

CAPABILITY STATEMENT: HYDRODYNAMIC MODELLING

Marine Dynamics Modelled with Precision

Supporting the sustainable development of
ports, industry and coastal infrastructure

WKC HYDRODYNAMIC MODELLING PROFILE

WKC is a privately-owned environmental consultancy providing technically focused, independent studies to clients across the Middle East, Africa, Europe, and Asia.

Our Hydrodynamic Modelling team provides **specialist marine and coastal modelling services** to support ports, coastal infrastructure, industrial facilities, marine developments, and environmental impact assessments.

Using the **MIKE by DHI** software suite, our team delivers robust **2D and 3D numerical modelling studies** that help clients understand marine processes, assess environmental impacts, and support permitting and regulatory approvals.

Combining expertise in oceanography, engineering, environmental assessment, and marine ecology, we provide practical, science-based solutions that support informed decision-making throughout the project lifecycle.

WHY WKC?



MIKE by DHI specialists delivering advanced marine modelling solutions.



Specialist modules covering oil spill, sediment transport, EcoLab, and mixing zone assessments.



2D and 3D modelling capability supporting complex coastal and marine environments.



Field data collection and model validation using ADCP and tide gauge monitoring.

TEAM EXPERTISE:



Certified in MIKE 21/3 FM HD, SW, MT, and EcoLab modelling platforms.



PADI-certified team members supporting marine field investigations and data collection.



Trained in Marine Mammal Observation (MMO) and Passive Acoustic Monitoring (PAM).



Experienced in underwater acoustics, marine mammal impact assessment, and environmental monitoring.

HYDRODYNAMIC MODELLING SERVICES (1/2)

WKC provides a comprehensive range of hydrodynamic modelling services to support marine and coastal developments throughout planning, permitting, design, construction, and operation. Using the MIKE by DHI software suite, our team delivers robust 2D and 3D numerical modelling studies that help clients understand marine processes, evaluate environmental impacts, optimise project design, and support regulatory approvals.



HYDRODYNAMIC MODELLING & ASSESSMENT

Simulation of currents, tides, water levels, and circulation patterns to understand baseline marine conditions and assess potential changes associated with proposed developments.



EFFLUENT DISPERSION ASSESSMENT

Simulation of thermal, saline, pollutant, and stormwater discharges to evaluate dilution, dispersion, environmental impacts, and compliance with applicable environmental requirements.



FLUSHING ASSESSMENT

Assessment of water exchange efficiency, circulation performance, and potential stagnation areas to support coastal planning, marina developments, and water quality studies.



CORMIX NEARFIELD MIXING ZONE ASSESSMENT

Specialist nearfield modelling of marine and industrial discharges to evaluate diffuser performance, initial mixing behaviour, and regulatory mixing zone compliance.



SEDIMENT TRANSPORT & PLUME ASSESSMENT

Simulation of sediment transport, turbidity, erosion, deposition, and sediment plume dispersion associated with dredging, reclamation, and marine construction activities.



OIL SPILL MODELLING

Prediction of oil spill behaviour, transport, weathering processes, and shoreline interaction to support environmental risk assessments, contingency planning, and emergency response strategies.



Hydrodynamic modelling of water levels, flows, and circulation

HYDRODYNAMIC MODELLING SERVICES (2/2)

Accurate marine modelling relies on high-quality field data, specialist monitoring, and technical expertise. WKC provides a range of complementary services that strengthen model development, verification, interpretation, and environmental assessment outcomes. These services support the collection of site-specific data, improve model confidence, and provide additional technical input for environmental impact assessments and marine development projects across a range of sectors.

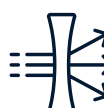
 **UNDERWATER NOISE MODELLING**
Assessment of underwater noise propagation associated with marine construction and operational activities to evaluate potential impacts on marine fauna and support mitigation planning.

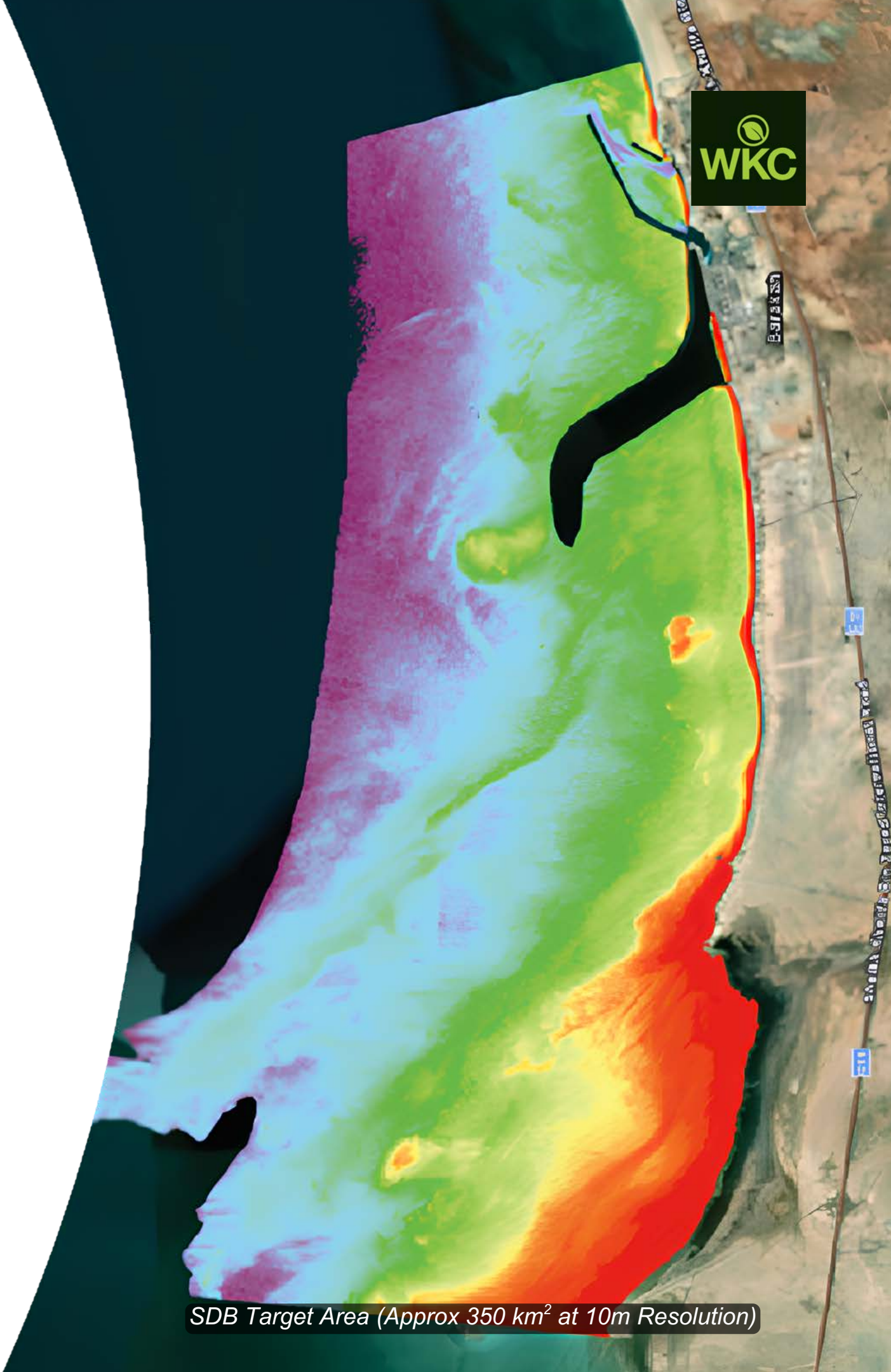
 **ADCP & TIDE GAUGE MONITORING**
Deployment of Acoustic Doppler Current Profilers (ADCPs) and tide gauges to collect site-specific water level, current speed, and current direction data for baseline studies, model calibration, and validation.

 **SATELLITE-DERIVED BATHYMETRY**
Generation of bathymetric datasets using satellite imagery to support marine planning and hydrodynamic modelling studies across large geographic areas.

 **MODEL CALIBRATION & VALIDATION**
Verification of model performance using field-collected data to ensure reliable and defensible 2D and 3D model predictions suitable for environmental and engineering applications.

 **ECOLOGICAL & WATER QUALITY ASSESSMENTS**
Integration of modelling outputs with ecological and water quality studies to evaluate potential impacts on marine habitats, species, and sensitive receptors.

 **SHORELINE EVOLUTION STUDIES**
Assessment of long-term sediment movement and morphological change to support coastal infrastructure planning, shoreline management, and resilience studies.



SELECTED KEY PROJECTS (1/4)



GULF OF AQABA (GOA) PHASE II ENVIRONMENTAL SERVICES

NEOM – 2023
Saudi Arabia

Hydrodynamic and sediment transport simulations were conducted to evaluate sediment plumes associated with marina construction works. The assessment also included evaluation of flushing efficiency within the proposed marina basins.



YAS IB2 GARDENIA PROJECT TECHNICAL MODIFICATION

ATKINS – 2024
UAE

Hydrodynamic simulations were undertaken to assess the dilution, dispersion, and potential environmental impacts of a proposed stormwater discharge. The modelling evaluated discharge behaviour under prevailing marine conditions.

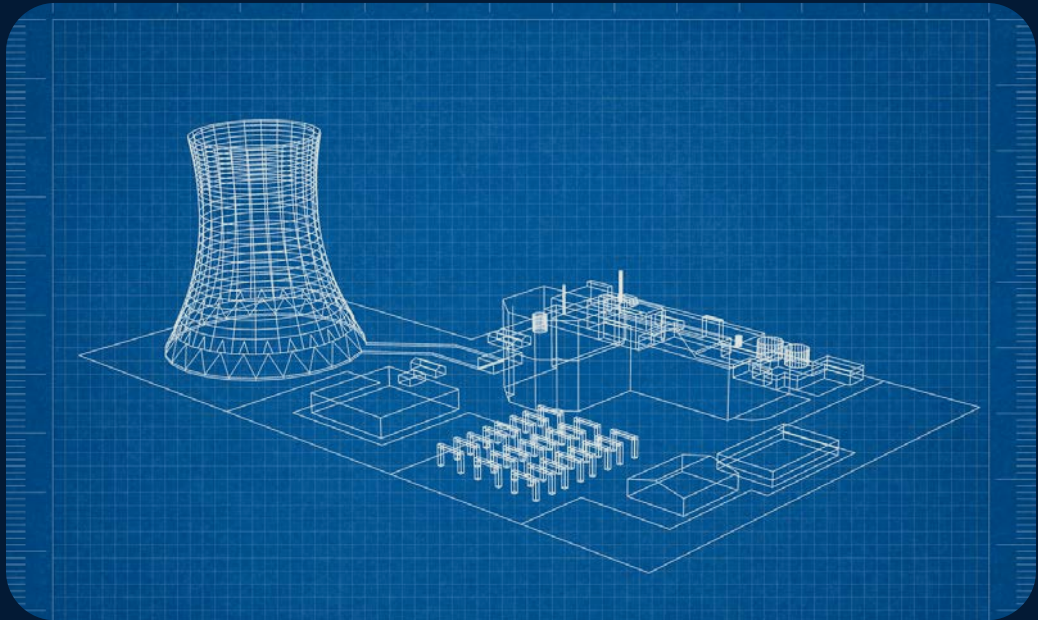


4197-ADSIC-P3 ENVIRONMENTAL SERVICES (AL MAQTA BRIDGE)

MEINHARDT – 2024
UAE

Hydrodynamic simulations were conducted to assess the proposed bridge construction methodology in Abu Dhabi, including demolition and reconstruction works with associated causeway construction. The assessment analysed changes in flow patterns, hydrodynamic behaviour, and flushing efficiency resulting from the construction activities.

SELECTED KEY PROJECTS (2/4)



FUJAIRAH 3 POWER PLANT MARINE NUMERICAL MODELLING

ANTHESIS – 2020

UAE

Hydrodynamic modelling and thermal plume simulations were undertaken for the proposed Fujairah 3 power plant. The scope included assessment of cumulative thermal impacts in combination with existing coastal facilities.



WASTESERV MALTA WASTE TO ENERGY PROJECT

WASTESERV – 2022

Malta

WKC undertook hydrodynamic modelling for the Malta Waste to Energy Project. The scope included preliminary design screening using the CORMIX mixing zone model and hydrodynamic modelling using the MIKE3 Flow Model to assess near-field mixing behaviour and effluent plume dispersion under ambient marine conditions.



ETIHAD RAIL BRIDGE - KHALIFA PORT EXPANSION

ANTHESIS – 2019

UAE

Hydrodynamic modelling and flushing assessments were conducted to evaluate existing conditions and post-construction impacts associated with a proposed rail bridge. The assessment considered changes to flow patterns and water circulation.

SELECTED KEY PROJECTS (3/4)



LAMU POWER PLANT HYDRODYNAMIC AND THERMAL PLUME MODELLING

KURRENT TECHNOLOGIES LIMITED – 2015

Kenya

WKC conducted hydrodynamic and thermal plume modelling for the cooling water discharge associated with the Lamu Power Plant. The modelling assessed thermal dispersion within the marine environment.



GSUSTAIN HYDRODYNAMIC MODELLING LUSAIL SEAWATER DISTRICT COOLING PLANT

GSUSTAIN – 2024

Qatar

Hydrodynamic modelling was undertaken to simulate saline discharge dispersion from the seawater district cooling plant. The assessment evaluated contributions to ambient salinity levels within the receiving marine environment.



BA AL GHAYLAM AND AL SADR MARINE NUMERICAL MODELLING

ANTHESIS – 2020

UAE

Marine numerical modelling was undertaken for the Ba al Ghaylam and Al Sadr coastal developments in Abu Dhabi. The scope included hydrodynamic modelling using a TMP model approach to support assessment of marine conditions associated with the proposed coastal developments.

SELECTED KEY PROJECTS (4/4)



NAKHEEL NORTH SHORE DREDGING AND RECLAMATION PROJECT

BUREAU VERITAS – 2024

Bahrain

Hydrodynamic simulations were carried out to assess island construction activities involving dredging and reclamation works. The scope included assessment of sediment plume dispersion arising from marine construction.



AZ ZOUR NORTH PHASE 2 IWPP HYDRODYNAMIC MODELLING

5 CAPITALS ENVIRONMENTAL – 2015

Kuwait

Thermal plume simulations were undertaken for the Az Zour North Phase 2 Independent Water and Power Plant. The scope included assessment of potential interactions with nearby coral and seagrass habitats.



MML AL FAHID ISLAND MASTER PLAN ENVIROMENTAL SERVICES

MOTT MACDONALD – 2024

UAE

Simulation of sediment plumes associated with dredging and reclamation activities was carried out for the Fahid Islands Master Plan. The assessment also evaluated resulting changes in flushing efficiency across the development area.

WKC GROUP - AT A GLANCE



TECHNICAL SERVICES

Our field work and technical studies form the foundation of our consultancy work. We cover a range of topics including **ecology**, **air quality**, **noise**, **GIS** & more.



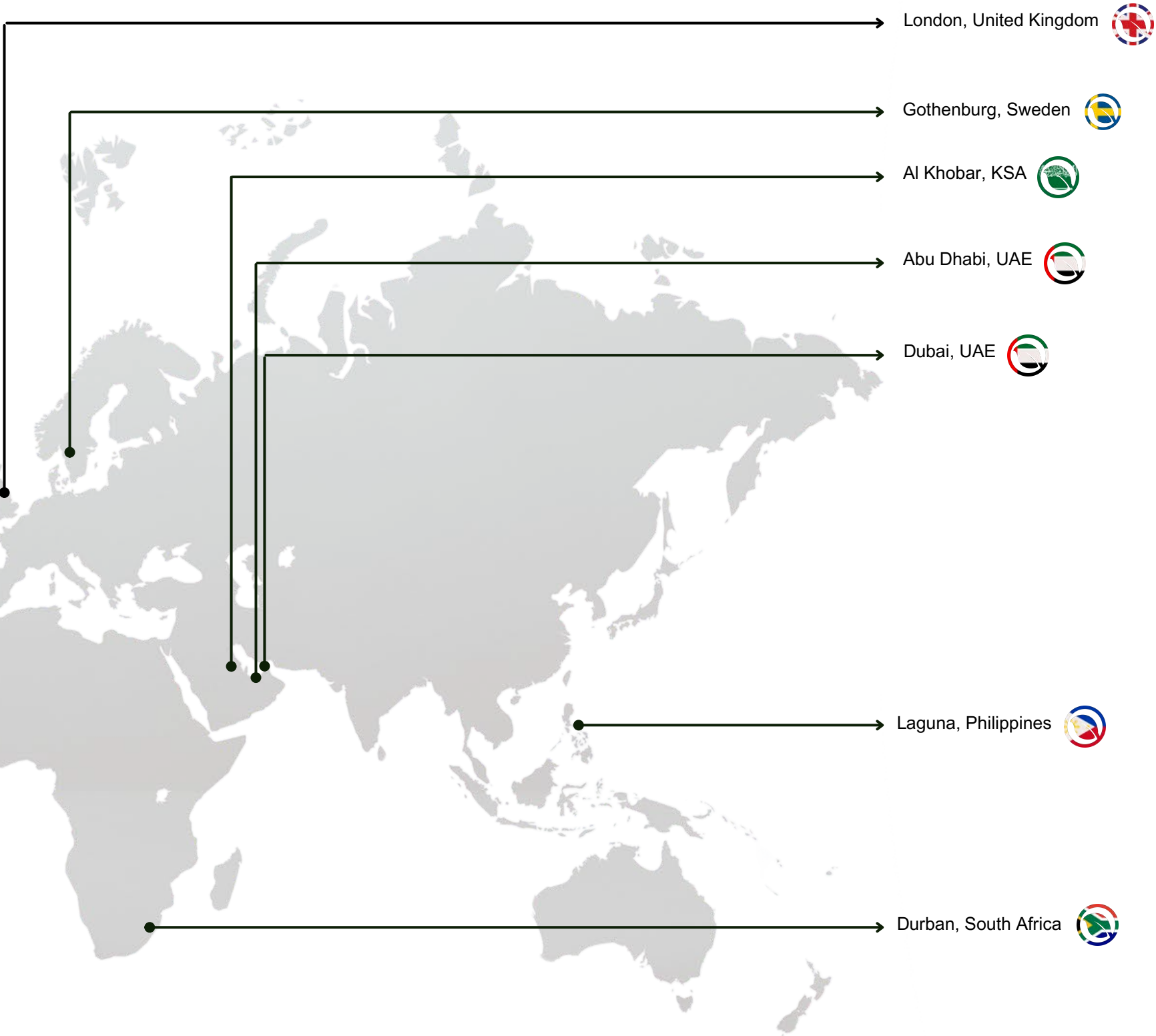
PLANNING & PERMITTING

Working with developers & engineering teams around the world, our knowledge of permitting systems and **ESIA** practices ensure the best outcomes.



ASSURANCE

From due diligence **audits** to embedding teams on large-scale work sites, from **sustainability** to **EMS**, we help clients manage their **ESG** responsibilities.



16+

YEARS OF SERVICE
EXCELLENCE

1000+

PROJECTS
COMPLETED

\$200 Bn+

CAPITAL VALUE OF
DEVELOPMENTS
SUPPORTED

50+

COUNTRIES
ADVISED IN

+95%

REPEAT
BUSINESS RATE



HYDRODYNAMIC MODELLING CAPABILITY STATEMENT



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