Huon Aquaculture Proposal Summary – Yellowtail Kingfish operations in the Mid-West Aquaculture Development Zone

August 2020

Contents

1 BACKGROUND

A Strategic Proposal to declare and establish the Mid-West Aquaculture Development Zone (MWADZ) was approved by the Minister for Environment in July 2017 (Ministerial Statement 1058).

The MWADZ is located approximately 75 kilometres west of Geraldton at the southern end of the Abrolhos archipelago, between the Pelsaert and Easter groups of islands (**Figure 1**). The Zone encompasses 3,000 hectares (ha) of marine waters and is divided into two separate areas. The Southern Area comprises an 800 ha existing licensed aquaculture site and the Northern Area comprises a 2,200 ha site.

Huon Aquaculture Company Pty Ltd (HAC) proposes to establish a finfish aquaculture site within the Northern Area of the MWADZ (**Figure 1**).

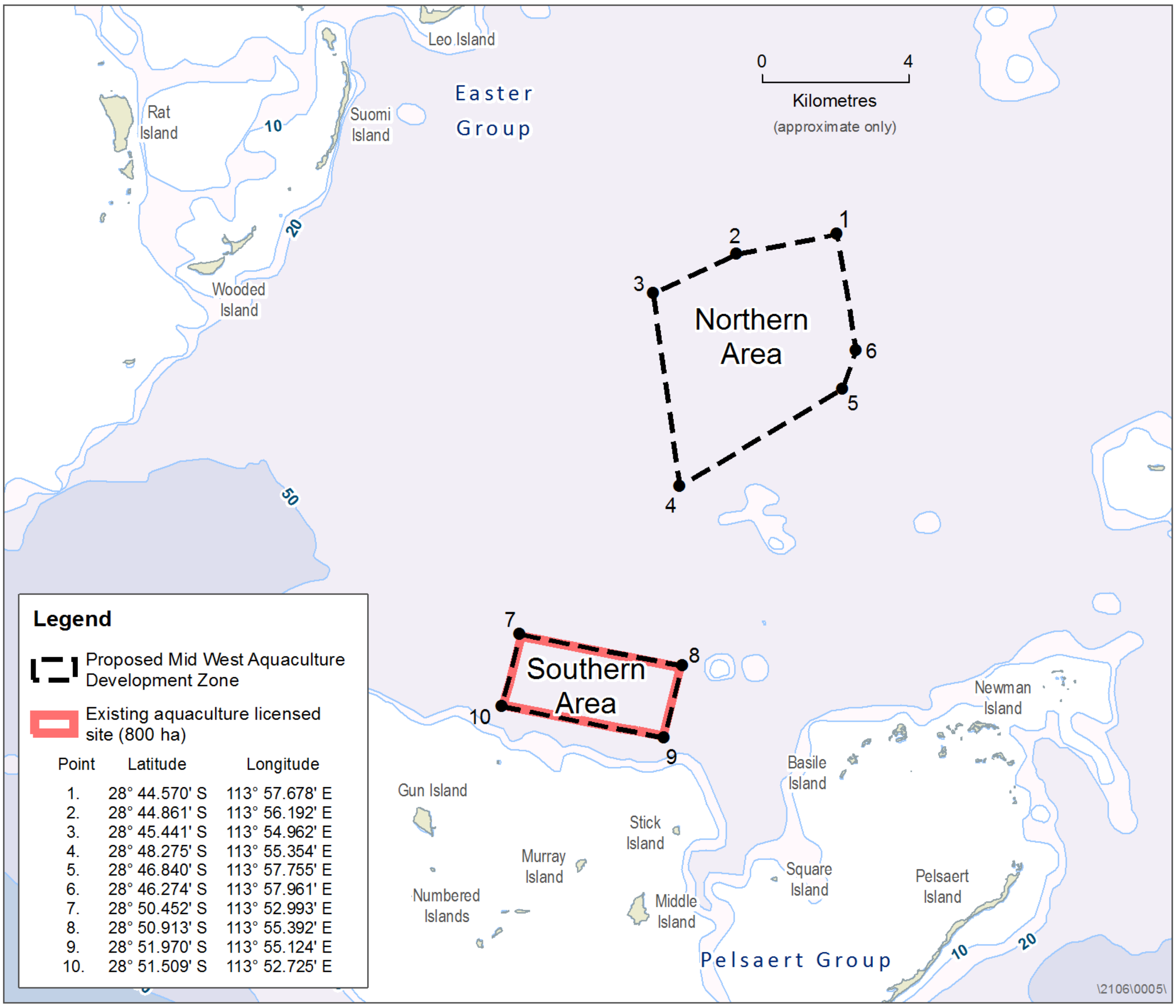


Figure 1 - Location of the Mid West Aquaculture Development Zone

2 OVERVIEW

2.1 Species & Culture Methods

HAC is proposing to farm yellowtail kingfish (*Seriola lalandi*) in the MWADZ.

HAC are committed to utilising a local (WA) supplier of juveniles cultured from locally (WA) sourced broodstock. In the initial phases of the staged development plan, HAC's preferred supplier is the Department of Primary Industries and Regional Development (DPIRD). DPIRD are proposing to develop a marine finfish nursery in Geraldton which will be essential for the establishment of a yellowtail kingfish industry in the MWADZ.

HAC will not compromise biosecurity by importing or supporting the import of biological material (broodstock, eggs or juvenile fish) from outside WA.

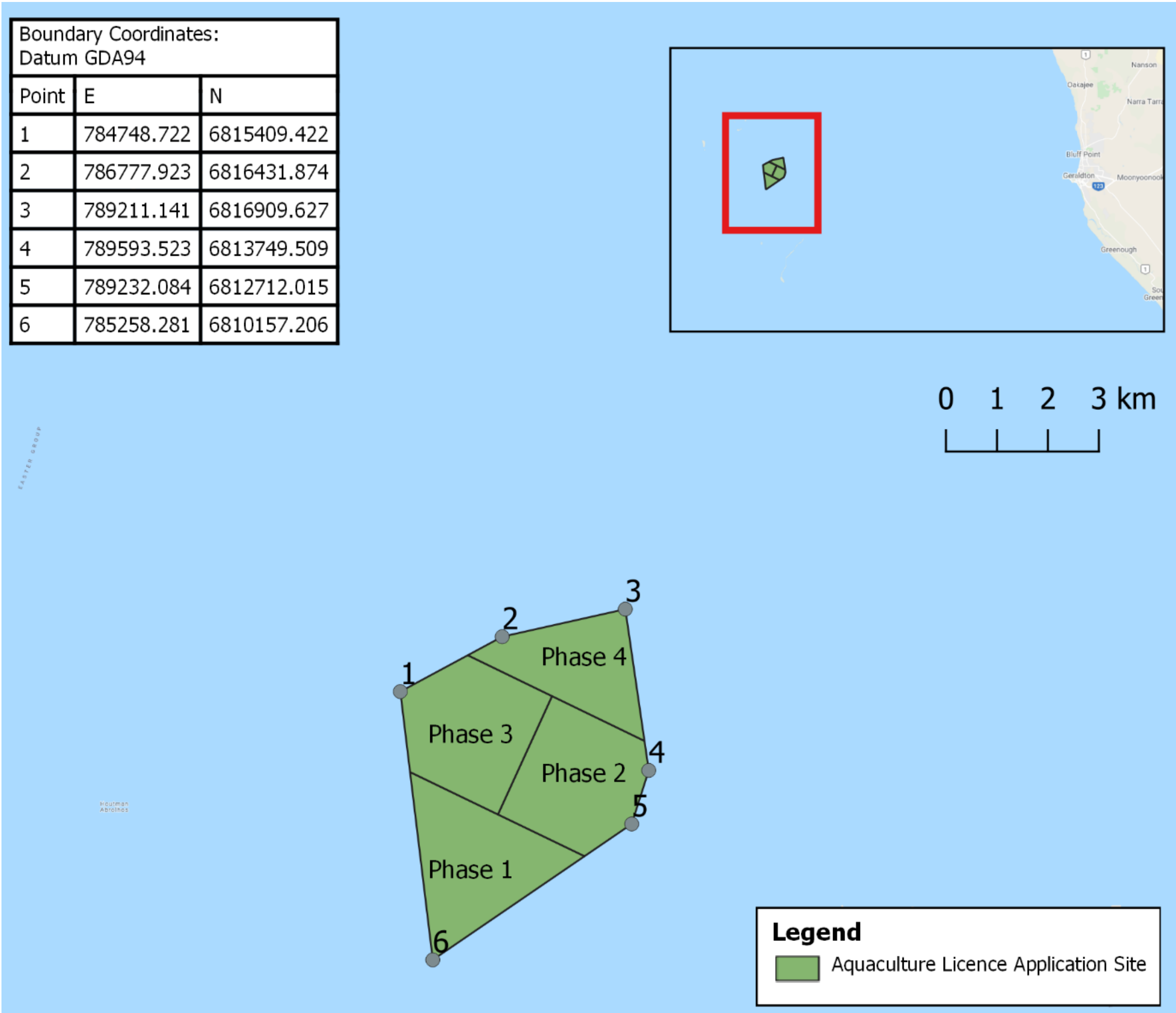
Subsequent phases of development will trigger the establishment of a HAC owned and operated hatchery and broodstock facility – this will likely be in Geraldton.

Feed will be supplied by HAC contract suppliers, currently HAC has contracts in place with Biomar Ltd (UK) and Skretting (Aus). HAC suppliers are GlobalGAP feed certified (www.globalgap.org/) with full traceability systems (certificates attached). All diets are dry extruded pellets specifically formulated for *Seriola lalandi.* The ability to import feed directly into the port of Geraldton will provide additional flexibility and efficiencies necessary to sustain the aquaculture industry in the MWADZ.

2.2 Location

Huon Aquaculture's proposal is to establish defined farming sites within the Northern Area of the MWADZ (**Figure 1**). With focus on strict biosecurity management, farming sites will be established in four phases, with separation distance between the farming sites maximised.

As per HAC's Staged Development Plan outlined in Section 4 of this proposal, Stages 1-3 will occur within the area marked as Phase 1 in **Figure 2** below. This initial farming site will form the technology development and pilot production site for further development in this zone. As the project progresses to Stage 4, the second farming site will be established within the area marked as Phase 2. Beyond the current Staged Development Plan, establishment of the third and fourth farming sites will occur within areas marked as Phase 3 & 4.



Boundary Coordinates: Datum GDA94		
Point	E	N
1	784748.722	6815409.422
2	786777.923	6816431.874
3	789211.141	6816909.627
4	789593.523	6813749.509
5	789232.084	6812712.015
6	785258.281	6810157.206

Figure 2 – Proposed HAC farming areas within Mid-West Aquaculture Development Zone Northern Area.

It is important to note that the actual footprint of each farm site will be much smaller than the areas shown in **Figure 2**. A fully established farming site will consist of 12 Fortress Pens, with seafloor infrastructure contained within a 62 ha area (refer **Figure 6**). This strategy will provide the necessary separation distance between different 'year classes' of Yellowtail Kingfish, which is essential to prevent the spread of disease within the zone.

3 PROPOSED FARM LAYOUT

3.1 Aquaculture Gear and Production Systems

3.1.1 *Pens*

HAC will deploy offshore Fortress Pens which are purpose built double netted pens, proven to act as a barrier to exclude wildlife whilst providing a safe and secure containment system for fish (**Figure 3**). The pens also provide a safe and stable platform for farm staff with built in walkways and handrails.

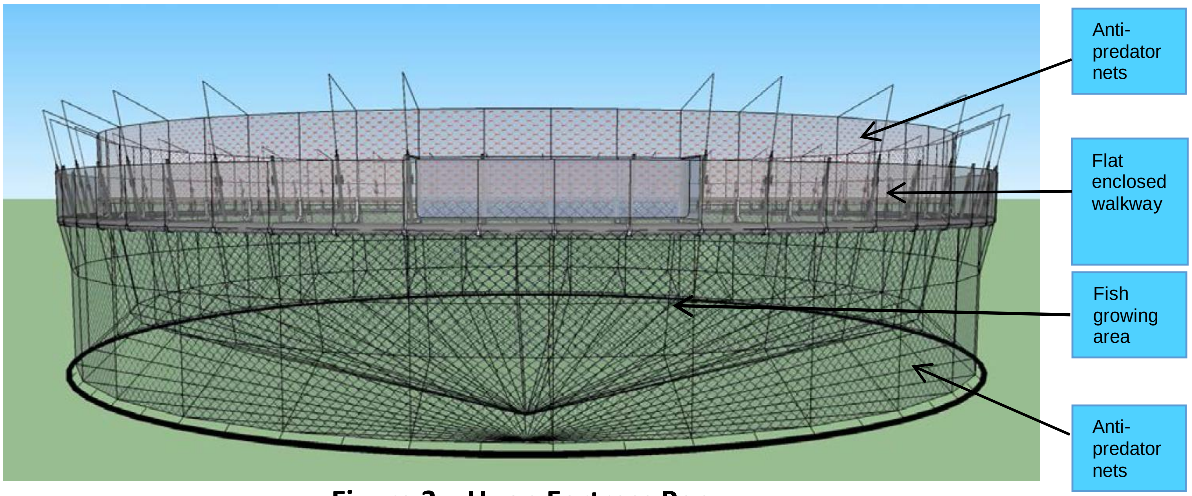


Figure 3 – Huon Fortress Pen

Up to twelve F160m will be deployed on a farming site. This would result in a pen surface area of 2.25 ha within each of the four farming areas identified in **Figure 2**. The F160m pens enclose more space for fish compared to historical 120m circumference designs. This results in lowering the stocking density and provides fish with maximum oxygen and an ideal environment to thrive.

The design of the proposed sea pens prevents predators from entering and becoming trapped. The net design and material discourages birds from resting on the pens and prevents them from accessing fish feed reducing the likelihood of bird entanglements. If predators are unable to enter the sea pens and interact with the standing stock, the attractiveness of the leases to predators such as sharks is greatly reduced. Preventing predator interactions with cultured stock eliminates fish stress, injury and loss. This allows the cultured fish to eat consistently, have better feed conversion ratios, faster growth rates resulting in healthier fish and less waste entering the environment. The combination of lower stocking density, increased oxygen flow and reduced stress in turn reduces mortality rates and stock losses.

The design of the Fortress Pens also reduces the OH&S issues associated with sea pens as they incorporate a flat, enclosed walkway which provides a safer and more stable work platform for farm workers particularly in bad weather. In addition, the design prevents sea lions from accessing the walkways, reducing the likelihood of aggressive sea lions interacting with employees. Fortress Pens have a proven ability to withstand extreme weather which reduces the risk of damage, stock escape, breakaway and associated debris.

3.1.2 *Nets*

Predator exclusion and inner containment nets are constructed from Dyneema® or equivalent Ultra High Molecular Weight Polyethylene (UHMWPE) fibre. Bird nets are constructed from UHMWPE fibre mesh with polyester framing ropes.

UHMWPE provides a proven barrier to predator attack, the strength-to-weight ratio for this material is 8 to 15 times higher than steel. The nets are consequently very strong and easy to work with. The dimensions of the nets are shown below (**Figure 4**).

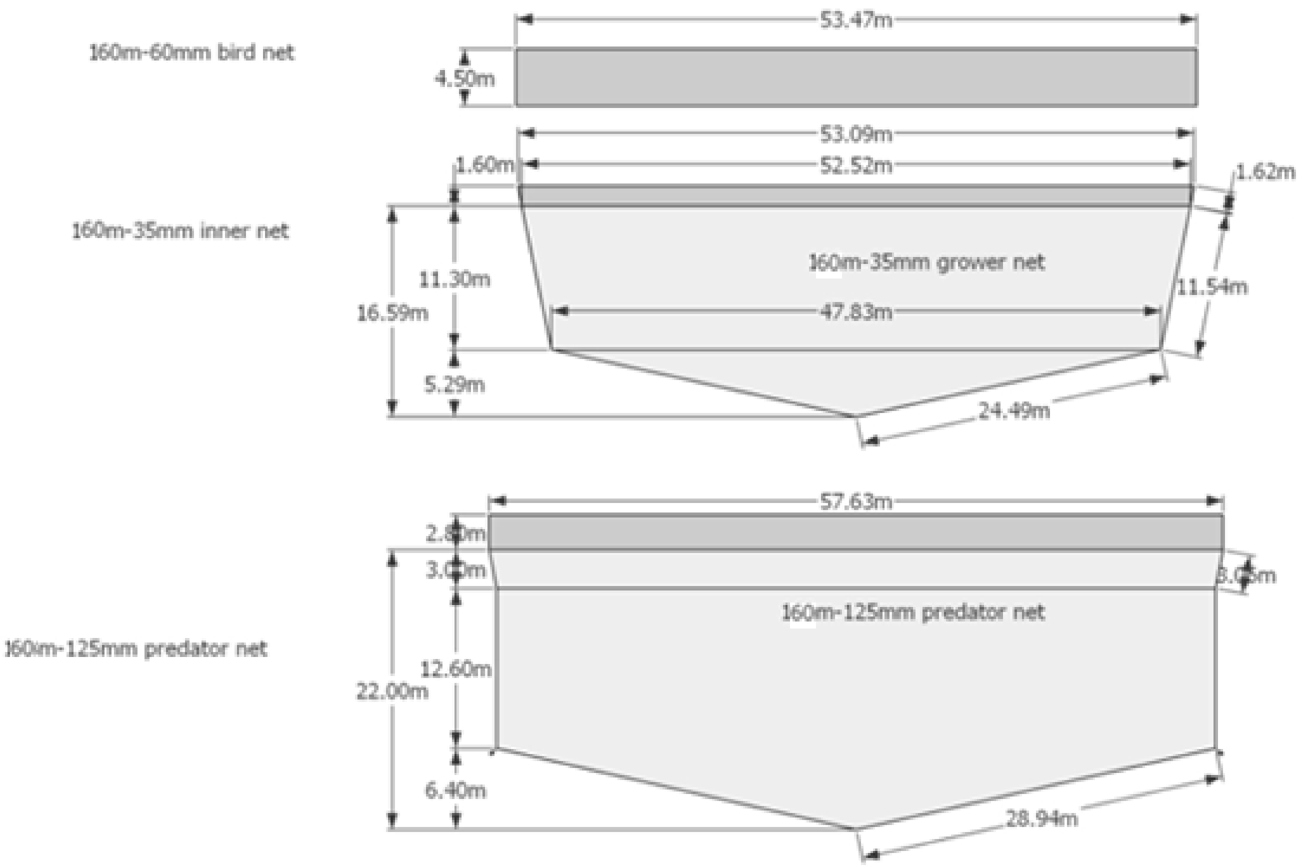


Figure 4 – Net dimensions and profiles

Net dimensions and shape provide the critical gap between the fish and the predator. The walls of the inner containment net are tapered and those of the predator exclusion net are parallel. This provides a minimum separation between the nets of 2.4 metres at the water surface increasing to 7 metres separation at depth (**Figure 5**).

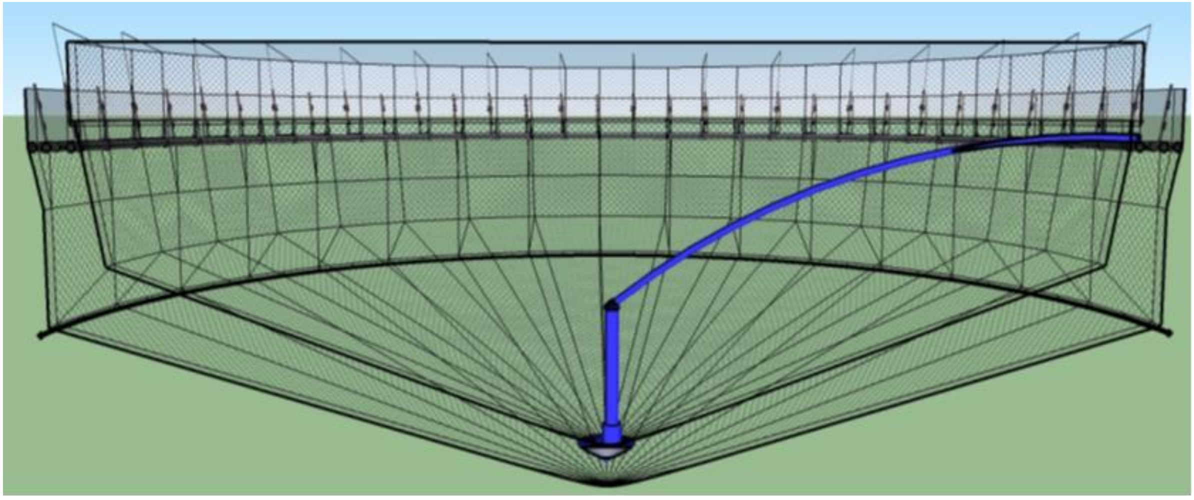


Figure 5 – Cross section through a Fortress Pen showing separation between inner and predator exclusion net and installation of a central mortality removal system

3.1.3 *Mooring systems*

The pens are held safely in a mooring grid (**Figure 6**). This is a tensioned ladder-like arrangement of ropes and joining components that provides individual mooring bays for a single pen. This allows pens to be taken to and from the farm, moved within the farm without lifting anchors and/or disrupting gaps between pens.

The farm will have two submerged mooring grids, tensioned off to anchors at a scope of between 4 to 1 and 6 to 1, depending on the depth and anchor holding tests. Anchor testing and mooring design optimisation will be undertaken in Stage 1 of the staged development plan.

Each grid will provide space for mooring six pens of 160 metres circumference. Each mooring bay will be 100 metres by 100 metres in size. The mooring bays will be arranged in a double row of three (**Figure 6**).

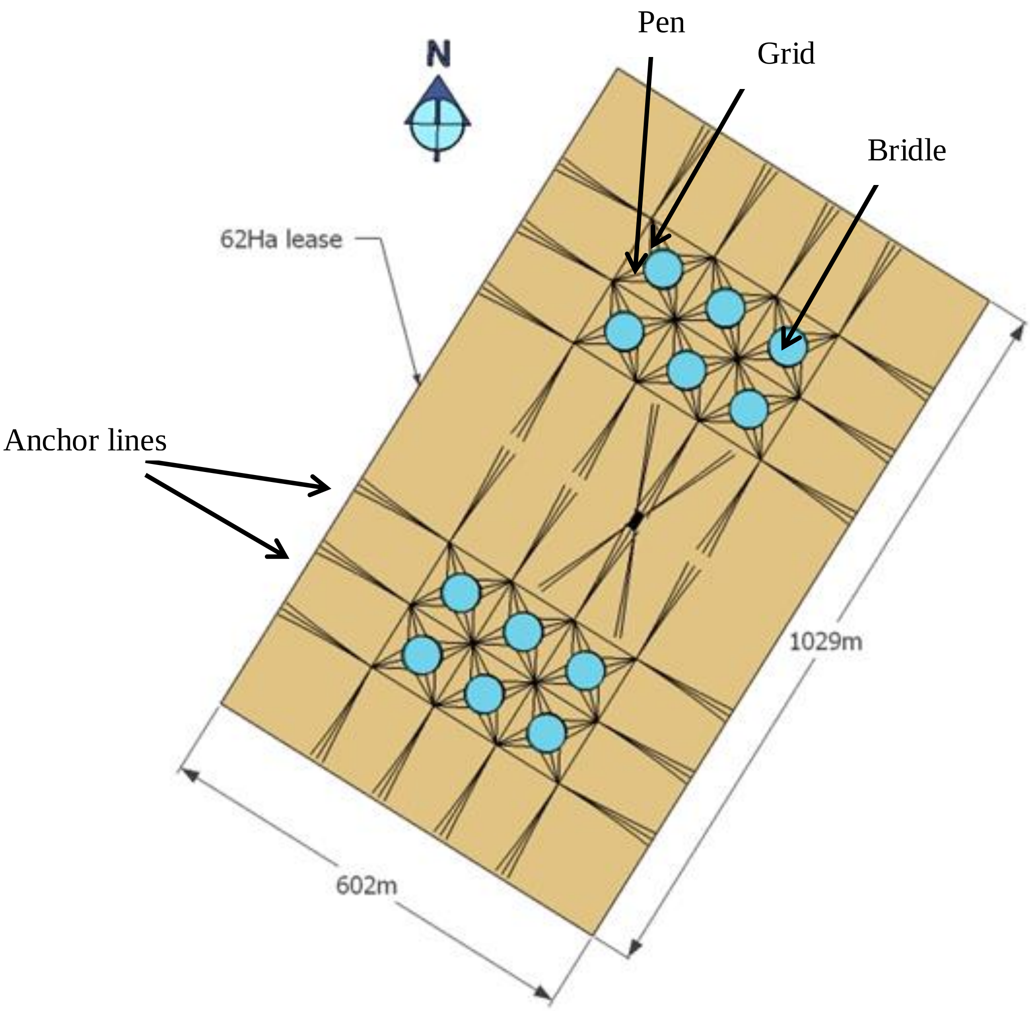


Figure 6 – Two fully stocked grids with a feeding barge moored between them.

The mooring system components are specified based on the farming area depths and sea conditions. In this schematic, each anchor line is a combination of rope and chain terminating in a 2-tonne Stingray type anchor. The grid lines are tensioned by the anchor lines. The bridles are used to attach the pen to the grid line.

The mooring systems will be designed in consultation with HAC's existing professional international expert consultants and will be fabricated locally in WA. An example of mooring component design and assembly output is shown below (**Figure 7**). Note, the anchor type and scope of moorings (length of anchor lines) may change as a result of finding from Stage 1 of the Staged Development Plan.

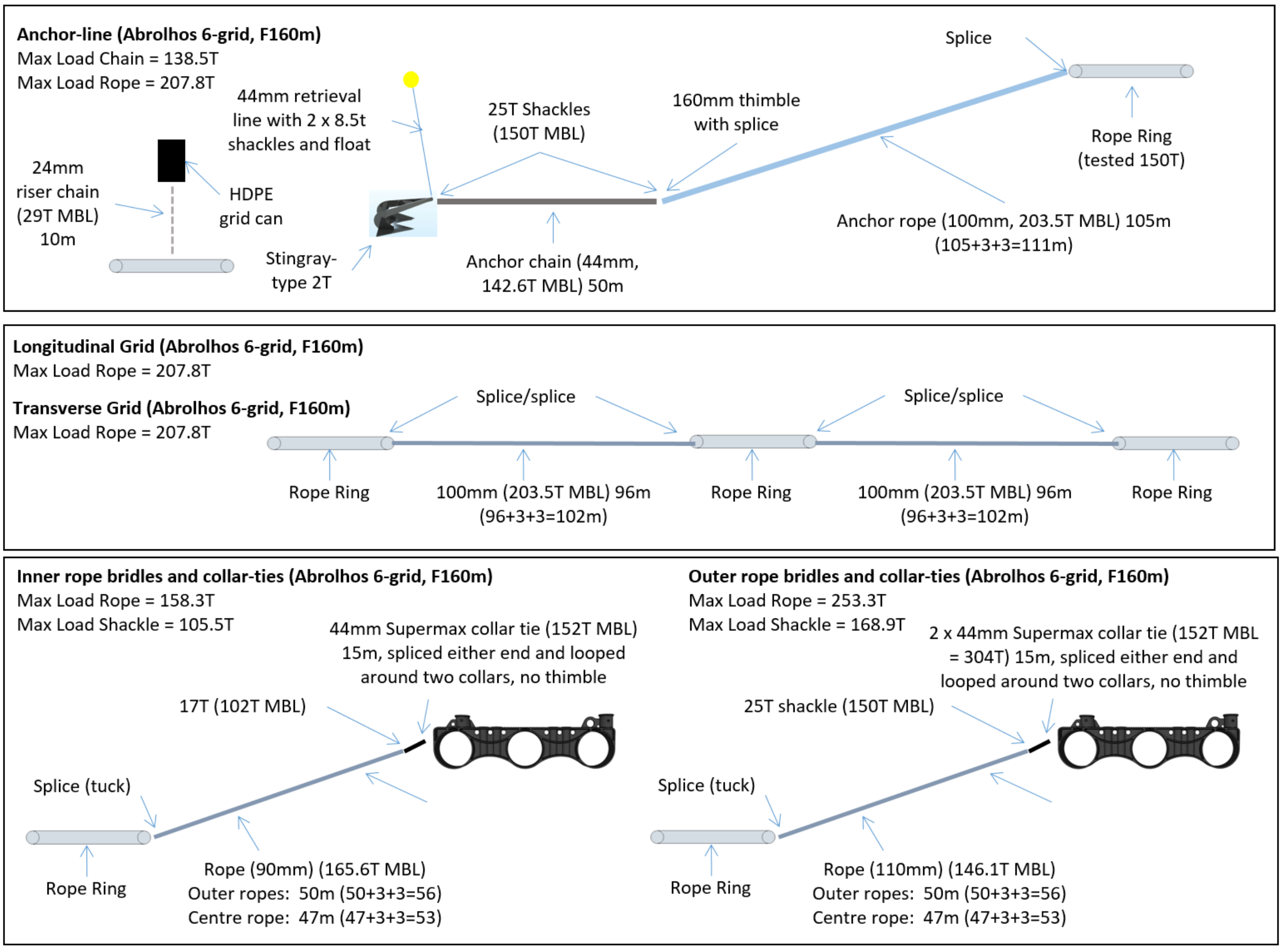


Figure 7 – Mooring components and arrangement

3.1.4 *Fallowing Procedures*

HAC will establish fallowing intervals during Stage 2 of the Staged Development Plan. Measurement of benthic and water column effects will inform the timing and duration of fallowing events. The proposed mooring grid structure allows HAC to fallow entire farms; single grids; or single pen bays. This flexibility provides HAC with significant control over farm utilisation and stocking levels.

3.2 Supporting Infrastructure

3.1.5 *Fish Transfer*

Juvenile fish will be transferred to the farm using specialist tankers that will be filled with water at the source hatchery. The fish and carriage water will be discharged via gravity into floating net pens. Water flow in the pens is via environmental means, there is no treatment of incoming or outgoing water. The fish will be stocked at final numbers (it is not intended to double stock a pen and split the population later). Any grading will be limited to size grading (top cropping) at harvest to optimise market size.

3.1.6 *Feeding*

Feed distribution will initially be conducted by in-pen hopper based systems with control of satiation achieved by underwater video monitoring in concert with HAC proprietary pellet detection technology. In-pen hoppers are solar powered and provide high capacity (up to 6 tonnes) feed storage and delivery system that minimise lost days due to weather where wave action would prevent manual feeding by blower or by hand (**Figure 8**). The hoppers will be replenished a maximum of twice a week by HAC work vessels with appropriate feed conveying technology.

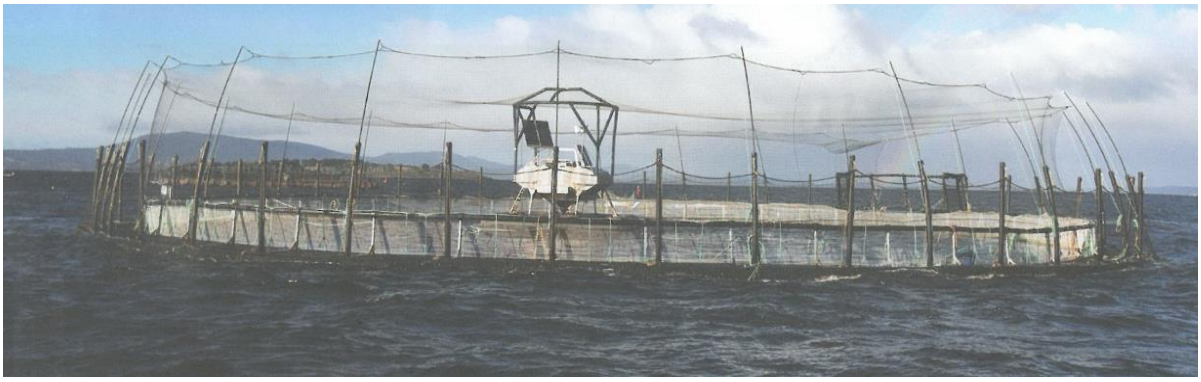


Figure 8 – Fortress 160m pen with feed hopper

As the number of pens increases, the hopper based technology will be replaced by a purpose built feed barge moored permanently on the lease to deliver the fish feed. The proposed feed barge delivers the feed via air blower systems. In the HAC barges, the blowers are mounted below deck in insulated machinery spaces and the pellets are delivered via reticulated polyethylene pipes to a central pivoting arm that spreads the feed across the pen surface with very low waste. This is achieved through the use of video surveillance devices to accurately deliver the required amount of feed to the sea pens. The electronic systems monitor fish behaviour within the sea pens, and also monitor the feed falling within the pens to vary or stop the delivery of feed if not being eaten.

The proposed barge design has a low profile and is painted blue to minimise visual impact (**Figures 9, 10 and 11**). Feed barges are permanently moored on-site and do not have their own propulsion systems. The barge is rated for Operational Area C, defined as a 4.5 metre significant wave height and 450 Pa gusting wind pressure. A 4.5 metre significant wave means you can expect occasional waves (1 every 1000) of 8.4 metres and a rogue of even more (when peaks of different trains coincide). A wind of 450 Pa is about 53 knots. The stability of the barges meets the requirements for a Class A (independent operation at sea, significant wave greater than 6 metres) vessel.

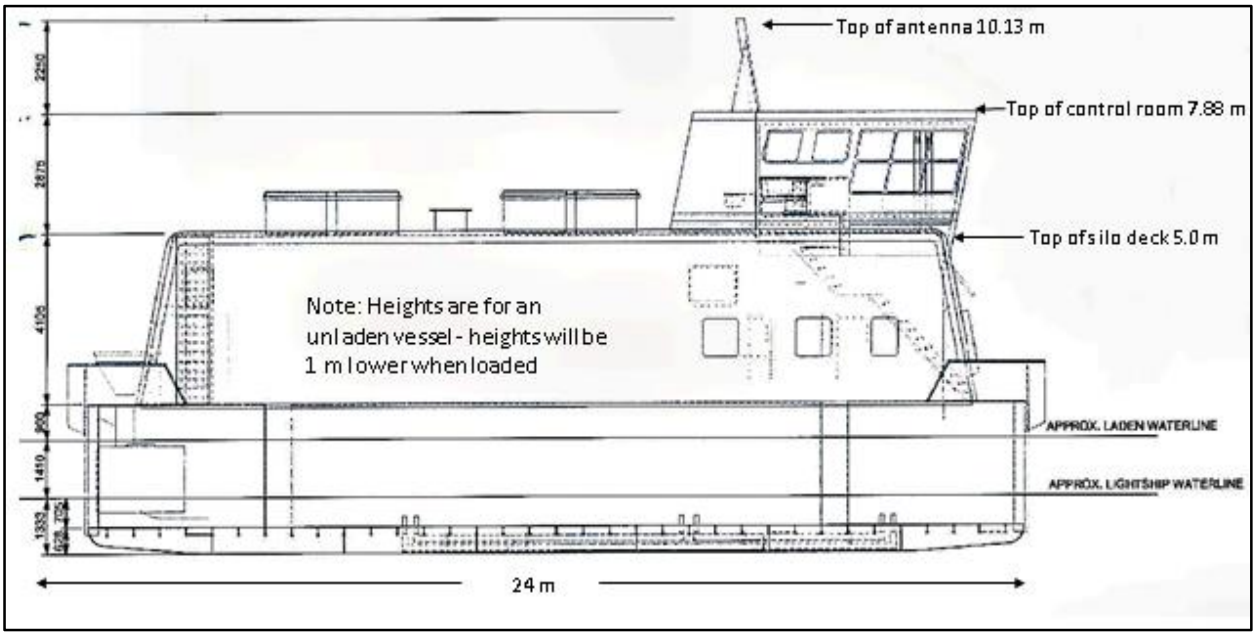


Figure 9 – Feed Barge dimensions

Figure 10 – Feed barge close up

Figure 11 - Feed barge at 550m distance

The proposed feed barge technology mitigates excess feed entering the surrounding waters which results in fewer nutrients discharging into the environment. It also provides for better feed conversion ratios as feeding can be tailored to the cultured stock requirements. For example, yellowtail kingfish feed faster (higher ingestion rate) than most other species commercially farmed. The proposed feed barge is specifically designed to match the desired feed rate of the fish, reducing stress caused by "scramble competition" and providing optimal feed efficiency.

The proposed feed barge holds up to 320 tonnes of feed in eight separate feed hoppers that are connected in such a way that any population of fish has a choice of two different feeds. A dedicated blower transports the feed in an airstream through floating high density polythene pipe to each individual pen. This is the only feeding system that can simultaneously feed all pens at the appropriate rate of delivery. The new barges can be filled in a single trip from a large vessel and will hold at least one week's food. All the machinery to measure and transport the food out to the fish is kept in a stable, dry space below deck rather than exposed to the elements.

The installation of the proposed feed barge system will reduce feed boat trips from daily to weekly, thereby reducing the amount of vessel traffic. The new barge system provides a safer work environment at full production volume and allows staff to focus on feeding the fish rather than maintaining the feed hoppers. The feed barge systems can be operated remotely from shore allowing feeding to occur in weather conditions that are uncomfortable or unsafe for workers.

3.1.7 *In-situ net cleaning*

All pens at the MWDAZ will be inspected at least fortnightly by net-cleaning staff. These staff will clean the inner net using in-situ remote operated net cleaners or more regularly as required. These staff will view underwater footage in real-time of the net condition and can report any issues. The outer predator net will be monitored and cleaned as required (expected interval every 1–2 months). Additional to the net cleaning operators inspecting the nets, a dedicated remotely operated vehicle (ROV) team will inspect the inner nets before and after each bathing operation and the outer predator net every second month. Bird nets are checked on a daily basis by feeders and other personnel on site.

Clean nets allow for better water flow through the pen, which means more oxygen reaches the salmon, making them more comfortable and healthier. Cleaning also ensures that fouling organisms, such as algae, mussels and squirts, are removed from the nets, which reduces drag, weight and chaffing, all of which can compromise the integrity of the pens.

Huon Aquaculture has further designed SOPs that are targeted towards minimising the growth of biofouling on all nets and ensuring good flow through all pens to maximise oxygen availability to the fish. As a core part of this strategy, all nets are cleaned once a week in summer and every 2-3 weeks in winter. This also greatly reduces the loadings from net washes during any single cleaning event and prevents the growth (final settlement) of higher biomass fouling organisms such as mussels and squirts. **Table 1** lists the cleaning intervals at which nets should be cleaned based on the net type.

Table 1: Intervals at which nets should be cleaned according based on the net type.

Net Location	Cleaning Interval
Inner net ‘water-line’	<21 days
Inner net ‘sides’	<5 days – 15mm mesh <6 days – 25mm mesh <7 days – 35mm mesh (or) within 3 days of bath
Inner net ‘base’	<10 days – 15mm mesh <12 days – 25mm mesh <14 days – 35mm mesh (or) within 3 days of bath
Predator net ‘top 3m’	Within 21 days
Predator net ‘sides’	Within 30 days
Predator net ‘base’	Within 60 days

The in-situ net cleaner works by positioning rotating high pressure water jets close to the surface of the net (**Figure 12**). This washes the biofilm and fouling from the net dispersing this fine material in the water. No chemicals are added, the cleaner uses seawater only. The unit is controlled by an operator in the wheelhouse of the net cleaner vessel, the net cleaner has inbuilt fore and aft video cameras to help the operator navigate the net and check for cleanliness and any wear on the net.

Figure 12 – RONC net cleaner in operation, note retro-jets holding the unit against the net

3.3 Land based operations

There will be a requirement for suitable land based operations in the port of Geraldton for deployment and routine maintenance to support the proposed off shore operational activities. An example of a typical shore base set-up is shown in **Figure 13.**

***Figure 13* – Example of Huon shore base requirements**

Initially HAC will contract existing local fish processing capacity to pack fish for market, however, in the later stages HAC will construct a processing plant to manage increased volumes and enhance quality and value of products.

Land sites suitable for the construction of pens and the storage of sufficient feed to buffer against logistics delays and/or appetite fluctuation are not easily available in the Abrolhos. This may result in HAC mooring relatively large storage barges close to the farms to allow engineering support facilities, staff accommodation, feed buffer stocks and chemical and consumable storage to be efficiently accessible for operations staff given the transit distance and time from Geraldton (**Figure 14**).

Figure 14 – Accommodation and service barge

HAC is also investigating the possibility of establishing an island camp in the Southern Group. HAC has been in discussion with the Southern Group Body Corporate regarding suitable island sites to establish a camp. HAC will also discuss potential site options with the Department of Fisheries regarding necessary licences are permits.

4 Staged Development Plan

HAC plan to transition through four stages:

Stage 1) Conduct research and development to ensure that technology (especially moorings) is optimal for Western Australian conditions; conduct baseline environmental monitoring and community consultation.

Stage 2) Complete pilot scale production to prove the performance of yellowtail kingfish at the MWADZ.

Stage 3) Commence commercial scale model development to determine the sustainable environmental production limits of the zone.

Stage 4) Commence commercial operations in second farming area (Phase 2).

The timeline for achievement of the plan requires flexibility as there may be a requirement to hold at a particular stage for longer than planned. For example; in order to fully analyse information; allow technology to be refined or implemented; secure increases in fingerling supply, etc.

The planned timeline and stages are set out below:

Year	Infrastructure	Harvest
Year 1 (Stage 1)	▪ Verify baseline environmental data and develop relationships with local community ▪ Secure an island camp at the Abrolhos Islands ▪ Secure a site for suitable shore base north of the Fishing Boat Harbour, Geraldton	
Year 2(Stage 1/2)	Upon completion of the Marine Finfish Nursery, Geraldton: ▪ Install first 3x2 mooring grid and five F160m pens, feed infrastructure, bathing infrastructure and accommodation/service barge ▪ Stock first juvenile yellowtail kingfish	
Year 4 (Stage 2/3)	▪ Install second 3x2 grid and feed barge plus two more F160m pens and two harvest pens adjacent to the accommodation barge.	Harvest 500 tonnes
Year 5 (Stage 3)	▪ Install five more F160m pens	Harvest 850 tonnes
Year 6 (Stage 4)	▪ Second farm established within the 'Phase 2' area of the MWADZ	Harvest 2430 tonnes