

## Ardersier WwTW Outfall Project 500649

### Temporary and Permanent Deposits Area Calculation.

Permanent Deposits (below MLWS)

Outfall length below Mean High Water Springs = 280m

Width of Outfall 1.5m (assumed for entire length however this is only the effective width at piles)

$$280 * 1.5 = 420m^2$$

Temporary Deposits (below MLWS)

Temporary Causeways upper beach piling

Causeway Length 45m

Causeway width 6m

$$45 * 6 = 270m^2$$

Jack up Barge

Temporary deposits below MHWS

Leg 2m x 2m = 4m<sup>2</sup> per leg

$$\text{Barge} = 4 \text{ Legs} = 16m^2$$

TOTAL temporary and Permanent deposits = 706m<sup>2</sup>

### Construction Methodology

A piled outfall has been selected as the preferred outfall.

SW/aBV are currently investigating the most appropriate type of pile to use in this environment. See extract below from the ongoing study;

**Table 2: Pile type advantages and disadvantages**

Pile Type	Advantages	Disadvantages
Timber Piles	<ul style="list-style-type: none"><li>• Timber Piles are cheaper than steel or concrete piles</li><li>• Will not decay when submerged</li></ul>	<ul style="list-style-type: none"><li>• Can decay as a result of living microbes when exposed above water</li><li>• Can come under attack from marine borers such as mollusc and crustacean</li><li>• Will require the application of preservatives</li><li>• Need to be installed with special care to prevent damage</li></ul>
Precast Concrete Piles	<ul style="list-style-type: none"><li>• Can be cast to required length</li><li>• Design life is good</li></ul>	<ul style="list-style-type: none"><li>• If left uncovered the steel reinforcement can corrode</li><li>• Will be required to be driven into place which can cause noise pollution damaging to wildlife</li></ul>

Pile Type	Advantages	Disadvantages
Steel	<ul style="list-style-type: none"> <li>• Easily splice</li> <li>• If concrete-filled and the pipe corrodes the load-carrying capacity of the pile remains intact due to concrete</li> <li>• Cheaper than concrete piles</li> </ul>	<ul style="list-style-type: none"> <li>• Would need to be close ended to obtain necessary end bearing</li> <li>• Would require to be backfilled with either gravel or concrete to prevent floatation</li> <li>• Would require a protective coating to prevent corrosion</li> </ul>
Rotary Cast In-Situ Piles	<ul style="list-style-type: none"> <li>• Simple and efficient installation process</li> <li>• Casing can add additional protection to concrete piles</li> <li>• The use of casing which extends above the high water mark will allow work to take place during all tidal conditions</li> <li>• Low levels of noise and vibration</li> </ul>	<ul style="list-style-type: none"> <li>• Concrete has to be cast onsite leading to increased construction time</li> </ul>

Rotary Cast in-Situ Piles are the current preference (also now being considered are vibrated steel piles).

The installation of the outfall will include land based and marine based piling. It is intended that a temporary causeway approximately 45m long 6m wide will be constructed onto the beach to support the piling equipment. This is to facilitate the installation of piles close to the beach with land based equipment. This causeway is in the process of being reevaluated to see if it can be removed completely from scope. The piles further down the beach will be installed using marine based equipment. It is envisaged that this will be completed from a jack up barge.