Measurements

Profiles of the turbidity in the water column were taken at four locations. Due to the current, these are lines instead of points, starting south, drifting north.

- The probe was lowered to the maximum cable length (30 m), where turbidity was measured for approximately a minute.
- The probe was then reeled in to halfway the maximum cable length, where turbidity was again measured for approximately a minute.
- The probe was then reeled in to approximately 1.5m depth to measure turbidity at the surface for approximately a minute.

The locations are as follows:

- Plume 1 – taken in the middle of the plume around 15:45, just before high tide
- VGNW – Villigili Northwest, referred to in the EIA as W15
- VGSW – Villigili Southwest
- Plume 2 – taken in the middle of the plume around 16:15, just after high tide

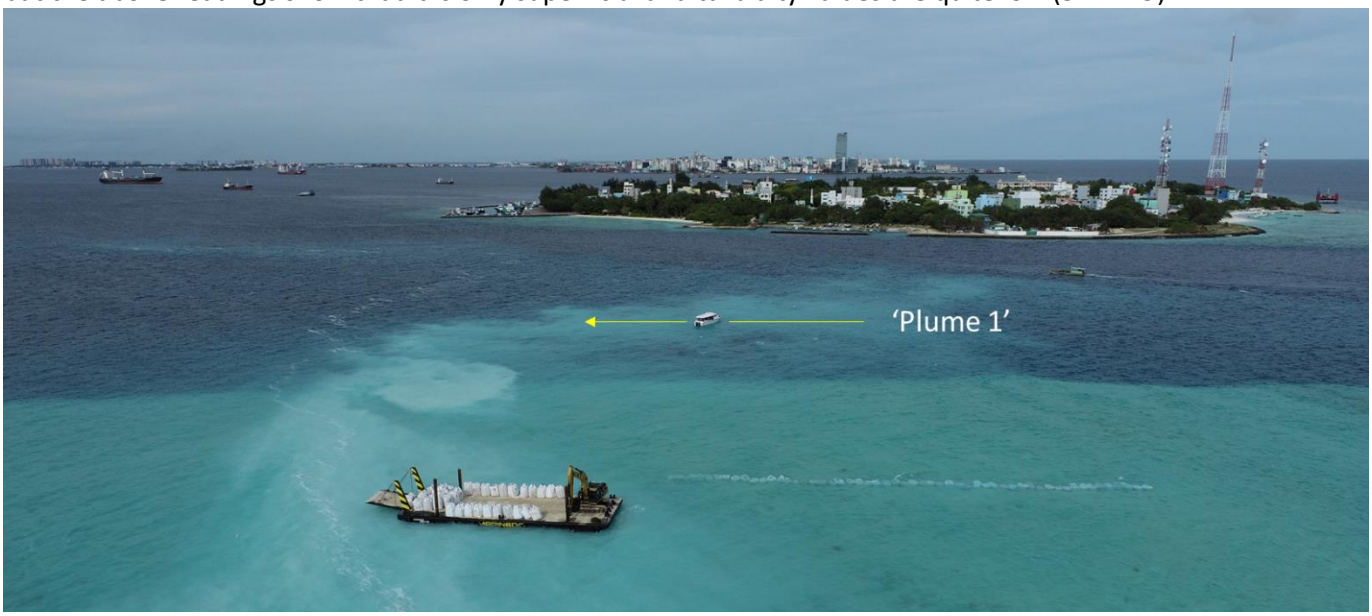
Results

The highest turbidity readings were found at the surface of 'Plume 1', namely 5.4 NTU. Measurements during 'Plume 2' were already much lower, showing that the plume quickly disperses after high tide. At both Villigili locations, no detectable plume was found. Using a conversion rate of 1:1.92 for NTU:TSS as found by Contractor during previous Projects in the Maldives, an indication of TSS is given. Due to the current lockdown situation, no samples could be taken and analysed for TSS in a laboratory, as all laboratories are closed.

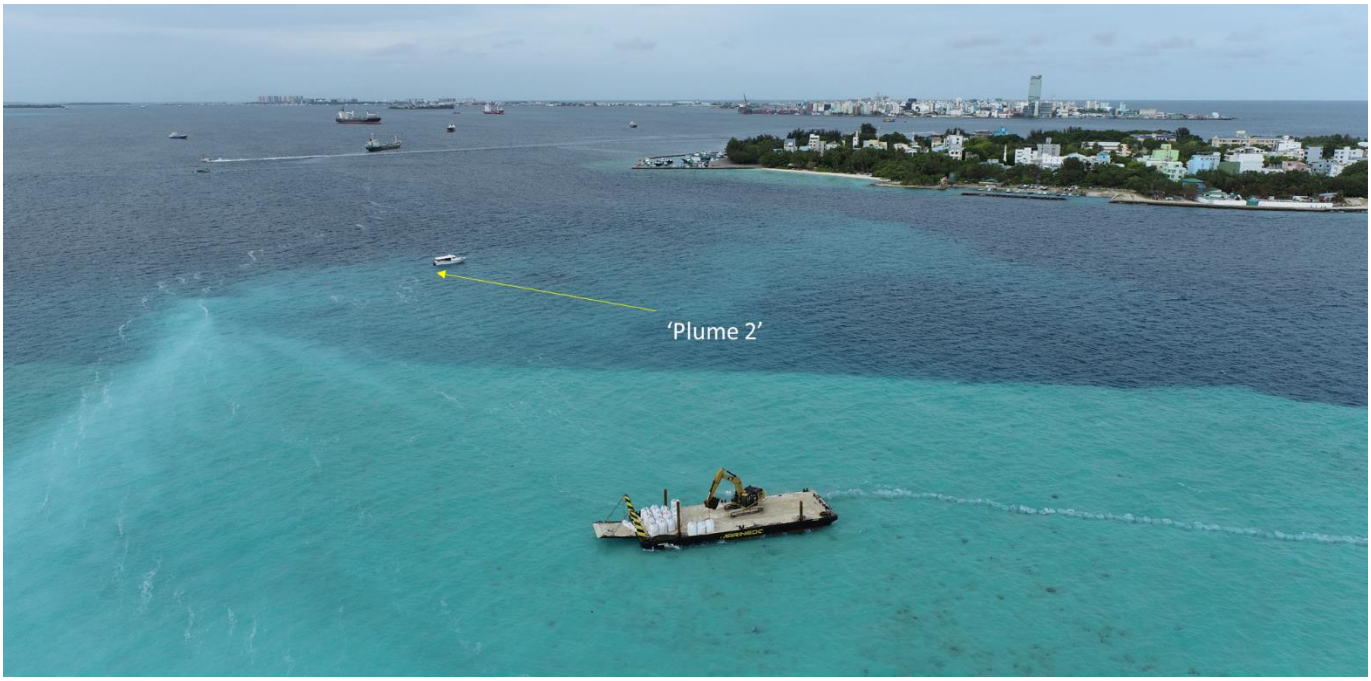
NTU	Plume 1	VGNW	VGSW	Plume 2	**TSS (mg/l)**	Plume 1	VGNW	VGSW	Plume 2
Surface	5.4	0.1	-0.1	1.3	Surface	10.5	0.1	-0.2	2.5
Midwater	2.7	0.4	-0.1	2.1	Midwater	5.2	0.8	-0.3	4.0
Bottom	0.3	0.3	-0.2	1.6	Bottom	0.5	0.5	-0.3	3.0

Visualization

Below image was taken at 15:49, halfway during the measurement 'Plume 1'. The yellow arrow shows the path along which the boat drifted during the measurement. The image shows a clearly visible plume, but the above readings show that it is only superficial and turbidity values are quite low (5.4 NTU).



Below image was taken at 16:20, towards the end of measurement 'Plume 2'. The image clearly shows that the plume has decreased quickly after high tide (16:02).



Mitigation

Both above pictures show Contractor constructing a row of big bags on the eastern side of Gulhifalhu reef. During low tide, these big bags contain turbidity over the entire water column, as the big bags then

reach above water. During high tide, the big bags contain the lower part of the turbidity plume. Big bag effectiveness will be further evaluated the coming days and extended if effective and necessary.

Furthermore, the pictures show the effectivity of halting backhoe operations before high tide and resuming only after high tide. On 27-05, Contractor halted backhoe operations approximately two hours before high tide and resumed work approximately half an hour after high tide.

Using the drone, Contractor can closely monitor the development of any plume. Contractor will take regular drone pictures the coming period, to halt backhoe operations in time if necessary. It is foreseen that halting backhoe operations 2 hours before high tide and resuming backhoe operations half an hour after high tide will strongly decrease the chance of a sediment plume reaching Villigili shore. This will be verified the coming days.

Placement of a silt screen on the reef flat or between Gulhifalhu and Villigili is not effective nor possible. Contractor's experience is that silt screens are generally effective in current conditions up to 0.5 m/s. Current speeds in the reef pass between Gulhifalhu and Villigili are approximately 0.5 – 0.8 m/s. Furthermore, the water depth in the reef pass does not allow for anchoring of the silt screen. If the silt screen were anchored on top of the reef or on the reef slope of Gulhifalhu, the silt screen would touch the reef, thereby suspending sediments, damaging coral and the silt screen would likely tear soon.