Clydeport Operations Limited

Method Statement & Risk Assessment

Water Injection Dredging (WID) – River Clyde

1. Project Details

Client: Clydeport Operations Limited
Location: River Clyde
Operation: Water Injection Dredging (WID)

2. Introduction

Water Injection Dredging (WID) is a hydrodynamic dredging technique that injects low-pressure, high-volume water into riverbed sediment to create a near-bed density current that transports fluidised material downslope using gravity and ambient currents. This technique is proven effective for fine sediments typical of the River Clyde.

The River Clyde undergoes regular maintenance dredging under Peel Ports' established environmental and sediment management framework.

3. Scope of Works

- Routine maintenance dredging using a WID vessel to fluidise and redistribute fine sediment within the Clyde channel.
- Pre- and post-dredge hydrographic surveys.
- Environmental and turbidity monitoring.
- Compliance with Peel Ports Clydeport Marine Notices

4. Equipment

- **Water Injection Dredger** (large WID 'Rhone' or similar)
    - Centrifugal pumps and low-pressure injection system.
    - Excellent for working close to quay walls, structures, and constrained river sections

5. Method of Execution

5.1 Pre-Operational Activities

- Mobilisation (See Section 9)
- Issue **Notice to Mariners** and coordinate movements with Clydeport VTS on Ch12. [peelports.com]
- Conduct pre-dredge hydrographic survey to identify high spots.

5.2 Dredging Procedure

1. Position WID vessel along defined dredge lanes.
2. Inject low-pressure water into sediment, creating a near-bed density current.

3. Mobilised sediment flows naturally with tidal/river currents to deeper authorised deposition zones.
4. Optimise operations during ebb tide to maximise downstream transport efficiency.
5. Minimise turbidity via correct nozzle depth and flow regulation

5.3 Environmental Controls

- Sediment remains close to the bed, minimising water-column turbidity versus mechanical dredging.
- Operate within environmental guidance

5.4 Completion

- Post-dredge hydrographic survey.
- Compile volume calculations and monitoring data, if applicable

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6. RISK ASSESSMENT (WID – RIVER CLYDE)

Risk Matrix:

Likelihood (1–5) × Severity (1–5)

6.1 Operational Risks

Hazard	Risk	Likelihood	Severity	Controls / Mitigation
Vessel collision	Interaction with commercial traffic in Clyde channel	2	4	VTS coordination, Notice to Mariners, AIS monitoring, safe passing plans. [peelports.com]
Uncontrolled sediment movement	Excessive mobilisation affecting sensitive areas	2	3	Apply WID within BPEO recommendations and sediment AL thresholds. [marine.gov.scot]
Turbidity increase	Reduced water clarity impacting ecology	2	3	Operate within recommended nozzle pressures; sediment remains near-bed. [porttechnology.org]
Equipment failure	Pump or nozzle malfunction	1	3	Daily inspections; standby engineer; adherence to WID operational guidance. [epawebapp.epa.ie]

Hydrodynamic instability	Unexpected plume behaviour	1	4	Adhere to WID hydrodynamic guidance on sediment density currents. [usace.cont...m.oclc.org]

6.2 Environmental Risks

Hazard	Risk	Likelihood	Severity	Controls / Mitigation
Bedform alteration	Minor channel disturbance	2	2	Limit injection depth; monitor post-dredge survey. [cerema.fr]
Sediment migration to sensitive habitats	Ecological disruption	1	4	Review Clyde environmental constraints; time dredging during favourable tides. [marine.gov.scot]
Contaminant mobilisation	Release of pollutants	1	4	Use AL1/AL2 sediment assessments to guide operations. [marine.gov.scot]

6.3 Health & Safety Risks

Hazard	Risk	Likelihood	Severity	Controls / Mitigation
Man overboard	Injury or fatality	1	5	Mandatory PPE, guard rails, MOB drills, rescue boat standby.
High-pressure water exposure	Injury from jet impact	1	4	Designated exclusion zones, trained operators, lock-off procedures.
Slips, trips, falls	Deck hazards	2	3	Deck housekeeping, non-slip surfaces, safety briefings.

7. Emergency Procedures

- Immediate halt to dredging on alarm or loss of control.
- Notify Clydeport VTS and Head of Marine
- Environmental incident reporting in accordance with Marine Directorate licence conditions.

8. References (Cited Evidence)

- **WID process and density currents:** USACE/ERDC technical note. [usace.cont...m.oclc.org]

- **Clyde BPEO sediment classification & regulatory context:** River Clyde Maintenance Dredge Report. [marine.gov.scot]
- **Clydeport Notices to Mariners:** Peel Ports Clydeport. [peelports.com]
- **WID operational principles & applications:** Van Oord working principles. [vanoord.com]
- **WID's low turbidity and close-quarters capability:** Van Oord UK projects. [porttechnology.org]
- **Environmental considerations:** Cerema WID guidance. [cerema.fr]
- **Risk assessment structure:** Van Oord WID method statement examples. [epawebapp.epa.ie]

9. Mobilisation Method Statement – Water Injection Dredging (WID)

Peel Ports Clydeport – River Clyde

Mobilisation is the controlled process of preparing the Water Injection Dredger (WID), support craft, crew, and operational systems for safe deployment within the River Clyde dredge area. The mobilisation phase ensures technical readiness, regulatory compliance, and safe integration with Clydeport traffic management.

9.1 Objectives of Mobilisation

- Ensure all equipment, crew, and documentation are in place before operations begin.
- Safely transport WID assets to the River Clyde.
- Complete inspections, certifications, and pre-deployment testing.
- Coordinate with Peel Ports Clydeport Marine Department and VTS to maintain safe navigational operations.
- Mitigate mobilisation-related risks through formal checks and controls, following similar procedures used in established WID operations worldwide. [epawebapp.epa.ie]

9.2 Mobilisation Activities

9.2.1 Documentation & Regulatory Readiness

1. Verify Marine Scotland dredging licence and ensure compliance with BPEO requirements for the Clyde. [marine.gov.scot]
2. Submit a **Marine Operations Notice** and **Notice to Mariners**, detailing:
    - Mobilisation timings
    - Vessel manoeuvring zones

- Expected duration of dredging works

3. Confirm all crew training, PPE provisions, inductions, and WID-specific competencies per method statement and risk assessment templates used in similar WID projects.

9.2.2 Vessel Preparation

1. **Mechanical & Hydraulic Systems**
    - Inspect centrifugal pumps, diesel engines, injection nozzles, and hose assemblies.
    - Conduct pressure tests and verify flow rate capability consistent with WID operational principles.
      (WID relies on high-volume, low-pressure injection.)
2. **Navigation & Positioning**
    - Calibrate GPS, motion sensors, echo sounders, and dredge control systems.
    - Ensure dredge lane data and channel survey overlays are loaded into onboard systems.
3. **Safety Equipment**
    - MOB equipment checks, fire detection systems, lifejackets, first-aid kits, and internal communications.

9.2.3 Personnel Mobilisation

1. Complete daily toolbox talks covering:
    - Project scope
    - Navigational hazards
    - Hydrodynamic behaviour of fluidised sediment
    - Site-specific environmental sensitivities

2. Assign crew roles including:
    - Master / DPO
    - WID operator
    - Engineer / pump specialist
    - Surveyor
    - Safety officer

Each role must understand the WID process, which utilises gravity-driven down-slope sediment transport.

9.2.4 Arrival & Positioning in the Clyde

1. Prior to entering the Clyde operational area:
    - Contact Clydeport VTS (Ch12).
    - Follow routing and movement restrictions per current Marine Notices.
2. Secure temporary berth or mooring for on-site functional tests.

9.2.5 On-Site Mobilisation Tests

Before dredging operations commence, perform:

A. Pump & Injection System Test

- Verify pump capacity, nozzle height control, and sediment mobilisation efficiency.
- Confirm injection pressures are within WID safe operational limits.
  (Low-pressure injection is a defining safety characteristic of WID.)

B. Survey Integration Test

- Conduct a short test track along a pre-dredge survey line.
- Verify that real-time depth measurement aligns with hydrographic survey benchmarks.

9.3 Mobilisation Risk Assessment (Addendum)

Hazard	Risk Description	Controls / Mitigation	Reference
Vessel manoeuvring risk	Restricted space approaching quays, docks, and berths	Use tug assistance; follow Clydeport VTS navigational controls	[peelports.com]
Pump pressurisation failure	Over-pressure causing equipment hazard	Pre-start inspections; pressure test aligned with WID principles	[usace.cont...m.oclc.org]
Inadequate crew briefing	Human error during first dredge run	Mandatory toolbox talks and role assignments	[epawebapp.epa.ie]
Environmental non-compliance	Mobilisation before confirming AL1/AL2 thresholds	Environmental review per River Clyde BPEO	[marine.gov.scot]
Hydrosedimentary risk	Mobilised sediment in an unsuitable tidal window	Use ebb tide mobilisation tests and guidance on hydrodynamic dredging	[cerema.fr]

9.4 Completion of Mobilisation

Mobilisation is complete when:

- All checks and test runs are signed off by the Master, WID Supervisor, and Peel Ports Harbour Master (or delegate).
- VTS grants operational permission.
- Pre-dredge survey, environmental baselines, and equipment reports are logged.

WID operations may then begin in accordance with the full Method Statement.