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Abstract

Reclamation is a development process that extends towards the sea with the addition of new land on the coast. The Reclamation of Makassar's Center of Point Indonesia made the flow pattern change from before reclamation to after reclamation. The aim of this research is to analyze tidal current patterns around the coast of Center Of Point Indonesia Makassar and analyze the influence of Center Of Point Indonesia (CPI) coastal reclamation on tidal current patterns at Losari beach. This research method involves collecting secondary data and primary data. The required data includes tidal data, wind data, current data, as well as topographic and bathymetric data. After collecting all the data, the next step is to process the data using Mike 21 with the Flow Model FM 2D modeling to get results that showing changes in current patterns due to tides and wind. As for the results obtained, the current flow velocity at high tide conditions on 2/8/2023 at 05.00 Western Indonesia Time shows a current flow velocity of 0.13 m/s in front of the Indonesian Center of Points reclamation and the lowest current flow velocity is in that area. is in the reclamation area or precisely in the front area of Losari Beach. with a flow velocity of 0.022 m/s. in neap tide conditions or when the moon is not aligned with the sun on 8/8/2023 the current flow velocity in front of Losari beach area is 0.032 m/s. As for the results obtained to get the current to improve again, it is necessary to dredge the Losari beach area to a certain depth.

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* Masterminded EasyChair and created the first stable version of this document
† Created the first draft of this document

1 Introduction

Reclamation is the process of building out to sea by adding new land to the coast. Reclamation development at the centre of Makassar city. This place has become a tourist spot for local and international tourists because of its location in the centre of Makassar. With the reclamation, the sea condition changes both in temperature and salinity. (Hatta, Thaha, and Lakatua, 2018). The reclamation of a beach process will result in significant changes in both the flow velocity and direction of the current, which will have an impact on the surrounding environment. (Liang et al. 2017). The reclamation of Makassar's Centre Point Of Indonesia has changed the flow pattern of the current from the sea, while from the land direction it is a drain such as small rivers, drainage from the city of Makassar to the waters of Losari Beach. This is what makes a significant impact on the condition of Losari Beach waters. Reclamation Center Point Of Indonesia has a very good design that resembles the shape of a garuda that is pictured from google earth images a new icon for the city of Makassar and a beautiful tourist location because it has a view of the sunset to the west.

Wave conditions are also reduced by beach reclamation or wave deflection (Diffraction), which when an incident wave is blocked by an obstacle such as a breakwater or island, the wave will bend around the end of the obstacle and enter a sheltered area. (Puspita et al. 2020). So that the height of the waves that lead to the waters of Losari Beach is not too big but the impact caused by the reduction of waves entering the Losari Beach area makes the circulation of sea water slow and murky, plus drainage channels from urban areas that become the last drain to the Losari Beach area. Reclamation changes the elevation of bathymetry contours from minus interval coastal depths to positive intervals, which changes the direction of sediment (Arafat et al. 2016). When there is a wave force from the sea, this condition causes a sudden deflection and siltation from before. The coastal current will also change after the reclamation building both from the downshore current and the perpendicular current.(Kurniawan et al. 2011).

MIKE 21 is a leading software package for 2D modelling of hydrodynamics, waves, sediment dynamics, water quality and ecology. It is a professional software with high reliability, quality and versatility. In this research will use Mike 21 software in the process of modelling the center point of Indonesia reclamation to see the tidal flow pattern due to reclamation. For 25 years, MIKE Powered by DHI software products have been used in water environments around the world. Thousands of professionals choose MIKE software to solve tough and complex challenges in areas such as oceans and coastlines, rivers and reservoirs, ecology, groundwater, water distribution, wastewater, and more. (DHI 2020)

2 Research Method

Survey This research uses 2 types of data sources, which include primary data and secondary data. In collecting data, information related to reclamation development is needed. The methods used are collecting, identifying, processing written data and working methods used. The survey methods used are tidal survey method, bathymetry, topography, flow velocity, data analysis, and numerical modelling.

3 Results and Discussion

3.1 Flow Velocity Before Reclamation

The data collection of flow velocity there are several locations that become the centre of point taking including point one is in the location of the inside of losari beach, the second point is at the front of losari beach precisely the end of the soekarno hatta pier, the third point is near the soekarno hatta harbour pool and the fourth point is on the outside of the south side of losari beach. There is a coastal protection building outside the port of Soekarno Hatta that protects the harbour pool in loading and unloading ships. The location of the data collection point of the simulation results can be seen in the following figure :

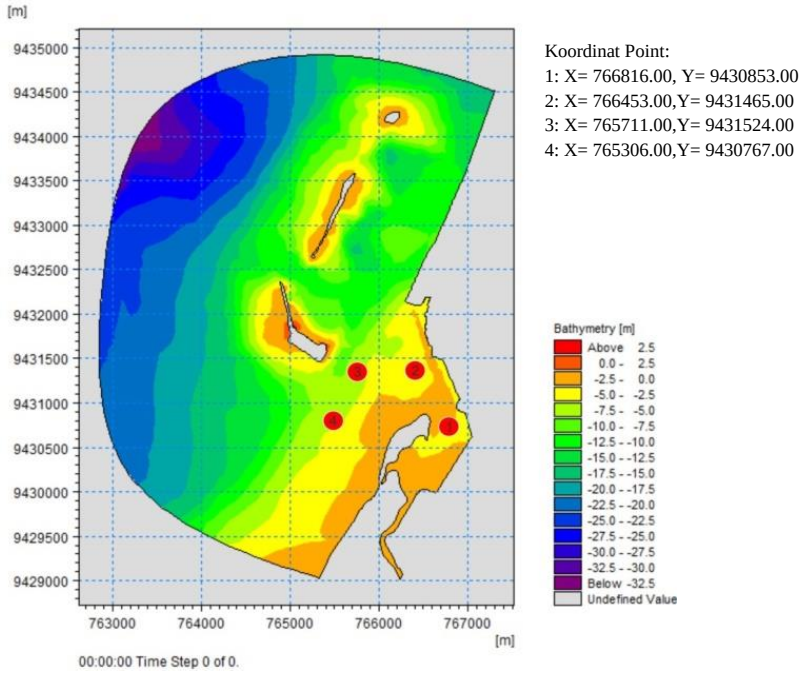

Figure 1: Flow velocity points and bathymetry before reclamation

3.1.1 Spring Tide

At high tide towards low tide the dominant direction of the current is from the north, for the losari beach area the direction of the outgoing flow moves from north to south, the presence of land in front of losari beach makes the direction of the current more clearly turn to the south, for the dominant harbour pool area the current decreases due to the presence of coastal protection buildings or lae-lae islands that block the flow speed. The point of flow velocity at point 1: 0.061 m/s, in this condition the flow leads out of losari beach with the gap between the losari beach platform and the small island in front making the current speed increases, for point 2 the flow velocity: 0.056 m/s slower than the first point is because the location is already in an open area so that the current has spread to the south, point 3 flow velocity: 0.122 m/s increased due to being east of the island of Lae-lae and the dominant current direction from the front of the harbour is to the south and point 3: 0.103 m/s.

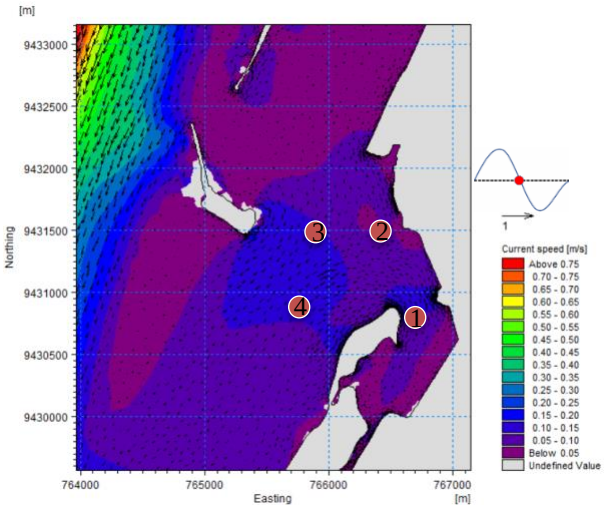

Figure 2: Flow velocity at low ebb conditions

Conditions towards the tide the dominant flow direction is from the north along the coast until it enters the harbour pool and enters the losari beach area. In the losari beach area there is a rotation of the current due to the condition of the island which closes the path of the current outflow so as to make the current turn back out of losari beach. The current speed at point 1: 0.062 m/s, this indicates that the current slows down from the harbour pool into the losari beach area, the current speed at point 2: 0.096 m/s, faster than point 1 because it is at the end of the harbour pier location, the current speed at point 3: 0.131 m/s and the current speed at point 4: 0.078 m/s. The current speed of the four points above obtained the maximum speed is at point 3 with a speed of 0.131 m/s due to being between the island of lae-lae and losari beach which leads to the south. The lowest current speed is at point 1 with a speed of 0.062 m/s. because it is in the losari beach area which is dominantly closed so that the dominant current speed slows down due to increasingly shallow water conditions.

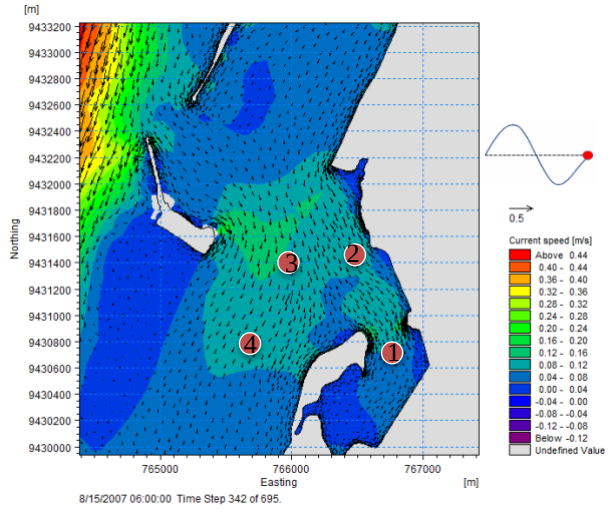

Figure 3: Current velocity towards high tide conditions

3.1.2 Neap Tide

The low tide condition of the Makassar sea water flow movement is not seen so clearly because the current velocity in neap tide conditions is reduced so that the current is not too visible. At point 1 = 0.01989 m / s this condition where the tide is at its lowest condition so that the current movement is not so visible or in calm conditions, the current speed at point 2: 0.008 m / s, the current speed at point 3: 0.007 m / s and the current speed at point 4: 0.03 m / s. for conditions in the area outside the dominant harbour current speed of 0.2 m / s to 0.7 m / s.

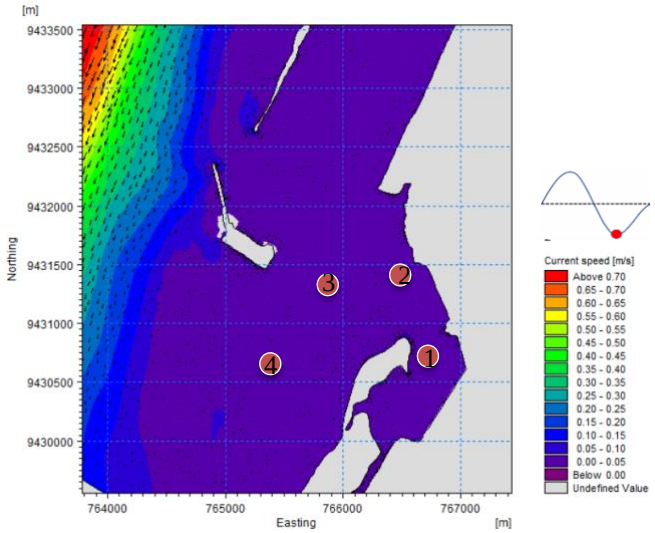

Figure 4: Flow velocity at low ebb conditions

Conditions towards the tide flow in front of the dominant harbour breakwater is faster than the area inside the harbour which is dominantly slower. Flow velocity at point 1: 0.002 m/s, there is a good current circulation in front of losari beach due to the meeting of the current towards the tide and the current from inside losari beach causing the current rotation. current velocity at point 2: 0.007 m/s, current velocity at point 3: 0.017 m/s, in the eastern part of the gusung island, the current direction is obtained along the gusung island and into the sukarno hatta harbour area, while for point 4 the current velocity : 0.016 m / s dominantly leads to the south caused by the circulation of current circulation in front of point 4.

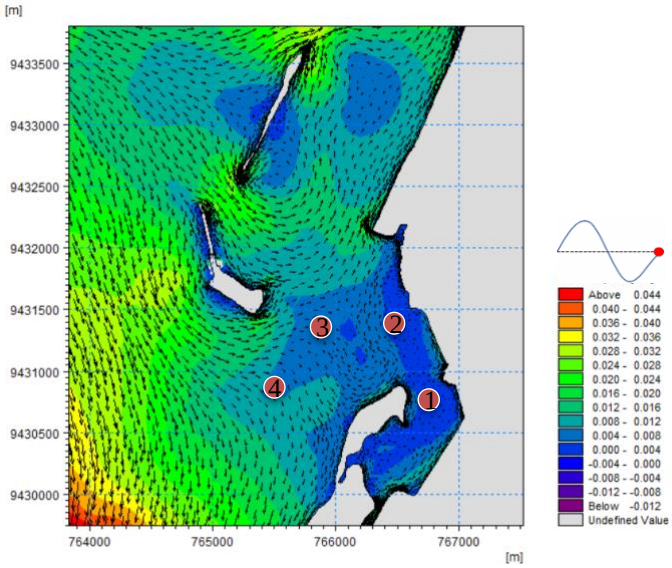

Figure 5: Current velocity towards high tide conditions

3.2 Flow Velocity After Reclamation

In taking current velocity data there are several locations that become the centre of the point taking including point one is in the inner location of losari beach, the second point is at the front of losari beach, the third point is near the soekarno hatta port pool and the fourth point is on the outside of the south of cpi reclamation.

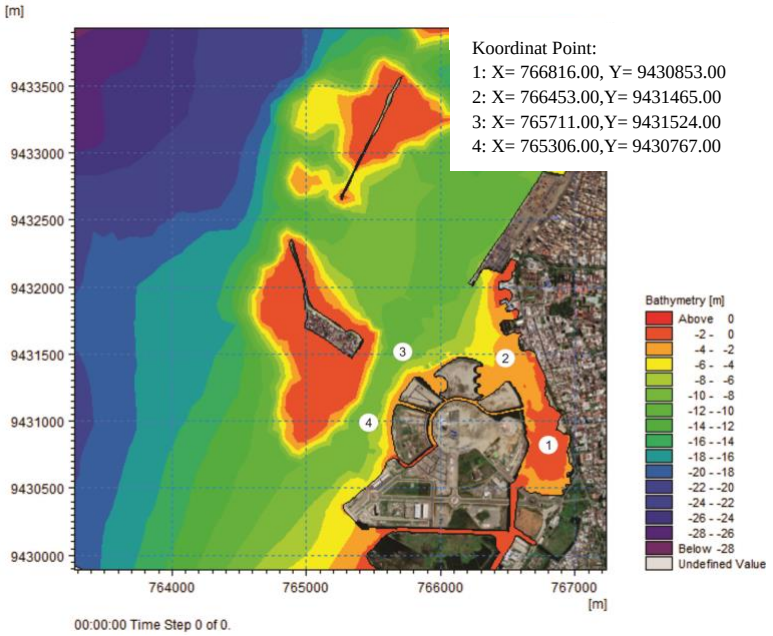

Figure 6: Flow velocity points and bathymetry after reclamation

3.2.1 Spring Tide

At low tide, the current moves from the losari beach to the sukarno hatta harbour pond. The existence of currents from the west into the harbour pool makes the current spin on the back of the north side breakwater. The current speed at point 1: 0.009 m/s, the dominant current direction moves from the inside of losari beach towards the harbour pool with the reclamation making a gap from between the CPI and the losari beach platform making the current speed slow down. current speed at point 2: 0.076 m/s, there is a rotation of the current at this second point due to the current that leads out of losari beach. current speed at point 3: 0.421 m/s and for current speed at point 4: 0.322 m/s.

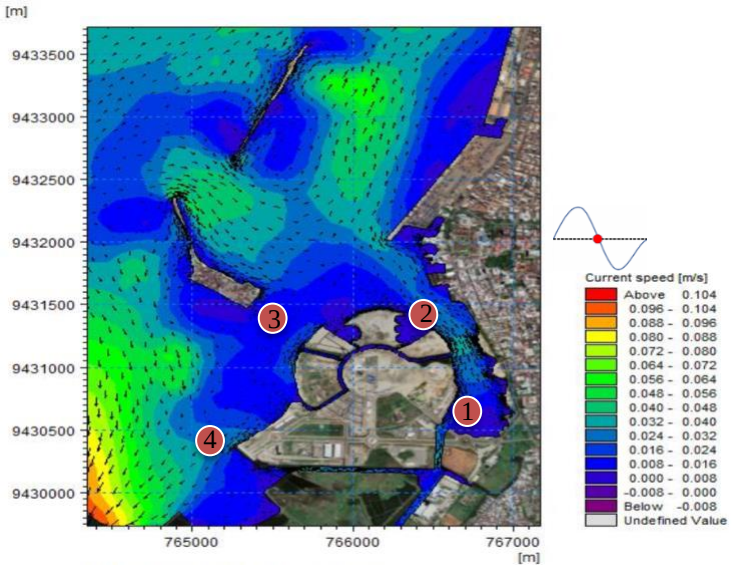

Figure 7: Flow velocity at low ebb conditions

Conditions towards the tide The direction of the current moves from north to south entering in front of losari beach, there is a rotation of the current at the end of the pier before entering the losari beach area, the current that leads to the south is blocked by the breakwater so that the current direction leads out of the harbour pool. The current velocity at point 1: 0.034 m/s, where it can be seen from the figure that at point 1 is in the losari beach area where the circulation of current supply from the jongaya canal and from the direction of the harbour pool in this condition the current slows down due to. After observing that the current enters the jongaya canal then exits through losari beach. current speed at point 2: 0.090 m/s, current speed at point 3: 1.51 m/s and for the current speed at point 4: 1.97 m/s. from the observations at point 1, the current velocity is almost the same as the simulation which is 0.034 m/s. These results also resemble the results of (Maulana et al. 2023) with the same current velocity.

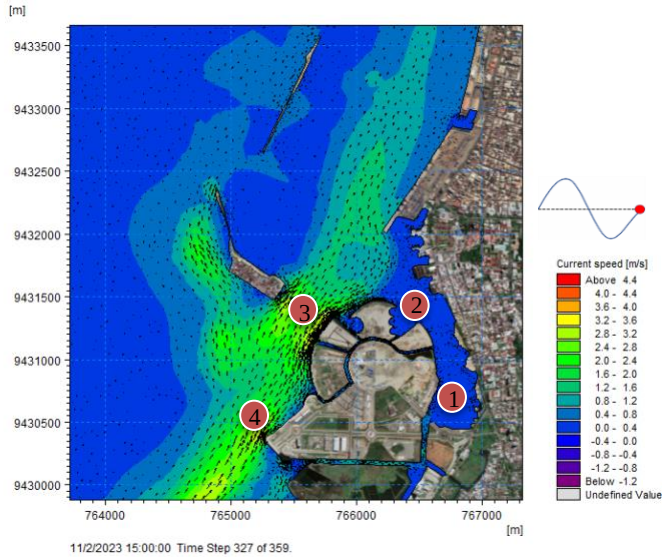

Figure 8: Current velocity towards high tide conditions

3.2.2 Neap Tide

Low tide conditions The direction of the current moves from south to north or from inside losari beach leads out to the front of sokurano hatta harbour, the current enters the harbour pool through the breakwater gap. The current speed at point 1: 0.025 m / s, the current speed at point 2: 0.087 m/s, the movement of the dominant current vector is small because the position of the water is at low tide or calm, but there is still a current velocity that moves between the island of lae-lae and cpi this indicates that the current is still moving fast in that location and for the current velocity at point 3: 0.46 m/s and for the current velocity at point 4: 0.34m/s, the dominant current is faster than the observations in the field obtained the current velocity at point 1: 0.028 m/s, therefore the simulation results and observations obtained results that resemble.

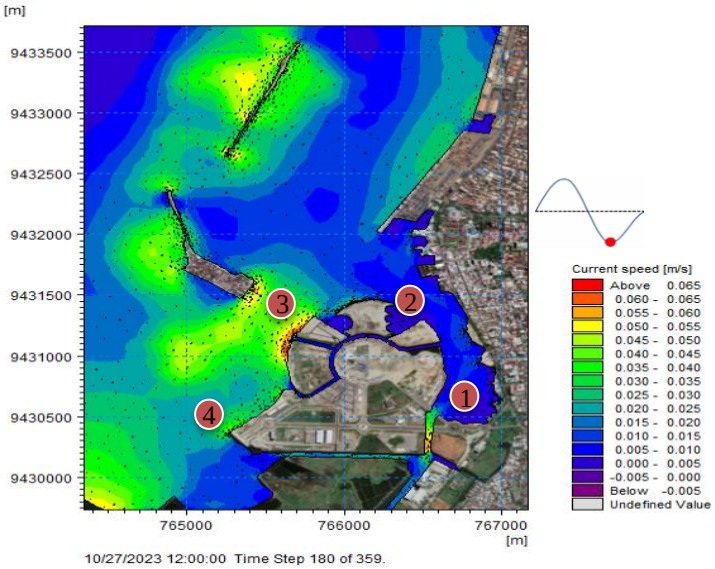

Figure 9: Flow velocity at low ebb conditions

4 Conclusions

Flow velocities at points 1,2,3 and 4 differ between before CPI reclamation and after CPI reclamation. Average current speed before reclamation at point 1: 0.031 m/s, average current speed at point 2: 0.052 m/s, average current speed at point 3: 0.090 m/s, current speed at point 4: 0.073 m/s. while the average current speed after CPI reclamation at point 1: 0.026 m/s, at point 2: 0.119 m/s, at point 3: 1.11 m/s while for the average current speed at point 4: 1.56 m/s. from the results of this study it is concluded that the current speed changes in the area inside the reclamation, namely the front of losari beach, slowing down 0. 13% and the current speed at point 2 the speed becomes 1.3% up from before, the current speed at point 3 rises to 11.32% which is in the gap between lae-lae island and reclamation centre point of Indonesia the current speed increases due to the direction of the current from north to south and enters the gap, at point 4 the average current speed is 20.44% up from before. So it is concluded that on the inside of the reclamation the current speed slows down and on the outside of the reclamation the current speed increases

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