DRAFT

Compatibility Determination: Considerations for Siting Coastal and Ocean Uses

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Prepared by:

The UMass Boston Planning Frameworks Team *and*
The Massachusetts Ocean Partnership

Massachusetts Ocean Partnership

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Contributors:

University of Massachusetts Boston

Urban Harbors Institute: Jack Wiggin, Kristin Uiterwyk, Steve Bliven, Dan Hellin

Environmental, Earth and Ocean Sciences Department: John Duff

Good Harbor Consulting: Fara Courtney

Provincetown Center for Coastal Studies: Rich Delaney, Pat Hughes

University of Rhode Island Marine Affairs Department: Tracey Morin Dalton

Massachusetts Ocean Partnership: Stephanie Moura, Nicholas Napoli, Kim Starbuck

GOALS AND PURPOSE

This draft report is one of several prepared under contract to the Massachusetts Ocean Partnership (MOP) to support the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) in its development of the integrated coastal ocean management plan mandated by the *MA Oceans Act of 2008*. Among other requirements, the *Oceans Act* states that the plan shall "identify appropriate locations and performance standards for activities, uses and facilities allowed under sections 15 and 16 of chapter 132A[1]." To fulfill this requirement, the EEA planning team wanted to utilize compatibility determinations as a tool for considering the appropriate locations for activities, uses and facilities relative to one another. This report was prepared for Massachusetts ocean planning purposes but contains information that may be useful to coastal ocean resource managers in other locations.

A compatibility determination is a tool used to consider the impact of particular human uses on other resources and/or uses located or occurring in the same area to better understand their relative compatibility or incompatibility. This draft report contains information that can be used to inform compatibility determinations for certain uses occurring in coastal/ocean locations (i.e. aquaculture, offshore wind energy, etc.) and for certain uses in conjunction with resources (i.e. fish stocks, eelgrass beds, etc.). The analyses can inform spatial and temporal siting decisions and development of performance standards associated with particular uses.

There are a number of ways compatibility determinations may be employed, including (a) the preparation of a management plan requiring decisions to be consistent with that plan's goals, objectives, and policies, and (b) developing a marine spatial plan to identify what can and cannot happen in specific areas (for more information, see "Planning Framework Options for the Massachusetts Ocean Plan" located at www.massoceanpartnership.org).

The compatibility determination information in this report is displayed in the form of A) a compatibility matrix and B) compatibility tables. MOP and its contractors are building off this preliminary work to develop other software based models and decision support tools to assist with compatibility determinations and the development of performance standards.

A) COMPATIBILITY MATRIX

One useful application of the compatibility matrix during Massachusetts' ocean planning process was simply to *organize information* about the potential interactions between different uses and between uses and resources. Developed further, a compatibility matrix tool can also be used to examine issues such as where uses are compatible or incompatible with other uses/resources; where uses may be *conditionally* compatible with other uses/resources if certain criteria – including temporal considerations - are met; and where compatibility may be linked to a policy component. The draft matrix below is a preliminary snapshot of compatibility planning in Massachusetts. (*Nothing in this matrix should be interpreted as the Commonwealth's final compatibility decision with regard to any specific use or resource*.)

While a matrix such as that shown below is useful to organize information and examine compatibility decisions, a considerable limitation is that it does not enumerate the rationale for each determination of compatible, incompatible, conditionally compatible, etc. Those compatibility decisions may be influenced or determined by many things, including:

- The types of decision support tools/models used (or potentially used);
- Data availability;
- Commonwealth laws and policies; and/or
- Experiences from similar projects elsewhere.

[1] Sections 15 and 16 of Chapter 132A provide a list of prohibited and allowed uses in Massachusetts' ocean sanctuaries. Refer to the General Laws of Massachusetts for more information.

USES/RESOURCES

USES

This matrix represents existing conditions and does not consider possibililties related to advances in technologies/science

		Renewable Energy			Sand & Gravel Mining	Navigation			Commercial Fishing						Recreational Fishing			Linear Infrastructure		Aqua-culture	Sensitive/Unique Habitat				Organisms			
		Wind	Tidal (demonstration project)	Wave (demonstration project)	Sand & gravel mining	Shipping	Anchorages	Ferry routes	Bottom dragging	Gill nets	Trawl	Hook/lines	Traps, pots	Shellfish	Rod/reel	Traps, pots	Shellfish	Pipelines	Cables	Deep-water aquaculture	Air	Surface	Water column	Benthic	Air	Surface	Water column	Benthic
Renew-able Energy	Wind								P	P	P	P	P	P	P	P	P				P	P	P	P	P	P	P	P
	Tidal								P	P	P	P	P	P	P	P	P				P	P	P	P	P	P	P	P
	Wave								P	P	P	P	P	P	P	P	P				P	P	P	P	P	P	P	P
Sand & Gravel Mining	Sand and gravel mining					T		T	P	P	P	P	P	P	P	P	P				P	P	P	P	P	P	P	P
Navigation/ Transportation	Shipping				T				T	T	T	T	T	T	T	T	T											
	Anchorages																											
	Ferry routes				T				T	T	T	T	T	T	T	T	T											
Commercial Fishing	Bottom dragging	P	P	P	P	T		T												P							
	Gill nets	P	P	P	P	T		T							T	T	T			P							
	Trawl	P	P	P	P	T		T							T	T	T			P							
	Hook/ lines	P	P	P	P	T		T							T	T	T			P							
	Traps, pots	P	P	P	P	T		T							T		T			P							
	Shellfish	P	P	P	P	T		T							T	T				P							
Recreational Fishing	Rod/reel	P	P	P	P	T		T		T	T	T	T	T						P							
	Pots/traps	P	P	P	P	T		T		T	T	T		T						P							
	Shellfish	P	P	P	P	T		T		T	T	T	T							P							
Linear Infrastructure	Pipelines																				P	P	P	P	P	P	P	P
	Cables					T		T													P	P	P	P	P	P	P	P
Aqua-culture	Deep-water aquaculture								P	P	P	P	P	P	P	P	P				P	P	P	P	P	P	P	P

Key				
	Compatible	T	Temporal considerations drive (in)compatibility
	Functionally Incompatible	P	Relevant planning policy will determine (in)compatibility
	Conditionally compatible		

B) COMPATIBILITY TABLES

As mentioned above, one possible source of information to inform compatibility decisions for ocean uses and resources is to look at experiences from similar projects conducted elsewhere. Massachusetts' ocean planning considered many uses, but because much of the planning area is governed by the Ocean Sanctuaries Act, focused on:

- Offshore wind energy;
- Submarine pipelines;
- Submarine cables;
- Aquaculture (including shellfish and finfish projects); and
- Sand and gravel mining

Focusing on these specific uses, examples were pulled from the projects listed below and were summarized in the following compatibility tables. The tables identify spatial considerations (impacts of uses or uses and resources occupying the same space at the same time) and temporal considerations (temporary impacts, or impacts that are tied to a specific timeframe), as well as examples of siting standards, compensation requirements, mitigation requirements, and license conditions.

These tables were developed under a tight deadline; therefore research was limited to published and online sources only. Efforts were made to include a wide range of projects from activities having some relevance to Massachusetts. While these tables provide a strong base of information, they are not meant to be comprehensive, and additional research may yield further information for each use. For example, offshore oil and gas extraction is not a priority for Massachusetts waters, therefore the review of aquaculture projects did not include any co-located with oil and gas development, and the tables reflect this gap. Blank cells indicate either a) lack of available information based on the materials reviewed - as in the case of aquaculture and offshore oil and gas - or b) absence of impact a use has on another use or a resource - as in the case of aquaculture and civil aviation.

Though not directly stated in all of the tables, cumulative impacts are an important consideration when siting a project, and may affect siting standards, mitigation requirements, license conditions, and/or compensation required. Cumulative impacts should be considered in situations where (1) the impacts stem from one type of use repeated multiple times or in multiple locations, and/or (2) the impacts stem from different types of uses.

The projects reviewed while creating these tables include:

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Roth, E.M., Verhoef, L.A., Dingenouts, M.W.L. (2004). Concerted Action for Offshore Wind Energy Deployment: Overview of environmental impacts of offshore wind energy.

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White Consultants. (2009). Seascape Study (working paper), Offshore Energy Strategic Environmental Assessment (SEA).

AQUACULTURE SITING CONSIDERATIONS (Includes shellfish and finfish projects)

UMass Boston Planning Team, May 2009. This table presents information from a number of international projects. This table should only be used as an initial guide. Additional research would be necessary to identify actual spatial and temporal considerations, standards, conditions, compensations, and mitigation measures for a specific project. This document does not represent positions or conclusions of the preparers, MOP, or EEA.

In addition to the information contained in this table, there are some fundamental conditions to consider when siting any type of aquaculture project. They include:
• Appropriate growing conditions (i.e. size, water circulation, substrate, storm exposure, temperature, salinity, dissolved oxygen, currents, hydrology, waves, shoreline stability, snowfall, freeze-over, freshwater availability, predators, plankton blooms, water quality)
• Consistent with applicable planning goals and objectives

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: HABITAT	Habitat: Air	Proximity to important bird habitat; consistency with protected areas' goals		Project not allowed within 1 km from existing or approved proposals for ecological reserves; must be at least 1 km from existing or approved proposals for ecological reserves <1000 ha	Vessels muffled to reduce noise; lights not used for any of the aquaculture operation; lessees must comply with BMP manual and conduct annual compliance inspections; required criteria relating to color, height, shape, and mass; lease will not result in an "unreasonable" impact from noise or lights at the boundary of the lease site
	Habitat: Surface	Impact to essential or significant habitats; consistency with protected areas' goals		Project not allowed within 1 km from existing or approved proposals for ecological reserves; must be at least 1 km from existing or approved proposals for ecological reserves <1000 ha	Lessees must comply with BMP manual and conduct annual compliance inspections; required criteria relating to color, height, shape, and mass; lease will not result in an "unreasonable" impact from noise or lights at the boundary of the lease site
	Habitat: Water Column	Impact to essential or significant habitats; consistency with protected areas' goals; impacts of food and fish waste		Sites must be outside manatee protection and speed zones; sites must be located in areas with adequate water circulation and mixing patterns to provide food and remove waste; sites often sited in state's aquatic reserves because of water quality requirements; aquaculture activities are allowed only in approved and conditionally approved waters; sites must be 300 m from inter-tidal shellfish beds that are exposed to water flow from a salmon farm and which have regular or traditional use from First Nations, recreational, or commercial fisheries; must be at least 1 km from existing or approved proposals for ecological reserves <1000 ha; ban on aquaculture in certain areas	Water quality monitoring and reporting; lessees must comply with BMP manual and conduct annual compliance inspections; required criteria relating to color, height, shape, and mass; lease will not result in an "unreasonable" impact from noise or lights at the boundary of the lease site
	Habitat: Benthic	Threats to seagrass beds; consistency with protected areas' goals; impacts of food and fish waste		Sites are in water depths greater than 4.5 ft. in order to avoid seagrass beds; sites in suitable substrate type to minimize disturbance and loss of soft and/or live bottom habitat; must be at least 1 km from existing or approved proposals for ecological reserves <1000 ha	DEP will monitor benthic conditions. If conditions change, regulatory action may be triggered; lessees must comply with BMP manual and conduct annual compliance inspections; required criteria relating to color, height, shape, and mass; lease will not result in an "unreasonable" impact from noise or lights at the boundary of the lease site
NATURAL RESOURCES: ORGANISMS	Organisms: Air	Threats to endangered species; new feeding/predation opportunities		Site must be at least 1 km from existing or approved proposals for ecological reserves <1000 ha	
	Organisms: Surface	Presence of significant commercial species; impact to flora/fauna; threats to endangered species; new feeding/predation opportunities; displacement of existing species		Site must be at least 1 km from existing or approved proposals for ecological reserves <1000 ha; must be an appropriate distance from the areas used extensively by marine mammals, as determined by DFO and the province; must be outside manatee protection and speed zones	

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: ORGANISMS	Organisms: Water Column	Presence of significant commercial species; impact to flora/fauna; threats to endangered species; escape of penned species; transmission of disease to wild stock; new feeding/predation opportunities; displacement of existing species		Project not allowed within 1km of designated vital, major, or important herring spawning areas; project not allowed 1 km from the mouth of a salmonid-bearing stream determined as significant in consultation with DFO and the province; must be at least 1 km from existing or approved proposals for ecological reserves <1000 ha; must be an appropriate distance from areas of "sensitive fish habitat", as determined by DFO and the province; must be an appropriate distance from the areas used extensively by marine mammals, as determined by DFO and the province; must be outside manatee protection and speed zones	DEP will monitor dominant species. If conditions change, regulatory action may be triggered
	Organisms: Benthic	Presence of significant commercial species; impact to flora/fauna; loss of commonly-occurring species; replacement of commonly-occurring species with aquacultured species; threats to endangered species		Sites are in water depths greater than 4.5 ft. in order to avoid seagrass beds; 125 m from all other wild shellfish beds and commercial shellfish growing operations; must be at least 1 km from existing or approved proposals for ecological reserves <1000 ha; must be an appropriate distance from areas of "sensitive fish habitat", as determined by DFO and the province; must be an appropriate distance from the areas used extensively by marine mammals, as determined by DFO and the province	DEP will monitor dominant species. If conditions change, regulatory action may be triggered
USES	Commercial Fisheries	Presence of significant commercial species; gear entanglement	Impact might be greatest during certain fishing seasons; During storms, increased potential of damage to support structures, resulting in floating debris - -depending on location of site	Site must be 300 m from inter-tidal shellfish beds that are exposed to water flow from a salmon farm and which have regular or traditional use by First Nations, recreational, or commercial fisheries; must be at least 125 m from all other wild shellfish beds and commercial shellfish growing operations; not in areas that would pre-empt important Aboriginal, commercial or recreational fisheries as determined by the province in consultation with First Nations and DFO	License allows for prohibition on hand scalloping under pens, but lobstering in the open areas of the site outside the pen and mooring area will be allowed; commercial and recreational fishing is allowed over on-bottom shellfish leases if it does not infringe on or interfere with the aquaculture activity
	Aquaculture	Proximity to other aquaculture operations; intensity and frequency of use at other sites		Project must be 125 m from all other wild shellfish beds and commercial shellfish growing operations; spacing between farm sites to be three kilometers or in accordance with a local area plan or Coastal Zone Management Plan (may be reduced to one kilometer in the case of farms operated by the same company); must be at least 3 km from any existing finfish aquaculture site, or in accordance with a local area plan or Coastal Zone Management Plan	
	Oil & Gas	Physical occupation of space; may be opportunity to co-locate			
	Sand & Gravel Mining	Physical occupation of space			
	Pipelines & Cables	Physical occupation of space; may be opportunity to co-locate			
	Defense				
	Shipping	Physical occupation of space; collision risks	During storms, increased potential of damage to support structures, resulting in floating debris - - depending on location of site	Minimum setback of 100 ft from marked navigation channels - individual leases often have greater setback distance from navigation channels; must be at least 30 m from the edge of the approach channel to a small craft harbor, federal wharf or dock	Some vessel traffic is allowed over lease sites located in water depths greater than 5 feet; some individual leases will not be approved if they "unreasonably" restrict access or obstruct access to upland properties, channels, creeks, marinas, and docks

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
USES	Anchorages	Physical occupation of space; collision risks	During storms, increased potential of damage to support structures, resulting in floating debris - - depending on location of site		Some vessel traffic is allowed over lease sites located in water depths greater than 5 feet
	Ferry Routes	Physical occupation of space; collision risks	During storms, increased potential of damage to support structures, resulting in floating debris - - depending on location of site	Some individual leases will not be approved if they "unreasonably" restrict access or obstruct access to upland properties, channels, creeks, marinas, and docks; must be at least 30 m from the edge of the approach channel to a small craft harbor, federal wharf or dock	Some vessel traffic is allowed over lease sites located in water depths greater than 5 feet
	Onshore Transportation				
	Civil Aviation				
RENEWABLE ENERGY	Wind	May be opportunity to co-locate			
	Tidal	May be opportunity to co-locate			
	Wave	May be opportunity to co-locate			
CULTURE/RECREATION	Sites of Archeological Significance	Damage to resource			
	Traditional Rights	Consistency with First Nation priorities		Salmon opportunity areas not typically allowed within 1 km of a First Nations reserve; site at least 300 m from inter-tidal shellfish beds that are exposed to water flow from a salmon farm and which have regular or traditional use from First Nations, recreational, or commercial fisheries; site not in areas that would pre-empt important Aboriginal, commercial or recreational fisheries as determined by the province in consultation with First Nations and DFO; site not in areas of cultural or heritage significance as determined in the Heritage Conservation Act	Lessee and agents cannot use nearby island except for the purpose of removing trash and equipment from the island
	Views	Bottom cultures have little/no visual impact		No salmon farms within the line of sight up to 1 km in all directions from existing federal, provincial or regional parks, and Marine Protected Areas; not in areas of cultural or heritage significance as determined in the Heritage Conservation Act	

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
CULTURE/RECREATION	Recreation	Physical occupation of space; collision risks	May have greater impact during fishing, swimming, and boating seasons; During storms, increased potential of damage to support structures, resulting in floating debris - -depending on location of site	Should not interfere with public use/enjoyment within 1,000 ft. of a beach, park, docking facility or certain conserved land owned by the federal, state, or municipal government; not allowed within 1,000 feet from nearby island to ensure riparian access; 300 m from inter-tidal shellfish beds that are exposed to water flow from a salmon farm and which have regular or traditional use from First Nations, recreational, or commercial fisheries; no salmon farms within the line of sight up to 1 km in all directions from existing federal, provincial or regional parks, and Marine Protected Areas; must be at least 30 m from the edge of the approach channel to a small craft harbor, federal wharf or dock; site not in areas that would pre-empt important Aboriginal, commercial or recreational fisheries as determined by the province in consultation with First Nations and DFO; sites generally located 1500-2000 feet offshore to minimize conflict	Proper navigation aids; prohibition on hand scalloping under pens, but lobstering in the open areas of the site outside the pen and mooring area will be allowed; some vessel traffic is allowed over lease sites located in water depths greater than 5 feet; some individual leases will not be approved if they "unreasonably" restrict access or obstruct access to upland properties, channels, creeks, marinas, and docks; commercial and recreational fishing is allowed over on-bottom shellfish leases if it does not infringe on or interfere with the aquaculture activity
SOCIO-ECONOMIC	Jobs		Construction and maintenance, harvesting		
	Onshore Spending		Seed purchase, employment, construction, licensing		
	Tourism	Biosecurity; sanitation		Site not in areas of cultural or heritage significance as determined in the Heritage Conservation Act; Ban on aquaculture in areas of importance to tourism	

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In addition to the information contained in this table, there are some fundamental conditions to consider when siting submarine cables. These include:

- Appropriate technology for the depth and capacity of the cables
- Consistency with applicable planning goals and objectives

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: HABITAT	Habitat: Air		Air pollution during the construction phase; light and noise pollution from vessels during construction		Use biodiesel, or other fuel which would result in lowest emissions; minimize diesel engine fuel use; use shore-side power when docked, rather than running engines; aim work lights on the cable-laying ship and support vessels to illuminate work areas in such a way as to minimize spilling light into adjacent areas of water; construction contractors should operate only well-maintained engines
	Habitat: Surface		Vessel strikes during installation; increased noise during installation; water pollution from vessel discharges, etc. during installation and repairs - both on land (runoff) and submarine; light pollution from vessels during construction; timing and location of installation will impact pinniped haul-out areas		Vessel operators should update their fuel spill contingency plans (based on NOAA's Environmental Sensitivity Index) and continue to use emergency response services for pollution incidents; use oil-absorbent materials, maintained on the construction vessels, in the event of a petroleum product spill on the deck and/or if any sheen is observed in the water; maintain vessels and equipment to minimize pollution; if the cable is severed, whether due to a catastrophic natural event (earthquake) or human caused event (anchor), sensors in the system will stop the flow of electrical current in the cable; aim work lights on the cable-laying ship and support vessels to illuminate work areas in such a way as to minimize spilling light into adjacent areas of water
	Habitat: Water Column	Heat dispersal from cable into sediment and water (even if cable is insulated)	Disturbance during installation stemming from vessel noise and sediment disruption from trenching, digging and prop-wash; water pollution from vessel discharges, etc. during installation and repairs - both on land (runoff) and submarine; stir up contaminated sediment during construction and repair activities; light pollution from vessels during construction; on-shore activities related to bringing the cable on-shore may impact water quality	Construction should avoid known areas of sediment contamination	Implement a hazardous materials management plan; implement mitigation measures to minimize increased sedimentation and pollution (including a hazardous materials management plan and a plan for containing any spills); comply with MARPOL regulations; sediment sampling should be conducted in pre-determined sites prior to construction; vessel operators should update their fuel spill contingency plans (based on NOAA's Environmental Sensitivity Index) and continue to use emergency response services for pollution incidents; use oil-adsorbent materials, maintained on the construction vessels, in the event of a petroleum product spill on the deck and/or if any sheen is observed in the water; implement BMPs to reduce impact of drilling including the release of drilling mud and the fracturing of near-surface formations; maintain vessels and equipment to minimize pollution; if the cable is severed, whether due to a catastrophic natural event (earthquake) or human caused event (anchor), sensors in the system will stop the flow of electrical current in the cable; aim work lights on the cable-laying ship and support vessels to illuminate work areas in such a way as to minimize spilling light into adjacent areas of water

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: HABITAT	Habitat: Benthic	Heat dispersal from cable into sediment (even if cable is insulated)	Increased turbidity and temporary loss of habitat during installation (from trenching, digging, and boat's prop-wash); disruption of longshore sediment transport; installation and repair activities - both on land (runoff) and submarine - can stir up contaminated sediment; (temporary) displacement of marine vegetation from trenching and sediment burial	Avoid a cable route that negatively impacts eel grass beds	Implement a hazardous materials management plan; implement mitigation measures to minimize increased sedimentation and pollution; clearing will be limited to the minimum needed for safe implementation; areas of habitat that are temporarily disturbed during cable installation will be restored upon the completion of the installation phase; trenches will be back filled and vegetation recolonization will be encouraged through replacing sediment to original depths; monthly monitoring of restored benthic areas will be required for 5 months (with a focus on sediment transport and erosion), with additional restoration and monitoring conducted as needed; anchors will not be dragged on the seafloor, and they will be retrieved vertically so as to minimize disruption of benthic habitat; construction should avoid known areas of sediment contamination and sediment sampling should be conducted in pre-determined sites prior to construction; vessel operators should update their fuel spill contingency plans (based on NOAA's Environmental Sensitivity Index) and continue to use emergency response services for pollution incidents; use jetting technology that minimizes sediment disruption; if the cable is severed, whether due to a catastrophic natural event (earthquake) or human caused event (anchor), sensors in the system will stop the flow of electrical current in the cable; use BMPs to reduce turbidity and impact to sediment; the maximum speed of the cable laying will not exceed 6 knots per hour so that the amount of seabed sediment disturbed and dispersed during the cable laying process can be kept to a minimum; assess impacts to nearshore habitat at the HDD hole end point and at trenching to a depth of 70 feet (21 m) within two weeks after cable installation is completed, and again after 1 year, during the growing season. If the marine vegetation has not recovered to 80% of the density of adjacent areas within 3 years of monitoring, develop a mitigation plan in consultation with WDFW
NATURAL RESOURCES: ORGANISMS	Organisms: Air		Temporary impact of installation (on migrating birds); impact on electro-sensitive organisms; bird behavior disturbed due to noise and light from vessels		Cables have to be insulated (non-oil based) in order to minimize their electromagnetic fields; have a trained marine mammal observer on board the cable-laying vessel to record any observations of marine mammals, especially ESA-listed species; during nighttime operations, observer would use low-light binoculars for observations. During cable laying operations, observations for a minimum of 10 min. would be made at least 4 times/hour. If any listed species are observed, the following procedures would apply: (1) If an individual/group of animals is observed at 1,000 yds from the cable-laying vessel, then behavior would be recorded and vessel operators would be notified. No change to cable-laying operations would be required. (2) If an individual/group of animals approaches the cable-laying vessel within 500 yds, the behavior of the animals would be recorded, the vessel operator would be notified, and preparations to reduce the speed of cable laying operations would begin. (3) If an individual/group of animals approaches the cable-laying vessel within 400 yds, the behavior of the animals would be recorded, the vessel operator would be notified, and cable-laying operations would be reduced to half speed. The operator would prepare to stop cable-laying operation if necessary. (4) If an individual/group of animals approaches the cable-laying vessel within 100 yds, the behavior of the animals would be recorded, the vessel operator would be notified, and cable-laying operations would cease until the individual/group of animals had moved beyond 100 yds of the vessel, then reduced-speed operations may be resumed

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NATURAL RESOURCES: ORGANISMS	Organisms: Surface	Introduction of invasive species from construction vessels	Impact on electro-sensitive organisms; vessel-based disturbances during installation, including vessel strikes; disruption of breeding, migration and feeding during installation due to increased vessel noise; ingestion of pollutants stirred up during installation (biomagnification); noise, wake, and light from vessels may disturb bird and fish behavior		Cables have to be insulated (non-oil based) in order to minimize their electromagnetic fields; adhere to IMO regulations; monitoring required for marine mammals and turtles during installation and other marine activities; vessel crews must report the sighting of any injured or dead sea turtles or marine mammals (even if death or injury is not related to project); deploy any item or material that has the potential for entangling marine mammals only as long as necessary to perform its task, and then immediately remove it from the project site; in the unlikely event that a marine mammal becomes entangled, immediately notify the stranding coordinator at NOAA Fisheries so that a rescue effort can be initiated; have a trained marine mammal observer on board the cable-laying vessel to record any observations of marine mammals, especially ESA-listed species; vessel operators will maintain a distance of 100 m or greater and will travel at 10 knots or less when safety permits until animals are more than 500 m away. Abrupt changes in direction will be avoided; implement appropriate mitigation measures as required by USFWS, NOAA, or WDFW through consultations, including potential work windows (for example, no in-water work from March 2 through July 15 to protect migrating juvenile salmonids); during nighttime operations, the observer would use low-light binoculars for observations. During nighttime operations, observer would use low-light binoculars for observations. During cable laying operations, observations for a minimum of 10 min. would be made at least 4 times/hour. If any listed species are observed, the following procedures would apply: (1) If an individual/group of animals is observed at 1,000 yds from the cable-laying vessel, then behavior would be recorded and vessel operators would be notified. No change to cable-laying operations would be required. (2) If an individual/group of animals approaches the cable-laying vessel within 500 yds, the behavior of the animals would be recorded, the vessel operator would be notified, and preparations to reduce the speed of cable laying operations would begin. (3) If an individual/group of animals approaches the cable-laying vessel within 400 yds, the behavior of the animals would be recorded, the vessel operator would be notified, and cable-laying operations would be reduced to half speed. The operator would prepare to stop cable-laying operation if necessary. (4) If an individual/group of animals approaches the cable-laying vessel within 100 yds, the behavior of the animals would be recorded, the vessel operator would be notified, and cable-laying operations would cease until the individual/group of animals had moved beyond 100 yds of the vessel, then reduced-speed operations may be resumed

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NATURAL RESOURCES: ORGANISMS	Organisms: Water Column	Introduction of invasive species from construction vessels	Temporary impact of installation (on spawning fish, from entanglement with equipment or impact from prop wash); impact on electro-sensitive organisms; new habitat on/around non-submerged cables; disrupted breeding, migration and feeding during installation from vessel noise and light pollution; smothering from sediment disruption during the cable-laying process; increased nutrients available to filter feeders during construction activities; ingestion of pollutants stirred up during installation (biomagnification)		Cables have to be insulated (non-oil based) in order to minimize their electromagnetic fields; adhere to IMO regulations; monitor for marine mammals and turtles during installation and other marine activities; implement mitigation measures to minimize increased sedimentation and water pollution; vessel crews must report the sighting of any injured or dead sea turtles or marine mammals (even if death or injury is not related to project); deploy any item or material that has the potential for entangling marine mammals only as long as necessary to perform its task, and then immediately remove it from the project site; in the unlikely event that a marine mammal becomes entangled, immediately notify the stranding coordinator at NOAA Fisheries so that a rescue effort can be initiated; have a trained marine mammal observer on board the cable-laying vessel to record any observations of marine mammals, especially ESA-listed species; Vessel operators will maintain a distance of 100 m or greater and will travel at 10 knots or less when safety permits until animals are more than 500 m away. Abrupt changes in direction will be avoided; implement appropriate mitigation measures as required by USFWS, NOAA, and WDFW through consultations, including potential work windows (for example, no in-water work from March 2 through July 15 to protect migrating juvenile salmonids; during nighttime operations, the observer would use low-light binoculars for observations. During cable laying operations, observations for a minimum of 10 minutes would be made at least four times each hour. If any listed species are observed, the following procedures would be followed: (1) If an individual or group of animals is observed at 1,000 yards (915 m) from the cable-laying vessel, then behavior would be recorded and vessel operators would be notified. No change to cable-laying operations would be required. (2) If an individual or group of animals approaches the cable-laying vessel within 500 yards (457 m), the behavior of the animals would continue to be recorded, and the vessel operator would be notified and preparations to reduce the speed of cable laying operations would begin. (3) If an individual or group of animals approaches the cable-laying vessel within 400 yards (366 m), the behavior of the animals would continue to be recorded, the vessel operator would be notified, and cable-laying operations would be reduced to one-half speed. The operator would prepare to stop cable-laying operation if necessary. (4) If an individual or group of animals approaches the cable-laying vessel within 100 yards (91 m), the behavior of the animals would continue to be recorded, the vessel operator would be notified, and cable-laying operations would cease until the individual or group of animals had moved beyond 100 yards (91 m) of the vessel, then reduced-speed operations may be resumed
	Organisms: Benthic	Introduction of invasive species from construction vessels; impact on electro-sensitive organisms; new habitat on/near non-submerged cables	Ecological recovery of the disturbed seabed in the vicinity of offshore wind cables during construction would be rapid; disrupted breeding, migration and feeding during installation from construction vessel noise; smothering/crushing from sediment disruption during the cable-laying process; increased nutrients available to filter feeders because of installation activities; ingestion of pollutants stirred up during installation (biomagnification)		Cables have to be insulated (non-oil based) in order to minimize their electromagnetic fields; adhere to IMO regulations; implement mitigation measures to minimize increased sedimentation and water pollution; compensatory mitigation, if required, for the loss of Geoduck clams would be negotiated with the Department of Natural Resources (DNR) and the WDFW; mitigate loss of geoducks based on agreements with the DNR and WDFW; monitor beach within 100 feet of the route for concentrations of crab and urchins, under the supervision of a qualified biologist over a two-week period prior to installation for any work occurring between February and September. If survey identifies an unexpectedly high concentration of these priority species that would be directly impacted by the project, then determine additional mitigation requirements in consultation with WDFW; implement appropriate mitigation measures as required by USFWS, NOAA, and WDFW through consultations, including potential work windows (for example, no in-water work from March 2 through July 15 to protect migrating juvenile salmonids)

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USES	Commercial Fisheries	Gear entanglement	Animals may ingest pollutants stirred up during installation (biomagnification); vessel collisions (mostly limited to times of installation and repairs)		Contractors must implement procedures to reduce risk of vessel collision; vessels will increase watch when navigating in areas that are known to be used by fishermen and other vessels. If other vessels are observed within the near vicinity, the Project vessel will stop moving, make contact with the other vessel if possible, and wait until it has been confirmed that the course of both vessels will not result in collision or damage to equipment; while a ship is laying cable its maneuverability is restricted, as such it will display the day signals and lights of a hampered vessel to avoid collision with other vessels at sea; crews will watch for navigational hazards; coordinate construction with USCG who will issue a Local Notice to Mariners which identifies a safety precaution area around the working boat; all ships operating under a foreign registry must have a Pilot escort them into the area; vessels laying cable must identify themselves and follow all applicable navigation rules; no trawling within 200 m around submarine cables; fishing vessels must keep their implements or nets at a distance of at least 1 nautical mile from a vessel engaged in laying or repairing a cable or at least ¼ of a nautical mile from buoys intended to mark the position of a cable when being laid or when out of order
	Aquaculture	Physical occupation of space			
	Oil & Gas	Physical occupation of space (related to both structures and drilling)			
	Sand & Gravel Mining	Interference with extraction activities			No sand or gravel mining for the life of offshore wind turbine operations because of potential damage to cables; sand extraction is not permitted in a zone with a width of 500 meters around cables; no recovery of raw materials within an area of 200 m around submarine cables
	Cables	Interference with other cables; opportunity for co-location			
	Pipelines	Opportunity for co-location			
	Defense				
	Shipping	Conflict with development of new ports	Potential for vessel collisions (mostly limited to times of installation and repairs)	Cable route selected to avoid major shipping channels	Cable routes will be added to navigational charts; cables must be “armored” and buried in areas where anchoring or scouring might occur; contractors must implement procedures to reduce risk of vessel collision; vessels will increase watch when navigating in areas that are known to be used by fishermen and other vessels. If other vessels are observed within the near vicinity, the Project vessel will stop moving, make contact with the other vessel if possible, and wait until it has been confirmed that the course of both vessels will not result in collision or damage to equipment; while a ship is laying cable its maneuverability is restricted, as such it will display the day signals and lights of a hampered vessel to avoid collision with other vessels at sea; crews will watch for navigational hazards; coordinate construction with USCG who will issue a Local Notice to Mariners which identifies a safety precaution area around the working boat; all ships operating under a foreign registry must have a Pilot escort them into the area; vessels laying cable must identify themselves and follow all applicable navigation rules; if the cable were severed, the electricity would instantaneously turn-off; vessels must maintain a 1.15 mile separation from a vessel laying or repairing an undersea cable
	Anchorages	Anchors damaging cables; cables entangling anchors		Avoid siting cables in anchorages	Cables must be “armored” and buried in areas where anchoring or scouring might occur; bury the cable bundle deep enough to provide protection, up to 12 feet (3.6 m), in areas of soft soils and potential ship anchorage; if the cable is severed, whether due to a catastrophic natural event (earthquake) or human caused event (anchor), sensors in the system will stop the flow of electrical current in the cable; no anchoring within an area of 200 m around submarine cables

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USES	Ferry Routes		Vessel collisions (mostly limited to times of installation and repairs)		Crews will watch for navigational hazards; coordinate construction with USCG who will issue a Local Notice to Mariners which identifies a safety precaution area around the working boat; all ships operating under a foreign registry must have a Pilot escort them into the area; vessels laying cable must identify themselves and follow all applicable navigation rules; vessels must maintain a 1.15 mile separation from a vessel laying or repairing an undersea cable
	Onshore Transportation		Increased traffic from construction vehicles during installation		
	Civil Aviation				
RENEWABLE ENERGY	Wind	Will likely involve cables as part of any project			
	Tidal	Will likely involve cables as part of any project			
	Wave	Will likely involve cables as part of any project			
CULTURE/RECREATION	Sites of Archeological Significance	Cables may harm archeologically significant sites		Cables should be re-routed around shipwrecks and important archeological sites	A remote-sensing survey should be conducted along the cable's route to detect and document any archeological resources; if a site cannot be avoided, additional work must be done to evaluate the significance of the resource (against NRHP/CRHR significance criteria). If sites meet significance criteria, Data Recovery may be required; identify and locate any potential historic resources along marine cable corridor using existing sonar data, if adequate, or gather additional data, if necessary; develop an Inadvertent Discovery Plan that details crew member responsibilities for reporting in the event of a discovery during marine cable installation
	Traditional Rights				
	Views		Vessels visible from certain locations during installation and repairs; an attraction for those who want to view the boats and equipment used during installation		
	Recreation	Non-submerged cables can interfere with boating; fishing gear entanglement	Animals can ingest pollutants stirred up during installation (biomagnification); vessel collisions (mostly limited to times of installation and repairs)		Cable routes will be added to navigational charts; cables must be “armored” and buried in areas where anchoring or scouring might occur; contractors must implement procedures to reduce risk of vessel collision; vessels will increase watch when navigating in areas that are known to be used by fishermen and other vessels. If other vessels are observed within the near vicinity, the Project vessel will stop moving, make contact with the other vessel if possible, and wait until it has been confirmed that the course of both vessels will not result in collision or damage to equipment; while a ship is laying cable its maneuverability is restricted, as such it will display the day signals and lights of a hampered vessel to avoid collision with other vessels at sea; crews will watch for navigational hazards; coordinate construction with USCG who will issue a Local Notice to Mariners which identifies a safety precaution area around the working boat; all ships operating under a foreign registry must have a San Francisco Bar Pilot escort them into the Bay; vessels laying cable must identify themselves and follow all applicable navigation rules; vessels must maintain a 1.15 mile separation from a vessel laying or repairing an undersea cable

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SOCIO-ECONOMIC	Jobs		Create new job opportunities in the community; temporarily displace fishing operations		
	Onshore Spending		New onshore spending during construction		
	Tourism	Loss of tourists who would have come to dive on any shipwrecks discovered and destroyed by installation			Identify and locate any potential historic resources along marine cable corridor using existing sonar data, if adequate, or gather additional data, if necessary

UMass Boston Planning Team, May 2009. This table presents information from a number of international projects. This table should only be used as an initial guide. Additional research would be necessary to identify actual spatial and temporal considerations, standards, conditions, compensations, and mitigation measures for a specific project. This document does not represent positions or conclusions of the preparers, MOP, or EEA.

In addition to the information contained in this table, there are some fundamental conditions to consider when siting an offshore wind project. They include:

- Appropriate water depths, substrate, and wind speeds for the technology being used
- Adequate proximity to land-based electrical connections
- Consistent with applicable planning goals and objectives

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NATURAL RESOURCES: HABITAT	Habitat: Air	Physical occupation of space (collision, creation of barrier); air turbidity; new roosting habitat; noise	Temporary localized air quality impacts from vessels during construction; may improve air quality over the course of time; spatial impacts may be more significant during times of migration, feeding, and construction	Wind farms not allowed in any special areas of conservation/protection	Install lighting systems to minimize attraction while meeting aviation standards; secure air quality offsets for construction emission impacts; vessels must be maintained to ensure efficient use of fuel; a waste management plan must be in place prior to construction; monitor noise; conduct a multi-year analysis of avian use (before, during, and after construction), including species-specific uses and population; adhere to specific construction methods to minimize environmental impact; time construction to avoid migrations and breeding; avoid population-level impacts
	Habitat: Surface	Physical occupation of space from turbines and construction equipment (collision, creation of barrier); vibrations; noise; contamination from anti-fouling paint, vessels, and equipment	Spatial impacts may be more significant during times of spawning, migration, feeding, and construction	Wind farms not allowed in any special areas of conservation/protection	All oil filled equipment is fully bundled to ensure no spillage in the event of a leak or puncture in any vessels or the offshore substation; a waste management plan must be in place prior to construction; monitor the impacts of vibrations; minimize risks through the application of best management practices for construction and operation; include seasonal restrictions on construction as needed
	Habitat: Water Column	Physical occupation of space (creation of barrier); vibrations; contamination from anti-fouling paint, vessels, and equipment; electromagnetic field; noise (during construction and operation); turbidity; creation of artificial reef; create new habitat type; attract feeding species	Spatial impacts may be more significant during times of spawning, migration, feeding, and construction	Wind farms not allowed in any special areas of conservation/protection	Insulate cables to reduce impact of magnetic field; a waste management plan must be in place prior to construction; all oil filled equipment is fully bundled to ensure no spillage in the event of a leak or puncture in any vessels or the offshore substation; power cables would use an alternative non-oil based solid insulator; TBT based anti-fouling paints would not be used on the submerged surfaces of foundations -- instead, barnacles and mussels attached to the foundation would be removed by scraping if necessary; adhere to specific construction methods (such as soft-start pile driving, bubble curtains, or other noise-dampening procedures during pile driving) to minimize environmental impact; monitor sedimentary and hydrological processes, electromagnetic fields, noise, vibrations, suspended sediment concentrations, contaminants, and currents; include seasonal restrictions on construction as needed; to prevent corrosion, sacrificial aluminum based anodes may be placed on foundations. These are designed to slowly break down and would release aluminum gradually into the water

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NATURAL RESOURCES: HABITAT	Habitat: Benthic	Physical occupation of space (creation of barrier); disruption of sediment transport; loss of habitat from scouring; vibrations; turbidity; noise; contamination from anti-fouling paint vessels, and equipment; electromagnetic field; potential to create new habitat type	Spatial impacts may be more significant during times of spawning, migration, feeding, and construction	Wind farms not allowed in any special areas of conservation/protection; cables allowed in special areas of conservation/protection	All oil filled equipment is fully bundled to ensure no spillage in the event of a leak or puncture in any vessels or the offshore substation; power cables use an alternative non-oil based solid insulator; adhere to specific construction methods to minimize environmental impact; a waste management plan must be in place prior to construction; armor and bury cables in those areas where anchoring or scouring might occur; insulate cables to reduce impact of magnetic field; monitor sedimentary and hydrological processes, benthic ecology, electromagnetic fields, noise, vibrations, suspended sediment concentrations, and contaminants; include seasonal restrictions as needed
NATURAL RESOURCES: ORGANISMS	Organisms: Air	Increased mortality (collision); displacement from area; attracting birds, bats, etc. with the lights; new roosting opportunities; new food sources	Spatial impacts may be more significant during times of migration, feeding, and construction	Wind farms not allowed in any special areas of conservation/protection	Install lighting system to minimize attraction while meeting aviation standards; consider cumulative impacts on birds; adhere to specific construction methods to minimize environmental impact; conduct a multi-year analysis of avian use (before, during, and after construction), including species-specific uses and population; time construction to avoid migrations and breeding; avoid population-level impacts
	Organisms: Surface	Displacement from area; new feeding opportunities; change in species composition	Spatial impacts may be more significant during times of spawning, migration, feeding, and construction	Wind farms not allowed in any special areas of conservation/protection	All oil filled equipment will be fully bundled to ensure no spillage in the event of a leak or puncture in any vessels or the offshore substation; adhere to specific construction methods to minimize environmental impact, including seasonal restrictions as necessary; a waste management plan must be in place prior to construction
	Organisms: Water Column	Increased biodiversity and number of organisms (because of new reef habitat); loss of organisms during construction or in the event of contamination; disruption of behavior because of electromagnetic field, noise, and/or vibrations	Spatial impacts may be more significant during times of spawning, migration, feeding, and construction	Wind farms not allowed in any special areas of conservation/protection	All oil filled equipment would be fully bundled to ensure no spillage in the event of a leak or puncture in any vessels or the offshore substation; Power cables would use an alternative non-oil based solid insulator; TBT based anti-fouling paints would not be used on the submerged surfaces of foundations. Instead, barnacles and mussels attached to the foundation would be removed by scraping if necessary; Adhere to specific construction methods to minimize environmental impact; A waste management plan must be in place prior to construction; Insulate cables to reduce impact of magnetic field; Monitor fish and cetaceans, including cumulative impacts; Construction timed for when juvenile fish are not present
	Organisms: Benthic	New habitat may increase biodiversity and number of organisms; loss of organisms during construction or in the event of contamination; disruption of behavior from electromagnetic field; serve as artificial reef	Spatial impacts may be more significant during times of spawning, migration, feeding, and construction	Wind farms not allowed in any special areas of conservation/protection	All oil filled equipment will be fully bundled to ensure no spillage in the event of a leak or puncture in any vessels or the offshore substation; power cables will use an alternative non-oil based solid insulator; adhere to specific construction methods to minimize environmental impact, including seasonal restrictions on construction as needed; a waste management plan must be in place prior to construction; insulate cables to reduce impact of magnetic field; monitor benthic ecology

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USES	Commercial Fisheries	Physical occupation of space; entanglement of gear; exclusion of certain types of fishing gear; potential exclusion of all fishing; potential increase in species diversity and/or number of fish; potential increase of commercially important species due to refugia (restrictions on fishing effort)	Impacts may be greatest during fishing seasons	Avoid siting farm in most important fishery grounds for key species	Scour protection must not obstruct fishing gear; to the extent possible, all construction boat traffic must use existing shipping routes; maintain open dialogue with fishermen (during planning, construction, and operation) to determine the safe operating practices required within the site, and to minimize conflicts; local fishermen can continue placing pots for whelk during the operational period; provide appropriate financial compensation for lost effort; trawling and anchoring not allowed in wind farm; unauthorized vessels may not approach within 35 meters of a turbine, or tie up to any part of the structure; vessels of sufficiently small draft for the waters over the sand bank are free to pass through the wind farm, avoiding the 35m exclusion zone; boating (of any kind) is prohibited in all of the country's wind farms; leisure and fishing craft can move through the wind park during the operational period
	Aquaculture	Potential for accommodating aquaculture activities			
	Oil & Gas	Physical occupation of space		Not allowed in gas fields (existing or proposed); Wind and oil and gas may co-exist and benefit from shared infrastructure	
	Sand & Gravel Mining	Physical occupation of space		Offshore wind not allowed in existing sand and gravel extraction sites; extraction generally not permitted beyond 12 miles from the coast, as this area has been set aside for wind farms. Wind farms will always take priority seaward of the 12 mile zone; sand extraction is not allowed in a zone with a width of 500 meters around offshore platforms, wind turbines, cables and pipelines	Coordinate siting with identification of sand and gravel resources
	Pipelines & Cables	Physical occupation of space		Cannot interfere with existing or approved pipelines and cables; avoid existing pipelines and cables unless opportunities for co-use exist	
	Defense	Physical occupation of space		Cannot interfere with defense activities	

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USES	Shipping	Physical occupation of space (collision risks); interference with radar		Cannot be located in shipping lanes or navigational channels	Appropriate navigation aids must be used during and after construction to maximize safety in the area; painting scheme must maximize safety but minimize visual impact; to the extent possible, all construction boat traffic must use existing shipping routes; implement mariner education and explore technology upgrades to mitigate some radar issues; unauthorized vessels may not approach within 35 meters of a turbine, or tie up to any part of the structure; vessels of sufficiently small draft for the waters over the sand bank would be free to pass through the wind farm, avoiding the 35m exclusion zone; anchoring in the wind farm is prohibited; boating of any kind is prohibited in all of the country's wind farms
	Anchorages	Physical occupation of space (collision risks); interference with radar		Cannot be located in shipping lanes or navigational channels	Appropriate navigation aids must be used during and after construction to maximize safety in the area; painting scheme must maximize safety but minimize visual impact; armor and bury cables in those areas where anchoring or scouring might occur; implement mariner education and explore technology upgrades to mitigate some radar issues; unauthorized vessels may not approach within 35 meters of a turbine, or tie up to any part of the structure; vessels of sufficiently small draft for the waters over the sand bank would be free to pass through the wind farm, avoiding the 35m exclusion zone; anchoring in the wind farm is prohibited; boating of any kind is prohibited in all of the country's wind farms
	Ferry Routes	Physical occupation of space (collision risks); interference with radar		Cannot be located in a ferry route; cannot be located in shipping lanes or navigational channels	Appropriate navigation aids must be used during and after construction to maximize safety in the area; painting scheme must maximize safety but minimize visual impact; implement mariner education and explore technology upgrades to mitigate some radar issues; unauthorized vessels may not approach within 35 meters of a turbine, or tie up to any part of the structure; vessels of sufficiently small draft for the waters over the sand bank would be free to pass through the wind farm, avoiding the 35m exclusion zone; anchoring in the wind farm is prohibited; boating of any kind is prohibited in all of the country's wind farms
	Onshore Transportation	Increased road and rail traffic; congestion			
	Civil Aviation	Physical occupation of space (collision risks); potential interference with radar		Sites cannot interfere with air navigation (military and/or civilian)	Appropriate navigation aids must be used during and after construction to maximize safety in the area; painting scheme must maximize safety but minimize visual impact; implement aviator education and explore technology upgrades to mitigate some radar issues
RENEWABLE ENERGY	Wind	Physical occupation of space – cannot be co-located		Must not occupy the same space as other approved offshore wind projects	An education center must be created to teach about the benefits of wind energy
	Tidal	Potential for co-location			
	Wave	Potential for co-location			
CULTURE/ RECREATION	Sites of Archeological Significance	Damage to shipwreck/significant site		Must avoid known shipwrecks and important sites; a 100m exclusion zone is required around known wrecks; avoid potentially significant sites	

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CULTURE/RECREATION	Traditional Rights	Impairment of various traditional rights			Involve First Nations in planning process
	Views	Loss of sense of place		Avoid areas of outstanding natural beauty; site a set distance off shore to avoid visual impacts	Painting scheme must maximize safety but minimize visual impact; orientate project so that its most narrow edge faced shore, minimizing the visual impacts when seen from land
	Recreation	Physical occupation of space; entanglement of gear; collision risk; visual impact to onshore recreation; water quality and clarity; exclusion zones; increase diversity of species and/or number of fish; interference with radar	Impacts may be greatest during fishing and boating seasons	Identify and avoid highest-use recreational areas	Scour protection must not obstruct fishing gear; appropriate navigation aids must be used during and after construction to maximize safety in the area; not allowed to create exclusion zones preventing sailing within wind farm site; leisure and fishing craft can move through the wind park during operational period; painting scheme must maximize safety but minimize visual impact; all oil filled equipment would be fully bundled to ensure no spillage in the event of a leak or puncture in any vessels or the offshore substation; to the extent possible, all construction boat traffic must use existing shipping routes; local fishermen can continue placing pots for whelk during the operational period; unauthorized vessels may not approach within 35 meters of the turbine, or tie up to any part of the structure; vessels of sufficiently small draft for the waters over the sand bank would be free to pass through the wind farm, avoiding the 35m exclusion zone; trawling and anchoring prohibited in wind farm; boating of any kind is prohibited in the wind farm; leisure and fishing craft can move through the wind park during the operational period
SOCIO-ECONOMIC	Jobs	Job creation (construction and operation); opportunity to become leading location for turbine construction			
	Onshore Spending	Increased visits; impact of new workforce			
	Tourism	Increased (or decreased) visits			

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- The use of appropriate materials for depth and material being transported
- Appropriate substrate to support construction and operation
- Consistency with applicable planning goals and objectives

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: HABITAT	Habitat: Air		Minor air pollution impacts expected from vessels during construction	Avoid crossing areas designated as “protected” or “environmentally sensitive”	Supervisor (Director of OEP) can change conditions of FERC's Order, add new measures (including stopping work), and other measures to assure compliance and avoid/mitigate environmental impact; conduct construction outside of the ozone protection period (which runs from May 15 - September 15)
	Habitat: Surface	Gas contamination from seepage or rupture		Avoid crossing areas designated as “protected” or “environmentally sensitive”	Supervisor (Director of OEP) can change conditions of FERC's Order, add new measures (including stopping work), and other measures to assure compliance and avoid/mitigate environmental impact
	Habitat: Water Column	Gas contamination from seepage or rupture; change in water flows	Increased pollution during construction and pre-construction; contaminated sediment suspended in water column; running into pockets of gas	Avoid crossing areas designated as “protected” or “environmentally sensitive”	Clear sediment, mud, and construction refuse post-construction to restore natural flow regime; conduct geotechnical investigations and analyses prior to construction in order to determine any design features or mitigation measures to avoid leaks from earthquakes or soil liquefaction; use non-toxic anti-fouling products; employ BMPs to reduce pollution from spills; monitor water quality; supervisor (Director of OEP) can change conditions of FERC's Order, add new measures (including stopping work), and other measures to assure compliance and avoid/mitigate environmental impact
	Habitat: Benthic	Habitat created by new pipes; accelerated erosion; gas contamination from seepage or rupture	Change in slope runoff dynamics during construction; increased turbidity during construction and pre construction; contaminated sediment disturbed; habitat loss due to reduced sunlight during periods of high water turbidity; minor pollution from release of metal particles from anti-corrosion nodes; temporary habitat loss due to anchors, pipe-laying, and other activities; physical alteration of the seabed; running into pockets of gas	Avoid crossing areas designated as “protected” or “environmentally sensitive”	Clear sediment, mud, and construction refuse post-construction to restore natural flow regime; depth of pipe burial is determined by taking into account the possibility of movement in the sea bed and the requirements of future dredging works; conduct geotechnical investigations and analyses prior to construction in order to determine any design features or mitigation measures to avoid leaks from earthquakes or soil liquefaction; use mid-line buoys on anchor cables or use a dynamically positioned lay barge to reduce anchor cable sweep; develop and file plans to backfill and monitor trenched area prior to construction; employ BMPs and monitoring to minimize scouring; supervisor (Director of OEP) can change conditions of FERC's Order, add new measures (including stopping work), and other measures to assure compliance and avoid/mitigate environmental impact; use native type of sediment (e.g. sandy instead of rocky) to backfill trenches in order to reduce likelihood of providing new habitat for colonization by invasive species

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: ORGANISMS	Organisms: Air		Munitions clearing can impact birds; turbidity can impact diving birds' feeding	Avoid crossing areas designated as "protected" or "environmentally sensitive"	Conduct studies to identify possible munitions and follow BMP to deal with them; supervisor (Director of OEP) can change conditions of FERC's Order, add new measures (including stopping work), and other measures to assure compliance and avoid/mitigate environmental impact; develop and implement lighting plan to reduce impacts on avian species, marine mammals, and fish; use monitors during construction to identify listed species; avoid listed species and marine mammals during construction; identify appropriate mitigation measures as they relate to harassment thresholds for construction activities and noise
	Organisms: Surface	Gas contamination from seepage or rupture	Munitions clearing would impact animals throughout the water column; increased construction noise may harm fish and marine mammals	Avoid crossing areas designated as "protected" or "environmentally sensitive"	Conduct studies to identify possible munitions and follow BMP to deal with them; avoid the use of high-speed vessels during construction; use monitors during construction to identify listed species; avoid listed species and marine mammals during construction (develop a vessel strike avoidance plan); supervisor (Director of OEP) can change conditions of FERC's Order, add new measures (including stopping work), and other measures to assure compliance and avoid/mitigate environmental impact; develop and implement lighting plan to reduce impacts on avian species, marine mammals, and fish; identify appropriate mitigation measures as they relate to harassment thresholds for construction activities and noise
	Organisms: Water Column	Gas contamination from seepage or rupture; increase in biomass (of macrozoobenthos for example) from gas in water; impact to EFH and EFH-managed species	Increased noise may harm fish and marine mammals; increased vibrations may harm fish and marine mammals; noise from gas moving through pipe might require an adjustment phase; munitions clearing in some sites could cause tissue damage to some fish	Avoid crossing areas designated as "protected" or "environmentally sensitive"	Conduct studies to identify possible munitions and follow BMP to deal with them; time construction to avoid harming sea turtles; use monitors during construction to identify listed species; avoid listed species and marine mammals during construction (develop a vessel strike avoidance plan); supervisor (Director of OEP) can change conditions of FERC's Order, add new measures (including stopping work), and other measures to assure compliance and avoid/mitigate environmental impact; identify appropriate mitigation measures as they relate to harassment thresholds for construction activities and noise; develop and implement lighting plan to reduce impacts on avian species, marine mammals, and fish
	Organisms: Benthic	Gas contamination from seepage or rupture; increase in biomass (of macrozoobenthos for example) from gas in water; impact to EFH and EFH-managed species	Increased noise may harm fish and marine mammals; smothering from construction activities; loss due to reduced sunlight during periods of high water turbidity; munitions clearing would impact animals throughout the water column	Avoid crossing areas designated as "protected" or "environmentally sensitive"	Conduct studies to identify possible munitions and follow BMP to deal with them; use mid-line buoys on anchor cables or use a dynamically positioned lay barge to reduce anchor cable sweep; use native type of sediment (e.g. sandy instead of rocky) to backfill trenches in order to reduce likelihood of providing new habitat for colonization by invasive species; supervisor (Director of OEP) can change conditions of FERC's Order, add new measures (including stopping work), and other measures to assure compliance and avoid/mitigate environmental impact; use 3 inch steel-reinforced concrete around pipeline to reduce impacts from anchor strikes

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
USES	Commercial Fisheries	Displacement of fishing activities within exclusion zone around pipeline; damage to fishing gear	Displacement of fishing activity and navigation of fishing vessels during construction and munitions clearing; increased vessel traffic during construction could increase congestion on the water; the use of exclusion zones around construction/maintenance vessels may increase congestion on the water; impacts may be greatest during certain fishing seasons	Site route to minimize impact to commercial fisheries	Monitor to determine impact of pipelines on presence (either increased or decreased) of fish; mitigation measures may be arranged with displaced fishermen; add pipeline to navigational charts; vessels prohibited from anchoring along pipeline corridor; pipe buried to avoid anchor strikes; consider a thicker pipe wall, thicker concrete coating, rock armor, or concrete slabs to protect against harm from anchoring; prior to construction, complete final compensation agreements with commercial fishermen impacted by the safety and security zones; a mechanism will be developed to compensate fishermen for gear damaged as a result of the pipeline and related LNG project
	Aquaculture				
	Oil & Gas	Will likely be co-located			
	Sand & Gravel Mining				Depth of pipe burial is determined by taking into account the possibility of movement in the sea bed and the requirements of future dredging works; sand extraction is not permitted in a zone with a width of 500 meters around pipelines
	Cables	May damage existing utilities; may be co-located		Site route to minimize impact to existing cables	In consultation with utility companies having submarine pipes or cables, develop site-specific construction plans to avoid impacts to those utilities
	Pipelines	May damage existing utilities; may be co-located		Site route to minimize impact to existing pipes	In consultation with utility companies having submarine pipes or cables, develop site-specific construction plans to avoid impacts to those utilities
	Defense			Site route to minimize impact to military activities; site route to avoid old munitions dumping sites	
	Shipping	Displacement of shipping activities within exclusion zone around pipeline	Displacement of shipping activities during construction and munitions clearing; increased vessel traffic during construction could increase congestion on the water; the use of exclusion zones around construction/maintenance vessels may increase congestion on the water	Site route to minimize impact to shipping	Add pipeline to navigational charts; vessels prohibited from anchoring along pipeline corridor; pipe buried to avoid anchor strikes; consider a thicker pipe wall, thicker concrete coating, rock armor, or concrete slabs to protect against harm from anchoring; 3 inch steel-reinforced concrete around pipeline to reduce impacts from anchor strikes
	Anchorages	Anchors may damage pipelines			Vessels prohibited from anchoring along pipeline corridor; pipe buried to avoid anchor strikes; consider a thicker pipe wall, thicker concrete coating, rock armor, or concrete slabs to protect against harm from anchoring; 3 inch steel-reinforced concrete around pipeline to reduce impacts from anchor strikes

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
USES	Ferry Routes		Increased vessel traffic during construction could increase congestion on the water; the use of exclusion zones around construction/maintenance vessels may increase congestion on the water		Add pipeline to navigational charts; consider a thicker pipe wall, thicker concrete coating, rock armor, or concrete slabs to protect against harm from anchoring
	Onshore Transportation		Transportation of construction materials may impact roadway congestion		Use rail transportation as much as possible to reduce impact to roadways/traffic patterns
	Civil Aviation				
RENEWABLE ENERGY	Wind			Site route to minimize impact to existing offshore wind projects	
	Tidal				
	Wave				
CULTURE/RECREATION	Sites of Archeological Significance	Significant and potentially significant sites may be damaged during construction		Site route to minimize impact to archeological resources	Conduct remote sensing surveys to detect archeological sites; use mid-line buoys on all anchor cables to reduce anchor cable sweep; significant and potentially significant sites will have a 100 ft. buffer around them
	Traditional Rights				
	Views		Vessels and equipment will have minor impacts on views during construction		
	Recreation		Increased vessel traffic during construction could increase congestion on the water; the use of exclusion zones around construction/maintenance vessels may increase congestion on the water; impacts may be greatest during fishing and boating seasons	3 inch steel-reinforced concrete around pipeline to reduce impacts from anchor strikes	Add pipeline to navigational charts; vessels prohibited from anchoring along pipeline corridor; pipe buried to avoid anchor strikes; consider a thicker pipe wall, thicker concrete coating, rock armor, or concrete slabs to protect against harm from anchoring
SOCIO-ECONOMIC	Jobs		Construction jobs would be created (and some maintenance jobs)		
	Onshore Spending				LNG pipe and terminal operator would either pay taxes or an annual fee to communities during the life of the project
	Tourism			Site route to minimize impact to tourism activities	

SAND AND GRAVEL SITING CONSIDERATIONS

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In addition to the information contained in this table, there are some fundamental conditions to consider when siting sand and gravel extraction projects. They include:
- Appropriate sediment type(s) and water depth
- Consistency with applicable planning goals and objectives.

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: HABITAT	Habitat: Air	May impact air quality	Lighting during mining may disrupt animal behavior; contamination from mining equipment	Mining areas should not be in natural parks or biological protected areas; mining only allowed in areas that were previously identified through an impact assessment; mining should not influence fragile ecosystems	Projects may be required to use environmentally friendly extraction technologies; lighting impacts during construction should be minimized through reduction, shielding, lowering and appropriate placement; from May-October lighting on barges operating 3 nmi from sea turtle nesting beaches must use the minimum lighting necessary to comply with USCG and OSHA requirements; habitat mapping may be required
	Habitat: Surface	Alterations to water circulation, current speeds, and normal water-level fluctuations	Lighting during mining may disrupt animal behavior; contamination from mining equipment	Mining areas should not be in natural parks or biological protected areas; mining only allowed in areas that were previously identified through an impact assessment; mining should not influence fragile ecosystems	Projects may be required to use environmentally friendly extraction technologies; lighting impacts during construction should be minimized through reduction, shielding, lowering and appropriate placement; from May-October lighting on barges operating 3 nmi from sea turtle nesting beaches must use the minimum lighting necessary to comply with USCG and OSHA requirements; habitat mapping may be required
	Habitat: Water Column	Alterations to water circulation, current speeds, and normal water-level fluctuations	Increased concentrations of suspended particulates/turbidity; impact on primary production; lighting during mining may disrupt animal behavior; contamination from mining equipment	Mining areas should not be in natural parks or biological protected areas; mining only allowed in areas that were previously identified through an impact assessment; mining should not influence fragile ecosystems	Special attention is given to turbidity plumes and their consequences for primary production, benthos, fish, and birds; license conditions may specify limits for spills; projects may be required to use environmentally friendly extraction technologies; lighting impacts during construction should be minimized through reduction, shielding, lowering and appropriate placement; take necessary precautions to prevent discharge of oil and hazardous materials; from May-October lighting on barges operating 3 nmi from sea turtle nesting beaches must use the minimum lighting necessary to comply with USCG and OSHA requirements; habitat mapping may be required

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: HABITAT	Habitat: Benthic	Substrate impacts (including deposition outside the extraction area, sediment transport); impairment or destruction of habitat; recolonization of fauna; removal of contaminated sediment	Increased concentrations of suspended particulates/turbidity	Mining areas should not be in natural parks or biological protected areas; mining only allowed in areas that were previously identified through an impact assessment; mining should not influence fragile ecosystems; deep sand extraction is only allowable further than 2 kilometers out past the 20 meter isobaths; projects at least 3 nautical miles from shore, grassland, or phanerogamae; buffer areas (400 or 600 feet wide) should be placed around all hard-bottomed areas located within/near borrow areas, and no excavation or mooring should be allowed in these areas	If extraction volume exceeds 10 million meters cubed, or an extraction area exceeds 500 hectares, an environmental impact assessment is required; an ecological study is required when the intended extraction depth exceeds 2 meters; standard sand extraction permits (for extraction down to depths of 2 meters) are issued on the basis of a generic environmental impact report; knowledge of physical and ecological response of the sand pits is needed to assess their environmental impact; projects may be required to use environmentally friendly extraction technologies; coastal supplementation, carried out under the Flood Defense Act, does not need a permit; environmental assessment report is required, often concentrating on the production of turbid plumes and deposition of sand or finer-grained sediment on the seabed outside the extraction area. Includes a description of existing environment and of impacts of proposed dredging compared with alternatives; monitoring of mining pits, nearby beaches, nearshore reefs, and hard bottom areas; typical aspects investigated as part of an environmental impact assessment include: spill and spreading of fine sediment during dredging, extension and thickness of deposition area, impact on marine flora and fauna, and description of existing environmental conditions and of the impacts of proposed dredging; monitoring is required every five years; mining typically allowed to depth of 3m; significant impacts to essential fish habitat may result in requiring compensatory mitigation; habitat mapping may be required
NATURAL RESOURCES: ORGANISMS	Organisms: Air		Impact to transient and resident birds in the sand extraction site; lighting during mining may disrupt animal behavior	Mining only allowed in areas that were previously identified through an impact assessment	Projects may be required to use environmentally friendly extraction technologies

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NATURAL RESOURCES: ORGANISMS	Organisms: Surface	Incidental take of organisms	Disruption of spawning, feeding, and migratory areas; lighting during mining may disrupt animal behavior	Mining areas should not be in natural parks or biological protected areas; mining only allowed in areas that were previously identified through an impact assessment	Projects may be required to use environmentally friendly extraction technologies; projects may not exceed the authorized incidental take limits on endangered and threatened species established by NOAA's SE Regional Office Protected Resource Division's Regional Biological Opinion, and formal consultation is required when 75% of the authorized incidental take level is reached; incidental takes must be reported; monitors must be used when in areas where, and during seasons in which sea turtles are present; a specified % of the dredged material must be screened and observed for beach nourishment activities during the sea turtle season; hopper dredges must be equipped with sea turtle deflecting dragheads during months where sea turtles are present; use BMPs to prevent injury to turtles; dredging within right whale critical habitat from December-March must follow the protocol established within the Early Warning System; whale observers must be on board to conduct daytime observations between December and March; during daylight, operators must take steps to avoid whales; during evening hours or other times of limited visibility (fog, sea conditions), the dredge must be slowed to 5 knots or less when transiting between areas if whales have been spotted within 15 nm of the vessel's path within the previous 24 hours; lighting impacts during construction should be minimized through reduction, shielding, lowering and appropriate placement; from May-October lighting on barges operating 3 nmi from sea turtle nesting beaches must use the minimum lighting necessary to comply with USCG and OSHA requirements; species monitoring may be required

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
NATURAL RESOURCES: ORGANISMS	Organisms: Water Column	Incidental take of organisms	Disruption of spawning, feeding, and migratory areas; lighting during mining may disrupt animal behavior	Mining areas should not be in natural parks or biological protected areas; mining only allowed in areas that were previously identified through an impact assessment	Projects may be required to use environmentally friendly extraction technologies; projects may not exceed the authorized incidental take limits on endangered and threatened species established by NOAA's SE Regional Office Protected Resource Division's Regional Biological Opinion, and formal consultation is required when 75% of the authorized incidental take level is reached; incidental takes must be reported; monitors must be used when in areas where, and during seasons in which sea turtles are present; a specified % of the dredged material must be screened and observed for beach nourishment activities during the sea turtle season; hopper dredges must be equipped with sea turtle deflecting dragheads during months where sea turtles are present; use BMPs to prevent injury to turtles; dredging within right whale critical habitat from December-March must follow the protocol established within the Early Warning System; whale observers must be on board to conduct daytime observations between December and March; during daylight, operators must take steps to avoid whales; during evening hours or other times of limited visibility (fog, sea conditions), the dredge must be slowed to 5 knots or less when transiting between areas if whales have been spotted within 15 nm of the vessel's path within the previous 24 hours; flexible graduated screens should be used; relocation trawling guidelines should be followed; lighting impacts during construction should be minimized through reduction, shielding, lowering and appropriate placement; from May-October lighting on barges operating 3 nmi from sea turtle nesting beaches must use the minimum lighting necessary to comply with USCG and OSHA requirements; species monitoring may be required
	Organisms: Benthic	Excavation or otherwise directly killing species (crustaceans, mollusks, and other marine organisms); ability of fauna to recolonize	The effects of extraction on benthic communities were hard to detect after a number of years; disruption of spawning, feeding and migratory areas	Sand extraction is generally not permitted within areas that contain biodiversity of benthic communities or the presence of rare species; mining only allowed in areas that were previously identified through an impact assessment	Projects may be required to use environmentally friendly extraction technologies; screen sizes must be approved; flexible graduated screens should be used; species monitoring may be required
USES	Commercial Fisheries	Affect the suitability of commercial fishing grounds as a habitat; impact spawning; impact migration routes	Disruption of spawning, feeding, and migratory areas; risk of collision during extraction activities	Mining should not influence use of marine resources	License conditions may specify interactions with fishing activities
	Aquaculture				
	Oil & Gas			Sand extraction cannot happen within 500 meters of offshore platforms	A setback may be established

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
USES	Sand & Gravel Mining			Leases should avoid overlapping extraction sites; an area that has been mined once cannot be mined again	Conditions may specify methods to be used (e.g. trailing suction)
	Pipelines & Cables			Sand extraction cannot happen within 500 meters of pipelines and cables	A setback may be established
	Defense				
	Shipping	Dredging required to maintain channels	Risk of collision during extraction activities		May specify conditions on vessels to be used; not allowed to reduce navigation depth
	Anchorages	Damage to anchors	Physical occupation of space during extraction activities		
	Ferry Routes	Dredging required to maintain channels	Risk of collision during extraction activities		Not allowed to reduce navigation depth
	Onshore Transportation				
	Civil Aviation				
RENEWABLE ENERGY	Wind	Physical occupation of space; affect on substrate; erosion		Sand extraction is generally not permitted beyond 12 miles from the coast, as this area has been set aside for wind farms; wind farms will always take priority seaward of the 12 mile zone; sand extraction is not allowed in a zone with a width of 500 meters around offshore platforms, wind turbines, cables and pipelines	Offshore wind will not be developed in sand and gravel mining sites
	Tidal			Mining should not influence usage of marine resources	
	Wave			Mining should not influence usage of marine resources	
CULTURE/RECREATION	Sites of Archeological Significance			Mining areas (including mooring areas) should not be in archeological sites; bottom disturbing activities (including anchoring) should avoid cultural resources by a minimum distance of 200 feet; archaeological avoidance areas may be designated	Conduct surveys prior to mining to identify significant resources; if a site cannot be avoided, an in-depth investigation must be conducted and submitted to MMS; resources found while extraction is underway should be reported to MMS, and operations shall halt until MMS gives further instructions
	Traditional Rights			Mining should not influence usage of marine resources	
	Views				

		POTENTIAL SPATIAL CONSIDERATIONS (May be limited to the duration of the project)	POTENTIAL TEMPORAL CONSIDERATIONS (May be limited to the duration of the project)	EXAMPLES OF SITING STANDARDS	EXAMPLES OF COMPENSATION/MITIGATION/CONDITIONS
CULTURE/RECREATION	Recreation	Affect the suitability of commercial fishing grounds as a habitat; impact spawning; impact migration routes; alter the aesthetic value by impacting water quality, natural substrate; denial of access to resources or resource site because of changes in odor, air quality, or noise levels at the site; modify the educational, historical, recreational, and scientific qualities of the site; dredging required to maintain channels; beach nourishment from extracted materials	Disruption of spawning, feeding, and migratory areas	Mining areas should not be in natural parks or biological protected areas; mining should not influence usage of marine resources	The beach should not be affected from draw-down into the dredged area (no permanent trapping of sediments of beach into dredged area)
SOCIO-ECONOMIC	Jobs				
	Onshore Spending	Sediment transport; storm protection functions; beach nourishment from extracted materials		Based on the onshore/offshore movement of sand, minimum distance for sand mining is 600 meters from the shore; no dredging if an adjacent beach already suffers from erosion; dredging of banks adjacent to the coastline is not allowed, except in conditions of high accretion rates	The beach should not be affected from draw-down into the dredged area (no permanent trapping of sediments of beach into dredged area); the supply of sediments to the coastline should not be affected (requires an estimation of modified flow and wave patterns, of changes to sediment transport over seabed and hence to (coastal) morphology based on regional and local modeling and existing field data); any significant changes in wave refraction patterns altering nearshore waves and hence the alongshore transport of sediment should be avoided; any changes to tidal currents close to the coastline should be avoided; sand bars/banks: minimum depth based on special studies depending on location; conduct studies and monitoring of nearshore shingle bank dredged for beach recharge; conduct studies to ensure no damage/affect to sand bars/banks providing storm protection, no significant interference with nearshore transport process, no significant changes in nearshore wave climate, and no change in tidal currents, levels, and tidal prism; any bars/banks providing protection to the coast from wave attack should not be damaged/affected
	Tourism	Used for beach re-nourishment		No dredging if an adjacent beach already suffers from erosion	The beach should not be affected from draw-down into the dredged area (no permanent trapping of sediments of beach into dredged area)