

# HYDRODYNAMICS OF EXTENDED DUBAI CREEK SYSTEM

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## INTRODUCTION

Dubai Creek is a semi-enclosed waterway approximately 14 km long located in the Emirate of Dubai. At its mouth, the creek has an opening of approximately 200m and then widens to approximately 1200m towards the upper end of the creek. Ras Al Khor Wildlife Sanctuary, a RAMSAR designated conservation site is located at the upper end of the creek. The average depth of the creek ranges approximately 6.5 to 7m below Dubai Municipality Datum (DMD) throughout the waterway. Tidal flushing and mixing are the dominant transport processes in Dubai Creek. Treated sewage effluent (fresh water with nutrient content) from Al Awir sewage treatment plant is discharged into creek forming a source of pollution.

## EXTENSION OF DUBAI CREEK

The extension of existing Dubai Creek into the Business Bay district and through to the Arabian Gulf at Jumeirah coast is intended to create numerous opportunities by significantly increasing waterfront developments, facilitate marine transport, improve water quality in the Dubai Creek and to boost tourism.

In November 2016, the extension of Dubai Creek through Business Bay Canal and Dubai Water Canal was completed forming an uninterrupted navigable waterway (Fig. 1) of length 24 km approximately.

## HYDRODYNAMIC MODELING

In the past, several numerical modeling studies were carried out to study the hydrodynamics of Dubai Creek (HydroQual, 2003; DHI, 2009). The studies revealed poor flushing of Dubai creek with high residence time,  $T_{50} \approx 45$  days at the upper end of the creek.

While numerical modeling studies (DHI, 2009; Halcrow, 2014) showed significant improvement (upto 33%) in flushing of the Dubai creek ( $T_{50} \approx 33$  days) with its connection to new entrance at Jumeirah coast, the model results couldn't be validated.

In this paper, it is intended to simulate the hydrodynamics of the extended Dubai creek system using MIKE 3FM and study the flushing and circulation in the creek system. The model calibration using measured surface elevation, current speed and direction from Dubai Municipality monitoring stations in the creek will be presented. Further, the details of the model setup, boundary conditions and calibration parameters will also be presented.

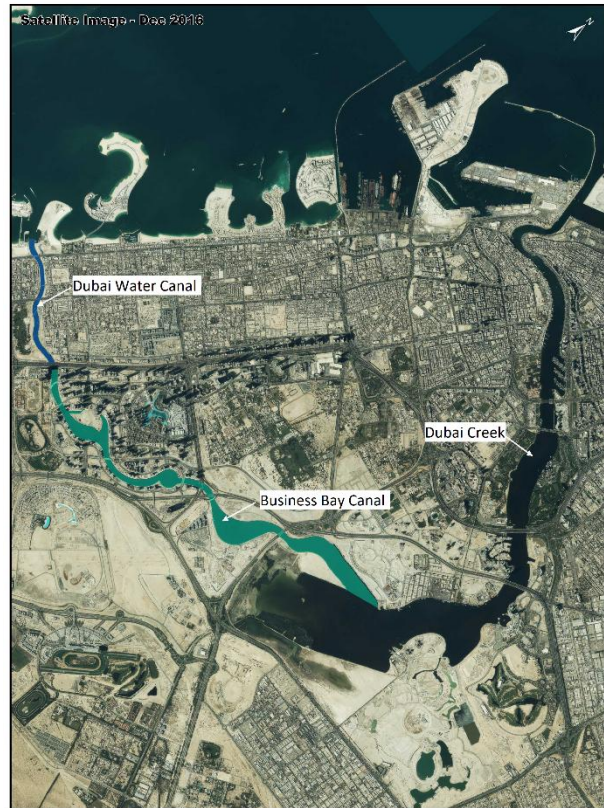


Figure 1 - Extended Dubai Creek System [Satellite Image dated December 2016. Source: Dubai Municipality]

## CONCLUSIONS

The performance of the extended Dubai creek system with its new entrance to Arabian Gulf at Jumeirah coast in improving the flushing of Dubai Creek using a hydrodynamic model calibrated with measured data is presented.

## REFERENCES

- DHI (2009): Waterways Studies for Dubai Emirate, Dubai Waterways Committee.
- Halcrow (2014): R999 - Dubai Water Canal - Hydrodynamic and Water Quality Modeling Report.
- HydroQual (2003): Dubai Creek Water Quality and Sediment Characteristics Modelling.