



SpillSmart

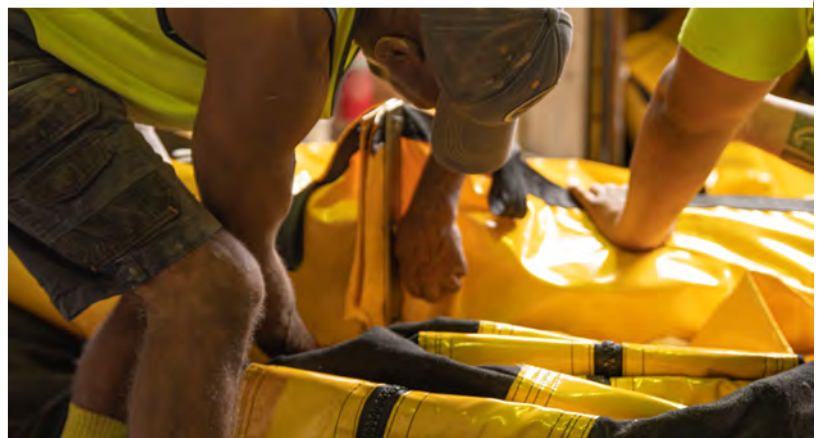
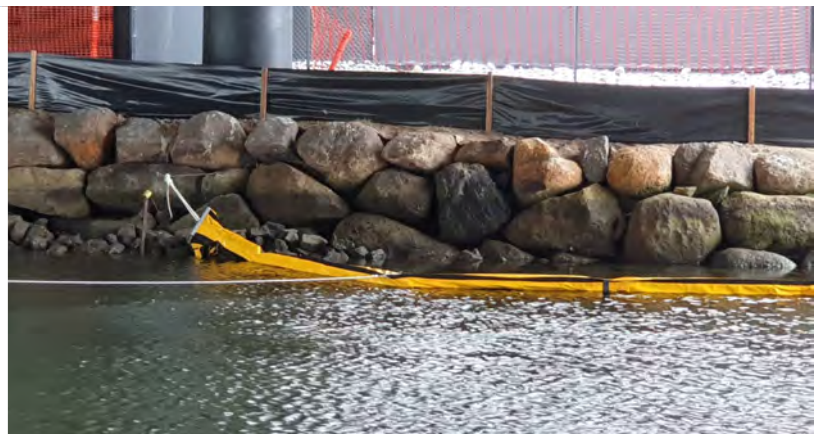
ANCHORING GUIDE
BOOMS & SILT CURTAINS

INTRODUCTION

For well over two decades, Envirosmart has enjoyed the challenge of engineering and manufacturing Silt Curtains, booms and baffles for successful projects around Australia and overseas. In this time, we have deployed literally thousands of kilometres of these amazing marine devices and in return have earned experience, expertise, and knowledge that few others in our industry can attest to.

Ensuring booms and baffles remain anchored and in place can be a great challenge. Marine conditions have a lot of different variables including wind, tidal currents, flow rate of the waterway and wave action. An anchoring strategy needs to allow for flexibility and movement to work with the elements whilst holding the device in place. The duration of the deployment is another important consideration and will also impact the technique used to anchor.

We thank you for investing the time to read this short anchoring guide and wish you the best for all your future deployments.



BOOM & SILT CURTAIN ANCHORING

An anchoring plan needs to be developed prior to deployment. Boom construction factors will impact overall performance and maintenance with site-specific conditions also requiring assessment as the scope and project duration will have bearing on the anchor loads. Factors to consider are:

- Water velocity
- Wind speed/direction
- Wave action
- Tides
- Scope and project duration

In calm water conditions or when a Boom is deployed for less permanent time frames or in non-tidal waters, the Boom may be anchored with stakes, posts or star pickets from the bank. Secure tree stumps or bridge abutments may also be used to tie off on opposing shores or anchored utilising a light anchor. In flowing water to ensure adequate load-bearing for the site conditions, anchoring should centre on positioning the boom so that it is parallel to the water flow not across a significant body of moving water.



For longer-term deployments, moorings will be required for floating Booms and Silt Curtains to ensure they remain in place. The calculated force being placed on the Boom or Silt Curtain must be considered when anchoring in the sea or river beds. Further consideration should also be given to the type of seabed for the mooring as anchoring systems and hardware will need to change accordingly.

ANCHOR TYPES

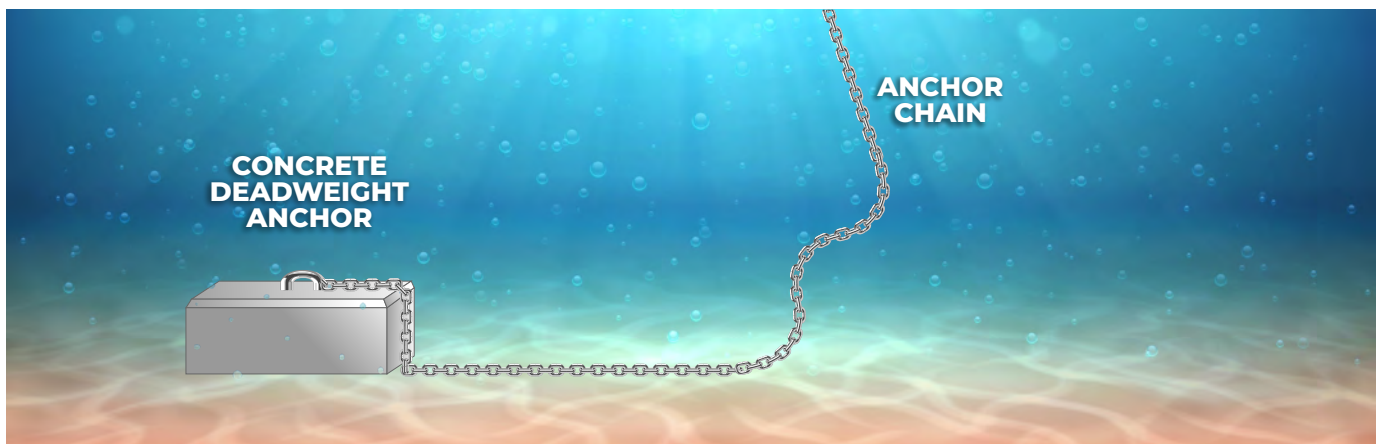
DANFORTH ANCHORS



One of the most common anchors seen and utilised today. The Danforth Anchor is recognisable by its 2 large triangular flukes attached to the stock. This design allows the flukes to orientate towards the seafloor at a 32° degree angle for maximum holding capacity. These anchors are readily available, easy to use and are best suited in soft seabeds like mud, silt and sand. This anchor is unsuitable in scenarios such as rocky floor bottoms or tides with variable directions as tension may be compromised when the flow reverses.

CONCRETE ANCHORS

Concrete Anchors are solely reliant on their sheer weight, with their holding ability defined by their weight underwater. Also known as Dead Weight Anchors they can be effective regardless of the type of seabed with suction likely to increase if the anchor becomes buried in the seafloor. These anchors are more likely to be chosen for longer-term deployments and may require mechanical devices such as a crane to deploy and retrieve. Dead Weight anchors may also come in the form of solid metal blocks or stone.



WHAT ANCHOR WHEN?

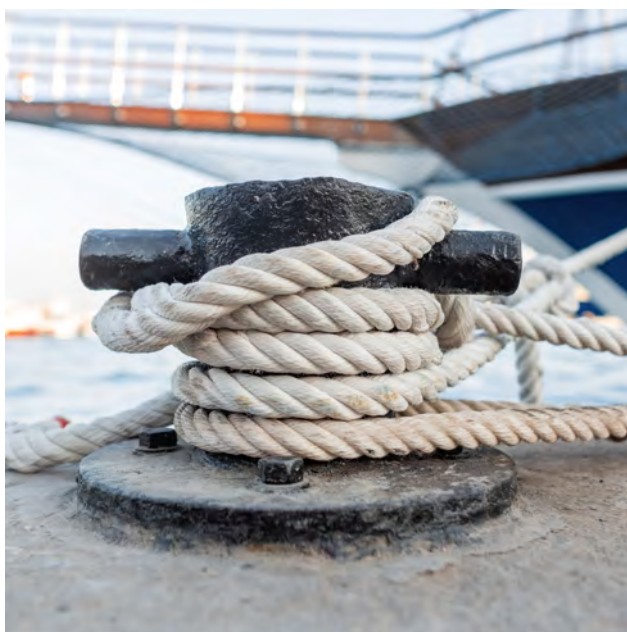
Successful anchoring and mooring is only about one thing, holding strength. Danforth anchors are often a preferred choice in moving water and anchoring into seabeds that are sand or mud. If the seabed is extremely soft, then a Concrete anchor or Dead Weight anchor will be a more suitable choice as the Danforth will have difficulty holding in those particular seabed conditions.

Although Danforth anchors are exceptionally convenient Concrete Anchors or Dead Weight anchors will be a preferred option if the bottom is rocky, gravel, is too hard for an anchor and especially in extremely soft seabeds as mentioned. Concrete is often a popular choice based on cost but does become 45% lighter underwater, so depending on the conditions large blocks may be required and factored in when estimating holding force. Conversely, iron Dead Weights will lose 14% and steel 13% of their weight when submerged.

ANCHOR ROPE

The Anchor Rope or sometimes Chain essentially connects the anchor to the Boom. In conditions where the device will experience high and low tide variances, an Anchor Buoy will also be deployed close to the Boom. This helps create an anchoring buffer allowing for rising and falling tides without putting excessive load on the device. Therefore, the Anchor Rope will be attached from the anchor to the Anchor Buoy with a line connecting the Anchor Buoy to the Boom or Silt Curtain.

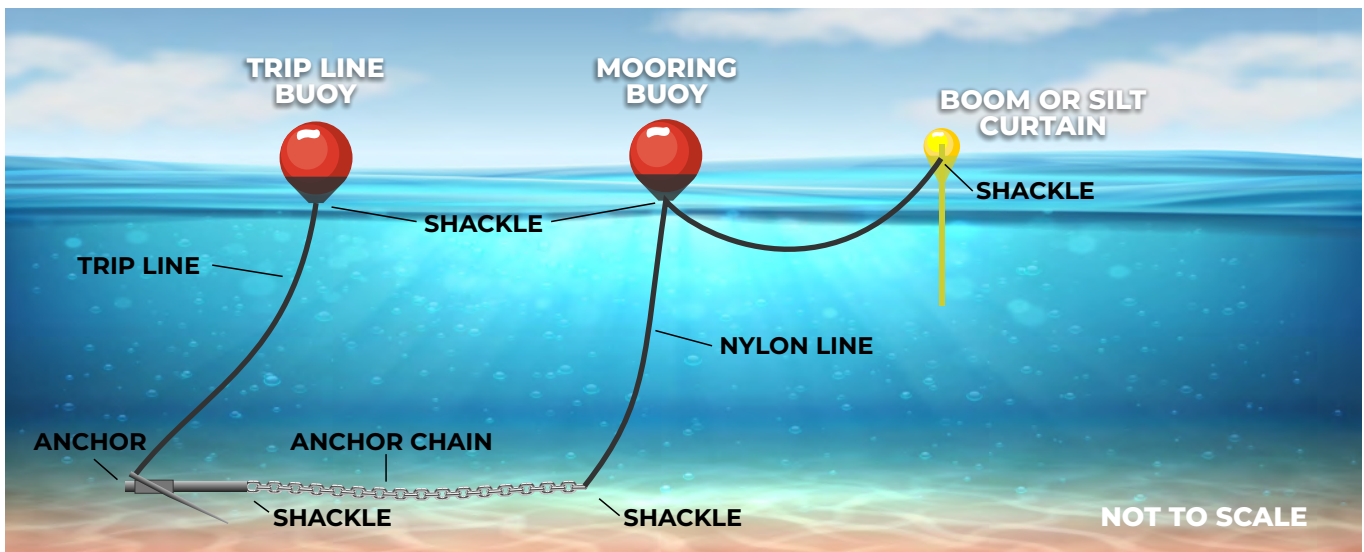
Calculating the correct length of rope is integral. If the rope is too short in high tides, the floats on the Boom will be pulled under the water surface causing additional loads and may lead to failure, including dislodging the anchor if a Danforth is being used. Too long a rope and the Boom or Silt Curtain may travel outside of its profile and displace contaminants. Anchor lines should be 3–5 times the maximum depth at high tide as a general guide. Once installed, the Boom should be monitored closely in the first 24 hours and checked periodically to ensure the device is functioning correctly.



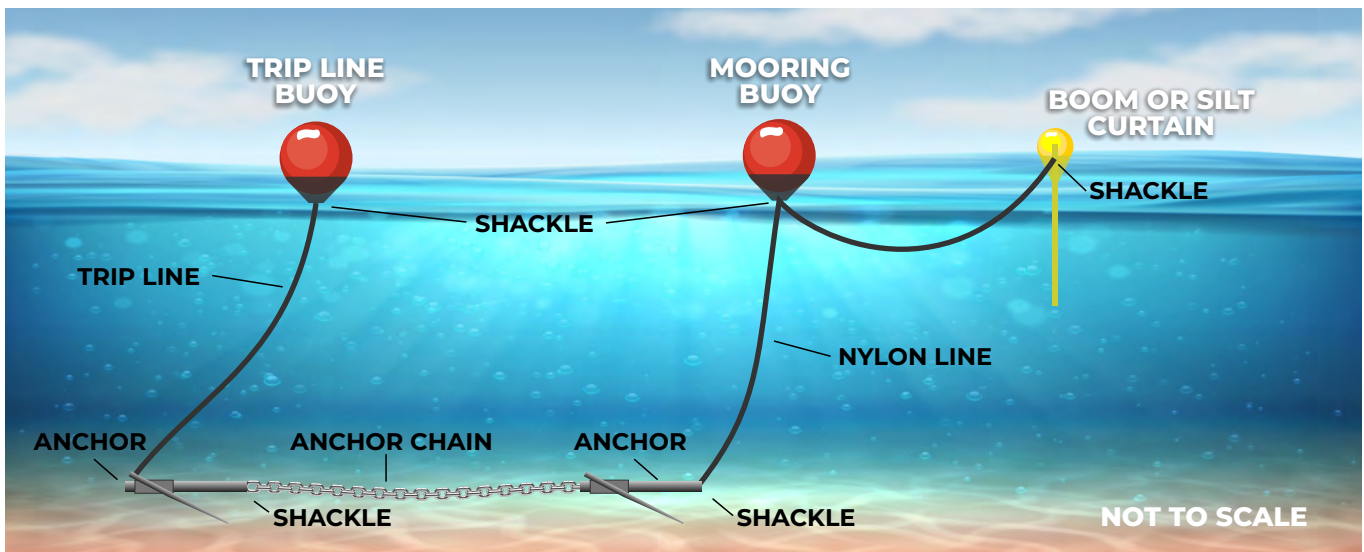
ANCHORING CONFIGURATIONS

Tidal or other conditions when anchoring the Silt Curtain or Boom may place the device under loading from either side. This may then require anchoring from both sides to ensure the loading is not compromised due to wind or water current change. An Anchor Buoy attached to an Anchor rope with a line to the Boom or Silt Curtain can also assist to maintain horizontal pull on the Boom to help prevent it from submerging on the leading boom or panel. To prevent tidal changes pulling the buoy or curtain down, enough slack must be given on the lines for the Buoy and Curtain to float freely.

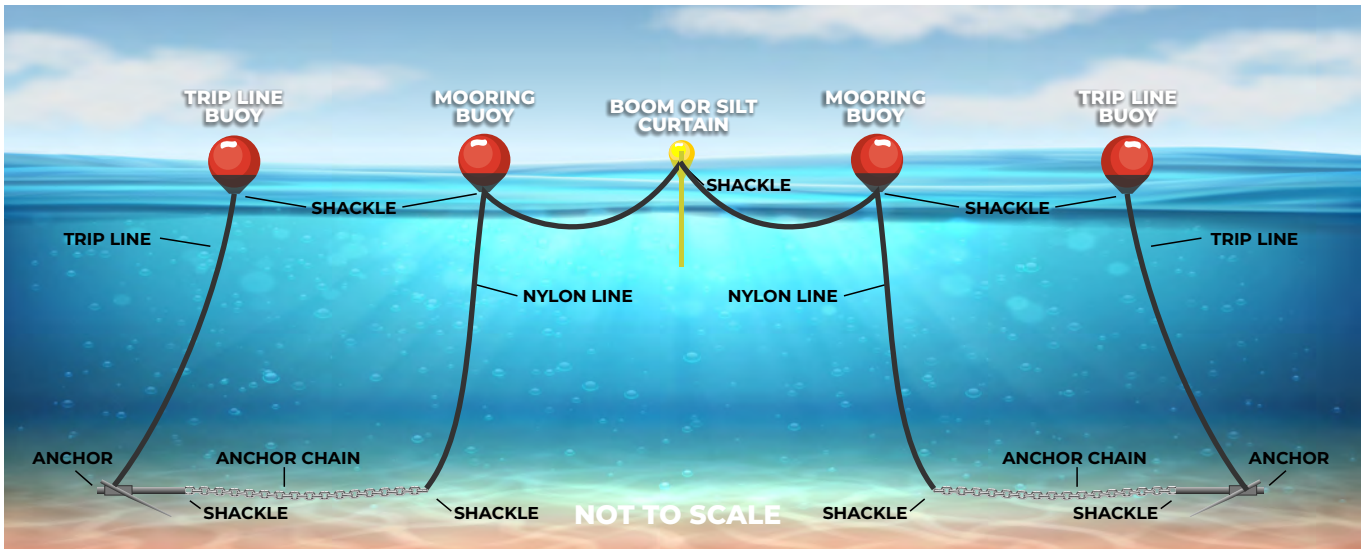
SINGLE ANCHOR CONFIGURATION



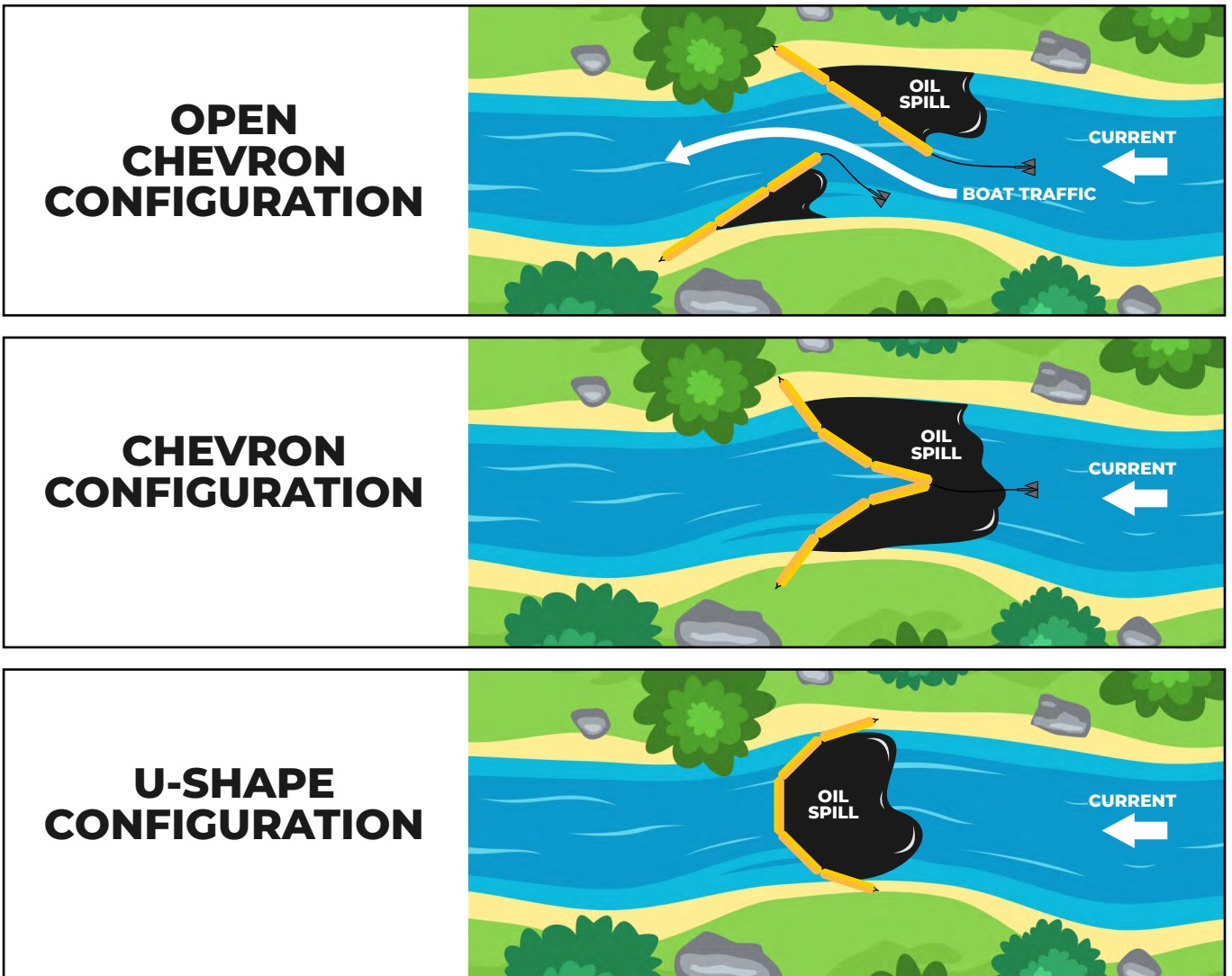
DOUBLE ANCHOR CONFIGURATION



DUAL DIRECTION ANCHOR CONFIGURATION



OIL SPILL CONTAINMENT BOOM CONFIGURATION



EnviroCsmart



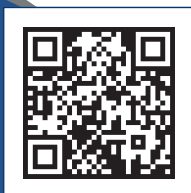
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