

WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



Report Date: 24-10-2020 Week: 43-2020

Number: 022 Period: 17-10-2020 to 23-10-2020

Project : Dredging, Land Reclamation and Revetment Works at Gulhifalhu Document number : 462.10062-WQR-22

Contract number : AGR(471)-PIDS2/PRIV/2019/194 Contractor : Boskalis Westminster Contracting Ltd
Project number [MIAS] : 462.10042 Client : Ministry of National Planning and Infrastructure

Attention <u>shaana.farooq@planning.gov.mv</u>

qiq	Correlation coefficient (NTU:TSS	Monitoring equipment	TSS limit (mg/L)	Converted limit NTU	Limit applicability
NTU - TSS Relations	1.92	Eureka Manta	10	5.2	Maintain a threshold level for turbidity at all reefs within the atoll lagoon in proximity to the dredging site, measured as Total Suspended Solids (TSS) to a maximum of 10 mg/l. not exceeding 20% of the measurements. Exceptions shall be made where background rates exceeded the threshold level and in reefs where extensive reclamation work has been undertaken (including e.g. Thilafushi, Gulhifalhu, Villigili, Malé, Hulhumalé). Considerations also shall be made to account for naturally elevated levels of turbidity which may occur during storm events or bad weather.

Activities and other observations

Daily in situ seawater quality measurements and sampling performed.

No unexpected values or exceedances.

Calibration of water quality sensors.

CDE retrieved and replaced sediment traps at T-2, T-4, T-6, T-7, T-9 & T-11.

Revetment installation works ongoing.

Corrective actions taken if necessary

Mitigation

Measurements are taken using a Eureka Manta Multiparameter probe.

The EIA requires measurements and water sample at the surface, at approximately 1 meter depth.

For completeness, two additional depths are measured; 'bottom' and 'mid-water'

The 'bottom' measurement is taken at either:

The maximum depth the probe will go to on a 30m cable (dependent on currents), or

90% of the water column if water depth is < 30m $\,$

The 'mid-water' measurement is taken at approximately 0.5 * the 'bottom' depth

Eureka Manta Turbidity sensor has an accuracy of 2% of reading or 0.2 (https://www.waterprobes.com/water-quality-sensor-specifications).

Therefore, negative readings of up until -0.2 NTU indicate no turbidity.

Eureka Manta Multiparameter probe
S/N: MT
S/N: MT

S/N: MT12183556 Calibration Date: 18/10/2020 Status: Used for measurements

S/N: MT12183554 Calibration Date: N/A Status: Spare

	Location ID	Description
	W2	
	W5	
	W7	Reclamation
	W10	rteciamation
	W11	
	W14	
	W15	Villigili
su	W16	Reclamation
Locations	W19	Background
Loc	W20	
	W25	Borrow area
	W26	
	W27	Background
	W36	
	W45	
	W46	Borrow area
	W47	
	W51	



Signed by Contractor Signed by Client



WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



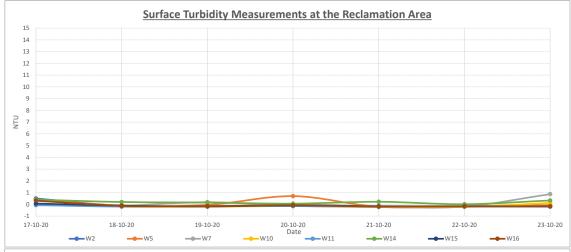


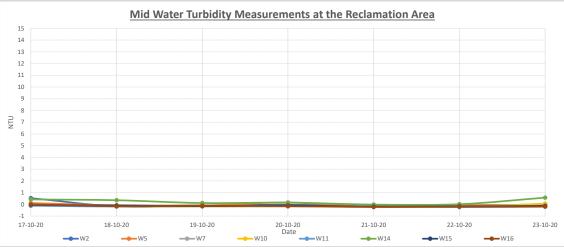
Project : Dredging, Land Reclamation and Revetment Works at Guilhitalhu | Document number : 46Z-10062-WQR-22.2

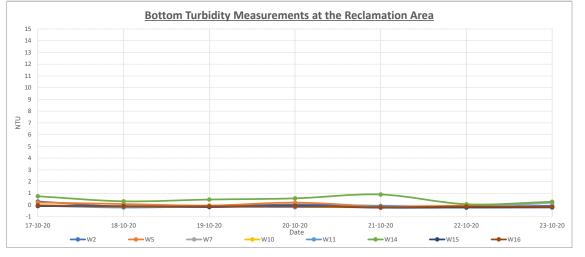
Contract number : AGR(471)-PIDS2/PRIV/2019/194 Contractor : Boskalis Westminster Contracting Ltd

Project number [MIAS] : 46Z-10042 Client : Ministry of National Planning and Infrastructure

Attention shaana_farooq@olenning.gov.mv









W5

W7

W11

W14

W15

W16

W19

W20

W26

W27

W36

W45

W47

Results

WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



Date: 17-10-2020 Time: 16:20 to 18:00

56156

56101

56054

56063

56023

56013

56132

56079

56035

56169

56124

56152

56003

55999

56031

56111

56090

56095

Project : Dredging, Land Reclamation and Revetment Works at Gulhifalhu □

Contract number : AGR(471)-PIDS2/PRIV/2019/194

Depth (m)

12

23

1

12

24

12

24

18

11

23

11

17

remperat (°C)

28.8

28.8

28.7

28.7

28.7

28.9

28.9

28.9

28.9

28.7

29.0

28.9

28.8

28.9

28.8

7.0

6.9

6.9

6.7

6.6

6.6

6.9

7.0

7.1

7.1

7.1

6.4

6.3

6.3

6.8

6.7

6.7

Project number [MIAS] : 462.10042

Mid-water

Bottom

Surface

Mid-water

Bottom

Surface

Mid-water Bottom

Surface Mid-water Bottom Surface

Mid-water

Bottom

Surface

Bottom

Surface

Bottom

Surface

Mid-water

Bottom

Surface

Mid-water Bottom Surface

Mid-water

Bottom Surface Mid-water

Bottom Surface

Mid-water Bottom Surface

Mid-water Bottom Surface

Mid-water Bottom Surface

Mid-water
Bottom
Surface
Mid-water
Bottom
Surface

Mid-wate Bottom Surface

Mid-water

Document number Contractor Client

0.50

0.53

0.31

0.38

0.11

0.22

-0.07

-0.12

-0.06

0.40

0.42

0.75

0.07

-0.05

-0.09

0.31

-0.01

-0.02

Attention

Conductivity (uS/cm) Turbidity (NTU)

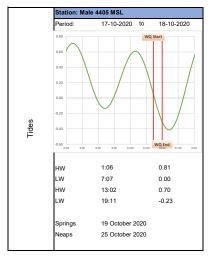
: 462.10062-WQR-22.4

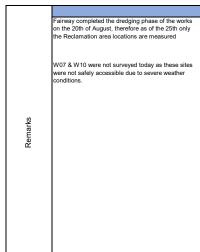
: Boskalis Westminster Contracting Ltd

: Ministry of National Planning and Infrastructure

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	Vessel	Stop	Start
ώ			
Stoppages			
Stop			











W5

W7

W11

W14

W15

W16

W19

W20

W26

W27

W36

W45

W47

Results

WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



Date: 18-10-2020 Time: 8:10 to 10:30

56105

56099

56060

56082

56087

56102

55975

56016

56025

56072

56038

56020

56071

56045

56064

56231

56214

56190

56022

56050

56041

56125

56137

56105

Project : Dredging, Land Reclamation and Revetment Works at Gulhifalhu □

Contract number : AGR(471)-PIDS2/PRIV/2019/194

Depth (m)

11

22

11

21

11

12

21

12

20

8

17

12

22

12

19

rempera. (°C)

28.8

28.8

28.8

28.8

28.8

28.8

28.9

28.9

28.9

28.9

28.9

28.9

29.0

28.9

28.8

28.7

28.7

28.8

28.8

28.8

28.9

28.9

28.9

7.1

7.0

7.0

7.0

6.9

6.9

6.8

6.8

7.0

7.0

6.9

7.2

7.2

7.3

7.2

7.2

6.8

6.7

6.8

7.2

7.1

7.1

Project number [MIAS] : 462.10042

Mid-water

Bottom

Surface

Mid-water Bottom Surface

Mid-water

Bottom Surface Mid-water

Bottom Surface

Mid-water Bottom

Surface

Mid-water Bottom

Surface

Mid-water Bottom Surface

Mid-water
Bottom
Surface
Mid-water
Bottom
Surface

Mid-water
Bottom
Surface
Mid-water

Document number Contractor Client

-0.12

-0.17

-0.15

-0.10

-0.08

0.09

-0.15

-0.18

-0.17

-0.21

-0.20

-0.19

-0.19

-0.19

-0.21

0.20

0.35

0.32

-0.11

-0.10

-0.09

-0.13

-0.16

-0.12

Attention

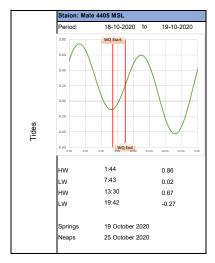
Conductivity (uS/cm) Turbidity (NTU)

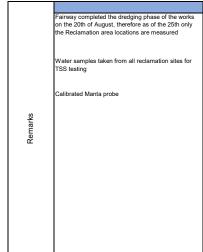
: 462.10062-WQR-22.5

: Boskalis Westminster Contracting Ltd : Ministry of National Planning and Infrastructure

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	Vessel	Stop	Start
S			
Stoppages			
Sto			











W5

W7

W11

W14

W15

W16

W19

W20

W26

W27

W36

W45

Results

WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



Date: 19-10-2020 Time: 7:20 to 9:50

56098

56105

56074

56098

56090

56153

56156

56142

56100

56122

56141

56207

56168

56172

56131

56160

56141

56001

56055

56046

56117

56168

56147

Project : Dredging, Land Reclamation and Revetment Works at Gulhifalhu □

Contract number : AGR(471)-PIDS2/PRIV/2019/194

nperat (°C)

28.8

28.8

28.7

28.7

28.7

28.7

28.6

28.6

28.8

28.8

28.6

28.8

28.8

28.8

28.9

28.8

28.9

28.7

28.6

28.8

28.8

рΗ

8.3

8.2

7.9

7.6

7.5

7.5

7.6

7.6

7.6

7.8

7.7

77

7.8

7.7

7.7

7.9

7.9

7.9

7.6

7.5

7.5

7.8

7.7

7.7

Depth (m)

12

23

1

11

19

12

24

12

25

12

23

8

16

12

24

12

20

Project number [MIAS] : 462.10042

Mid-water

Bottom

Surface

Bottom

Surface

Mid-water

Bottom

Surface

Mid-water

Bottom

Surface

Mid-water Bottom Surface

Mid-water

Bottom Surface Mid-water

Bottom Surface

Mid-water Bottom Surface

Mid-water Bottom Surface

Mid-water Bottom Surface

Mid-water
Bottom
Surface
Mid-water
Bottom
Surface

Document number Contractor Client

-0.15

-0.12

-0.10

-0.05

-0.10

-0.04

0.18

-0.09

-0.10

-0.20

-0.19

-0.12

-0.14

-0.16

-0.13

0.15

0.11

0.47

-0.18

-0.15

-0.17

-0.15

-0.12

-0.11

Attention

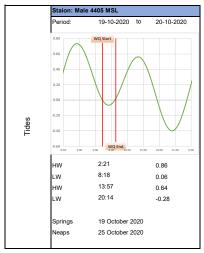
Conductivity (uS/cm) Turbidity (NTU)

: 462.10062-WQR-22.6

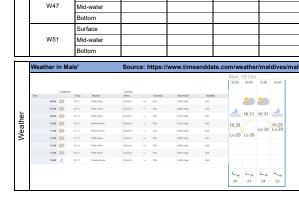
: Boskalis Westminster Contracting Ltd : Ministry of National Planning and Infrastructure

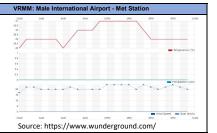
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	Vessel	Stop	Start
S			
Stoppages			
Sto			



Fairway completed the dredging phase of the works on the 20th of August, therefore as of the 25th only the Reclamation area locations are measured







WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



Date: 20-10-2020 Time: 12:50 to 15:15

56132

56091

Project : Dredging, Land Reclamation and Revetment Works at Gulhifalhu □

Contract number : AGR(471)-PIDS2/PRIV/2019/194

nperai (°C)

28.8

рΗ

7.9

7.8

Depth (m)

12

Project number [MIAS] : 462.10042

Mid-water

Document number Contractor Client

-0.06

-0.03

Attention

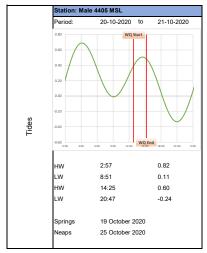
Conductivity (uS/cm) Turbidity (NTU)

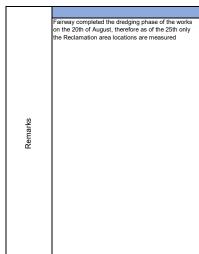
: 462.10062-WQR-22.7

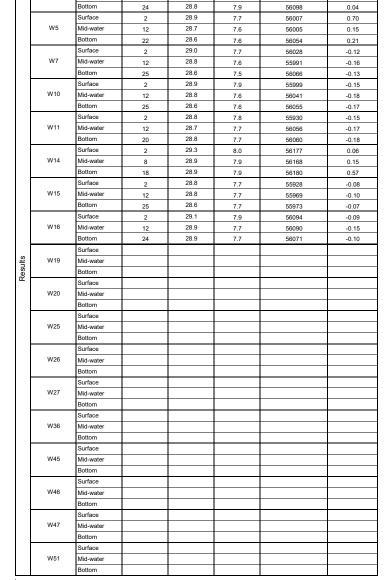
: Boskalis Westminster Contracting Ltd : Ministry of National Planning and Infrastructure

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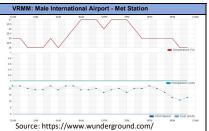
	Vessel	Stop	Start
8			
Stoppages			
Sto			













W5

W7

W11

W14

W15

W16

W19

W20

W26

W27

W36

W45

W47

Results

WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



Date: 21-10-2020 Time: 7:20 to 9:50

55992

55954

55970

55867

55874

55840

55887

55931

55970

55883

55865

55929

55914

55935

55988

56113

56048

56036

55895

55907

55905

55955

55937

55933

Project : Dredging, Land Reclamation and Revetment Works at Gulhifalhu □

Contract number : AGR(471)-PIDS2/PRIV/2019/194

nperat (°C)

28.8

28.7

28.8

28.7

28.7

28.8

28.6

28.6

28.8

28.8

28.6

28.8

28.7

28.6

29.0

28.8

28.7

28.7

28.7

28.8

28.7

28.7

рΗ

8.2

8.0

7.8

7.7

7.6

7.6

7.8

7.7

7.7

7.8

7.8

7.8

7.9

7.8

7.7

8.2

8.1

8.1

7.5

7.4

7.4

8.1

7.9

7.8

Depth (m)

12

22

1

12

22

11

19

2

12

24

12

23

17

2

12

24

12

18

Project number [MIAS] : 462.10042

Mid-water

Bottom

Surface

Bottom

Surface

Mid-water

Bottom

Surface

Mid-water

Bottom

Surface

Mid-water Bottom Surface

Mid-water

Bottom Surface Mid-water

Bottom Surface

Mid-water Bottom Surface

Mid-water Bottom Surface

Mid-water Bottom Surface

Mid-water
Bottom
Surface
Mid-water
Bottom
Surface

Mid-wate Bottom Document number Contractor Client

-0.15

-0.17

-0.07

-0.21

-0.21

-0.10

-0.23

-0.23

-0.21

-0.21

-0.17

-0.19

-0.19

-0.18

-0.11

0.22

-0.02

0.90

-0.17

-0.19

-0.22

-0.18

-0.22

-0.19

Attention

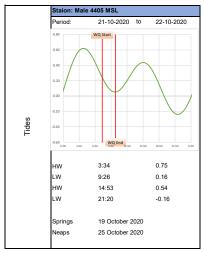
Conductivity (uS/cm) Turbidity (NTU)

: 462.10062-WQR-22.8

: Boskalis Westminster Contracting Ltd : Ministry of National Planning and Infrastructure

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	Vessel	Stop	Start
S			
Stoppages			
Sto			



Fairway completed the dredging phase of the works on the 20th of August, therefore as of the 25th only the Reclamation area locations are measured

SEE BUT SE







W5

WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



Date: 22-10-2020 Time: 7:50 to 10:10

56116

56143

56118

56090

56107

Project : Dredging, Land Reclamation and Revetment Works at Gulhifalhu □

Contract number : AGR(471)-PIDS2/PRIV/2019/194

nperai (°C)

28.8

28.8

28.8

28.8

7.9

7.9

7.9

7.6

7.5

Depth (m)

12

21

2

12

Project number [MIAS] : 462.10042

Mid-water

Bottom

Surface

Mid-water

Document number Contractor Client

-0.16

-0.10

-0.16

-0.16

-0.07

Attention

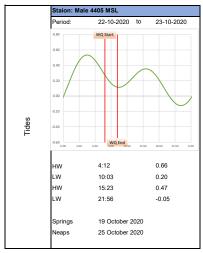
Conductivity (uS/cm) Turbidity (NTU)

: 462.10062-WQR-22.9

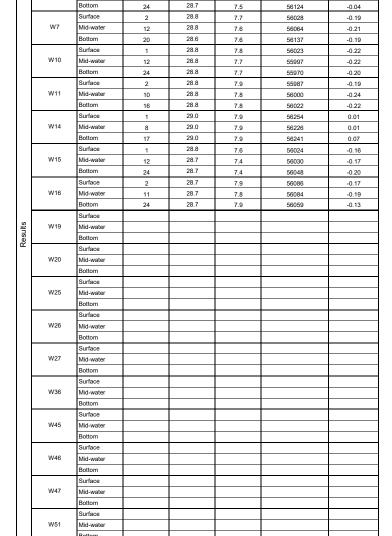
: Boskalis Westminster Contracting Ltd : Ministry of National Planning and Infrastructure

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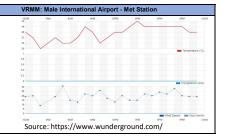
	Vessel	Stop	Start
w			
Stoppages			
Stop			



Fairway completed the dredging phase of the works on the 20th of August, therefore as of the 25th only the Reclamation area locations are measured









WATER QUALITY REPORT

Dredging, Land Reclamation and Revetment Works at Gulhifalhu



Date: 23-10-2020 Time: 8:30 to 10:30

55970

55953

55911

Project : Dredging, Land Reclamation and Revetment Works at Gulhifalhu □
Contract number : AGR(471)-PIDS2/PRIV/2019/194

nperat (°C)

28.7

28.7

рН

7.8

7.6

7.7

Depth (m)

12

21

Project number [MIAS] : 462.10042

Mid-water

Bottom

Document number Contractor Client

-0.13

-0.18

-0.06

Attention

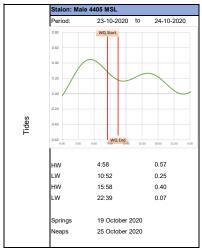
Conductivity (uS/cm) Turbidity (NTU)

: 462.10062-WQR-22.10

: Boskalis Westminster Contracting Ltd : Ministry of National Planning and Infrastructure

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	Vessel	Stop	Start
Stoppages			
pac			
fop			
o o			



Fairway completed the dredging phase of the works on the 20th of August, therefore as of the 25th only the Reclamation area locations are measured

1		Surface	1	28.7	7.6	55943	-0.07
	W5	Mid-water	12	28.7	7.6	55964	-0.05
		Bottom	21	28.7	7.6	55927	0.22
		Surface	2	28.6	7.7	55801	0.87
	W7	Mid-water	12	28.7	7.6	55876	0.05
		Bottom	23	28.7	7.6	55883	0.20
		Surface	1	28.8	7.8	56033	0.12
	W10	Mid-water	12	28.8	7.8	56008	0.05
		Bottom	23	28.3	7.8	56074	-0.18
		Surface	1	28.7	7.8	55984	-0.19
	W11	Mid-water	12	28.7	7.7	55956	-0.20
		Bottom	23	28.7	7.7	55950	-0.18
		Surface	1	29.0	7.9	56052	0.33
	W14	Mid-water	8	28.8	7.8	56042	0.57
		Bottom	17	28.7	7.7	56009	0.28
		Surface	1	28.7	7.6	55932	-0.18
	W15	Mid-water	12	28.7	7.5	55948	-0.13
		Bottom	23	28.7	7.5	55911	-0.20
		Surface	2	28.7	7.7	56001	-0.16
	W16	Mid-water	12	28.7	7.6	56023	-0.19
		Bottom	22	28.7	7.7	56002	-0.16
		Surface					
ţ	W19	Mid-water					
Results		Bottom					
쮼		Surface					
	W20	Mid-water					
		Bottom					
		Surface					
	W25	Mid-water					
		Bottom					
		Surface					
	W26	Mid-water					
		Bottom					
		Surface					
	W27	Mid-water					
		Bottom					
		Surface					
	W36	Mid-water					
1	******	Bottom	-				
		Surface					
	W45						
	W45	Mid-water					
		Bottom					
	14/40	Surface					
1	W46	Mid-water					
		Bottom					
1	10/47	Surface					
	W47	Mid-water					
1		Bottom					
1		Surface					
	W51	Mid-water					
		Bottom					





Male' Water & Sewerage Company Pvt Ltd Water Quality Assurance Laboratory

Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv



WATER QUALITY TEST REPORT Report No: 500185317

Customer Information: CDE Pvt Ltd H.Orchidmaage, 4th Floor Ameeru Ahmed Magu Male K Report date: 28/10/2020
Test Requisition Form No: 900190549
Sample(s) Recieved Date: 21/10/2020
Date of Analysis: 21/11/2020 - 21/11/2020

Sample Description ~	GF_REC-W15	GF_REC-W05	GF_REC-W07
Sample Type ~	Sea Water	Sea Water	Sea Water
ıple No	83214209	83214210	83214211
Sampled Date ~	18/10/2020 08:23	18/10/2020 08:23	18/10/2020 08:23
PARAMETER		ANALYSIS RESULT	
Physical Appearance	Clear with particles	Clear with particles	Clear with particles
Total Suspended Solids	<5 (LoQ 5 mg/L)	<5 (LoQ 5 mg/L)	<5 (LoQ 5 mg/L)

Keys: mg/L : Milligram Per Liter

Checked by

Aminath Sofa Laboratory Executive Approved by

Mohamed Eyman Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory This report shall not be reproduced except in full, without written approval of MWSC This test report is ONLY FOR THE SAMPLES TESTED.

~ Information provided by the customer Replacement for Report No: 500185246

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Male' Water & Sewerage Company Pvt Ltd Water Quality Assurance Laboratory Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv



WATER QUALITY TEST REPORT Report No: 500185317

Customer Information: CDE Pvt Ltd H.Orchidmaage, 4th Floor Ameeru Ahmed Magu Male K

Report date: 28/10/2020 Test Requisition Form No: 900190549 Sample(s) Recieved Date: 21/10/2020 Date of Analysis: 21/11/2020 - 21/11/2020

Sample Description ~	GF_REC-W10	GF_REC-W11	GF_REC-W16	
Sample Type ~	Sea Water	Sea Water	Sea Water	
Sample No	83214212	83214213	83214214	
Sampled Date ~	18/10/2020 08:23	18/10/2020 08:23	18/10/2020 08:23	TEST METHOD
PARAMETER		ANALYSIS RESULT		
Physical Appearance	Clear with particles	Clear with particles	Clear with particles	
Total Suspended Solids	<5 (LoQ 5 mg/L)	<5 (LoQ 5 mg/L)	<5 (LoQ 5 mg/L)	HACH Method 8006

Keys: mg/L : Milligram Per Liter

Checked by

Aminath Sofa Laboratory Executive Approved by

Mohamed Eyman Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory This report shall not be reproduced except in full, without written approval of MWSC This test report is ONLY FOR THE SAMPLES TESTED.

~ Information provided by the customer Replacement for Report No: 500185246

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Male' Water & Sewerage Company Pvt Ltd Water Quality Assurance Laboratory

Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv



WATER QUALITY TEST REPORT Report No: 500185317

Customer Information: CDE Pvt Ltd H.Orchidmaage, 4th Floor

Ameeru Ahmed Magu

Male K

Report date: 28/10/2020 Test Requisition Form No: 900190549 Sample(s) Recieved Date: 21/10/2020 Date of Analysis: 21/11/2020 - 21/11/2020

Sample Description ~	GF_REC-W02
Sample Type ~	Sea Water
Sample No	83214215
Sampled Date ~	18/10/2020 08:23
PARAMETER	ANALYSIS RESULT
Physical Appearance	Clear with particles
Total Suspended Solids	<5 (LoQ 5 mg/L)

Keys: mg/L : Milligram Per Liter

Checked by

Aminath Sofa Laboratory Executive Approved by

Mohamed Eyman Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory This report shall not be reproduced except in full, without written approval of MWSC This test report is ONLY FOR THE SAMPLES TESTED.

~ Information provided by the customer Replacement for Report No: 500185246

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Male' Water & Sewerage Company Pvt Ltd Water Quality Assurance Laboratory

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WATER QUALITY TEST REPORT Report No: 500185247

Customer Information: CDE Pvt Ltd H.Orchidmaage, 4th Floor Ameeru Ahmed Magu Male K Report date: 23/10/2020
Test Requisition Form No: 900190558
Sample(s) Recieved Date: 21/10/2020
Date of Analysis: 21/10/2020 - 21/10/2020

Sample Description ~	Gf_REC-W14
Sample Type ~	Sea Water
Sample No	83214248
Sampled Date ~	18/10/2020 10:21
PARAMETER	ANALYSIS RESULT
Physical Appearance	Clear with particles
Total Suspended Solids	<5 (LoQ 5 mg/L)

Keys: mg/L : Milligram Per Liter

Checked by

Aminath Sofa Laboratory Executive Approved by

Mohamed Eyman Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory This report shall not be reproduced except in full, without written approval of MWSC This test report is ONLY FOR THE SAMPLES TESTED.

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