COASTAL MONITORING REPORT - 02

PROJECT: GULHIFALHU PORT DEVELOPMENT
PROJECT PHASE 1: DREDGING, RECLAMATION AND SHORE PROTECTION

Monitoring Period

May 2020 – November 2020

Report Number

CMR_25/11/2020 (Rev 1.0)

Client

Boskalis Westminster Contracting Limited

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Abbreviations and Symbols

EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
GPS	Global Positioning System
m	Meter
TSHD	Trailing Suction Hopper Dredger
UAV	Unmanned Aerial Vehicle

1 Introduction

1.1 Purpose of the report

This report provides the results of the coastal assessment of Villingili (Vilimalé) in November of 2020 as part of the Environmental Monitoring Plan approved by the Environmental Protection Agency (EPA) for the Phase I of Gulhifalhu Port development Project (Dredging, Reclamation and Revetment works).

This report has been prepared by CDE Consulting under a service contract with Boskalis Westminster Contracting Limited for the purpose of meeting EPA requirement for monitoring coastline of Villingili.

The baseline assessment was carried out in May 2020 and the current report provides a comparison of the coastal conditions at Villingili, assessed in November 2020.

1.2 Major project activities during monitoring period

The following were the major project activities that were undertaken between the baseline and this monitoring period:

1. Installation of permanent revetment at the reclaimed land.

2 Methodology

The coastal changes are assessed using shoreline surveys and by measuring the beach profiles at pre-defined locations.

2.1 Shoreline Surveys

Shorelines were mapped using geo-referenced, high-resolution ortho-image created using aerial images taken with Unmanned Aerial Vehicle (UAV). The flight altitude was between 150 - 220 meters.

Shoreline surveys are aimed at identifying recession of the low and high tide lines which may be caused by scouring and erosion.

2.2 Beach Profiling

Beach profiles help to calculate the degree of erosion at the measured site and provides an estimate for any volumetric loss of beach sand from the cell. Beach profiles also capture any offshore transport sediment within the beach cell.

The locations had been marked using landscape features during the baseline surveys.

3 Monitoring Sites

Beach profile monitoring is required at 9 locations (Table 3-1) of Villingili in the approved Environmental Monitoring Plan for the project. These locations are shown in Figure 3-1.

Table 3-1: GPS coordinates of Beach Profile locations

Beach Profile ID	Island	GPS Coordinate	
		X	Y
BP16	Villigili	461162.2	331799.5
BP17	Villigili	461232.1	331771.6
BP18	Villigili	461266.2	331687.3
BP19	Villigili	461542.7	331599.6
BP20	Villigili	461646.9	331654.6
BP21	Villigili	461699.8	331712.8
BP22	Villigili	461514.4	332104.6
BP23	Villigili	461383.4	332112.5
BP24	Villigili	461254.4	332099.9

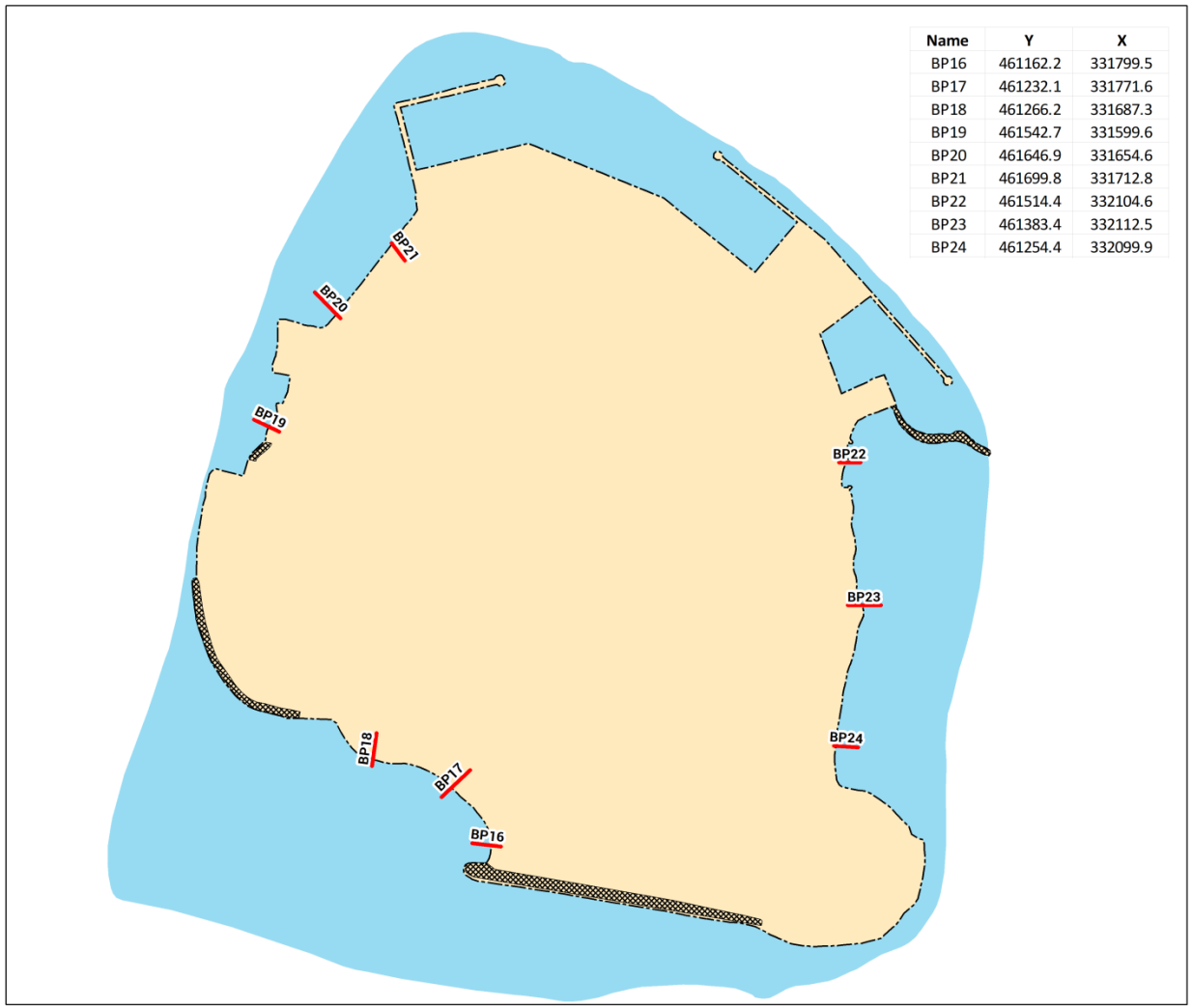


Figure 3-1: Beach profile locations at Villingili

4 Results

4.1 Shorelines

Description of Villingili shoreline is given in Figure 4-1.

From the surveys carried out it can be seen that there have not been any drastic changes to the shorelines of Villingili during the beach surveys of August 2020 and November 2020.

The rate of sediment drift across the South Beach seems to have significantly stabilized compared to the changes observed between May 2020 and August 2020.

High-tide line has moved seawards at the northern end of the North-West Beach. This does not necessarily indicate accretion but the beach acquiring a smoother seaward slope.

No changes in shorelines were observed at West Beach. The shoreline map has been provided in Appendix A.

4.2 Beach Profiles

The comparison of beach profiles between the baseline survey of May 2020, August 2020 and the recent survey of November 2020 have been given Appendix B.

Little to no changes were observed in the profiles P22, P23 and P24 taken on the East Beach. However, the slope of the beach seems to become less steep, attributable to the absence of high-energy north-eastern wind waves during this period.

None of the three profiles at South Beach show great change but sediment seems to have continued their east-ward drift a considerably lowered rate. This is expected to stop eventually before the north-eastern monsoon, before transport within the beach cell reverses direction.

No changes were observed at P19, located at the West Beach. Despite facing west, absence of changes in shorelines and beach profile may be due to the lack of fine sand, which is more susceptible to drift.

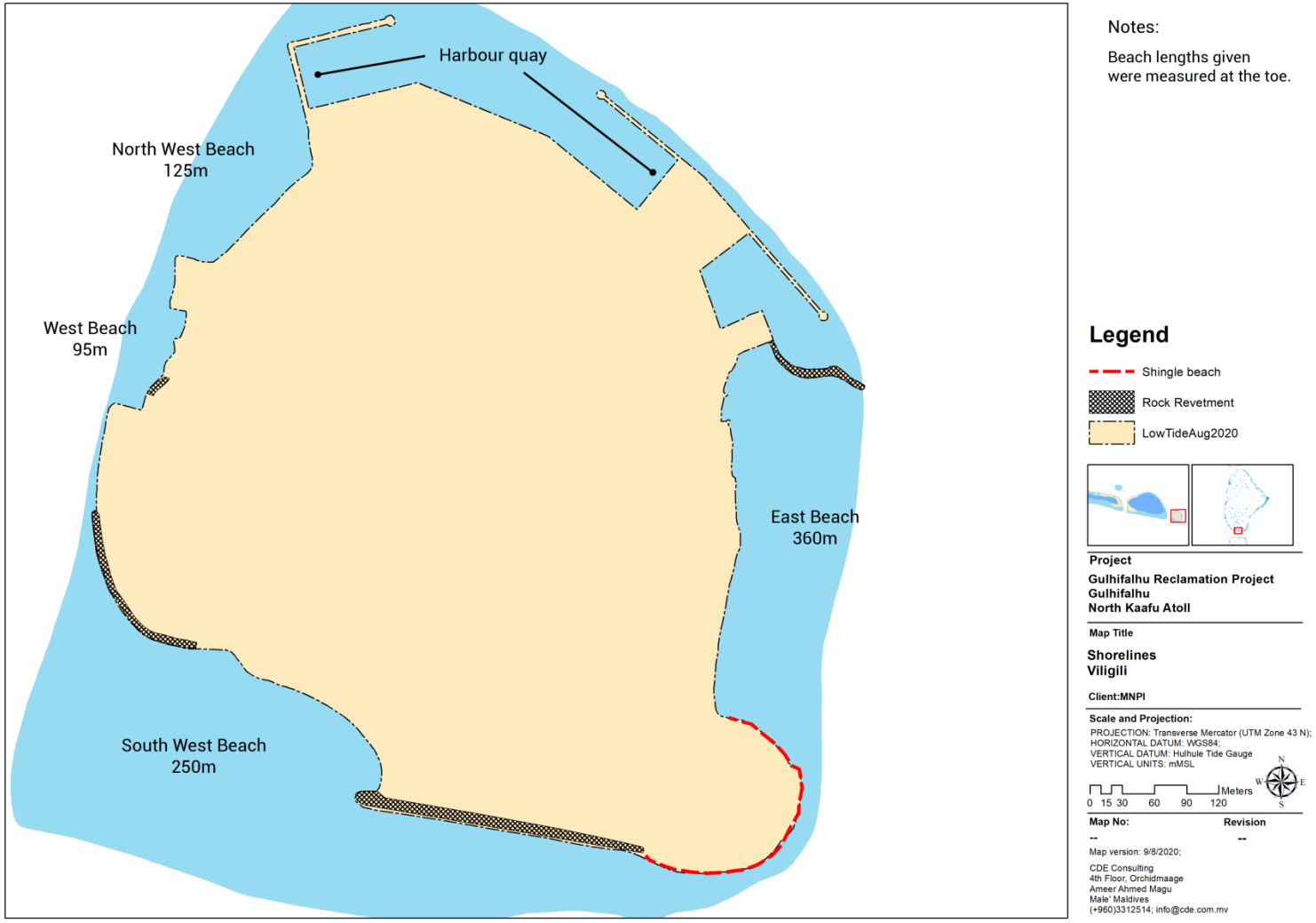


Figure 4-1: Description of Villingili shorelines

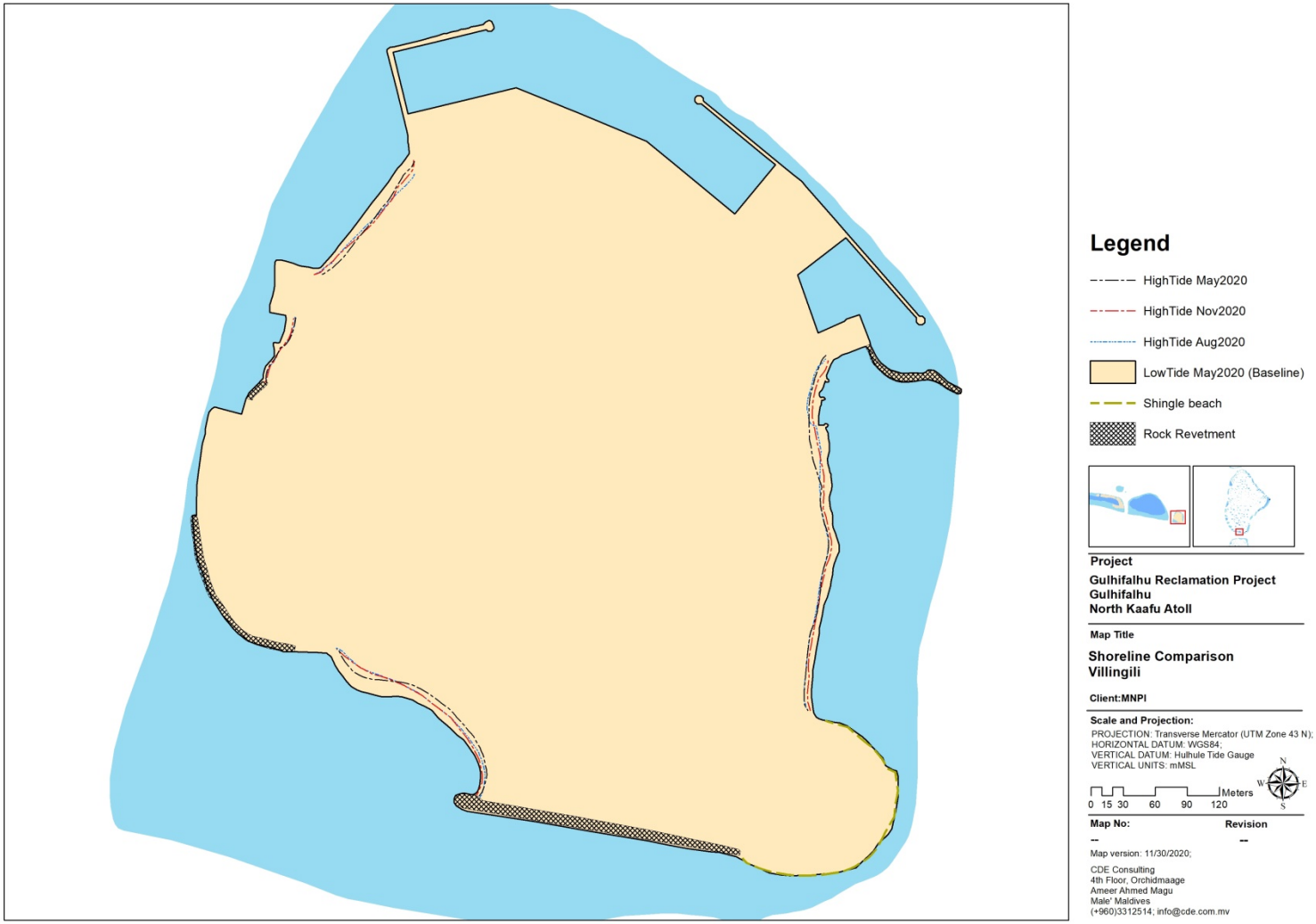
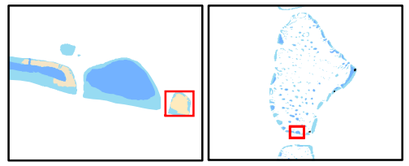


Figure 4-2: Shoreline Comparison

Appendix A – Shoreline Map of Villingili

Legend

- HighTide May2020
- HighTide Nov2020
- HighTide Aug2020
- LowTide May2020 (Baseline)
- Shingle beach
- Rock Revetment



Project

Gulhifalhu Reclamation Project
Gulhifalhu
North Kaafu Atoll

Map Title

Shoreline Comparison Villingili

Client:MNPI

Scale and Projection:

PROJECTION: Transverse Mercator (UTM Zone 43 N);
HORIZONTAL DATUM: WGS84;
VERTICAL DATUM: Hulhule Tide Gauge
VERTICAL UNITS: mMSL

0 15 30 60 90 120 Meters

N W E S

Map No: **Revision**

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Map version: 11/30/2020;

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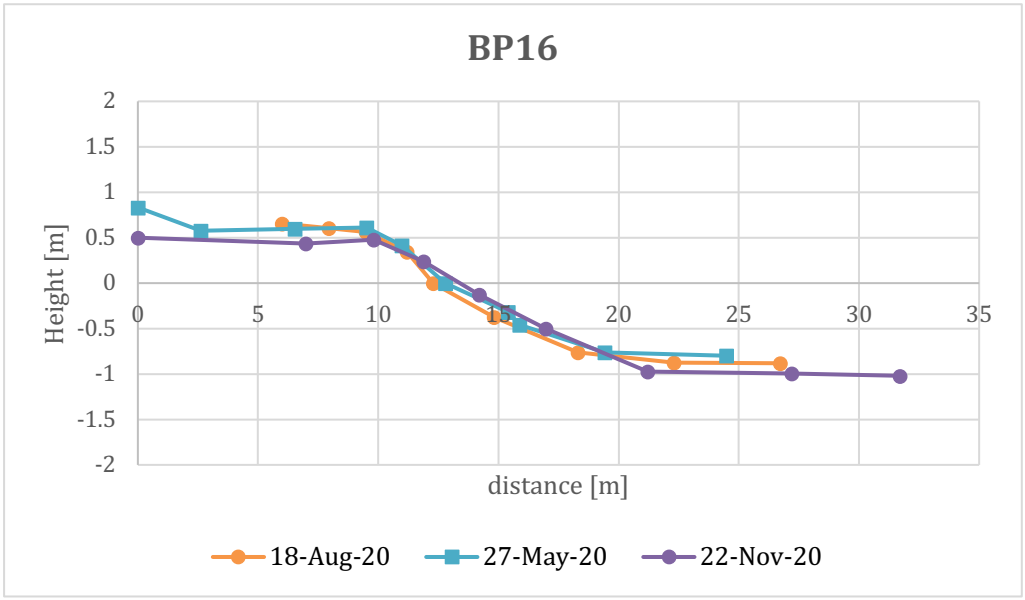
Appendix B – Comparison of Beach Profile at Villingili

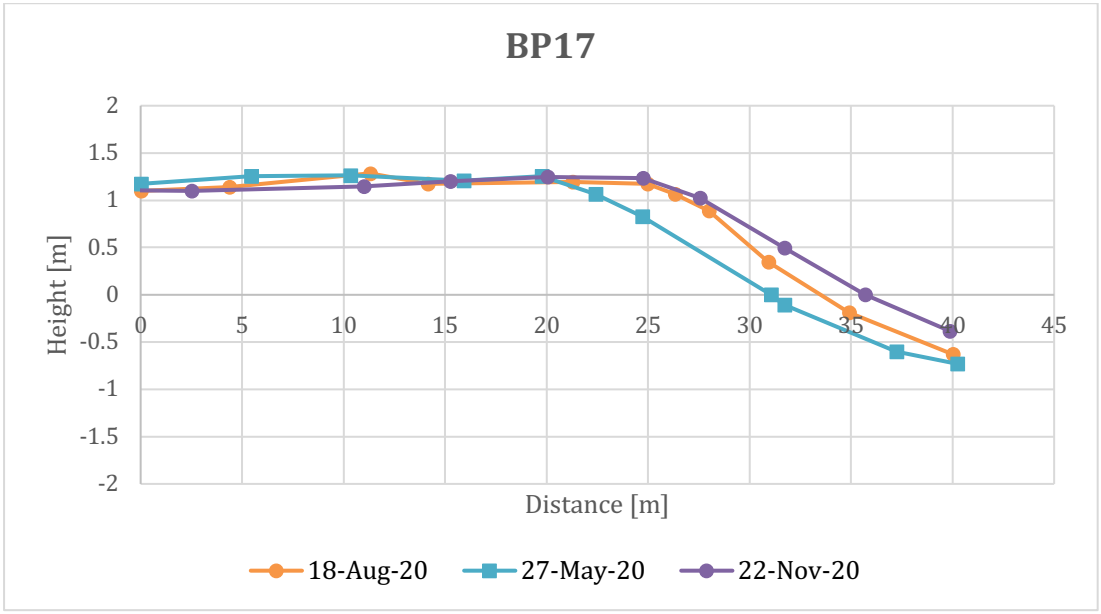
a) Beach Profile ID: BP-16

Left to right: Photos facing south and north respectively (22 Nov 2020)



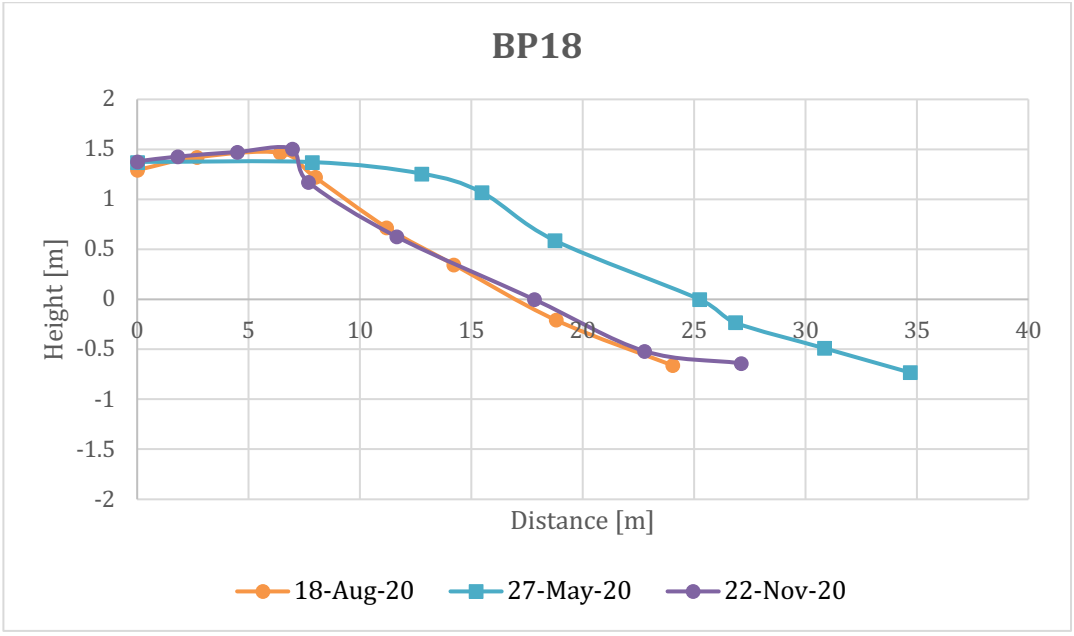
b) Beach Profile ID: BP-17

Left to right: Photos facing south and north respectively (22 Nov 2020)



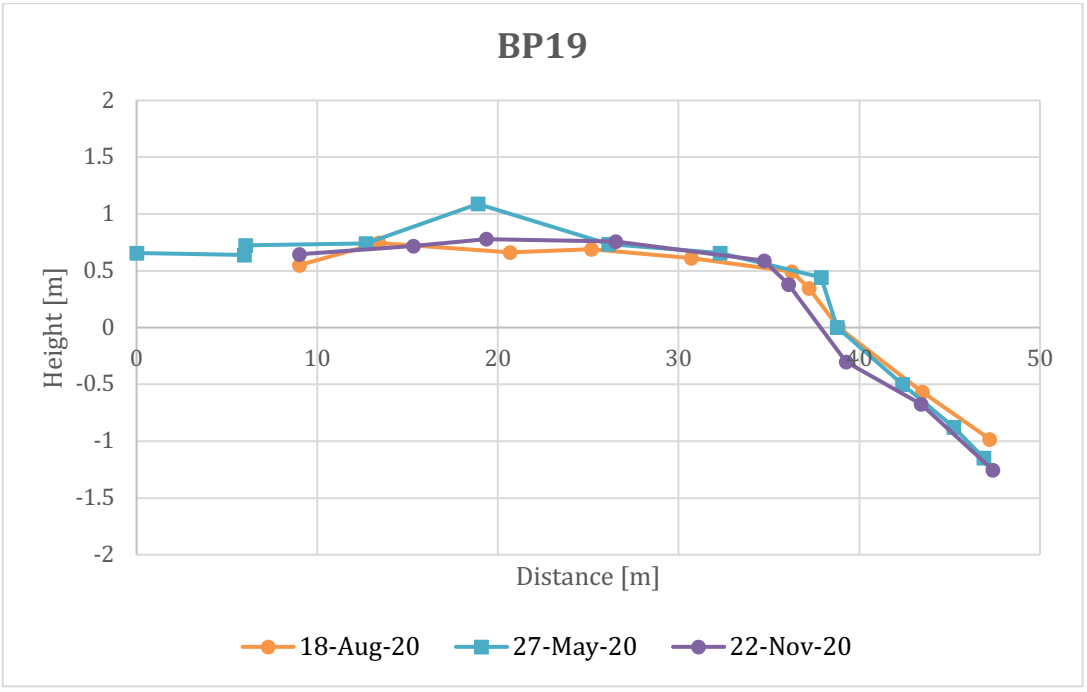
c) Beach Profile ID: BP-18

Left to right: Photos facing south and north respectively (22 Nov 2020)



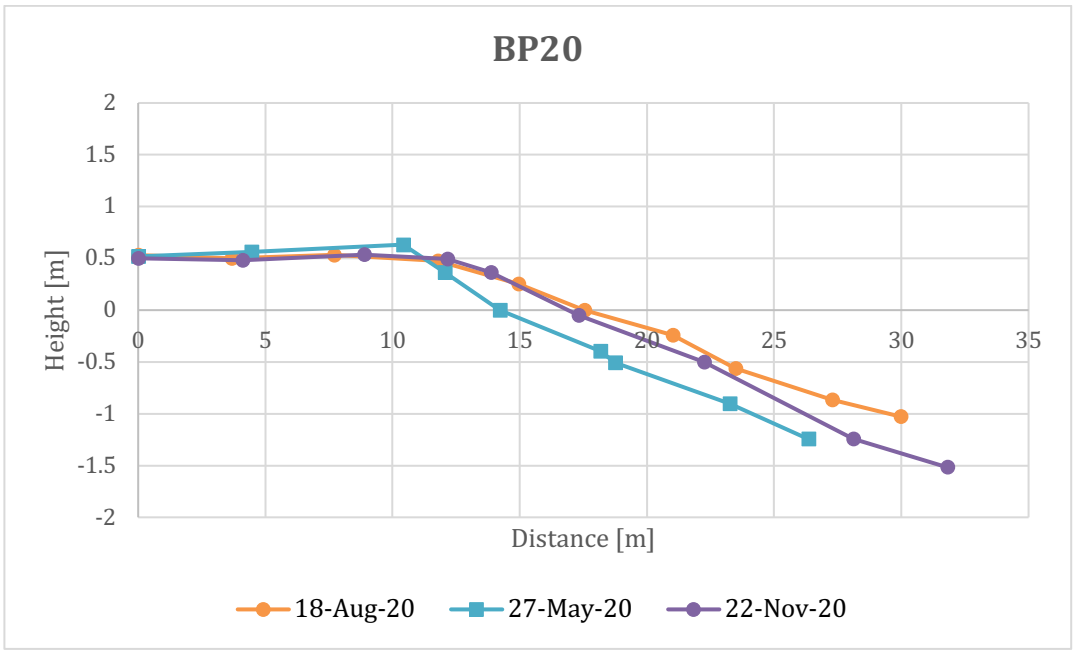
d) Beach Profile ID: BP-19

Left to right: Photos facing south and north respectively (22 Nov 2020)



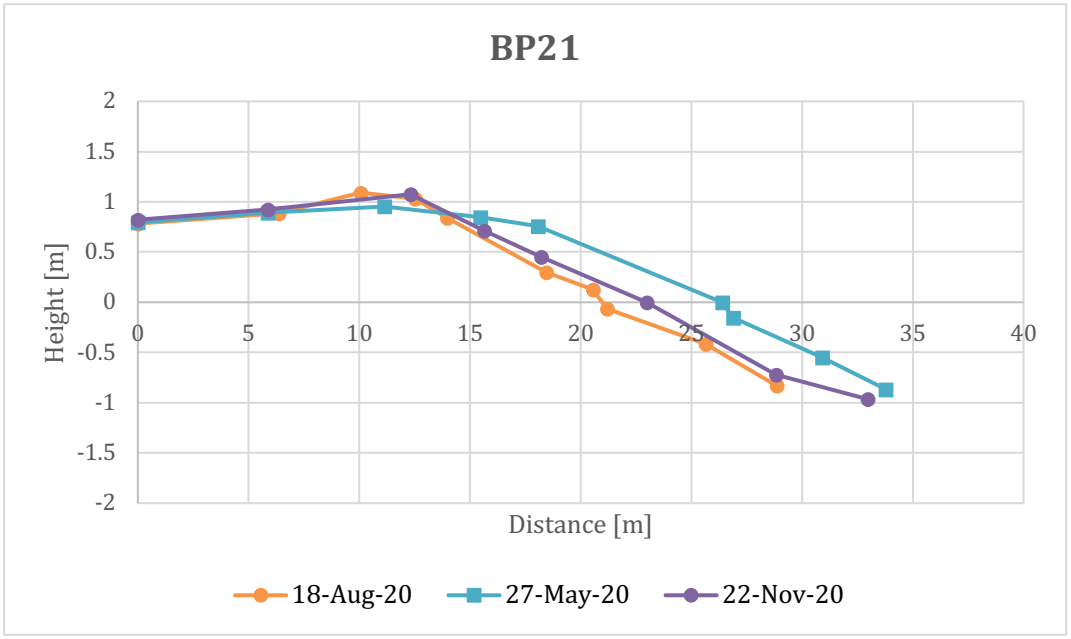
e) Beach Profile ID: BP-20

Left to right: Photos facing south-west and north-east respectively (22 Nov 2020)



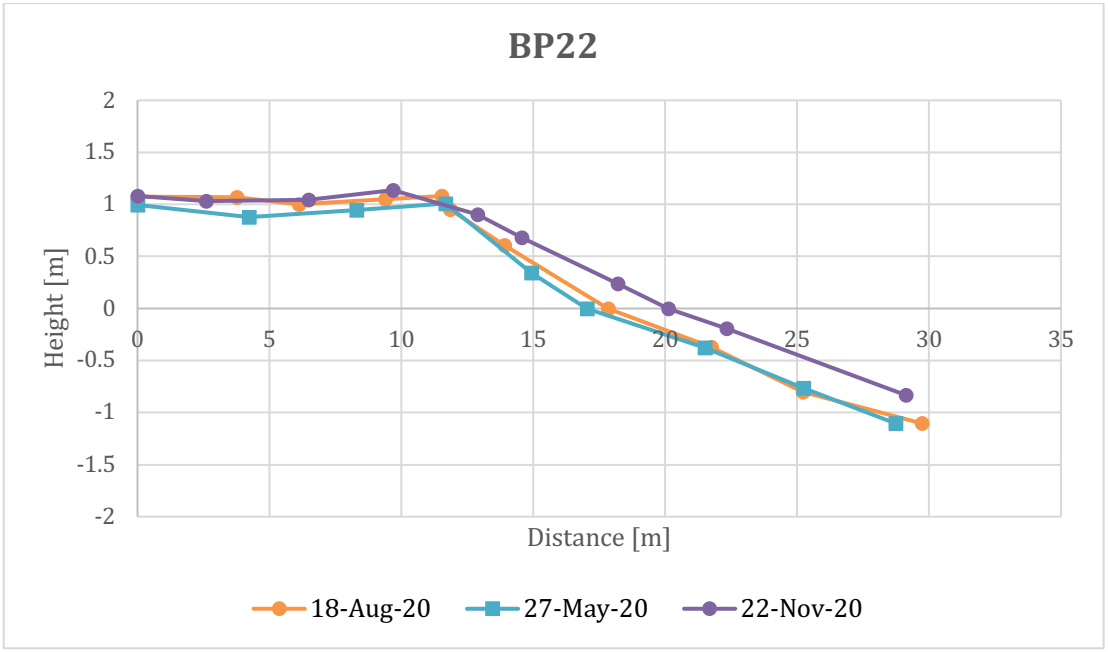
f) Beach Profile ID: BP-21

Left to right: Photos facing south and north respectively (22 Nov 2020)



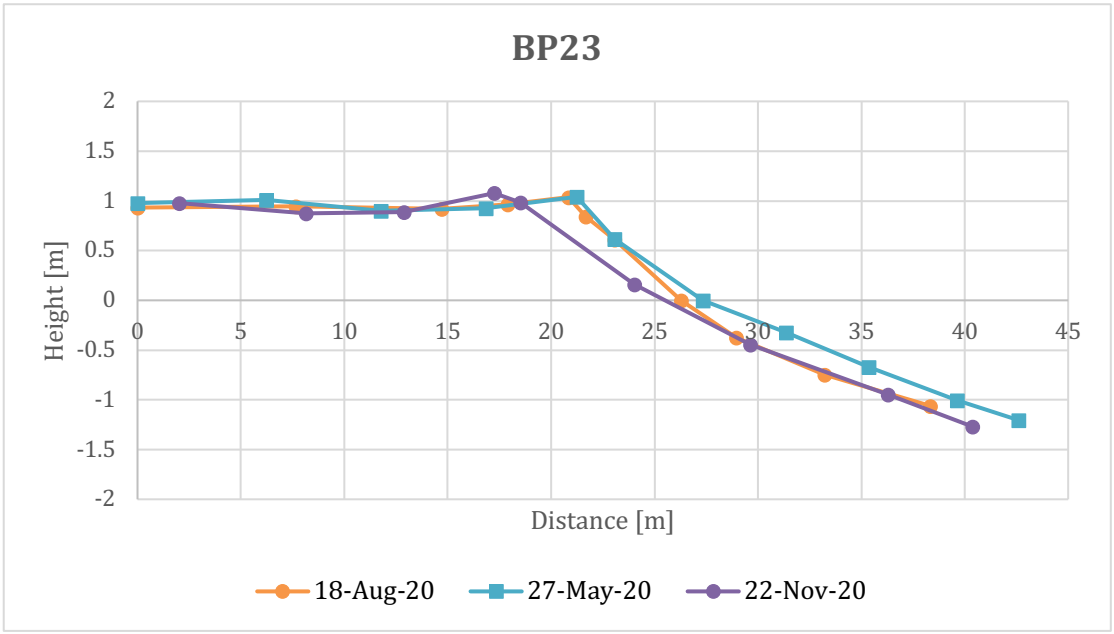
g) Beach Profile ID: BP-22

Left to right: Photos facing north and south respectively (22 Nov 2020)



h) Beach Profile ID: BP-23

Left to right: Photos facing north and south respectively (22 Nov 2020)



a) Beach Profile ID: BP-24

Left to right; Photos facing north and south respectively (22 Nov 2020)