

Port of Dundee Methodology for Marine Pile Installation Protocol

1.0 Marine Pile Install Method

- 1.1 Each pile will be installed through a double height gate.
- 1.2 Once the gate is in location, the pile will be pitched by the attending crane.
- 1.3 The pile will be plumbed and lined prior to driving.
- 1.4 The pile will be driven initially using an 8t vibro hammer or similar that exerts 2700kN force.
- 1.5 Once the pile has been driven with the vibro hammer, it will be driven with the impact hammer until it reaches a set or a toe level. The impact hammer drives the pile with an energy output of 280kN.
- 1.6 Each pile install will follow the below protocol as outlined in the marine licence and JNCC guidelines.

2.0 Protocol for Each Pile

- 2.1 Under the marine licence number MS-00008483 the marine pile install procedure must follow the JNCC 2010 “piling protocol” guidelines. The following methodology will be adopted for every pile installed.
- 2.2 Marine piling is only permitted between the hours of 0700 and 1800 Monday to Friday and 0800 and 1300 on a Saturday. There will be no marine piling on a Sunday.
- 2.3 As well as the time restrictions, impact piling is only permitted for 4hours within a 24 hour day.
- 2.4 Prior to any impact piling commencing, Marine Mammal Observation (MMO) trained operatives will carry out observations within the 500m mitigation zone, Figure 1 below for a minimum of 30 minutes. If the weather is adverse and the 500m mitigation zone cannot be seen, no impact piling can commence. Impact piling can only commence once the MMO gives the go ahead.

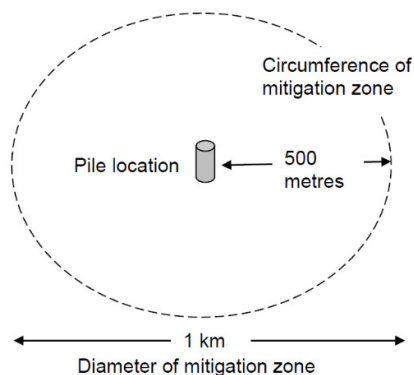


Figure 1 - Mitigation Zone

- 2.5 If any marine mammals are spotted during this 30 minute pre piling phase. No impact piling can commence for at least 20 mins or until the MMO is satisfied the marine mammal has left the mitigation zone.
- 2.6 The next phase is to adopt the soft start procedure. This is where the marine piling commences slowly over a minimum of 20 minutes.
- 2.7 The marine piling will increase power over the 20 minute period where the piling will hit full power no less than 20 minutes from starting. As a rule of thumb, the power should be increased by 20% every 5 minutes.
- 2.8 If a marine mammal enters the mitigation zone within the 20 minute soft start process, the piling can continue at the same power as when the marine mammal entered the mitigation zone. The power can only continue to increase following instruction from the MMO.
- 2.9 If a marine mammal enters the mitigation zone when the hammer is on full power, the marine piling operations will not cease as the marine mammal has entered "voluntarily."
- 2.10 If there is a break on 10 minutes or more in the marine piling operations, a soft start procedure must start again. During marine piling operations, the MMO will be on watch duty for the full duration therefore a pre pile search is not required again following the break.
- 2.11 MMO reports will be collated for each impact piling operation and will be submitted at the end of the marine piling activity.