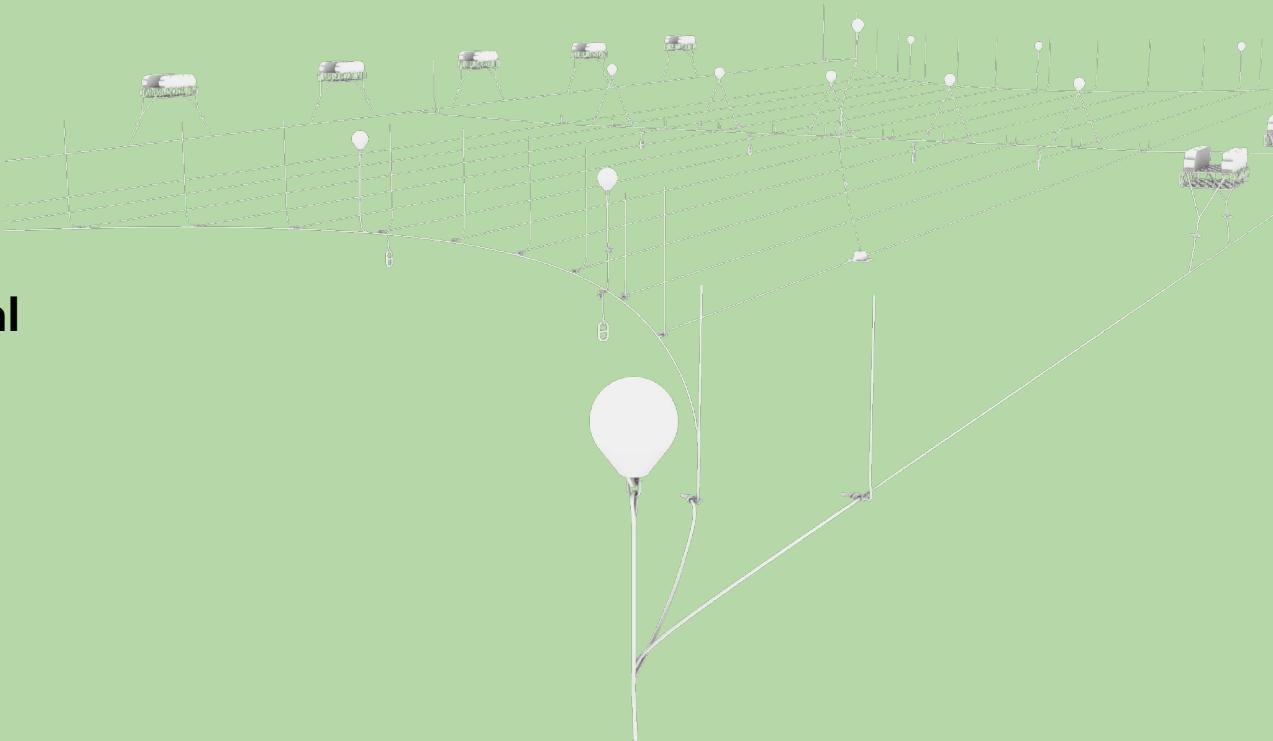




Open Climate Solutions

Farm Pilot Manual



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About the Manual

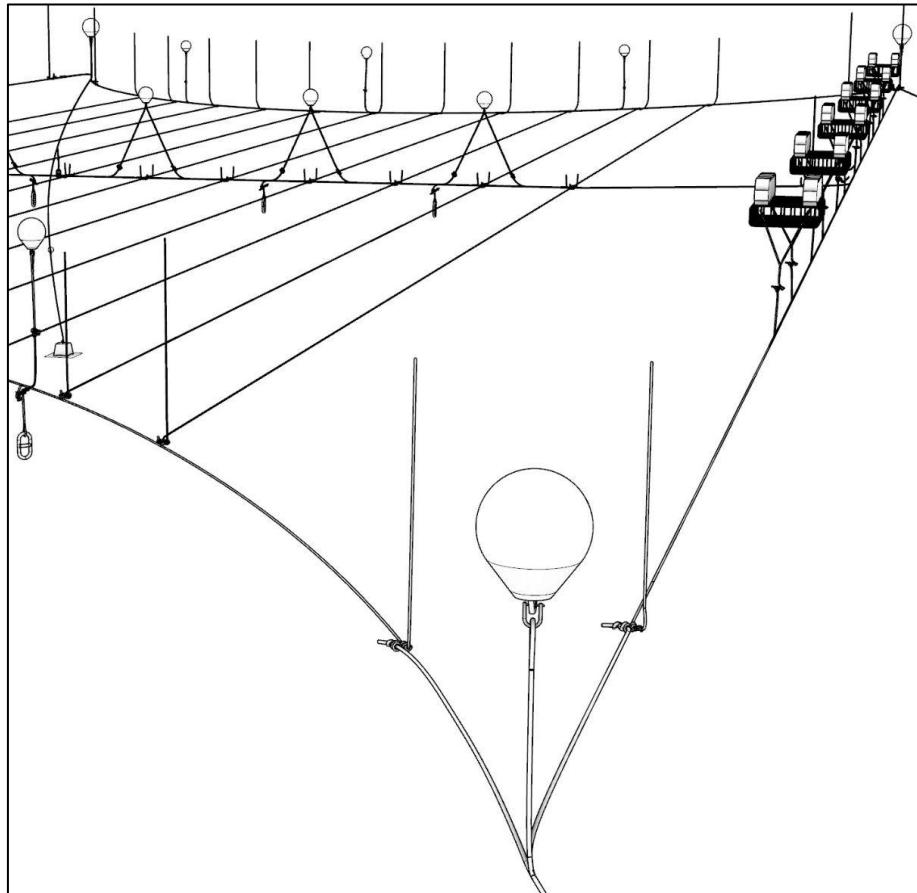
This manual should serve as a comprehensive guide for both industry professionals and individuals interested in exploring the seaweed farming space with the potential of starting their own small-scale project. Please keep in mind, that this manual is within the ethos of open source project, a working document where additional findings and community feedback is constantly added. This manual on seaweed cultivation provides an example of a seaweed farm designed for a specific location on the west coast of Scotland. It is strongly recommended to seek guidance from industry professionals when designing a farm to accommodate the unique requirements of any other site. This manual does not provide a warranty or guarantee for its content.

The legal landscape, including licensing requirements and regulations is not the main focus in this manual, since regional requirements can be very different, but it should be noted that designing an efficient and environmentally friendly farm respecting all regulations is the first crucial step. So please consult with the regulatory body or industry professionals within your region. The presented layout represents one version among many possible farm designs. Therefore, it is encouraged to explore different farm layouts that best fit regional infrastructure requirements, technology integration, and regulatory frameworks to optimize for the best results.

This exploration also involves understanding the budget and aligning it with the procurement process for seaweed farming equipment and materials. From selecting species-specific cultivation gear to sourcing sustainable construction materials, it is essential to ensure that you have the right resources for a successful operation.

The farm component section aims to provide a blueprint for turning plans into reality. Follow step-by-step instructions on constructing seaweed cultivation structures, installing equipment, and implementing efficient farm seeding techniques.

The seeding process begins at the nursery and continues through cultivation. Keep in mind the specific needs of different seaweed species and how to nurture them through their growth stages. Learn best practices for monitoring and maintaining a healthy crop.





Farm Scope:

2.76

Seabed footprint:

A-B: 209m

A-C: 79.35m

C-D: 218.35m

D-B: 825m

Mooring line length:

Line A: 66m

Line B: 67.5m

Line C: 69.1m

Line D: 70.8m

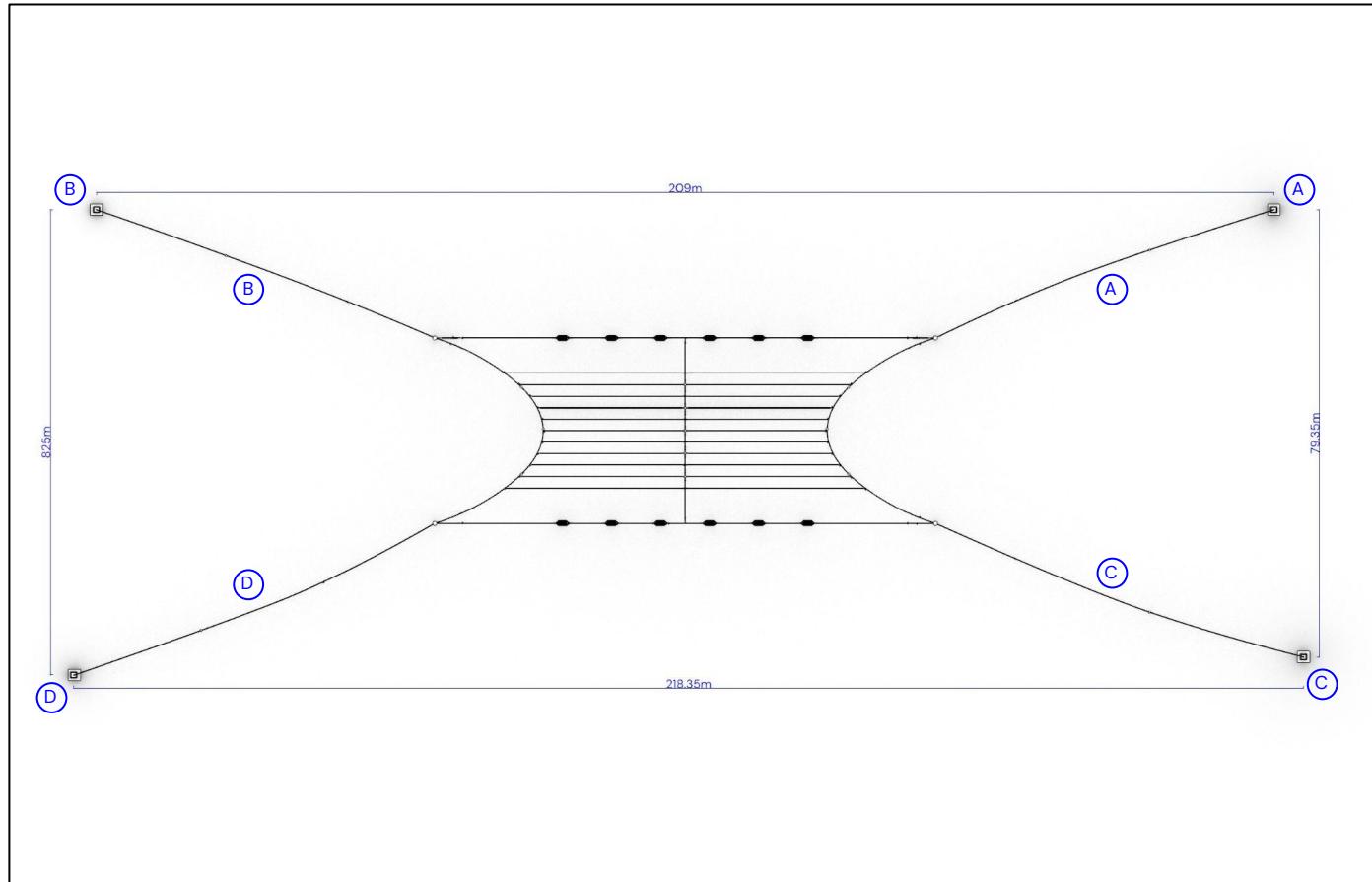
Growline length total:

Alaria esculenta: 100m

Saccharina latissima: 350m

Direct seed lines total:

Saccharina latissima: 100m





Farm Scope:

2.76

Seabed footprint:

A-B: 209m

A-C: 79.35m

C-D: 218.35m

D-B: 825m

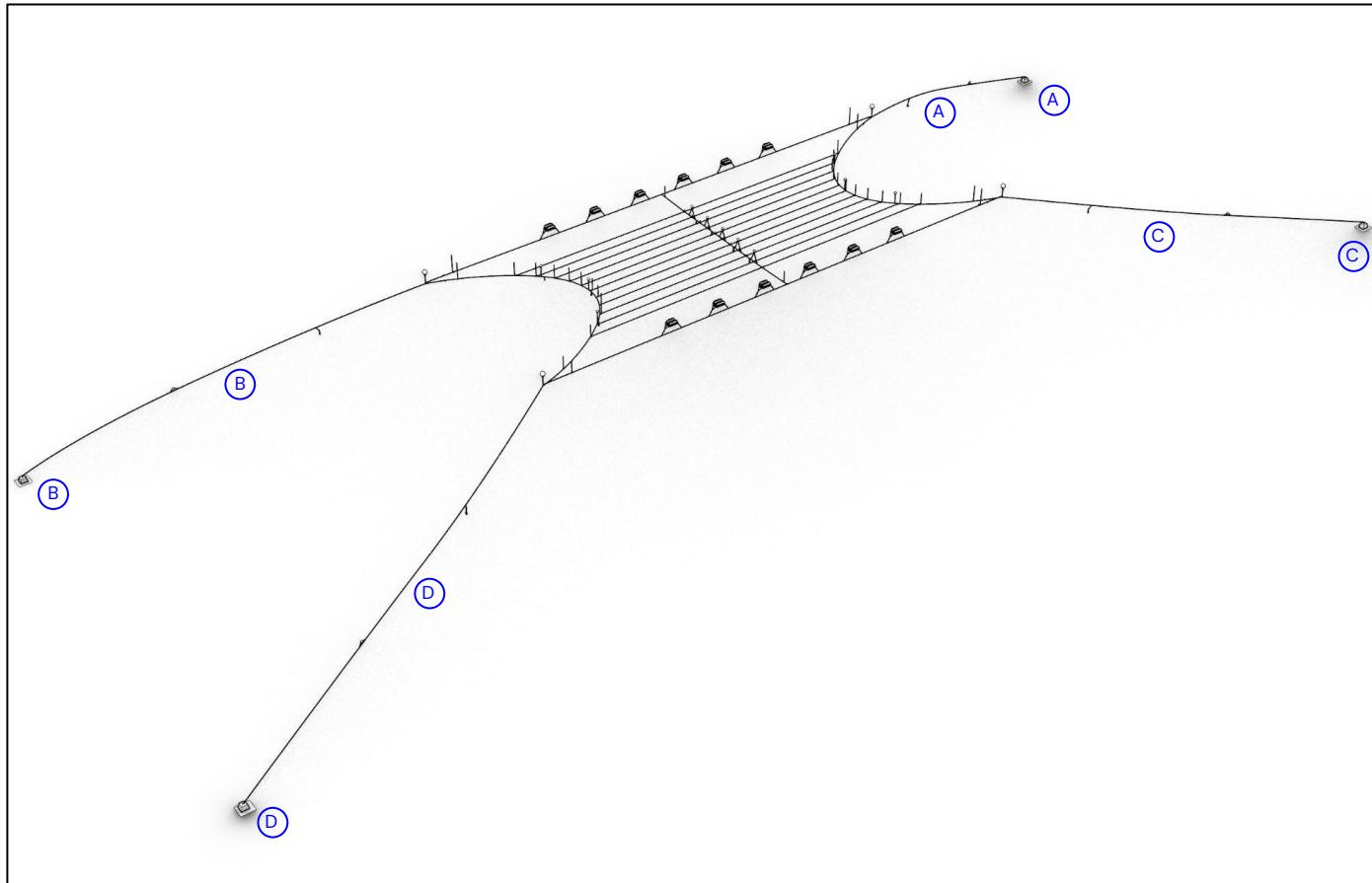
Mooring Line Length:

Line A: 66m

Line B: 67.5m

Line C: 69.1m

Line D: 70.8m



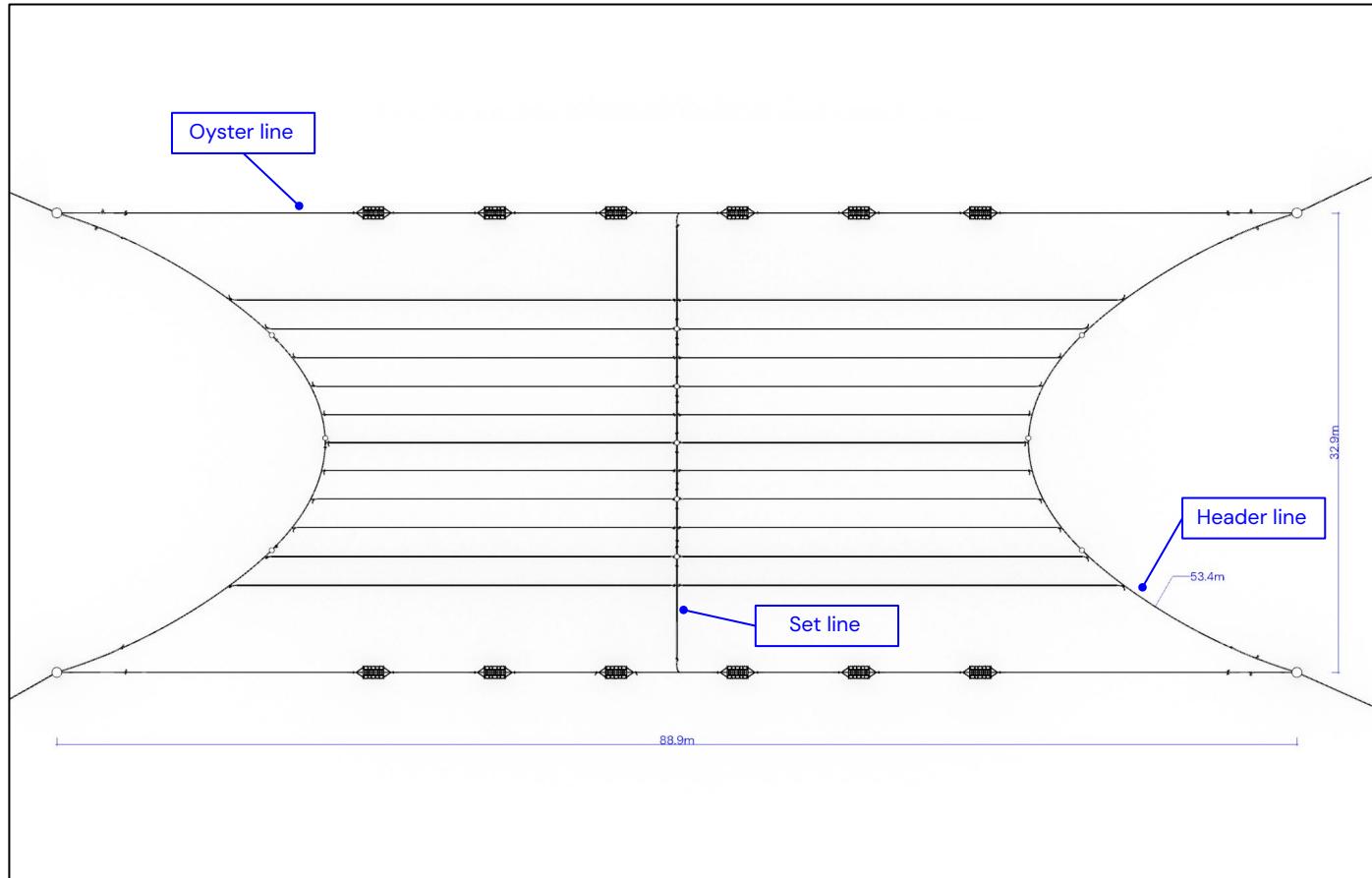


Frame lines and set line

Header line: 53.4m
18mm Polysteel (3 strand)

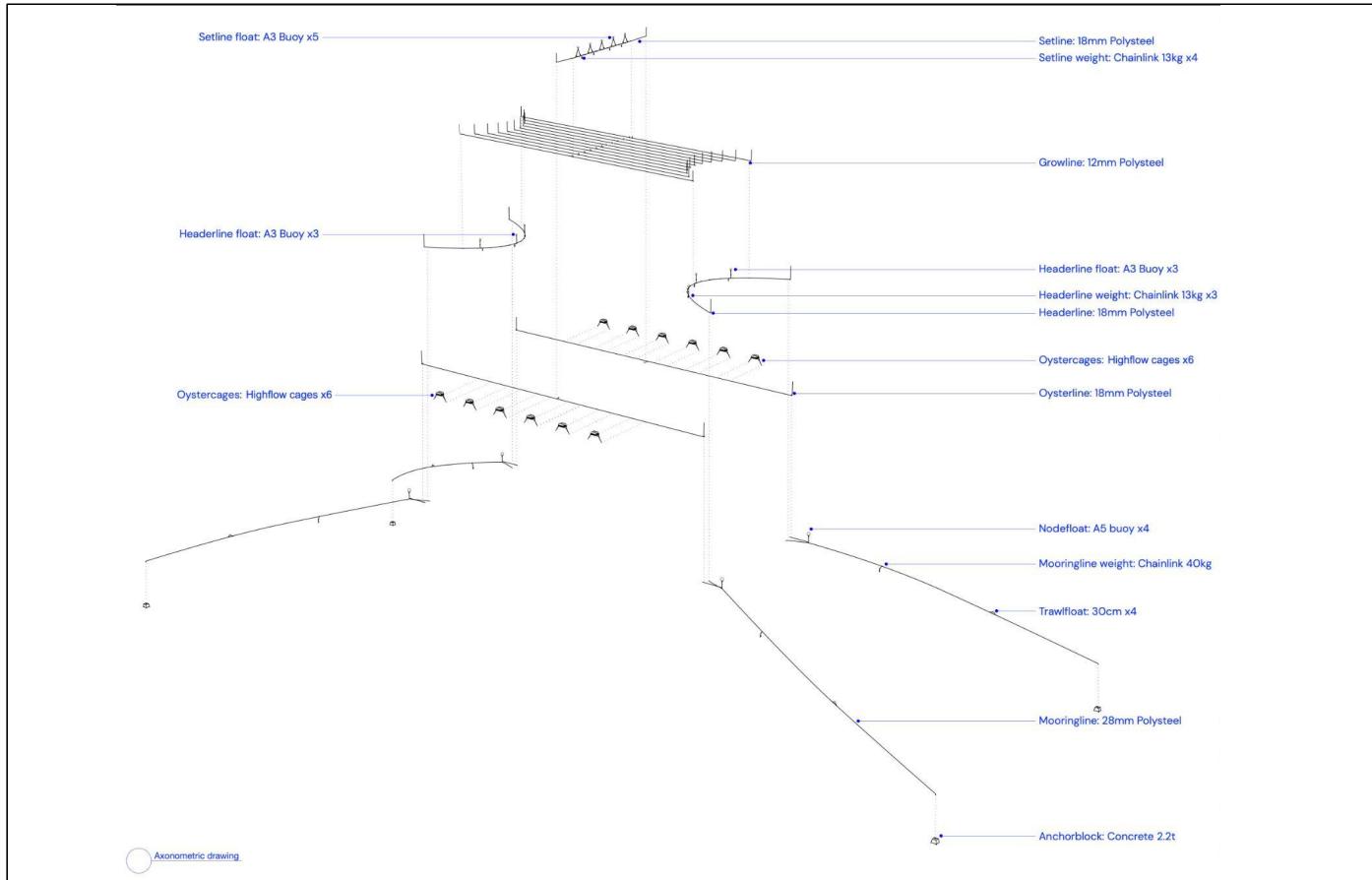
Oyster line: 88.9m
18mm Polysteel (3 strand)

Set line: 32.9m
18mm Polysteel (3 strand)





Axonometric drawing





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Farm Components

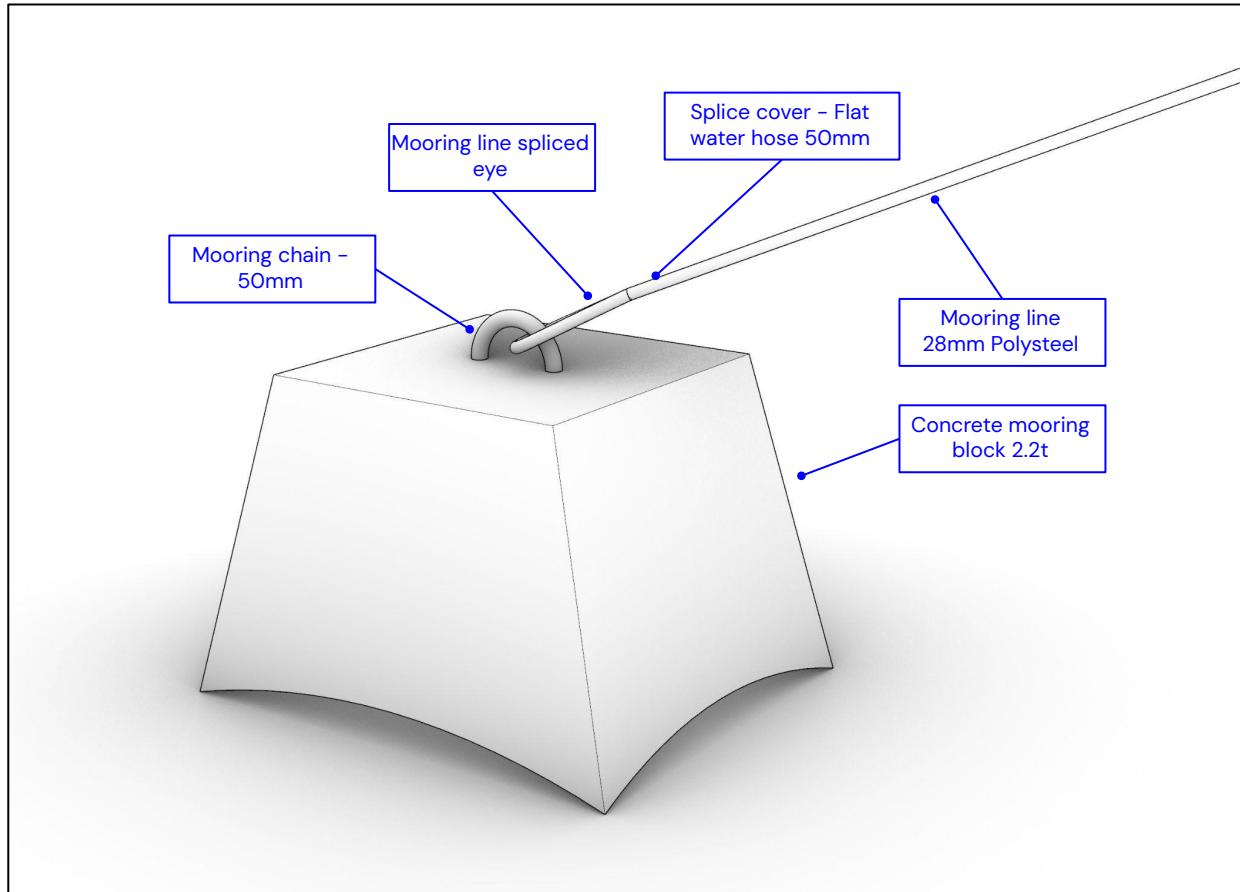


Mooring block

2.2t concrete block

Dimensions: 120x80x80cm

Mooring block





Mooring Line Length:

Line A: 66m

Line B: 67.5m

Line C: 69.1m

Line D: 70.8m

**Float attachment-
m from anchor:**

Line A 23.7m

Line B 27.1m

Line C 19.8m

Line D 25.7m

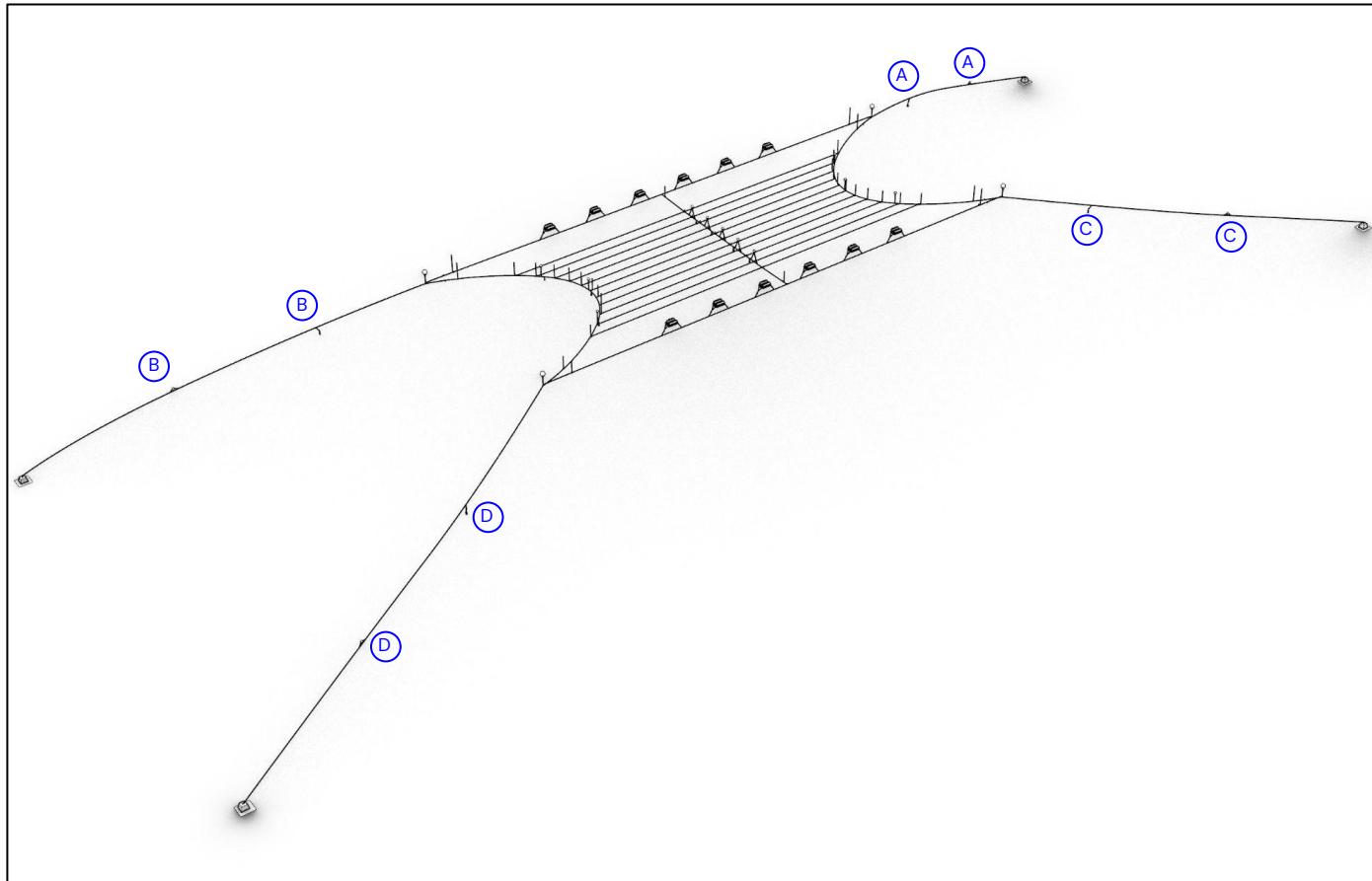
**Angel attachment-
m from anchor:**

Line A 50.4m

Line B 50.4m

Line C 50.4m

Line D 50.4m





Mooring line – Trawl float/ Chainlink weight

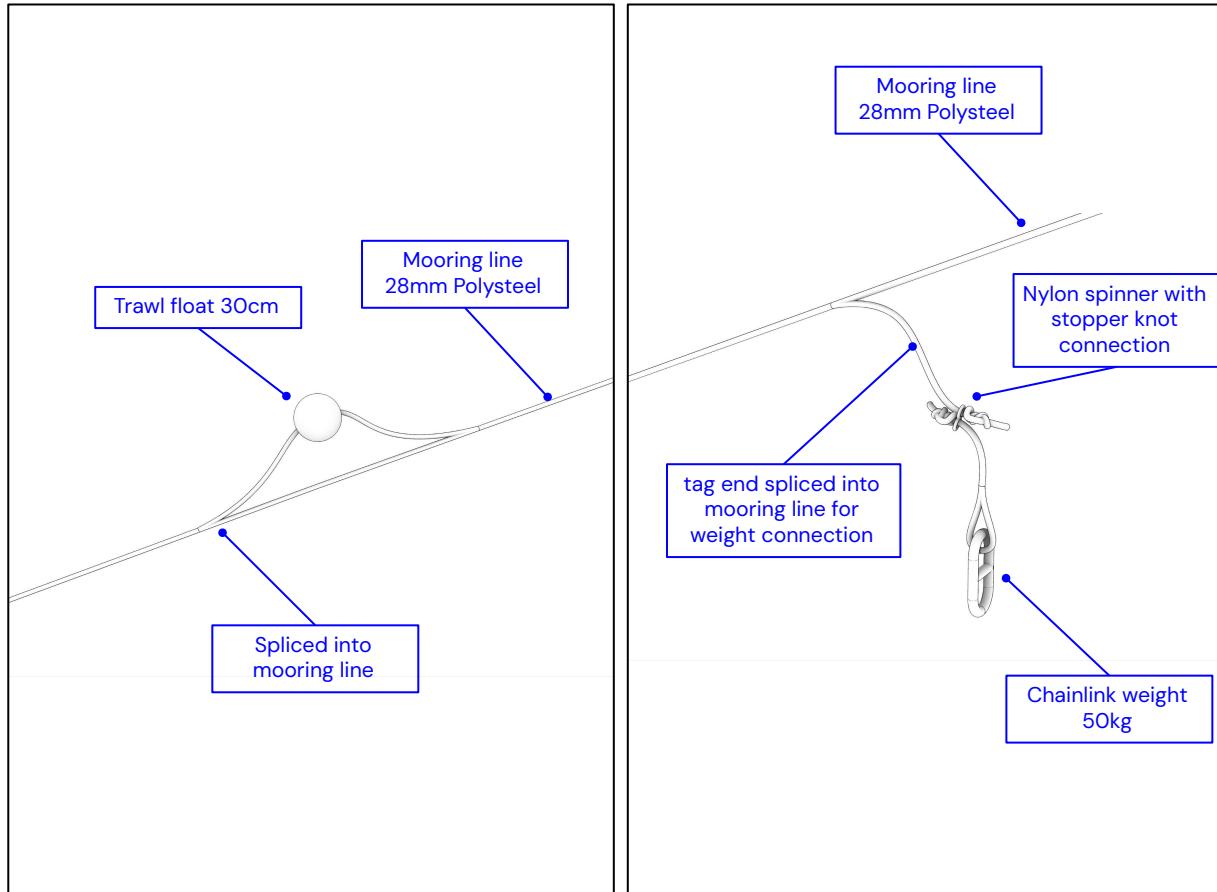
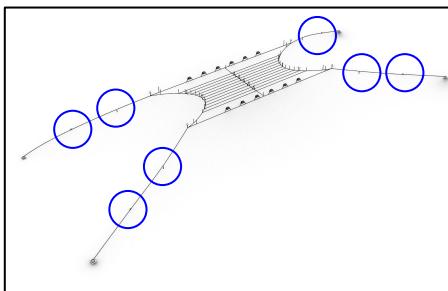
Mooring line:

28mm Polysteel (3 strand)

Trawl float: 30cm

Chainlink weight: 50kg

All four mooring lines should have a float to avoid damaging the mooring line, which can happen in low tide, by abrasion of the mooring line on the mooring block.





Corner nodes

Corner node:

Mooring line:

28mm Polysteel (3 strand)

Header line:

18mm Polysteel (3 strand)

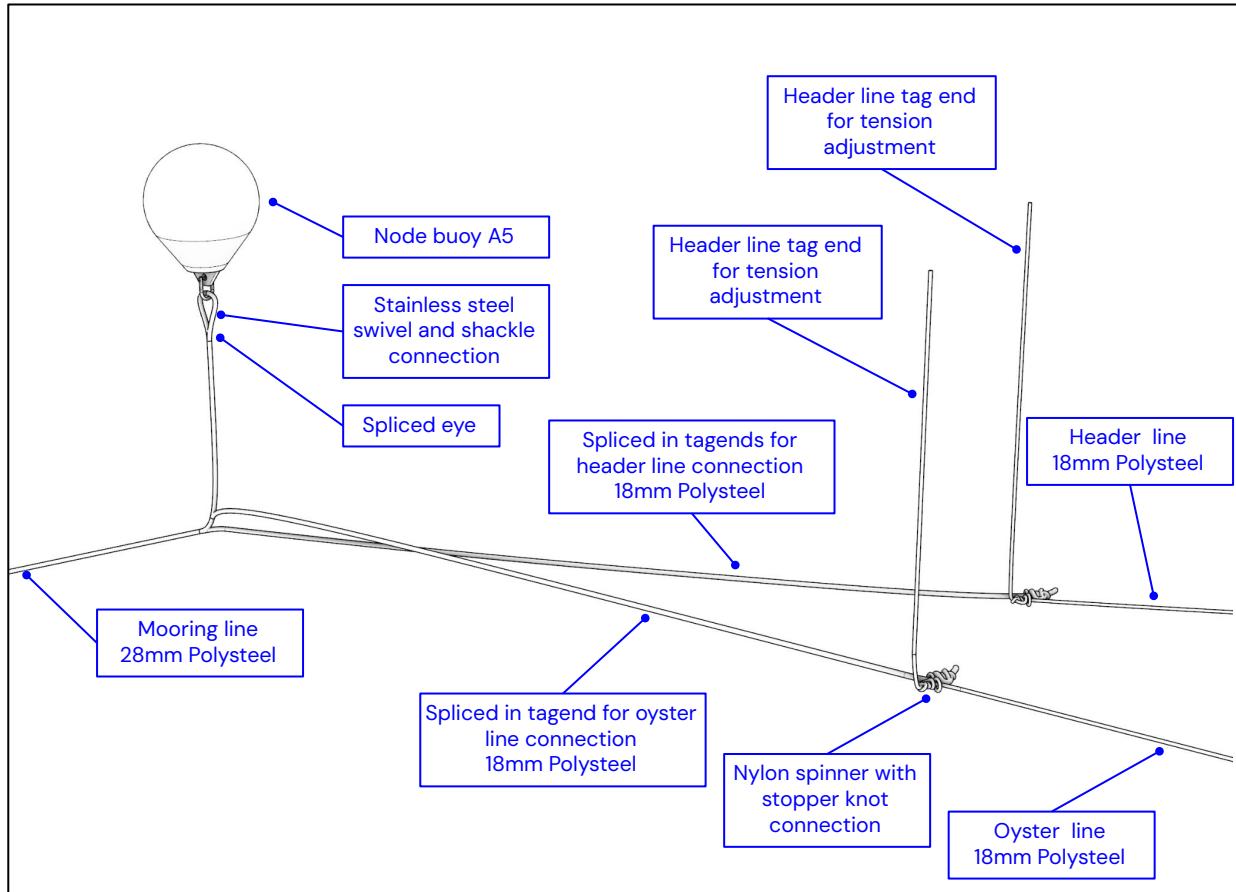
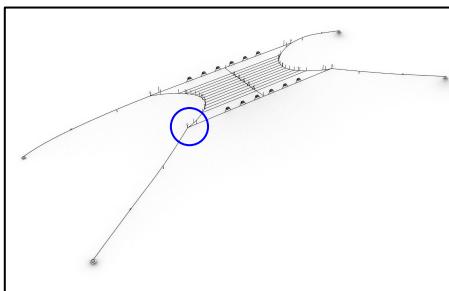
Oyster line:

18mm Polysteel (3 strand)

Connections:

XL Nylon Spinner with stopper knots on both sides of connected lines

Buoy: A5





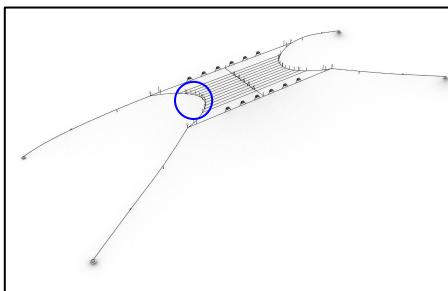
Header Line: 53.4m
18mm Polysteel (3 strand)

Connections:

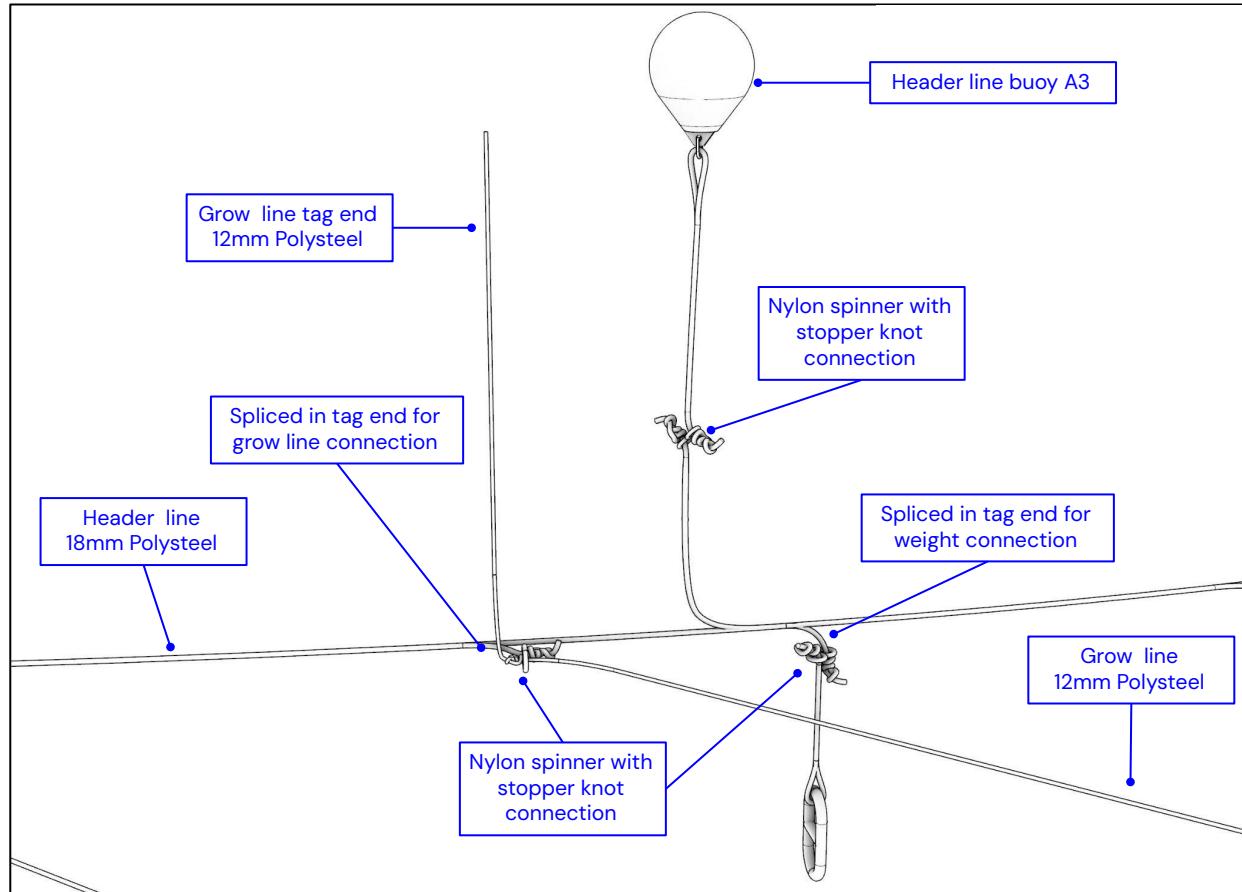
XL Nylon Spinner with stopper knots on both sides of connected lines

Buoy: A3

Weight: Chainlink 13kg



Header line





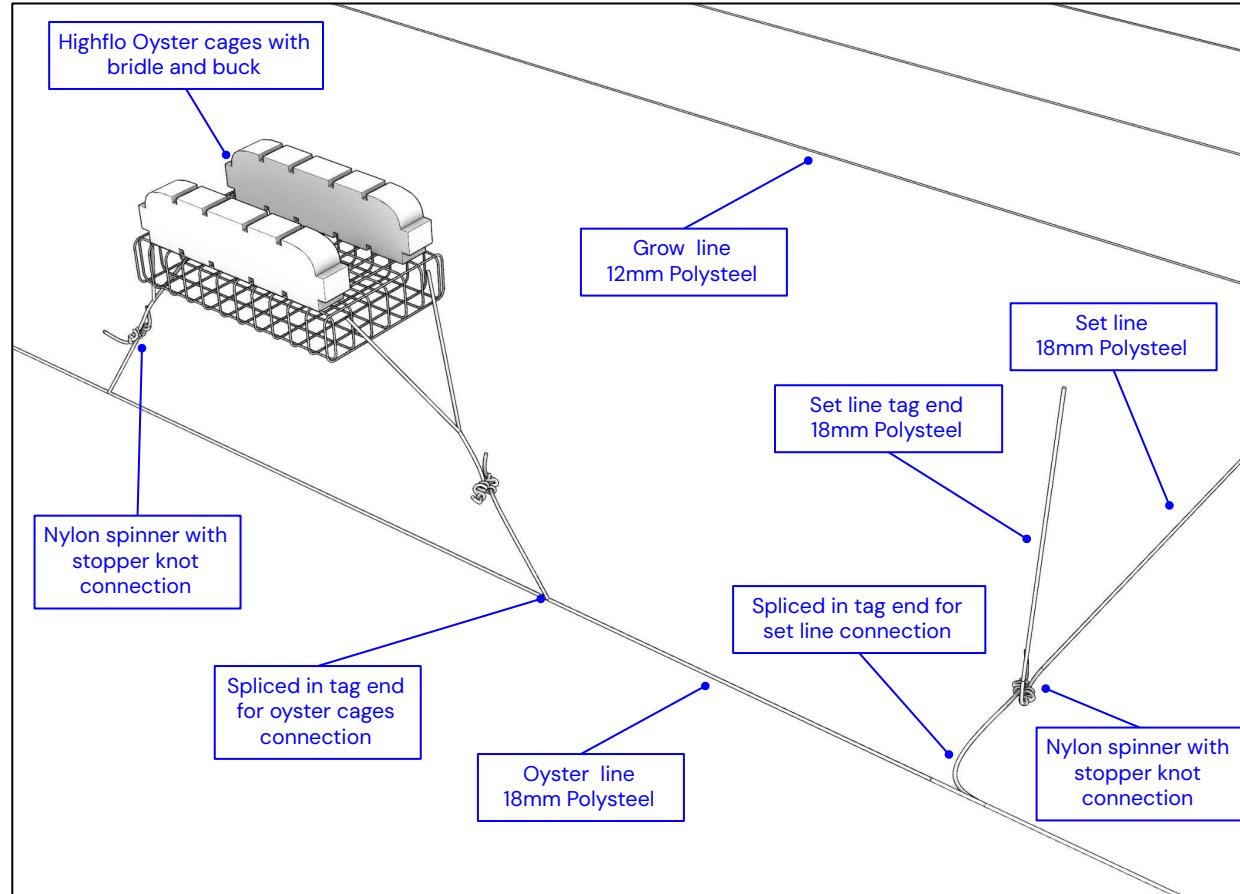
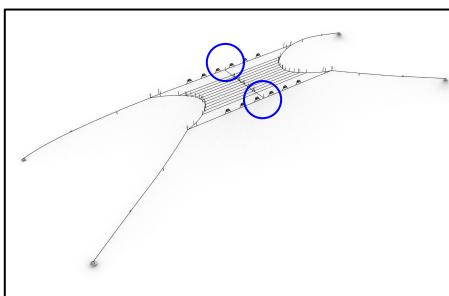
Oyster line- Oyster farming system

Oyster Line: 88.9m
18mm Polysteel (3 strand)

Connections:

XL Nylon Spinner with stopper knots on both sides of connected lines

Oyster farming system:
[OysterGro Highflo model](#)





Oyster farming system- positions

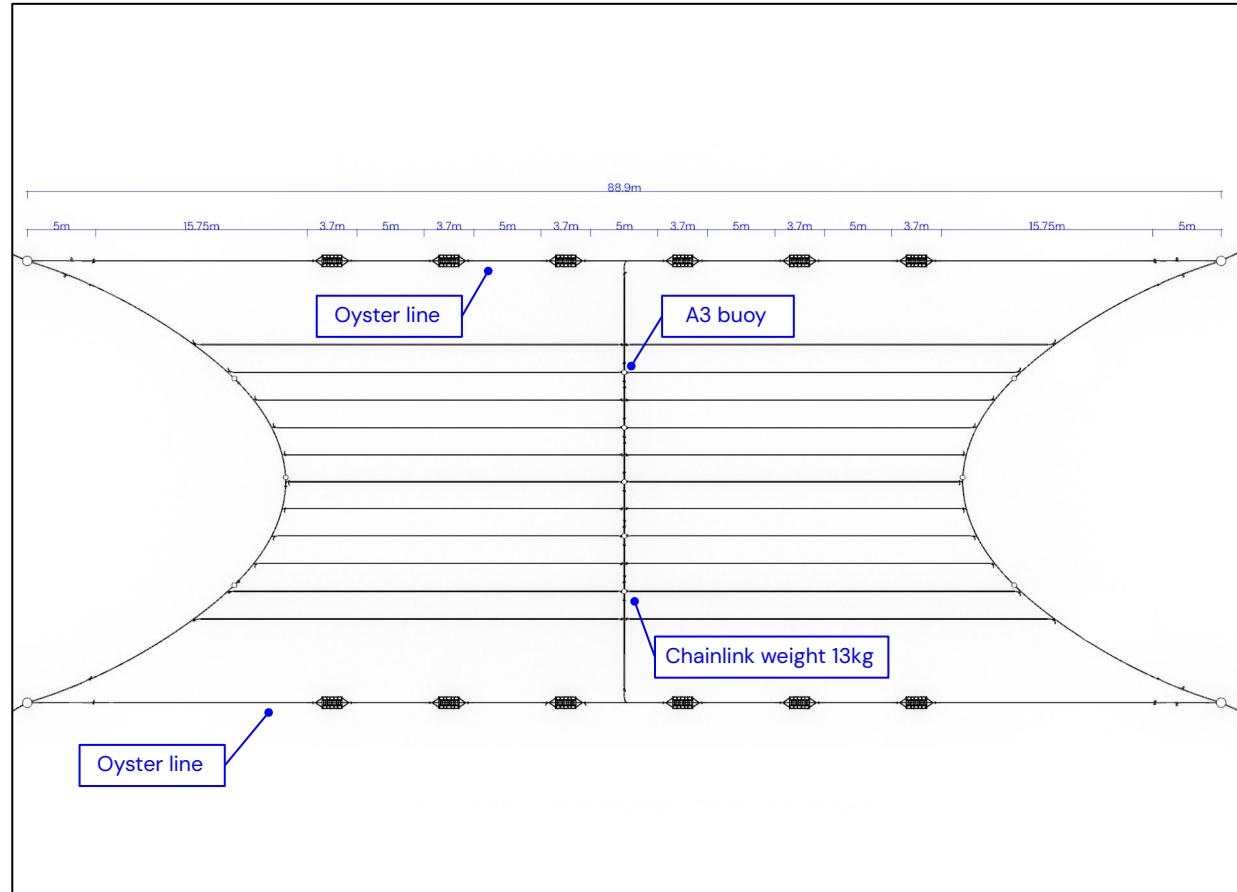
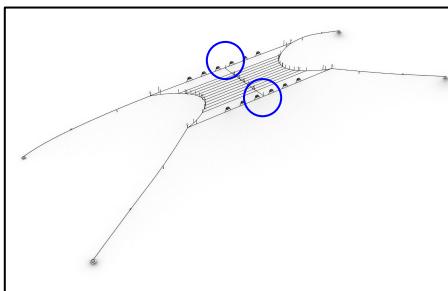
Oyster farming system:
[Oystergro Highflo model](#)

Oyster Line: 88.9m
18mm Polysteel (3 strand)

Connections:
XL Nylon Spinner with
stopper knots on both
sides of connected lines

Buoy: A3x 5

Weight: Chainlink 13kgx 5





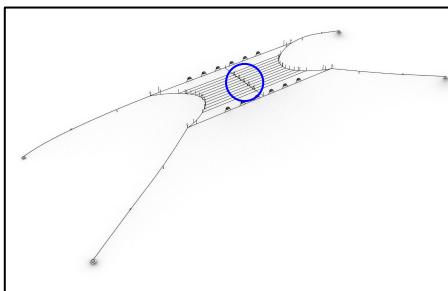
Set Line: 32.9m
18mm Polysteel (3 strand)

Connections:

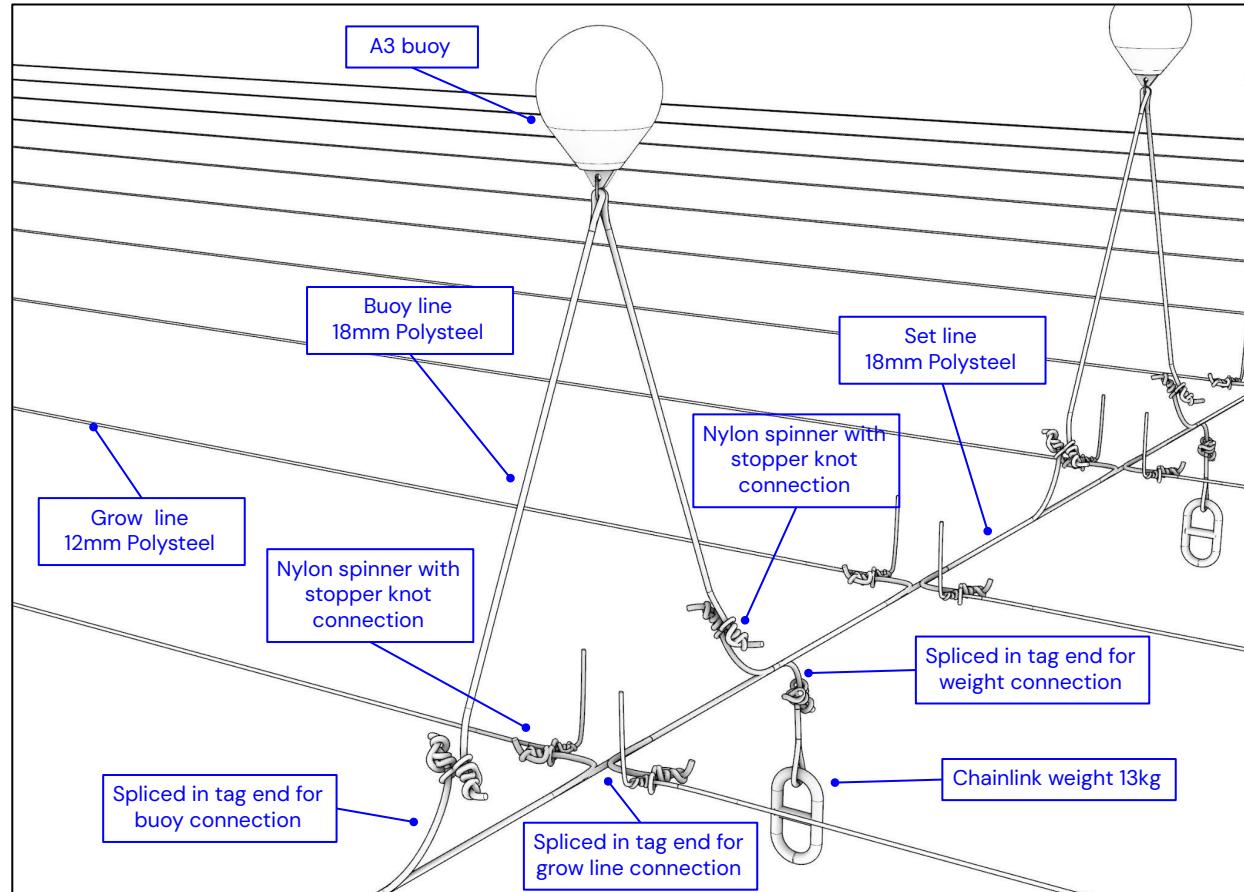
XL Nylon Spinner with stopper knots on both sides of connected lines

Buoy: A3x 5

Weight: Chainlink 13kgx 5



Set line





Grow line:

12mm Polysteel (3 strand) x 11

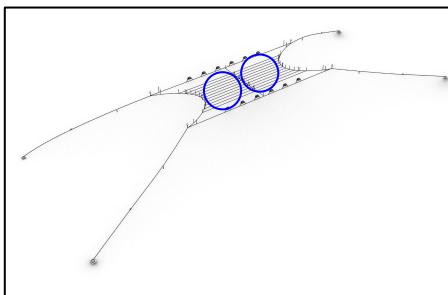
Connections:

XL Nylon Spinner with stopper knots on both sides of connected lines

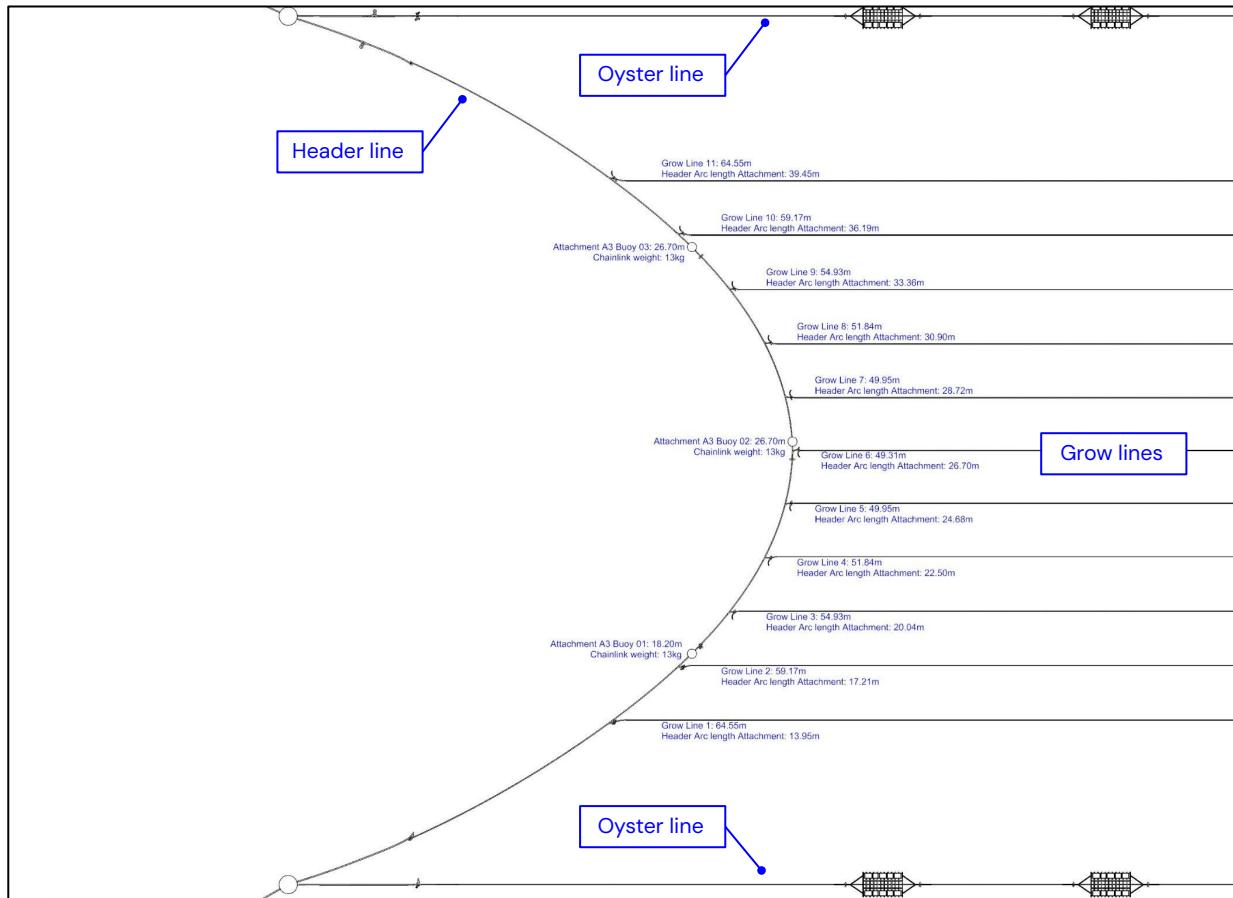
Buoy: A3 x3 , along header line

Weight: Chainlink 13kg x3 , along header line

Each grow line has a nylon spinner/ stopper knot connection, which allows for easy tension adjustment and attaching or detaching of the line. The grow lines are in two individual segments, the center ends are connected to the set line.



Grow line





Grow line:

12mm Polysteel (3 strand) x 11

Growline length total:

(Standard seeded line with twine)

Alaria esculenta: 100m

Saccharina latissima: 350m

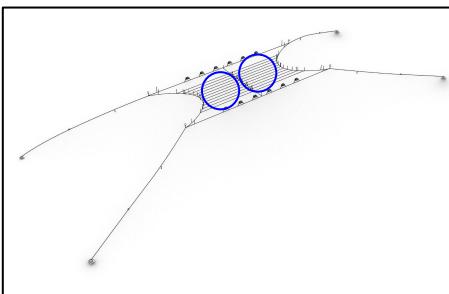
Lines 1-4, 6 and lines 8-11

Direct seed lines total:

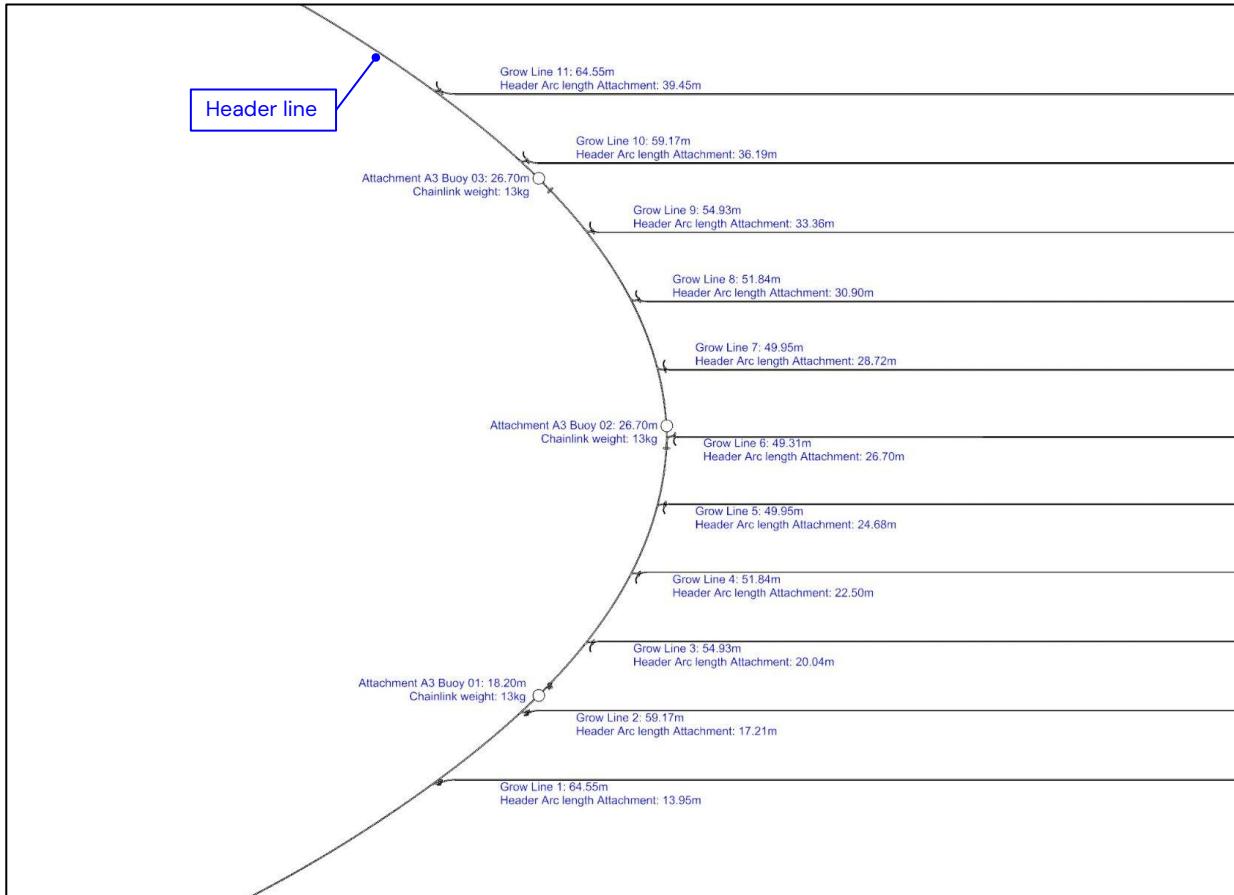
Saccharina latissima: 100m

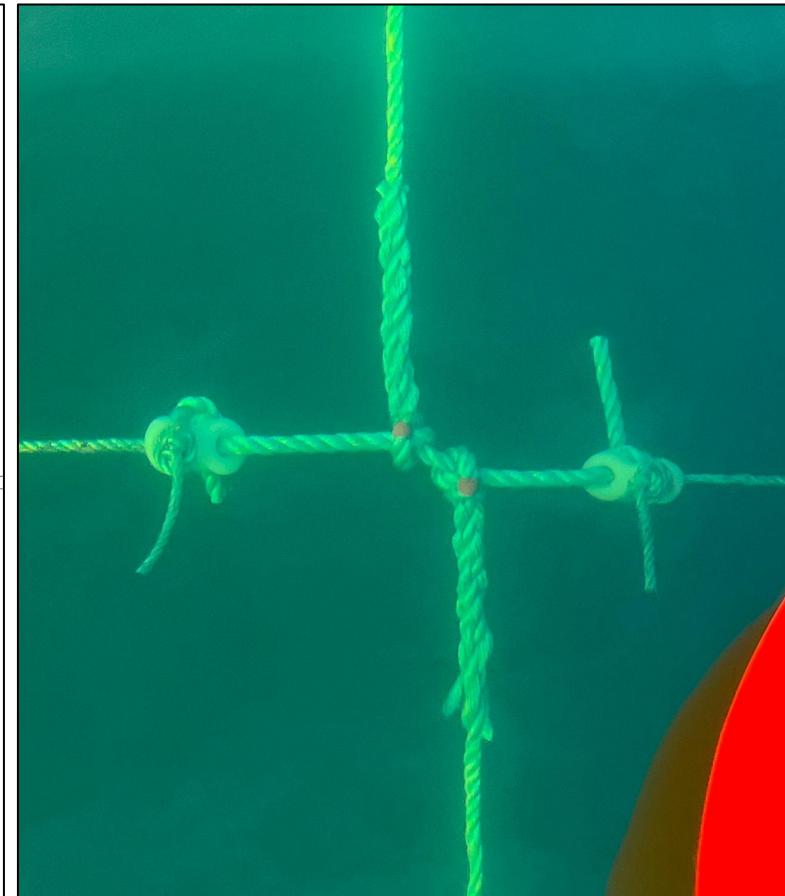
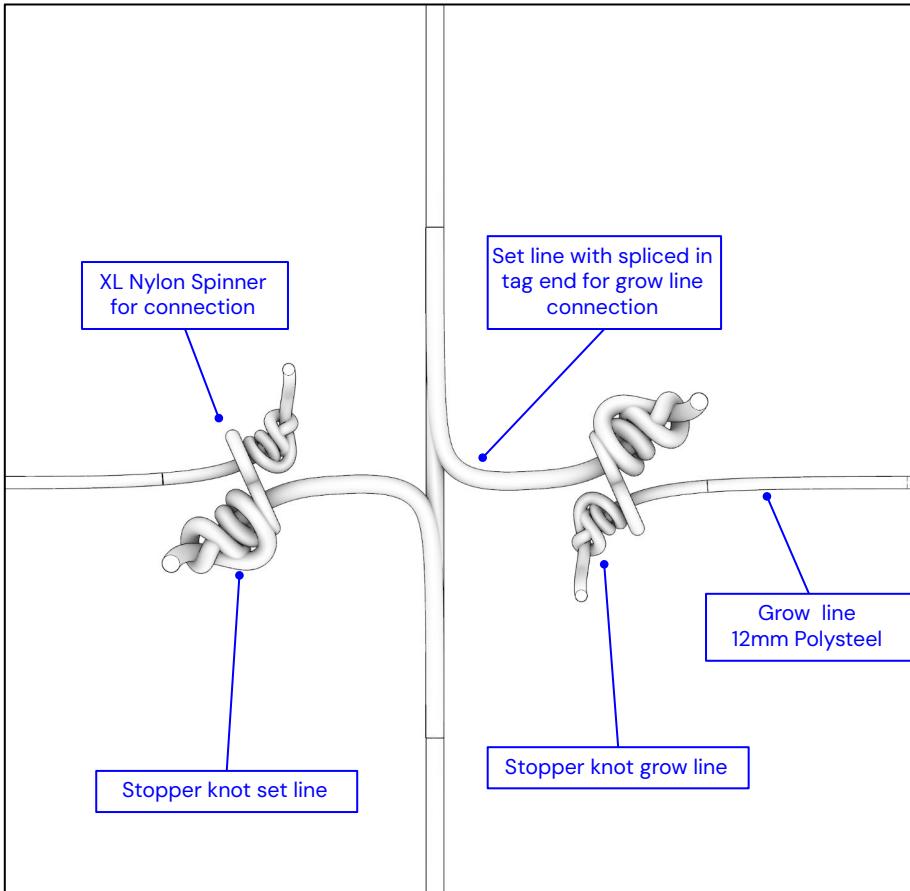
Line 5 and line 7

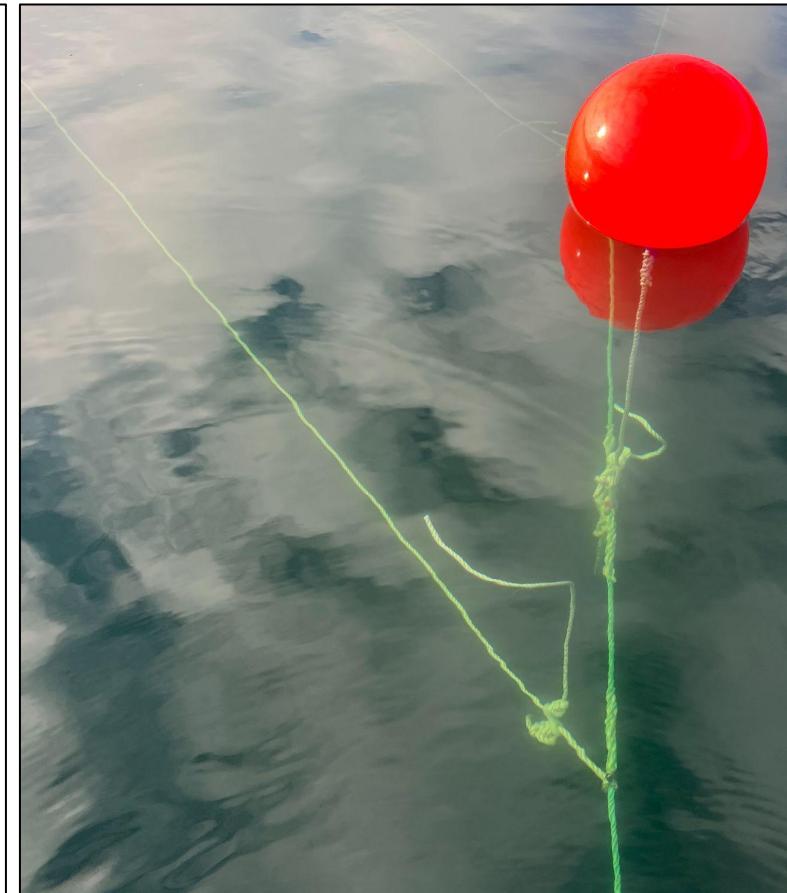
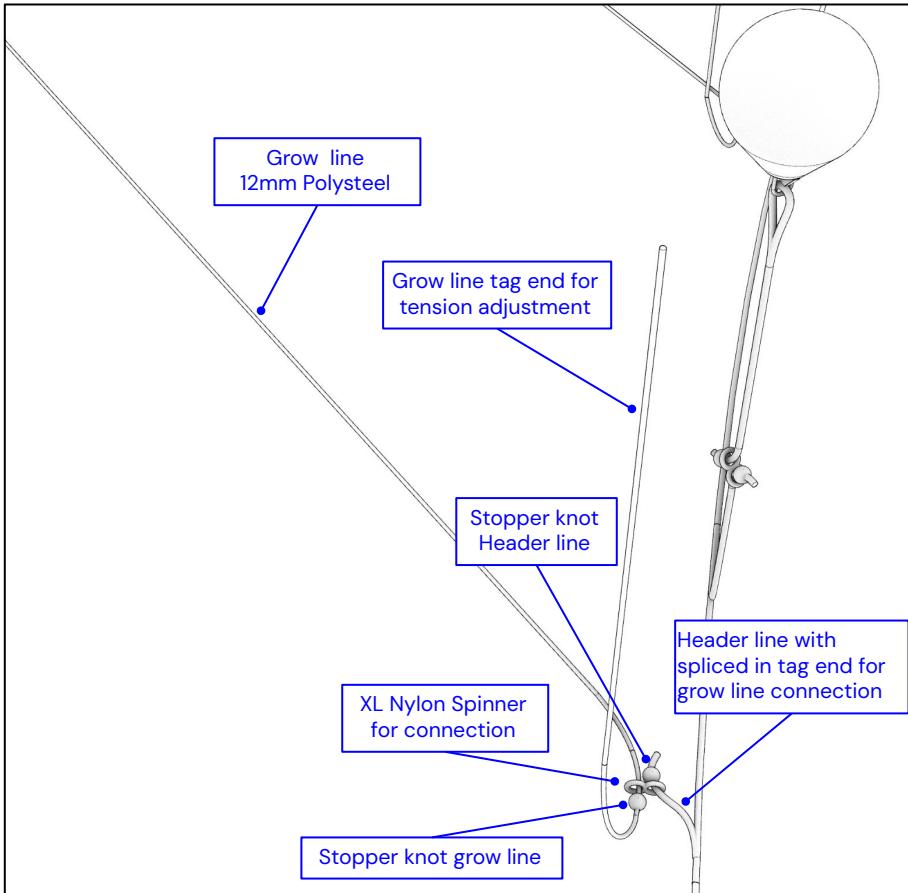
Each grow line has a nylon spinner/ stopper knot connection, which allows for easy tension adjustment and attaching or detaching of the line. The grow lines are in two individual segments, the center ends are connected to the set line.



Grow line









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Farm seeding



Farm seeding- Seeding tool

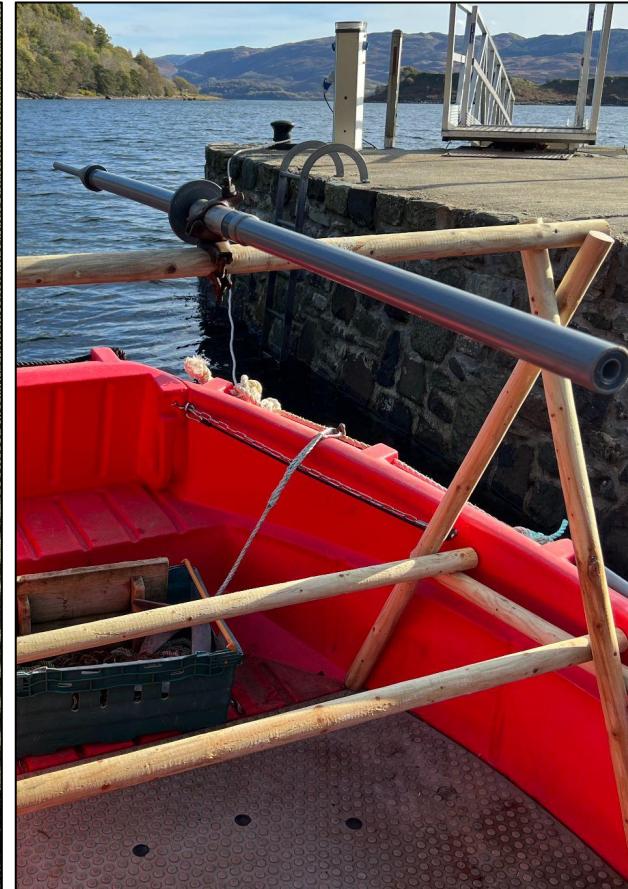
Seeded twine:

Alaria esculenta: 100m
Saccharina latissima: 350m

For the application of the seeded twine we recommend a seeding tool, see image on the left. Basically it can be a tube which allows the seeded twine spool to be mounted onto it. This will help to release some initial tension from the seed lines when applied onto the grow lines, additionally the seeded twine will wrap correctly around the grow lines during the application.

left image:
seeded twine wrapped around a plastic tube.

right image:
seeding tool without a seeded twine tube on it.





Seeded twine:

Alaria esculenta: 100m
Saccharina latissima: 350m

For the application of the seeded twine we recommend a so called seeding tool, see image on the left, Basically it can be an tube which allows the seeded twine spool to be mounted onto it. This will help to release some initial tension from the seed lines when applied onto the grow lines, additionally the seeded twine will wrap correctly around the grow lines during the application.

left image:

seeding tool with a seeded twine tube placed on it. The grow line runs through the tool, at the beginning of it the seeded twine should be attached. Keep an offset of roughly 2m for tag ends and stopper knot.

right image:

seeded twine is wrapped well around the grow lines, the ends of the twine should be again fixed with a knot onto the grow line.





Grow lines- applied seeded twine

Seeded twine:

Alaria esculenta: 100m
Saccharina latissima: 350m

left image:

Grow lines with already applied seeded twine, the twine is visible close to the stopper knot connection of the grow line and the header line.

right image:

Grow lines with seeded twine wrapping around them.





Farm marine engineering



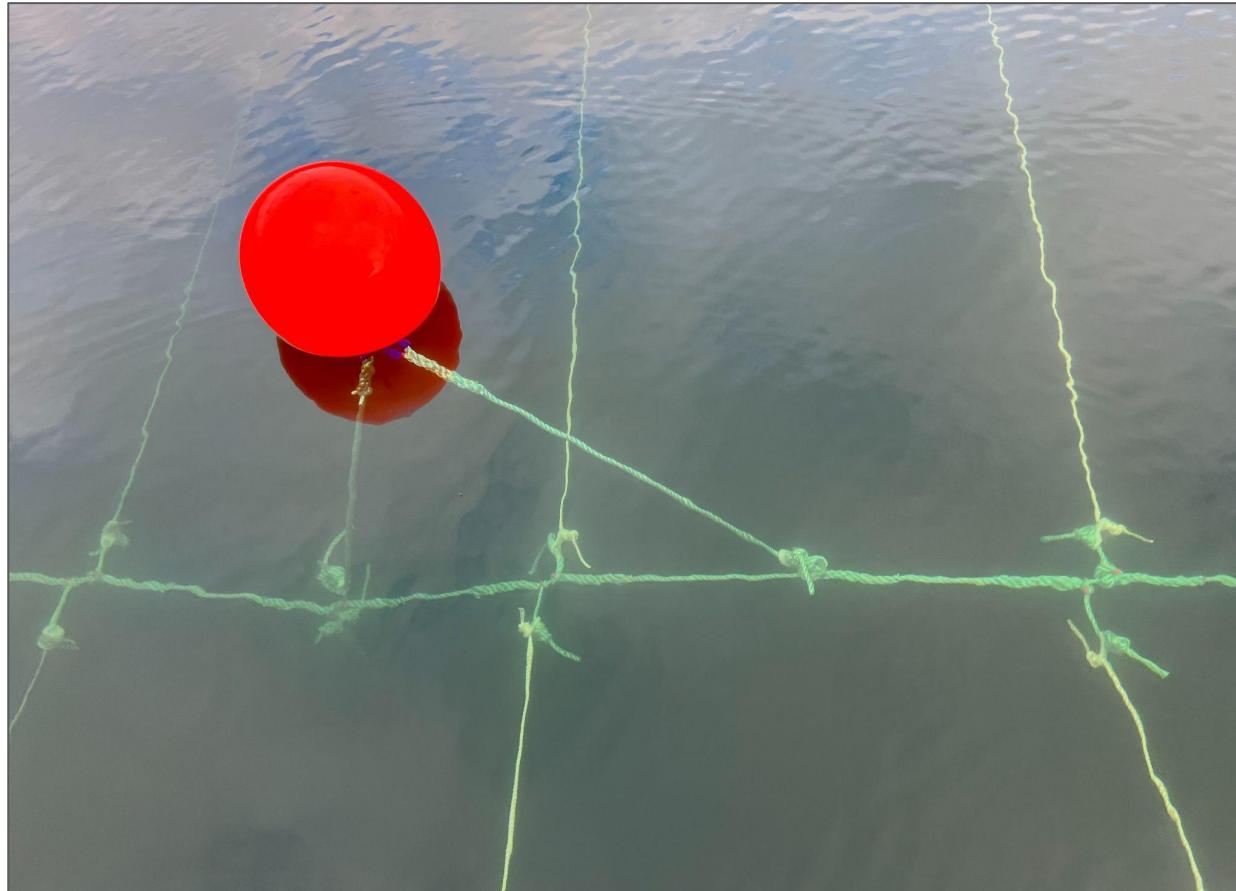
Introduction to engineering report:

This report is calculated and simulated for a specific site on the west coast of Scotland, it is highly advisable to consult an engineer while designing a farm to address all specific structural conditions of a farm.

The report should include simulations of various characteristic load cases to analyze how the proposed system would respond to fluctuations in current, wave, wind, and tidal conditions to optimize the performance and operability of the envisioned aquaculture farm system.

The engineering report should entail the computation of extreme current, wave, and wind conditions associated with a storm that has a 50-year recurrence interval (referred to as the 50-year storm). This calculation utilizes a hindcast model based on current and wave data, which has been validated through comparisons with nearby ocean observations.

This report was developed by Kelson Marine, all materials in this section are published with allowance by Kelson.





Farm budget

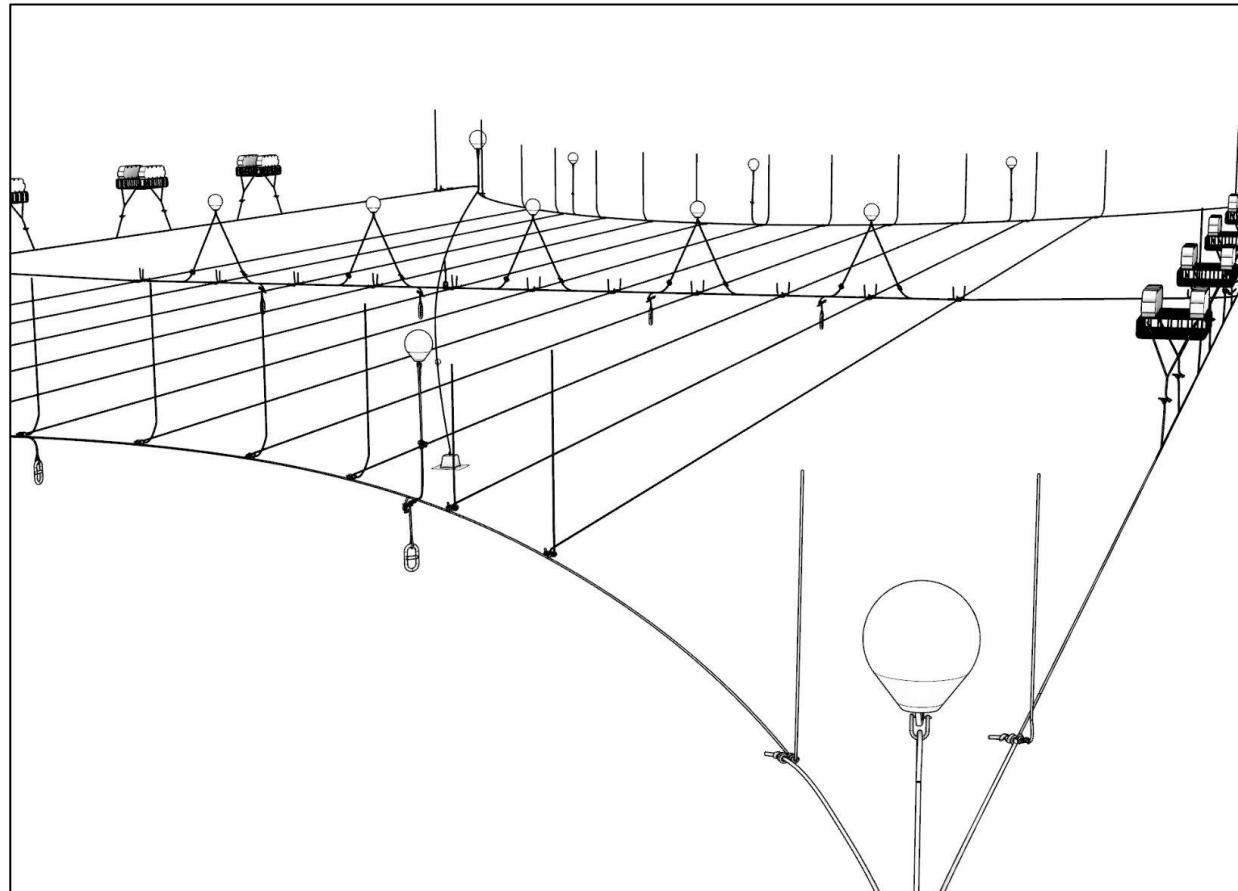


Introduction to the budget sheet:

This comprehensive budget sheet should help to assist in planning and managing the financial planning and procurement of a seaweed farm. The figures presented here serve as a usable reference point, but it's essential to acknowledge local price differentiations, which are always inherent and can significantly impact the budget.

The budget sheet, ranges from administrative costs such as the application, the anchor components, listing additional farm components used in this design, the different ropes needed and the seeded twine for the grow lines.

These variances in prices, either resulting from an adapted design or the characteristics of the local fishing and seaweed farming ecosystem in the selected area shall we respected in the planning of the budget.





Farm maintenance



Introduction to the farm maintenance:

Seaweed farming demands careful attention to various factors, environmental conditions, including water quality, and cultivation techniques.

While specific circumstances may vary, the principles outlined here provide a foundational framework that can be adapted to suit the unique requirements of your farm.

WIP





Farm harvest

