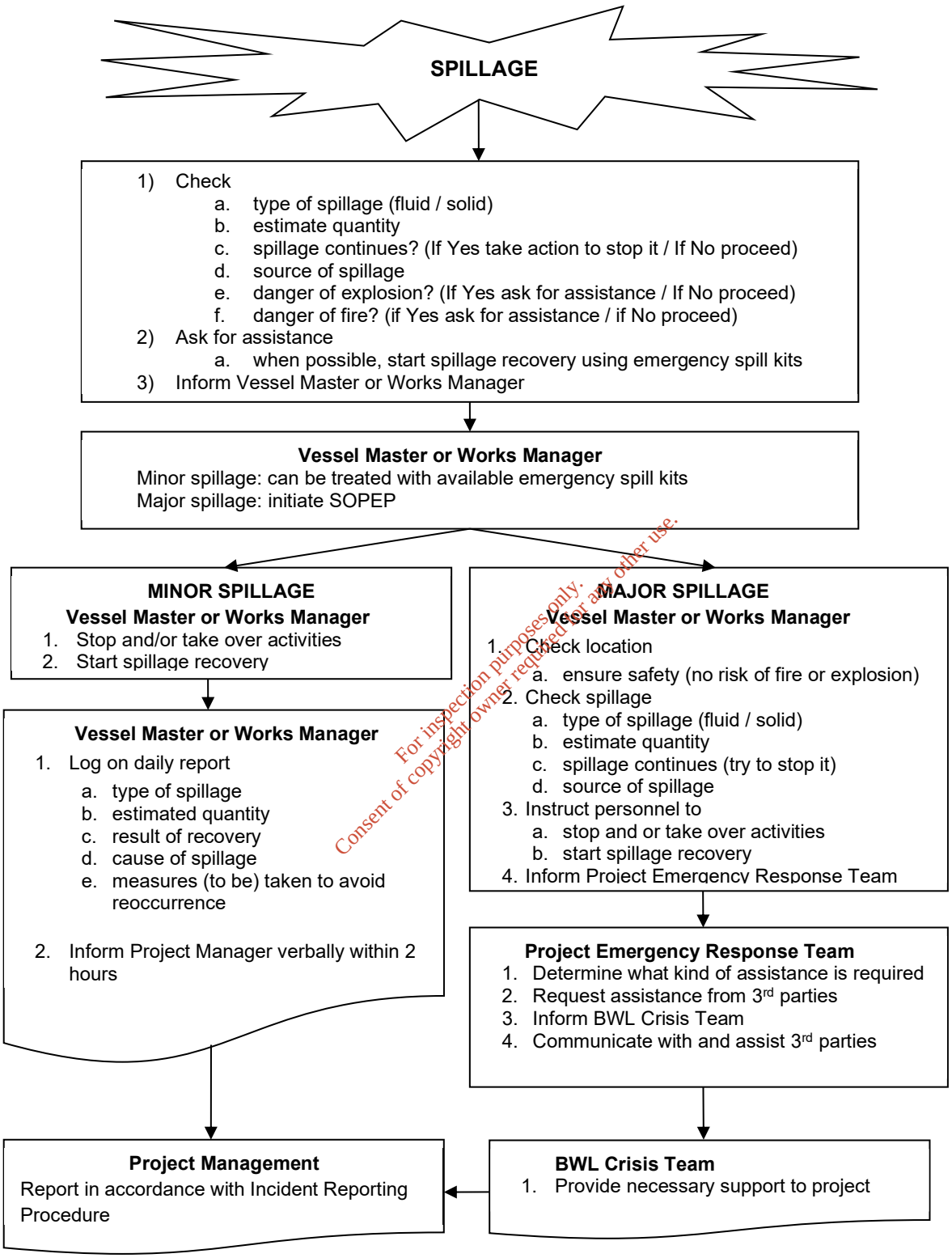
Attachment 03: Flowchart – Environmental Spill



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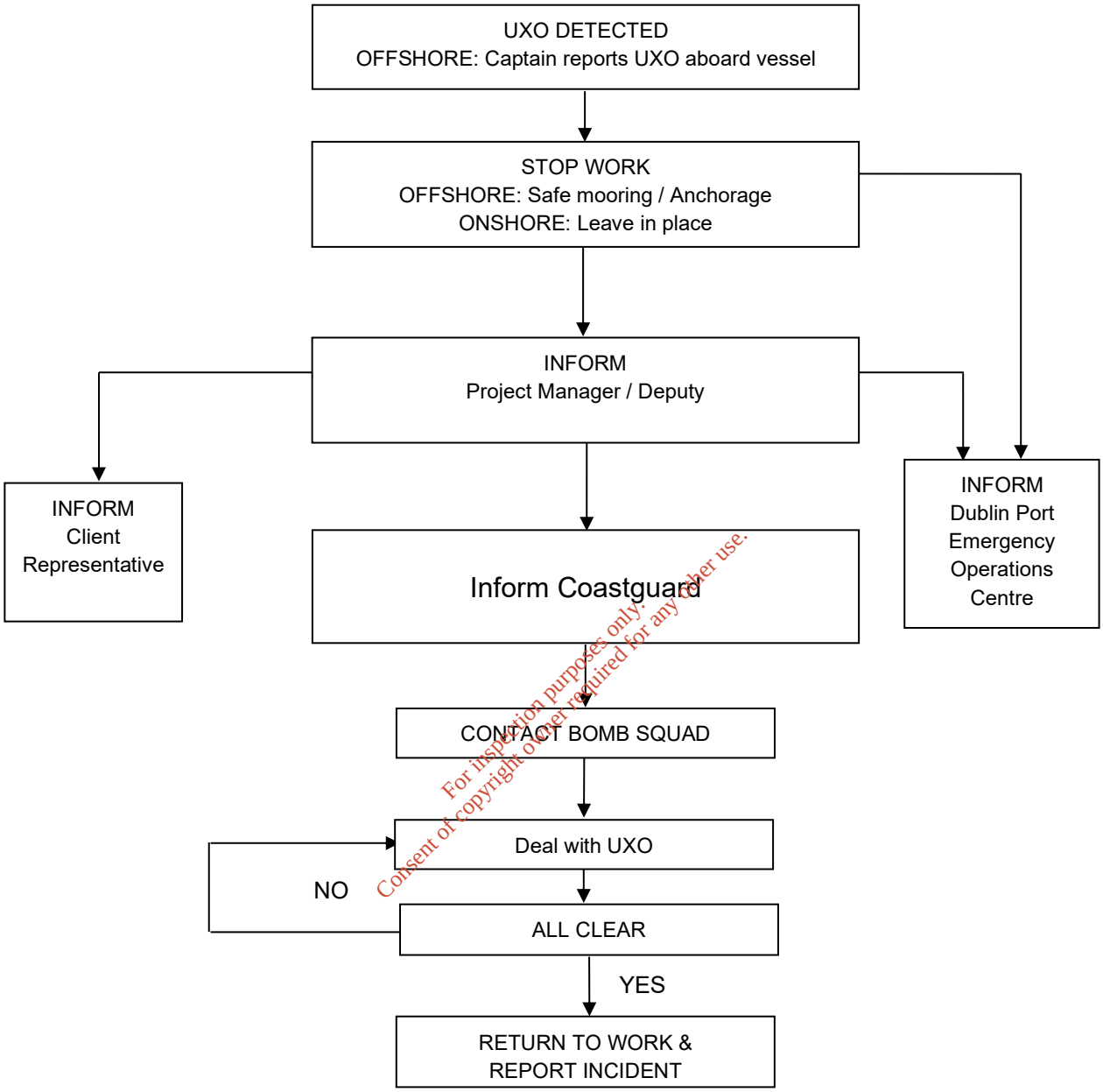
Attachment 04: Unexploded Ordnance (UXO)



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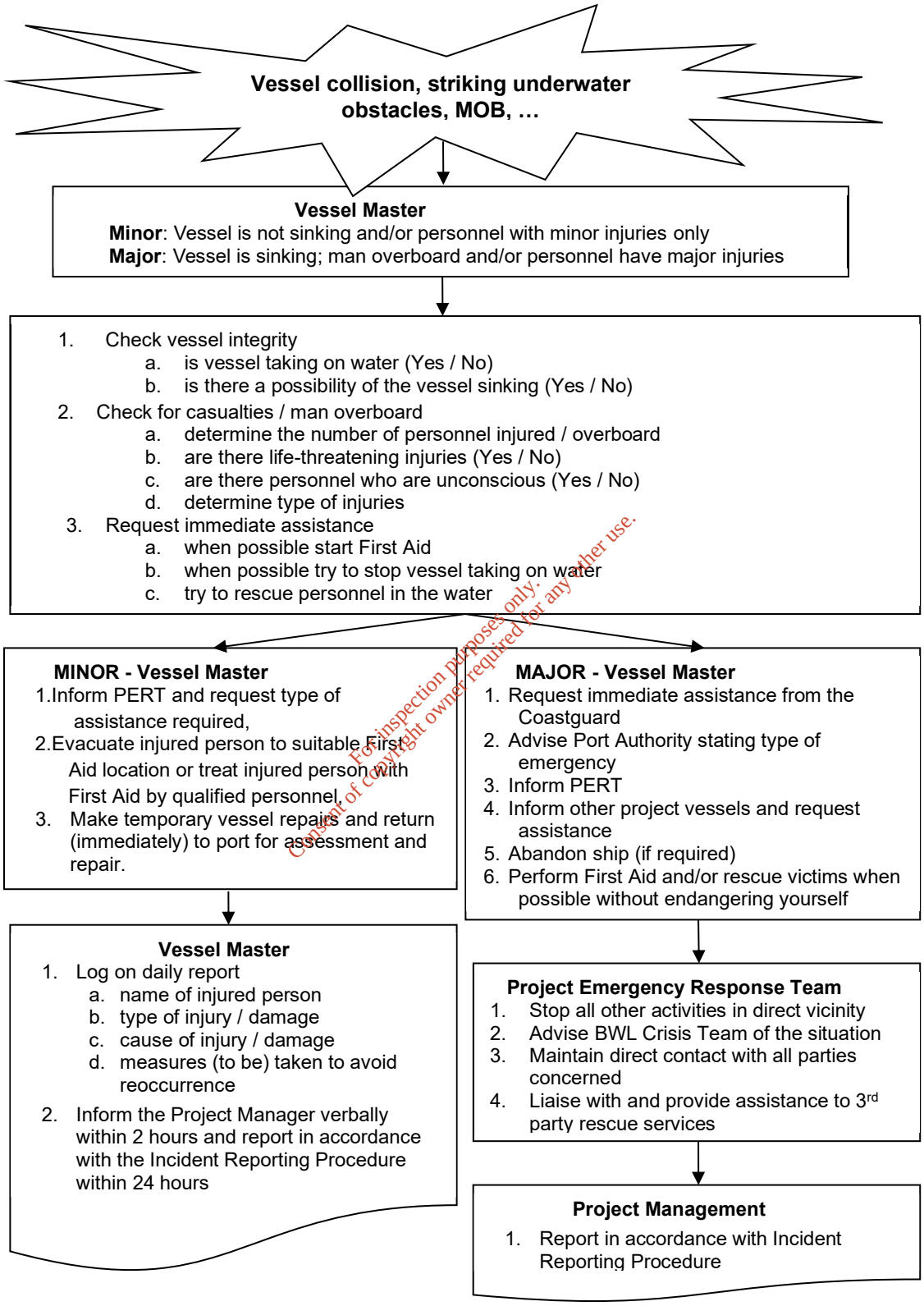
Attachment 05: Emergencies Offshore



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Attachment 05: Emergencies Offshore

Boskalis
Irish Dredging

Project Emergency Contact list				
Dublin Port 2020-2021		**P0043785**	**Version: 25/08/2020**	
Project Site Office: Irish Dredging Company Ltd, Maintenance and Services Building Port Centre				
Dublin VTS	**VHF 12/13 - traffic**	**+353 1 8876070**		**DREDGING WORKING CHANNEL VHF P1, to be checked with Smit Neyland and Norma**
	VHF 16 - emergency			
	VHF 12 - pilot			
EMERGENCY SERVICES : 999-112	**VHF 9 - tug**			

Name	Designation	Phone No.	Mobile No.	E-mail
PERT (project emergency response team)				
Irish Dredging Company				
Gerrit Jan van den Bosch	Project Manager		+44 7795 821 902	gerrit.jan.vd.bosch@boskalis.com
Richard Chester	Superintendent		+44 7825 633 494	richard.chester@boskalis.com
Tony Wall	Chief Surveyor		+44 7712 842 033	anthony.wall@boskalis.com
Boskalis Westminster Crisis Team				
Boskalis Fareham				
Boskalis Fareham	Head Office General	+44 1489 885933		bwl@boskalis.com
Bob Kidd	Maintenance Business Manager		+44 7712 842 066	bob.kidd@boskalis.com
Chris Cates	Marine Service Business Manager		+44 7866 254 475	chris.cates@boskalis.com
Neil Martin	SHE-Q Manager		+44 7712 842 041	neil.martin@boskalis.com
Medical Facilities				
Name	**Address**	**Phone No.**	**Mobile No.**	
HOSPITAL - Mater Misericordiae University	**Eccles Street 7 , Inns Quay, D07 R2WY**	**+353 1 8032000**		
HOSPITAL - Beaumont	**Beaumont Road, Beaumont, Dublin**	**+353 1 8093000**	**+353 1 8092714**	
Emergency Operation Centre Line 1		**+353 1 8876833**	**+353 1 7040833**	
Emergency Operation Centre Line 2		**+353 1 8876834**	**+353 1 7040834**	
Port Security		**+353 1 8876858**		
East Wall Medical Centre	**145 Church Road, East Wall, D03 X894**	**+353 1 8365505**		
Dentist	**Dublin university hospital**	**+353 1 6127200**		

Boskalis Papendrecht				
Boskalis Papendrecht	Head Office General	+31 78 6969000		
Henrick Keij	Fleet Manager	+31 786 969 405		henrick.keij@boskalis.com
Arjan Mol	Fleet Engineer	+31 786 969 091		arjan.mol@boskalis.com
Arjan Gossije	Operational Manager NW-Europe	+31 786 968 629		arjan.gossije@boskalis.com

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