

## 1. Introduction

This document details an outline method statement for the marine surveys and ground investigations associated with the Cumbrae Slipway Renovation. It is noted that the methodology discussed herein has been developed as part of the design stage, prior to contractor involvement. Therefore, some variation is expected within the bounds permitted by the requirements of the Scope.

The location plan of the site and indicative survey area is shown in Figure 1.

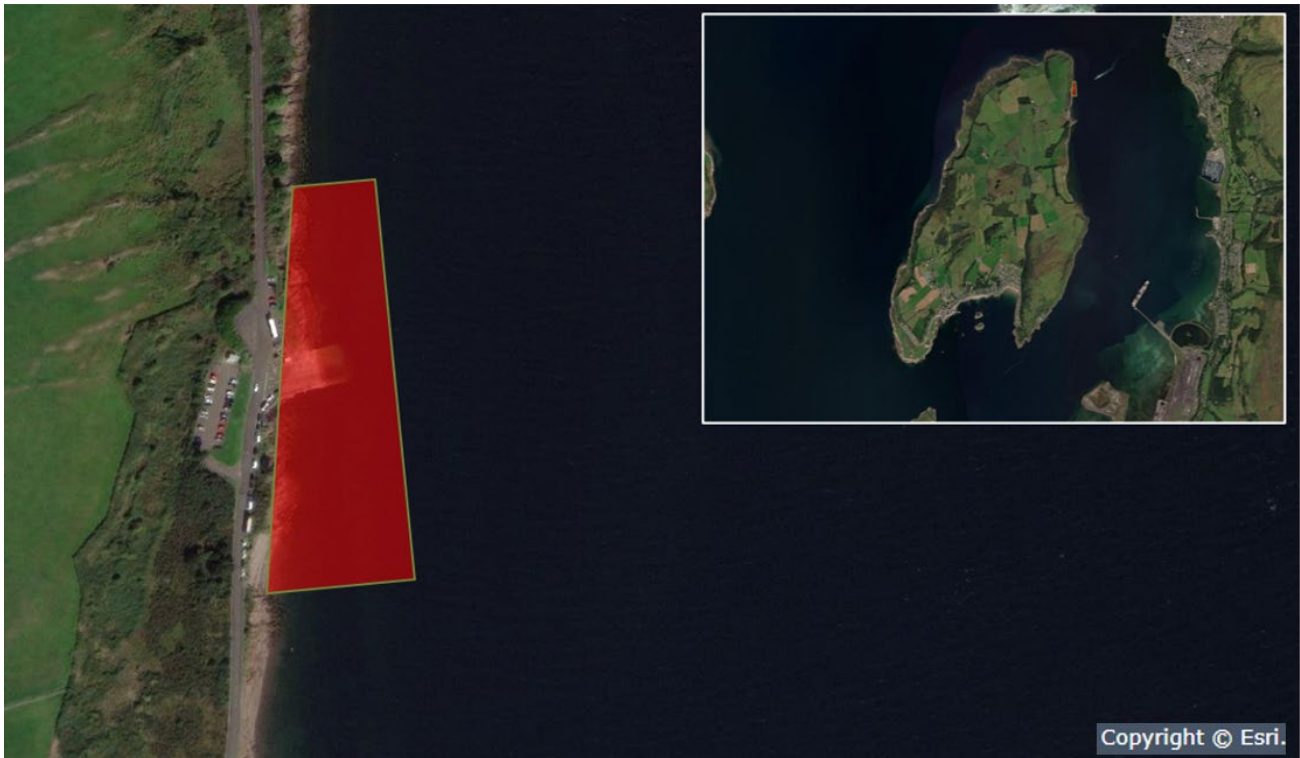


Figure 1. Location plan of Cumbrae Slipway and indicative survey area.

## 2. Proposed Surveys

The proposed surveys comprise:

- Marine surveys
  - Bathymetric survey;
  - Sub-bottom profiling, to identify rockhead;
  - Magnetometer survey to identify any obstructions to piling;
  - Side scan sonar; and
  - Sediment grabs and vibro cores.
- Intertidal ground investigation (no in-water working)
  - Trial pits.

The exact specification of the equipment used will be responsibility of the contractor, however typical equipment and noise levels for the marine surveys is detailed below.

Sensor	Frequency	Maximum power (dB re 1µPa @1m)
Multibeam Echosounder	200 – 400 kHz	-
Acoustic boomer	2-25 kHz	215dB re 1uPa @1m at 200J
Parametric Sub-bottom profiler	2-115 kHz	238dB re 1uPa @1m
Vibro core		187db re 1uPa @1m

### 3. Impact Assessment and Mitigation

#### 3.1 Baseline

Data suggests that low numbers of cetaceans (mainly harbour porpoise (*Phocoena phocoena*) and occasionally bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*) and minke whale (*Balaenoptera acutorostrata*)) may be transient in the area, with only harbour porpoise likely to be resident year-round (Marine Scotland, 2023<sup>1</sup>; Hague *et al.*, 2020<sup>2</sup>; Mills *et al.*, 2017<sup>3</sup> Seawatch<sup>4</sup>).

#### 3.2 Impacts

Underwater noise has the potential to impact marine species causing behavioural changes or hearing injury. Marine mammals are known to be more sensitive to impulsive noise than non-impulsive (Southall *et al.*, 2019<sup>5</sup>). Seismic surveys are considered to be impulsive noise while coring and drilling are considered to be continuous.

Harbour porpoise are considered to be one of the more sensitive marine mammal species, generally with lower noise thresholds than other species. Reviews of the hearing abilities of marine mammals have indicated that exposure to noise above 140 dB re 1 µ Pa results in profound and sustained avoidance behaviour (Southall *et al.*, 2007<sup>6</sup>) and that non-impulsive noise over 153 dB re 1 µ Pa (sound exposure level (SEL)), and impulsive noise over 140 dB re 1 µ Pa (SEL) and 196 dB re 1 µ Pa (peak sound pressure level (SPL)) has the potential to result in temporary effects on the hearing of harbour porpoise (Southall, *et al.*, 2019). Using the noise levels presented above it is considered that there is potential for disturbance or injury of harbour porpoise in close proximity to the surveys. Marine mammals transiting on the west coast of Great Cumbrae are unlikely to be affected by the proposed surveys.

The surveys will be undertaken in close proximity to an active and regular ferry crossing and therefore have the potential to be masked by existing background noise when the ferry is close to the slipway. It is anticipated that the marine surveys will take 3-4 days to complete and will aim to be outside the sensitive breeding and calving period (between May and August (IAMMWG *et al.*, 2015<sup>7</sup>)), when the number of marine mammals likely to be affected is low and disturbance less significant. The ground investigation works within the intertidal zone are

<sup>1</sup> Marine Scotland (2023). National Marine Plan Interactive. Available at: <https://marinescotland.atkinsgeospatial.com/nmpi/> [Accessed January 2023].

<sup>2</sup> Hague, E.L., Sinclair, R.R. and Sparling, C.E. (2020). Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish Waters. Scottish Marine and Freshwater Science Vol 11 No.12.

<sup>3</sup> Mills, F., Sheridan, S. and Brown S. (2017) Clyde Marine Region Assessment. Clyde Marine Planning Partnership. pp 231.

<sup>4</sup> Sea Watch Foundation (2023) Recent Sightings. <https://www.seawatchfoundation.org.uk/recent-sightings/> [Accessed January 2023].

<sup>5</sup> Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. *Aquatic Mammals* 45: 125-232. DOI 10.1578/AM.45.2.2019.125.

<sup>6</sup> Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene C.R.Jr., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A. and Tyack, P.L. (2007). Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. *Aquatic Mammals* 33(4): 411-521.

<sup>7</sup> IAMMWG, Camphuysen, C.J. and Siemensa, M.L. (2015) A Conservation Literature Review for the Harbour Porpoise (*Phocoena phocoena*). JNCC Report No. 566, Peterborough. 96pp.

expected to take up to 1 week to complete, due to the requirement of working around the tides. As these works will not be undertaken in-water, there is little potential for disturbance of cetaceans.

Basking sharks (*Cetorhinus maximus*) have been recorded in the vicinity of Great Cumbrae however, this species is mainly present during the summer months and is not considered sensitive to underwater noise due to lack of a swim bladder (Popper et al., 2014<sup>8</sup>). As such there is no predicted effect on basking sharks.

### 3.3 Mitigation

To mitigate the potential for injury or disturbance of harbour porpoise it is proposed that JNCC guidelines, specifically in relation to the presence of a Marine Mammal Observer (MMO), be applied during the marine surveys. This is not considered necessary for the intertidal trial pits.

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<sup>8</sup> Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, D.A., Bartol, S., Carlston, T.J., Coombs, C., Ellison, W.T., Gentry, R.L., Halvorsen, M.B., Lokkeborg, S., Rogers, P.H., Southall, B.L., Zeddies, D.G. and Tavola, W.N. (2014). Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI.