License Application for sustainable hand-harvesting of *Ascophyllum nodosum* in Kenmare Bay.

Proposal Document

Prepared by: BioAtlantis Ltd.
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BioAtlantis Ltd,
Clash Industrial Estate,
Tralee,
Co. Kerry,
Ireland.

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Abbreviations:

AIMU	Assessment of Impacts of the Maritime Usage
A. nodosum	*Ascophyllum nodosum*
Cert.	Certificate
CZ	Coastal zone
DAFM	Department of Agriculture, Food and the Marine
DOEHLG	Dept. of the Environment Heritage and Local Government
EBIC	European Biostimulants Industry Council
EEZ	Exclusive economic zone
GES	Good environmental status
GMP+	Good Manufacturing Practices
GRN	Goods Received Note
H&S	Health and safety
IFI	Inland Fisheries Ireland
IRF	Incident Report Form
Isd/Is	Island
I-WeBS	The Irish Wetland Bird Survey
LSEs	Likely significant impacts/effects.
MARA	Maritime Area Regulatory Authority
MPPs	Marine Planning Policies
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Planning
MULs	Maritime Usage Licences
NCR	Non-Conformance Report Form
NHA	National Heritage Area
NIS	Natura Impact Statement
NMPF	National Marine Planning Framework
NPWS	National Parks & Wildlife Service
OMPP	NMPF Overarching Marine Planning Policy
OSM	Ordinance Survey Map
pNHA	Proposed National Heritage Area
QC	Quality Control
R&D	Research and Development
SAC	Special Area of Conservation
SIF	Site Inspection Form
SISAA	Supporting Information for Screening for Appropriate Assessment
SOPS	Standard Operating Procedures
SPA	Special Protection Area
T	Tonnes
WFD	Water Framework Directive

Section 1: Introduction

This proposal document provides details of BioAtlantis Ltd.'s Maritime Usage Licence (MUL) application to sustainably hand harvest *Ascophyllum nodosum* seaweed in Kenmare Bay. The document describes the harvesting plan and methodology to be employed, along with detailed assessments undertaken to assess the potential impacts associated with the proposed activity. Mitigation measures are outlined for the purposes of ensuring sustainability of the activities involved, and the protection of marine and coastal habitats in the license area. Mitigation measures are also in place to ensure that cumulative or in combination effects do not occur and to prevent interactions or impacts on existing and planned activities in the area. The application also ensures compatibility with other aspects including the National Marine Planning Framework (NMPF), Marine Spatial Planning (MSP) and other relevant Government policies, plans, frameworks and regulations, and is written in line with requirements of the Maritime Area Regulatory Authority, MARA (ref: MARA 2024A and 2024B).

Appendices cited throughout this document are attached separately, and are listed as follows:

- **Appendix 1:** Assessment of potential interactions with archaeological sites.
- **Appendix 2:** Maps of Harvest Area.
- **Appendix 3:** Compliance and Record Forms.
- **Appendix 4:** Code of Practice for *A. nodosum* harvest activities.
- **Appendix 5:** Impact Assessment of *A. nodosum* harvesting activities.
- **Appendix 6:** Assessment of potential impacts on bird species.
- **Appendix 7:** Assessment of potential cumulative and in-combination effects.
- **Appendix 8:** Audit Forms for hand harvesting system.
- **Appendix 9:** Assessment of Otter *(Lutra Lutra)* distribution in Kenmare River SAC.
- **Appendix 10**: Assessment of fish, crustaceans and shellfish of commercial relevance.
- **Appendix 11:** Assessment of compatibility with MSP policies and activities.
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Other documents associated with the application and cited in this document include:

- **Application Form (MUL)**
- **SISAA Report:** Supporting Information for Screening for Appropriate Assessment Report
- **Annex IV Report:** Risk Assessment for Annex IV Species Report
- **NIS:** Natura Impact Statement
- **AIMU Report:** Assessment of Impact of the Maritime Usage Report

Section 2: Project Description

2.1 Overview of project

2.1.1. Summary:

BioAtlantis applied for a license to sustainably hand harvest *A. nodosum* in Kenmare River SAC on the 27th of June, 2022 (pre-application number FS007554). The application has been updated further and ensures the following:

- Traditional seaweed harvesting rights are fully respected, in line with clarification provided by the Attorney General in 2018 – this includes both appurtenant and Profit-à-Prendre rights to harvest seaweed. It is envisaged that a clause may be inserted into the license issued to reflect this.
- Provision of a sustainable income in the Kenmare Bay area for local hand harvesters and associated parties, consistent with other sectors of the economy and prices paid by competing companies. This can be in the form of a contractor relationship or direct employee of BioAtlantis.
- Provision of careers in the seaweed harvesting and processing industry that are attractive to young people, offering reliable and attractive primary or stand-alone incomes, rather than secondary incomes only.
- Genuine competition between plant biostimulant companies on the market, ensuring maximum return for harvesters.
- Hand harvesting will be undertaken in a sustainable, regenerative and traceable manner, and in line with traditional hand harvesting methods currently employed in the area.
- Employment of science-based seaweed resource management practices.
- Inclusion of a sustainability Code of Practice and mitigation measures to prevent impacts on Annex I and II marine and coastal habitats and species in the SAC, in line with national and European environmental legislation. This includes measures to protect harbour seals, otters, birds, and sensitive community types and habitats such as shingle, reef, seagrass, large shallow inlets and bays, estuarine mud, muddy-fine sand, intertidal sand/mobile sand and saltmarsh habitat.
- Prevention of in combination and cumulative effects with other businesses and marine and coastal activities, including seaweed harvesting, aquaculture, fisheries, angling, periwinkle collection, tourism, recreation and sport.
- BioAtlantis will cooperate with indigenous Irish companies in Co. Cork and Co. Kerry and the west who are engaged in seaweed harvesting, drying or processing, with the view to building partnerships which benefit the local economy and increase job creation in these areas.
- Full alignment with EU and Irish Government plans and policies, in relation to environmental sustainability and development of the Irish marine Blue Bioeconomy and Circular Bioeconomy.
- Value will be added to the resource in Ireland, maximizing economic returns to the State.
- The harvested seaweed will be utilized to develop and manufacture organically certified products and technologies, with significant environmental and societal benefits, as follows:
  - Mitigating the effects of climate change: BioAtlantis has pioneered the development of a 'Molecular Priming' technology, which mitigates the effects of climate change in agriculture. For example, applying a key product from BioAtlantis' portfolio, SuperFifty® Prime, to a crop 3

to 5 days in advance of an adverse weather event, ensures that the crop will be protected for up to 15 days post-application.

- Reducing agrichemical inputs in crop production: BioAtlantis has developed products that strengthen crops making them more resilient to disease, thus the requirement for agrichemicals on farms can be minimized. The company is also developing a biopesticide to help crop growers transition from some agrichemicals.
- Nutraceuticals: BioAtlantis is developing nutraceuticals for human health applications.

2.1.2. Reasons for applying for a license in Kenmare Bay:

BioAtlantis commissioned a new production facility in 2019 at its base in Tralee, Co. Kerry, costing €19M. This is the largest SME-owned, fully automated seaweed extraction facility in Britain or Ireland, including technologies for seaweed intake, extraction, separation, purification and spray drying. *Ascophyllum nodosum* is a critical renewable resource, essential to the company's success and continued growth. To support the company's continued growth and job creation in the Southwest, a reliable local supply of *A. nodosum* is necessary. To secure this supply, BioAtlantis applied to the Foreshore Unit for a license to sustainably hand harvest *A. nodosum* in Kenmare Bay, Co. Cork and Kerry, on the 27th of June 2022 (pre-application number FS007554). The application was later revised for submission to MARA, and involves the sustainable hand harvesting of up to 1,826 wet tonnes of *A. nodosum* per annum on a regenerative and renewable basis. Kenmare Bay was selected due to the sustainable supply of *A. nodosum* in the area, the company's close proximity to the bay, and its 20-year history of economic activity in the region. This application represents an excellent opportunity to establish a vibrant and sustainable industry locally, leading to increased job creation and sustainable employment.

2.1.3. Respecting legal rights of traditional hand harvesters:

While *A. nodosum* was harvested in Kenmare Bay in previous decades, opportunities for local hand harvesters has been relatively limited. BioAtlantis is in an excellent position to create well paid employment for hand harvesters in the Kenmare area, given the company's focus on developing patented technologies and manufacturing high value added products from the resource. In addition to creating new jobs in the area, BioAtlantis also wish to work in partnership with local hand harvesters to create a vibrant and sustainable industry, whilst also ensuring that existing seaweed harvesting rights are respected. On the 28th of June 2018, [redacted] clarified the legal position around seaweed harvesting and applications received under the Foreshore Act, as advised by the Attorney General. In line with this, this application ensures that traditional seaweed harvesting rights are fully respected and measures are included to ensure the license has no impacts on existing harvesting rights in Kenmare River SAC. BioAtlantis will not harvest in any area where existing appurtenant rights exist, without first obtaining permission from the owner of such rights. Where Profit-à-Prendre rights are successfully registered with the Property Registration Authority of Ireland (PRAI)/Tailte Éireann, the harvesting plan will be adjusted to ensure that those individuals can continue to harvest. It is envisaged that a clause may be included in the licence issued to allow the harvesting of *A. nodosum*, stating that if a Profit-à-Prendre rights holder provides sufficient proof of their right, the licensee would be prohibited from harvesting in that area, without first obtaining permission

from the owner of such rights. As confirmed by the Government, existing seaweed rights holders can continue to exercise their right to harvest seaweed and do not require consent under the Foreshore Act. However, requirements for operating in SACs and relevant national and European environmental legislation must be respected.

BioAtlantis will explore the potential of purchasing a boat for the area to collect/tow the harvested *A. nodosum* to pick up points, whilst also providing the option for local hand harvesters (including those with existing harvesting rights) to tow their harvested seaweed directly to pick-up points, or in accordance with other common practices employed by harvesters in the bay. The price paid for the harvested seaweed will be consistent with other sectors of the economy and prices paid by competing companies.

2.1.4. Compliance with EU and Irish laws in relation to SACs:

At any time, the current commercial harvesting of seaweeds underway in SACs along Ireland's coast may be stopped, as it is likely to be considered illegal under EU and Irish laws. To comply with EU laws in relation to commercial harvesting activities in SACs the activity must be regulated and licensed. This license application will bring increased traceability to harvesting, helping to ensure compliance with Irish and EU regulations for human activities operating in SACs. Central to this is a sustainable hand harvesting methodology which ensures rapid recovery and re-growth post-harvest, monitored by a Resource Management team and a Marine Ecologist. In line with the EU Birds and Habitats Directives, this application includes measures to prevent impacts on Large Shallow Inlets and Bays [1160] and Annex I and II marine and coastal habitats and species in the SAC. The application is supported by the development of a sustainable hand harvesting Code of Practice, which includes a range of measures to prevent impacts from occurring. This application is also supported by the following environmental reports:

- Supporting Information for Screening for Appropriate Assessment (SISAA).
- Natura Impact Statement (NIS).
- Risk Assessment for Annex IV Species.

Granting a license to BioAtlantis will allow for improved management of sustainable harvesting, as it:

- Improves traceability.
- Ensures sustainable harvesting and post-harvest recovery.
- Ensure that activities are in line with conservation objectives for the SAC.
- Prevents in combination or cumulative effects with other marine and coastal activities.
- Complies with European and Irish laws in relation to commercial activities in SACs.

2.1.5. Preventing interactions with other operators, plans and activities:

Measures are in place to prevent in combination or cumulative effects with existing business and marine and coastal activities, including other seaweed harvesting activities, aquaculture, fisheries activities, angling, periwinkle collection, tourism, recreation and sport. This includes both existing and planned developments and activities. Measures are also in place to prevent interactions with other activities during the transfer and pick-up of harvested seaweed. Site-specific measures are in place to prevent interactions with specific sites and locations during certain times of the year,

and a code of practice for environmentally safe navigation and other health and safety measures are also included.

2.1.6. Alignment of the application with Government plans and policies:

This application aligns with several Government plans and policies listed below. In order for these plans and policies to be realised, it is imperative that the Government prioritise the marine biotech sector and in particular, the regulation and licensing of seaweed harvesting:

- National Marine Planning Framework (NMPF) and Marine Spatial Planning policies: This proposal is consistent with the NMPF's aims to support sustainable harvesting of seaweed given its important economic and social contribution. Harvesting will be undertaken on a renewable and sustainable basis, without any negative interactions with other marine-based activities.
- Climate Action plan, 2024 and 2025: As hand harvesting of *A. nodosum* is a sustainable and renewable activity, the proposal aligns with the Government's climate action plan in relation to the Marine Environment. BioAtlantis' products also provide a means of enhancing crop yields (10% increase) without increased use of fertilizer and agrichemicals, thus aligning closely with the action plan.
- National Adaptation Framework Planning for a Climate Resilient Ireland, 2024: Drought is listed as a sectoral impact associated with climate change, due to impacts on crop growth and soil. BioAtlantis has developed a 'Molecular Priming technology' (based on bioactive compounds from *A. nodosum)* that enhances crop tolerance to drought stress. This technology has been validated by the Max Plank Institute and the University of Potsdam in Germany and by the Center of Plant Systems Biology and Biotechnology (CPSBB), Bulgaria, as part of a number of EU Horizon research projects (ref: Rasul *et al.,* 2021. *International journal of molecular sciences*, *22*(3), p.1469).
- Ireland's National Biodiversity Action Plan 2023–2030: The application aligns with targets specifying requirements for a licence to harvest seaweed. The application is compatible with biodiversity policies, as harvesting will be undertaken sustainably and with ecological monitoring. Studies also show that hand-harvesting of *A. nodosum* has no impact on overall biodiversity.
- Bioeconomy Action Plan 2023-2025: This proposal aligns with Government actions to support the development of the bioeconomy and steps needed to deliver on these actions, including facilitating opportunities for new high added-value biobased products and ensuring that enterprise, industrial and research policy support the goal of moving from research to industrial production with accelerated speed.
- The European Green Deal, EU Farm to Fork strategy (EC, 2020), EU biodiversity strategy for 2030 and EU soil strategy for 2030: The products developed by BioAtlantis are organically certified, listed by the Organic Materials Review Institute (OMRI), attested by EcoCert and are EU REACH compliant. These products provide a means of increasing yields (10%) with normal fertilizer and agrochemical use. The next step is to achieve the same yields with less agrichemical inputs. The products are safe to the environment, pollinators and humans alike. BioAtlantis has also developed a technology to restore soil health and function (MicroGrow®), thus aligning with relevant EU policies in this area.

2.1.7. Blue Bioeconomy development along the western seaboard:

Coastal and marine areas along the west of Ireland face many challenges including:

- Rural population declines,
- Lack of economic opportunities,
- Lack of job creation,
- Challenges facing the Agri-sector,
- Increasing pressures associated with climate change and other environmental challenges.

These pressures are felt by communities and stakeholders throughout the western seaboard, and are experienced by people in a range of counties throughout the northwest, west and south west. However, the development of a thriving Blue Bioeconomy along the western seaboard has the potential to address some of these issues. Development of a Blue Bioeconomy, based on innovation, science and export of high value-added products, will require stakeholders from various counties along the western seaboard to work together to overcome these shared challenges. The indigenous Irish seaweed and marine biotechnology sectors are well established along the west of Ireland and have a proven track record in job creation and in stimulating economic growth in rural and coastal areas. BioAtlantis has been a key driver of this success and wishes to contribute further to sustainable growth in the Blue Bioeconomy in the west of Ireland, by expanding further and building strong relationships with local hand harvesters and other stakeholders in Co. Cork and Kerry.

BioAtlantis, a founding member the European Biostimulants Industry Council (EBIC), strives to position Ireland's seaweed industry as a global leader at the cutting edge of research and innovation, benefiting coastal communities and society by delivering highly innovative and sustainable applications. A stable supply of this essential raw material is required in order to maximise the potential of the industry and to create new jobs in the Blue Bioeconomy in rural, coastal and marine areas. A license granted to BioAtlantis will provide greater structure and opportunities to grow the harvesting industry and the Blue Bioeconomy, as it will:

- Provide sustainable quantities of renewable raw materials required to bring new environmentally friendly technologies to market, in crop, animal and human health areas.
- Facilitate investment in Ireland's indigenous harvesting sector, providing a sustainable income along the western seaboard, creating opportunities in coastal and rural communities in the process.
- Ensure responsible management of the sustainability of the resource, fostering collaboration between private and government interests to prevent impacts.
- Allow harvesters to be contracted or directly employed by BioAtlantis if they wish.

2.1.8. About BioAtlantis:

BioAtlantis, an Irish-owned SME, was established with the vision of utilizing bioactive compounds sustainably derived from nature to solve significant environmental, societal and health problems. To realise this vision, the company had to invest in developing a cutting-edge R&D and engineering base, a highly automated be-spoke manufacturing facility and a technical sales and agronomy team to compete on the world market. BioAtlantis has become a leading innovator in

the Irish bioeconomy, delivering environmentally friendly and sustainable solutions to its customers in over 30 countries worldwide. The company employs over 50 people in Ireland in a range of areas, including: science, engineering, skilled trades, sales, marketing and finance, and is committed to continuing its development as a major employer in the west of Ireland. A further 14 people are employed overseas in agronomy and technical sales, with subsidiary offices located in Brazil, China, India, Mexico and USA.

BioAtlantis has grown rapidly since 2004 and has developed an extremely strong scientific base. In line with its strong reputation as an innovator in the European biotechnology sector, BioAtlantis is a partner in a range of EU Horizon research projects and collaborates with over 20 universities worldwide. The company also collaborates with a range of universities in Ireland, co-funding scholarships in education, internships and graduate programs, and co-funding MSc and PhD students and Post Doctoral Researchers. BioAtlantis is part of the following organizations and groups: European Biostimulants Industry Council (EBIC), Circular Bioeconomy Cluster in south-west Ireland, Marine Ireland Industry Network, Marine Spatial Planning, Climate KIC – DAFM programme, Tech Industry Alliance and Kerry Sci-Tech.

BioAtlantis has invested heavily in its business and the foundations are in place to build a world-leading Irish biotechnology company based in the west of Ireland. BioAtlantis is well known in the Plant Biostimulant industry and has built a strong reputation as a company which prioritizes honesty and integrity. BioAtlantis has also taken the necessary steps to secure the protection of its intellectual property, with several international patents granted in the areas of crop, animal and human health. In recognition of the company's success, BioAtlantis' CEO, [redacted] was nominated for the EY Entrepreneur of the Year Awards, 2022, in the international entrepreneur category.

Bioactive compounds from seaweeds such as *A. nodosum* and *Laminaria* spp., are essential components of BioAtlantis' products and technologies, which provide substantial societal and environmental benefits, as follows:

- **Crops:** The AgriPrime product portfolio is a range of biostimulant technologies developed to aid growers in both organic and non-organic agriculture. These proven tools nourish crops from soil to harvest and help them cope with a variety of stresses and growth limiting factors, allowing crops achieve their genetic potential. Key technologies include:
  - **Oxidative stress reduction:** BioAtlantis has pioneered the development of a 'Molecular Priming' technology which mitigates the effects of climate change. The company's main product, SuperFifty® Prime, is a novel 'oxidative stress inhibitor' that works by modulating gene expression and inducing stress tolerance mechanisms in treated crops. SuperFifty Prime, works by 'priming' and preparing crops to tolerate and respond more efficiently to future 'abiotic' stresses, including adverse weather events associated with climate change, such as cold, drought, heat and water logging. Trials in Ireland and UK show that SuperFifty® Prime provides an extra 10% yield to potato growers, without the requirement for additional agrichemical inputs. SuperFifty Prime has been validated by the Max Plank Institute and University of Potsdam in Germany and by CPSBB, Bulgaria, as part of a number of EU Horizon projects,

culminating in the publication of several research papers in high-impact international scientific journals. The technology was launched and featured in Irish Times on October 26th, 2023: ***"Science and seaweed combine to protect crops from climate change"*** (https://www.irishtimes.com/business/innovation/2023/10/26/science-and-seaweed-combine-to-protect-crops-from-climate-change/). BioAtlantis was recognized for this innovation by receiving the *'Smart Technology Innovation Award'* at the 2024 Tech Industry Alliance Awards.

- **Soil Health:** MicroGrow® improves the soil microbiome and microbial activity, fostering growth of beneficial microorganisms. The product targets early crop establishment, improving rooting and shoot formation and increasing yield.
- **Fruit finishing and shelf-life:** AtlantiCal® improve fruit-finish and post-harvest shelf-life, with application at the fruit-sizing stage.

- **Animals**: BioAtlantis has developed a technology that modulates the immune system and gastrointestinal microbiome in animals. This pioneering product (LactoShield®) improves maternal immunity transfer to piglets, reducing the requirement for antibiotics and zinc oxide in the first six weeks of the piglet's life. Administered in the form of a feed supplement, this product provides a sustainable, effective and economical means of preventing infectious diseases and enhancing gastrointestinal health and performance, aligning with the Irish Government's *'One Health National Action Plan on Antimicrobial Resistance 2021-2025'.* LactoShield's efficacy has been validated by world-leading scientific experts in the School of Agriculture and Food Science, University College Dublin, Ireland.
- **Humans**: BioAtlantis is developing nutraceuticals targeting immunological, metabolic and stress-related conditions in humans. This technology is based on natural compounds that modulate biological processes, with efficacy proven in a range of cohorts. Our flagship nutraceutical is based on a unique composition that addresses immunological and metabolic problems.

2.1.9. Conclusions:

To continue to bring societal and environmental solutions to market, BioAtlantis must grow and expand. The company's main barrier to growth is a lack of security over raw material supply. Issues with licensing and a lack of security over raw material supply have also been identified in the *"Ireland's Ocean Economy"* reports (2022, 2023 and 2024), as major barriers to the growth of the seaweed, marine biotechnology and bio-products industry. BioAtlantis requires the Government to take the necessary steps to regulate seaweed harvesting to ensure that it benefits all relevant stakeholders, including seaweed harvesters and indigenous Irish companies. Regulation and licensing is also necessary in order for the Government to meet its targets and goals in relation to environmental sustainability, climate mitigation and development of the blue bioeconomy. Granting a license to BioAtlantis will allow for improved management of sustainable harvesting, in line with EU and Irish environmental laws, whilst also helping to drive the development of the blue bioeconomy along the western seaboard of Ireland. A partnership approach with local hand harvesters in Kenmare Bay will be central to this, and as the technologies the company brings to the market are novel, BioAtlantis will be able to pay harvesters a competitive price for harvested seaweed.

The vision of BioAtlantis in 2004 was to research, produce and market products that enhance crop, animal and human health. The technologies are proven and can be produced at scale to fulfil market requirements for natural and safe products, equally as effective as synthetic chemicals. The only significant barrier to market entry is a sustainable supply of seaweed harvested in Ireland. This can be resolved by following the regulatory process and issuing a license for the sustainable harvesting of seaweed, as outlined in this application. BioAtlantis welcomes all comments regarding this proposal, and invites interested members of the public to contact the company directly if they wish to discuss any aspects of the proposal further.

2.2 Investigation / Initial Phase

2.2.1 Background.

The Irish seaweed industry represents a rapidly growing indigenous exporting sector. Factors influencing the success of this industry include innovation, R&D investment and co-operation between academia and business. However, the growth of the industry globally is largely dependent on having control over the supply of high quality raw materials. BioAtlantis aims to sustainably develop the seaweed industry in Kenmare Bay, an area with significant levels of the *Ascophyllum nodosum* seaweed, located in a number of sheltered locations. In line with our strong scientific and engineering platform, BioAtlantis aims to implement a sustainable hand harvesting system which is based on good environmental and management principals. In keeping with Ireland's obligations to ensuring protection of designated SACs, this proposal to harvest *A. nodosum* has been designed to ensure no significant effects on marine and coastal habitats in the two counties. BioAtlantis will have a long term commitment to ensuring these goals are met.

According to a study by the Marine Institute, Ireland has the potential to sustainably yield in excess of 74,000 tonnes (T) of *A. nodosum* per annum (Hession C, *et al.,* 1998). However, the annualized potential yield has been under-harvested (<30,000 tonnes is estimated to be harvested per annum) and the true potential of *A. nodosum* as a renewable resource in Ireland has not been realized. The majority of these resources are found in Galway, Mayo and Donegal and it has been estimated that ~70,500 potential wet tonnes per annum may be harvested sustainably from these areas. Estimates by Hession C, *et al.,* (1998) indicate that there are significant levels of *A. nodosum* in Kerry, with estimates of approximately 1,160 sustainable tonnes along the coastline of Kenmare Bay (excluding the islands).

A. nodosum is a large, intertidal brown seaweed which grows in abundance on sheltered, rocky shores in the west coast of Ireland and other temperate parts of northern Europe. Reproduction of this species occurs both sexually and asexually. While sexual reproduction maintains genetic diversity within populations, vegetative reproduction plays a crucial role in maintaining the size of the *A. nodosum* population, most notably by generating shoot growth and subsequent increases in biomass for years thereafter. Frond growth can continue for years while the holdfast can reproduce vegetatively for decades. Given the importance of vegetative growth to maintenance of *A. nodosum* population size, it is essential to incorporate data on regeneration rates into harvesting strategies where possible. This application draws upon such data, in particular those presented by Kelly *et al.,* (2001) in a study assessing the impact of hand harvesting of *A. nodosum* on regeneration and biodiversity in the west of Ireland. BioAtlantis will implement a sustainable approach which requires that 200-300mm (8-12 inches) of *A.*

nodosum material is left behind post-harvest. This approach will be minimally destructive to *A. nodosum* and other species within this biotope, thus allowing for shorter recovery periods post-harvest. Moreover, harvest will not exceed 20% of the available harvestable *A. nodosum* per site per annum, thus ensuring sustainability of harvesting year-on-year, and minimizing any potential impacts on this important SAC.

Provided that harvesting programmes are designed to allow for sufficient periods of regeneration, hand-harvesting has an almost negligible impact on levels of cover and biodiversity. The strong regenerative ability and productivity of Irish *A. nodosum* beds post-hand harvest was recognised as far back as 1949. Baardseth E (1949 & 1955) measured the re-growth of "patches" left behind by cutters and determined that sustainable harvesting was possible once an adequate level of material is left behind, as reviewed by Guiry, M. and L. Morrison (2013A). Environmental impact assessments carried in the west of Ireland have demonstrated almost complete recovery of *A. nodosum* cover 11 to 17 months post- harvest, in Clew Bay and Connemara respectively (Kelly L *et al.,* 2001). Provision of a 4-5 year window for recovery of *A. nodosum* post-harvest remains the current consensus. In light of such studies, the cautious 3-5 year fallowing time-frame preferred by decision makers would appear sufficient to ensure recovery of this seaweed species in areas harvested. BioAtlantis propose to incorporate known rates of *A. nodosum* growth and recovery in the west of Ireland into a broader system of harvesting, based primarily with sustainability in mind. Central to this approach will be a harvesting methodology which is minimally invasive and ensures rapid recovery and re-growth of *A. nodosum* post-harvest.

2.2.2 Size of the area to be directly impacted in this phase.

The area to be impacted during the developmental phase includes Kenmare Bay. The most comprehensive study of *A. nodosum* resources in Kerry and Cork to date was published by Hession *et al* (1998). The figures provided by Hession are focused on coastal areas and are considered quite conservative. In Table 1 below, figures for coastal areas are based on Hession *et al.,* 1998. Figures for islands were calculated as described in the next section. In the developmental phase, personnel will visit sites identified by Hession with the objective of verifying levels of *A. nodosum*. A secondary aim of site visitations is to identify areas containing *A. nodosum* which Hession *et al.,* may not have identified.

Table 1: Estimated sustainable *A. nodosum* biomass levels in Kenmare Bay.

No.	Zone[†]	Tonnes
1	Coastline	1125
2	Islands	701
	Total	1826

2.2.3 Types of activities associated with investigation/development phase.

There are five main components to the investigation/development phase:

1) Biomass Determination & Risk Assessment.
2) Development of Management & Implementation systems.
3) Development of monitoring systems.
4) Consultations.
5) Natura Impact Statement (NIS).

- **Biomass Determination & Risk Assessment:**
  Total available biomass in the area was calculated through use of the published reports of Hession *et al* (1998), combined with aerial photographs, satellite images and GIS software. Risk assessments were carried out by BioAtlantis in order to develop the sustainable harvesting system, prior to seeking outside consultation. This is described in the proposal document and its associated appendices. This was followed by a NIS to inform the Appropriate Assessment, carried out by Ecofact Environmental Consultants Ltd, which is included as a stand-alone document to this application. The objectives and methodology employed by BioAtlantis in conducting the risk assessments, are summarized as follows:

  a) Literature review & data gathering.
  - Objective: to assess the peer-reviewed literature and datasets relating to:
    - *A. nodosum* biomass levels in Irish and other coastal areas of the North Atlantic.
    - Regional variability in *A. nodosum* biomass levels in Ireland.
    - Hand harvesting and its potential impact on *A. nodosum* regeneration and associated species.
    - Communities and biological environments protected in the SAC (marine & coastal zones).
  - Methods:
    - Mapping: Assessments of the admiralty charts, Ordinance Survey Discovery series maps (OSM), Ariel photography and NPWS site synopses and mapping.
    - Literature review: Study of environmental impact assessments and surveys of the area.

  b) Electronic Mapping: Electronic maps were created using the latest OSM of the region, aerial and satellite photographs and GIS software. Details of the harvest areas were overlaid using GIS software. Additional information on protected biological and environmental areas are identified on these maps. The length of the coastline of each harvestable area was measured from the maps. Satellite images, tidal information and aerial photographs were used to estimate coverage of each site. This data was used to calculate the total biomass available from each site.

  c) Visits to the site: Several visits were made to Kenmare River SAC to identify areas of *A. nodosum* growth, assessment of collection piers, quays and harbours in terms of location, size and suitability and identification of major sites of relevance from a recreation, sports and tourism viewpoint. Visits also involved travel along the N70 (northern coastline) and R571 (southern coastline) and linked public by roads and existing routes in proximity or adjacent to the coastline. The visits provided valuable information in relation to potential piers, quays, harbours and pick up point throughout the area and allowed for integration of further local knowledge into the harvest plans, particularly in relation to recreation, sports and tourism activities.

  d) Risk assessment, control measures, monitoring & corrective actions:
  The following approach was taken to assess the potential risks associated with hand harvesting of *A. nodosum* in Kenmare River SAC, and to develop measures, monitoring & corrective actions:
  - Assessment of extent of conservation requirements for species & habitats of qualifying interest.
  - Identification of potential hazards (biological, chemical and physical).
  - Risk of hazard occurring (probability 'X' severity), on a scale 1 – 25.
  - Control measures to prevent hazards from occurring:
    - Exclusion of sites from harvest plan during sensitive times of the year (e.g. harbour seal breeding and moulting sites; bird wintering and breeding sites).
    - Mitigation measures:
      - High risk hazards which require mitigation (i.e. risk ≥15) and therefore, a NIS.
      - Low-moderate risk hazards (risk <15) requiring control measures and potentially mitigation and NIS.

- Determination of means in which to minimize impact on protected environs within the harvest areas, where applicable.

- Action limit/non-conformance: determine levels at which control measures are deemed to be breached or close to being in breach.
- Analytical procedure: identify methods to determine whether action limits have been exceeded.
- Duties: staff assigned responsibility for assessing conformance with control measures and limits.
- Monitoring schedule: determine frequency at which conformance with control points and action limits are assessed.
- Corrective actions: determine methods to counteract non-conformances or ensure that problems are not repeated.
- Verification: determine means of assessing the validity of control measures and associated analytical procedures and schedules, to ensure that hazards are prevented from occurring.
- Natura Impact Statement (NIS): Assess whether or not an NIS is required in the event of not being able to rule out the risk of hazards affecting Annex I or Annex II species and habitats.

- **Development of Management & Implementation systems.**

Management: Defining the resource management team – See Figure 1 below:

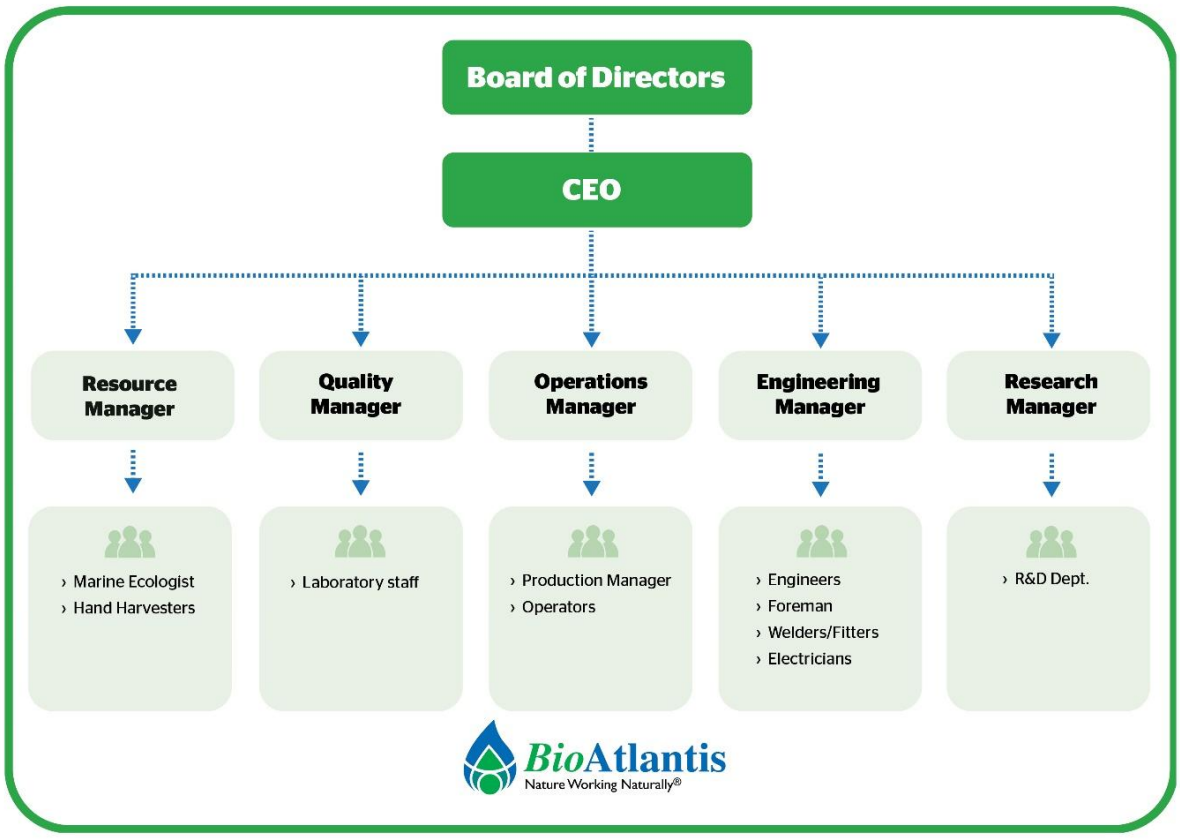

Figure 1 : Resource Management Team

Implementation of Systems:

- Compliance and Record Forms (Appendix 3 of proposal document): The following forms were developed to ensure that systems are in place to assess harvest activities and report incidents and non-conformances on an ongoing basis:

- Goods Received Note (GRN) form.
- Site Inspection Form (SIF).
- Non-Conformance Report (NCR) form (G012).
- Incident Report (IRF), form (G008).
- Information in the above may alternatively be provided in other suitable formats by electronic or other means on site and/or at production facilities.

➢ Code of Practice: mitigation measures were developed to ensure that significant direct, indirect and cumulative effects on qualifying interests do not occur (Appendix 4 of the proposal document).
➢ Quarterly and annual audits: As part of the Code of Practice, regular audits will be required to monitor quality standards (see Appendix 8 of the proposal document for Audit template).
➢ Standard Operating Procedures (SOPs) will be put in place to ensure that the harvest activities are carried out in a clearly defined manner which does not impact on the protected communities and species within the SAC region. Where necessary, these procedures will be implemented along with regular training, assessment and supervision by members of the Resource Management Team.

- **Development of monitoring systems:**
  ➢ Quantifying *A. nodosum*: Methods of quantifying the *A. nodosum* resource are required to ensure that hand harvesting takes place in a sustainable and controlled manner. During the developmental stage, a number of methods will be under review, under optimisation or being trialled. A similar trial was carried out as part of BioAtlantis' application to hand harvest *A. nodosum* in Clew Bay, Co. Mayo and involved the development of visual and direct on-site measurement approaches, along with inspection of site quality (see BioAtlantis Foreshore Licence Application No. FS006269).
  ➢ Monitoring site quality: Involving on-site checks to ensure that *A. nodosum* has not been cut below 8 inches. This will assessed and verified by means of SIF (Appendix 3 and 8 of proposal document).
  ➢ Fallowing and harvesting requirements: Measurements of biomass and/or site recovery will be incorporated into a functioning database, for calculations aimed at to determining future fallowing and harvest requirements, on a site-by-site basis. See Tables 3 & 4 for details.

- **Consultations:** BioAtlantis have consulted a large body of data and literature which exists in the public domain covering a wide range of areas including: planning, regulatory and legal requirements, business interests, aquaculture and fisheries, tourism, sports or recreation and activities, local authority plans, growth and development plans, existing environmental data, peer-reviewed literature, scientific databases and media. While large-scale commercial *A. nodosum* harvesting does not currently take place in Kenmare Bay, small scale local harvesting may take place for personal use or by small operators. BioAtlantis will engage with key groups including any existing hand harvesters, landowners and a number of local business interests in the area. Consultations such as these represent a key component of the BioAtlantis plan to develop the industry sustainably in Kenmare Bay. BioAtlantis have a policy of explaining our objectives in an open, transparent and approachable manner. In doing so, BioAtlantis hope to gain public, governmental and business approval for a management plan which we believe will provide a substantial economic benefit to the area, whilst also guaranteeing that the objectives for this SAC are met. All concerns and suggestions by any existing hand harvesters in Kenmare Bay will be taken on board. From an environmental viewpoint, all necessary bodies such as NPWS, IFI and others will be consulted as part of this licence application.

- **Natura Impact Statement:** The initial risk assessment carried out by BioAtlantis formed an important component in the development of the management plan (see Appendix 5 of proposal document). However, as a number of moderate risks were identified, it was deemed necessary to liaise with independent consultants, in order to assess whether or not a Natura Impact Statement (NIS) was required. The NIS is enclosed as a separate stand-alone document with this application.

2.2.4 Locations & months in which operations/activities will take place.

Table 2 : Summary of operations/activities undertaken during developmental phase (Jan 2015-present).

No.	Operation/activity	Details		
1.	**Risk Assessment**	**Date**	**Location**	**Status**
(a)	Literature review & data gathering.	Jan 2015 – Oct 2024	BioAtlantis	Completed
(b)	Electronic Mapping	July 2016- July, 2024	BioAtlantis	Drafted
(c)	Visits to the site	2016 to present	Kenmare	Completed
(d)	Risk assessment, control measures, monitoring & corrective actions	April 2015 – Oct 2024	BioAtlantis	Completed
2.	**Development of Management & Implementation systems**	**Date**	**Location**	**Status**
(a)	Defining the management team.	April 2015 – Oct 2021	BioAtlantis	Completed
(b)	Compliance & Record Forms (GRN, NCR, IRF)	April 2015 – Oct 2021	BioAtlantis	Completed
(c)	Code of Practice for protecting SAC & environment	April 2015 – Oct 2024	BioAtlantis	Completed
(d)	Standard Operating Procedures (SOPs).	Incomplete	BioAtlantis	Incomplete
3.	**Development of monitoring systems**	**Date**	**Location**	**Status**
(a)	General Systems	April 2015 – Oct 2021	BioAtlantis	Completed
(b)	Quantifying *A. nodosum*	Sept 2015 – May 2022	BioAtlantis	Completed
(c)	Fallowing and harvesting requirements	Sept 2015 – May 2022	BioAtlantis	Completed
(d)	Monitoring the Code of Practice: Quarterly and annual auditing system	Sept 2015 – May 2022	BioAtlantis	Completed
4.	**Consultations:**	**Date**	**Location**	**Status**
(a)	Department of the Environment, Heritage and Local Government.	27th June, 2022 to 15/12/2023	Correspondence via email	Submission of pre-application form & associated application documentation and maps.
(b)	National Parks & Wildlife Service (NPWS)	Feb, 2020	Correspondence via email	Request for clarification regarding site conservation objectives documents
(c)	BirdWatch Ireland	14th May 2015 to 18th June, 2020.	Correspondence via email	Datasets obtained & analysed
(d)	Inland Fisheries Ireland (IFI)	Incomplete	Incomplete	Incomplete
(e)	Ecofact Environmental Consultants Ltd.	November 2017 to present	Kenmare Bay	NIS and other environmental reports completed.
(f)	Harvesters			Incomplete
(g)	Landowners			Incomplete
(h)	County Councils & other parties			Incomplete

2.3 Operation

2.3.1 Area to be directly impacted: Overview

BioAtlantis' plans for harvesting *A. nodosum* in Kenmare Bay have been designed based on environmental sustainability. Based on our own assessment and the study of the area by Hession C, *et al.,* (1998), we propose to harvest *A. nodosum* from the coast of Kenmare Bay, including the islands. This is identified more clearly in Appendix 2 of the proposal document (Maps). The study by Hession C, *et al.,* (1998) concluded that the coastal areas of Kenmare Bay have the potential to sustainable yield 1,160 wet tonnes of *A. nodosum* per annum. This figure for sustainable yield is for the coastal area alone, and does not include the islands. Through use of data obtained from Hession C, *et al.,* (1998) and maps and aerial photographs of the region, we estimate the current maximum annual yield to be approximately 9,133 wet tonnes. This equates to an annual sustainable harvest of 1826 wet tonnes from both the coastline and islands (1125 and 701 respectively). The figures of 1826 wet tonnes is somewhat higher that the figure of from Hession et al., as the current application also incorporates a range of island in Kenmare Bay, which were not assessed by Hession et al. Table 3 lists the sites that will be harvested and the estimated available biomass in each case. Sustainable hand harvesting may take place at these locations, in line with the management plan, in accordance with the sustainability Code of Practice (Appendix 4 of the proposal document), and in line with existing appurtenant rights in relation to seaweed harvesting.

To manage the harvest activities, BioAtlantis will employ or contract a Resource Manager or Project Manager, preferably with relevant environmental qualifications, a marine ecology background and/or experience in the fishing / marine resources industry. This individual will be responsible for managing activities within the harvesting area and in ensuring sustainability of these activities, and will report directly to the company CEO, and work as part of the resource management team. The person tasked with assessing recovery post-harvesting will have a marine ecology background.

Areas containing harvestable quantities of *A. nodosum* in Kenmare Bay are as follows: ~68.54Km of coastline and 92 Islands. For the effective management of the licence area, BioAtlantis will create a database of the islands and coastal areas. This database will be used to:

(a) Determine sites which require a fallowing period to allow for adequate recovery from recent activities.
(b) Determine rotation requirements (i.e. extrapolation and calculation of the duration or fallowing period required prior to a particular area being fit for re-harvest).
(c) Prevent harvest activities that would lead to a decline in yield.
(d) Record the details of each harvest, how much, by whom & when.

Moreover, this database will represent a central, working component of the BioAtlantis Code of Practice for harvesting *A. nodosum* which requires:

(a) Development of pre-harvest plans in advance of harvest activities.
(b) A cap of 20% on the level of biomass which can be harvested from a given site per annum.
(c) *A. nodosum* cannot be cut below 200mm in height. At least 200-300mm (8-12 inches) material must be left behind.

Table 3 Areas & quantities to be harvested in Kenmare Bay.

* Harvesting Zone ID's were assigned by BioAtlantis as part of establishing the management system.

† Maximum Annual Harvest (Tonnes) is calculated as 20% of the total available biomass per site. The figure of 20% refers to the percentage of the total available *A. nodosum* biomass harvested per site, per annum.

§ Denotes the percentage of coastline which can support *A. nodosum* growth.

No.	Site ID	Name/Area	Island name	Internal code	Harvestable Area (m^2)	Density (Kg/m2)	Coverage §	Harvest levels (Tonne) †	
								Available Seaweed (T)	Maximum Annual Harvest (T)
1	A	Vedanona-Parknasilla		CZ 1.1	3549.94	2.25	80	6.39	1.28
2	B			CZ 1.1	6647.37	2.25	80	11.97	2.39
3	F			CZ 2.1	46642.86	0.75	98	34.28	6.86
4	H			CZ 2.1	4264.29	0.75	98	3.13	0.63
5	G			CZ 2.1	5140.41	0.75	98	3.78	0.76
6	E			CZ 2.1	31127.11	0.75	98	22.88	4.58
7	I			CZ 2.1	20857.03	0.75	98	15.33	3.07
8	AB			CZ 2.2	18729.22	2.50	98	45.89	9.18
9	AA			CZ 2.2	44404.85	2.50	98	108.79	21.76
10	Z			CZ 2.2	11538.30	2.50	97	27.98	5.60
11	AF			CZ 2.3	28072.82	4.50	97	122.54	24.51
12	AU	Coongar Harbour-Rossmore Island		CZ 3.1	64850.78	4.50	95	277.24	55.45
13	AZ			CZ 3.2	55215.02	4.00	95	209.82	41.96
14	AY			CZ 3.2	25632.80	4.00	95	97.40	19.48
15	BI	Derreennamaken-Templeone Pier		CZ 4.1	11583.75	3.50	75	30.41	6.08
16	BJ			CZ 4.2	17132.23	3.50	65	38.98	7.80
17	BK			CZ 4.3	85655.53	3.50	65	194.87	38.97
18	BN			CZ 4.5	28718.68	3.50	95	95.49	19.10
19	CX			CZ 5.1	20935.42	3.50	70	51.29	10.26
20	EK	Coornagillagh-Kenmare Pier		CZ 5.2	9604.35	5.00	95	45.62	9.12
21	EL			CZ 5.2	15204.53	5.00	98	74.50	14.90
22	DA			CZ 5.3	4199.41	5.50	95	21.94	4.39
23	DB			CZ 5.3	8557.35	6.00	95	48.78	9.76
24	DC			CZ 5.4	10366.30	6.00	95	59.09	11.82
25	DD			CZ 5.5	16923.82	6.00	98	99.51	19.90
26	DE			CZ 5.6	21758.97	5.50	98	117.28	23.46
27	DF			CZ 5.7	27703.46	6.50	85	153.06	30.61
28	DG			CZ 5.8	18570.36	6.50	95	114.67	22.93
29	DH			CZ 5.9	20273.93	6.25	85	107.71	21.54
30	DI			CZ 5.10	7947.97	6.25	98	48.68	9.74
31	DJ			CZ 5.10	10800.92	6.25	98	66.16	13.23
32	DK			CZ 5.11	49539.35	3.80	85	160.01	32.00
33	DN			CZ 5.12	64072.10	3.80	80	194.78	38.96

No.	Site ID	Name/Area	Island name	Internal code	Harvestable Area (m²)	Density (Kg/m2)	Coverage §	Harvest levels (Tonne) †	
								Available Seaweed (T)	Maximum Annual Harvest (T)
34	DO			CZ 5.13	8120.11	3.80	85	26.23	5.25
35	DP			CZ 5.13	27632.44	3.80	85	89.25	17.85
36	DQ			CZ 5.14	20985.99	3.80	80	63.80	12.76
37	DU	Lehid Harbour		CZ 6.1	87892.91	3.80	85	283.89	56.78
38	DR			CZ 6.1	19894.04	3.80	85	64.26	12.85
39	DX	Bunaw-Collarus		CZ 7.1	82402.30	1.66	98	134.01	26.80
40	DV			CZ 7.1	9846.34	1.66	98	16.01	3.20
41	DY			CZ 7.2	74771.18	1.66	98	121.60	24.32
42	DZ			CZ 7.3	45451.29	1.66	98	73.91	14.78
43	EA			CZ 7.3	7789.30	1.66	98	12.67	2.53
44	EB	Ardgroom Harbour-Cappul Bridge		CZ 8.1	23052.47	2.25	98	50.83	10.17
45	EC			CZ 8.1	23183.11	2.25	98	51.12	10.22
46	ED			CZ 8.1	1678.24	2.25	98	3.70	0.74
47	EE			CZ 8.2	64212.21	2.25	98	141.59	28.32
48	EJ	Ballycrovane Harbour		CZ 9.1	26166.07	6.00	98	153.86	30.77
49	EF			CZ 9.1	25951.82	6.00	98	152.60	30.52
50	EG	Vedanona-Parknasilla	Sherky Island	IS 1	33334.06	0.90	25	7.50	1.50
51	EH		Illaunanadan	IS 2	30084.27	0.90	30	8.12	1.62
52	EI		Inishkeragh	IS 3	17481.14	0.90	20	3.15	0.63
53	D		Garinish	IS 4	32623.64	1.66	75	40.62	8.12
54	C		Einnaun	IS 5	5901.14	1.66	60	5.88	1.18
55	P		Illaunslea	IS 8	6378.74	6.25	35	13.95	2.79
56	N		Illaunslea	IS 8	9734.42	6.25	35	21.29	4.26
57	M			IS 9	6191.71	2.00	95	11.76	2.35
58	J			IS 10	3988.28	6.50	98	25.41	5.08
59	K			IS 11	3637.57	6.50	95	22.46	4.49
60	L			IS 12	5398.00	6.50	95	33.33	6.67
61	Y			IS 13	3111.27	6.50	95	19.21	3.84
62	R			IS 14	5447.61	6.50	97	34.35	6.87
63	S			IS 14	1936.54	6.50	97	12.21	2.44
64	Q			IS 15	4527.14	6.50	90	26.48	5.30
65	T			IS 16	4289.46	6.50	90	25.09	5.02
66	U			IS 17	3993.13	6.50	90	23.36	4.67
67	V			IS 18	12681.73	6.50	90	74.19	14.84
68	X			IS 19	8282.15	6.50	98	52.76	10.55
69	W			IS 20	20103.02	6.50	95	124.14	24.83
70	AC			IS 22	2351.06	2.50	96	5.64	1.13
71	AD			IS 23	1622.95	2.50	97	3.94	0.79
72	AE			IS 24	1806.42	5.75	97	10.08	2.02

No.	Site ID	Name/Area	Island name	Internal code	Harvestable Area (m²)	Density (Kg/m2)	Coverage §	Harvest levels (Tonne) †	
								Available Seaweed (T)	Maximum Annual Harvest (T)
73	AH		Rossdohan Island	IS 25	16042.25	7.75	95	118.11	23.62
74	AG			IS 25	8873.64	7.75	95	65.33	13.07
75	CY			IS 27	1922.20	4.50	95	8.22	1.64
76	AI			IS 26	3307.55	7.50	95	23.57	4.71
77	AJ		Brown Island	IS 28	10373.76	7.50	86	66.91	13.38
78	AK		Carrigleagh	IS 29	2322.95	7.50	85	14.81	2.96
79	AL				1217.48	7.50	95	8.67	1.73
80	AM			IS 33	1023.81	7.50	95	7.29	1.46
81	AN				702.38	7.50	95	5.00	1.00
82	AO			IS 34	6105.51	7.50	95	43.50	8.70
83	AW	Coongar Harbour-Rossmore Island		IS 42	680.76	5.25	98	3.50	0.70
84	AX			IS43, IS44	14985.12	5.25	98	77.10	15.42
85	BF			IS 47	804.70	5.25	98	4.14	0.83
86	BE			IS 50	785.39	5.25	98	4.04	0.81
87	CV	Derreennamaken-Templeone Pier/Coornagillagh-Kenmare Pier	Dronnoge	IS 51	747.16	7.25	98	5.31	1.06
88	CD		Carrignaluinga	IS 52	1901.42	7.25	97	13.37	2.67
89	CF			IS 53	997.28	7.25	97	7.01	1.40
90	CK			IS 56	2695.00	7.25	95	18.56	3.71
91	CL			IS 57	4344.94	7.25	95	29.93	5.99
92	CB			IS 58	2447.22	7.25	97	17.21	3.44
93	BZ		Greenane Isds	IS 59	22854.78	7.25	97	160.73	32.15
94	CM			IS 60	8248.14	7.25	95	56.81	11.36
95	CR			IS 61	23261.43	8.25	98	188.07	37.61
96	CS			IS 62	16571.32	8.25	97	132.61	26.52
97	CU			IS 63	37902.80	8.25	98	306.44	61.29
98	CC		Illaungowla	IS 65	8819.01	7.25	97	62.02	12.40
99	CT			IS 66	2138.19	7.25	95	14.73	2.95
100	CN			IS 67	6824.07	7.25	95	47.00	9.40
101	CQ			IS 68	2619.37	7.25	95	18.04	3.61
102	CO			IS 69	19802.35	7.25	95	136.39	27.28
103	CH			IS 73	845.64	8.00	95	6.43	1.29
104	CG		Cappanacush	IS 74	1949.18	8.00	95	14.81	2.96
105	BL		Illaunreanageah	IS 77	2239.53	8.00	95	17.02	3.40
106	BU			IS 78	5068.96	7.50	95	36.12	7.22
107	BT		Fox Island	IS 79	10404.50	7.50	98	76.47	15.29
108	BS			IS 80	2074.62	7.50	98	15.25	3.05
109	BR			IS 81	37104.12	7.00	98	254.53	50.91
110	BP			IS 82	2434.94	7.00	98	16.70	3.34

No.	Site ID	Name/Area	Island name	Internal code	Harvestable Area (m^2)	Density (Kg/m2)	Coverage §	Harvest levels (Tonne) †	
								Available Seaweed (T)	Maximum Annual Harvest (T)
111	BO		Reengarriff	IS 83	2942.57	7.00	95	19.57	3.91
112	BX		Dunkerron Isd (west)	IS 84	1057.24	6.00	95	6.03	1.21
113	BW			IS 85	851.54	6.00	98	5.01	1.00
114	BY		Rossmore Island	IS 86	1170.23	7.50	96	8.43	1.69
115	BH			IS 86	49260.74	7.50	96	354.68	70.94
116	BV		Illaunnakilla	IS 87	5261.27	7.50	98	38.67	7.73
117	BQ		Dunkerron Isd (east)	IS 88	26411.07	7.50	98	194.12	38.82
118	DM		Brennel Islands	IS 89	11589.85	7.50	75	65.19	13.04
119	DL			IS 90	8928.57	7.50	95	63.62	12.72
120	EN	Sneem			53860.50	4.00	95	204.67	40.93
121	EQ				113081.25	4.00	95	429.71	85.94
122	ES				30414.06	4.00	95	115.57	23.11
123	ET			IS91	6594.23	4.00	95	25.06	5.01
124	EU				2178.99	4.00	95	8.28	1.66
125	EV				2612.11	4.00	95	9.93	1.99
126	EX				14938.96	4.00	95	56.77	11.35
127	EY				18879.09	4.00	95	71.74	14.35
128	FA			IS92	1682.36	4.00	95	6.39	1.28
129	FC				121565.78	4.00	95	461.95	92.39
130	FD			IS93	2259.17	4.00	95	8.58	1.72
131	FE			IS94	1124.20	4.00	95	4.27	0.85
132	FF				31183.53	4.00	95	118.50	23.70

2.3.2 Different types of operations/activities

There are four main types of activities associated with the operational phase, as follows:
a) Operation/Activity No. 1: Management and Implementation.
b) Operation/Activity No. 2: Monitoring, recording and reporting.
c) Operation/Activity No. 3: Verification & Analysis.
d) Operation/Activity No. 4: Long term assessment of biomass and community structure

These operations/activities are described in detail throughout this section.

(a) Operation/Activity No. 1: Management and Implementation

The sustainable harvest system consists of several key management and implementation components. These include activities relating to:
(i). Managing expansive and prolonged operations.
(ii). Managing personnel and exploitation levels.
(iii). Planning and scheduling of harvesting activities.
(iv). Data recording and analysis.
(v). Navigation to and from harvest sites.
(vi). Communication.
(vii). Hand-harvest methodology, guidelines and Codes of Practice.
(viii). Health and safety measures
(ix). Preventing spread of invasive species.

The details of how BioAtlantis proposes to manage these activities are as follows:

(i). Managing expansive and prolonged operations

BioAtlantis will employ a site-specific management approach to Kenmare Bay, throughout the entire year. This ensures that activities take place at appropriate locations and at appropriate times. Specifically, this allows for robust mitigation measures to be employed to ensure that sites designated as unavailable for harvest at a particular time due to presence of sensitive seal and bird species, are not visited and/or appropriate mitigation measures are implemented where required. Thus, while the total area of coastline in Kenmare Bay is quite large, the approach of selecting appropriate sites and employing site specific mitigation measures, effectively narrows the focus to a small number of discrete locations at any given time. The Resource Manager will have ease of access to the sites during inspections and will manage operations throughout the area. This brings full traceability to the process, as the quality of harvest from each location is monitored and biomass will be weighed on collection or pick up and a Goods Received Note (GRN) will be issued, with sites also inspected post-harvest to ensure the sustainability of the methods employed (SIF; Appendix 3 of the proposal document). Harvesting at low tide and pick-up or towing of nets/bags at high tide avoids potential for coastal damage that could be caused by bringing in large quantities of seaweed ashore at inappropriate locations.

(ii). Managing personnel and exploitation levels

An individual harvester will occupy an area corresponding to approximately 0.4 acres per day, for up to 5 hours. Approximately 2 tonnes of *A. nodosum* may be cut in a given day by an individual harvester. Approximately 10-20 harvesters will be employed and allocated in appropriate numbers to harvest zones of varying size. No more than 20% of *A. nodosum* biomass per site will be harvested per annum. Thus, the low number of people over a wide area reduces the potential for anthropogenic impacts (e.g. intensity of trampling) on the biotope. Given that the BioAtlantis plan will target specific areas at certain times of the year, the low levels of trampling events will be largely episodic in nature. It is unlikely therefore, that any significant change in the structure of *A. nodosum* assemblages will occur. Furthermore, as BioAtlantis will implement a strict policy against holdfast removal, the incidence of *A. nodosum* mortality will be reduced considerably (see Appendix 4 of the proposal document). As such, the harvest level of 20% will represent a relatively constant figure and will not be exacerbated due to significant levels of *A. nodosum* mortality due to partial or complete holdfast removal.

(iii). Planning & scheduling of harvesting activities

To effectively manage activities, BioAtlantis will create a database of all coastal areas and islands in the bay. This will contain information as to the length of coastline, density of *A. nodosum* and coverage percentage, along with details of each harvest. In the initial stages, it is necessary to establish details of when each area, if any, was last harvested. Any evidence for recent harvest activities will be recorded. This data will be used to decide when a region will be next available for harvest.

Once the data from the most recent harvest has been established, this will be entered in the database as illustrated in Table 4, in the highlighted columns. The maximum harvest available from each Island or coastal zone has been established from previous studies. The recovery time is generally accepted to be 3-5 years from a complete harvest. BioAtlantis propose a maximum harvest of 20% of the total available *A. nodosum* biomass per site per annum to ensure sustainability. The figure of 20% refers to the percentage of the total available *A. nodosum* biomass harvested per site per annum. As *A. nodosum* biomass can potentially recover within 11 to 17 months (Kelly et al., 2002), it may be possible therefore to harvest year on year in certain locations; however this is subject to recovery being achieved. As outlined in this application, measures will be implemented to ensure that harvesting does not take place if a site has not recovered from the previous year.

Adaptive Management: BioAtlantis will implement an Adaptive Management Approach. This will ensure continual improvements to the harvesting plan during its implementation and ensuring its effectiveness into the future. For example, BioAtlantis will also work to include local knowledge as to best practice when approaching sites and will take a scientific approach to decision making and in ensuring that conservation objectives for the SAC are met.

Table 4 : Planning of Harvest Activities

Site ID	Harvest limits		Details of Previous harvest			Predicted Fallow Period (Years)	Date of Next Harvest
	Available Seaweed on site (Tonnes)	Maximum Annual Harvest per site (20%) (Tonnes)	Date of Last Harvest (Sample dates used)	Quantity of previous harvest (Max 20%) Weight (Estimated for Table)	% of Available Biomass		
BI	30.41	6.08	August, 2023	5.9	19.40%	1.0	Sept, 2024
BJ	38.98	7.8	September, 2023	7.5	19.24%	1.0	Oct, 2024
EK	45.62	9.12	October, 2023	9.1	19.97%	1.0	Nov, 2024
DB	48.78	9.76	March, 2024	9.2	18.86%	0.9	Feb, 2025
DC	59.09	11.82	July, 2024	9.8	16.58%	0.8	May, 2025

* The sample data entered above is for illustration purposes only.

Once the re-harvesting date for site is established, this information will be used to plan the next seasons harvesting. When planning future harvests, some sites will be marked as unavailable for certain times of the year. This is to ensure that known harbour seal breeding & moulting sites and sensitive bird sites are avoided. It also ensures avoidance of a number of sites where significant in-combination effects could occur at certain times of the year. The Resource Manager will be responsible for ensuring that these sites are avoided. A list of sensitive sites in the bay which harvesters will be advised to avoid at certain times of year (due to the presence of seals, breeding and wintering bird populations and potential for in-combination effects in general) is provided in Table 7 of this document. This is described further in Appendix 4 of the proposal document, along with a list of restricted sites and site-specific measures for harbour seal moulting, breeding and resting sites and bird breeding and wintering sites. The Resource Manager will be required to verify that each site has fully recovered prior to re-harvesting. This will be done by via on-site assessments and updating the plan as necessary with the results of this analysis.

Duty: BioAtlantis Resource Management Team.

Harvesting Flow Chart: The flow chart shown in Figure 2, describes the harvesting process and the pre- and post-harvest checks that are in place to ensure that the correct procedures are followed.

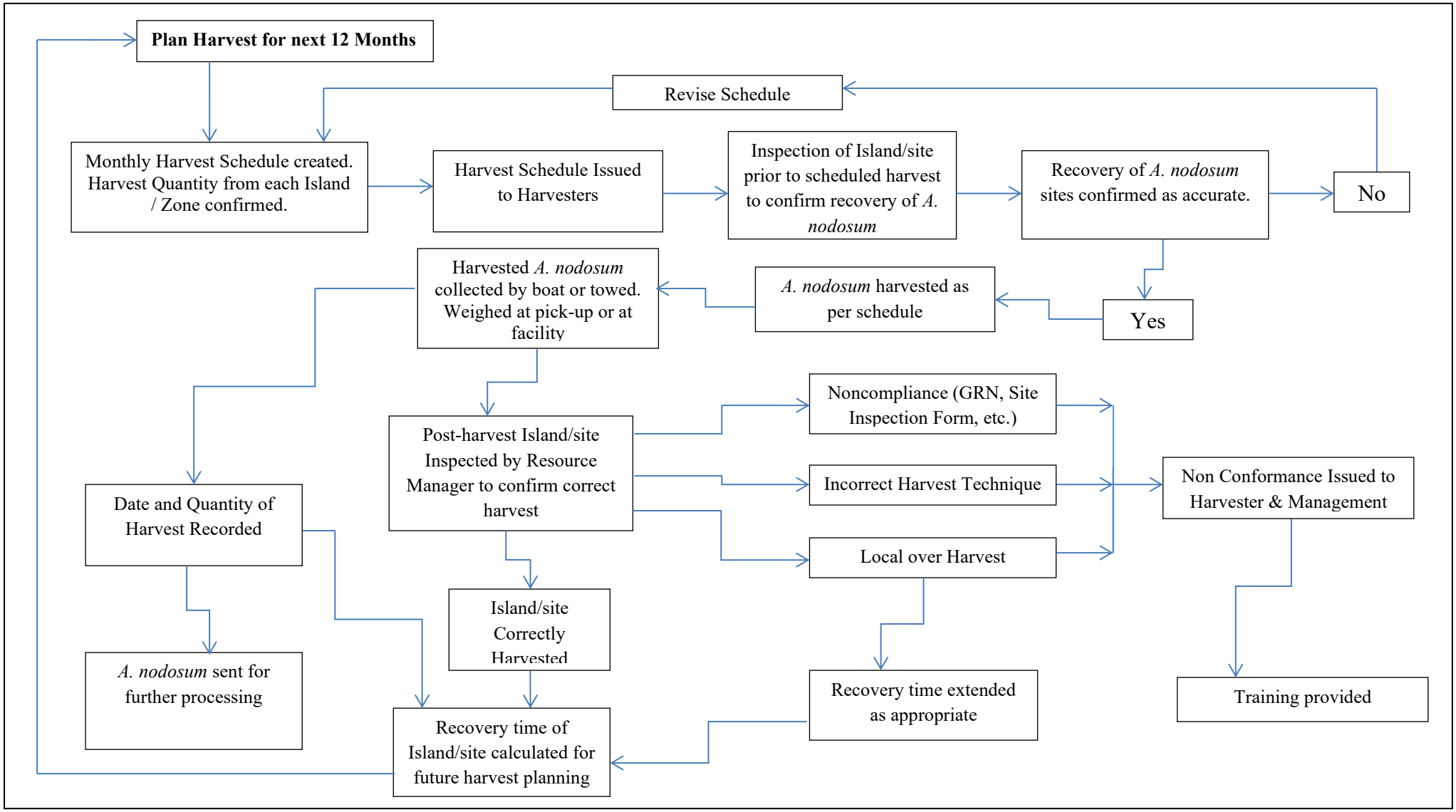

Figure 2: Harvesting Flow Chart

(iv). Data recording & analysis

BioAtlantis will explore the applicability of purchasing a boat for the area to be used for the collection of harvested *A. nodosum*. Alternatively, harvesters may tow the floating bags/nets from the harvest site directly to the pick-up point. In some cases, certain individuals with existing seaweed harvesting rights may prefer to land seaweed at pick up points. The seaweed collected from each point will be weighed and the details of the harvest recorded at each collection point. The seaweed may alternatively be weighed on delivery to the processing facility. The person or transport company receiving the harvested seaweed will complete a "Goods Received Notes" (GRN, see Appendix 3 of the proposal document)" to record the harvest from each site. This will include:

- Name of harvester.
- Date & time of harvest.
- Pick-up location.
- Location of site/name of island/coastal sector and if appropriate, zone or additional location information.
- Description of the site:
  - Quantity of harvest.
  - Quality of harvest: is seaweed free of the following:
    - Excessive levels of sand, shingle, gravel, pebbles stones or debris.
    - *A. nodosum* holdfasts.
    - Other species (e.g. *Fucus*).

The Resource Manager will inspect sites post-harvest using the "Site Inspection Form (SIF)" (Appendix 3 of the proposal document) to confirm that harvesters have worked to ensure:

- Cutting of *A. nodosum* 200-300mm (8-12 inches) above holdfast.
- No more than 20% of the available *A. nodosum* biomass is harvested.
- Activities only take place at approved sites.
- H&S requirements are adhered to (applicable if harvesters are present during inspection).

After receipt of the *A. nodosum* in the factory, these details will be uploaded into the main database and a second GRN will also be completed. Alternatively, where the quality cannot be checked on collection, quality will be assessed by production staff and/or the QC team and any deviations from the specified requirements will be recorded. Checks may be undertaken by random or specific quality inspections on bags/nets. Regular auditing of the harvest records (e.g. SIF, GRN and production logsheets) will be carried out to ensure compliance with all BioAtlantis SOPs to ensure that communities and species within the SAC are protected. The procedures for reporting non-conformances are:

- Relevant personnel may be advised of non-conformance and receive further training if necessary.
- Where there is continued/repeated non-conformances, management will decide on appropriate action, depending on the severity of the non-conformance.
  (see Appendix 3 of the proposal document for standard NCR Forms).

Computerised data will be maintained of all harvest records and non-conformances. Once the production planning and schedule for each year has been completed and prior to recommencing harvesting, each site will be visited by the Resource Manager to ensure the validity of the data

relating to projected regeneration times and site recovery. Planned harvesting activities will be adjusted accordingly in the event of any inaccuracies in the projections.

Duty: Implementation, monitoring & analysis by BioAtlantis staff (e.g. Engineering, IT, Production, Quality personnel and Resource Manager).

(v). Navigation to and from harvest sites:

The harvesters shall use their own boats to navigate to and from the island sites. In the case of coastal sites, the harvesters shall be responsible for access to and from the sites using a boat or through use of existing routes. BioAtlantis will explore the applicability of purchasing a boat for the collection of the harvested *A. nodosum* from the designated sites. Alternatively, harvesters may tow the floating bags/nets from the harvest site directly to the pick-up points. The harvesters will be made aware that all harvested *A. nodosum* must be collected by BioAtlantis for weighing and processing, and the seaweed will only be collected from the sites or pick up points identified on the harvesting schedule or as required by management. In some cases, certain individuals with existing seaweed harvesting rights may prefer to land seaweed at pick up points. The seaweed will be weighed by BioAtlantis at pick up points and/or on delivery to the processing facility.

(vi). Communication

The number of harvesters operating for BioAtlantis will be approximately 4 to 6 full time or 8 to 16 part-time. Communication of the harvesting plan will be done in advance each month/quarter via email or post. This will include information on sites that are to be harvested and the quantity and dates for each harvest site. Sites will be identified on a map and the anticipated quantities for each site indicated. Communications with the harvesters during harvesting activities will be either via a mobile phone or 2 way radios, as deemed appropriate. Duty: Communication by the BioAtlantis Resource Management Team. Implementation by hand harvesters.

(vii). Hand-Harvest methodology, Guidelines and Codes of Practice.

- **Selection of a harvest methodology suited to Kenmare Bay:**
  There are several different harvest methods employed throughout the world, including sickle/knife hand-harvesting and 'rake'-type methods. Each method has varying degrees of efficacy and safety and some may be better suited to a particular environment than others. In the case in Kenmare River SAC, the coastal substrate is a mixture of reef (cobbles and boulders, vertical rock walls, flat and sloping bedrock) and shingle (pebbles and gravel). Potentially stony or friable substrate may occur in some locations. It is known that increased removal of holdfast by-catch can occur due to the presence of underlying friable substrate (ref: paragraph. 3, page 19, Vandermeulen *et al.,* 2013). It is important that the harvest system in Kenmare Bay mitigates against effects associated with harvesting *A. nodosum* which can grow on friable substrate, cobbles, pebbles and gravel. On assessment of the literature and by considering the *A. nodosum* substrate in these areas, management at BioAtlantis have selected a methodology which minimizes the risk of:
  (a) Disturbing or displacing substrate during hand harvest.
  (b) Damaging holdfast material .

(c) Removal of holdfast material and associated *A. nodosum* mortality.

The methodology involves use of the sickle/knife method at low tide which provides harvesters with full view of the cutting process, taking care not to disturb the substrate, not harvest too low or damage holdfast. For more details, see the Code of Practice in Appendix 4 of the proposal document.

Rake methods of hand harvesting at high tide may be more suitable in areas with large, solid substrata, while hand harvesting at low tide may be preferable in regions with a heterogeneous mix of small rocks, pebbles, and friable materials. In Canada, where the hand-harvesting "rake" method is used, *A. nodosum* biomass typically recovers within 2 to 5 years (Sharp and Tremblay, 1989, and references therein). Recovery has been observed as early as 3 years after 50% biomass removal (Sharp and Tremblay, 1989; Lauzon-Guay et al., 2021, and references therein). This rapid regrowth may result from stimulated shoot growth and branching in suppressed clumps (Ugarte et al., 2006). A study by Lauzon-Guay et al., 2023, shows that harvest of *A. nodosum* at sites with a 20 + year history of commercial harvesting in Canada, does not have long-term impact on the morphology of the algae or on the abundance of its main inhabitants. During the operational phase of the license, BioAtlantis will evaluate both hand-harvesting methods (hand harvesting at low-tide on the shore, and harvesting at high tide with the rake) to determine their applicability and suitability.

- **Guidelines and Codes of Practice:**

Harvesters will receive training, where necessary, on methods to harvest *A. nodosum* in an environmentally friendly and sustainable manner. Activities will be carried out in accordance with a clearly defined protocol which will prevent any damage to the environment or underlying growth substrate, whilst also facilitating sufficient re-growth and re-generation of the vegetation post-harvest. The Code of Practice for *A. nodosum* harvest activities can be found in Appendix 4 of the proposal document. SOPs will also cover the following areas:

- Environmentally sensitive navigation methods, i.e. to prevent damage to estuarine mud, muddy-fine sand, intertidal sand, saltmarsh habitat, Intertidal mobile sand, shingle, reef areas and bogland SAC areas occurring adjacent to the coast. Navigation at these areas will be at high tide or when the tide has begun to recede.
- Determining suitability of harvest areas, i.e., fronds that are too short will not be harvested.
- Method for using sickle or knife to cut fronds of *A. nodosum* between 200-300mm (8-12 inches) above the base, without damaging holdfast or underlying substrate and method for bagging of cut *A. nodosum* in bags/nets.
- Method for transferring seaweed via boat.
- Method for automatic weighing and transfer of weed to boat (subject to being applicable to the area).
- Method for filling out GRN.
- Methods for weighing, loading and transporting of cut weed to BioAtlantis via suitable piers, quays and harbours.
- Method for communicating with BioAtlantis.
- Method for reporting incidents to BioAtlantis.

Training will also be provided to ensure competence in navigation and use of electronic and health and safety equipment.

Duty: Training provided by BioAtlantis staff.

(viii). Health and Safety measures:

Harvesters will be provided with appropriate and certified Health & Safety Training. BioAtlantis will run regular training days for the harvesters, where necessary. Duty: Health & Safety Manager.

(ix). Preventing spread of invasive species

Hand harvesting has potential to act as a vector in the spread of invasive species. To ensure that activities do not lead to the spread of the invasive species, such as, *Bonamia ostreae, Botrylloides violaceus, Caprella mutica, Crassostrea gigas, Crepidula fornicate, Didemnum vexillum, Perophora japonica, Sargassum muticum, Spartina anglica, Schizoporella errata* and *Styela clava*, BioAtlantis require that any collection or harvester boats be painted once a year with appropriate anti-fouling paint. Harvester boats will not leave Kenmare Bay; in the rare case that they do, cleaning measures will be implemented on land which will involve cleaning with appropriate cleaning agents or using other suitable methods. All bags/nets must be cleaned with appropriate cleaning agents or other suitable methods on delivery to production facilities and returned to harvesters in a clean condition. Harvesting will be limited to the *A. nodosum* zone and will not take place in subtidal areas, exposed or semi-exposed sites. Harvesters will keep distance from aquaculture units to prevent the spread of any species that may be associated with artificial structures. Harvesters will prevent disturbance to rocky substratum, will avoid co-harvesting non-*A. nodosum* material and will ensure that inadvertent by-catch of other Animalia, algae or dead, drifting material/algae will be prevented and minimized. Duty: Resource Manager, Production Manager & hand harvesters.

(b) Operation/Activity No. 2: Monitoring, recording and reporting

The sustainable harvest system consists of several monitoring, recording and reporting components. These include:

(i). Core Requirements.
(ii). Monitoring the *A. nodosum* resource: initial and continual assessments.
(iii). Maintenance of Harvest Database.
(iv). Accurately plan harvest periods.
(v). Quality Control (QC).
(vi). Quotas.
(vii). Monitoring & reporting of other activities.
(viii). Quarterly and annual audits of the harvesting system.

Details of how BioAtlantis proposes to manage these activities are as follows.

(i).Core requirements

Activities in this region must be sufficiently monitored and recorded using appropriate techniques and reported in a manner which allows for continual assessments, statistical analyses and verification of controls measures which are in place. This includes continuous monitoring of the *A.*

nodosum resource, maintenance of a non-conformance reporting system and maintenance of a database containing the following information:

- Harvester details: name, date and time of harvest.
- Location of harvest site and pick-up point.
- Quantity harvested at site.
- Quality parameters (i.e. contaminants such as sand, stones, holdfasts, debris, other species, etc).

Duty: This information will be cross-checked by QC/Production staff at BioAtlantis. Maintenance of the database will allow for continuous monitoring and analysis of the harvest of the resource.

(ii). Monitoring of the *A. nodosum* resource: initial and continual assessments

- Initial assessment: The Resource Manager will perform an initial assessment to verify the levels of biomass at each site prior to conducting harvest. The Resource Manager will visit each site and verify the data by means of direct measurements or visual assessments. It is also necessary to determine which sites have been recently harvested and if necessary, assign sufficient fallowing periods to allow for biomass recovery at such sites.
- Continual Assessment: *A. nodosum* levels will be monitored on a continual basis to ensure that sites have sufficiently recovered prior to harvest taking place. This information will be recorded in the database to ensure that harvest activities are planned to ensure that harvest is limited exclusively to sites where *A. nodosum* density has recovered.

  Duty: BioAtlantis staff (e.g. Resource Manager), etc. A Marine Ecologist will be directly employed or contracted for the purposes of measuring *A. nodosum* recovery and conducting ecological surveys.

(iii). Maintenance of Harvest Database.

Immediately following harvest, *A. nodosum* will be bagged. The harvested seaweed will be weighed automatically on the collection boat (if applicable to the area), at the pickup point or at the processing facility. Details will be recorded on the GRN, allowing for accurate recording of locations and quantities harvested. The Resource Manager will be responsible for uploading the data forms to the harvest database. The maintenance of the database will be the responsibility of BioAtlantis staff. Scientific, production and quality personnel will have access to the database as required for the correct implementation of their duties.

(iv). Accurately plan harvest periods.

Locations and periods of harvest will be planned in a manner which ensures that (a) there is no damage to the environs of the SAC, (b) there is sufficient *A. nodosum* biomass available for harvest and (c) sufficient time has passed to allow for recovery. The most accurate means of ensuring that these goals are met are through analysis of datasets as they emerge. In this way, staff will make decisions which are informed by knowledge of the rates of *A. nodosum* regeneration and site recovery. Data relating to biomass levels and site recovery will be incorporated into the main database (see Tables 3 & 4) for use in planning harvest periods.

(v). Quality Control (QC):

BioAtlantis as a GMP+ certified company must ensure full traceability to end users of the origin and location of the raw material used in the products which we manufacture. Therefore, QC system in BioAtlantis will play a key role in the management and monitoring of work relating to harvest of *A. nodosum* in Kenmare River SAC. In brief, this will involve:

- Assessment of quality control (QC) checks on harvesting activities to ensure conformance with quality and other requirements such are protection of SAC areas.
- Assessment of QC checks to ensure recording is conducted appropriately (GRN, SIF, etc).
- Implementation of corrective actions where necessary. Liaise with BioAtlantis Resource Management Team on non-conformance issues should they arise.
- Utilization of this knowledge to prepare, schedule and allocate resources for harvesting.
- Assist in the implementation and training of all personnel & contractors involved in hand harvesting activities in the Kenmare Bay area.
- Liaise with BioAtlantis R&D Department regarding interpretation of data, statistical analysis and on R&D related issues.
- Ensure customers have full traceability from point of harvest to the end product.
- Audits: assist in quarterly and annual audits on the harvesting system.

(vi). Quotas:

The quota is a sustainable harvest of 20% of the available *A. nodosum* per site per annum (see Table 3 for estimation at each site). If quota is exceeded, a NRC will be issued. Harvesters will be provided with training if necessary. The Resource Manager will routinely inspect sites post-harvest to ensure compliance of harvesters with sustainable hand harvest methods. The Resource Manager will routinely inspect sites post-harvest to ensure compliance with sustainable hand harvest methods. An NCR will be filed and training provided if necessary.

(vii). Monitoring & reporting of other activities:

In the event that harvesters contracted cut excess amounts of *A. nodosum* and/or sell material to unlicensed operators, BioAtlantis will investigate and if necessary take disciplinary procedures.

(viii). Quarterly and Annual audits of the harvesting system

A key requirement in implementing and securing a functioning system for sustainably hand harvesting of *A. nodosum*, are effective control measures, reporting and monitoring systems. BioAtlantis will conduct quarterly and annual audits of standards covering the areas below. The audit template is attached as Appendix 8 of the proposal document.

(a) Quarterly Audit:

- Audit Part A: Records, Forms & Documents:
  Step 1: Forms: receipt of training & verification of understanding.
  Step 2: Completed Training Certs (obtained through training above).
  Step 3: Records, forms & documents (general).
- Audit Part B: Quality Assessment (documentation):
  Step 1. GRNs or other format/method.
  Step 2. Production Logsheets (Production Facilities).
  Step 3. Incident Reports.
  Step 4. Non-conformance Reports.
  Step 5. Software Systems.
  Step 6: Site Inspection Forms of other format/method.

(b) Annual Audit (on-site):

Step 1. Site Quality (inspection of harvested sites).

Step 2. Harvest methods (inspection of techniques).

Step 3. Delivery and collection methods (e.g. Collection boat, if deemed applicable to the area).

(c) Operation/Activity 3: Verification, Analysis and System updates

The harvest system must be continually assessed to ensure the validity, efficacy, fitness for purpose of its various components. Central to ensuring the system works as a whole, there will be regular audits of all systems and robust follow-up to ensure that standards, codes of practice and mitigation measures are adhered to. The 3 key features of this system are as follows:

- Verification.
- Analysis.
- Updating the system.

Details of how activities will be managed are as follows.

(i). Verification

Control measures will be required in order to ensure that processes involved in harvesting are not detrimental to Kenmare Bay. The following systems will be put in place to verify the effectiveness of the systems and control measures:

- Annual review of the harvesting system.
- Assessment and confirmation of the conformance of harvesters to the sustainable hand harvesting system.
- Annual review of the QC system to ensure the company is operating according to the harvesting plan.
- Quarterly review of hand harvesting records.
- Quarterly review of records for deviations and corrective actions.
- Validation of limits set for implementation of control measures and confirm that they are adequate to prevent any non-conformances.
- Validation of the Harvesting Plan, including on-site review.
- Review of any modifications to the Harvesting Plan.
- Verification of the accuracy and effectiveness of the system will be conducted:
  - Quarterly, in order to ensure potential non-conformances are under control (i.e. via Internal Audit).
  - When concerns emerge regarding environmental non-conformances or damage.
  - To confirm that changes have been implemented correctly after the Harvesting Plan has been modified.
  - To assess whether the harvesting system should be modified due to any changes in EU Law or Irish Law should they arise.

(ii). Analysis

- On-going and annual assessments of the validity of the current controls used to ensure protection of biological communities in Kenmare Bay.
- Analysis of data obtained during implementation of harvest by means of Mapping Software or statistical methods.
- Utilization of this knowledge in preparation, scheduling and allocation of resources for harvesting.

(iii). Updating the system

During regular quarterly and annual audits and meetings, it may be determined that improvements are necessary to refine the harvesting system. Any significant changes will be documented. For example, it may be necessary to avoid previously unknown sensitive sites. On review of quality checks on GRNs, SIFs and on review of incidents that arise on a week-by-week basis (Incident Report Forms), it may be necessary to improve systems or copper fasten

mitigation measures to ensure maximum compliance with standards for protecting the SAC. It may also be necessary to allow certain sites extended re-growth periods, due to the potential for localised or regional variability in growth rates. This 'Adaptive Management Approach' will ensure the optimal performance if the system in the short and long term.

(d) Operation/Activity 4: Long term assessment biomass and community structure

BioAtlantis have invested considerably in R&D since 2004 and is currently involved in several internationally recognised research collaborations (see Figure 3). This research focus will continue, with additional emphasis placed on assessing the long term impact of hand harvesting on *A. nodosum* biomass recovery and community structure. BioAtlantis will build on the findings of Kelly *et al.,* (2001) in relation to the potential impact of harvesting on the *A. nodosum* biotope. This will involve continuous assessment of the impact of *A. nodosum* harvesting throughout the life-time of the licence. This approach will allow BioAtlantis to continually validate and improve the methodology on an ongoing basis and on a long term basis throughout the life-time of the licence. This will ensure that scientific knowledge is increased over a longer time period that other studies such as Kelly *et al.* (2001). This will be important in ensuring that conservation objectives are met continually into the future. For more details as to how assessments will be carried out, the experimental design and the parameters measured, please see below. Additionally, the potential impacts of hand harvesting on community structure are discussed in Appendix 5 of the proposal document.

Experimental design and methodology: The experimental design will be developed to include important parameters, techniques and measurements as summarised below:

- Designation of experimental sites to facilitate comparisons between non-harvested areas and harvested areas. The chosen control sites will not be subjected to commercial harvest activities. During assessment, personnel will divide the site into distinct sections, to include replicates where harvesting will take place and replicates where harvesting will not take place.
- Sections will be large enough to allow for sufficient numbers of replicates. A minimum of 4 x $1m^2$ replicates will be required to compare harvest versus non-harvest areas. However, to ensure robust statistical analysis and to enhance the accuracy of the assessment, the number, size and type of replicates may be altered depending on the levels of variability between replicates and with respect to the individual parameters assessed. Each quadrant will be spaced approximately 3 meters apart where possible. To accurately assess changes in biodiversity over time, replicates will be assigned to the same position every year, either as determined via GPS or through demarcation. Alternatively, replicates may be assigned randomly if required.
- Numbers and/or density of *A. nodosum* plants, numbers of *Fucus* plants, and numbers of *Animalia* will be measured. Density will be measured as wet weight per unit area. Numbers and/or density of periwinkles, limpets, barnacles or other relevant species will be measured. The presence/absence of red algae and Ephemeral green algae will also be assessed.
- Statistical analysis will be performed by research scientists and statisticians using geospatial tools and/or by appropriate statistical packages.
- Assessments will be performed on an annual basis to allow for monitoring over an extended time-period, ideally between 5-10 years.

The experimental design outlined above may be subject to change depending on the sites involved, the underlying analytical methodology and the parameters/statistical methods employed. Annual reports and datasets will be made available to NPWS and others if requested. This will be important in ensuring that conservation objectives are met continually into the future. Scientists at BioAtlantis have strong expertise in the biological sciences and excellent publication records. This high levels of expertise will ensure that assessments and will be carried out to these high standards. This work will also ensure that scientific knowledge of the potential impact of hand harvesting in Kenmare River SAC is assessed over a long term period, beyond the timeframe assessed by Kelly *et al.,* 2001.

Duty: BioAtlantis R&D personnel, etc. A Marine Ecologist will be directly employed or contracted for the purposes of measuring *A. nodosum* recovery and conducting ecological surveys.

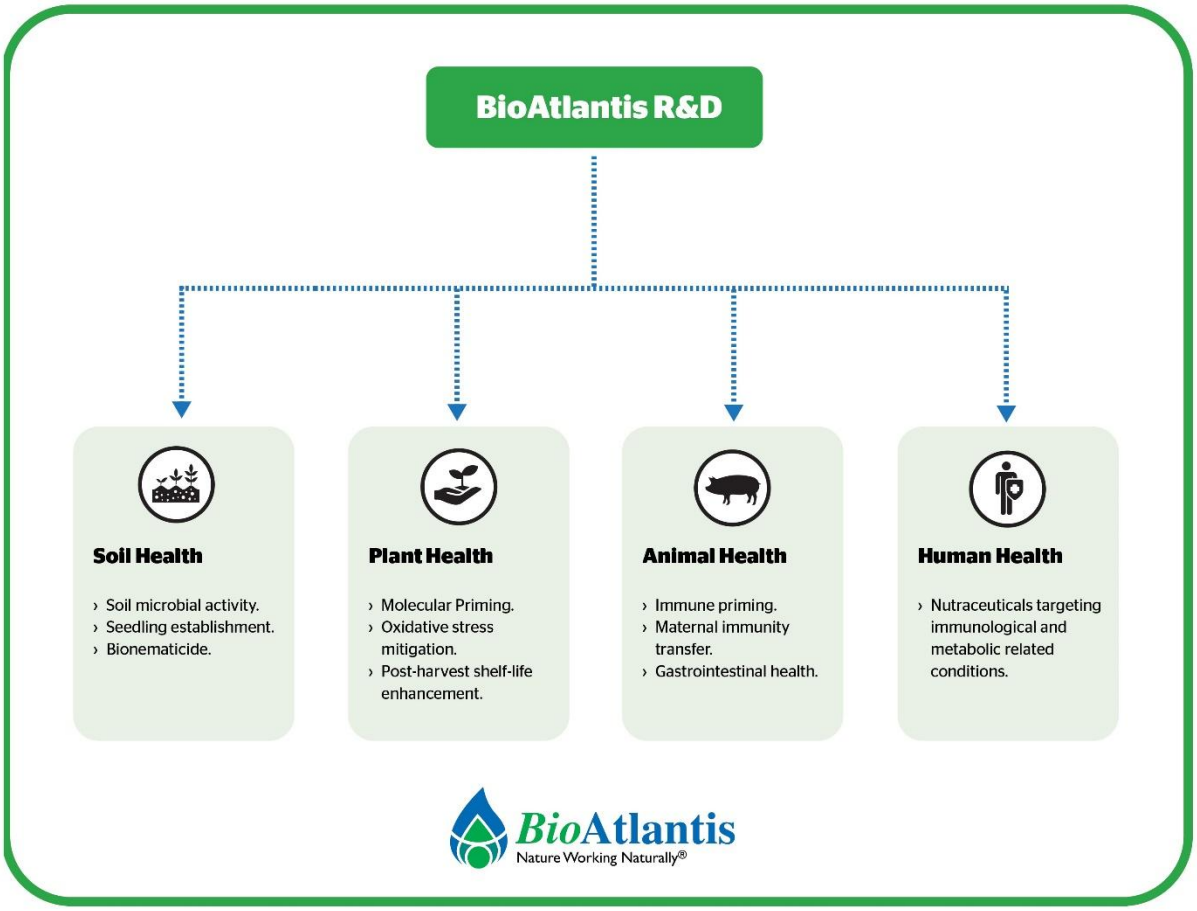

Figure 3: BioAtlantis Current Research Programmes

2.3.3 Locations in which operations/activities will take place.

2.3.3.1 Harvest zones

Initially, BioAtlantis will identify areas which have been shown to have been subjected to a recent harvesting, if any. These areas will be given an appropriate fallowing period to facilitate recovery. A duration of 3-5 years is generally considered a time-frame effective in ensuring re-growth of *A. nodosum* (Kelly, 2001, Guiry, 2013A). This approach will ensure that effects on fauna and microflora are minimized, whilst maintaining the regenerative capacity of the macroflora. The density of *A. nodosum* in the west of Ireland ranges from 0.2 – 37 Kg/m^2 (Kelly L. *et al.,* 2001). Densities within other regions are given in Table 5 below. It is estimated that *A. nodosum* densities in the licence area range from between approximately 0.7 to 11.8kg/m^2. From a total available harvest of 9,133 Tonnes and based on the sustainable harvest methodology of a 20% harvest per site per annum and cutting of 200-300mm (8-12 inches) above the holdfast, there is an annual sustainable harvest of 1,826.6 Tonnes (Table 6).

Table 5: Yields of *A. nodosum* in five regions of the North Atlantic

Region	Yield(kg/m^2)	Reference
Canada	7.1	Ugarte R & Sharp GJ (2011A)
Iceland	5.0 - 8.0	Valsdóttir P (2011)
Ireland	0.2 -37.0	Kelly L. *et al.,* (2001)
Norway	4.0 - 7.0	Steen H (2009)
Scotland (Western Isles)	4.6- 24.1	Minch Project (1995)

Table 6: Available harvest of *A. nodosum* in designated zones in Kenmare Bay

Kenmare Bay	Total Available Harvest (Tonnes)	Sustainable Annual Harvest (Tonnes Per Annum)*
Coastline	5,626.7	1,125.3
Islands	3,506.3	701.3
Total	9,133	1,826.6

* Harvest will not exceed 20% of the available harvestable *A. nodosum* per site per annum.

2.3.3.2 Access to harvesting sites

Access to the islands will be by boat, according to methods which minimise potential impacts on the SAC (e.g. harbour seals, estuarine mud areas, wintering and breeding birds, etc; see Appendix 4 of the proposal document). Access to the coastline will be via existing routes or boats as required. Should a pick-up boat be deemed applicable to the area, launch to islands will be made from existing piers. Individual harvesters will access sites via existing methods. The harvested seaweed will be collected in nets or bags at the shoreline; these nets or bags will then be collected by the pick-up boat (if deemed applicable for the area) and delivered to a pier for onward transport. The size of the shore area covered by an individual net or bag will be approximately 2m^2 to 8 m^2.

Harvest will occur at islands and shorelines as described in the harvest management plan. Nets or bags will then be picked up at each location in which harvesting took place. Alternatively, harvesters may

tow the floating nets or bags from the harvest site directly to the pick-up points. In some cases, certain individuals with existing seaweed harvesting rights may prefer to land seaweed at pick up points.

The seaweed will be weighed by BioAtlantis at pick up points and/or on delivery to the processing facility. Final pick-up points will be at established piers, quays and harbours. The piers typically vary in size from large, medium to small. While public piers will be accessed, privately owned piers will not be used without permission. The main pick up/collection points for transport to the processing plant are as follows:

- South eastern area of Iveragh Peninsula: Blackwater Pier, Kenmare Pier, Templenoe Pier.
- South-mid area of Iveragh Peninsula: Oysterbed Pier, Rossdohan Pier, Coongar Harbour (pier).
- North-mid area of Beara Peninsula: Bunaw Pier-Kilmakilloge Harbour, Lauragh Pier, Pallas Pier.
- North-western area of Beara Peninsula: Ballycrovane Pier
- North-eastern area of Beara Peninsula: Dawros Pier.
- Access via the N70 and R571 respectively, including linked byroads and coastal roads.

Harvesting will be carried out in a manner which does not negatively impact on fishing and sea angling in the complex. Several sites which are documented to be of relevance to fisheries and sea angling have been identified and will not be negatively affected by harvest activities (see Appendix 7 of the proposal document). The operational areas of charter boats and skippers in Kenmare River SAC have also been identified and will not be impacted by harvest activities. Harvesters will work to ensure that angler's space will be respected at all times.

2.3.3.3 Facilities to cope with biological and industrial waste

There will be no biological waste generated from this process. All of the material harvested will be transported to BioAtlantis manufacturing facilities in Tralee, Co. Kerry where it will be used as raw material for the extraction of bioactives for the plant, animal and human health sectors. BioAtlantis' production facilities are certified in the EU by GMP+ International B.V., granting the company permission to produce and trade seaweed extracts destined for use in highly regulated markets of the EU. The production facilities are compliant with all necessary regulations, including planning permission granted by Kerry County Council covering the covering the processing of seaweed (ref. no. 17/552), and a Trade Effluent Discharge Licence issued by Irish Water (ref. No. IW-DTS-725014-01).

2.3.4 Months in which operations/activities will take place.

Harvesting operations will take place all year round. Harvesters will work with the tide to ensure that they arrive in boats in appropriate conditions. Time-frames in which harvesters will work at islands and sites will vary. Small-medium sized sites/islands will require approximately 2-4 harvesters. Medium to large sites/islands may require between 4-6, while larger sites/islands may require >6 harvesters. The known moulting & breeding sites of the harbour seals will be avoided during the months of May to September. Outside of this time-frame, sites may only be accessed when unoccupied by harbour seals. Absence of seals from sites must be verified by harvesters using binoculars prior to landing. See Appendix 4 of the proposal document for site specific details for protected seal and bird species. BioAtlantis will work to incorporate any islands currently unlisted as having relevance for harbour seals, e.g. unlisted moulting sites, etc. Similar to harbour seals, these sites are either avoided at sensitive times of the year, or specific measures are in place to prevent any

disturbance effects or other impacts on a species-specific basis. Site and species-specific details for protected bird species are provided in Appendix 4 and Appendix 6 of the proposal document. Sites will also be avoided as appropriate, particularly where there are significant risks of seasonal in-combination effects due to potential interactions with existing operations or planned operations. For example, Dirreencallaugh, Sneem, Parknasilla, Eyeries and Dromquinna exhibit substantial human activity during peak tourist season (July-August). These sites will be avoided during peak tourist season (see Code of Practice). This prevents any in combination effects associated with increased anthropogenic disturbances which may occur during summer due to increased numbers of tourists in these areas.

Table 7 : Sites requiring seasonal avoidance due to sensitive species or existing or planned operations.

This table lists sensitive sites in the bay requiring seasonal avoidance. The sites are listed in the Code of Practice to inform harvesters of sensitive sites which should be avoided at certain times.

'X' denotes importance of a site at a particular time of year to harbour seals, protected wintering or breeding bird species or sites with high levels of recreational/tourism activity.

§Harvesters may access resting haul out sites during the specified periods, subject the absence of harbour seals. This must be verified using binoculars prior to site visitation.

*denotes sites where interactions with existing operations has potential to give rise to significant in-combination effects at times of the year indicated by 'X'. No planned operations have been identified which could give rise to significant in-combination effects.

See Code of Practice (Appendix 4) of the proposal document and associated maps for further details.

Site Name	Harvest control measures/month											
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Ardea west, Tuosist				X	X	X	X					
Ardgroom Harbour (and sites therein)				X	X	X	X	X	X			
Beara Peninsula SPA [site code: 004155].	X	X	X	X	X	X	X	X	X	X	X	X
Brennel Island			X	X	X	X	X	X	X	X		
Brown Island & adjacent skerries					X	X	X	X	X			
Cappanacush Island§					X	X	X	X	X			
Carrignaronomore§					X	X	X	X	X			
Coongar Harbour (and sites therein) §					X	X	X	X	X			
Coornagillagh			X	X	X	X	X	X	X			
Coulagh Bay				X	X	X	X					
Cove Harbour (West Cove)				X	X	X	X	X	X			
Deenish & Scariff Is. SPA (site code 004175)	X	X	X	X	X	X	X	X	X	X	X	X
Dinish Island			X	X	X	X	X	X	X			
Dirreencallaugh (coastal area)*							X	X				
Dromquinna (coastal area)*							X	X				
Dronnoge					X	X	X	X	X			
Dunkerron Island West								X	X			
Eyeries (coastal area)*							X	X				
Eyeries Island pNHA			X	X	X	X	X	X	X	X		
Freshwater areas of Lough Inchiquin, Glan Lough, Lough Fadda, Tahilla Lough, Dunkilla lough, Thaha Lough, Black Lough, Ross Lough, Askive Lough, Tobacco Lough, Loough Corlagh, Lough Cloonee, Derryvegal Lough, the River Sheen, River Finnihy, River Blackwater, River Sneem, and Roughty River, Tahilla River, Staigure River, Gowla River, Coomnahorna River, Cloonee River, Owenshagh river, Croanshagh River, Kealincha river, Ballydonghan River, Dromoghty River, Reen River.	X	X	X	X	X	X	X	X	X	X	X	X

Site Name	Harvest control measures/month											
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Greenane Islands§					X	X	X	X	X			
Hog Island§					X	X	X	X	X			
Illaunakilla					X	X	X	X	X			
Illaunanadan-Inishkeragh								X	X			
Illaungowla								X	X			
Illaunnameanla	X	X	X	X				X	X	X	X	X
Illaunsillagh§					X	X	X	X	X			
Illaunslea§				X	X	X	X	X	X			
Inishkeelaghmore								X	X			
Iveragh Peninsula SPA [site code: 004154]	X	X	X	X	X	X	X	X	X	X	X	X
Kilcatherine point to Doonagh				X	X	X	X					
Kilmackillogue Harbour (and sites therein)§				X	X	X	X	X	X			
Lehid Harbour, Tuosist				X	X	X	X					
Mouth of River Blackwater	X	X	X	X					X	X	X	X
Mouth of River Finnihy	X	X	X	X					X	X	X	X
Mouth of River Sheen	X	X	X	X					X	X	X	X
Mouth of Roughty River	X	X	X	X					X	X	X	X
Mouth of Sneem River	X	X	X	X					X	X	X	X
Ormonde's Island								X	X			
Parknasilla*§					X	X	X	X	X			
Potato Island and Garinish Island					X	X	X	X	X			
Rossdohan Island pNHA§			X	X	X	X	X	X	X			
Sherky Island								X	X			
Sneem Harbour (Inner) *§					X	X	X	X	X			
Sneem Harbour (Outer; inc. Oysterbed)* §				X	X	X	X	X	X			
Spanish Island pNHA			X	X	X	X	X	X	X	X		

2.4 Status & Local Investment.

In January 2015, BioAtlantis expanded into a larger facility in Tralee, Co. Kerry, to facilitate expansion. Subject to obtaining a licence to harvest in Kenmare Bay, BioAtlantis will expand employment to service existing production requirements and will employ part-time and/or full time hand harvesters from the region. The harvesters will ideally be people who have farm or fishing interests in the area. BioAtlantis will work with the harvesters to apply sustainable methods of harvesting, collection and conservation of the resource, paying close attention to the requirements as described by the NPWS and others. Transport of the seaweed from the collection points to the factory will be undertaken by employee(s) or contractor(s). A Marine Ecologist will be directly employed or contracted for the purposes of measuring *A. nodosum* recovery and conducting ecological surveys. Current employment at BioAtlantis will be secured and the operation in the BioAtlantis factory will be expanded leading to further job creation. Given the sustainable design of the hand harvesting system, the investment in Kenmare Bay will have long term benefits.

Section 4: Code of Practice.

Part 1: Introduction

Kenmare River SAC in Co. Kerry, is a long, narrow, south-west facing bay. It is a deep, drowned glacial valley and the bedrock is mainly Old Red Sandstone which forms reefs along the middle of the bay throughout its length. The bay contains numerous islands and inlets in which a variety of habitats and unusual communities occur. Kenmare River SAC supports a diverse range of human activities spanning fisheries, aquaculture, tourism, recreation, sport and hand harvesting of invertebrates and algae. The site is a Special Area of Conservation (SAC) selected for a range of habitats and species listed on Annex I and II of the E.U. Habitats Directive.

BioAtlantis Ltd. aim to sustainably develop the seaweed industry in Co. Kerry. The company has applied for a license to sustainably hand harvest 1,826 wet tonnes of *A. nodosum* annually, in a manner that minimises and prevents any potential effects on species and habitats in the bay, whilst also providing sustainable work to hand harvesters. BioAtlantis has developed this **Code of Practice** to ensure that harvesting is undertaken in a sustainable manner and works closely in-line with conservation objectives specified for the SAC for a range of Annex I and II habitats and species. Key measures outlined in this **Code of Practice** include:

Methods to ensure *A. nodosum* is harvested in a sustainable manner:

- Implementation of sustainable harvesting techniques to ensure regeneration post harvesting.
- Management to limit harvesting to ≤20% of the total *A. nodosum* biomass per site per annum.
- Full traceability: harvest location, quality and quantity of harvested seaweed and persons involved.
- Continuous disturbance of Annex I marine community types cannot exceed recommended levels.

Environmentally safe navigation techniques:

- Use of a collection boat (if deemed applicable to the area) to pick up floating bags/nets at high tide, preventing impacts on the foreshore, or harvesters towing floating bags/nets from harvest sites to pick-up points (in some cases, certain individuals with existing seaweed harvesting rights may prefer to land seaweed at pick up points).
- Prevent impacts on mudflats, sandflats, intertidal sandy mud, estuarine mud areas, fine-sand, salt meadows, shingle and reef areas.

Methods to prevent impacts on relevant wildlife and animal species:

- Harbour Seals, Birds and Otters.

Requirements to prevent interactions, cumulative and in-combination effects with the following:

- Tourism, sport and recreation.
- Aquaculture, angling and fisheries activities.
- Other seaweed and invertebrate harvesting activities.
- Spread of invasive species.

The Code of Practice has been developed based on the peer reviewed literature, best scientific knowledge, risk assessments and previous studies carried out in the area (see Application documents and appendices). The Code of Practice must be adhered to by all staff and harvesters supplying *A. nodosum* to BioAtlantis and management within the company, to ensure that the objectives for protecting the Kenmare River SAC are adhered to in an effective manner.

Part 2: Securing the Code of Practice during the operation phase

2.1. Step 1: On-site survey & schedule (Start date: Month 1. Duration: 1-2 weeks).
The first step in securing and implementing the hand harvesting system is to verify the accuracy of the production plan. This will involve time spent on the ground for approximately 3-5 weeks, to establish which sites, if any, have been harvested recently and which require a fallowing period in order to recover. These assessments will form the basis of developing a schedule to meet SAC and production requirements, and implementing the production plan.

2.2. Step 2: Recruitment of personnel (Completed by end of month 1).
Most personnel will be in place by the end of month 1. Hand harvesters will be contracted and the harvesting system and plan will be explained. A Resource Manager and some staff/sub-contractors involved in transport will be hired or contracted during this time.

2.3. Step 3: Training (Start date: month 1. Duration: 3 months)
On completion of the on-site survey above, figures will be verified and revised accordingly. From here, training will be provided to harvesters where necessary. This will initially involve theoretical training (1-2 days) to explain the system and requirements of the harvesters on the ground to ensure that the SAC is protected according to the Code of Practice. Training will be carried out by staff in BioAtlantis, along with local personnel using detailed training material. Once theoretical training is complete, practical on-site training will take place. This will involve harvesters performing harvesting tasks according to the harvesting schedule. BioAtlantis will monitor and assess the technique employed to verify that the correct technique is in use and that the correct steps are being taken. In the event that hand harvesters encounter any difficulties, BioAtlantis staff will provide further training. Harvesters will finally receive certification to confirm that they have received training and are verified in having a full understanding of the system.

2.4. Step 4: Verification of systems (Start date: month 1. Duration 3 months)
During the initial 3 months of the operational phase, all software, communications, transport and quality systems will be optimized and verified as being effective. This will ensure that systems are fully operational and in place when commercial harvesting begins.

2.5. Step 5: Full implementation (Start date: month 4. Duration: lifetime of the licence)
Once staff and harvesters are verified as having sufficient training and understanding of the system, commercial hand harvesting will begin in accordance with the schedule. This will be managed by the Resource Manager who will report directly to BioAtlantis management. A key requirement in implementing and securing a functioning system for sustainable *A. nodosum* harvesting, are effective control measures, reporting and monitoring systems. These are set out in this Code of Practice document and form a key framework for managing and ensuring that the system is adhered to in a precise, correct, seamless and traceable manner. A key component to ensuring this will be a strong and robust auditing system. BioAtlantis will conduct audits covering the items listed below:

(a) Quarterly Audit:

- Audit Part A: Records, Forms & Documents.
  Step 1: Forms: receipt of training & verification of understanding.
  Step 2: Completed Training Certs (obtained through training above).
  Step 3: Records, forms & documents (general).
- Audit Part B: Quality Assessment (documentation):
  Step 1. GRNs or other format/method.
  Step 2. Production Logsheets (Production Facilities).

Step 3. Incident Reports.
Step 4. Non-conformance Reports.
Step 5. Software Systems.
Step 6: Site Inspection forms or other format/method.

(b) Annual Audit (on-site):
Step 1. Site Quality (inspection of harvested sites).
Step 2. Harvest methods (inspection of techniques).
Step 3. Delivery and collection methods (e.g. Collection boat, if deemed applicable to the area).

The Audit form is provided in Appendix 8 of the proposal document. Additionally, see tables in Appendix 5 of the proposal document for details on: Control Measures, Action Limits/non-conformance, Analytical Procedures, Monitoring Schedule, Corrective Actions and Verification. The harvesting system will be reviewed annually to assess and verify the control measures and determine areas in need of improvement.

Part 3: Sustainable hand harvesting of *A. nodosum*

3.1. Management of harvesting activities:

BioAtlantis will be responsible for managing commercial harvesting activities. To prevent in combination effects from occurring, the following will apply:

- Harvesters will not cut *A. nodosum* in any areas where there are existing appurtenant rights or burdens in relation to the harvesting, gathering or removal of seaweed from the shore, without first obtaining permission from the person to whom those rights belong.
- Where Profit-à-Prendre rights to harvest seaweed are successfully registered with the PRAI, the harvesting plans must be adjusted to ensure that those individuals can continue to harvest *A. nodosum.*
- Harvesting will not take place in privately owned maritime areas without prior consent on the property owners.

3.2. Resource Database

For the effective management of the Kenmare River SAC area, BioAtlantis will create a database of the islands and coastal areas. This database is required to:

- Determine sites that require fallowing to allow for adequate recovery from recent activities.
- Determine rotation requirements (i.e. extrapolation and calculation of the duration or fallowing period required prior to a particular area being fit for re-harvest).
- Prevent harvest activities that would lead to a decline in yield.
- Record the details of each harvest, how much, by whom & when.

3.3. Certificate and training

Harvesters receiving training in methods which ensure *A. nodosum* recovery and regeneration post-harvest can supply *A. nodosum* to BioAtlantis. Training will be provided by BioAtlantis where necessary, and a certificate of training will be provided.

3.4. Navigation to harvest sites

Harvesters must follow pre-planned harvest schedules. Schedules will be provided by BioAtlantis in advance of harvest to ensure no entry into protected areas at times inappropriate or damaging to species and habitats. Should any confusion arise, the Resource Manager must be contacted.

3.5. Health and Safety

Harvesters must comply with H&S requirements and relevant Maritime Legislation. Essential H&S requirements and key equipment may include:

- An efficient marine outboard engine capable of manoeuvring boat safely ahead and astern, and steering the boat at its maximum speed in the fully loaded condition within the limits of the intended area of operation; an anchor with rope of length at least equal to four times the length of the boat; a permanently rigged suitable painter (rope) not exceeding the length of the boat and which may also be used as a tow rope.
- Adequate seating or thwarts, pair of oars and rowlocks, bailer, hand-held distress flares or a portable horn, boat hook, waterproof torch, approved lifejacket or personal flotation device for each person on boat, communication device(s), navigation maps and compass.
- Mobile phone, sharp blade cutters, measuring tape, binoculars (to assess presence/absence of seals or mudflats, sandflats or intertidal sandy mud areas), harvest bags/nets and hi visibility buoys.
- Pick up of bags/nets: ensure that bags/nets containing seaweed are located away from piers or typical boating routes. These must be made visible using buoys etc., and be hauled for pick-up when transport is scheduled.
- Pick up of loose harvested seaweed: Where certain individuals with existing seaweed harvesting rights wish to land seaweed in loose form at pick up points, those individuals involved in harvesting or pick-up must park appropriately and not block access to the road, coast or marine area for other users.
- Lifting of harvested seaweed: Follow all standard operating procedures to manage the lifting of bag/nets or loose harvested seaweed.
- Temporary storage of bags: Follow all standard operating procedures to manage temporary storage of bag/nets or loose harvested seaweed.

3.6. Harvest Records:

The Goods Received Note (GRN) must be completed by the person or transport company in receipt of the harvested seaweed. Alternatively, such information may be provided in other suitable formats by electronic or other means on site and/or at BioAtlantis' production facilities. Without a completed GRN, harvested *A. nodosum* may not be accepted. A second GRN will also be completed on receipt of the seaweed at BioAtlantis' factory. Where quality cannot be checked on collection, assessments will be undertaken by production/QC staff by random or specific inspections.

3.7. Accident and Incident Reporting:

Sites must be harvested according to the schedule. This ensures that sensitive sites (e.g. seal and bird sites), sandflats or intertidal sandy mud areas are avoided. All accidents, incidents and near misses must be recorded immediately and reported to the Resource Manager who will complete an Incident Report Form (Appendix 3 of the proposal document). Incidents which should be reported include:

- Health and safety accidents or near misses.
- Incidents relating to disturbance of seals during navigation (e.g. , e.g. flushing into the water).
- Incidents of disturbance or damage to any estuarine mud, intertidal sand, or muddy-fine sand areas during navigation.

3.8. Harvesting of *A. nodosum*:

When harvesting *A. nodosum*, the following is required:

- Once a site is approved according to the schedule, harvest can take place. Harvest can only occur at sites containing a high density of *A. nodosum* and which have been approved by BioAtlantis' personnel. On arrival, harvesters will determine whether or not the site is suitable for harvest. They will receive training from BioAtlantis on the criteria required to make this determination, if necessary.
- Date & time of harvest, site name and location within the site (required for completing the GRN).
- When cutting *A. nodosum*, ensure that a minimum of 200mm (8 inches) of material is left behind. This limit will be inspected by the Resource Manager as it is essential in order to:
  - Avoid overharvesting or extensive removal of *A. nodosum* canopy coverage, which could otherwise lead to changes in community structure or biodiversity stasis or could impact the ecosystem in general, e.g. animals resident in the intertidal zone, coastal habitats, etc.
  - Avoid dormant/resting species at the canopy base (e.g. periwinkles) and ensure sufficient biomass coverage to allow free living forms of *L. littorea* and other species settle and establish at the base.
  - Avoid plants containing periwinkle egg masses, thus preventing harvest of viable eggs.
  - Avoid physical impacts with clusters of *Gibbula cinerea* (the Grey Top Shell) and *Nucella lapillus* (Dog Welk) on or beneath boulders at low tide.
  - Prevent by-catch of benthic, sessile, slow moving/mobile species present on the shore at low tide.
- *A. nodosum* holdfast must be left fully intact and attached to substrate to allow for recovery. Holdfast bycatch exceeding >1% will represent a severe non-conformance (inspected on the GRN). The Production Manager will perform spot checks on harvested seaweed for evidence of stones and holdfast, as such contaminants may damage production equipment. Non-conformances may be issued depending on the severity of the incident. This limit on holdfast content is essential to:
  - Prevent mortality of *A. nodosum* and prevent injury to *A. nodosum* holdfast.
  - Prevent severe removal of habitat for understory species.
  - Avoid physical disturbance of dormant or resting species at the base of the canopy.
  - Avoid occurrence of overharvesting which could impact on the ecosystem in general.
- Ensure that no other types of seaweed other than *A. nodosum* are harvested and/or placed into harvest bags/nets. Inspections will be carried out at the pick-up point in Kenmare River SAC and at production facilities in Tralee, Co. Kerry. The presence of contaminants may result in potential corrective actions, depending on the severity of the non-conformance. Harvesters must limit *Fucus* content of harvested *A. nodosum* to no more than 10%, thus preventing removal of an additional canopy source which supports periwinkles, limpets and other species.
- When cutting the weed and filling the bags/nets, ensure that excessive levels of sand, shingle, pebbles, stones or holdfasts are not inadvertently included. In the event of non-conformances, training may be provided to harvesters where necessary.
- Harvest must be limited to 20% of the total available *A. nodosum* biomass per site per annum, in order to allow for sufficient regrowth. The limitation at 20% avoids overharvesting which could impact on the ecosystem in general, and reduces the removal of species such as hemiparasitic *Polysiphonia lanosa* (Linnaeus) *Tandy*, which commonly grows on *A. nodosum.*
- To reduce potential for anthropogenic impacts (e.g. intensity of trampling) on the biotope, the numbers of harvesters are limited to: 2-4 per small-medium sized sites, 4-6 per medium to large islands and 6-10 on larger islands. The Resource Manager and other staff may inspect sites for brief periods. Low numbers of individual working along the foreshore in this way, will ensure that BioAtlantis work within the limit of 15% disturbance limit.

- Harvest must not take place in areas within 50m of sewage outfalls or other source of pollution. This will ensure that stressed *A. nodosum* growth is not exacerbated further by harvest activities.
- Ensure that there are no physical interactions with biogenic reef in the rare event that it is encountered on the shore (e.g. honeycomb structures or mussels).

3.9. Completion of harvest, subsequent pick-up and quality check:

- The following must be recorded on the GRN: Date, Harvester Name / No., Pick-up location, Harvest Location (site name, region, etc). See Appendix 3 of proposal document for a copy of the GRN.
- Quality checks must be conducted to confirm that the seaweed is free of the following: (a) Sand, gravel, stones or debris, (b) *A. nodosum* holdfasts. and (c) other species (e.g. *Fucus, ≤10% max.*).
- The seaweed will be weighed by BioAtlantis at pick up points and/or on delivery to the processing facility.

3.10. Assessment of harvest operations:

The Resource Manager will inspect sites post-harvest to confirm that harvesters are operating as specified to ensure:

1. Cutting of *A. nodosum is* >200mm above holdfast .
2. No more than 20% of the total available biomass per site per annum is harvested.
3. Activities only take place at approved sites.
4. Health and safety requirements are adhered to.

See Appendix 3 of the proposal document, “Site Inspection Form”, for further details.

3.11. By-catch:

Take care not to co-harvest other species (including mobile, immobile and encrusting species). Co-removal of amphipods, isopods, periwinkles or other Animalia identified post-harvest must be collected and returned to the water, where possible.

3.12. Harvest Quantity and batch code

Quantity of harvest (no. bags/nets, weight per bag/net, time and date of harvest), Inspection check (pass: Y/N).

3.13. Communicating with BioAtlantis:

Harvesters must keep in regular contact and report their activities to BioAtlantis. In most cases reporting will be via the Resource Manager and GRN. However, harvest plans will be communicated regularly over the phone or via email or post to designated harvesters by the Resource Manager.

3.14. Prevent interactions:

Follow pre-planned harvest schedules in order to avoid potential congestion at pick up points such at piers that may be busy at certain times. Work to ensure that space required by others using piers, harbours, quays or ports is respected.

3.14. Other:

- Ensure that no debris from boats is inadvertently deposited into the environment.
- Ensure appropriate removal or recycling of any rubbish, debris or other foreign matter when ashore.
- Ensure routine maintenance of boat engines.
- Ensure appropriate cleaning procedures of boats are undertaken.

Part 4: Marine and coastal habitats.

To ensure that the area, structure and function, future prospects and conservation status of marine and coastal habitats is maintained, harvesters will ensure the following:

(a) Harvesting is not permitted in the following areas:

- Zostera (seagrass) Community
- Maerl Dominated community
- Laminaria-dominated community complex
- Intertidal mobile sand community complex
- Muddy fine sands dominated by polychaetes & *A. filiformis* community complex.
- Fine to medium sand with crustaceans & polychaetes community complex.
- Coarse sediment dominated by polychaetes community complex.
- Submerged of partially submerged sea caves.
- Coastal habitats beyond the *A. nodosum* zone.

(b) When travelling to harvest zones, avoid impacts with the above habitats by adhering to Part 7 of the Code of Practice, "Environmentally safe navigation". Doing so will prevent disturbance to soft substratum areas and their associated communities and species.

(c) When operating in the intertidal zone where *A. nodosum* is present (e.g. sheltered reef substratum areas), adhere to all aspects this Code of Practice. This will ensure that (i) the habitat area is maintained and (ii) structure and function is maintained or improved. It also ensures that the future prospects and conservation status of reef and shingle areas are maintained or enhanced, whilst also preventing in combination effects with existing and planned activities.

(d) BioAtlantis must ensure that <u>continuous disturbance of each community type does not exceed an approximate area of 15% </u>(recommended by NPWS to ensure adherence to the EU commissions' requirements; NPWS 2013A and 2013B). Working within this limit is critical to ensure compliance with the European Commission Article 17 reporting framework which considers disturbances of >25% of an area in an Annex I habitat to represent an unfavourable conservation status. The area affected by harvest activities/annum is provided in Table 8. To adhere with these limits, harvesting locations and activities must be planned and recorded. Sites will be inspected prior to scheduled harvest to confirm sufficient biomass of *A. nodosum* is present and recovery post harvesting. Inspection of sites post-harvest will be undertaken to ensure compliance with sustainable hand harvest methods. The status and quality of the *A. nodosum* habitat must be maintained by adhering to the sustainable harvesting methods and limits specified for the extent of these harvesting activities.

Table 8: List of marine habitat types in Kenmare River SAC and the area potentially affected.

No.	Marine community types	Total Area in Kenmare River SAC		Maximum Annual area affected by hand harvest activities			Area of Large Shallow Inlets & Bays [1160] affected/annum
		m^2	Ha	m^2	Ha	%	%
1	Zostera Community	1451621	145.2	0	0	0%	0%
2	Shingle	14239	1.4	0	0	0%	0%
3	Maerl Dominated community	2523260	252.3	0	0	0%	0%
4	*Laminaria*-dominated community complex	36782752	3678.3	0	0	0%	0%
5	Intertidal reef community complex	6802856	680.3	275652.4	27.57	4.05%	0.07%
6	Intertidal mobile sand community complex	636507	63.7	0	0	0%	0%
7	Muddy fine sands dominated by polychaetes & *A. filiformis* community complex.	209321835	20932.2	36232.04	3.62	0.017%	0.009%
8	Fine to medium sand with crustaceans & polychaetes community complex.	19953464.32	1995.3	0	0	0%	0%
9	Coarse sediment dominated by polychaetes community complex.	83342197	8334.2	0	0	0%	0%
10	*Pachycerianthus multiplicatus* community	60000	6	0	0	0%	0%
11	Subtidal reef with echinoderms and faunal turf community complex	4800000	480	0	0	0%	0%

** A. nodosum* cannot be harvested in *Laminaria*, Maerl, Zostera or other subtidal areas.

Part 5: Harbour Seals and Birds.

5.1. Introduction

As harbour seals are highly sensitive to human behaviour, the key objective of the Code of Practise is to ensure that "Disturbance events" do not occur. In addition, certain species of breeding and wintering birds can be disturbed by human presence and may be sensitive to alterations in food supply. Therefore, this Code of Practise also works to ensure that behaviour and food supply to these protected species is unaffected by harvest activities.

The following rules and guidelines were developed based on findings from the published peer-reviewed literature, NPWS guidelines and recommendations from organizations such as Birdwatch Ireland and the Hampshire & Isle of Wight Wildlife Trust (Anon 2016B and 2016C; NPWS 2013A and 2013B; Thanet Project 2016; I-Webs). Harvesters will be provided with training on seal behaviour and requirements of birds by staff at BioAtlantis. Similar training will also be provided in relation to Otter. The requirements are explained as follows:

5.2. General Measures:

Seasonality: Harbour seals are present throughout the year in aquatic and terrestrial habitats, including intertidal shorelines. Equal emphasis will be placed on not disturbing the behaviour throughout the year. Important aspects of the annual life cycle includes:

- Breeding (May-July approx.)
- Moulting (August-September approx.)
- Outside the breeding and moulting seasons (i.e., from October-April, 'resting sites').

Several species of breeding and wintering birds must not be disturbed at established sites during sensitive times. Harvesters will operate based on known locations of established breeding, moulting and resting sites of harbour seals (NPWS, 2011A) and sites of relevance to important bird species.

Requirements in relation to seasonality:

- Harvesting is prohibited at moulting sites between Aug-Sept, while permitted between Oct-July.
- Harvesting is prohibited at breeding sites between May-July, and permitted between Aug-April.
- Sites not used by seals during breeding/moulting seasons may be accessed between May-Sept.
- Harvesting at resting sites is permitted between May-Sept. Harvesting at resting sites between Oct-April can only take place subject to the sites being unoccupied by harbour seals. This must be verified by harvesters using binoculars prior to landing.
- Where sites serve dual functions (e.g. breeding & moulting), avoidance times may be prolonged.
- Where sites serve triple functions (breeding, moulting & resting) avoidance times may be prolonged, however, harvesting may take place at these sites during the resting period subject to the sites being unoccupied by harbour seals.
- Harvest boats must not enter within 100m of breeding and moulting sites during sensitive times. In addition, certain bird sites may not be entered at sensitive times of the year.

Locations and Sites: The location of haul out sites are identified on the maps. In cases where haul out sites occur together in numbers, they may be distinguished and defined further by their geographical names or grouped together into single units. Bird wintering and breeding sites are also indicated.

Data Recording: Harvest boats cannot land at breeding or moulting sites between May-July and Aug-Sept respectively. Harvest location and pick-up points will be recorded on GRNs (Appendix 3 of the proposal document). GRNs will be checked by audit to ensure compliance. Harvesters must report incidents of seal disturbance to the Resource Manager who will record it on the Incident Report Form. Similar measures are in place to ensure avoidance of bird breeding and wintering sites at sensitive times of the year.

Navigation: To minimise the effects of boats on seal behaviour, best practice for boating activities will require that harvesters (a) work according to pre-planned schedules and (b) avoid stalling/slowing down unnecessarily en route to harvest locations or pick up points (pier, etc), as these behaviours can lead to alterations in seal behaviour (flushing etc.). This is particularly relevant when operating within 100m of haul out sites. These measures will reduce the risk of being noticed by seals at haul out sites, not subject to harvest activities at a given time.

5.3. Site-specific measures:

See Table 9 for list of site-specific measures.

5.4. Other requirements:

Harbour Seals:

- Always follow pre-planned harvest schedules provided by BioAtlantis. When navigating within 100m of haul out sites, harvesters should observe sites from a distance with binoculars. If avoidance/disturbed behaviour is observed (e.g. rapid changes in direction away from the boat), increase distance between the boat and the site if possible.
- Never approach seals (or other marine mammals) in a 'bow on' manner. When in proximity to haul out sites, approach from the side and maintain a constant speed. If a seal is observed in open water, slow down (<5knts) or no-wake speed. To minimise disturbance, ensure movements are steady and in parallel to the animal.
- If a seal is encountered, ensure an escape route is provided. Avoid 'boxing-in' the animal or blocking narrow channels. If a mother and pup are encountered, leave the vicinity immediately and slowly.
- Navigation is not permitted within 100m of sites where harvesting is prohibited due to the presence of seals
- In the event that seal disturbance is observed, the event must be reported to the Resource Manager, who will record the details in the Incident Report Form.
- Noise must be kept to a minimum, for example, avoid revving of engines or shouting.
- On rare occasions, seals can display curiosity towards humans. If seals approach boats, maintain the course at constant speed or remain stationary. Do not approach the seal.
- If you encounter seals on a site not recognised as a haul-out site, leave the area promptly and quietly and report to the Resource Manager who will record the event in the Incident Report Form.

Birds (Breeding and Wintering)

- Always follow pre-planned harvest schedules provided by BioAtlantis.
- Harvesting is prohibited at important breeding sites during Spring/Summer periods. Harvesting is prohibited at important wintering sites during Autumn/Winter periods (table 9).
- Sites which are out of bounds are indicated in Table 9 below.
- To minimise disturbance, ensure activities on islands are maintained in the intertidal *A. nodosum* zone.
- Avoid estuarine areas containing soft mud or marsh at the mouths of rivers between Sept-April. Ensure caution if in the vicinity of these areas between May-Aug.
- Avoid approaching, chasing, scaring or putting birds to flight at any time, including roosting or feeding birds.

Birds (Breeding and Wintering)

- **Overview:**

  Mitigation measures to protect bird species were developed in Appendix 6 of the proposal document. This include a range of site-specific mitigation measures (outlined in Table 9) and species-specific mitigation measures. The measures outlined in this Code of Practice incorporate life cycle requirements of a range of species, including but not limited to: Arctic Tern *(Sterna paradisaea),* Bar-tailed Godwit *(Limosa lapponica),* Black-headed Gull *(Larus ridibundus),* Black-tailed Godwit *(Limosa limosa),* Brent Goose *(Branta bernicla hrota),* Common gull *(Larus canus),* Common Sandpiper *(Actitis hypoleucos),* Common Tern *(Sterna hirundo),* Cormorant *(Phalacrocorax carbo),* Dunlin *(Calidris alpine),* Goldeneye *(Bucephala clangula),* Great Black-backed Gull *(Larus marinus),* Green Sandpiper *(Tringa ochropus),* Greenshank *(Tringa*

*nebularia),*Little Tern *(Sterna albifrons),* Manx Shearwater *(Puffinus puffinus),* Mediterranean Gull *(Larus melanocephalus),* Oystercatcher *(Haematopus ostralegus),* Red Knot *(Calidris canutus),* Redshank *(Tringa tetanus),* Ringed Plover *(Charadrius hiaticula),* Rock Pipit *(Anthus petrosus),* Roseate Tern *(Sterna dougallii),* Sandwich Tern *(Sterna sandvicensis),* Scaup *(Anas marila),* Shelduck *(Tadorna tadorna),* Storm Petrel *(Hydrobates pelagicus),* Turnstone *(Arenaria interpres)* and White Tailed Sea Eagle *(Haliaeetus albicilla).*

- **Code of practice:**
  - Always follow pre-planned harvest schedules provided by BioAtlantis.
  - Harvesting cannot take place at SPAs at any time, including: Iveragh Peninsula SPA, including Derrynane Bay and nearby rocky islands (site code 004154), Deenish Island and Scariff Island SPA (site code 004175), Beara Peninsula SPA (site code 004155), Sheep's Head to Toe Head SPA (site code 004156) & Three Castle Head to Mizen Head SAC (Site Code: 000109).
  - Harvesting is prohibited at important breeding sites during Spring/Summer periods. Harvesting is prohibited at important wintering sites during Autumn/Winter periods (table 9).
  - Sites which are out of bounds are indicated in Table 9.
  - To minimise disturbance of birds, ensure that all activities on islands are maintained within the intertidal *A. nodosum* zone.
  - Harvesters must avoid areas of coast beyond the intertidal zone, thus avoiding contact with nests on ground areas beyond the high tide mark.
  - Harvesters must stay clear of sea cliffs or burrow-like habitats which occur on islands or inland in areas beyond the intertidal zone, thus avoiding contact with nests on ground areas beyond the high tide mark.
  - Avoid thickets, reed beds and other areas of coast beyond the intertidal zone, thus avoiding contact with nests on ground areas beyond the high tide mark.
  - Estuarine areas containing soft mud or marsh will be avoided during winter (Sept-April) at the mouths of Roughty River, River Sneem, River Sheen, River Blackwater, River Finnihy and Kenmare Estuary. Ensure caution if in the vicinity of these areas between May-Aug.
  - Keep distance from colonies of birds, particularly black-headed gull, Great Black-backed Gull and turnstone.
  - Avoid approaching, chasing, scaring or putting roosting or feeding birds to flight at any time.
  - Shingle banks will be avoided between March to September.
  - Exposed sandy beach areas will be avoided all year round.
  - Open sandy coasts, beaches, dunes and salt marsh habitat will be avoided all year round.
  - Do not harvest dead/senescing/storm cast algae.
  - When approaching the shore at high tide, move slowly and keep distance from groups of resting birds such as turnstone.
  - As outlined above, harvest must be undertaken in a manner which ensures canopy coverage is maintained and interactions with understory species is avoided.
  - If approaching shore at high tide, move slowly and keep distance from groups of resting birds.
  - Avoid shores at dusk or night, where possible.

Preventing interactions with tourism & recreation:

Harvesting cannot take place at seal/bird sites at sensitive times of the year, thus preventing in combination effects with tourism and recreation activities (e.g. Power Boat Trips, Sea Trampoline, Sit-On-Top Kayaking, Stand up Paddling, Sea Kayaking, Dinghy Sailing, Windsurfing, Canoeing, Stand Up Paddle Boarding, Keel Boat Sailing).

Table 9: Sites in Kenmare River SAC which require seasonal avoidance.

Harbour seal haul out sites were identified by NPWS and others. Bird sites were identified and mitigation measures were established as described in Appendix 6. While harvesting may be restricted at certain sites/times of the year, access to collection points are permitted all year round. Not all sites in the table below are included in the harvesting plan, but are listed to inform harvesters of sensitive sites which should be avoided at certain times.

†Harvesters may access resting haul out sites during the specified periods, subject the absence of harbour seals. This must be verified using binoculars prior to site visitation.

*Harvest will not occur at certain sites between July-August, thus preventing any in combination effects associated with increased anthropogenic disturbances which may occur during summer due to increased numbers of tourists in the area.

Site Name	Harbour seals			Birds		Control measures	
	Breeding Site	Moulting Site	Resting Site	Breeding site	Wintering site	Avoidance	Attendance
Ardea west, Tuosist				Yes		April-July	Aug-Mar
Ardgroom Harbour (and sites therein)	Yes	Yes		Yes		April to Sept	Oct to Feb
Beara Peninsula SPA [site code:004155].				Yes	Yes	Avoid SPA all year round.	
Brennel Island	Yes	Yes	Yes	Yes		Mar to Oct	Nov to Feb†
Brown Island & adjacent skerries	Yes	Yes	Yes			May to Sept	Oct to April†
Cappanacush Island	Yes	Yes	Yes			May to Sept	Oct to April†
Carrignaronomore	Yes	Yes	Yes			May to Sept	Oct to April†
Coongar Harbour (and sites therein)	Yes	Yes	Yes			May to Sept	Oct to April†
Coornagillagh				Yes		Mar to Sept	Oct to Feb
Coulagh Bay				Yes		April-July	Aug-Mar
Cove Harbour (Westcove)	Yes	Yes		Yes		April to Sept	Oct to March
Deenish Island and Scariff Island SPA (site code 004175),				Yes	Yes	Avoid SPA all year round.	
Dinish Island		Yes		Yes		Mar to Sept	Oct to Feb
Dirreencallaugh (coastal area)*						July-August	Sept-June
Dromquinna (coastal area)*						July-August	Sept-June
Dronnoge	Yes	Yes				May to Sept	Oct to April

Site Name	Harbour seals			Birds		Control measures	
	Breeding Site	Moulting Site	Resting Site	Breeding site	Wintering site	Avoidance	Attendance
Dunkerron Island West		Yes				Aug-Sept	Oct to July
Eyeries (coastal area)*						July-August	Sept-June
Eyeries Island pNHA		Yes		Yes		Mar to Oct	Nov to Feb
Freshwater areas of Lough Inchiquin, Glan Lough, Lough Fadda, Tahilla Lough, Dunkilla lough, Thaha Lough, Black Lough, Ross Lough, Askive Lough, Tobacco Lough, Loough Corlagh, Lough Cloonee, Derryvegal Lough, the River Sheen, River Finnihy, River Blackwater, River Sneem, and Roughty River, Tahilla River, Staigure River, Gowla River, Coomnahorna River, Cloonee River, Owenshagh river, Croanshagh River, Kealincha river, Ballydonghan River, Dromoghty River, Reen River.						Avoid freshwater rivers and connecting lakes all year round to ensure no impact fish and otters.	
Greenane Islands	Yes	Yes	Yes			May to Sept	Oct to April†
Hog Island	Yes	Yes	Yes			May to Sept	Oct to April†
Illaunakilla	Yes	Yes				May to Sept	Oct to April
Illaunanadan-Inishkeragh		Yes				Aug to Sept	Oct to July
Illaungowla		Yes				Aug-Sept	Oct to July
Illaunnameanla		Yes	Yes			Aug to April	May to July
Illaunsillagh	Yes	Yes	Yes			May to Sept	Oct to April†
Illaunslea			Yes			April to Sept	Oct to March†
Inishkeelaghmore		Yes				Aug to Sept	Oct to July
Iveragh Peninsula SPA [site code: 004154]				Yes	Yes	Avoid SPA all year round.	
Kilcatherine point to Doonagh				Yes		April-July	Aug-Mar

Site Name	Harbour seals			Birds		Control measures	
	Breeding Site	Moulting Site	Resting Site	Breeding site	Wintering site	Avoidance	Attendance
Kilmackillogue Harbour (and sites therein)	Yes	Yes	Yes	Yes		April to Sept	Oct to March†
Lehid Harbour, Tuosist				Yes		April-July	Aug-Mar
Mouth of River Blackwater					Yes	Sept-April	May-Aug
Mouth of River Finnihy					Yes	Sept-April	May-Aug
Mouth of River Sheen					Yes	Sept-April	May-Aug
Mouth of Roughty River and Kenmare Estuary					Yes	Sept-April	May-Aug
Mouth of Sneem River					Yes	Sept-April	May-Aug
Ormonde's Island		Yes				Aug-Sept	Oct to July
Parknasilla*	Yes	Yes	Yes			May to Sept	Oct to April†
Potato Island and Garinish Island	Yes	Yes				May to Sept	Oct to April
Rossdohan Island pNHA	Yes	Yes	Yes	Yes		Mar to Sept	Oct to Feb†
Sherky Island		Yes				Aug to Sept	Oct to July
Sneem Harbour (Inner)*	Yes	Yes	Yes			May to Sept	Oct to April†
Sneem Harbour (Outer; inc. Oysterbed)*	Yes	Yes	Yes	Yes		April to Sept	Oct to March†
Spanish Island pNHA				Yes		Mar to Oct	Nov to Feb

Part 6: Otters

Otters may be sensitive to human presence and alterations of food source and supply. To avoid or prevent disturbance or interactions with otters, ensure the following:

- All activities are maintained within the intertidal *A. nodosum* zone. Avoid linear habitats located beyond the intertidal zone or marine riparian areas beyond the foreshore. Only use existing routes.
- Never interfere with couching sites, holts, access paths/routes, that may be present near coastal areas, agricultural fencing, roads, slipways, access points or other areas.
- Avoid large trees near coastal areas as they can represent important otter breeding and resting sites. Avoid undisturbed areas (e.g. impenetrable scrub/reeds) which are refuges for otters.
- Do not behave in an obtrusive or noisy manner around otters.
- Never interfere with, deliberately approach or disturb otters or their cubs that are resting, sleeping, hunting, feeding or foraging in water or on the shore during the daytime, dawn or dusk. Ensure caution during the periods of breeding, rearing and hibernation.
- If migrating/commuting otters are encountered in water, do not obstruct their movement. Slow down boat and give sufficient space to pass without “boxing” them in, blocking narrow channels or acting as a barrier to commuting or connectivity.
- If encountered on the shore, allow otters free access and ample opportunity to escape to the water/land. Do not behave in manner causing them to move away or flee human disturbance.
- To prevent in combination effects, adhere to the above measures at all times, particularly when working in areas known to exhibit signs of otter activity.

To prevent impacts on the dietary and other requirements of otter, the following measures apply:

- Follow pre-planned schedules and harvest in areas defined by BioAtlantis. Harvesting is limited to 20% of the total available *A. nodosum* biomass per site per annum, to allow for sufficient regrowth.
- Harvesting must not take place beyond the *A. nodosum* zone, as these habitats represent the broader habitat range of the otter’s prey during adult and early life stages, including: flowing and static freshwater areas (rivers, streams, canals, lakes, reservoirs, ponds), deep water subtidal areas (>30m), shallow subtidal areas (<30m), exposed areas, estuarine mud areas, brackish waters, subtidal gravel/coarse bottom substratum, intertidal soft bottom (sand/mud), lagoons, maerl, rock pools, saltmarsh habitats, seagrass, subtidal soft bottom (sand/mud) and exposed waters in the vicinity of rocky cliffs.
- Avoid exposed and non-sheltered areas that represent the otter’s broader habitat range, hunting ground and foraging area.
- Avoid co-harvesting non-*A. nodosum* material near coastal habitats, near the shoreline or on the shore. Ensure that inadvertent by-catch of other algae, dead/senescing algae, amphipods, isopods or other *Animalia* or material is prevented and minimized.
- Do not remove the *A. nodosum* holdfast and take care not to disturb rocky/crevice substratum.
- Avoid all freshwater aquatic linear habitat and riparian environments including lakes and rivers and other areas .
- Harvesting cannot occur in fresh water habitats. This prevents potential impacts on salmon, trout and European eel, in turn preventing any impacts on otter.

Part 7: Environmentally safe navigation

7.1. Introduction:

The following rules and guidelines have been developed on the basis of NPWS's objectives for ensuring protection of sensitive marine and costal habitats/areas in Kenmare River SAC, including estuarine mud, muddy-fine sand, intertidal sand, saltmarsh habitat, intertidal mobile sand, shingle, reef areas and bogland SAC areas occurring adjacent to the coast. These guidelines must be adhered to by all harvesters supplying *A. nodosum* to BioAtlantis.

7.2. Protection of sensitive areas:

Harvesting *A. nodosum* along rocky shorelines located beyond estuarine mud or fine-medium sand areas requires that work be done in a manner that prevents impacts with these substratum areas. Training will be provided, where necessary, to ensure that all harvesters are aware of requirements for protecting these areas and species residing within these and other habitats in the SAC. Important aspects to the code of practice are as follows:

- Advanced preparations will be necessary in advance of work in these locations. Always adhere to clearly defined harvesting schedules provided by BioAtlantis.
- It is essential not to enter into intertidal sand or estuarine mud areas during low tide. Entry into these areas at low tide will cause physical damage to these environs and the associated species. These areas will be indicated clearly in the maps provided (soft mud occurs in Sneem River and the River Blackwater estuary areas). Access by boat to rocky shores located beyond these areas must be undertaken at high tide or when the tide has begun to recede.
- If estuarine mud areas are entered into inadvertently, promptly leave and inform the Resource Manager of the incident who will record the incident.
- When approaching coastal areas in small boats or vessels, ensure that contact with reef, shingle, intertidal sand or estuarine mud is minimal. This will ensure no damage is inflicted to the boat or reef or shingle habitat.
- In smaller boats or vessels, always approach the shore at slow pace so as to avoid intertidal reef (i.e. mixed substrate of pebbles and cobbles) or shingle and to avoid infralittoral habitats in the vicinity of the lower eulittoral zone (i.e. mud, sand, coarse/mixed sediment, biogenic reef). Care must particularly be taken in areas where fine-medium sand occur in close proximity to intertidal reef areas, e.g. the complex substrate mosaics in close proximity to (1) an area in Kilmackillogue Harbour located between Collorus Pt. and Laughaunacreen near Bunaw and (2) an area in the vicinity of Cove Harbour and Castlecove, (3) North Allihies to Coomeen and (4) just west of Garnish Island.
- The harvest collection boat (if deemed applicable to the area) will be fitted with a depth sounder to ensure that contact with the reef is avoided. Hard substrate may be encountered between 2-14m and should be avoided. The sonar depth sounder must be in working order during all collection activities. This measure will ensure that displacement or disturbance of reef and species therein does not occur.
- To ensure that *A. nodosum* harvesting does not negatively impact on salt marsh (Atlantic & Mediterranean Salt Meadows) habitat in general, *A. nodosum* must not be harvested at the fringes of these areas. In particular, harvesters will avoid saltmarsh habitat and ensure caution when

operating at sites near Castlecove, Sneem, Reennagross, Doon Pt., Derreenacallaha, Derrynid, Reennaveagh, Laughragh Lower, Derreen House, Dinish, Tahilla and West Cove.

- Harvesters must avoid harvesting *A. nodosum* and *Fucus* at the fringes of salt marshes.
- Harvest of *A. nodosum* cannot take place along the fringes of Drongawn Lough SAC.

Part 8: Tourism, sport and recreation

Tourist, sport and recreation activities may cause anthropogenic disturbances and disturb sensitive harbour seals and bird species. To prevent interactions with these activities, the following is required:

- As a general policy, hand harvesters will avoid sites where tourism, sport and recreation activities are observed to be taking place. This will be determined on a case-by-case basis.
- Harvesters must not work within 50m of bases where tourism and recreation-related equipment or vessels are manually introduced in the water (e.g. kayaks). This ensures that no in combination effects occur, such as exacerbation of anthropogenic disturbance which could give rise to localized reductions in density of intertidal seaweed and the associated biotope.
- Hand harvesting will not occur at harbour seal breeding or moulting sites located in proximity to Rossdohan, Sneem, Parknasilla, Sherkey Island, Templenoe, Tahilla Cove, Dawros, Ormonds View, Dromquinna, Ardgroom or Kilmacillogue Harbour or Dinish Island between May-Sept, thus preventing in combination disturbance effects.
- To prevent in combination effects which may occur during summer due to increased numbers of tourists, harvesting will not occur at Dirreencallaugh, Sneem, Parknasilla, Eyeries or Dromquinna between July-August. Harvest will not occur in Derrynane at any time as this is part of the Iveragh Peninsula SPA [004154].
- BioAtlantis will not harvest in Caherdaniel at any time of the year due proximity with Iveragh Peninsula SPA [004154]. In addition to preventing impacts on the SPA, this also avoids in combination effects with seaweed tourism excursions in the area during peak tourist season in July and August.
- Harvesters must prevent any disturbance or interaction with otters in the water or on the shore. This includes recreation, sports and tourism-related areas such as Parknasilla where otters are known to be found.
- As a general policy, hand harvesters must ensure the following:
  - **(a) Boats and vessels:**
    - Maintain distance from other boats or vessels, such as power boats, cruise boats, kayaks, rib boats, row boats, rib boats and fishing boats when travelling to sites, thus preventing any in combination effects.
    - Maintain distance from passenger boats/vessels/ferries and cargo and tanker vessels and ensure no interactions with their routes and activities.
  - **(b) Site avoidance:** Avoid sites where sports, leisure activities, education excursions, retreats, seaweed foraging days, discovery tours or workshops are observed to be taking place. This will be determined on a case-by-case basis. Harvesters must not interact with people on the shore engaging in these activities.
  - **(c) Water sports:** Harvesters and operators of boats must ensure caution when operating in the vicinity of floating water sports, yacht moorings and areas where other sports such as dinghy

sailing, water skiing and jet skiing are taking place. Ensure caution when operating in known areas of importance to swimmers and kayakers.

(d) Harvesters and operators of boats must keep well clear of boats during training and racing and must observe "power gives way to sail" conventions when appropriate.

(e) Respect the space of all recreational users when operating in the complex.

Part 9: Aquaculture

To ensure that hand harvest activities do not exacerbate any negative effects associated with aquaculture in Kenmare River SAC, the following is required:

- Harvest activities cannot take place at breeding, resting or moulting sites during sensitive times of the year. This includes breeding, resting or moulting sites which maybe in close proximity to existing and planned aquaculture sites in Coongar Harbour, Kilmackillogue and Ardgroom Harbour and near Killaha East.
- Caution is required when approaching/operating near areas where planned and existing aquaculture sites are in relative proximity to seal sites and bird breeding/wintering sites (e.g. islands near Parknasilla such as Ship Rock, islands and coastal zones on Coongar Harbour, including site near Pointafadda in Coongar Harbour, islands in Kilmackillogue Harbour and south of Garinish Island) and bird breeding sites (e.g. islands in Kilmackillogue Harbour) and bird wintering sites.
- The requirements for environmentally safe navigation must be followed to ensure no in combination effects which could damage substratum where aquaculture sites are located, such as reef or soft substratum areas.
- Ensure caution when travelling in the vicinity of defined aquaculture navigation routes. Do not impede workboat or tractor access to aquaculture sites along access routes, including but not limited to those associated with routes via Bunaw Pier, Bunaw (Kilmackillogue Pier), areas near Kilmackillogue Pier, Blackwater Pier and Oysterbed Pier, roadway access points at Templenoe (upper Kenmare Bay), access along the foreshore over intertidal habitats (e.g. near Templenoe, via public roads such as R571), areas with existing rights of way and other locations including those near the Beara Peninsula, Sneem (e.g. slipway), Coulagh Bay, Travara, Eyeries, Kilcatherine Point, Ardgroom Harbour, Cleandra (landing pier), Coongar Harbour, Pallas Pier, inner Kenmare Bay, outer Kenmare Bay and private laneways or routes or pick up points.
- Do not interfere with aquaculture users who are licensed to harvest or grow seaweed.
- Ensure that no aspects of *A. nodosum* harvesting give rise to any physical interaction or contact with aquaculture production units, their structures or anchors.

Part 10: Angling and fisheries activities.

- There are several sites of relevance to fisheries and sea angling in Kenmare River SAC. Harvesters must work to ensure that the space of fishermen and sea angler's is respected at all times.
- Ensure that the space of recreational/shore anglers is respected, particularly when competitions and festivals take place, particularly during summer months.
- Seaweed harvesting may only take place in the intertidal *A. nodosum* zone and not in subtidal areas of relevance to fisheries activities such as potting (lobster, crab, shrimp, whelk, nephrops), dredging (e.g. scallop, native oyster, cockle), trammel net fishing for bait, otter trawl, tangle net (crayfish), gillnet, Mid-water trawl. Activities in subtidal waters that are permitted include site visits, inspections, surveys, collection of harvested seaweed, transport and transfer to pick up points.

- Avoid interactions with non-*A. nodosum* habitats which represent the broader habitat range of fish, shellfish, invertebrates and fisheries species during adult and early-life stages, including: deep water areas, seagrass, estuarine mud areas, saltmarsh, lagoons, maerl, subtidal gravel/coarse bottom, subtidal soft bottom areas, intertidal soft bottom areas and exposed shores.
- Avoid soft substratum areas where bait digging for ragworm/lugworm is observed to be taking place.

Part 11: Other seaweed harvesting activities

BioAtlantis is responsible for commercial harvesting of *A. nodosum*. To ensure compliance with the SAC's conservation objectives and prevent in combination or cumulative effects, the following applies:

- Harvesting is not permitted in areas with existing appurtenant rights/burdens in relation to seaweed, without first obtaining permission from the person to whom those rights belong.
- Where Profit-à-Prendre harvesting rights are successfully registered with the PRAI, the harvesting plans must be adjusted to ensure that those individuals can continue to harvest *A. nodosum.*
- Harvesting will not take place in privately owned maritime areas without prior consent on the property owners.
- If unlicensed large-scale commercial harvesting is observed to occur, this will be recorded and advice will be sought from the relevant authorities on how to proceed. BioAtlantis will not harvest in such areas until *A. nodosum* has regenerated and will work to ensure that any harvesting is limited to 20% of the total available biomass per site per annum and continuous disturbance of each community type does not exceed the required limit.
- Any commercial user having small requirements of approximately 1 tonne per annum (e.g. hotels, health Spas) will be identified and BioAtlantis will work to prevent in combination effects.
- Harvest will not take place in the proposed hand harvest application area of Sykoni Lowes in Eskivaude, Allihies, Beara, County Cork. This site is marked as excluded areas on the map.
- Harvesting activities must not impact on other people who harvest small volumes of seaweed, edible seaweeds or invertebrates for their own personal use, e.g. dillisk, carrageenan, limpets, mussels, clams, periwinkles and scallops or seaweed for own personal use in gardens, artisan foods/drink and food festivals.

Part 12: Invasive species

To ensure that harvest activities to not act as a vector and lead to the spread of the invasive species, such as, *Bonamia ostreae, Botrylloides violaceus, Caprella mutica, Crassostrea gigas, Crepidula fornicate, Didemnum vexillum, Perophora japonica, Sargassum muticum, Spartina anglica, Schizoporella errata* and *Styela clava,* BioAtlantis will ensure the following:

- Boats will be painted once a year with appropriate anti-fouling paint.
- Harvesting will be limited to the *A. nodosum* zone.
- The harvesters boats will not leave Kenmare River SAC. In the rare case that they do leave Kenmare River SAC, harvesters are required to implement a cleaning measure on land which will involve cleaning with appropriate cleaning agents or using other suitable methods.
- All bags/nets must be cleaned with appropriate cleaning agents or other suitable methods on delivery to production facilities and returned to harvesters in a clean condition.
- Nets/bags used in Kenmare River SAC will not be used to collect seaweed outside this SAC.
- Harvesting will be limited to the *A. nodosum* zone and will not take place in subtidal areas, exposed or semi-exposed sites.

- Harvesters must keep distance from aquaculture units to prevent the spread of any species that may be associated with artificial structures.
- Harvesters will prevent disturbance to rocky substratum, will avoid co-harvesting non-*A. nodosum* material and will ensure that inadvertent by-catch of other Animalia, algae or dead, drifting material/algae will be prevented and minimized.

Section 5: Concluding remarks

This proposal and the associated documentation submitted with this application provided details of:
(a) the importance of Kenmare Bay as a source of *A. nodosum* raw material to the Irish seaweed sector,
(b) the assessment of the potential impacts of hand harvesting of this resource on these environs and control measures therein,
(c) details of the proposed harvesting activities, and
(d) the system for securing and managing the 'Code of Practice' for protecting the SAC.

Following the implementation of the proposed mitigation measures as outlined in this application and the Natura Impact statement (NIS), no significant impacts on protected Natura 2000 sites are foreseen. The NIS prepared by Ecofact Environmental Consultants Ltd. concludes the proposed activities will not adversely affect the integrity of Kenmare River SAC or other Natura 2000 sites, and states that: *"following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the proposed activity, and with the implementation of the mitigation measures proposed, that the proposed works do not pose a risk adversely affecting the integrity of any Natura 2000 site, either alone or in-combination with other plans or projects".* On receipt of a license to harvest *A. nodosum* in Kenmare River SAC, BioAtlantis Ltd. are committed to ensuring that harvest activities will have no impacts which would affect the integrity of this SAC.

This application provides comprehensive details on the nature, scope and sustainability of the proposed hand harvesting activities in Kenmare Bay. Upon receiving approval from Maritime Area Regulatory Authority (MARA), BioAtlantis will move forward with the public consultation phase and work towards implementing the harvesting system as soon as possible, and will extend our consultations to ensure the smooth progression of the plan. The system is ready for implementation, with key mitigation measures integrated to prevent impacts on marine and coastal habitats and species. The application ensures the provision of a sustainable income in the Kenmare Bay area for local hand harvesters and associated parties, consistent with other sectors of the economy and prices paid by competing companies, in the form of a contractor relationship or direct employee of BioAtlantis. The application also ensures that traditional seaweed harvesting rights are fully respected, with measures in place to ensure that there are no impacts on appurtenant and Profit-à-Prendre harvesting rights in the bay.

BioAtlantis view this as a valuable opportunity to foster a vibrant and sustainable industry in the southwest, driving job creation and long-term employment in the local area. Furthermore, a license will provide a solid foundation for the continued production of innovative, patented and high-value *A. nodosum*-based products in Ireland, for export to global markets. As part of this effort, BioAtlantis will continue to boost employment and economic activity in the local economies of Kerry and Cork. This proposal aligns with the Government's initiatives to support the blue bioeconomy, including facilitating the development of high-value marine biobased products and ensuring that enterprise, industrial, and research policies effectively transition from research to industrial production at an accelerated pace.

Section 6: References

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