5.5 Impacts Scoped In / Scoped Out

The following section presents the EIA scoping table, outlining key project parameters and potential impacts considered during the scoping process. The key project parameters detailed in Table 5.7 represent worst-case assumptions to ensure a conservative and robust evaluation. This approach allows for a comprehensive assessment of potential risks and impacts, providing confidence that actual outcomes are likely to be more favourable than those presented.

Table 5.7. Scoping assessment for commercial fisheries.

Impact Pathway	Key Project Parameters	Scoped In / Out	Justification
Construction			
Reduction in access to, or exclusion from, established fishing grounds.	**<u>Capital dredging of main harbour area</u>** • Dredging of the inner harbour, using a CSD and TSHD. • Dredging will take place approximately 800 m to 1,800 m inside the current harbour entrance. • Dredging to approximately 12.4 m below Chart Datum (mCD), with a small section in the east of the harbour to approximately -6 mCD. • Dredging of approximately 2,000,000 m^3 of sand and gravel. • Dredging will be between March and November inclusive. Estimated to take approximately 12 weeks. **<u>Potential dredging operations to the west of 'Tern Island'</u>** • Removal of 200-500 m^3 of sand.	Scoped In	Dredging operations within port limits may temporarily exclude fishers, particularly those using static gear from traditional grounds near the port approach, breakwaters, or mooring zones due to safety exclusion areas and active dredge footprint. While dredging is confined to the port, safety zones, vessel movements, or sediment plumes may extend beyond the port limits, temporarily restricting access to nearby fishing grounds outwith the limits.

Impact Pathway	Key Project Parameters	Scoped In / Out	Justification
	<u>Disposal of capital dredge material at Burghead</u> • Vessels transiting between the harbour and the disposal site.		
Displacement of fishing activity leading to gear conflict and increased fishing pressure on adjacent grounds.	**<u>Capital dredging of main harbour area</u>** • Dredging of the inner harbour, using a CSD and TSHD. • Dredging will take place approximately 800 m to 1,800 m inside the current harbour entrance. • Dredging to approximately 12.4 m below Chart Datum (mCD), with a small section in the east of the harbour to approximately -6 mCD. • Dredging of approximately 2,000,000 m^3 of sand and gravel. • Dredging will be between March and November inclusive. Estimated to take approximately 12 weeks. **<u>Potential dredging operations to the west of 'Tern Island'</u>** • Removal of 200-500 m^3 of sand. **<u>Disposal of capital dredge material at Burghead</u>** Vessels transiting between the harbour and the disposal site.	Scoped In	Fishers displaced from areas near the port entrance due to dredging related disturbance may relocate gear to nearby inshore areas, concentrating effort further afield, increasing competition and the risk of gear entanglement or gear conflict in neighbouring fishing grounds.
Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity.	**Installation of new quay wall and integration pocket** • All excavations and installation works will be carried out through the existing platform without any exposure to the marine environment.	Scoped In	Noise, turbidity, and sediment resuspension and dispersion from dredging may disrupt feeding, spawning, or sheltering behaviour of commercial fisheries target species, reducing catch rates and prompting temporary relocation of fishing effort.

Impact Pathway	Key Project Parameters	Scoped In / Out	Justification
	• Piling of the quay wall - Vibropiling or conventional sheet piling of the quay wall within the marine environment, followed by infilling behind this to level off the platform. **Removal of old sheet piles** • Excavation of sheet piles to at least below Mean High Water Springs (MHWS). • Removal of sheet piles using a vibratory piling rig and lay on platform. **Installation of mooring dolphins** • Installation of piles through combination of vibropiling and impact piling. • Installation is expected to take place over approximately 19 days with piling occurring for 12 days during that period. **Capital dredging of main harbour area** • Dredging of the inner harbour, using a CSD and TSHD. • Dredging will take place approximately 800 m to 1,800 m inside the current harbour entrance. • Dredging to approximately 12.4 m below Chart Datum (mCD), with a small section in the east of the harbour to approximately -6 mCD. • Dredging of approximately 2,000,000 m^3 of sand and gravel.		

Impact Pathway	Key Project Parameters	Scoped In / Out	Justification
	• Dredging will be between March and November inclusive. Estimated to take approximately 12 weeks. **<u>Potential dredging operations to the west of 'Tern Island'</u>** Removal of 200-500 m^3 of sand.		
Increased vessel traffic associated with the project within fishing grounds leading to interference with fishing activity.	**<u>Capital dredging of main harbour area</u>** • Dredging of the inner harbour, using a CSD and TSHD. • Dredging will take place approximately 800 m to 1,800 m inside the current harbour entrance. • Dredging to approximately 12.4 m below Chart Datum (mCD), with a small section in the east of the harbour to approximately -6 mCD. • Dredging of approximately 2,000,000 m^3 of sand and gravel. • Dredging will be between March and November inclusive. Estimated to take approximately 12 weeks. **<u>Potential dredging operations to the west of 'Tern Island'</u>** • Removal of 200-500 m^3 of sand. **<u>Disposal of capital dredge material at Burghead</u>** Vessels transiting between the harbour and the disposal site.	Scoped In	Dredgers, barges, and support vessels transiting between the port and offshore disposal sites may pass through active fishing grounds, interfering with gear deployment, hauling, or safe navigation.
Additional steaming to alternative fishing grounds	**<u>Capital dredging of main harbour area</u>** • Dredging of the inner harbour, using a CSD and TSHD. • Dredging will take place approximately 800 m to 1,800 m inside the current harbour entrance.	Scoped In	Fishers who typically operate close to the port entrance may need to travel further to avoid construction related disturbance, increasing fuel costs, reducing fishing time and impacting operational efficiency.

Impact Pathway	Key Project Parameters	Scoped In / Out	Justification
	• Dredging to approximately 12.4 m below Chart Datum (mCD), with a small section in the east of the harbour to approximately -6 mCD. • Dredging of approximately 2,000,000 m^3 of sand and gravel. • Dredging will be between March and November inclusive. Estimated to take approximately 12 weeks. **Potential dredging operations to the west of 'Tern Island'** • Removal of 200-500 m^3 of sand. **Disposal of capital dredge material at Burghead** Vessels transiting between the harbour and the disposal site.		
Temporary increases in SSC and sediment deposition from dredge spoil leading to disruption of fishing activity through smothering of target species and reduced catch rates.	No relevant project parameters have been identified for further assessment, as the potential impact has been scoped out.	Scoped Out	Potential impacts on commercial fisheries receptors from capital dredge spoil disposal have been scoped out of detailed assessment. Deposition is proposed at established, licensed marine disposal sites where operations are tightly regulated and environmentally modelled to avoid significant disruption to sensitive receptors.
Operations and Maintenance (O&M)			
Long-term exclusion from established fishing grounds.	No relevant project parameters have been identified for further assessment, as the potential impact has been scoped out.	Scoped Out	Long-term exclusion from established fishing grounds as a result of O&M activities has been scoped out of the assessment due to O&M related activities for Phase 2 having already been consented in 2019 during phase 1.

Impact Pathway	Key Project Parameters	Scoped In / Out	Justification
Displacement of fishing activity leading to gear conflict and increased fishing pressure on adjacent grounds.		Scoped Out	Displacement of fishing effort as a result of O&M activities has been scoped out of the assessment due to O&M related activities for Phase 2 having already been consented in 2019 during phase 1.
Interference with fishing activity from maintenance vessel traffic.		Scoped Out	Interference with fishing activity from maintenance vessel traffic has been scoped out of the assessment due to O&M related activities for Phase 2 having already been consented in 2019 during phase 1.
Alteration of fish and shellfish behaviour influencing species distribution, catch rates, or seasonal abundance patterns.		Scoped Out	Alteration of fish and shellfish behaviour influencing species distribution, catch rates, or seasonal abundance patterns has been scoped out of the assessment due to O&M related activities for Phase 2 having already been consented in 2019 during phase 1.
Reduced fishing efficiency and increased costs.		Scoped Out	Reduced fishing efficiency and increased costs as a result of O&M activities have been scoped out of the assessment due to O&M related activities for Phase 2 having already been consented in 2019 during phase 1.
Increased SSC and deposition from maintenance dredging.		Scoped Out	Maintenance dredging was considered within the 2018 EIA, and a separate application has been submitted to the Marine Directorate for a maintenance dredge licence for the main port approach.

6. Assessment

6.1.1 Construction

6.1.1.1 Reduction in access to, or exclusion from, established fishing grounds

VMS data (MMO, 2023a), ScotMap spatial data (ScotMap, 2025), fisheries landings statistics, and informal consultation with local fisheries stakeholders indicate that the area surrounding the port approach channel supports low to moderate levels of commercial fishing activity, as described in Section 4.2. Fishing activity outside the port limits is predominantly undertaken by inshore vessels deploying static gear, such as pots and creels, targeting whelk, brown crab, lobster, velvet crab, and *Nephrops*. To a lesser extent, demersal trawls are used to target *Nephrops*, squid, and other demersal species.

ScotMap data indicates very low levels of effort by small-scale or opportunistic inshore vessels deploying pots and creels within the port limits. However, through existing Harbour Powers a byelaw is being implemented that will prohibit fishing within the Statutory Harbour Area. Fishing activity in the region is therefore concentrated in adjacent coastal waters rather than within the operational port itself (Scottish Government, 2014; 2025). As a result, direct impacts from reduction in access to, or exclusion from, established fishing grounds within the proposed development footprint as a result of construction phase activities have not been considered further in this assessment.

Capital dredging activities are proposed within the port limits, spanning a corridor of approximately 800 m inshore from the seaward extent of the port boundary to 1,800 m toward the port facilities, to deepen the port basin and approach channel for larger vessel access. Sediment plumes generated during dredging may reduce visibility and create operational challenges for fishing gear deployment, indirectly discouraging fishing activity in adjacent areas. While spoil disposal is anticipated to occur at the licensed Burghead disposal site, located approximately 32 km from the proposed development, the combined effect of dredging and disposal operations may result in short-term displacement of fishing effort and reduced access to productive grounds within the vicinity of the port.

Magnitude of Impact

The dredging will deepen the harbour to 12.4 m below Chart Datum (CD), with an area in the east of the harbour dredged at between 3 and 6 metres m CD. These works will result in the removal of approximately 2,000,000 m^3 of sediment, which will be disposed of approximately 2 km offshore, near Burghead. The dredging is proposed to take place between March and November in either 2027, 2028, or 2029, with an approximate duration of 12 weeks. Given the location of the planned dredging works 800 m inside the port limits, and the prohibition of fishing activity within this area, temporary exclusion zones in relation to works undertaken by cutter suction dredgers (CSD) and/or trailer suction hopper dredgers (TSHD) outwith the port limits are not currently anticipated being required. NtMs will be issued to inform vessels of transit routes between the port and the Burghead disposal site, ensuring timely communication and helping to minimise navigational conflicts with other marine users, including fishing vessels. As such, the magnitude of potential exclusion-related impacts on commercial fisheries is considered **low**, given the limited spatial extent of the works, existing restrictions within the port, and the transient nature of vessel movements along the disposal route.

In the absence of sediment plume modelling, a tidal excursion distance of approximately 1.1 km near Riff Bank has been used as a proxy to estimate sediment transport from dredging activities. Given the coarse nature of the seabed, predominantly comprising sand and gravel with minimal silt, and the semi-diurnal tidal flows of the Moray Firth, sediment plumes are expected to be short-lived and largely contained within the port. As a result, any indirect spatial exclusion for inshore vessels using creels, trawls, or dredges is anticipated to be localised and temporary, with **low** overall magnitude.

Sensitivity of Receptor

The affected commercial fisheries receptors are locally important and may experience temporary disruption due to reduced access to, or exclusion from, established fishing grounds during dredging and disposal activities. However, given that the planned dredging works are located within the port limits where fishing is prohibited and any additional spatial restrictions are expected to be limited in extent and duration, vessel operators are likely to adapt with minimal impact. Furthermore, advance notice of works and the transient nature of vessel movements along the disposal route support the conclusion that affected commercial fisheries receptors have a **medium** sensitivity to this impact pathway.

Significance of Effect

The duration of dredging operations, and therefore associated sediment deposition, is expected to be short-term (approximately 12 weeks) and confined to the construction phase. Given the location of the planned dredging works 800 m inside the port limits where fishing activity is already prohibited and the limited spatial extent of potential exclusion, additional restrictions for vessels operating outside the port are not currently anticipated. Considering the medium sensitivity and adaptability of affected commercial fisheries, particularly inshore vessels capable of adjusting to temporary spatial restrictions, the potential impact from reduction in access to established fishing grounds is assessed as **minor adverse** and **not significant** in EIA terms.

Secondary Mitigation and Residual Effect

Embedded mitigation measures, including advance notification of dredging activities and disposal vessel transit routes via NtMs, are expected to reduce disruption to inshore fisheries operators. No further mitigation is considered necessary, as the likely effect in the absence of additional measures, beyond the embedded mitigation measures outlined in Error! Reference source not found., is not significant in EIA terms. The residual effect is therefore assessed as **minor adverse**.

6.1.1.2 Displacement of fishing activity leading to gear conflict and increased fishing pressure on adjacent grounds

The surrounding coastal waters of the Firth support a mix of fleet segments operating across overlapping grounds, particularly during seasonal peaks targeting whelk, brown crab, lobster, velvet crab, *Nephrops*, squid and other demersal species. Whilst the capital dredge footprint within the port limits is not a core fishing area, adjacent grounds are routinely used by multiple operators, often with differing gear types and operational fishing patterns, therefore the potential for spatial overlap and gear interaction is heightened in nearshore environments where fishing effort is concentrated and access to preferred grounds is constrained by physical, regulatory or operational limits. ScotMap data indicates very low levels of effort by small-scale or opportunistic inshore vessels deploying pots and creels within the harbour limits, however, through existing Harbour Powers a byelaw is being implemented that will prohibit fishing within the Statutory Harbour Area, therefore direct impacts from displacement have not been considered further in this assessment.

Magnitude of Impact

As discussed above, capital dredging is proposed within the port limits to deepen the basin and approach channel, spanning a corridor from 800 m offshore to 1,800 m inland, enabling access for larger vessels. Approximately 2,000,000 m³ of sediment will be removed and disposed of at a licensed site near Burghead, approximately 32 km from the proposed development. Works are scheduled between March and November in 2027, 2028, or 2029, lasting approximately 12 weeks, using cutter suction and trailer suction hopper dredgers, both of which are known to generate sediment plumes. These sediment plumes have the potential to displace fishing activity directly outside the port limits, resulting in short-term disruption to established patterns of activity, including gear deployment, retrieval, and seasonal targeting strategies. Temporary displacement from areas directly adjacent to the port boundary may result in the relocation of small-scale inshore vessels deploying pots and creels and demersal trawls into adjacent fishing grounds. This redistribution of effort has the potential to increase competition for space, particularly where static and mobile gear types co-exist outside the port boundary. Displaced vessels may be forced to operate in unfamiliar or less optimal grounds, increasing the risk of gear conflict, entanglement, or loss. Additionally, concentrated effort in neighbouring areas may elevate fishing pressure on target stocks, potentially affecting catch rates and economic returns.

In the absence of plume modelling, tidal excursion distances of up to 1.1 km have been used to estimate sediment transport, though most material is expected to settle within the port due to coarse seabed composition (predominantly sand and gravel, with only 2% silt). Tidal dynamics in the Moray Firth, driven by semi-diurnal cycles and coastal hydrodynamics, support efficient dispersion and rapid settling of suspended sediments. As a result, sediment plumes are anticipated to be short-lived and spatially confined. These results support the conclusion that while short-term turbidity increases are expected, the environmental footprint of the plume is spatially limited and temporally brief. Displacement is expected to be short-term and temporary in nature, occurring only during the active capital dredging phase (approximately 12 weeks). Therefore, the magnitude of displacement is considered **low**.

Sensitivity of Receptor

Static gear operators are particularly vulnerable to gear conflict when displaced into areas used by mobile gear fleets. The risk of entanglement or gear loss may increase when vessels operate in unfamiliar or suboptimal grounds. Additionally, concentrated fishing effort in neighbouring areas may elevate pressure on target stocks, potentially affecting catch rates and economic viability. However, local fleets are generally adaptable and have experience navigating temporary spatial constraints. This operational flexibility, combined with the short-term nature of the displacement, supports a conclusion of **medium** sensitivity for the affected commercial fisheries receptors.

Significance of Effect

Due to the limited spatial extent of dredging, short duration of works, rapid dispersion of sediment plumes, and the coarse nature of seabed material, any disruption to commercial fisheries is expected to be temporary and localised. The overall impact on commercial fisheries is assessed as **minor adverse** and **not significant** in EIA terms.

Secondary Mitigation and Residual Effect

Embedded mitigation measures aim to minimise disruption to fishing activity. These include advance notification of dredging operations and disposal vessel transit routes through issue of NtMs, . Such measures are expected to reduce the likelihood of gear interaction, facilitate operational planning, and support safe navigation and compliance. No further mitigation is considered necessary, as the likely effect in the absence of additional measures beyond the embedded measures outlined in **Error! Reference source not found.**, is not significant in EIA terms. The residual effect is therefore assessed as **minor adverse**.

6.1.1.3 Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity

The coastal waters surrounding the port approach channel support a broad range of commercially targeted shellfish and finfish species. These species are targeted by inshore vessels with seasonal peaks in effort aligned to biological cycles and market demand (MMO, 2023a). Benthic habitats in the area provide foraging and sheltering grounds, and while no designated spawning or nursery areas are located within the dredge footprint, adjacent habitats may support sensitive life stages (CNE-Siar, 2025). Species-specific responses to disturbance vary, but many shellfish are known to be sensitive to changes in turbidity, sedimentation, and underwater noise, particularly during moulting or reproductive periods (Jennings and Kaiser, 1998; Boyd *et al*., 2003). Disruption to these environmental conditions may influence species distribution, behaviour, and catchability, with implications for fishing activity and economic viability.

Between April and September, the inshore waters of the Moray Firth support several key seasonal fisheries. Brown crab and lobster are actively targeted during this period, with increased catchability linked to warmer water temperatures and seasonal moulting and mating behaviours (CNE-Siar, 2025). Whelk fishing also intensifies in spring and early summer, as favourable substrate conditions and water clarity improve catch rates (MMO, 2023a). The proposed capital dredging window March to November inclusive, for an approximate duration of 12 weeks overlaps directly with these seasonal fisheries, increasing the potential for disruption to active fishing operations and catch availability. These seasonal patterns are important for local fleet planning and should be considered when scheduling construction activities to minimise adverse effects. The proposed installation of a new quay wall and integration pocket involves vibropiling or conventional sheet piling within the marine environment, removal of existing sheet piles, and installation of mooring dolphins. While all excavations and installation works will be conducted from the existing platform without direct exposure to the marine environment, piling will be undertaken within the marine environment. The works are expected to span approximately 19 days, with active piling occurring over 12 days during this period. These activities have the potential to temporarily disturb commercially important fish and shellfish resources and disrupt local fishing operations.

Magnitude of Impact

As discussed above, capital dredging is proposed within the port limits to deepen the basin and approach channel, spanning a corridor from 800 m offshore to 1,800 m inland, enabling access for larger vessels. Approximately 2,000,000 m³ of sediment will be removed and disposed of at a licensed site near Burghead, approximately 32 km from the proposed development. Works are scheduled between March and November in 2027, 2028, or 2029, lasting approximately 12 weeks, using CSD's and TSHD's, both of which are known to generate sediment plumes. Capital dredging activities have the potential to disturb benthic habitats through the generation of sediment plumes that affect water clarity and substrate composition. These changes can alter the availability of foraging grounds, reduce visibility for predator-prey interactions, and trigger avoidance behaviour in target species. Consequently, this may lead to short-term displacement of stocks from traditional fishing grounds, reducing catch rates and driving relocation of effort.

In the absence of plume modelling, tidal excursion distances of up to 1.1 km have been used to estimate sediment transport, though most material is expected to settle within the port due to coarse seabed composition (predominantly sand and gravel, with only 2% silt). Tidal dynamics in the Moray Firth, driven by semi-diurnal cycles and coastal hydrodynamics, support efficient dispersion and rapid settling of suspended sediments. As a result, sediment plumes are anticipated to be short-lived, spatially confined and rapidly dispersed by tidal flushing. Underwater noise and vibration generated by vibropiling undertaken within the confines of the harbour may cause temporary displacement of fish and shellfish species from the immediate vicinity of the works. Species sensitive to acoustic disturbance, such as herring, cod, and crustaceans, may exhibit avoidance behaviour, potentially leading to short-term disruption of local fisheries. Removal of old sheet piles using vibratory rigs may also contribute to cumulative noise exposure, although these impacts are expected to be localised and short term in nature.

Excavation of sheet piles below Mean High Water Springs (MHWS) may result in minor sediment resuspension, which could affect benthic habitats and filter-feeding organisms, however, the spatial extent and duration of these activities are limited, and significant impacts on shellfish beds or nursery grounds are considered unlikely. The magnitude of biological disturbance to commercially important species resulting in displacement or disruption to inshore fisheries is considered **low**.

Sensitivity of Receptor

Mobile shellfish species, including those commercially targeted in the area, are generally tolerant of short-term increases in suspended sediment. These species inhabit dynamic coastal environments where turbidity levels naturally fluctuate and possess behavioural and physiological adaptations that allow them to withstand episodic sedimentation (Roberts *et al*., 2010; Boyd *et al*., 2021). While elevated sediment may temporarily affect foraging or burrow ventilation for *Nephrops*, these effects are reversible, and individuals typically return to affected grounds once conditions stabilise (Royal HaskoningDHV, 2024). The mobility of crustaceans and gastropods also enables them to avoid areas of peak turbidity, reducing the likelihood of long-term displacement or population-level impacts (JNCC, 2011). The marine environment adjacent to the works supports a range of commercially important fish and shellfish species, some of which may be sensitive to acoustic disturbance. Local fisheries, particularly small-scale and inshore operators, may be vulnerable to temporary displacement due to restricted access or changes in fish behaviour. However, the resilience of these receptors is considered moderate to high, given the short duration of disturbance and the availability of alternative fishing grounds nearby.

Nevertheless, the sensitivity of fisheries to biological disturbance is considered **medium**, as catch rates and economic returns are closely tied to species availability and behaviour. Given the short duration of disturbance and the availability of alternative fishing grounds nearby, local fleets are generally adaptable and capable of responding to short-term changes in stock distribution.

Significance of Effect

Considering the short-term and temporary nature of biological disturbance associated with the activities described above, the resilience of commercially targeted species to transient, short-lived episodic disturbance, and the moderate sensitivity of affected fisheries to temporary changes in stock behaviour and availability, the potential impact on commercial fisheries from disturbance of target species leading to displacement or disruption of fishing activity is assessed as **minor adverse** and **not significant** in EIA terms.

Secondary Mitigation and Residual Effect

Embedded mitigation measures, including appropriate and timely communication with fisheries stakeholders, are expected to reduce disruption and support operational planning. These measures will help ensure that local fleets are informed of dredging schedules and can adjust their activities accordingly. No further mitigation is considered necessary, as the likely effect in the absence of additional measures beyond the embedded commitments outlined in **Error! Reference source not found.** is not significant in EIA terms. The residual effect is therefore assessed as **minor adverse**.

6.1.1.4 Increased vessel traffic within fishing grounds leading to interference with fishing activity

This section assesses the potential impact of increased vessel traffic on commercial fisheries during Phase 2 of the proposed development, specifically in relation to capital dredging and spoil disposal operations. While dredging activities are confined to the port limits, vessel movements will extend beyond the immediate footprint to include transits to Burghead marine disposal site. These transits may intersect with areas used by inshore fishing vessels, particularly those deploying static gear.

Magnitude of Impact

Phase 2 of the proposed development will result in a temporary increase in vessel traffic associated with capital dredging and support operations. Dredging will be confined to the port limits, with vessel movements concentrated along a corridor extending approximately 800 m seaward from the port boundary and 1,800 m inland toward the quay. However, vessel traffic will also increase between the port and Burghead marine disposal site, where dredge spoil will be transported and deposited.

Although the disposal site is located away from sensitive fishing grounds, transits between the dredge site and disposal ground may intersect with areas used by inshore fishing vessels, particularly those deploying static gear. This could result in short-term interference with gear placement or vessel manoeuvrability during peak disposal operations. Given the temporary and intermittent nature of vessel transits between the two locations, the magnitude of interference is considered **low**.

Sensitivity of Receptor

Inshore fishing vessels operating in the vicinity of the port are considered to have **low** sensitivity to temporary increases in vessel traffic associated with capital dredging and spoil disposal. These vessels are typically small, mobile, and capable of adjusting gear placement or transit routes in response to short-term spatial restrictions. Operators are familiar with dynamic coastal conditions and routinely adapt to seasonal changes, marine works, and other maritime activities. Their operational flexibility reduces the likelihood of significant disruption.

Significance of Effect

With appropriate advance notice and embedded mitigation measures in place, such as NtMs , disruption to fishing operations is expected to be minimal and manageable. The potential impact from increased vessel traffic within fishing grounds is therefore assessed as **minor adverse** and **not significant** in EIA terms.

Secondary Mitigation and Residual Effect

Embedded mitigation measures including timely communication with vessel operators through NtMs, is expected to reduce the likelihood of gear interaction and support safe coexistence of port operations and fishing activity. No further mitigation is considered necessary, as the likely effect in the absence of additional measures beyond the embedded measures outlined in **Error! Reference source not found.**, is not significant in EIA terms. The residual effect is therefore assessed as **minor adverse**.

6.1.1.5 Additional Steaming to Alternative Fishing Grounds

This section evaluates the potential impact of temporary spatial restrictions and additional steaming requirements for inshore fishing vessels during Phase 2 of the proposed development. Capital dredging and associated marine operations within the statutory harbour limits may displace fishing activity adjacent to the port, leading to changes in operational patterns, increased transit times, and economic implications for local fleets.

Magnitude of Impact

Phase 2 of the proposed development will result in direct temporary spatial restrictions within the statutory port limits due to capital dredging and associated marine operations. ScotMap data indicates very low levels of effort by small-scale inshore vessels deploying pots and creels within the harbour limits. However, through existing Harbour Powers a byelaw is being implemented that will prohibit fishing within the Statutory Harbour Area. Fishing activity in the region is concentrated in adjacent coastal waters rather than within the operational harbour itself (Scottish Government, 2014; 2025). Therefore, direct impacts resulting from additional steaming to alternative fishing grounds for vessels that would otherwise fish within the proposed development footprint have not been considered further in this assessment.

Vessels operating adjacent to the port limits may be required to temporarily relocate to alternative fishing grounds during the construction phase. This may result in short-term additional steaming, particularly for vessels targeting grounds near the approach channel or along the transit corridor to the licensed offshore marine disposal site. Capital dredging activities will generate sediment plumes that could displace fishing activity directly outside the port limits, resulting in short-term disruption to established patterns of activity.

Additional steaming time resulting from temporary displacement can lead to increased fuel consumption, operational costs, and reduced fishing efficiency for affected vessels. Longer transit distances to alternative grounds may shorten the effective fishing window within a given tide or day, particularly for small inshore vessels with limited endurance and crew capacity. This can impact catch volumes and profitability, especially for fisheries targeting species with time-sensitive landing requirements such as *Nephrops*. While most inshore vessels are operationally flexible and capable of adapting to short-term spatial changes, cumulative effects of extended steaming are more problematic, particularly if sustained over longer periods, contributing to economic strain, increased wear on gear and engines, and logistical challenges in maintaining regular fishing schedules.

As discussed above, capital dredging is proposed within the port limits to deepen the basin and approach channel, spanning a corridor from 800 m offshore to 1,800 m inland, enabling access for larger vessels. Approximately 2,000,000 m³ of sediment will be removed and disposed of at a licensed site near Burghead, approximately 32 km from the proposed development. Works are scheduled between March and November in 2027, 2028, or 2029, lasting approximately 12 weeks, using cutter suction and trailer suction hopper dredgers, both of which are known to generate sediment plumes. In the absence of plume modelling, tidal excursion distances of up to 1.1 km have been used to estimate sediment transport, though most material is expected to settle within the port due to coarse seabed composition (predominantly sand and gravel, with only 2% silt). Tidal dynamics in the Moray Firth, driven by semi-diurnal cycles and coastal hydrodynamics, support efficient dispersion and rapid settling of suspended sediments. As a result, sediment plumes are anticipated to be short-lived, spatially confined and rapidly dispersed by tidal flushing. Given the short-term nature of displacement and the operational flexibility of local fleets, the magnitude of impact associated with additional steaming to alternative fishing grounds is considered to be **low**.

Sensitivity of Receptor

Inshore fishing vessels operating in the vicinity of the port are considered to have **low** sensitivity to temporary increases in steaming distance associated with capital dredging and spoil disposal. These vessels are typically small, mobile, and capable of adjusting gear placement or transit routes in response to short-term spatial restrictions. Operators are familiar with dynamic coastal conditions and routinely adapt to seasonal changes, marine works, and other maritime activities. While cumulative effects of extended steaming may present operational challenges, the short-term nature of the displacement and the absence of critical fishing grounds within the harbour limits reduce overall sensitivity.

Significance of Effect

With appropriate advance notice and embedded mitigation measures in place disruption to fishing operations is expected to be minimal and manageable. The potential impact from additional steaming to alternative fishing grounds is therefore assessed as **minor adverse** and **not significant** in EIA terms.

Secondary Mitigation and Residual Effect

Embedded mitigation measures, including timely communication with vessel operators through NtMs, are expected to reduce the likelihood of operational disruption and support safe coexistence of port operations and fishing activity. No further mitigation is considered necessary, as the likely effect in the absence of additional measures, beyond the embedded measures outlined in **Error! Reference source not found.**, is not significant in EIA terms. The residual effect is therefore assessed as **minor adverse**.

6.1.2 Operation and Maintenance

No impacts have been scoped in for commercial fisheries receptors during the operation and maintenance phase of the Proposed Development, as described in Table 5.7.

7. Cumulative Assessment

Impacts from the proposed development alone are generally spatially restricted to the inner port area, however, certain impacts have the potential to be observed over a wider area in the inner Moray Firth. These cumulative effects are the effects of the Ardersier ETF Expansion, combined with the effects from other projects, on the same receptor or group of receptors. Chapter 14: Cumulative Effects details how potential cumulative effects will be assessed for the Ardersier ETF Expansion through a Cumulative Effects Assessment (CEA).

A CEA screening process has identified the relevant other plans, projects, and activities which are to be included in the assessment. Those plans/projects relevant to the CEA for commercial fisheries receptors are indicated in Table 55.8. For each of these relevant plans/projects, the most up-to-date publicly available project parameters have been used to inform the CEA. These plans or projects may present different levels of potential cumulative effect when combined with the proposed development, informed by other plan/project's readiness and likelihood for actual operation.

This CEA for commercial fisheries has considered the worst-case design scenario for each of the proposed development plans and activities. For potential effects on commercial fisheries receptors, planned projects were screened into the assessment based on a 15 km zone of influence (ZoI) for the CEA. This distance reflects the spatial extent over which key project-related stressors have the potential to contribute to spatial compression, increased vessel traffic, and long-term exclusion zones, resulting in a reduction of available fishing grounds and intensified displacement effects. Given the spatial nature of commercial fishing activity and breadth of the commercial fisheries study area, determination of an appropriate ZoI is subject to professional judgement, however evidence from similar development assessments indicates that ZoIs for commercial fisheries impacts typically range between 10 and 30 km, depending on project design parameters, receptor sensitivity and hydrodynamic conditions. The adopted 15 km ZoI is therefore considered precautionary yet proportionate for a project of this scale, capturing both direct and indirect pathways of impact while aligning with best practice in cumulative effects methodology and ensuring interactions with other marine activities and developments in the vicinity are appropriately considered. Each project, plan or activity within the screening range has been considered and screened in or out based on effect–receptor pathway, data confidence and the temporal and spatial scales involved. Projects were therefore screened out, if they had the following:

- No temporal overlap with the proposed works at the Ardersier Port;
- No physical effect-receptor overlap; and
- No effect-receptor pathway.

Operational/active projects were also screened out, as they were considered to be existing impacts included within the baseline (this includes all shipping ports, shipping routes and oil and gas pipelines), or if no construction timeline was available.

Table 5.8. Relevant plans and/or projects considered for cumulative effects.

Plan/Project	Summary	Distance from Ardersier Port	Dates of proposed works	Operational by (if relevant)	Summary of interaction with Proposed Development
Ardersier ETF Expansion	Port Expansion	N/A	Piling operations – 2026 Piling and dredging- 2027-2028 Dredging- 2029	2030	N/A
Port of Cromarty Firth	Maintenance Dredging	9.45 km (screened in on a precautionary basis)	2025-2028	2029	Dredging operations have a temporal interaction with dredging and piling operations at Ardersier Port in 2026-2028.
Port of Nigg	Maintenance Dredging and Sea Disposal	10.84 km (screened in on a precautionary basis)	2025-2026	2027	Dredging operations have a temporal interaction with dredging operations at Ardersier Port.
Invergordon Service Base Phase 5 Development	Extension to the existing Quay West Berth Capital Dredging and Sea Deposit	14.3 km (screened in on a precautionary basis)	2025 - 2028	2030	Dredging and construction operations have a temporal interaction with Ardersier Port in 2026-2028.

Impacts that are scoped into the assessment alone are generally spatially restricted to being within close proximity to the proposed development. However, certain potential impacts, such as displacement of fishing activity, have the potential to be observed over a wider area.

For commercial fisheries, the following impacts from the proposed development have the potential to act cumulatively with impacts from other plans and/or projects to contribute to cumulative effects:

- Reduction in access to, or exclusion from established fishing grounds;
- Displacement leading to gear conflict and increased fishing pressure on adjacent grounds; and
- Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity.

In assessing potential cumulative effects on commercial fisheries, the Worst-Case Design Scenario will be considered for each relevant project. This approach ensures that the assessment captures the maximum potential impact by evaluating the largest spatial footprint, highest intensity of activity, longest duration, and least favourable timing of works, particularly where these coincide with sensitive fishing periods or ecological windows.

7.1.1.1 Reduction in access to, or exclusion from established fishing grounds

The CEA considers the potential for reduction in access to, or exclusion from, established fishing grounds resulting from multiple marine developments within 15 km of the proposed development, as detailed in .

Table 58, each of which has the potential to contribute to cumulative effects on commercial fisheries receptors.

Magnitude of Cumulative Impact

Dredging activities, while typically short-term and spatially confined, may temporarily restrict access to fishing grounds due to safety exclusion zones, increased vessel traffic and sediment plumes. These impacts are generally limited in duration and extent, but when considered cumulatively, may contribute to broader patterns of displacement and disruption and disproportionate effects on small inshore vessels with limited spatial flexibility. Dredging operations proposed at the proposed development alone, and from screened in projects (dredging at the Port of Cromarty Firth and the Port of Nigg) have the potential to result in cumulative impacts on commercial fisheries receptors. Where multiple developments coincide spatially or temporally, the potential for compounded displacement of fishing effort increases. This may result in economic impacts for local fleets, increased fuel costs, gear conflict, or pressure on alternative fishing areas.

Maintenance dredging works at the Port of Cromarty Firth are proposed to be undertaken at the same time as the proposed works at Ardersier Port (located 9.45 km from Ardersier Port). The proposed works at the Port of Cromarty Firth will consist of dredging operations undertaken between 2025-2028, during which piling and dredging works at Ardersier Port are proposed. Observations of the Phase 3 Development construction operations at the Port of Cromarty Firth, reported the creation of sediment plumes at both the dredging and disposal sites, although the observed plumes were relatively small, dispersed quickly and at no point occluded the Cromarty Firth.

Dredging operations, and sea disposal are also proposed at the Port of Nigg, located 10.84 km from Ardersier Port. These operations are proposed to be undertaken from 2025 to 2026, during which piling and dredging works at Ardersier Port are proposed. Results of sediment transport modelling show that as the sediment within the Port predominantly consists of sand, with a very small level of fines (silt or clay), the majority of sand and silt lost to the water column during dredging will remain within the dredge area, with any with increased turbidity and sedimentation also being very localised and anticipated to be short term. Disposal of dredged material generated at both the Port of Cromarty Firth and Port of Nigg occurs at Sutors disposal ground, approximately 30 km from the Burghead disposal site, therefore no cumulative sediment plume or vessel transit overlap is expected to occur as a result of these projects.

Given the localised nature of effects from the proposed works at the Ardersier ETF Expansion, and the limited spatial overlap with screened-in projects, none of which are located within close proximity to the Port (the nearest being 9.45 km away), the magnitude of cumulative impact on commercial fisheries receptors is considered to be **low**. This reflects the confined footprint of dredging and marine operations, the absence of critical fisheries receptors within the immediate ZoI, and the spatial separation between the proposed development and other projects.

Sensitivity of Receptor

The sensitivity of commercial fisheries receptors to reduced access to, or exclusion from established fishing grounds is detailed in Section 7.1.1.1 of this technical appendix and are assessed as having a **medium** sensitivity.

Significance of Effect

Each project considered within the CEA has or will be subject to its own environmental appraisal, supported by dedicated mitigation measures designed to minimise individual and collective impacts. These measures are tailored to the nature, scale, and location of each development, and include spatial planning to reduce overlap with sensitive receptors, timing restrictions to avoid key ecological or fishing seasons, and operational controls to limit disturbance. By implementing project-specific mitigation, the potential for cumulative effects, such as reduced access to, or exclusion from established fishing grounds is reduced. This approach ensures that while multiple developments may occur within the same regional footprint, their combined impact is managed through coordinated planning. The cumulative footprint of these developments will be monitored to ensure that access to key fishing grounds is maintained wherever possible, and that any residual impacts are proportionate and appropriately managed.

Given the localised nature of exclusion zones and the temporary duration of most construction and dredging activities, the magnitude of impact on access to established fishing grounds is considered low. Commercial fisheries in the region exhibit medium sensitivity to spatial restrictions, however existing mitigation measures such as navigational notices, stakeholder engagement, and phased scheduling are anticipated to minimise disruption. While spatial squeeze from multiple concurrent projects is acknowledged, these works are generally confined to port infrastructure or involve dredging operations that are spatially and temporally limited. As such, cumulative interactions from multiple projects in the Moray Firth with the potential to exert reduced access to, or exclusion from established fishing grounds are unlikely to result in significant additional pressure beyond what has already been assessed for each development individually. The potential impact from cumulative reduced access to, or exclusion from established fishing grounds is therefore assessed as **minor adverse** and **not significant** in EIA terms.

7.1.1.2 Displacement leading to gear conflict and increased fishing pressure on adjacent grounds

The cumulative assessment considers the potential for displacement leading to gear conflict and increased fishing pressure on adjacent grounds resulting from multiple marine developments within 15 km of the proposed development, as detailed in .

Table 58.

Dredging activities, while typically short-term and spatially confined, may temporarily displace fishing activity. Although impacts are generally limited in duration and extent, when considered cumulatively, they may contribute to broader patterns of disruption with disproportionate effects on small inshore vessels that lack the flexibility to relocate easily. Displacement of fishing effort into adjacent areas can increase the risk of gear conflict, particularly where multiple fleets operate in close proximity or where alternative grounds are limited.

This redistribution of effort may also lead to intensified fishing pressure on habitats not typically subject to high levels of effort, with potential implications for stock sustainability and economic viability.

Maintenance dredging works at the Port of Cromarty Firth are proposed to be undertaken at the same time as the proposed works at Ardersier Port (located 9.45 km from Ardersier Port). The proposed works at the Port of Cromarty Firth will consist of dredging operations undertaken between 2025-2028, during which piling and dredging works at Ardersier Port are proposed. Observations of the Phase 3 Development construction operations at the Port of Cromarty Firth, reported the creation of sediment plumes at both the dredging and disposal sites, although the observed plumes were relatively small, dispersed quickly and at no point occluded the Cromarty Firth.

Dredging operations, and sea disposal are also proposed at the Port of Nigg, located 10.84 km from Ardersier Port. These operations are proposed to be undertaken from 2025 to 2026, during which piling and dredging works at Ardersier Port are proposed. Results of sediment transport modelling show that as the sediment within the Port predominantly consists of sand, with a very small level of fines (silt or clay), the majority of sand and silt lost to the water column during dredging will remain within the dredge area, with any with increased turbidity and sedimentation also being very localised and anticipated to be short term.

Given the localised nature of effects from the proposed works at the Ardersier ETF Expansion, and the limited spatial overlap with screened-in projects, none of which are located within close proximity to the Port (the nearest being 9.45 km away), the magnitude of cumulative impact on commercial fisheries receptors is considered to be **low**. This reflects the confined footprint of dredging and marine operations, the absence of critical fisheries receptors within the immediate ZoI, and the spatial separation between the proposed development and other projects.

Sensitivity of Receptor

The sensitivity of commercial fisheries receptors to displacement is detailed in Section 7.1.1.2 of this technical appendix and are assessed as having a **medium** sensitivity.

Significance of Effect

Each project considered within the CEA has been or will be subject to its own environmental appraisal, supported by dedicated mitigation measures designed to minimise individual and collective impacts. These measures are tailored to the nature, scale, and location of each development and include spatial planning to reduce overlap with sensitive receptors, timing restrictions to avoid key ecological or fishing seasons, and operational controls to limit disturbance.

While spatial squeeze from multiple concurrent projects is acknowledged, these works are generally confined to port infrastructure or involve dredging operations that are spatially and temporally limited. As such, cumulative interactions from multiple projects in the Moray Firth with the potential to displace fishing activity are unlikely to result in significant additional pressure beyond what has already been assessed for each development individually. The cumulative impact is therefore assessed as **minor adverse** and **not significant** in EIA terms.

7.1.1.3 Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity

The cumulative assessment considers the potential for disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity resulting from multiple marine developments within 15 km of the proposed development, as detailed in .

Table 55.8.

Magnitude of Cumulative Impact

Construction activities have the potential to disturb commercially important fish and shellfish resources across the regional marine environment. These disturbances may arise from underwater noise, sediment resuspension, changes in water quality, and physical seabed disruption. Such pressures can alter the behaviour, distribution, or availability of target species, particularly during sensitive biological periods such as spawning, settlement, or migration. The cumulative assessment therefore considers how these pressures when occurring simultaneously or in close succession may lead to temporary displacement of fishing activity or reduced catch efficiency in affected areas. While dredging impacts are typically short-term and spatially limited, and Offshore Wind Farm (OWF) and port construction phases are time-bound, the combined footprint of multiple developments may increase the likelihood of disruption to fishing operations. This is especially relevant where activities overlap with key fishing grounds or coincide with periods of heightened biological sensitivity.

Maintenance dredging works at the Port of Cromarty Firth are proposed to be undertaken at the same time as the proposed works at Ardersier Port (located 9.45 km from Ardersier Port). The proposed works at the Port of Cromarty Firth will consist of dredging operations undertaken between 2025-2028, during which piling and dredging works at Ardersier Port are proposed. Observations of the Phase 3 Development construction operations at the Port of Cromarty Firth, reported the creation of sediment plumes at both the dredging and disposal sites, although the observed plumes were relatively small, dispersed quickly and at no point occluded the Cromarty Firth.

Dredging operations, and sea dispersal are also proposed at the Port of Nigg, located 10.84 km from Ardersier Port. These operations are proposed to be undertaken from 2025 to 2026, during which piling and dredging works at Ardersier Port are proposed. Results of sediment transport modelling show that as the sediment within the Port predominantly consists of sand, with a very small level of fines (silt or clay), the majority of sand and silt lost to the water column during dredging will remain within the dredge area, with any with increased turbidity and sedimentation also being very localised and anticipated to be short term.

Given the localised nature of effects from the proposed works at the Ardersier ETF Expansion, and the limited spatial overlap with screened-in projects, none of which are located within close proximity to the Port (the nearest being 9.45 km away), the magnitude of cumulative impact on commercial fisheries receptors is considered to be **low**. This reflects the confined footprint of dredging and marine operations, the absence of critical fisheries receptors within the immediate ZoI, and the spatial separation between the proposed development and other projects.

Sensitivity of Receptor

The sensitivity of commercial fisheries receptors to displacement or disruption as a result of disturbance of commercially important fish and shellfish resources is detailed in Section 7.1.1.3 of this technical appendix and are assessed as having a **medium** sensitivity.

Significance of Effect

Each project considered within the CEA has or will be subject to its own environmental appraisal, supported by dedicated mitigation measures designed to minimise individual and collective impacts. These measures are tailored to the nature, scale, and location of each development, and include spatial planning to reduce overlap with sensitive receptors, timing restrictions to avoid key ecological or fishing seasons, and operational controls to limit disturbance. By implementing project-specific mitigation, the potential for cumulative effects, such as reduced access to, or exclusion from established fishing grounds is reduced. This approach ensures that while multiple developments may occur within the same regional footprint, their combined impact is managed through coordinated planning. The cumulative footprint of these developments will be monitored to ensure that access to key fishing grounds is maintained wherever possible, and that any residual impacts are proportionate and appropriately managed.

Given the localised nature of exclusion zones and the temporary duration of most construction and dredging activities, the magnitude of impact is considered low. Commercial fisheries in the region exhibit medium sensitivity to spatial restrictions, however existing mitigation measures such as navigational notices, stakeholder engagement, and phased scheduling are anticipated to minimise disruption. While spatial squeeze from multiple concurrent projects is acknowledged, these works are generally confined to port infrastructure or involve dredging operations that are spatially and temporally limited. As such, cumulative interactions from multiple projects in the Moray Firth are unlikely to result in significant additional pressure beyond what has already been assessed for each development individually. The potential impact from cumulative disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity is therefore assessed as **minor adverse** and **not significant** in EIA terms.

8. Assessment Summary

A summary of the assessment of impacts alone undertaken in Section **Error! Reference source not found.**, and CEA undertaken in Section **Error! Reference source not found.** is provided in Table 5.9. This includes residual effect significance after any required secondary mitigation and proposed monitoring.

Table 5.9. Summary of commercial fisheries technical appendix key findings.

Effect	Receptor	Magnitude	Sensitivity	Significance	Secondary Mitigation	Residual Effect
Construction						
Reduction in access to, or exclusion from, established fishing grounds	Local inshore Scottish creel fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish otter trawl fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish dredge fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish demersal trawl fleet	Low	Medium	Minor	N/A	Minor
Displacement of fishing activity leading to gear conflict and increased fishing pressure on adjacent grounds	Local inshore Scottish creel fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish otter trawl fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish dredge fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish demersal trawl fleet	Low	Medium	Minor	N/A	Minor

Effect	Receptor	Magnitude	Sensitivity	Significance	Secondary Mitigation	Residual Effect
Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing	Local inshore Scottish creel fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish otter trawl fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish dredge fleet	Low	Medium	Minor	N/A	Minor
	Local inshore Scottish demersal trawl fleet	Low	Medium	Minor	N/A	Minor
Increased vessel traffic associated with the project within fishing grounds leading to interference with fishing activity	Local inshore Scottish creel fleet	Low	Low	Minor	N/A	Minor
	Local inshore Scottish otter trawl fleet	Low	Low	Minor	N/A	Minor
	Local inshore Scottish dredge fleet	Low	Low	Minor	N/A	Minor
	Local inshore Scottish demersal trawl fleet	Low	Low	Minor	N/A	Minor
Additional steaming to alternative fishing grounds	Local inshore Scottish creel fleet	Low	Low	Minor	N/A	Minor

Effect	Receptor	Magnitude	Sensitivity	Significance	Secondary Mitigation	Residual Effect
	Local inshore Scottish otter trawl fleet	Low	Low	Minor	N/A	Minor
	Local inshore Scottish dredge fleet	Low	Low	Minor	N/A	Minor
	Local inshore Scottish demersal trawl fleet	Low	Low	Minor	N/A	Minor

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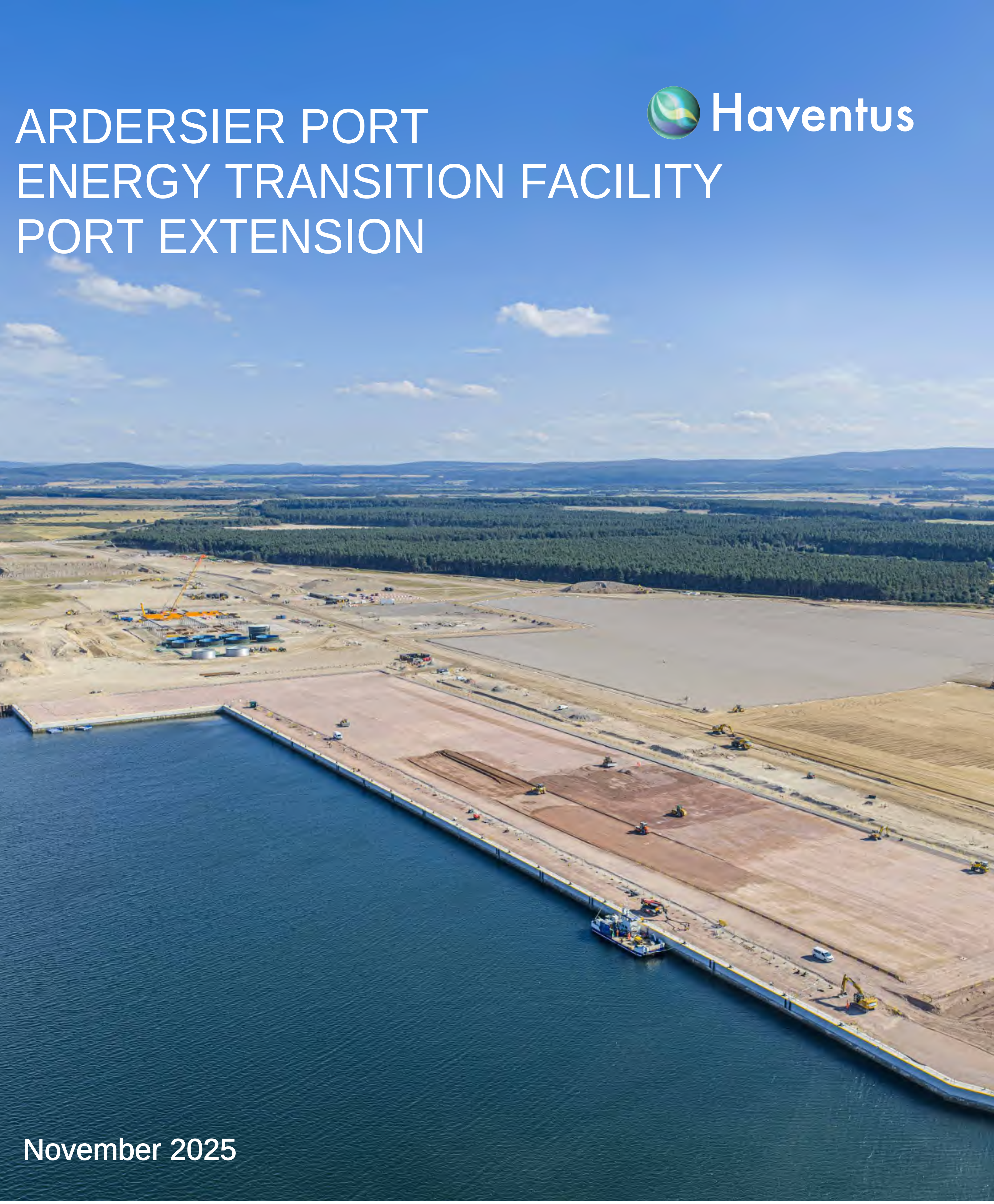
ARDERSIER PORT
ENERGY TRANSITION FACILITY
PORT EXTENSION

Haventus



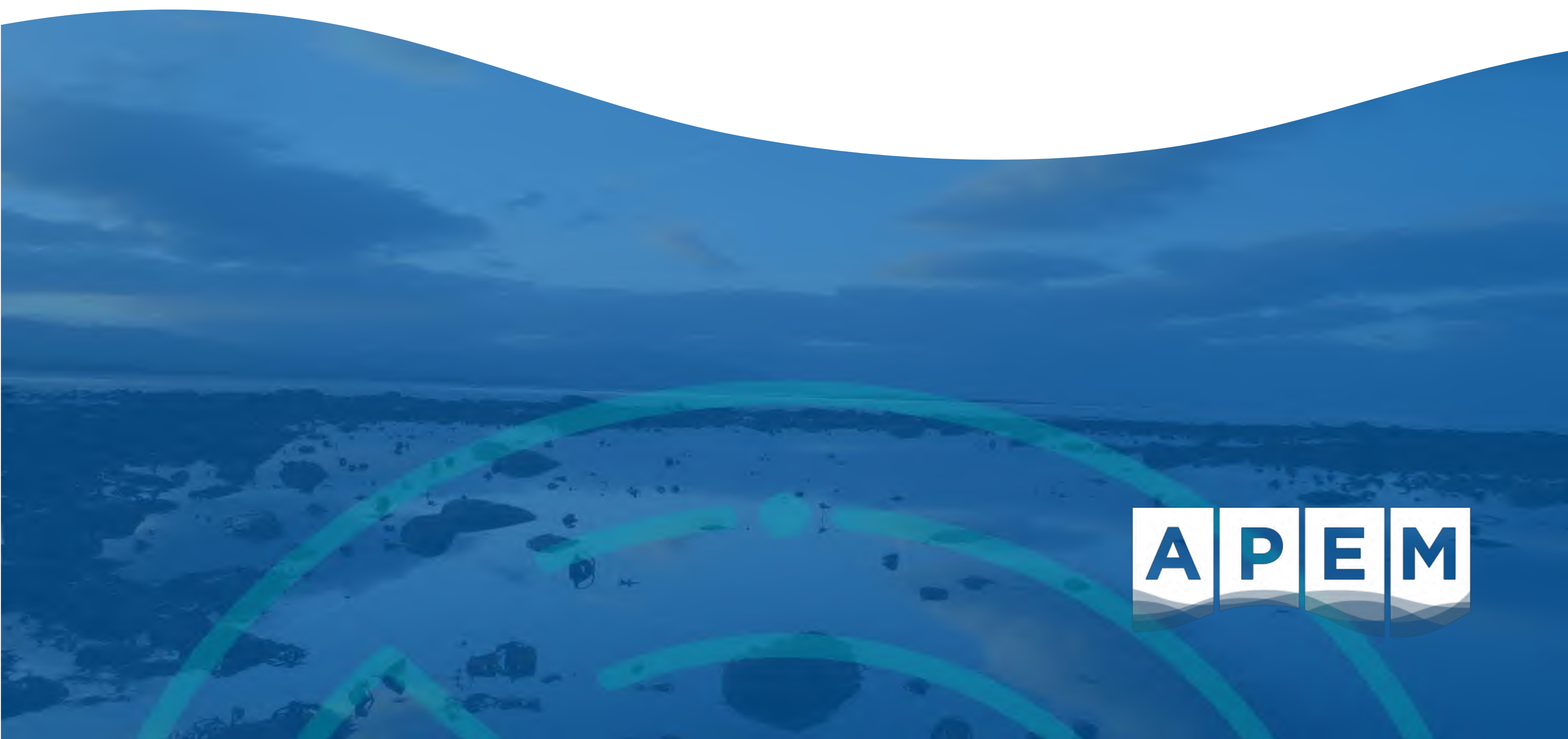
November 2025

Appendix 5.8 Marine and Coastal Ecology

Haventus

Marine and Coastal Ecology

APEM Group Ltd.



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Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
v1.0	17/10/2025	All	All	Draft	APEM Ltd.
v2.0	24/10/2025	All	All	Addressed client comment on draft	APEM Ltd.

Competent Expert Evidence

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Contents

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Acronyms and Abbreviations

Term	Definition
BAP	Biodiversity Action Plan
BPEO	Best Practice Environmental Option
BWM	Ballast Water Management
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CSD	Cutter Suction Dredger
DSFB	District Salmon Fishery Board
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMODnet	European Marine Observation and Data Network
ES	Environmental Statement
EU	European Union
EUNIS	European Nature Information System
GES	Good Environmental Statement
HED	Highland Ecology and Development
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
MarESA	Marine Evidence-based Sensitivity Assessment
MarLIN	Marine Life Information Network
mCD	Chart Datum
MD-LOT	Marine Directorate - Licencing Operations Team
MD-SEDD	Marine Directorate - Science, Environment, Digital and Data
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Plan
MoUs	Memoranda of Understanding
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MSS	Marine Scotland Science
MSW	Multi-sea-winter
NBN	National Biodiversity Network
NNS	Non-Native Species

Term	Definition
NVC	National Vegetation Classification
O&M	Operation and Maintenance
PAH	Polyaromatic Hydrocarbons
PMF	Priority Marine Feature
PWMP	Port Wast Management Plan
RSIS	Ramsar Sites Information Service
SAC	Special Area of Conservation
SEL	Sound Exposure Level
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPL	Sound Pressure Level
SSC	Suspended Sediment Concentration
SSSI	Site of Special Scientific Interest
SWS	Single Winter Salmon
TSHD	Trailing Suction Hopper Dredgers
TSS	Total Suspended Solids
TTS	Temporary Threshold Shift
UK	United Kingdom
UWN	Underwater Noise
VER	Valued Ecological Receptor

Units

Unit	Definition
dB	Decibels
kJ	Kilojoule
km	Kilometre
mm	Millimetre
m	Metre
m2	Metre squared
m3	Metre cubed
nm	Nautical mile
NTU	Turbidity

1. Introduction

The aim of this Technical Appendix is to assess the potential impacts to marine and coastal habitats and diadromous fish arising from the proposed development, with the objective of identifying potential impacts arising from the proposed development, both alone and cumulatively, on matters raised during the scoping opinion process, across both the construction and operation and maintenance (O&M) phases. Potential impacts to marine mammals are considered in Chapter 11: Marine Mammals, of the Environmental Impact Assessment Report (EIAR).

The project description is provided in Chapter 3: Project Description of the EIAR. An Environmental Constraints Plan is provided in Chapter 1: Introduction.

2. Legislative Context

A summary of relevant legislation directly applicable to marine and coastal habitats and diadromous fish is outlined in Table 5.1.

Table 5.1 Legislation and policy relevant to Marine and Coastal Ecology and Diadromous Fish.

Legislation and Policy	Relevance
International	
The Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR Convention) (1992).	The OSPAR Convention serves as the collaborative framework for 15 Western European governments dedicated to safeguarding the marine environment in the North East Atlantic region. In 2003, the United Kingdom (UK) government made a commitment to establish a well-managed and ecologically coherent network of Marine Protected Areas (MPAs), commonly referred to as the OSPAR MPA commitment. As part of the UK's initial contribution to the OSPAR network, Marine Special Areas of Conservation (SACs) designated under the European Habitats Directive have been submitted. In 2008, OSPAR compiled a catalogue of marine habitats and species facing threats or decline in the north-east Atlantic.
The International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management (BWM) Convention) (2004)	An international treaty adopted by the International Maritime Organisation (IMO) to prevent the spread of harmful aquatic organisms via ballast water and sediments.
The Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention) (1979)	Provides the framework for agreements known as Memoranda of Understanding (MoUs) that focus on the conservation of particular migratory species or groups of species. These MoUs provide a framework for collaborative conservation efforts among countries to protect migratory animals.
European Union (EU)	
EU Habitats Directive (Directive 92/43/EEC) and associated implementing habitats regulations: 1) The Conservation of Habitats and Species Regulations (2017), (as amended) 2) Conservation (Natural Habitats, &c.)	The EU Habitats Directive lists 11 marine habitats, eight of which are found in benthic environments. SACs have been designated in UK waters to meet the requirements outlined in Article 3 of the Directive and to contribute to the European network of conservation sites. 1) Implements species protection requirements of the Habitats Directive in Scotland, in relation to specific activities up to 12 nautical miles (nm), including applications for s36 consent. 2) Implements species protection requirements of the Habitats Directive in Scotland on land and within 12 nm.

Legislation and Policy	Relevance
Regulations (1994), (as amended)	
The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention; 1979)	Focuses on safeguarding and preserving marine biodiversity, habitats, and geological features within European wildlife areas. Specifically, the Convention underscores the importance of conserving marine biodiversity by establishing protected zones to sustainably manage fish and shellfish populations and their habitats, as outlined in Article 4, which mandates Contracting Parties to enact legislative measures for habitat conservation of specified flora and fauna species
EU Directive 2008/56/EC – Marine Strategy Framework Directive (MSFD)	The MSFD sets out measures for Good Environmental Status (GES) in the marine environment.
National	
The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations (the 'Habitat Regulations'), (2019)	Transpose the requirements of retained EU law (i.e. the 'Habitats Directive' and the 'Birds Directive') into Scottish law.
Marine and Coastal Access Act (2009)	The Marine and Coastal Access Act 2009 Establishes provisions for the management and protection of the marine environment.
Wildlife and Countryside Act (1981), (as amended)	The Wildlife and Countryside Act (1981) makes it an offence to intentionally (or recklessly) kill, injure or take any wild animal listed on Schedule 5 of the Act, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places.
Nature Conservation (Scotland) Act (2004)	The Nature Conservation (Scotland) Act (2004) sets out a series of measures which are designed to conserve biodiversity and to protect and enhance the biological and geological natural heritage of Scotland.
Marine (Scotland) Act (2010)	The Marine (Scotland) Act (2010) requires all regulators to ensure that there is no significant risk of hindering the achievement of the conservation objectives of a MPA before giving consent to an activity, plan, or project. A management intervention will be required if an ongoing activity presents a significant risk of hindering the achievement of an MPA's conservation objectives. This intervention will be practical and proportionate, using the most appropriate statutory mechanism to reduce the risk.
The Marine Works (Environmental Impact Assessment (EIA)) (Scotland) Regulations (2017)	The Marine Works (Environmental Impact Assessment) (Scotland) Regulations (2017) establishes the requirement for EIA in relation to marine licensing in Scotland.
Merchant Shipping (Control and Management of Ships' Ballast Water and	Implements the BWM Convention into UK law following the UK's accession in May 2022. It ensures compliance post-Brexit and includes enforcement mechanisms specific to UK jurisdiction.

Legislation and Policy	Relevance
Sediments) Regulations 2022	
Invasive Non-Native Species (INNS) (EU Exit) (Scotland) (Amendment etc.) Regulations 2020)	This legislation was introduced to ensure the continued operability of EU Regulation 1143/2014 on INNS in Scotland following Brexit. It replaces references to EU institutions and processes with Scottish equivalents, creating a Scottish list of species of special concern and empowering Scottish Ministers to manage and amend this list. The regulations also update enforcement provisions under the Wildlife and Countryside Act 1981, enabling control measures, licensing, and penalties for activities INNS.
Marine Strategy Regulations 2010	The MSFD requires the UK to put in place measures to achieve or maintain GES in the marine environment by 2020. The MSFD is transposed for the whole of the UK by the Marine Strategy Regulations 2010, providing a UK-wide framework for meeting the requirements of the Directive. The Marine Strategy Regulations 2010 still contain references to the MSFD. Where the provisions of the Directives being referred to contain references that do not make sense for the purposes of the Marine Strategy Regulations now that the UK is no longer a Member State, the amendments set out how the provisions are to be read in order for them to make sense. For example, references to "Member States" in certain provisions of the Marine Strategy Regulations are to be read as if the UK were a Member State.
Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003	The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 is the primary legislation governing the management and conservation of salmon and freshwater fisheries in Scotland. The Act provides the Scottish Government with powers to regulate salmon fishing and protect vulnerable salmon stocks, requiring annual assessments and mandatory catch-and-release or retention bans where necessary. It also empowers the establishment of local District Salmon Fishery Boards to manage fisheries and introduces measures like a ban on the sale of rod-caught salmon to aid conservation efforts.
Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003	The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 is the primary legislation governing the management and conservation of salmon and freshwater fisheries in Scotland. The Act provides the Scottish Government with powers to regulate salmon fishing and protect vulnerable salmon stocks, requiring annual assessments and mandatory catch-and-release or retention bans where necessary. It also empowers the establishment of local District Salmon Fishery Boards (DSFBs) to manage fisheries and introduces measures like a ban on the sale of rod-caught salmon to aid conservation efforts.
Scottish Priority Marine Features (NatureScot, 2020)	NatureScot and the Joint Nature Conservation Committee (JNCC) collaborated with Marine Scotland to establish a Priority Marine Features (PMFs) list, which identifies crucial marine habitats and species in Scotland's seas. This list is in line with Marine Scotland's vision for marine nature conservation as articulated in the Marine Nature Conservation Strategy. It functions as a focused roadmap for future conservation endeavours in Scotland (SNH, 2014). In 2013, Marine Scotland conducted a consultation on the proposed PMFs list

Legislation and Policy	Relevance
	(Marine Scotland, 2013). Within this compilation, the various benthic and intertidal species and habitats have either been previously documented in the surrounding area or have the potential to exist within the study area.
Eel Management plans for the United Kingdom: Scotland River Basin District (Department for Environment Food and Rural Affairs, 2010)	Established in 2010 in response to the Eel Recovery Plan (formed under European Commission Council Regulation No 1100/2007) with the aim of improving the European eel stocks.
Scottish Wild Salmon Strategy (Scottish Government, 2022b)	Published in January 2022, the Scottish Wild Salmon Strategy outlines the objectives, actions to improve the conditions of Scotland's rivers and coastal waters and better manage salmon stocks.

3. Consultation

A request for an EIA Scoping Opinion was sought from the Marine Directorate - Licencing Operations Team (MD-LOT) and The Highlands Council in January 2025 as part of the EIA scoping process. A formal consultation period was held between February and March 2025, during which, statutory consultees were consulted and invited to provide feedback.

During this period, concerns were raised by MD-LOT, the Marine Directorate - Science, Environment, Digital and Data (MD-SEDD) team, NatureScot and The Highland Council regarding the consideration of marine and coastal habitats within the EIA. Specifically, these concerns relate to the potential impact of the proposed development on the qualifying interests of nearby designated sites.

Concerns were also raised by MD-LOT, MD-SEDD, NatureScot, DSFB and The Highland Council regarding the consideration of diadromous fish within the EIA. Specifically, these concerns relate to the potential impacts of the proposed development on migratory salmonid fish including Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta*).

A summary of the relevant consultation responses received during the scoping process, and how these concerns have been addressed within this report, are outlined in Table 5.2.

Table 5.2. Consultation relevant to marine and Coastal Ecology and Diadromous Fish.

Consultee	Date and Nature of Consultation	Summary of response	How and where addressed
MD-LOT	Scoping Opinion June 2025	The Applicant has not considered coastal and marine ecology as part of the Scoping Report. The Scottish Ministers note that a coastal and marine ecology EIA chapter is referred to under heading 1 of Appendix A: Terrestrial Ecology in the Scoping Report, but this topic has not been considered in the Scoping Report and it is therefore assumed that the Applicant does not consider that coastal and marine ecology should be within the scope of the EIA. However, the Scottish Ministers advise that coastal and marine ecology must be scoped in for both the construction and operational phases of the Proposed Works.	An assessment of the potential impacts on marine and coastal ecology, including marine and coastal habitats has been undertaken in Section 6.1 of this Technical Appendix.
MD-LOT	Scoping Opinion June 2025	The Applicant has not considered diadromous fish as part of the Scoping Report and it is therefore assumed that the Applicant does not consider that diadromous fish should be within the scope of the EIA Report. However, the Scottish Ministers advise that diadromous fish must be scoped in for both the construction and operational phases of the Proposed Works.	An assessment of the potential impacts on diadromous fish from the proposed development has been undertaken in Section 6.2 of this Technical Appendix.
MD-LOT	Scoping Opinion June 2025	Scottish Ministers note that salmon and sea trout are considered as endangered in Scotland and are known to migrate through the Moray Firth and therefore advise that diadromous fish must be scoped in for further assessment in the EIA during construction, operation and maintenance.	An assessment of the potential impacts on diadromous fish from the proposed development has been undertaken in Section 6.2 of this Technical Appendix.
MD-LOT	Scoping Opinion June 2025	Based on the advice provided by NatureScot, the Scottish Ministers advise that the impacts of rock armour deposits must be fully assessed in the EIA.	An assessment of the potential impacts of rock armour deposits on marine and coastal habitats has been undertaken in Section 6.1 of this Technical Appendix, including the impacts of 'Permanent and/or long-term habitat loss/alteration

Consultee	Date and Nature of Consultation	Summary of response	How and where addressed
			from introduction of hard structures' (Section 6.1.2.1).
MD-LOT	Scoping Opinion June 2025	The Scottish Ministers advise that that the potential effect on Whiteness Sands requires investigation and must be scoped in for consideration in the EIA for construction, operation and maintenance, beyond the scope suggested by the Applicant.	An assessment of the potential impacts on Whiteness Sands Site of Special Scientific Interest (SSSI) from the proposed development has been undertaken in Section 6.1 of this Technical Appendix.
MD-SEDD	Scoping Opinion June 2025	MD-SEDD noted that the Scoping Report is not clear if the chapter on coastal processes and geomorphology includes subtidal habitats and species, and that the subtidal sandbank qualifying interest of the Moray Firth SAC was not considered in the Scoping Report. The Scottish Ministers advise that impacts on the subtidal sandbank qualifying interest of the Moray Firth SAC must be scoped in for further assessment in the EIA.	An assessment of the potential impacts on the subtidal sandbank qualifying interest of the Moray Firth SAC from the proposed development has been undertaken in Section 6.1 of this Technical Appendix.
MD-SEDD	Scoping Opinion June 2025	MD-SEDD advise of the presence of a horse mussel bed off Chanonry Point and advised that hydrodynamic modelling of the dredge and deposit areas must be carried out to determine if the Proposed Works will affect any subtidal benthic features, including subtidal sandbanks and horse mussel beds.	Sediment plume modelling has not been undertaken for the proposed development. However, previous monitoring of Total Suspended Solids (TTS) and turbidity have been conducted prior to, during and following the phase 1 capital dredge for Ardersier Port, which commenced in April 2025. This information has been used to assess the potential impacts of increased Suspended Sediment Concentration (SSC) and deposition from capital

Consultee	Date and Nature of Consultation	Summary of response	How and where addressed
			dredging activities, on marine and coastal habitats in Section 6.1. This includes subtidal sandbanks and horse mussel beds.
MD-SEDD	Scoping Opinion June 2025	All dredging operations should consider the sensitive salmon smolt migration period and this sensitive window should be determined and avoided for all dredging operations. The selection of the deposit site for dredge material should consider potential connectivity with salmon from the River Moriston SAC and other important salmon and sea trout rivers in close proximity to the Proposed Works, as listed in the MD-SEDD advice.	An assessment of the potential impacts from Underwater Noise (UWN), and increased SSC and deposition from dredging activities, on diadromous fish from the proposed development has been undertaken in Section 6.2 of this Technical Appendix, and due regard has been given to the potential connectivity with salmon from the River Moriston SAC and other important salmon and sea trout rivers in close proximity to the Proposed Works.
MD-SEDD	Scoping Opinion June 2025	It is advised that all local DSFBs, as listed in the MD-SEDD advice, should be consulted on the Proposed Works.	Local DSFB's have been consulted during the scoping process, with concern's raised addressed within this Technical Appendix. Further consultation is anticipated to take place on the EIAR for the proposed development.
NatureScot	Scoping Opinion June 2025	NatureScot advise that coastal and marine ecology should be scoped in. NatureScot advised that modelling studies for the potential impacts on coastal processes due to the inner harbour dredging, as detailed under heading 5 of Appendix A: Coastal	An assessment of the potential impacts of 'changes in physical processes resulting from capital dredging and installation of hard structures (e.g.,

Consultee	Date and Nature of Consultation	Summary of response	How and where addressed
		Processes and Geomorphology in the Scoping Opinion, must include the potential impacts on the protected coastal habitats.	changes in wave/tidal current regimes)' has been undertaken in Section 6.1 of this Technical Appendix, with reference to coastal processes modelling studies outlined in Chapter 10: Coastal Processes and Geomorphology.
NatureScot	Scoping Opinion June 2025	NatureScot notes that the subtidal sandbanks qualifying feature of the Moray Firth SAC can have a low resilience to the introduction or spread of INNS and advises that the Proposed Works have the potential to introduce and spread the invasive non-native species slipper limpet via the deposit of dredge material. NatureScot advise that a robust Port Biosecurity Plan with a strong focus on managing risks associated with slipper limpet and future monitoring of the invasive species is included as part of the EIA. The Scottish Ministers agree with NatureScot's advice and advise this potential impact must be scoped in for assessment within the EIA for both construction and operational phases.	An assessment of the potential impacts of the 'increased risk of introduction and/or spread of marine INNS' has been undertaken for both the construction and O&M phases of the proposed development in Section 6.1 of this Technical Appendix. A marine INNS biosecurity management plan has been produced for the proposed development (Chapter 5: Supporting Information and Assessments) as an appendix. Due regard has been given to managing risks associated with slipper limpet and future monitoring of INNS.
NatureScot	Scoping Opinion June 2025	NatureScot advise that the deposit of rock armour might adversely affect the Inner Moray Firth Ramsar Site habitats and/or replace them with artificial structures where currently natural coastal habitats predominate.	An assessment of the potential impacts of rock armour deposits on marine and coastal habitats has been undertaken in Section 6.1 of this Technical Appendix,

Consultee	Date and Nature of Consultation	Summary of response	How and where addressed
			including the impacts of 'Permanent and/or long-term habitat loss/alteration from introduction of hard structures' (Section 6.1.2.1).
NatureScot	Scoping Opinion June 2025	NatureScot advised that the deeper dredge could significantly increase the harbours tidal volume and therefore hydrology. This could cause the inlets main tidal channel to alter its profile and/or width, potentially changing the extent of the sand dune, shingle and saltmarsh habitats of the Inner Moray Firth Ramsar Site. Additionally, any change to inundation characteristics on the saltmarsh could affect the nature and characteristics of this habitat, which can be sensitive to such changes.	An assessment of the potential impacts of 'changes in physical processes resulting from capital dredging and installation of hard structures (e.g., changes in wave/tidal current regimes)' has been undertaken in Section 6.1 of this Technical Appendix, with reference to coastal processes modelling studies outlined in Chapter 10: Coastal Processes and Geomorphology.
NatureScot	Scoping Opinion June 2025	NatureScot advise that the dredging has the potential to affect Whiteness Sands, which supports the Inner Moray Firth Ramsar Site habitats of sand and mudflats, through increasing the tidal volume and therefore increasing water flow through the access channel.	An assessment of the potential impacts of 'changes in physical processes resulting from capital dredging and installation of hard structures (e.g., changes in wave/tidal current regimes)' has been undertaken in Section 6.1 of this Technical Appendix, with reference to coastal processes modelling studies outlined in Chapter 10: Coastal Processes and Geomorphology.
NatureScot	Scoping Opinion June 2025	NatureScot also advised that there are potential impacts on sedimentation and water circulation within the Inner Moray Firth Ramsar Site from the dredging required to	An assessment of the potential impacts of 'changes in physical processes

Consultee	Date and Nature of Consultation	Summary of response	How and where addressed
		maintain Tern Island, and by the potential change to the volume of dredge sediment deposited at Whiteness Sands, compared to that currently licenced.	resulting from capital dredging and installation of hard structures (e.g., changes in wave/tidal current regimes)' has been undertaken in Section 6.1 of this Technical Appendix, with reference to coastal processes modelling studies outlined in Chapter 10: Coastal Processes and Geomorphology.
Nairn DSFB	Scoping Opinion June 2025	Nairn DSFB noted that migratory salmonid fish, specifically salmon and sea trout have not been considered as part of the Scoping Report. It advised that as the site of the Proposed Works lies in close proximity to the River Nairn, an important river for migratory salmonids, the impact of dredging and noise on these species should be assessed in the EIA.	An assessment of the potential impacts from UWN, and increased SSC and deposition from dredging activities, on diadromous fish from the proposed development has been undertaken in Section 6.2 of this Technical Appendix. Due regard has been given to salmonids migrating from the River Nairn and through the Moray Firth.
The Highland Council	Scoping Opinion March 2025	The proposal have the potential to affect: • the Inner Moray Firth Ramsar; • Moray Firth SAC; • Moray Firth and Inner Moray Firth Special Protection Areas (SPA); and • Whiteness Head Site of SSSI. The EIA must therefore assess the direct and indirect impacts on these protected areas and their qualifying interests in the context of their conservation / management objectives. The assessment must also consider the impact of the proposal as a single	As highlighted in Chapter 15: Schedule of Mitigation and Enhancements, an Appropriate Assessment (AA) will be carried out by NatureScot, drawing on information provided as part of the EIAR on potential impacts to the Inner Moray Firth SPA and the Inner Moray Firth SPA and SAC.

Consultee	Date and Nature of Consultation	Summary of response	How and where addressed
		development and cumulatively with other developments affecting these protected areas.	An assessment of both direct and indirect impacts of the proposed development on qualifying features of designated sites including the Inner Moray Firth Ramsar, Moray Firth SAC and Whiteness Head SSSI has been undertaken in Section 6.1 of this Technical Appendix. An assessment of the cumulative impacts of the proposed development with other developments has been undertaken in Section 7 of this Technical Appendix.
The Highland Council	Scoping Opinion March 2025	It would be expected that any potential barriers to salmon migration to be considered. The cumulative impacts should be considered, particularly those within the Cromarty and Moray Firth.	An assessment of the potential impacts on diadromous fish from the proposed development has been undertaken in Section 6.2 of this Technical Appendix. Particular regard has been given to the potential for barriers to migration from UWN, and sediment plumes from the proposed development. The potential for cumulative impacts on diadromous fish has also been assessed in Section 7 of this Technical Appendix (with

Consultee	Date and Nature of Consultation	Summary of response	How and where addressed
			particular regard to those within the Cromarty and Moray Firth).

4. Baseline

The overall aim of this Technical Appendix is to assess the potential impacts arising from the proposed development, on key issues raised within the scoping opinion relating to marine and coastal habitats, and diadromous fish.

4.1 Marine and Coastal Ecology Study Areas

For the purposes of this report, the marine and coastal ecology Study Areas are presented in Figure 5.1 below, and are defined as the following spatial scales for the respective topics of this Technical Appendix:

- Marine and coastal habitats Study Area
    - The Study Area for marine and coastal habitat receptors is defined by the greatest zone of influence from the proposed development works for these features. This is anticipated to result from indirect effects that arise from changes to the physical environment, particularly increased suspended sediment and sediment deposition. The Study Area is therefore defined by the area over which suspended sediment might travel following disturbance from the proposed works. In the absence of sediment plume modelling, the Study Area represents a buffer around the proposed development defined by the mean spring tidal excursion. This represents the expected maximum distance that suspended sediments may be transported on a mean spring tide in a flood and/or ebb direction, although most suspended sediments are expected to be deposited much closer to the disturbance activity. The closest mean spring tidal excursion distance to the proposed development is located approximately 4 kilometres (km) at Riff Bank (ABPmer, 2025) and has been used as a proxy as the expected maximum distance that suspended sediments may be transported. Here, the tidal excursion distance is approximately 1.1 km. For marine and coastal habitat receptors, a precautionary 2 km Study Area for suspended sediment has been defined and is referred to as the 'marine and coastal habitat Study Area' in this Technical Appendix (Figure 5.1). Direct impacts on marine and coastal habitat receptors, from impacts such as habitat disturbance and habitat loss, will be encapsulated within the proposed development boundary, and defined Study Area.
- Diadromous fish Study Area
    - For diadromous fish receptors, a wider Study Area has been defined, by potential impact ranges from UWN, representing the greatest zone of influence from the proposed development works on diadromous fish receptors. This area has been informed by the outputs of the UWN modelling,

undertaken for the proposed development. The greatest range of impact from UWN, from impact piling operations, is 1,760 m (for Temporary Threshold Shift (TTS)), with a potential wider range of impacts arising from behavioural effects. As a precautionary measure, considering the mobile nature of diadromous fish receptors, the Study Area has been defined as a 5 km buffer from the proposed development, and is referred to as the 'diadromous fish Study Area' in this Technical Appendix (Figure 5.1). Potential impacts on diadromous fish arising from sediment disturbance, and release of sediment bound contaminants, will be encapsulated within this defined Study Area.

- Disposal site Study Area
    - A further Study Area has been defined, to encapsulate the greatest zone of influence from spoil disposal at the Burghead disposal site. The greatest range of impact from these works will arise from increased SSC and sediment deposition. The disposal site Study Area is therefore defined by the area over which suspended sediment might travel following spoil disposal, as defined by the mean spring tidal excursion. The tidal excursion at the Burghead disposal site is approximately 1.3 km (ABPmer, 2025); therefore, as a precautionary measure, a 2 km Study Area for suspended sediment has been defined and is referred to as the 'disposal site Study Area' in this Technical Appendix (Figure 5.1).

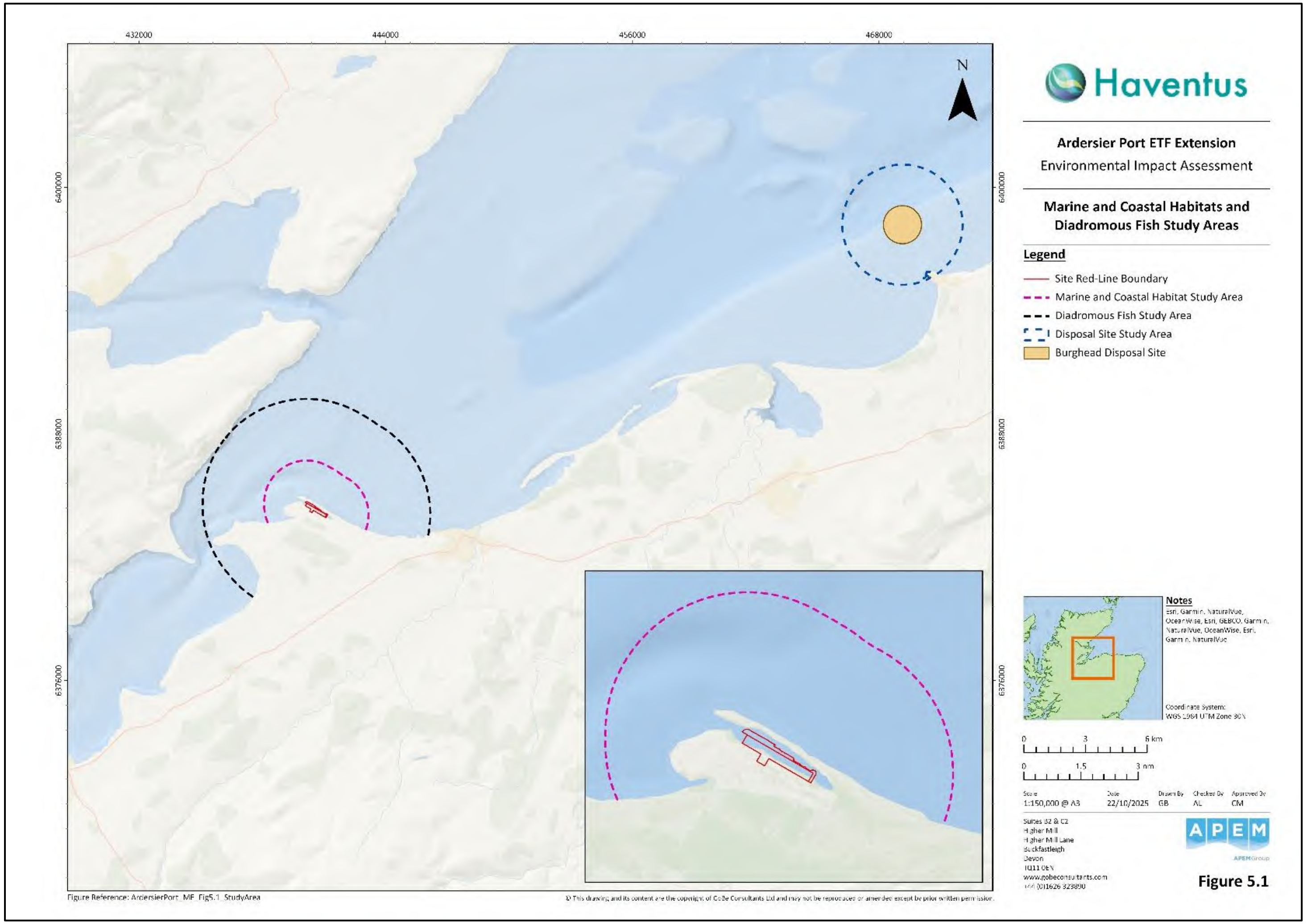

Figure 5.1. Marine and Coastal Habitats and Diadromous Fish Study Areas.

4.2 Desktop Study

To inform the assessment on marine and coastal habitats and diadromous fish, a high level desk-based review has been conducted using a range of existing ecological and environmental data (Table 5.3).

Table 5.3. Summary of desk-based review sources used.

Source	Summary
Ardersier Port Expansion Chapter 12: Terrestrial Ecology -Technical Appendix 12.13: Phase 1 and Habitat Condition Assessment	Site-specific Phase I walkover habitat survey and condition assessment of terrestrial habitats, conducted by Highland Ecology and Development (HED) ltd for the proposed development.
Ardersier Port Expansion Chapter 12: Terrestrial Ecology -Technical Appendix 12.15: National Vegetation Classification (NVC)	Site-specific NVC walkover survey of terrestrial habitats conducted by HED ltd for the proposed development.
Ardersier Port Habitat Survey Update (EnviroCentre, 2024)	UK habitat and NVC walkover surveys of terrestrial habitats conducted by EnviroCentre ltd at Ardersier Port.
Former Fabrication Yard Ardersier EIAR - Technical Appendix 8.3: Intertidal and Benthic Ecology (EnviroCentre, 2018a)	Phase I intertidal walkover survey conducted by EnviroCentre ltd across the intertidal area of Ardersier Port including Whiteness Head as part of the previous EIAR in 2018 for construction and dredging works at Ardersier Port.
Ardersier Port Proposed Offshore Renewables Manufacturing and Port Facility Environmental Statement (ES) Volume 2 (Savilles, 2013)	Phase I intertidal and subtidal benthic grab surveys and characterisation of intertidal and subtidal biotopes as part of the previous ES in 2013 for construction and dredging at Ardersier Port.
Phase 1 Whiteness Head Habitat Survey (Physlia, 2005)	Phase I intertidal walkover survey conducted by Physalia ltd in 2005, characterising littoral and supralittoral habitats at Whiteness Head, in the vicinity of the former Ardersier Rig Yard.
National Biodiversity Network (NBN) Atlas (NBN, 2025)	Records of marine INNS within the marine and coastal habitat Study Area.
European Marine Observation and Data Network (EMODnet) broad scale seabed habitat map for Europe (EUSeaMap) (EMODnet, 2023)	European Nature Information System (EUNIS) Level 4 model, detailing biological zone and substrate across the study areas and wider region.
Information on species of conservation interest (JNCC, 2007)	Species specific data, of native species of conservation interest.
Scottish Salmon and Sea Trout Fishery Statistics (2024)	Long-term records on catches of Atlantic salmon and sea trout.

4.3 Designated Sites

There are several designated sites with marine and coastal habitat qualifying features which interact with the marine and coastal habitat Study Area, and the Disposal site Study Area. No designated sites with qualifying diadromous fish features lie within the diadromous fish Study Area or the Disposal site Study Area. One SAC (the River Moriston SAC) has been identified that has potential connectively with the diadromous fish Study Area, and the disposal site Study Area due to the potential for migrating Atlantic salmon to transit these areas.

All such designated sites with marine and coastal habitat and diadromous fish qualifying features that could be affected by the construction and O&M phases of the proposed development are set out in Table 5.4, and are shown relative to the proposed development and Burghead disposal site in Figure 5.2.

Table 5.4. Designated sites within the Study Area and their relevant qualifying interests and conservation/management objectives.

Site	Distance from the proposed development	Distance from the Burghead disposal site	Relevant Qualifying Features	Relevant Conservation Objectives
Whiteness Head SSSI	0.00 km	28.37 km	Sandflats Saltmarsh Sand dunes Shingle	**Objectives for Management** • To maintain and where appropriate manage coastal processes and features in order to safeguard the extent and condition of the special habitats and landforms present. • To maintain habitats and conditions suitable for important bird populations by avoiding damage and disturbance. To maintain habitats and conditions suitable for rare and scarce plants and invertebrates associated with the sandflats, saltmarsh and shingle spit.
Inner Moray Firth Ramsar site	0.00 km	28.37 km	Mudflat Sandflat Saltmarsh Shingle	There are no specific conservation objectives or management measures for the Inner Moray Firth Ramsar site. Conservation objectives for the Inner Moray Firth SPA include: • To avoid deterioration of the habitats of the qualifying species, thus ensuring that the integrity of the site is maintained. • To ensure for the qualifying species of the Inner Moray Firth SPA that the following are maintained in the long term: ○ Distribution and extent of habitats supporting the species. Structure, function and supporting processes of the habitats supporting the species.

Site	Distance from the proposed development	Distance from the Burghead disposal site	Relevant Qualifying Features	Relevant Conservation Objectives
Moray Firth SAC	0.18 km	0 km	**Annex I habitats that are a primary reason for selection of this site:** Sandbanks which are slightly covered by seawater all of the time (1110)	**Conservation Objectives for Sandbanks which are slightly covered by seawater all of the time (1110)** • Maintain/restore the extent and distribution of the habitat within the site. • Maintain/restore the structure and function of the habitat and the supporting environment on which it relies. Maintain/restore the distribution and viability of the typical species of the habitat.
River Moriston SAC	56.24 km Whilst this site doesn't lie within the proposed development Study Areas, there is potential for connectivity as Atlantic salmon migrate out of the River Moriston and into the Moray Firth.	85.71 km Whilst this site doesn't lie within the disposal site Study Area, there is potential for connectivity as Atlantic salmon migrate out of the River Moriston and into the Moray Firth.	**Annex II species present as a qualifying feature, but not a primary reason for site selection:** Atlantic salmon	**Conservation Objectives for Atlantic salmon** • Restore the population of Atlantic salmon, including range of genetic types, as a viable component of the site. • Restore the distribution of Atlantic salmon throughout the site. Restore the habitats supporting Atlantic salmon within the site and availability of food.

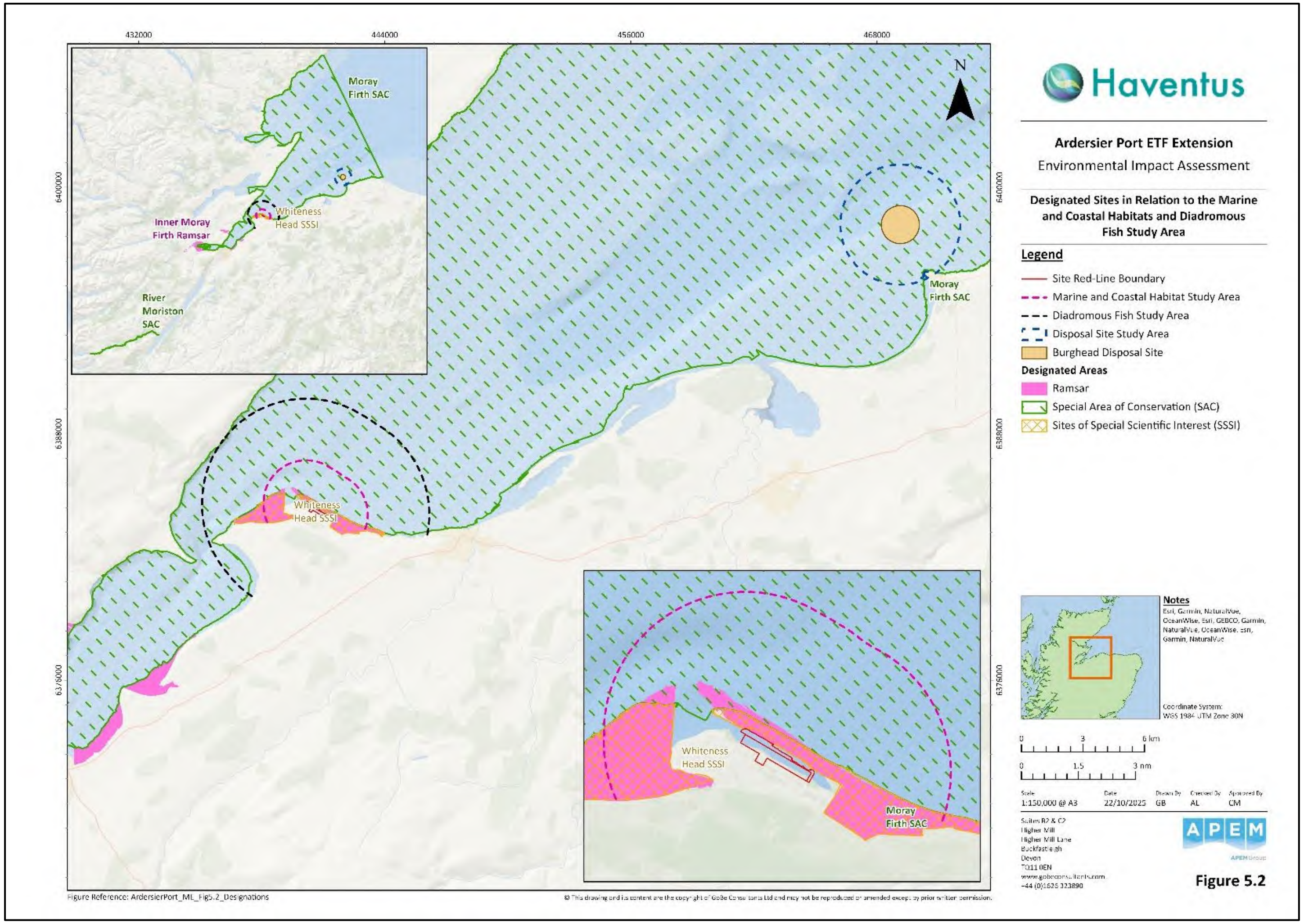

Figure 5.2. Designated Sites in Relation to the Marine and Coastal Habitats and Diadromous Fish Study Areas.

4.4 Marine and Coastal Habitats

4.4.1 Coastal Habitats

For the purpose of this Technical Appendix, coastal habitats are considered terrestrial and nearshore environments, influenced by the marine environment (i.e. salt spray and coastal weather), but are located above Mean High Water Springs (MHWS) and not exposed to tidal action. Within the marine and coastal habitat Study Area, coastal habitats include sand dunes which are described below in more detail.

Sand dunes

Sand dunes are a qualifying feature of the Whiteness Head SSSI, located within the marine and coastal habitat Study Area (Scottish National Heritage (SNH), 2013). Site-specific UK habitat and NVC surveys conducted as part of the proposed development identified that sand dune habitat is present along the length of the Whiteness Head spit. Sand dune habitat is primarily classified as ‘dune grasslands’ with a small area of ‘shifting dunes with marram’ to the east of Whiteness Head spit (EnviroCentre, 2024; Chapter 12: Terrestrial Ecology - Technical Appendix 12.13 and 12.15).

4.4.2 Intertidal Habitats

Intertidal habitats are those which are submerged by seawater during high tide but exposed to the air during low tide. Within the marine and coastal habitat Study Area, a range of intertidal habitats including mudflats, sandflats, shingle and saltmarsh are present (EnviroCentre, 2018a), which are described in below in more detail.

Mudflats

Mudflats are a qualifying feature of the Whiteness Head SSSI, located within the marine and coastal habitat Study Area (SNH, 2013). Mudflat habitat has previously been identified during an intertidal walkover survey conducted as part of the ES for construction and dredging at Ardersier Port in 2013 (Savills, 2013). In this survey, habitat classified as ‘muddy sand’ (LS.LSa.MuSa; MA525)[1] was recorded on the northern and more sheltered shoreline within Ardersier Port, adjacent to the Whiteness Head split. However, this habitat

[1] The name of this biotope has since been updated to ‘Polychaete/bivalve-dominated Atlantic littoral muddy sand’.

was not recorded following a walkover survey undertaken as part of ES for construction and dredging at Ardersier Port in 2018 (EnviroCentre, 2018a).

Sandflats

Sandflats are a qualifying feature of both the Whiteness Head SSSI and Inner Moray Firth Ramsar site, located within the marine and coastal habitat Study Area (Ramsar Sites Information Service (RSIS), 2006; SNH, 2013). Sandflat habitat has previously been identified during intertidal Phase 1 surveying at Whiteness Head spit by Physalia (2005), in which areas of intertidal sand (with occasional patches of shingle) were identified on the eastern southern shore and entire northern shore of the Whiteness Head spit. This area of intertidal sand was characterised by cockles, lugworm and, at low tide levels on exposed shores, razor shells.

Sandflats were also identified during intertidal walkover surveys conducted as part of the ES for construction and dredging at Ardersier Port in 2013 and 2018 (Savills, 2013; EnviroCentre, 2018a). In these surveys, habitats classified as 'fine sand' (LS.LSa.FiSa; MA524)[2] and 'mobile sand' (LS.LSa.MoSa; MA523)[3] were recorded.

'Fine sand' (LS.LSa.FiSa; MA524) is present on both the northern shoreline of Ardersier Port, with areas of sandflat not covered at low tide, towards the entrance of Ardersier Port. These areas of 'fine sand' (LS.LSa.FiSa; MA524) are characterised by casts of the polychaete lugworm (*Arenicola marina*) and common cockle (*Cerastoderma edule*). 'Fine sand' (LS.LSa.FiSa; MA524) is also present at the lower edge of the northern (outer) shoreline of the Whiteness Head spit, exposed to the Moray Firth (Savills, 2013; EnviroCentre, 2018a).

'Mobile sand' (LS.LSa.MoSa; MA523) is present at the more exposed areas of the entrance to Ardersier Port, on both shores, and on the northern (outer) shore of the Whiteness spit. These areas of 'mobile sand' (LS.LSa.MoSa; MA523) are not covered by low tide and are largely amphipod dominated habitats (Savills, 2013; EnviroCentre, 2018a).

Shingle

Shingle is a qualifying feature of both the Whiteness Head SSSI and Inner Moray Firth Ramsar site, located within the marine and coastal habitat Study Area (RSIS, 2006; SNH, 2013). Shingle habitat has previously been identified during intertidal Phase 1 surveying at Whiteness Head

[2] The name of this biotope has since been updated to 'Polychaete/amphipod-dominated fine sand shores'.

[3] The name of this biotope has since been updated to 'Barren or amphipod-dominated Atlantic littoral mobile sand'.

spit by Physalia (2005), in which areas of intertidal shingle (with occasional patches of exposed sand) supporting talitrid amphipod shrimps and occasionally barnacles, characterised the southern shore of the Whiteness Head spit to the west.

Shingle habitat was also identified during intertidal walkover surveys conducted as part of the ES for construction and dredging at Ardersier Port in 2013 and 2018 (Savills, 2013; EnviroCentre, 2018a). In these surveys, the intertidal shingle habitat was recorded to the west on the southern shoreline of Ardersier Port and on the northern shoreline towards the entrance of Ardersier Port and classified as 'barren shingle' (JNCC code: LS.LSC.Sh.BarSh; EUNIS code: MA3211)[4], (Savills, 2013; EnviroCentre, 2018a).

Saltmarsh

Saltmarsh is a qualifying feature of both the Whiteness Head SSSI and Inner Moray Firth Ramsar site, located within the marine and coastal habitat Study Area (RSIS, 2006; SNH, 2013). Saltmarsh habitat has previously been mapped as part of the national Scottish saltmarsh survey, undertaken between 2010 and 2012 and includes areas of saltmarsh to the east of the proposed development (SNH, 2012), (Figure 5.3). Findings from the national Scottish saltmarsh survey indicated that this area of saltmarsh was classified as back-barrier saltmarsh, with vegetation communities of *Plantago maritima–Armeria maritima* sub-community found in mosaic with *Juncus gerardii* dominated sub-community and *Carex flacca* sub-community, (Haynes, 2016).

Site-specific UK habitat and NVC surveys conducted as part of the proposed development also identified these areas of coastal saltmarsh to the east of the proposed development. Saltmarsh here was classified as '*Suaeda maritima* saltmarsh community' (EnviroCentre, 2024; Chapter 12: Terrestrial Ecology - Technical Appendix 12.13 and 12.15).

4.4.3 Subtidal Habitats

Subtidal habitats are those which are continually submerged by seawater at all times, irrespective of tidal fluctuations. The EUSeaMap (2023) habitat types (MSFD benthic broad habitats) mapped by EMODnet indicate that for the Moray Firth and within the marine and coastal habitat Study Area, subtidal habitat is 'Atlantic circalittoral seabed', consisting of large areas of 'Atlantic infralittoral sand' (MB52), 'Atlantic circalittoral sand' (MC52), 'Atlantic

[4] The name of this biotope has since been updated to 'Barren littoral shingle'.

infralittoral mud' (MB62) and 'Atlantic circalittoral mud' (MC52) (EMODnet, 2023), (Figure 5.3).

For the Burghead disposal site, the EUSeaMap (2023) habitat types by EMODnet indicate that for the disposal site Study Area, subtidal habitats are characterised by 'Atlantic infralittoral sand' (MB52), 'Atlantic circalittoral sand' (MC52), 'Atlantic circalittoral mud' (MC62), 'Atlantic offshore circalittoral sand' (MD52) and 'Atlantic offshore circalittoral mud' (MD62), (EMODnet, 2023) (Figure 5.4).

The Moray Firth SAC is designated for the Annex I habitat 'sandbanks which are slightly covered by seawater all of the time'. Subtidal sandbank habitat which occurs within the marine and coastal habitat Study Area and the disposal site Study Area is described below in more detail.

Sandbanks

The proposed development is immediately adjacent to the boundary of Moray Firth SAC, which is designated for the Annex I habitat 'sandbanks which are slightly covered by seawater all of the time' (Table 5.4), (NatureScot, 2025a). Within Moray Firth SAC, there is approximately 45,000 ha of subtidal sandbanks, of which, approximately 320 ha occur within the marine and coastal habitat Study Area (Figure 5.3). These sandbank habitats of the Moray Firth SAC consist of several different types which may occur within the marine and coastal habitat study area including 'moderately deep relict sandbanks', 'sand bars' and 'deep, macrotidal channels and associated sandbanks' (NatureScot, 2025a).

There are a number of biotopes within the Moray Firth associated with the subtidal sandbanks which may occur within the marine and coastal habitat Study Area, primarily variations of *Amphiura* communities. Shallow areas with clean, medium-fine sand are important habitat for *Echinocardum* sp. / *Ensis* sp. biotopes (NatureScot, 2025a). The deeper relict sandbanks host brittlestar beds with an abundance of common brittlestar (*Ophiothrix fragilis*) as well as a smaller abundance of the black brittlestar (*Ophiocomina nigra*). Cobbles and stones with keel worm (*Pomatoceros triqueter*) and coralline algae were also common (Foster-Smith *et al*., 2009).

Sandbank habitat was identified during a subtidal benthic grab survey conducted as part of the ES for construction and dredging at Ardersier Port in 2013 (Savills, 2013). The survey, identified the following subtidal sandbank habitats:

- 'Sublittoral sand in low or reduced salinity (lagoons)' (MB52);
- 'Infralittoral mobile clean sand with sparse fauna' (MB5231);

- '*Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand' (MB5233); and
- 'Polychaete/bivalve-dominated Atlantic littoral muddy sand' (MA525)[5].

Although the above habitats were recorded as part of the ES for construction and dredging at Ardersier Port in 2013 (Savills, 2013), it was not possible to ascertain where samples were taken in relation to the proposed development as mapping of samples were not available.

For the Burghead disposal site, sandbank habitats are present within the disposal site Study Area (Figure 5.4).

Horse mussel beds

Horse mussel (*Modiolus modiolus*) beds are a PMF in Scotland and are known to occur within the Moray Firth. However, the closest known horse mussel beds are approximately 6 km southwest of the proposed development off Chanonry Point and beyond the marine and coastal habitat Study Area (Figure 5.3).

[5] This biotope was originally recorded as 'Muddy Sand' (LS.LSa.MuSa) which has since been updated to 'Polychaete/bivalve-dominated Atlantic littoral muddy sand' (MA525).

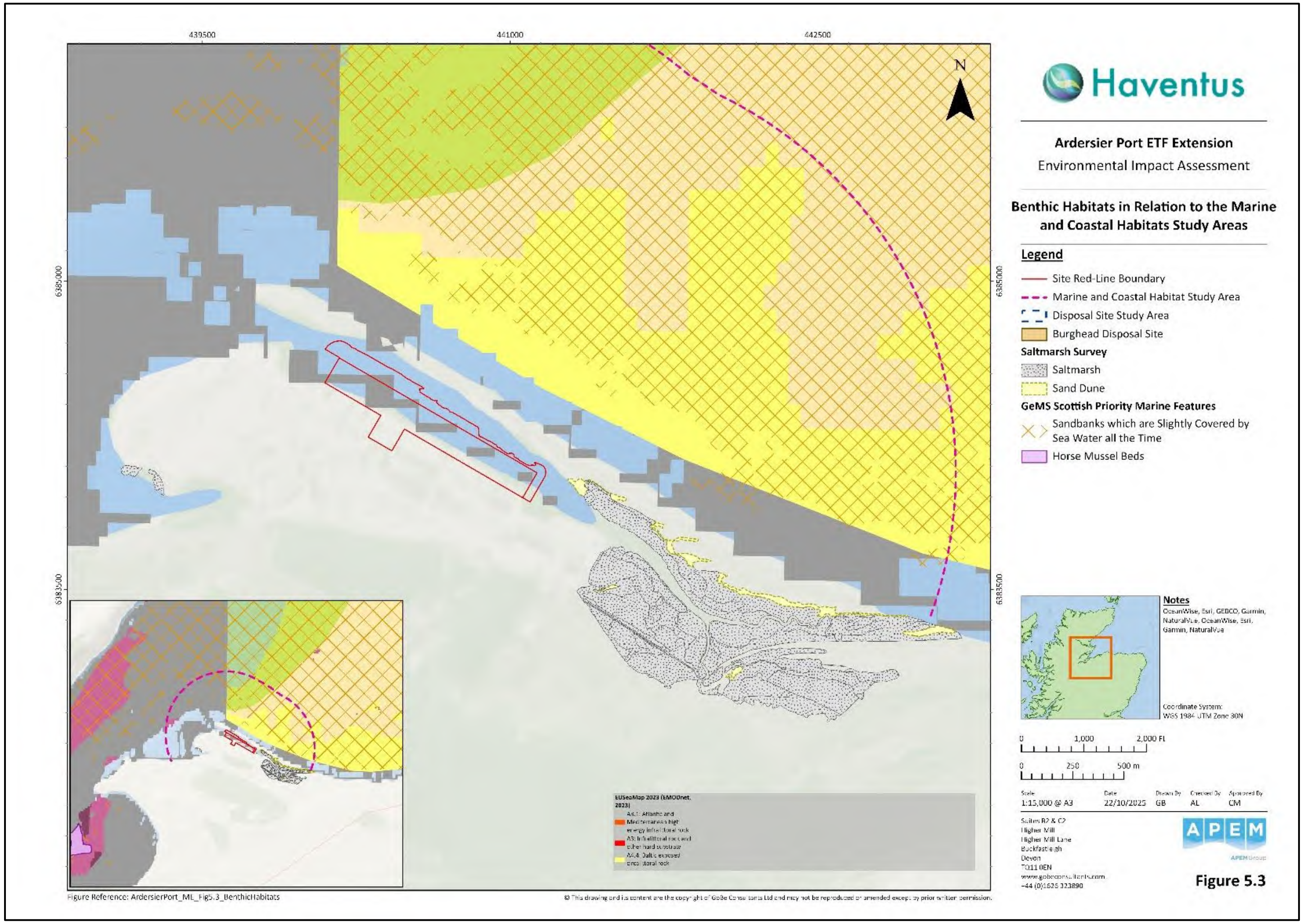

Figure 5.3. Benthic Habitats in relation to the Marine and Coastal Habitats Study Area.

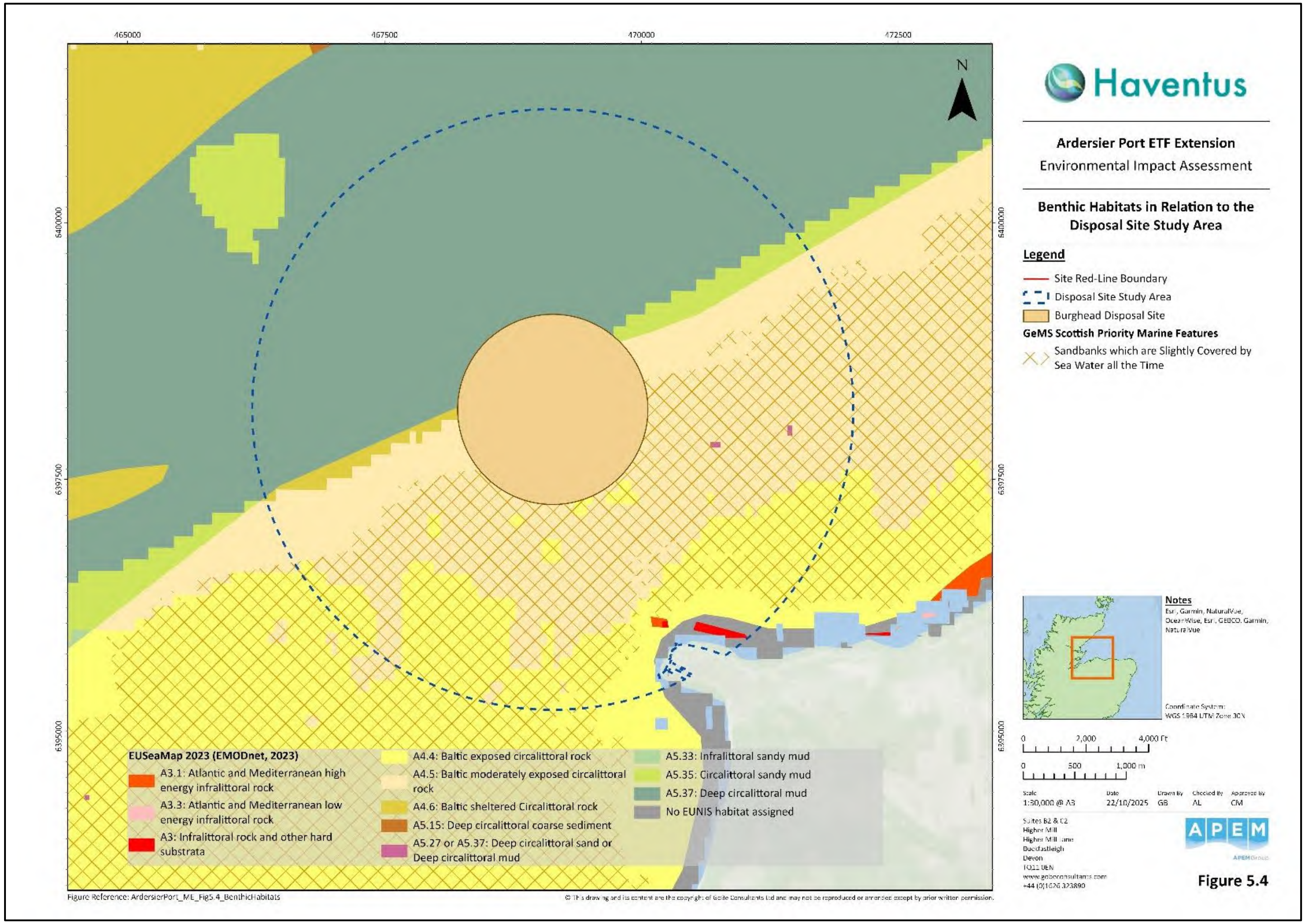

Figure 5.4. Benthic Habitats in Relation to the Disposal Site Study Area.

4.5 Invasive Non-Native Species

Non-Native Species (NNS) posing a threat to Scotland are listed by NatureScot (2025b). Of these, those that are widespread and well established in Scottish seas include wireweed (*Sargassum muticum*), green sea-fingers (*Codium fragile* subsp. *fragile*), the red algae (*Dasysiphonia japonica*), modest barnacle (*Austrominius modestus*), Japanese skeleton shrimp (*Caprella mutica*), leathery sea squirt (*Styela clava*), orange tipped sea squirt (*Corella eumyota*) and orange ripple bryozoan (*Schizoporella japonica*) (NatureScot, 2025b).

NNS only found in patchy locations in Scotland include American lobster (*Homarus americanus*), carpet sea-squirt (*Didemnum vexillum*), Pacific oyster (*Magallana gigas*), wakame (*Undaria pinnatifida*), and slipper limpet (*Crepidula fornicata*) (NatureScot, 2025b).

Species present in the British Isles but yet to reach Scotland include Chinese mitten crab (*Eriocheir sinensis*), Australian tubeworm (*Ficopomatus enigmaticus*), Asian shore crab (*Hemigrapsus sanguineus*), brush-clawed crab (*Hemigrapsus takanoi*), and American oyster drill (*Urosalpinx cinerea*) (NatureScot, 2025b).

Eight NNS have been recorded within the Moray Firth: Bonnemaison's hook weed (*Bonnemaisonia hamifera*); modest barnacle; Japanese skeleton shrimp; orange ripple bryozoan; slipper limpet; the soft-shelled clam (*Mya arenaria*); the orange cloak sea squirt (*Botrylloides violaceus*); and siphoned Japan weed (*Dasysiphonia japonica*) (NBN Atlas, 2025). Further information on NNS within the Moray Firth is provided in Chapter 5: Supporting Information and Assessments, which includes a marine INNS biosecurity management plan as an Appendix.

The intertidal walkover survey conducted as part of the previous EIAR for the construction and dredging works for the proposed development in 2018, noted that wireweed was present on the north shore of the Whiteness Head spit exposed to the Moray Firth. The species was washed up on the shore and not attached to substrate (EnviroCentre, 2018a).

Five of these species, wireweed, Japanese skeleton shrimp, orange ripple bryozoan, Bonnemaison's hookweed and slipper limpet are considered UK Priority marine INNS (GB NNSS, 2020).

No NBN Atlas marine INNS records were present within the Study Area (NBN Atlas, 2025).

4.6 Diadromous Fish

Migratory fish are species that spend part of their life cycle in freshwater and part in seawater; such species are termed diadromous (migrate between freshwater and saltwater) and can be anadromous (migrating up rivers from the sea to spawn) or catadromous (migrating from rivers to the sea to spawn).

Several migratory fish species have the potential to occur within the diadromous fish Study Area and disposal site Study Area, migrating to and from rivers and other freshwater bodies which have connectivity to the Study Areas, or transiting the Study Areas as part of their foraging activity. Migratory fish species that have the potential to traverse the Study Areas and exist in the nearby rivers and estuaries include Atlantic salmon, sea trout, European eel (*Anguilla Anguilla*), twaite shad (*Alosa fallax*), allis shad (*Alosa alosa*), river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*). Atlantic salmon, sea trout, twaite shad, allis shad and lampreys spend most of their adult lives in the oceans but return to freshwater to reproduce (anadromous). European eel are also migratory diadromous fish, but their lifestyle differs from anadromous fish; adult eels migrate out to sea to spawn, and their larvae make the return journey (catadromous).

4.6.1 Atlantic Salmon

Atlantic salmon are listed under Appendix II of the Bern Convention, which provides protection for species requiring strict conservation measures across Europe. In the UK, freshwater populations of Atlantic salmon are protected under the Conservation of Habitats and Species Regulations 2017, where they are recognised as a species of interest, particularly in SACs designated for salmon. The River Moriston SAC lies approximately 60 km from the Inverness Firth (56.24 km from the proposed development, and 85.71 km from the Burghead disposal site), and has Atlantic salmon listed as a qualifying feature, but not a primary reason for site selection. Whilst this site doesn’t lie within the defined Study Areas, there is potential for connectivity as Atlantic salmon migrate out of the designated river and into the Inverness and Moray Firth. The site, its relevant qualifying feature, and Conservation Objectives are summarised in Table 5.4 and shown relative to the proposed development in Figure 5.2. Atlantic salmon are also recognised as a priority species in the UK Biodiversity Framework and are Scottish PMF. Furthermore, the International Union for the Conservation of Nature (IUCN) classifies Atlantic salmon as “Endangered” in Europe, and “Near Threatened” on a global scale.

Salmon typically spawn in upper reaches of rivers or where suitable spawning gravel is located (Vladić and Petersson, 2015) (see Figure 5.5Figure 5 which shows rivers within the vicinity of the Proposed Development within which salmon are present). Atlantic salmon are referred to as Alvins after they hatch. Alvins are roughly 10 millimetres (mm) in size, still have a yolk sac and remain in interstitial gravel (Thorstad *et al*., 2011). After Alvins have used their yolk sac and grown to roughly 20 mm they are then referred to as fry and are found to inhabit slightly larger rocks and stones in river. After approximately one year after hatching Atlantic salmon are referred as par. They then undergo metamorphosis (often called smoltification) after two to three years, to survive in the marine environment and are referred to as smolts (Thorstad *et al*., 2011). External triggers are believed to be the cue for downstream smolt migration and include water discharge (flow and velocity) and temperature (McCormick *et al*., 1998; Thorstad *et al*., 2011).

The timing of the spring smolt migration is believed to significantly influence marine survival, ensuring that smolts arrive at the sea when ocean conditions, such as temperature and prey availability, are optimal. In Scottish rivers in proximity to the proposed development, smolt migration generally occurs between mid-April and mid-May. This aligns with the precautionary 'sensitive window for development activity' of day 103 of the year (April 13) to day 145 (May 25), as defined by Malcolm *et al*. (2015) to encapsulate the duration wherein large numbers of smolts are likely to be migrating into coastal waters. Although, the majority of smolts tend to migrate within a more concentrated period of one to two weeks. Smolts frequently travel downstream in groups or shoals, potentially providing them with some protection against predators. The smolt migration period, especially when smolts enter estuaries, is often marked by high mortality rates, primarily due to predation (Kocik *et al*., 2009; Thorstad *et al*., 2012). Upon reaching the sea, the movement of salmon smolts can be complex. Some smolts head directly out to sea, while others move in various directions, yet the overall movement is consistently seaward and active rather than passive (Thorstad *et al*., 2007).

The duration salmon spend at sea before returning to their natal rivers varies; in most Scottish west coast rivers, the majority return after a single winter at sea, and these fish are called grilse or single winter salmon (SWS). Two and three-sea winter salmon, also referred to as multi-sea-winter (MSW) salmon also exist but are generally less abundant than grilse. In the past ten to fifteen years, telemetry has provided insights into the movements of salmon at sea. Studies have shown that adult salmon are typically surface-oriented (Davidsen *et al*., 2013; Holm *et al*., 2006). Studies by Marine Scotland Science (MSS) into salmon swimming depth, confirmed that salmon spend most of their time near the surface (Godfrey *et al*., 2014; 2015). Despite their surface orientation, salmon were found to still utilise the full range of available depths. It is important to note however, that MSS studies mainly focus on salmon in the open sea and Pentland Firth.

Salmon in the open sea travel quickly, covering 50 to 100 km per day relative to the ground (Stewart *et al*., 2006). However, their migration speed decreases in coastal areas, likely because they need time to identify their natal region and river. In fact, salmon might not home directly to their natal river and sometimes enter other rivers where they may remain for a variable period before moving downstream to find their natal river (Stewart *et al*., 2006). Upon reaching the natal river, salmon can wait around the estuarine reaches for many days or even weeks until conditions, usually increased discharge, are suitable for them to pass into freshwater (Solomon and Sambrook, 2004). Many salmon die after spawning and those that survive will return to sea as kelts, and some of these will regain condition and spawn again (Mills, 1989).

A study by Newton *et al*. (2017) investigated the movements of Atlantic salmon smolt in the Cromarty and Moray Firths; the study observed relatively rapid downstream migration, with the fish taking an average of eight days to travel approximately 62 km. An eastern movement of smolt was observed from the Cromarty Firth, with observations made up to 30 km from shore in the marine environment, and less than 60 km from the river mouth. This is supported by Thorstad *et al*. (2004) and Finstad *et al*. (2005) who noted that smolts undergo rapid migrations towards open marine areas, away from their river of origin and in general do not follow nearby shores. However, contradictory evidence from Malcolm *et al*. (2010), suggests that smolt utilise nearshore areas at the commencement of their marine migration. A study investigating the migratory routes of adult Atlantic salmon in Scotland observed a general migratory pattern, whereby salmon migrate through the North Sea, and then travel along the coast back to their home river (Malcolm *et al*., 2010).

As aforementioned, Atlantic salmon are known to be present in several rivers which have been given SAC designation due to their presence. Additionally, Atlantic salmon are known to be present in several other non-designated rivers and water bodies which enter the Inverness and Moray Firth. To support the Conservation of Salmon (Scotland) Regulations 2016, the conservation status of Scottish salmon stocks in individual rivers is assessed each year, and gradings applied depending on the outcomes. This process is used to apply restrictions (such as catch and release) where stocks are in poor condition. Those rivers assessed as being of ‘good’ (grade 1), ‘moderate’ (grade 2) and ‘poor’ (grade 3) status, reflecting the vulnerability of the salmon stocks, are identified in Figure 5.5 below. Rivers of ‘poor’ status (and therefore highest vulnerability) are characterised by a probability of less than 60% to achieve their conservation limit, which is based on the chance that the salmon stock reached its egg requirement during each of the last five years. The allocation of a ‘poor’ status to a river, leads to the enforcement of mandatory catch and release regulations as a measure to support conservation objectives within these river systems (Scottish Government, 2025).

The proposed development lies in proximity to, or within the migratory pathway for salmon to the River Ness, the River Moriston and the River Beauly. All three rivers show an increased likelihood of meeting their egg requirements targets in 2024 compared to 2023. The River Ness holds a ‘moderate’ (grade 2) status, with a 78.8% chance of meeting the egg requirement. This classification also reflects the influence of the presence of the River Moriston SAC. The River Moriston shares the same ‘moderate’ status but has a higher probability of 91.71%. In contrast, the River Beauly is classified as ‘good’ (grade 1), with a

76.77% chance of meeting the target. The development is also close to the River Nairn, which is rated 'good' (grade 1). However, its 82.72% chance of meeting the egg requirement in 2024 represents a decrease from the previous year. The Burghead disposal site, where dredge spoil will be deposited, lies approximately 9 km east of the River Findhorn and 13 km west of the River Lossie. The River Findhorn is rated 'good' (grade 1), with a 90.12% chance of meeting the egg requirement in 2024, an improvement from 2023. In contrast, the River Lossie is classified as 'poor' (grade 3), with only a 5.06% chance of meeting its target, marking a significant decline from 62.05% in 2020 (Scottish Government, 2025).

Figure 5.5, shows all rivers known for the presence of Atlantic salmon as well as the River Moriston SAC, designated for Atlantic salmon, relative to the proposed development and the Burghead disposal site.

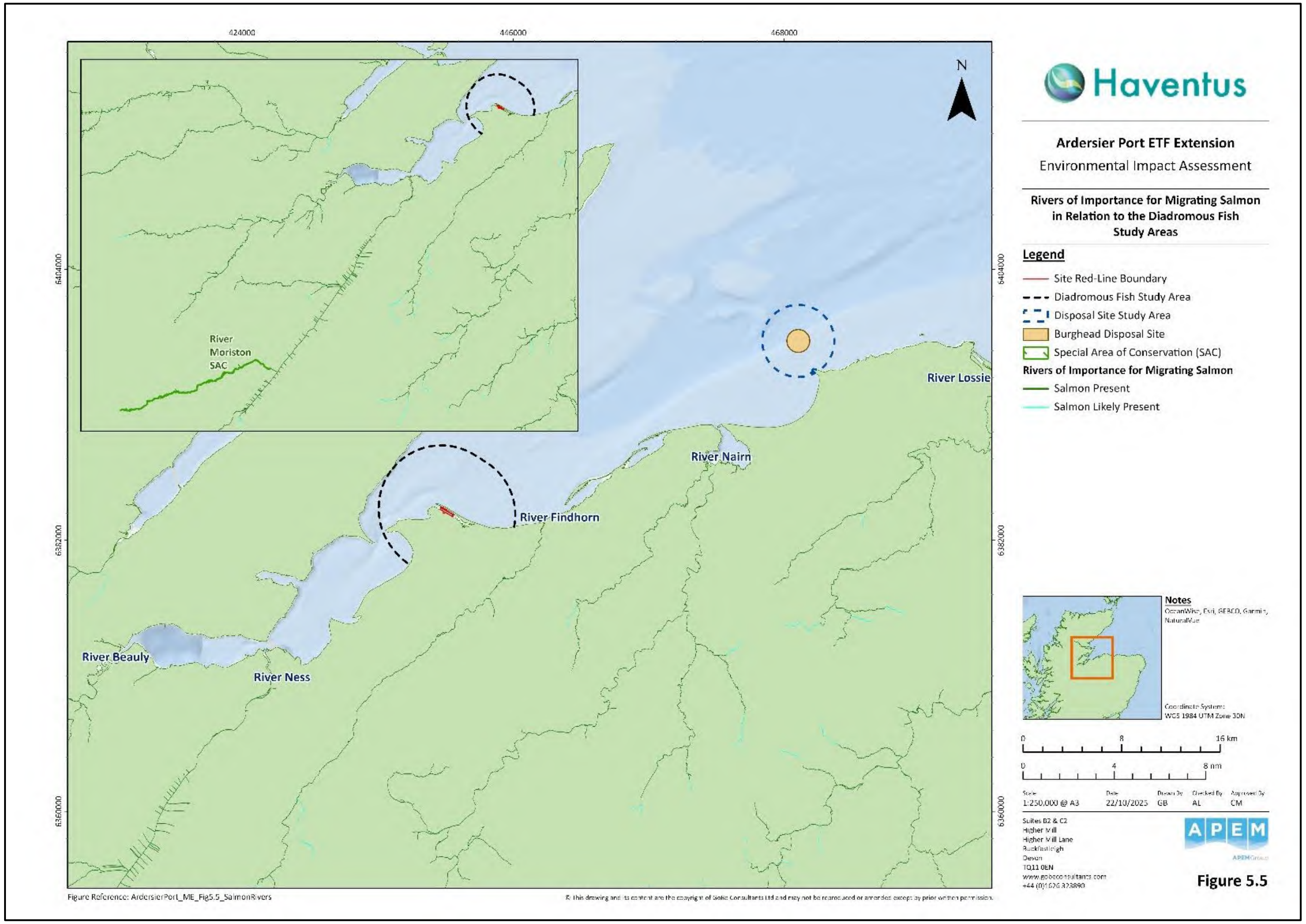

Figure 5.5. Rivers of Importance for Migrating Salmon in Relation to the Diadromous Fish Study Areas.

According to the Scottish Salmon and Sea Trout Fishery Statistics (2024), the total reported rod catch of wild salmon in Scottish rivers in 2024 was 46,978, 114% of the previous five-year average. Whilst the 2024 catches reflect an increase, they remain the among the lowest catches since records began in 1952. In 2024, catch and release accounted for 98% of the total rod catch in 2024, and 99% of the rod-caught spring MSW salmon. The reported spring MSW salmon catch was 2,593, the fourth lowest catch on record, but 104% of the previous five-year average. Figure 5.6 shows the temporal trends in annual total rod caught wild Atlantic Salmon from 1952 to 2024. Whilst there is interannual-variation in the total number of Atlantic salmon caught in Scottish waters, there is an overall observable decline since 2010. A report by Marine Scotland and Fisheries Management Scotland (2023) identified the key pressures acting on salmon in Scotland, with an aim to inform management and policy at local and national scales. The key pressures identified on Atlantic salmon populations in the east of Scotland were considered to be bird predation, and barriers to upstream migration. Pressures relating to climate change were identified as the greatest emerging threat to Atlantic salmon, with developing pressures also considered to be arising from marine developments and invasive crayfish, although the severity was concluded to be low, with uncertainty over their impacts.

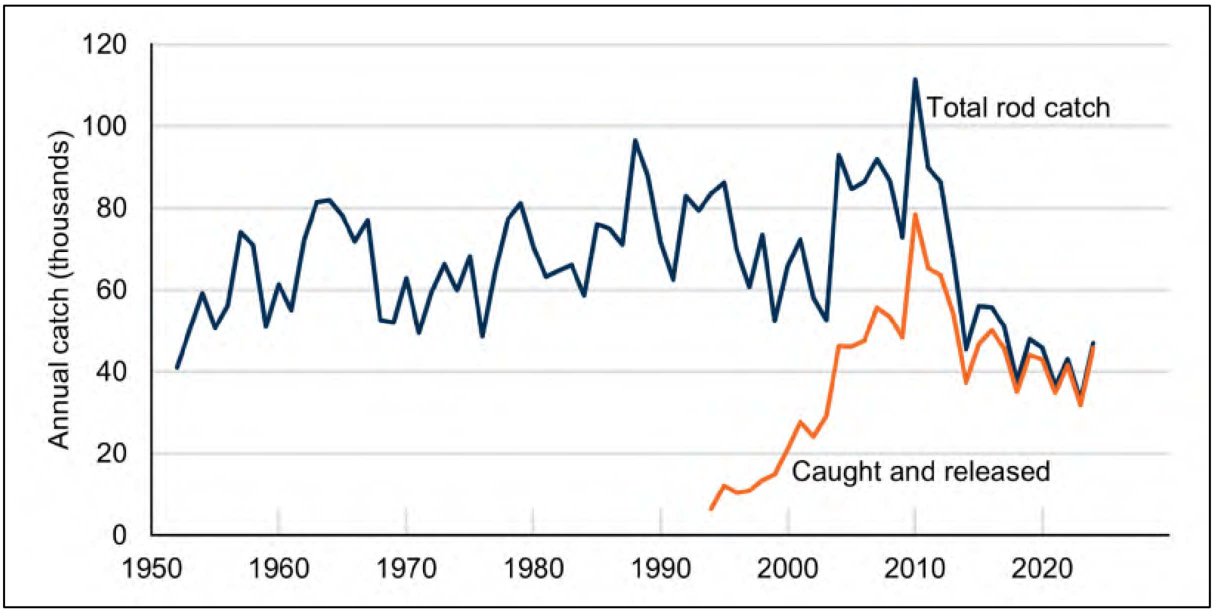

Figure 5.6. Annual number of salmon reported caught by rod fisheries since 1952, and annual number of salmon reported caught and released by rod fisheries since 1994 (Data source: 2024 Scottish salmon and sea trout fishery statistics, Supplementary Tables, Table 1, from the Scottish Government's Marine Directorate).

Taking the above into account, it can be considered with confidence that Atlantic salmon will be present within the Study Areas during their migration to and from their spawning rivers.

4.6.2 Sea Trout

Sea trout are found throughout Scotland, inhabiting headwater streams, lowland rivers, estuaries and some coastal marine waters (Scottish Wildlife Trust, 2018). Sea trout spend a number of years in freshwater before migrating out to coastal waters.

Sea trout often return to freshwater to spawn; netting and tracking data for post-smolt sea trout suggest that the species typically remain close to the coast for the first couple of months before moving further offshore (Finstad *et al*., 2005; as cited in Malcolm *et al*., 2010). There is little consistency in observed migratory patterns of adult sea trout, with studies on the west coast of Scotland suggesting locally constrained areas and contrasting studies suggesting wide range migrations supported by offshore fishing vessel catches of the species suggesting offshore movement and migrations (Malcolm *et al*., 2010). Sea trout are known to be present in several rivers and water bodies which enter the Inverness and Moray Firth. Notably, the proposed development lies in proximity to the River Nairn, with the Burghead disposal site located between the River Findhorn and the River Lossie, all three of which are considered important rivers for sea trout.

According to the Scottish Salmon and Sea Trout Fishery Statistics (2024), the total reported rod catch of sea trout in Scottish waters in 2024 was 13,876, 93% of the previous five-year average, and a decrease of 12% when compared to 2023 where 15,802 sea trout were caught. In 2024, the total rod catch of finnock was 7,329, 102% of the previous five-year average, and an increase of 11% when compared to 2023, where 6,593 were caught. The reported retained catch and release of sea trout in 2024, accounted for 94% of the total rod catch, reflecting the highest percentage of released rod caught sea tout since recorded began in 1994. Figure 5.7 shows temporal trends in annual rod caught wild sea trout in Scottish waters from 1952 to 2024. There is large interannual-variation in the total number of sea trout caught, however there is an observable decline in the number caught.

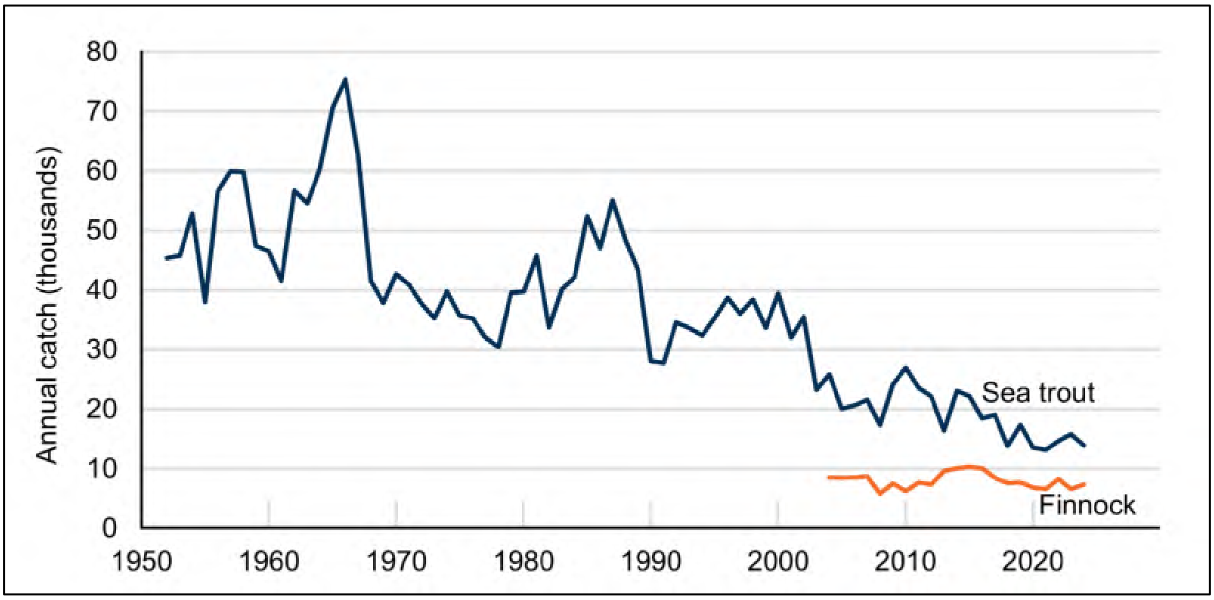

Figure 5.7. Annual number of sea trout caught by rod fisheries since 1952, and annual number of finnock reported since by rod fisheries since 2004 (data source: 2024 Scottish salmon and sea trout fishery statistics, Supplementary Tables, Table 7, from the Scottish Government's Marine Directorate).

Taking the above into account, it can be considered with confidence that sea trout will be present within the Study Area during their migration to and from their spawning rivers.

4.6.3 European Eel

European Eel are listed as critically endangered on the IUCN Red List and are UK Biodiversity Action Plan (BAP) priority fish species. In addition, the Scottish Eel Management Plan was established in 2010 in response to the Eel Recovery Plan (formed under European Commission Council Regulation No 1100/2007) with the aim of improving the European eel stocks (Defra, 2010). European eel are catadromous, feeding in freshwater and spawning at sea. The movements of juveniles migrating from the spawning grounds in the Sargasso Sea are thought to be primarily dictated by the course of prevailing currents, and there is a general assumption that proximity to Atlantic currents is associated with high eel numbers (Malcolm *et al*., 2010), and due to the location and direction of the North Atlantic Drift current, the migratory movements of juvenile European eel are assumed to follow a southern movement along the coast. In contrast to this, the migration routes of adult eels do not appear to hug the UK coastline, however, data on the understanding of European eel movements are scarce (Malcolm *et al*., 2010).

Whilst European eel are not exploited in Scottish waters, MSS undertakes monitoring of European eel stocks as part of the Scotland Eel Management Plan. Adult silver eels are measured at trap sites in Scotland, to estimate the biomass of adult silver eels leaving Scotland to breed (Scottish Government, 2020). The outputs of the monitoring (2008-2018), show annual variation in silver eel escapement, peaking in 2014, and showing an observable decline from 2015-2018, although escapement levels have remained above the defined escapement threshold (set by European Regulation 1100/2007) since 2013 (Scottish Government, 2020).

Considering the conservation importance of European eel, and taking a precautionary approach (based on their migratory nature), it is assumed that there is the potential for European eel to transit the Study Areas.

4.6.4 Allis and Twaite Shad

The allis shad and the twaite shad are both anadromous fish species found in the northeast Atlantic Ocean, including the North Sea and coastal waters of Scotland. The habitat requirements of twaite shad are not fully understood, but they are known to spawn at night in shallow areas near deeper pools, with their eggs sinking into the spaces between coarse gravel and cobble substrates (JNCC, 2021a). Allis shad also have poorly understood habitat needs, spending most of their adult lives in coastal waters and estuaries before migrating into rivers to spawn, sometimes traveling up to 800 km upstream in continental Europe. Allis shad spawn at night, releasing their eggs into the current where they settle among gaps in gravelly substrates, with shallow, gravelly areas adjacent to deep pools thought to represent optimal spawning habitat (JNCC, 2021b). Little is known about the adult distribution of allis shad and twaite shad in Scottish waters, although sparse records from the NBN Atlas, indicate the presence of twaite shad off of Fraserburgh.

Considering both twaite shad and allis shad are both listed on the Scottish Biodiversity list and taking a precautionary approach (based on their migratory natures), it is assumed that there is the potential for allis shad and twaite shad to transit the Study Areas.

4.6.5 River and Sea Lamprey

River lamprey and sea lamprey are designated under Appendix III of the Bern Convention, The Conservation of Habitats and Species Regulations (2017), Schedule 5 of the Wildlife and Countryside Act and are on the Scottish Biodiversity List.

River lamprey are widespread in the UK, typically occurring close to the coast (Barnes, 2008a). River lamprey are an anadromous species which grow to maturity in estuaries around Britain and then move into fresh water to spawn in clean rivers and streams. The larvae spend several years in silt beds before metamorphosing and migrating downstream to estuaries (Maitland, 2003).

Sea lamprey occur offshore throughout the UK, migrating upstream of rivers to spawn (Barnes, 2008b). Spawning in British rivers usually occurs in late May or June. After hatching, the larvae drift downstream, distributing themselves among suitable silt beds. The larvae spend several years in silt beds before metamorphosing and migrating downstream. Relatively little is known about them after they reach the sea, where they have been found in both shallow coastal and deep offshore waters (Maitland, 2003).

Considering their widespread distribution, and their migratory nature, it is assumed that there is the potential for river and sea lamprey to transit the Study Areas.

4.7 Valued Ecological Receptors

The value of ecological features is dependent upon their biodiversity, social, and economic value within a geographic framework of appropriate reference (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018). The most straightforward context for assessing ecological value is to identify those species and habitats that have specific biodiversity importance recognised through international or national legislation or local, regional or national conservation plans (e.g., OSPAR 'Threatened' and/or 'Declining' habitats/species, habitats/species on the Scottish Biodiversity List, and PMFs). Table 5.5 presents the Valued Ecological Receptors (VERs), the importance of each VER, and justification with reference to their conservation status.

Table 5.5. VERs within the Study Area.

VER / Representative Biotope(s)	Value	Justification	Interaction with Study Areas
Marine and Coastal Habitats			
Qualifying feature of SSSI and Ramsar Sites			
Mudflats Polychaete / bivalve dominated muddy sand shores (MA525)	International (for Inner Moray Firth Ramsar)	• Habitat of Principal Importance as per the Nature Conservation (Scotland) Act, 2004. • Qualifying feature of the Inner Moray Firth Ramsar as per the Ramsar Convention, 1971. • Mudflats and sandflats not covered by seawater at low tide are an Annex I habitat as per the Conservation of Habitats and Species Regulations, 2017.	• Located within the marine and coastal habitat Study Area, but beyond the footprint of the proposed development.
Sandflats 'Barren or amphipod-dominated mobile sand shores' (MA523) 'Barren littoral coarse sand' (MA5231) 'Polychaetes in littoral fine sand' (MA5241)	International (for Inner Moray Firth Ramsar)	• Qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar as per the Nature Conservation (Scotland) Act, 2004 and the Ramsar Convention, 1971 respectively. • Mudflats and sandflats not covered by seawater at low tide are an Annex I habitat as per the Conservation of Habitats and Species Regulations, 2017.	• Located within the marine and coastal habitat Study Area, but beyond the footprint of the proposed development.
Saltmarsh	International (for Inner	• Habitat of Principal Importance as per the Nature Conservation (Scotland) Act, 2004.	• Located within the marine and coastal habitat Study Area, but

VER / Representative Biotope(s)	Value	Justification	Interaction with Study Areas
'*Puccinellia maritima* salt-marsh community'	Moray Firth Ramsar)	• Qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar as per the Nature Conservation (Scotland) Act, 2004 and the Ramsar Convention, 1971 respectively. • Annex I habitat (Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) as per the Conservation of Habitats and Species Regulations, 2017	beyond the footprint of the proposed development.
Sand dune	National	• Qualifying feature of the Whiteness Head SSSI as per the Nature Conservation (Scotland) Act, 2004 and the Ramsar Convention, 1971 respectively.	• Located within the marine and coastal habitat Study Area, but beyond the footprint of the proposed development.
Shingle 'Barren littoral shingle' (MA3211)	International (for Inner Moray Firth Ramsar)	• Qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar. as per the Nature Conservation (Scotland) Act, 2004 and the Ramsar Convention, 1971 respectively.	• Located within the marine and coastal habitat Study Area, but beyond the footprint of the proposed development.
Annex I habitat features of SACs			
Sandbank '*Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand' (MB5233)	International	• Annex I habitat (Moray Firth SAC designated for Sandbanks which are slightly covered by sea water all the time) as per the Conservation of Habitats and Species Regulations, 2017; • Habitat of Principal Importance as per the Nature Conservation (Scotland) Act, 2004.; • Habitat of Conservation Interest as per the Conservation of Habitats and Species Regulations, 2017;	• Located within the marine and coastal habitat Study Area, but beyond the footprint of the proposed development.

VER / Representative Biotope(s)	Value	Justification	Interaction with Study Areas
PMF			
Horse mussel beds ‘*Modiolus modiolus* beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata’ (MC2231)	International	• Habitat of Principal Importance as per the Nature Conservation (Scotland) Act, 2004; • Habitat of Conservation Importance as per the Conservation of Habitats and Species Regulations, 2017; • OSPAR list of threatened and/or declining species and habitats as per the OSPAR convention, 1998; • PMF (Scotland) as per the Marine Scotland Act, 2010. • *Modiolus modiolus* beds are considered an Annex I biogenic reef habitat as per the Conservation of Habitats and Species Regulations, 2017	• Located approximately 6 km from the marine and coastal habitat Study Area.
Subtidal habitat			
Atlantic Infralittoral Sand ‘Sublittoral sand in low or reduced salinity (lagoons)’ (MB52) ‘Infralittoral mobile clean sand with sparse fauna’ (MB5231) ‘Nephtys cirrosa and Bathyporeia spp. in	National	• Recorded within regional surveys (Savills, 2013); • Habitat of Principal Importance as per the Nature Conservation (Scotland) Act, 2004; • Habitat of Conservation Importance as per the Conservation of Habitats and Species Regulations, 2017.	• Located within the marine and coastal habitat Study Area, with the potential to be present within the footprint of the proposed development.

VER / Representative Biotope(s)	Value	Justification	Interaction with Study Areas
infralittoral sand' (MB5233)			
Atlantic littoral sand Polychaete/bivalve-dominated Atlantic littoral muddy sand' (MA525)	National	• Recorded within regional surveys (Savills, 2013); • Habitat of Principal Importance as per the Nature Conservation (Scotland) Act, 2004.	• Located within the marine and coastal habitat Study Area, with the potential to be present within the footprint of the proposed development.
Diadromous Fish			
Atlantic salmon	International	• OSPAR list of threatened and/or declining species and habitats; • 'Vulnerable' on the IUCN Red List of threatened species; • Protected under the Convention on the Conservation of European Wildlife and Natural Habitats ('BERN') convention; • Protected under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003; • Protected under the Salmon Act (1986); • PMF (Scotland) as per the Marine Scotland Act, 2010; • Scottish Biodiversity list (as established by the Nature Conservation (Scotland) Act 2004); and • Qualifying feature of the nearby River Moriston SAC (as designated under the EU Habitats Directive (Directive 92/43/EEC))	• Potential for adult and juvenile receptors to transit the Study Areas during migration. • Salmon spawn in rivers and streams, and therefore there is no potential for eggs and larvae to be present within the Study Areas.
Sea trout	National	• PMF (Scotland) as per the Marine Scotland Act, 2010; • Scottish Biodiversity list (as established by the Nature Conservation (Scotland) Act 2004);	• Potential for adult and juvenile receptors to transit the Study Areas during migration.

VER / Representative Biotope(s)	Value	Justification	Interaction with Study Areas
		• Protected under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003; and • Protected under the Salmon Act (1986).	• Sea trout spawn in rivers and streams, and therefore there is no potential for eggs and larvae to be present within the Study areas.
European eel	International	• OSPAR list of threatened and/or declining species and habitats; • 'Critically endangered' on the IUCN Red List of threatened species; • Protected under the Scottish Eel Management Plan (2010); • PMF (Scotland) as per the Marine Scotland Act, 2010; • Scottish Biodiversity list (as established by the Nature Conservation (Scotland) Act 2004); • Scottish Biodiversity list (as established by the Nature Conservation (Scotland) Act 2004).	• Potential for adult and juvenile receptors to transit the Study Areas during migration. • European eel spawn in the Sargasso Sea, and therefore there is no potential for eggs and larvae to be present within the Study Areas.
Allis shad	International	• OSPAR list of threatened and/or declining species and habitats; and • Scottish Biodiversity list (as established by the Nature Conservation (Scotland) Act 2004).	• Potential for adult and juvenile receptors to transit the Study Areas during migration. • Allis shad spawn in rivers and streams, and therefore there is no potential for eggs and larvae to be present within the Study Areas.
Twaite shad	National	• Scottish Biodiversity list (as established by the Nature Conservation (Scotland) Act 2004).	• Potential for adult and juvenile receptors to transit the Study areas during migration. • Twaite shad spawn in rivers and streams, and therefore there is no

VER / Representative Biotope(s)	Value	Justification	Interaction with Study Areas
			potential for eggs and larvae to be present within the Study areas.
Sea lamprey	International	• OSPAR list of threatened and/or declining species and habitats; • Protected under the BERN convention; • Protected under the Salmon Act (1986); • PMF (Scotland) as per the Marine Scotland Act, 2010; • Scottish Biodiversity list (as established by the Nature Conservation (Scotland) Act 2004).	• Potential for adult and juvenile receptors to transit the Study Areas during migration. • Sea lamprey spawn in rivers and streams, and therefore there is no potential for eggs and larvae to be present within the Study Areas.
River lamprey	National	• PMF (Scotland) as per the Marine Scotland Act, 2010; and • Scottish Biodiversity list (as established by the Nature Conservation (Scotland) Act 2004).	• Potential for adult and juvenile receptors to transit the Study Areas during migration. • River lamprey spawn in rivers and streams, and therefore there is no potential for eggs and larvae to be present within the Study Areas.

5. Assessment Methodology

The overall aim of this Technical Appendix is to assess the potential impacts arising from the proposed development, on key issues raised within the scoping opinion relating to marine and coastal habitats and diadromous fish.

5.1 Guidance

The impacts and criteria used to determine sensitivity, magnitude and significance of effect on marine and coastal habitats and diadromous fish outlined in this Technical Appendix, have been undertaken in accordance with the following guidance documents:

- The CIEEM Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018):
  - The CIEEM guidance considers the importance of ecological features. Ecological features can be important for a variety of reasons and may relate, for example, to the quality, rarity or extent of habitats/species, and/or the extent to which they are threatened throughout their range, or to their rate of decline.
- Marine Life Information Network (MarLIN) on the Marine Evidence-based Sensitivity Assessment (MarESA) four-point scale (high – medium – low – not sensitive) (Tyler-Walters *et al.*, 2023):
  - The scale takes account of the resistance and recoverability (resilience) of a species or biotope in response to a stressor. Specific benchmarks (duration and intensity) are defined for the different impacts for which sensitivity has been assessed (e.g., smothering, abrasion, habitat alteration etc.). Detailed information on the benchmarks used and for further information on the definition of resistance and resilience can be found on the MarLIN website.

5.2 Criteria for Assessment

The process for determining the likely significance of effects is a two-stage process that involves defining the magnitude of the potential impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors.

5.2.1 Sensitivity

Sensitivity has been considered in the assessment of effects, taking into account factors such as receptor tolerance, resilience, and recovery potential. Information on receptor sensitivity to potential impacts is clearly described in the assessment narrative where relevant, and the criteria used to define sensitivity in this Technical Appendix are presented in Table 5.6. The MarLIN MarESA categories[6] have been used to support the definition of sensitivity within the assessment, where appropriate.

Table 5.6. Sensitivity criteria.

Sensitivity	Criteria
High	**Vulnerability:** The receptor cannot or has very low capacity to avoid, adapt or tolerate the impact. **Recoverability:** Partial recovery is only likely to occur after about 10 years and full recovery may take over 25 years.
Medium	**Vulnerability:** The receptor has limited capacity to avoid, adapt or tolerate the impact. **Recoverability:** Only partial recovery is likely within 5 years and full recovery is likely to take up to 10 years.
Low	**Vulnerability:** The receptor has a reasonable capacity to avoid, adapt or tolerate the impact. **Recoverability:** Full recovery will occur but will take many months (or more likely years) but should be complete within about five years.
Negligible	**Vulnerability:** The receptor has a high capacity to avoid, adapt or tolerate the impact. **Recoverability:** The receptor is anticipated to recover immediately (seconds to days).

5.2.2 Magnitude

The magnitude of an impact is defined by a series of factors, including the spatial extent, duration frequency and reversibility. Magnitude of impact has been assessed taking into account primary mitigation measures (i.e. embedded mitigation) designed into the proposed development to avoid or minimise environmental effects. Where an impact could reasonably be assigned to more than one level of magnitude, professional judgement has been used to determine which level is applicable. The magnitude criteria for marine and coastal habitat and diadromous fish receptors are defined in Table 5.7.Table 5.7. Magnitude criteria.

Table 5.7. Magnitude criteria.

Magnitude	Criteria
High	Fundamental, permanent/irreversible changes, over the whole receptor, and/or fundamental alteration to key characteristics or features of the particular receptors character or distinctiveness.

[6] MarLIN - The Marine Life Information Network - Marine Evidence based Sensitivity Assessment (MarESA)

Magnitude	Criteria
Medium	Considerable, permanent/irreversible changes, over the majority of the receptor, and/or discernible alteration to key characteristics or features of the particular receptors character or distinctiveness.
Low	Discernible, temporary change, over a minority of the receptor, and/or limited but discernible alteration to key characteristics or features of the particular receptors character or distinctiveness.
Negligible	Discernible, temporary change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the particular receptors character or distinctiveness.

5.2.3 Significance

Assessment of the significance of effect on marine and coastal habitat and diadromous fish receptors has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 5.8. In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached. The magnitude of the impact is correlated against the sensitivity of the receptor to provide a level of significance. On this basis, potential impacts are assessed as Negligible, Minor, Moderate or Major.

For the purposes of this assessment, any effects with a significance level of major and/or moderate have been deemed significant in EIA terms, while those of minor or negligible are deemed non-significant.

Table 5.8. Significance of effect matrix.

Significance of Effect		Sensitivity of Receptor			
		Negligible	Low	Medium	High
Magnitude of Effect	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	**Moderate**
	Medium	Negligible	Minor	**Moderate**	**Major**
	High	Negligible	**Moderate**	**Major**	**Major**

5.3 Embedded Mitigation

As the design of the proposed development has evolved, environmental constraints and considerations have been identified, enabling avoidance or reduction of potential environmental impacts where practicable (i.e. embedded mitigation measures) for marine and coastal habitats, and diadromous fish. These measures are presented below in Table 5.9.

Table 5.9. Embedded mitigation measures.

Embedded Mitigation	Rationale
Bunkering procedures, and Port Oil Spill Contingency Plans	Identify potential pollution sources and how the proposed development will respond to these spill events.
Construction Environmental Management Plan (CEMP)	Identifies the measures and procedures that will be in place on chemical usage, waste management, and any port related environmental policies.
Marine Environmental Policy	Marine Environmental Policy will set measurable environmental objectives and targets supported by a management programme that measures and monitors performance. It will involve and consult interested parties on environmental issues where appropriate, and systematically identify and assess environmental risks associated with port related activities. Marine Environmental Policy will also strive to achieve continual improvement in environmental management systems and performance.
Marine Mammal Mitigation Plan (MMMP)	The MMMP will include details of procedures to be implemented (e.g. soft starts and ramp up procedures) during piling activity. These measures will reduce the risk of injurious effects from UWN, on sensitive fish receptors.
Marine INNS biosecurity plan (Chapter 5: Supporting Information and Assessments)	The biosecurity management plan outlines activities at the port which pose risk of INNS introduction and/or spread, and recommends targeted, practical mitigation measures. Implementation of the developed biosecurity management plan therefore reduces the risk of INNS introduction into, and/or spread within, Ardersier Port.
Port Waste Management Plan (PWMP)	The PWMP will reduce environmental impact, promote resource efficiency, and maintain compliance with the Waste Framework Directive and national waste regulations.
Dredge Strategy/Method	Pre-construction sediment sampling of contaminants within the capital dredge area of the proposed development was conducted in 2025. The results of this will be reported within the Best Practice Environmental Option (BPEO). Subject to the results of contaminant analysis of sediment within the capital dredge area, a suitable dredge strategy/method will be developed (if necessary). The dredge strategy will ensure that no spread of material with elevated concentrations of contaminants will occur during dredging, and that no material with elevated concentrations of contaminants will be disposed of at the Burghead disposal site.

5.4 Assumptions and Limitations

- No dredge plume modelling has been undertaken for the proposed development in relation to potential impacts on marine and coastal ecology. As such, any assessment of effects on sensitive receptors is based on qualitative analysis, available baseline information (including sediment transport modelling undertaken by EnviroCentre between August 2023 and June 2025 and turbidity data collected by Haventus between March and August 2025, taken prior to, and during the phase 1 capital dredge), and hydrodynamic. spectral wave and sand transport modelling for the proposed development undertaken by EnviroCentre (Chapter 9: Hydrology and Hydrogeology; Chapter 10: Coastal Processes and Geomorphology).
- Site-specific survey data is limited in relation to the presence of intertidal and subtidal benthic habitats and species present. As such, any assessment of effects on sensitive receptors is based on available baseline information provided by historic intertidal and subtidal benthic surveys of the site, site-specific NVC surveys and publicly available datasets.

Data limitations have been managed by ensuring accurate interpretation of the data and clear understanding of its scope, together with cross-referencing between data sources. As data forms only part of the evidence base, the limitations identified are not considered to significantly affect the certainty, or reliability, of the impact assessments presented in Section 6.

5.5 Impacts Scoped In / Out of Assessment

The impacts that have been scoped in and out of the assessment for marine and coastal habitats and diadromous fish are presented in Table 5.10 and

Table 5.11 respectively. Key parameters for the proposed development are as described within the EIA (Chapter 2: Project Description). However, for the purpose of this Technical Appendix, key parameters for the assessment of concerns raised within the scoping opinion related to marine and coastal habitats and diadromous fish to impacts of the proposed development, are provided below in Table 5.10 and

Table 5.11. The key project parameters detailed in Table 5.10 represent worst-case assumptions to ensure a conservative and robust evaluation. This approach allows for a comprehensive assessment of potential risks and impacts, providing confidence that actual outcomes are likely to be more favourable than those presented.

Table 5.10. Impacts proposed to be scoped into, and out of, the assessment for marine and costal habitats.

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
Construction			
Loss of habitat from capital dredging	**Capital dredging of the main harbour area** • Dredging of the inner harbour, using Cutter Suction Dredger (CSD) and Trailing Suction Hopper Dredger (TSHD). • Dredging will take place approximately 800 m to 1,800 m inside the current harbour entrance. • Dredging to approximately 12.4 mCD, with a small section in the east of the harbour to approximately -6 mCD. • Dredging of approximately 2,000,000 m^3 of sand and gravel. • Approximate dredging footprint area of 199,504 m^2 to take place on the seabed. • Dredging will be between March and November inclusive. Estimated to take approximately 12 weeks. **Potential capital dredging to the west of 'Tern Island'** • Dredging of a channel spanning approximately 100 m in length, with a width of approximately two meters and depth of approximately one meter. • Approximate dredging footprint area of 200 m^2. • Dredging of approximately 200 – 500 m^3.	Scoped In	Loss of habitat will occur as a result of capital dredging within the marine environment.
Temporary habitat loss/disturbance	**Removal of old sheet piles**	Scoped In	Temporary habitat loss/disturbance will occur as a result of construction activities

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
	• Where water on the outside of the quay is deep, temporary sand bunds on the waterside of the quay wall may be required. • Approximately 150,000 m^3 of sand would be required to create sand bunds. **<u>Installation of mooring dolphins</u>** • Installation of mooring dolphins via jack-up barge, in which spud cans will be placed on the seabed. • The installation of mooring dolphins is expected to take place over approximately 19 days.		(e.g. presence of a jack-up barge for the installation of mooring dolphins and potential placement of temporary sand bunds for the removal of old sheet piles) that could have an impact on marine and coastal habitats.
Temporary increases in SSC and sediment deposition from capital dredging and disposal	**<u>Capital dredging of main harbour area</u>** • See key parameters above for 'loss of habitat from capital dredging'. **<u>Capital dredge spoil disposal</u>** • Disposal of approximately 2,000,000 m^3 of sediment, at Burghead disposal site. **<u>Potential dredging operations to the west of 'Tern Island'</u>** • See key parameters above for 'loss of habitat from capital dredging.	Scoped In	Temporary increases in SSC may occur as a result of capital dredging of the inner harbour during construction. Increased SSC and subsequent deposition can lead to the smothering of habitats, resulting in disruption of the normal functioning of breathing and filter feeding apparatus for species, making respiration and feeding difficult.

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
Seabed disturbance leading to release of sediment contaminants	**<u>Capital dredging of main harbour area</u>** • See key parameters above for 'loss of habitat from capital dredging'. **<u>Potential dredging operations to the west of 'Tern Island'</u>** • See key parameters above for 'loss of habitat from capital dredging.	Scoped In	Seabed disturbance from construction activities could lead to the mobilisation of existing sediment contaminants that could have an impact on marine and coastal habitats.
Increased risk of introduction and/or spread of marine INNS	**<u>Capital dredging of main harbour area</u>** • See key parameters above for 'loss of habitat from capital dredging'. **<u>Potential dredging operations to the west of 'Tern Island'</u>** • See key parameters above for 'loss of habitat from capital dredging. **<u>Construction of rock armour</u>** • Installation of rock armour within the harbour to the west of the new quay wall. • Approximately 150 m of rock armour length will be required, extending down to below MLWS. • Approximate rock armour footprint area of 2,906 m^2.	Scoped In	Introduction and/or spread of marine INNS may occur as a result of the introduction of hard structure (e.g. rock armour and rock mattress) into the marine environment, increased presence of vessels, dredging, and use of equipment and machinery during construction.

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
	Construction of rock mattress • Installation of approximately 300 - 500 mm of crushed rock layer at -6 mCD adjacent to the quay. • Approximate rock mattress footprint area of 14,400 m^2. **Vessel movements** • Vessel movements within the port during construction.		
Accidental pollution	No relevant project parameters have been identified for further assessment, as the potential impact has been scoped out.	Scoped Out	Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment and have detrimental effects on marine and coastal habitats. However, the risk and impact of accidental releases of hazardous substances will be reduced through the implementation of Bunkering Procedure and Port Oil Spill Contingency Plans and CEMP. In this manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimum the impact of any accidental release if it occurs, and hence the impact has been scoped out of this assessment.

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
O&M			
Permanent and/or long-term habitat loss/alteration from introduction of hard structures	**<u>Presence of rock armour</u>** • See key parameters above for 'increased risk of introduction and/or spread of marine INNS during construction'. **<u>Presence of rock mattress</u>** • See key parameters above for 'increased risk of introduction and/or spread of marine INNS during construction'.	Scoped In	Permanent and/or long-term habitat loss will occur as a result of the presence of structures (e.g. rock armour and rock mattress) within the marine environment.
Changes in physical processes resulting from capital dredging and installation of hard structures (e.g., changes in wave/tidal current regimes)	**<u>Capital dredging of main harbour area</u>** • See key parameters above for 'loss of habitat from capital dredging'. **<u>Potential dredging operations to the west of 'Tern Island'</u>** • See key parameters above for 'loss of habitat from capital dredging'. **<u>Presence of rock armour</u>** • See key parameters above for 'increased risk of introduction and/or spread of marine INNS during construction'.	Scoped In	Potential effects from changes in physical processes due to capital dredging and presence of hard structures within the water column (i.e. rock armour, rock mattress and mooring dolphins) may arise, such as changes in wave action and tidal current regimes. Changes in physical processes has the potential to alter the extent of marine and coastal habitats.

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
	<u>Presence of rock mattress</u> • See key parameters above for 'increased risk of introduction and/or spread of marine INNS during construction'.		
Increased introduction and/or spread of marine INNS	**<u>Presence of rock armour</u>** • See key parameters above for 'increased risk of introduction and/or spread of marine INNS during construction'. **<u>Presence of rock mattress</u>** • See key parameters above for 'increased risk of introduction and/or spread of marine INNS during construction'. **<u>Vessel movements</u>** • The vessel calls to the Port are anticipated to be between 250-350 per annum, with up to 400 vessel calls per year at peak periods in the short-term.	Scoped In	Introduction and/or spread of marine INNS may occur as a result of maintenance dredging, and port infrastructure maintenance and associated activities such as movement of structures, cleaning and use of equipment.
Accidental pollution	No relevant project parameters have been identified for further assessment, as the potential impact has been scoped out.	Scoped Out	Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment and have detrimental effects on marine and coastal habitats. However, the risk and impact of accidental releases of hazardous substances will be reduced through the implementation of a

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
			Bunkering Procedures and Port Oil Spill Contingency Plans, and CEMP. In this manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimum the impact of any accidental release if it occurs, and hence the impact has been scoped out of this assessment.
Increased SSC and deposition from maintenance dredging	No relevant project parameters have been identified for further assessment, as the potential impact has been scoped out.	Scoped Out	Maintenance dredging was considered within the 2018 EIA, and an application has been submitted to the Marine Directorate for a maintenance dredge licence for the main harbour approach. Impacts from these proposed works are therefore not considered further in this Technical Appendix.
Accidental pollution events during maintenance dredging activity			
Direct habitat disturbance from maintenance dredging			
Increased vessel presence from maintenance dredging activities			

Table 5.11. Impacts proposed to be scoped into, and out of, the assessment for diadromous fish.

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
Construction			
Mortality, injury, behavioural changes and auditory masking arising from noise and vibration	**Removal of old sheet piles** • Excavation of sheet piles to at least below MHWS. • Removal of sheet piles using a vibratory piling rig and lay on platform. **Installation of mooring dolphins** • Installation of piles through combination of vibropiling and impact piling. • Installation is expected to take place over approximately 19 days with piling occurring for 12 days during that period.	Scoped In	Potential effects from construction activities may arise from noise and vibrations from the removal of sheet piles and installation of dolphin moorings. UWN has the potential to cause significant impacts to diadromous fish, ranging from lethal trauma to behavioural changes (such as disturbance to migration events) in susceptible fish species.
Disturbance to migration from increases in SSC and sediment deposition from capital dredging in the port and disposal of material	**Capital dredging of main harbour area** • Dredging of the inner harbour, using CSD and TSHD. • Dredging will take place approximately 800 m to 1,800 m inside the current harbour entrance. • Dredging to approximately 12.4 mCD, with a small section in the east of the harbour to approximately -6 mCD. • Dredging of approximately 2,000,000 m^3 of sand and gravel. • Approximate dredging footprint area of 199,504 m^2 to take place on the seabed.	Scoped In	Sediment plumes from dredging operations, and sediment disposal can act as barriers to migration for diadromous fish. These plumes can disrupt the natural pathways of diadromous fish, which may lead to negative impacts on their migration routes.

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
	• Dredging will be between March and November inclusive. Estimated to take approximately 12 weeks. **<u>Capital dredge spoil disposal</u>** • Disposal of approximately 2,000,000 m^3 of sediment, at Burghead disposal site **<u>Potential dredging operations to the west of 'Tern Island'</u>** • Removal of 200 - 500 m^3 of sand. • Approximate dredging footprint area of 200 m^2. • Sand could either be removed by conventional land-based plant (excavator and dumper) and taken ashore, or if in less readily accessible areas (further from shore) be excavated by barge mounted backhoe and disposed of at the sea disposal ground. Alternatively, this material could be used to create the proposed extension to Tern Island described above or maintain it if in the future.		
Seabed disturbance leading to release of sediment contaminants	See key parameters above for 'Disturbance to migration from increases in SSC and sediment deposition from capital dredging in the port and disposal of material'.	Scoped In	Seabed disturbance from construction activities could lead to the mobilisation of existing sediment contaminants that could have an impact on diadromous fish.

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
Disturbance to migration from increased vessel presence	No relevant project parameters have been identified for further assessment, as the potential impact has been scoped out.	Scoped Out	Vessel movements to and from the Port are consented under the 2018 consent application. This indicated that approximately 340 vessels a year were anticipated to call at the Port. Although the extension area would give access to more land it is not expected to generate significantly more marine traffic. The vessel calls to the Port are anticipated to be between 250-350 per annum, comparable to the predicted 340 vessel calls per year in the 2018 application. As the increase in vessel numbers is minor, and considering the continuous nature of vessel noise, and the mobile nature of the diadromous fish receptors, this impact is scoped out of the assessment.
Accidental pollution events during construction activities		Scoped Out	Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment and have detrimental effects on diadromous fish. However, the risk and impact of accidental releases of hazardous substances will be reduced through the implementation of a Bunkering Procedures and Port Oil Spill Contingency Plans, and CEMP. In this

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
			manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimise the impact of any accidental release if it occurs, and hence the impact has been scoped out of this assessment.
Temporary habitat disturbance from capital dredging in the harbour		Scoped Out	The diadromous fish receptors do not rely on the seabed within the study area for spawning or feeding, and subsequently there is no pathway for effect. This impact has therefore been scoped out of this assessment.
O&M			
Increased SSC and deposition from maintenance dredging	No relevant project parameters have been identified for further assessment, as the potential impact has been scoped out.	Scoped Out	Maintenance dredging was considered within the 2018 EIA, carried out for the planning permission renewal in 2019, and a Marine Licence application has been submitted to the Marine Directorate for dredging of the main harbour approach. Impacts from these proposed works are therefore not considered further in this Technical Appendix.
Accidental pollution events during maintenance dredging activity		Scoped Out	
Direct habitat disturbance from maintenance dredging		Scoped Out	
Increased vessel presence from maintenance dredging activities		Scoped Out	
Permanent and/or long-term habitat loss/alteration due to the addition of new hard substrates		Scoped Out	The diadromous fish receptors do not rely on the seabed within the study area for spawning or feeding, and subsequently
		Scoped Out	

Impact Pathway	Key Project Parameters	Scoped In/Out	Justification
(such as scour protection, rock mattress or stone placement)			there is no pathway for effect from these impacts. These impacts have therefore been scoped out of the assessment.

6. Assessment

6.1 Marine and Coastal Habitats

6.1.1 Construction

6.1.1.1 Loss of habitat from capital dredging

Capital dredging activities are proposed within the inner harbour at the proposed development to deepen the port basin and approach channel to accommodate larger vessels. Capital dredging is also proposed to the west of Tern Island. These works are expected to result in the long-term loss of habitat within the footprint of the dredge during the construction and O&M phase of the proposed development.

Magnitude of impact

The capital dredging will deepen the inner harbour (approximately 800 m to 1,800 m inside the harbour entrance) to 12.4 mCD, with an area in the east of the inner harbour dredged to approximately -6 mCD. These works will result in the removal of approximately 2,000,000 m^3 of sediment, with an approximate dredging footprint area of 199,504 m^2 on the seabed. Additional capital dredging is also proposed to west of Tern Island located just outside of the harbour entrance, with approximately 200 - 500 m^3 of sand to be removed and an approximate dredging footprint area of 200 m^2.

The impact of capital dredging will directly affect receptors, causing the removal of habitat. However, the impact will take place in an area which has undergone significant disturbance including historic capital and maintenance dredging. As such, the impact is anticipated to result in a limited, but discernible, alterations to key characteristics of receptors. Furthermore, the capital dredging will be localised i.e. restricted to a small area of seabed habitat within the inner harbour (241,326 m^2), within the context of the marine and coastal habitat Study Area. Therefore, the magnitude of impact from loss of habitat from capital dredging is considered to be **low**.

Sensitivity of VERs

The sensitivity of VERs within the marine and coastal habitat Study Area has been assessed in relation to the following the MarLIN MarESA pressures relevant to loss of habitat from capital dredging:

- Habitat structure changes - removal of substratum (extraction).

Representative biotopes of the VERs ‘Atlantic Infralittoral Sand’ and ‘Atlantic littoral sand’ which were recorded within subtidal benthic surveys conducted in 2013 (Savills, 2013), and may be present within the footprint of the proposed development have a medium sensitivity to habitat structure changes (removal of substratum), (Tillin and Tyler-Walters, 2023; Tillin et al., 2023a; Tillin et al., 2023b). These biotopes are characterised by sedimentary infaunal communities, whereby the removal substrate via dredging, will be removed. However, characterising species are likely to recover through transport of adults in the water column or migration from adjacent patches of the same habitat (Tillin and Tyler-Walters, 2023; Tillin *et al*., 2023a; Tillin *et al*., 2023b). As such, the sensitivity of the biotopes is considered to be **medium**.

As highlighted in Table 5.5, the VERs, including ‘sandflats’, ‘saltmarsh’, ‘shingle’, (qualifying features of the Whiteness Head SSSI and Inner Moray Firth Ramsar), ‘sand dune’ (qualifying feature of the Whiteness Head SSSI), ‘mudflat’ (qualifying feature of the Inner Moray Firth Ramsar), ‘sandbank’ (a qualifying feature of the Moray Firth SAC), and ‘horse mussel beds’, are not present within the footprint of the proposed capital dredge. As such, it is considered that there will be no pathway for effect from loss of habitat from capital dredging. Therefore, these VERs have not been considered further.

Significance of effect

Overall, the magnitude of impact of loss of habitat from capital dredging on marine and coastal habitat receptors is assessed as **low**. The sensitivity of receptors affected is assessed as **medium**. The significance of the effect is therefore concluded to be **minor**, which is not significant in EIA terms.

6.1.1.2 Temporary habitat loss/disturbance

Temporary habitat loss and disturbance will likely occur during the construction phase of the proposed development as a result of the use of a jack-up barge for the installation of mooring dolphins on the existing westernmost quay area within the existing harbour channel. The potential placement of temporary sand bunds may also be required within the water column for the removal of old sheet piles, located parallel to the location of the new quay wall.

Magnitude of impact

During the construction phase, the installation of mooring dolphins will require the use of a jack-up barge for piling activities. It is anticipated that a single jack-up barge will be required during construction, however, the footprint area of spud cans is not yet known. It is anticipated that the installation of mooring dolphins will take place over approximately 19 days during construction and that jack-up barges will be in place during this period.

Additionally, temporary sand bunds may need to be installed on the seabed during construction to facilitate the removal of existing sheet piles and will be removed following the completion of the removal of sheet piles. The overall footprint of temporary sand bunds to be installed is not yet known. However, it is estimated that approximately 150,000 m^3 of sand will be required. While the overall footprint of temporary habitat loss is not known, the impact is predicted to be highly localised in spatial extent (covering a small area of seabed habitat within the existing port and in the context of the wider Study Area), be of short-term duration and reversible over time. Therefore, the magnitude of the impact of temporary habitat loss/disturbance is considered to be **negligible**.

Sensitivity of VERs

The sensitivity of VERs within the marine and coastal habitat Study Area has been assessed in relation to the following MarESA pressures relevant to loss of habitat from capital dredging:

- Abrasion/disturbance of the surface of the substratum or seabed.

Representative biotopes of the VERs 'Atlantic Infralittoral Sand' and 'Atlantic littoral sand' which were recorded within subtidal benthic surveys conducted in 2013 (Savills, 2013), and may be present within the footprint of the proposed development have a low sensitivity to abrasion/disturbance of the surface of the substratum or seabed (Tillin and Tyler-Walters, 2023; Tillin *et al*., 2023a; Tillin *et al*., 2023b). Abrasion and compaction of the surficial layer of sediment may damage certain individuals, such as those that are present within the surface layers of sediment. However, charactering species that burrow deeply into sediments will be more intolerant to the impact (Tillin and Tyler-Walters, 2023). For the biotopes, 'Infralittoral mobile clean sand with sparse fauna' (MB5231) and '*Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand' (MB5233), characterising species are generally present in low abundances and adapted to frequent disturbance suggesting that resistance to surface abrasion would be high. As such, the sensitivity of the biotopes is considered to be **low**.

As highlighted in Table 5.5Table 5, the VERs, including 'sandflats', 'saltmarsh', 'shingle', (qualifying features of the Whiteness Head SSSI and Inner Moray Firth Ramsar), 'sand dune' (qualifying feature of the Whiteness Head SSSI), 'mudflat' (qualifying feature of the Inner Moray Firth Ramsar), 'sandbank' (a qualifying feature of the Moray Firth SAC), and 'horse mussel beds', are not present within the footprint of proposed temporary habitat loss/disturbance. As such, it is considered that there will be no pathway for effect from temporary habitat loss/disturbance. Therefore, these VERs have not been considered further.

Significance of effect

Overall, the magnitude of the impact of temporary habitat loss/disturbance on marine and coastal habitat receptors is assessed as **negligible**. The sensitivity of receptors affected is assessed as **low**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

6.1.1.3 Temporary Increases in SSC and sediment deposition from capital dredging and disposal

Capital dredging activities are proposed within the inner harbour at the proposed development to deepen the port basin and approach channel to accommodate larger vessels. Additional capital dredging is also proposed to the west of Tern Island just outside of the harbour entrance. Disposal of arisings is anticipated to occur at Burghead disposal site (a licenced disposal ground, located approximately 32 km from the proposed development). These works are expected to result in temporary and localised increases in SSC and associated sediment deposition on marine and coastal habitats.

Magnitude of impact

The proposed dredging within the port will deepen the inner harbour (approximately 800 m to 1,800 m inside the harbour entrance) to 12.4 mCD, with an area in the east of the harbour dredged to approximately -6 mCD. These works will result in the removal of approximately 2,000,000 m^3 of sediment, which will be disposed of approximately 2 km offshore, at a licenced disposal site near Burghead. A discrete area to the west of Tern Island is also proposed to be dredged (with approximately 200 - 500 m^3 of sand to be removed and an approximate dredging footprint area of 200 m^2). The dredging is proposed to take place between March and November in either 2027 or 2028 with an approximate duration of 12 weeks. The works will be undertaken using a CSD and/or TSHD, both of which are known to generate sediment plumes.

In the absence of sediment plume modelling for the proposed development, the tidal excursion distances in the vicinity of the proposed development, and the disposal site at Burghead have been used as proxies, to determine the maximum extent at which sediments may be transported after disturbance, and deposition. The tidal excursion distance surrounding the Riff Bank (in proximity to the proposed development), is approximately 1.1 km, and the tidal excursion distance at the Burghead disposal site is approximately 1.3 km. It is therefore assumed that sediments disturbed through dredging operations, within the proposed development, could be transported up to 1.1 km from the port, with sediments deposited at the existing Burghead disposal site being transported up to 1.3 km from the site, although most suspended sediments are expected to be deposited much closer to the disturbance activity. Sediment characteristics within the port support the expectation of limited plume dispersion from dredging and disposal activities. The seabed is largely composed of sands, with gravel also present, with only around 2% silt. Given the relatively coarse nature of the dredge material, the limited extent of the tidal excursions in proximity to both the Proposed Development, and the Burghead disposal site, it is considered that any plumes generated as a result of the dredging works in the port, and spoil disposal will be very localised and short term in duration.

Further to this, EnviroCentre conducted sediment transport monitoring at five sites at Whiteness Sands (located just beyond the entrance of Ardersier Port) between 2022 and 2025. The monitoring analysed baseline conditions of TSS up to March 2025, just prior to the phase 1 capital dredge of the outer harbour, which commenced in April 2025. TSS was then analysed again in June 2025, during the phase 1 capital dredge operations. The results indicated that TSS concentrations recorded during the phase 1 capital dredge were within the lower end of the baseline range, indicating no significant increases in TSS from dredging operations (Chapter 9: Hydrology and Hydrogeology; Chapter 10: Coastal Processes and Geomorphology). Additionally, turbidity data has also been collected from a monitoring buoy installed in March 2025, located just beyond the entrance of Ardersier Port. Results of turbidity data indicated that during the phase 1 capital dredge, concentrations fluctuated, with an average of 3.9 NTU (turbidity) recorded. These fluctuations could be the result of a range of factors including weather, tidal or wave conditions or the phase 1 capital dredge. However, the majority of readings fell with the range of baseline readings and concentrations remained generally low, following the capital dredge.

Considering the limited tidal excursion distances proximal to the proposed development, the coarse nature of the sediments within the port, and the outputs of the monitoring, the magnitude of impact from sediment discharge and dispersion from dredging operations at the Proposed Development is considered to be **low**. The material removed from the proposed development during dredging operations will largely consist of sand and gravel, which will be disposed of at an existing disposal site at Burghead. Given the coarse nature of these substrates, and the limited tidal excursion, it is anticipated that the sediment will fall out of suspension rapidly, with any generated plumes being of short term duration, and localised to the disposal event. The magnitude of impact from sediment discharge and dispersion from disposal at the Burghead disposal site is therefore also considered to be **low**.

Sensitivity of VERs

The sensitivity of VERs within the marine and coastal habitat and disposal Study Areas has been assessed in relation to the following MarESA pressures relevant to temporary increases in SSC and deposition:

- Changes in suspended solids (water clarity)
- Smothering and siltation rate changes (heavy)

Representative biotopes of the VERs 'Atlantic Infralittoral Sand' and 'Atlantic littoral sand' which were recorded within subtidal benthic surveys conducted in 2013 (Savills, 2013), and may be present within the footprint of the proposed development have a not sensitive to low sensitivity to changes in suspended solids and a low sensitivity to smothering and siltation rate changes (heavy) (Tillin and Tyler-Walters, 2023; Tillin *et al*., 2023a; Tillin *et al*., 2023b). The representative biotopes occur is depositional environments where, where sedimentation is likely to occur and an event of heavy deposition may result in some mortality of individuals. However, sediment removal by wave action will likely mitigate the effect of overall smothering, allowing for recovery to occur (Tillin and Tyler-Walters, 2023; Tillin *et al*., 2023a; Tillin *et al*., 2023b). As such, the sensitivity of the VERs is considered to be **low**.

The representative biotope of the VER 'mudflats', which is also a qualifying feature of the Inner Moray Firth Ramsar has a very low sensitivity to increases in suspended sediment and low sensitivity to smothering (Tyler and Marshall, 2006). Smothering of the habitat is unlikely to affect characterising species that can burrow through the sediment, although it may adversely affect the feeding of suspension feeding organisms. However, recovery of any intolerant species is likely to be high (Tyler and Marshall, 2006). Similarly, changes SSC may interfere with the feeding apparatus of suspension feeders, although, the majority of fauna would be unaffected and with a high capacity to tolerate the impact with good recoverability (Tyler and Marshall, 2006). As such, the sensitivity of the VER is considered to be **low**.

The representative biotopes of the VER 'sandflats', which is also a qualifying feature of the Whiteness Head SSI and Inner Moray Firth Ramsar are not sensitive to changes in suspended solids and have a not sensitive to low sensitivity to smothering and siltation rate changes (heavy) (Tillin, 2018; Tillin and Budd, 2016; Ashley, 2024). Representative biotopes such as 'Barren or amphipod-dominated mobile sand shores' (EUNIS code: MA523) and 'Barren littoral coarse sand' (EUNIS code: MA5231) are characterised by the absence of species which would be exposed to suspended solids. In such dynamic areas, suspended solids are likely to rapidly dissipate through wave action, limiting the potential for prolonged suspension and associated ecological effects (Tillin, 2018; Tillin and Budd, 2016). The characterising species of the representative biotope 'Polychaetes in littoral fine sand' (EUNIS code: MA5241)' are unlikely to be affected by increased SSC and are considered to have a high capacity to tolerate varying levels of suspended solids and sediment deposition with good recoverability (Ashley, 2024). As such, the sensitivity of the VER is considered to be **low**.

The representative biotope of the VER 'shingle', which is also a qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar is not sensitive to changes in suspended solids or smothering and siltation rate changes (heavy) (Tillin *et al*., 2019). The representative biotope 'Barren littoral shingle' (EUNIS code: MA3211) occurs in scoured habitat and is likely to be frequently exposed to suspended solids. The biotope is also characterised by the absence of species, as such, changes in suspended solids will therefore not alter the character of this biotope. This biotope is therefore considered to have a high capacity to tolerate varying levels of suspended solids and sediment deposition with good recoverability. As such the sensitivity of the VER is considered to be **negligible**.

The representative biotopes of the VER 'sandbank', which is also a qualifying feature of the Moray Firth SAC ('sandbanks which are which are slightly covered by sea water all the time') have low sensitivity to changes in suspended solids and smothering and siltation rate changes (heavy) (Tillin *et al*., 2023a). The biotope '*Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand' (EUNIS code: MB5233) is associated with wave exposed habitats or those with strong currents, mitigating any effects of deposition, whilst characterising species such as the white catworm *Nephtys cirrosa* and amphipods are mobile and able to burrow through deposited sediment (Tillin *et al*., 2023a). Increases in SSC within the water column may have some effects on filter feeding species which characterise the biotope, however, it is unlikely the infaunal species of the biotope will be directly affected (Tillin *et al*., 2023a). The biotope is therefore considered to have a high capacity to tolerate varying levels of suspended solids and sediment deposition with good recoverability. As such the sensitivity of the VER is considered to be **low**.

The representative biotope of the VER 'saltmarsh', which is also a qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar has a low sensitivity to increases in suspended sediment and smothering and siltation rate changes (heavy) (Tyler-Walters, 2004). Saltmarsh habitats are dependent on accretion and erosion, where under suitable sedimentation conditions pioneer or low marsh species establish, gain height and increase in seaward extent (Tyler-Walters, 2004). Furthermore, burrowing infaunal species which characterise the habitat are unlikely to be significantly affected by smothering. However, suspension feeders may be more vulnerable to elevated levels of suspended solids (Tyler-Walters, 2004). As such the sensitivity of the VER is considered to be **low**.

MarLIN does not provide representative biotopes for the VER 'sand dune' for assessment of sensitivity to temporary increases in SSC and sediment deposition. However, the VER 'sand dune', which is also a qualifying feature of the Whiteness Head SSSI, is present above MHWS.

As such, it is considered that there will be no pathway for effect from temporary increases in SSC and sediment deposition. As such, this VER has not been considered further in the assessment.

As highlighted in Table 5.5Table 5, the VER 'horse mussel beds' is not present within the marine and coastal habitat Study Area, with horse mussel beds known to be present off the coast of Chanonry Point approximately 6 km from the proposed development (Figure 5.3). As such, it is considered that there will be no pathway for effect from temporary increase in SSC and deposition. Therefore, this VER has not been considered further.

Significance of effect

Overall, the magnitude of impact of temporary increases in SSC and sediment deposition, on marine and coastal habitat receptors is assessed as **low**. The sensitivity of all receptors affected is assessed as **negligible** to **low**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

6.1.1.4 Seabed disturbance leading to release of sediment contaminants

Capital dredging, and spoil disposal will re-suspend sediments into the water column. While in suspension, there is the potential for sediment-bound contaminants, such as metals, hydrocarbons and organic pollutants, to be released into the water column, which could lead to an impact on marine and coastal habitat receptors.

Magnitude of impact

Sediment sampling undertaken within the boundary of Ardersier Port in 2013, identified the presence of fine to medium sand, and gravelly substrates within the port, with sampling in 2018 also identifying the presence of gravelly silt (EnviroCentre, 2018b). Contaminants analysis in 2013 revealed no sediment contaminants exceeding Cefas Action Level 2, with Cefas Action Level 1 exceedances recorded in five grab samples for Polyaromatic Hydrocarbons (PAHs) and one sample with an exceedance in zinc concentration (EnviroCentre, 2018b). Pre-construction sediment sampling of contaminants within the capital dredge area of the proposed development has been completed in 2025 with the results reported in the BPEO submitted along with the disposal licence application.

Following sediment disturbance resulting from dredging activities, the majority of re-suspended sediments are expected to settle within the immediate vicinity of the works due to the predominance of coarse material. Contaminants, where present, typically adsorb to the finer silt and clay fractions of sediment. However, these finer fractions constitute only a small proportion of the seabed substrate in the area (approximately 2%), thereby limiting the potential for contaminant mobilisation. Any contaminants released from these fine sediments are expected to disperse rapidly through tidal and current-driven mixing. Notwithstanding this, if contaminants are recorded as present within the proposed dredge area (as reported in the BPEO (sediment risk assessment)), a suitable dredge strategy will be developed to ensure no spread of material with elevated concentrations of contaminants. Consequently, the impact is predicted to result in either a very slight or no measurable change to baseline conditions, given its localised spatial extent, short-term duration and proposed measures if contaminants are present. The magnitude of impact is therefore considered to be **low**.

Regarding disposal at the Burghead disposal site, as aforementioned, the dredged material will predominantly consist of coarse materials (sands and gravels), which contaminants do not typically adsorb to, which thereby limits the potential for deposition of contaminants at the disposal site. Furthermore, if contaminants are recorded as present within the proposed dredge area (as informed by the analysis of the site-specific pre-construction sediment sampling within the BPEO), a suitable dredge strategy will be developed if necessary, whereby no material with elevated concentrations of contaminants will be disposed of at the Burghead disposal site. This will be secured within the Marine Licence application. Therefore, the impact is not predicted to result in a measurable change to baseline conditions at the disposal site, and therefore the magnitude of impact from spoil disposal is considered to be **low**.

Sensitivity of VERs

Construction activities leading to the resuspension of sediments will have varying levels of impact dependent on the species present and pollutants involved.

The MarESA assessment does not provide an assessment of the relevant chemical pressures for the identified marine and coastal habitat VERs in Table 5.5Table 5, due to limited evidence, with the exception of the VERs 'saltmarsh' and 'horse mussel beds'. Where an assessment is available for VERs, sensitivity has been assessed in relation to the following MarESA pressures relevant to release of seabed contaminants:

- Transitional elements and organo-metal contamination
- Hydrocarbon and PAH contamination
- Synthetic compound contamination

The MarESA evidence base considers the effects of pollutants and chemicals should they be accidently released at concentrations that exceed environmental protection standards.

Representative biotopes of the VERs identified within Table 5.5Table 5, are largely characterised by sessile or low mobility species which will be unable to avoid any contaminants released from sediment. Additionally, many of these suspension feeding species may absorb contaminants directly from the water column by taking in suspended particulate matter.

Bivalve species accumulate heavy metals into their tissues at levels much higher than environmental levels, indicating a degree of tolerance (Widdows and Donkin, 1992). However, sub-lethal levels of heavy metals may cause a range of effects including siphon retraction, valve closure, inhibition of byssal thread production, disruption of burrowing behaviour, inhibition of respiration, inhibition of filtration rate and suppressed growth (Aberkali and Trueman, 1985). Echinoderms are considered to be intolerant of heavy metals, whilst polychaetes are more tolerant (Bryan, 1984; Kinne, 1984). Echinoderms and amphipods are also regarded as being intolerant of hydrocarbons, whilst polychaetes are considered to be tolerant of elevated hydrocarbon levels (Suchanek, 1993; Cabioch *et al*., 1978).

Recoverability of VERs from chemical contamination will vary considerably between species. For instance, bivalves and crustaceans typically have high fecundity and may recover fully. However, it should be noted that even with good annual recruitment/reproduction, this may take several years (Tyler-Walters, 2008; Sabatini and Hill, 2008). It is anticipated that, following cessation of any potential impact, re-colonisation of affected areas would occur via adult migration and larval settlement. Consequently, VERs are considered to be vulnerable to contaminants but may have a reasonable capacity to adapt and/or tolerate the impact, with good capacity to recover. As such, the sensitivity of the VERs is considered to be **medium**.

The representative biotope of the VER 'saltmarsh', which is also a qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar has a sensitivity of very low for heavy metal contamination and sensitivity of moderate for synthetic compound and hydrocarbon contamination (Tyler-Walters, 2004). Sheltered areas of saltmarsh, like those present within the eastern extent of Ardersier Port, may act as a sink for pollutants including synthetic compounds, heavy metals and hydrocarbons. Uptake of heavy metals occurs through the roots of saltmarsh plants and is species specific, where heavy metals are either excluded or accumulated. Overall, saltmarsh is considered relatively tolerant of heavy metals. However, some characterising marine infaunal species may be lost leading to a reduction in species richness (Tyler-Walters, 2004). As such, the sensitivity of the VERs is considered to be **medium**.

MarLIN does not provide representative biotopes for the VER 'sand dune' for assessment of sensitivity to seabed disturbance leading to release of sediment contaminants. However, the VER 'sand dune' which is also a qualifying feature of the Whiteness Head SSSI is present above

MHWS. As such, it is considered that there will be no pathway for effect from seabed disturbance leading release of sediment contaminants and has not been considered further.

As highlighted in Table 5.5Table 5, the VER ‘horse mussel beds’ is not present within the marine and coastal habitat Study Area, with horse mussel beds known to be present off the coast of Chanonry Point approximately 6 km from the proposed development (Figure 5.3). As such, it is considered that there will be no pathway for effect from temporary habitat loss/disturbance. Therefore, this VER has not been considered further.

Significance of effect

Overall, the magnitude of impact of seabed disturbance leading to release of sediment contaminants, on marine and coastal habitat receptors is assessed as **low**. The sensitivity of all receptors affected is assessed as **medium**. The significance of the effect is therefore concluded to be **minor**, which is not significant in EIA terms.

6.1.1.5 Increased risk of introduction and/or spread of marine INNS

NNS are those which have been introduced to a new location, outside of their native range, as a result of anthropogenic activity. INNS are NNS that cause negative ecological, economic and/or social impacts. Which NNS are ‘invasive’ is often context-dependant and can change over time.

Marine INNS impacts are wide ranging, including direct impacts such as food and space competition, predation and disease (Gallardo *et al*., 2015; Tsirintanis *et al*., 2022). It is important to note that indirect impacts can also occur, such as changes in nutrient levels, ecosystem functioning or trophic cascades, which can have knock-on effects on benthic communities (Gallardo *et al*., 2015; Dimitriadis, 2021). The impacts of marine INNS and receptors affected are therefore difficult to predict.

The majority of known marine INNS occupy hard surfaces and/or benthic environments in coastal intertidal and subtidal habitats (Wasson *et al*., 2005; Ruiz *et al*., 2011; 2015). This impact assessment will therefore focus on benthic habitats, although it is important to note that marine INNS can also be pelagic (e.g., Green *et al*., 2012) and can be found in a wide diversity of environments (Carlton 2002; 2003; Carlton and Schwindt, 2023).

The introduction and spread of INNS may occur during the construction phase of the proposed development due to the introduction of hard substrate into the marine environment (e.g. rock armour), the movement and presence of vessels (due to ballast water exchange, and biofouling of vessel hulls and infrastructure), dredged material and equipment (Hewitt *et al.*, 2009; Dey and Stebbing, 2024; Nall *et al*., 2015).

Magnitude of Impact

During construction, rock armour will be installed within the harbour, located to the west of the newly constructed quay wall. Approximately 150 m of rock armour is anticipated, extending below MLWS, with an approximate footprint area of 2,906 m^2. In addition, a rock mattress will also be installed within the harbour. This is expected to comprise a crushed rock layer positioned at approximately -6 mCD, adjacent to the quay wall, with an approximate footprint area of 14,400 m^2 and a total linear extent of approximately 300 to 500 m. The number of vessels required during construction of the proposed development is not known at this stage. However, any increase in vessel presence during construction is anticipated to be small in the context of vessels which already operate within the port.

Eradication of INNS is challenging, especially in open systems such as the marine environment. Therefore, if marine INNS were to be introduced and/or spread and consequently establish, and/or their populations were to increase in fitness, successful removal and consequent return to baseline conditions is unlikely in most scenarios. Any negative impacts caused by established marine INNS, particularly those at high densities, would be long-term, and potentially widespread and severe, in a worst-case scenario.

However, embedded mitigation measures include the development of an INNS biosecurity management plan (Chapter 5: Supporting Information and Assessments). This will outline measures to be taken to prevent the introduction and/or spread of INNS and will ensure that the risk of potential introduction and spread of marine INNS is reduced as far as practicable. Therefore, the magnitude of this impact at the construction phase, assuming the mitigation measures outlined in the biosecurity management plan are implemented, is considered to be **negligible**, indicating that there is unlikely to be anything over a very minor loss or detrimental alteration to one or more characteristics, features or elements.

Sensitivity of VERs

Assessing the sensitivity of marine and coastal habitat receptors to marine INNS impacts would require comprehensive knowledge of multiple dynamic and uncertain factors. These include: the current and potential future presence of marine INNS, their spatial distribution and abundance, the full suite of direct and indirect ecological impacts associated with each INNS, and the specific response of each receptor to those impacts. Given the inherent challenges in detecting marine INNS and the complex, often context-dependent nature of their ecological effects (e.g., Gallardo *et al*. 2015; Dimitriadis *et al*. 2021), such an assessment is not realistically achievable at the level of individual species-receptor combinations.

Therefore, on a precautionary basis, a resistance value of low to none has been assigned to all marine and coastal habitat receptors, acknowledging that some species will be more tolerant than others. Similarly, resilience is considered low to very low for all marine and coastal habitat receptors since a return to 'normal' conditions is highly unlikely if a marine INNS introduction and establishment occurred.

The sensitivity of VERs to the introduction or spread of marine INNS is deemed to be at worst-case **high**.

Significance of Effect

Overall, the increased risk of introduction or spread of marine INNS is considered to be **negligible** magnitude due to the development of an INNS biosecurity management plan which will outline measures to be taken to prevent the introduction and/or spread of INNS. The sensitivity of receptors affected is predicted to be at worst-case **high**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

6.1.2 O&M

6.1.2.1 Permanent and/or long-term habitat loss/alteration from introduction of hard structures

The installation of both rock armour and rock mattress is proposed during construction, which would result in long-term habitat loss and alteration of habitat during O&M.

Magnitude of impact

During the O&M phase, the completed development will include the presence of rock armour within the harbour, located to the west of the newly constructed quay wall. Approximately 150 m of rock armour is anticipated, extending below MLWS, with an approximate footprint area of 2,906 m^2. In addition, a rock mattress will be installed within the harbour. This is expected to comprise a crushed rock layer positioned at approximately -6 mCD, adjacent to the quay wall, with an approximate footprint area of 14,400 m^2 and a total linear extent of approximately 300 to 500 m. While the impact will directly affect receptors and comprise a long-term change in seabed habitat, the impact will be highly localised (covering a small area of seabed habitat within the context of Ardersier Port and the wider marine and coastal habitat Study Area). Therefore, the magnitude of impact from permanent and/or long-term habitat loss/alteration as a result of the installation of hard structures is considered to be **negligible**.

Sensitivity of VERs

The sensitivity of VERs within the marine and coastal habitat Study Area has been assessed in relation to the following MarESA pressures relevant to permanent and/or long-term habitat loss/alteration from introduction of hard structures:

- Physical change (to another seabed type).

Representative biotopes of the VERs 'Atlantic Infralittoral Sand' and 'Atlantic littoral sand' which were recorded within subtidal benthic surveys conducted in 2013 (Savills, 2013), and may be present within the footprint of the proposed development have a high sensitivity to physical change to another seabed type (Tillin and Tyler-Walters, 2023; Tillin *et al*., 2023a; Tillin *et al*., 2023b). These biotopes are characterised by sedimentary habitat. Therefore, a change to artificial or rock substratum would alter the character of the biotope, resulting in the loss of the sedimentary community including the characterising bivalve, polychaete and amphipod species (Tillin and Tyler-Walters, 2023; Tillin *et al*., 2023a; Tillin *et al*., 2023b). As such, the sensitivity of the biotopes is considered to be **high**.

As highlighted in Table 5.5Table 5, the VERs, including 'sandflats', 'saltmarsh', 'shingle', (qualifying features of the Whiteness Head SSSI and Inner Moray Firth Ramsar), 'sand dune' (qualifying feature of the Whiteness Head SSSI), 'mudflat' (qualifying feature of the Inner Moray Firth Ramsar), 'sandbank' (a qualifying feature of the Moray Firth SAC), and 'horse mussel beds', are not present within the footprint of the proposed development. As such, it is considered that there will be no pathway for effect from permanent and/or long-term habitat loss/alteration. Therefore, these VERs have not been considered further.

Significance of effect

Overall, the magnitude of impact of permanent and/or long-term habitat loss/alteration on marine and coastal habitat receptors is assessed as **negligible**. The sensitivity of receptors affected is assessed as **high**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

6.1.2.2 Changes in physical processes resulting from capital dredging and installation of hard structures (e.g., changes in wave/tidal current regimes)

Changes to physical processes (wave and current regimes) may occur as a result of changes in bed levels and water depths due to capital dredging activities proposed within the harbour as well as from the presence of associated rock armour, rock mattress and mooring dolphin structures on the seabed. These changes have the potential to alter tidal exchange volumes within the port, which could, in turn, influence the distribution and extent of adjacent marine and coastal habitats.

Magnitude of impact

The capital dredging will deepen the inner harbour (approximately 800 m to 1,800 m inside the harbour entrance) to 12.4 mCD, with an area in the east of the inner harbour dredged to approximately -6 mCD. These works will result in the removal of approximately 2,000,000 m^3 of sediment, with an approximate dredging footprint area of 199,504 m^2 on the seabed. The dredging is proposed to take place between March and November in either 2027 or 2028 with an approximate duration of 12 weeks.

During the O&M phase, the completed development will include the presence of rock armour within the harbour, located to the west of the newly constructed quay wall. Approximately 150 m of rock armour is anticipated, extending below MLWS, with an approximate footprint area of 2,906 m^2. Rock mattress will also be installed within the harbour. This is expected to comprise a crushed rock layer positioned at approximately -6 mCD, adjacent to the quay wall, with an approximate footprint area of 14,400 m^2 and a total linear extent of approximately 300 to 500 m. In addition, two mooring dolphin structures will be present during the O&M phase on the existing westernmost quay area.

Coastal processes modelling has been undertaken for the proposed development with respect to hydrodynamic and spectral wave modelling (Chapter 10: Coastal Processes and Geomorphology). Modelling results indicate that there will be no significant impacts are predicted to water levels or tidal phasing/durations and current speeds as a result of the proposed development. Additionally, no significant impact is predicted to wave heights within areas of saltmarsh, with only very minor increases observed within the harbour under north-westerly winds (Chapter 10: Coastal Processes and Geomorphology). It is considered that any changes to coastal processes would be long-term, however, would be localised, resulting in barely discernible changes over a small area. Therefore, the magnitude of impact from changes in coastal processes is considered to be **negligible**.

Sensitivity of VERs

The sensitivity of VERs within the study area have been assessed in relation to the following MarESA pressures relevant to changes in coastal processes:

- Water flow (tidal current) changes (local)

- Wave exposure changes

Representative biotopes of the VERs 'Atlantic Infralittoral Sand' and 'Atlantic littoral sand' which were recorded within subtidal benthic surveys conducted in 2013 (Savills, 2013), and may be present within the footprint of the proposed development have a not sensitive to medium sensitivity to water flow changes and a not sensitive to high sensitivity to wave exposure changes (Tillin and Tyler-Walters, 2023; Tillin *et al*., 2023a; Tillin *et al*., 2023b). For the biotope 'Sublittoral sand in low or reduced salinity (lagoons)' (MB52) occurs in weak to very weak flows, where an increase in flows may result in a change to sediment (Tillin and Tyler-Walters, 2023). For the biotope 'Polychaete/bivalve-dominated Atlantic littoral muddy sand' (MA525), an increase in wave exposure would alter the sediment and therefore, the habitat may be intolerant to the impact (Tyler-Walters and Marshall, 2006). As such, the sensitivity of the VERs is considered to be **high**.

The representative biotope of the VER 'mudflats', which is also a qualifying feature of the Inner Moray Firth Ramsar has a moderate sensitivity to increase in water flow rates and a high sensitivity to increase in wave exposure (Tyler-Walters and Marshall, 2006). Changes in the water flow rate may change sediment structure leading to the removal of the upper layer of fine silty sediment in muddier sediments and some habitat loss (Tyler-Walters and Marshall, 2006). Furthermore, increased water flow and wave exposure may require some characterising species to re-burrow more frequently, adversely affecting the energy budgets (Tyler-Walters and Marshall, 2006). As such, the sensitivity of the VER is considered to be **high**.

The representative biotopes of the VER 'sandflats', which is also a qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar are not sensitive to water flow changes and wave exposure changes (Tillin, 2018; Tillin and Budd, 2016; Ashley, 2024). For the representative biotopes 'Barren or amphipod-dominated mobile sand shores' (EUNIS code: MA523) and 'Barren littoral coarse sand' (EUNIS code: MA5231), it is unlikely that changes in water flow would lead to any alterations in the biotopes as wave exposure would still result in sediment mobility, preventing the establishment of a more species rich biotope (Tillin, 2018; Tillin and Budd, 2016). Additionally, representative biotopes are typically subject to moderately exposed, exposed or very exposed wave action and any increases in wave action is unlikely to lead to alterations to the biotopes (Tillin, 2018; Tillin and Budd, 2016). The representative biotope 'Polychaetes in littoral fine sand' (EUNIS code: MA5241), occurs on moderately exposed beaches where increased water flow and wave action is likely to resuspend finer material and may lead to reduced abundance of characterising species. However, recovery of the biotope would be rapid (Ashley, 2024). As such, the sensitivity of the VER is considered to be **negligible**.

The representative biotope of the VER ‘shingle’, which is also a qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar is not sensitive to water flow changes and wave exposure changes (Tillin *et al*., 2019). The representative biotope ‘Barren littoral shingle’ (EUNIS code: MA3211) is found on shores that are typically moderately exposed, exposed or very exposed to wave action, where any changes to water flow and wave action is unlikely to lead to an alteration to the biotope (Tillin *et al*., 2019). As such, the sensitivity of the VER is considered to be **negligible**.

The representative biotopes of the VER ‘sandbank’, which is also a qualifying feature of the Moray Firth SAC (‘sandbanks which are which are slightly covered by sea water all the time’) is not sensitive to water flow changes and wave exposure changes (Tillin *et al*., 2023a). For the representative biotope ‘*Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand’ (EUNIS code: MB5233), the sediments characterising the biotope are mobile sands, where increased water flows and wave action may lead to minor changes in sediment sorting. However, the biotope is not considered to be sensitive to increases in water flow (Tillin *et al*., 2023a). As such, the sensitivity of the VER is considered to be **negligible**.

Representative biotope of the VER ‘saltmarsh’, which is also a qualifying feature of the Whiteness Head SSSI and Inner Moray Firth Ramsar has a moderate sensitivity to increase in water flow rates and a low sensitivity to increase in wave exposure (Tyler-Walters, 2004). Increases in water flow rates and wave exposure will result in changes to the accretion and erosion rates in the saltmarsh, particularly at lower areas of the marsh exposed to immersion for longer periods of time, adversely affecting invertebrate marine species of the biotope (Tyler-Walters, 2004). Rates of recovery and recolonisation will vary depending on the level of damage or disturbance caused by increases in water flow and wave action (Tyler-Walters, 2004). However, pioneer species of the saltmarsh may be expected to recover rapidly (i.e. in a matter of months) where disturbance is slight, or longer (up to 10 years) where sediment is significantly disturbed. As such, the sensitivity of the VER is considered to be **medium**.

MarLIN does not provide representative biotopes for the VER ‘sand dune’ for assessment of sensitivity to changes in coastal processes including water flow and wave exposure changes. The VER is a qualifying feature of the of the Whiteness Head SSSI, where changes in coastal processes including any increased water flow and wave action, may result in the loss of extent to sand dune habitat. As such, the sensitivity of the VER is considered to be **high**.

As highlighted in Table 5.5Table 5, the VER ‘horse mussel beds’ is not present within the marine and coastal habitat Study Area, with horse mussel beds known to be present off the coast of Chanonry Point approximately 6 km from the proposed development (Figure 5.3). As such, it is considered that there will be no pathway for effect from changes in physical processes. Therefore, this VER has not been considered further.

Significance of effect

Overall, the magnitude of impact of changes in physical processes, on marine and coastal habitat receptors is assessed as **negligible**. The sensitivity of all receptors affected is assessed as **negligible** to **high**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

6.1.2.3 Increased Risk of Introduction and/or Spread of Marine INNS

An overview of marine INNS has been provided within Section 4.5. During the O&M phase of the proposed development, the introduction and spread of INNS may occur due to presence of vessels (due to ballast water exchange, and biofouling of vessel hulls and infrastructure). Additionally, the presence of new artificial hard substrate at the port, such as mooring dolphin structures, rock mattress, and a rock armour, will increase the hard substrate habitat available for INNS to colonise.

Magnitude of Impact

During O&M, the proposed development will include the presence of 150 m of rock armour extending below MLWS, with an approximate area of 2,906 m^2. Rock mattress with also be present, with an approximate footprint of 14,400 m^2 and a total linear extent of approximately 300 to 500 m. Additionally the presence of mooring dolphins structures within the water column will also provide hard substrate for INNS to colonise. While the total footprint of hard structures is not known at this stage, the impact will be highly localised (covering a small area of seabed habitat for INNS to colonise).

Vessel calls to the Port during O&M are anticipated to be between 250-350 per annum, with up to 400 vessel calls per year at peak periods in the short-term. This is similar to vessel calls per year in the 2018 application for Ardersier Port.

Furthermore, embedded mitigation measures include the implementation of the INNS biosecurity management plan. This will outline measures to be taken to prevent the introduction and/or spread of INNS, will ensure that the risk of potential introduction and spread of marine INNS is reduced as far as practicable. Therefore, the magnitude of this impact during the O&M phase of the proposed development is considered to be **negligible**, indicating that there is unlikely to be anything over a very minor loss or detrimental alteration to one or more characteristics, features or elements.

Sensitivity of Receptor

Assessing the sensitivity of marine and coastal habitat receptors to marine INNS impacts would require comprehensive knowledge of multiple dynamic and uncertain factors. These include: the current and potential future presence of marine INNS, their spatial distribution and abundance, the full suite of direct and indirect ecological impacts associated with each species, and the specific response of each receptor to those impacts. Given the inherent challenges in detecting marine INNS and the complex, often context-dependent nature of their ecological effects (e.g., Gallardo *et al*. 2015; Dimitriadis *et al*. 2021), such an assessment is not realistically achievable at the level of individual species-receptor combinations.

Therefore, on a precautionary basis, a resistance value of low to none has been assigned to all marine and coastal habitat receptors, acknowledging that some species will be more tolerant than others. Similarly, resilience is considered low to very low for all marine and coastal habitat receptors since a return to 'normal' conditions is highly unlikely if a marine INNS introduction and establishment occurred.

The sensitivity of VERs to the introduction or spread of marine INNS is deemed to be at worse case **high**.

Significance of Effect

Overall, the increased risk of introduction or spread of marine INNS is considered to be **negligible** magnitude due to the development of an INNS biosecurity management plan which will outline measures to be taken to prevent the introduction and/or spread of INNS. The sensitivity of receptors affected is predicted to be at worst-case **high**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

6.2 Diadromous Fish

6.2.1 Construction

6.2.1.1 Mortality, injury, behavioural changes and auditory masking arising from noise and vibration

UWN can potentially have a negative impact on diadromous fish receptors, ranging from behavioural effects (such as disturbance to migration) to physical injury/mortality. In general, biological damage as a result of sound energy is either related to a large pressure change (barotrauma) or to the total quantity of sound energy received by a receptor. Barotrauma injury can result from exposure to a high intensity sound even if the sound is of short duration (i.e., a single strike of a piling hammer). However, when considering injury due to the energy of an exposure, the time of the exposure becomes important. Fish are also considered to be sensitive to the particle motion element of UWN. However, research into this impact on fish populations is scarce, representing a source of uncertainty in the assessment process. Despite the lack of thresholds for particle motion, the criteria detailed within Popper *et al*. (2014) remain the best available evidence to inform the assessment of UWN impacts to fish receptors (Popper and Hawkins, 2021).

The worst case impacts from UWN will arise from the installation of three mooring dolphins through impact piling, vibratory (vibro) piling or a combination of both techniques, and deepening of the inner harbour through the use of TSHD or CSD. For the purposes of the assessment, UWN modelling has been undertaken to predict the received sound pressure levels and sound exposure levels generated during the proposed construction works. Chapter 11: Marine Mammals, Appendix 11.5: Construction Works – Port of Ardersier: Underwater Noise Modelling Assessment, presents the outputs of the modelling for a range of noise levels, representing the worst case scenario for the proposed piling and dredging activities (Table 5.12 summarises the parameters used to inform the modelling).

Table 5.12. Parameters used to inform the UWN modelling and impact assessment.

Proposed Activity	Relevant worst case parameters
Impact piling of piles for mooring dolphins	Pile: Steel Tubular Piles, 1,200 mm diameter Strike rate: 34 blows per minute Piling time per pile: 10 hours (including surveying and pile positioning etc.) (since the active piling time is unknown at the time of writing, 10 hours of continuous piling is assumed as a worst-case scenario to remain precautionary) Soft Start: 20 minutes (assumed at 20% energy) Maximum hammer energy: 294 kilojoules (kJ) Installation is expected to take place over approximately 19 days with piling occurring for 12 days during that period.
Vibropiling of piles for mooring dolphins	Since no project specific details were provided for vibropiling equipment, the proxy used to inform the modelling is described in Chapter 11: Marine Mammals, Appendix 11.5: Construction Works – Port of Ardersier: Underwater Noise Modelling Assessment. Piling time per pile: 10 hours (including surveying and pile positioning etc.) (since the active piling time is unknown at the time of writing, 10 hours of continuous piling is assumed as a worst-case scenario to remain precautionary) Installation is expected to take place over approximately 19 days with piling occurring for 12 days during that period.
Dredging	Although TSHD and CSD are proposed to be used, CSD is louder than TSHD, and therefore, only CSD was considered in the assessment, as a worst-case scenario. Since no project specific details were provided for CSD equipment, the proxy used to inform the modelling is described in Chapter 11: Marine Mammals, Appendix 11.5: Construction Works – Port of Ardersier: Underwater Noise Modelling Assessment. Since the active dredging time is unknown at the time of writing, CSD was

Proposed Activity	Relevant worst case parameters
	assumed to take place continuously for 24-hours, to remain precautionary)

The impact ranges, from piling and dredging activities, as derived from the UWN modelling, are used to inform the impact assessment for diadromous fish receptors. For impact piling, the modelling has used the criteria from Popper *et al*. (2014) for pile driving (summarised in Table 5.14). Since vibropiling and dredging are non-impulsive, continuous sound sources, the modelling uses the criteria from Popper *et al*. (2014) for shipping and continuous sounds (summarised in Table 5.15).

Popper *et al*. (2014) classifies receptors based on their hearing system; the diadromous fish VERs within the Project Study Area have therefore been grouped accordingly (see Table 5.13). It is important to note that there are differences in impact thresholds for the different hearing groups (see Table 5.14 and Table 5.15).

Table 5.13. Hearing categories of fish receptors (Popper *et al*., 2014) (*denotes uncertainty or lack of current knowledge with regards to the potential role of the swim bladder in hearing).

Category	VERs relevant to the Project
Group 1 (least sensitive): No swim bladder (particle motion detection)	Sea lamprey and river lamprey.
Group 2: Swim bladder is not involved in hearing (particle motion detection)	Atlantic salmon, sea trout.
Group 3 (most sensitive): Swim bladder involved in hearing (primarily pressure detection)	European eel*, twaite shad, allis shad
Eggs and larvae (considered separately by Popper *et al*. (2014) due to their potential vulnerability, reduced mobility, and small size.	Atlantic salmon, sea trout, twaite shad, allis shad, sea lamprey and river lamprey all spawn in rivers and streams, and European eel spawn in the Sargasso Sea. These receptors are therefore not present within the Study Areas, and potential impacts to eggs and larvae from UWN are therefore not assessed further as there is no pathway for effect.

Table 5.14. Impact piling threshold criteria from Popper *et al*. (2014).

Impact threshold noise level (sound pressure level (SPL) (Lp,pk)/ sound exposure level (SEL) (LE,p,24h)) and qualitative criteria (near-field (N), intermediate field (I) and far-field (F))					
Category	**Mortality and potential mortal injury**	**Recoverable injury**	**TTS**	**Masking**	**Behaviour**
Group 1	219dB $L_{E,p}$ 213dB $L_{p,pk}$	216dB $L_{E,p}$ 213dB $L_{p,pk}$	>>186dB $L_{E,p}$	(N) Moderate (I) Low (F) Low	(N) High (I) Moderate (F) Low
Group 2	210dB $L_{E,p}$ 207dB $L_{p,pk}$	203dB $L_{E,p}$ 207dB $L_{p,pk}$	>186dB $L_{E,p}$	(N) Moderate (I) Low (F) Low	(N) High (I) Moderate (F) Low
Group 3	207dB $L_{E,p}$ 207dB $L_{p,pk}$	203dB $L_{E,p}$ 207dB $L_{p,pk}$	186dB $L_{E,p}$	(N) High (I) High (F) Moderate	(N) High (I) High (F) Moderate

Table 5.15. Continuous noise threshold criteria from Popper *et al*. (2014).

Impact threshold noise level Popper *et al*. (2014) quantitative criteria ($L_{p,RMS}$) and qualitative criteria (near-field (N), intermediate field (I) and far-field (F))					
Category	**Mortality and potential mortal injury**	**Recoverable injury**	**TTS**	**Masking**	**Behaviour**
Group 1	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Group 2	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Group 3	(N) Low (I) Low (F) Low	170 dB $L_{p,48h}$	158 dB $L_{p,12h}$	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low

The modelling of cumulative sound exposure levels ($L_{E,p}$) provides outputs for both fleeing receptors, and stationary receptors, to account for species diversity and varying responses to noise. Most fish receptors are likely to swim away from harmful sounds (Dahl *et al*., 2015), and these speeds are likely to vary widely across species, therefore, a conservative swim speed of 1.5 ms^{-1} (Hirata, 1999) is used in fleeing animal models.

The noise modelling for injury ranges for fleeing and stationary diadromous fish receptors is presented in Chapter 11: Marine Mammals, Appendix 11.5 Construction Works - Port of Ardersier: Underwater Noise Modelling Assessment and referred to as appropriate in the following assessments. Table 5.16, Table 5.17 and Table 5.18 below summarise the results for each of the relevant criteria for the proposed construction works. The impact ranges for stationary receptors are also presented in Figure 5.8, Figure 5.9 and Figure 5.10[7].

Table 5.16. Predicted impact ranges associated with impact piling.

Hearing Group	Threshold	Estimated impact ranges (m) (fleeing/stationary)
Mortality and potentially mortal injury		
Group 1	219dB $L_{E,p}$	<10 m / 40 m
	213 dB $L_{p,pk}$[8]	20 m
Group 2	210dB $L_{E,p}$	<10 m / 180 m
	207dB $L_{p,pk}$	30 m
Group 3	207dB $L_{E,p}$	<10 m / 420 m
	207dB $L_{p,pk}$	30 m
Recoverable Injury		
Group 1	216 dB $L_{E,p}$	<10 m /60 m
	213 dB $L_{p,pk}$	20 m
Group 2	203 dB $L_{E,p}$	<10 m / 520 m
	207 dB $L_{p,pk}$	30 m
Group 3	203 dB $L_{E,p}$	<10 m / 520 m
	207 dB $L_{p,pk}$	30 m
TTS		
Group 1	>>186dB $L_{E,p}$	<10 m / 1,760 m
Group 2	>186dB $L_{E,p}$	<10 m / 1,760 m
Group 3	186 dB $L_{E,p}$	<10 m / 1,760 m

Table 5.17. Predicted impact ranges associated with vibropiling.

Hearing Group	Threshold	Estimated impact ranges (m)
Recoverable Injury		
Group 3	170 dB $L_{p,48h}$	20 m
TTS		

[7] It should be noted that due to the limited impact ranges for fleeing receptors (<10 m for all receptor groups), these haven't been presented in Figure 5.8, Figure 5.9 and Figure 5.10, as the extent of the noise contours is too small to show relative to the proposed development, wider Study Areas and rivers of importance to receptors. Noise contours for stationary receptors have therefore only been shown.

[8] The modelling of Lp,pk does not provide outputs for fleeing/static responses to noise

Hearing Group	Threshold	Estimated impact ranges (m)
Group 3	158 dB $L_{p,48h}$	80 m

Table 5.18. Predicted impact ranges associated with dredging activities.

Hearing Group	Threshold	Estimated impact ranges (m)
Recoverable Injury		
Group 3	170 dB $L_{p,48h}$	<10 m
TTS		
Group 3	158 dB $L_{p,48h}$	20 m

The following paragraphs provide the assessment of potential impacts on each VER for the spatial and temporal impacts from UWN associated with impact piling. Initial consideration is given to characterisation of the scale and magnitude of effect from the proposed works, before the sensitivity of each VER to UWN is determined. The significance of effect is then concluded, based on the matrix in Section 5.2.3.

Magnitude of impact, impact piling

The area over which potential impacts from UWN from impact piling may occur has been determined through UWN modelling, based on the sound pressure thresholds recommended by Popper *et al*. (2014). As summarised in Table 5.16, for peak pressure noise levels ($L_{p,pk}$ metric), Group 1 receptors are predicted to exceed their mortality and recoverable injury threshold if they are within 20 m of the impact piling activities. For the cumulative sound exposure ($L_{E,p}$ metric), mortality and recoverable injury of stationary Group 1 receptors is predicted to occur up to 40 m and 60 m from the source respectively, and TTS is predicted to occur up to 1,760 m from the source (see Figure 5.8).

Group 2 receptors are predicted to exceed their mortality and recoverable injury threshold if they are within 30 m from the impact piling activities. For the cumulative sound exposure ($L_{E,p}$ metric), mortality and recoverable injury of stationary Group 2 receptors is predicted to occur up to 180 m and 520 m from the source respectively, and TTS is predicted to occur up to 1,760 m from the source. The impact ranges for injurious effects however assume the receptors remain stationary for the maximum potential piling duration of 10 hours.

Given the mobile nature of Group 1 and Group 2 receptors (sea lamprey, river lamprey, sea trout and Atlantic salmon), the range of injurious effects and TTS is anticipated to be localised to the piling activities which will be undertaken within the confines of the harbour (<10 m based on a receptor fleeing at 1.5 ms^{-1}).

Regarding the potential for masking and behavioural effects on Group 1 and Group 2 receptors, the risk of masking effects are estimated to be moderate in the nearfield (10s of metres), with a high to moderate risk of behavioural effects in the near, and intermediate (100s of metres) fields respectively.

Considering the localised range of impacts from UWN, and the temporary and intermittent nature of piling operations, the magnitude of impact for the piling activities for Group 1 and 2 receptors is **low**.

Regarding the potential impacts to Group 3 receptors (European eel, allis shad and twaite shad), for peak pressure noise levels ($L_{p,pk}$ metric), Group 3 receptors are predicted to exceed their mortality and recoverable injury threshold if they are within 30 m from the impact piling activities. For the cumulative sound exposure ($L_{E,p}$ metric), mortality and recoverable injury of stationary Group 3 receptors is predicted to occur up to 420 m and 520 m from the source respectively, and TTS is predicted to occur up to 1,760 m from the source (see Table 5.16). However, this assumes a stationary receptor, and considering the mobile nature of European eel, allis shad and twaite shad the range of impact is likely to be localised to piling activity (<10 m based on a receptor fleeing at 1.5 ms^{-1}). Regarding masking and behavioural effects (such as disturbance to migration) the risks of effects are slightly higher, estimated as high in the near and intermediate fields, and moderate in the far field (1,000s' of metres). Considering the localised range of the impact for mobile receptors, and the temporary and intermittent nature of piling operations, the magnitude of impact for Group 3 receptors is **low**.

Magnitude of impact, vibropiling

As summarised in Table 5.17Table 5., the risk of mortality and potential mortal injury and recoverable injury from continuous noise activities such as vibropiling to Group 1 and Group 2 receptors is considered to be low at all distances from the source (although it should be acknowledged, that there is no direct evidence of mortality or potential mortal injury in fish from continuous noise sources). The risk of impacts from TTS, masking and behavioural effects are comparatively higher, with moderate impacts in the nearfield (10's of metres) from TTS, high risk of masking effects up to the intermediate field (100s of metres), and moderate risk of behavioural effects also up to the intermediate field. It is therefore apparent, that a small degree of disturbance to Group 1 and Group 2 receptors (from auditory masking and behavioural effects) may occur during vibropiling activities, however, any impacts from UWN will largely be restricted to within the vicinity of the works and considering the temporary and intermittent nature of piling activities, and the mobile nature of the receptors (reducing their exposure to UWN), the magnitude of impact for Group 1 and Group 2 receptors is **low**.

With regard to Group 3 receptors (European eel, allis shad and twaite shad), the risk of mortality and potential mortal injury from vibropiling is also considered to be low at all distances from the source. As summarised in Table 5.17Table 5., recoverable injury and TTS are anticipated to occur up to 20 m and 80 m from the source respectively. As summarised in Table 5.16, there is a high risk of masking effects of Group 3 receptors at all distances from the source (up to 1,000s of metres), and a high risk of behavioural effects in the nearfield (10’s of metres). It is therefore apparent, that a small degree of disturbance to Group 3 receptors (from auditory masking and behavioural effects) may occur during vibropiling activities, however, any impacts from UWN will largely be restricted to within the vicinity of the works and considering the temporary and intermittent nature of the proposed works, and the mobile nature of the receptors, the magnitude of impact for Group 3 receptors is therefore **low.**

Magnitude of impact, dredging activities

Like vibropiling, UWN generated from dredging activities is also continuous, and subsequently the range of impact is the same as those associated with vibropiling for Group 1 and Group 2 receptors (as the same qualitative Popper *et al*. (2014) criteria apply), and subsequently the magnitudes of impact for these receptors are also anticipated to be **low**. The range of impact from mortality and potential mortal injury, masking effects and behaviour effects from dredging activities for Group 3 receptors will also be the same as those from vibropiling. Recoverable injury and TTS are anticipated to occur up to 20 m from the source (as summarised in Table 5.18). Considering the continuous nature of the noise (there is no direct evidence of mortality or potential mortal injury in fish from continuous noise sources), the intermittent nature of the proposed activities, and the mobile nature of the receptors, the magnitude of impact from dredging noise for Group 3 receptors is anticipated to be **low**.

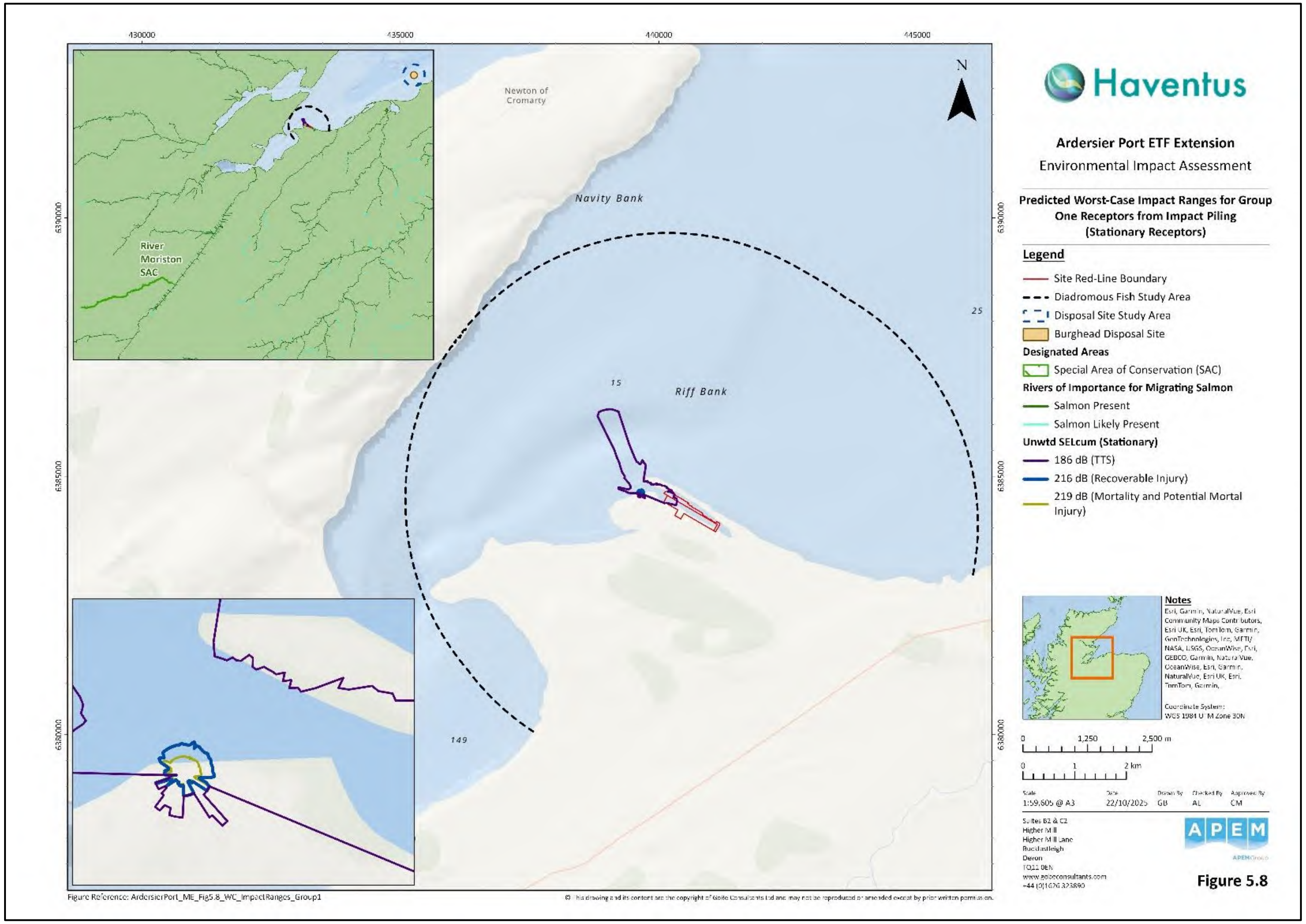

Figure 5.8. Predicted Worst-case Impact Ranges for Group One Receptors from Impact Piling (Stationary Receptors).

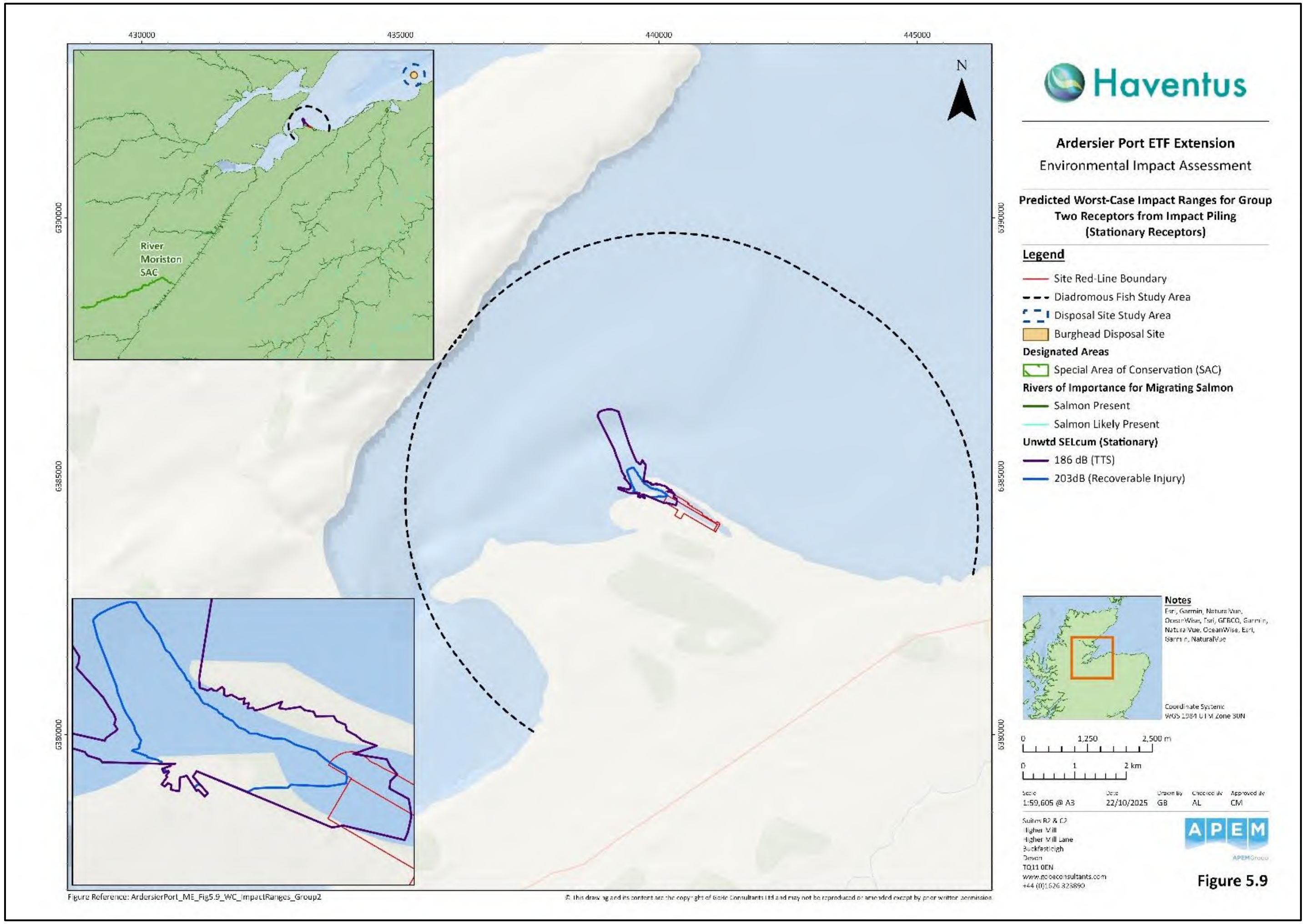

Figure 5.9. Predicted Worst-Case Impact Ranges for Group Two Receptors from Impact Piling (Stationary Receptors).

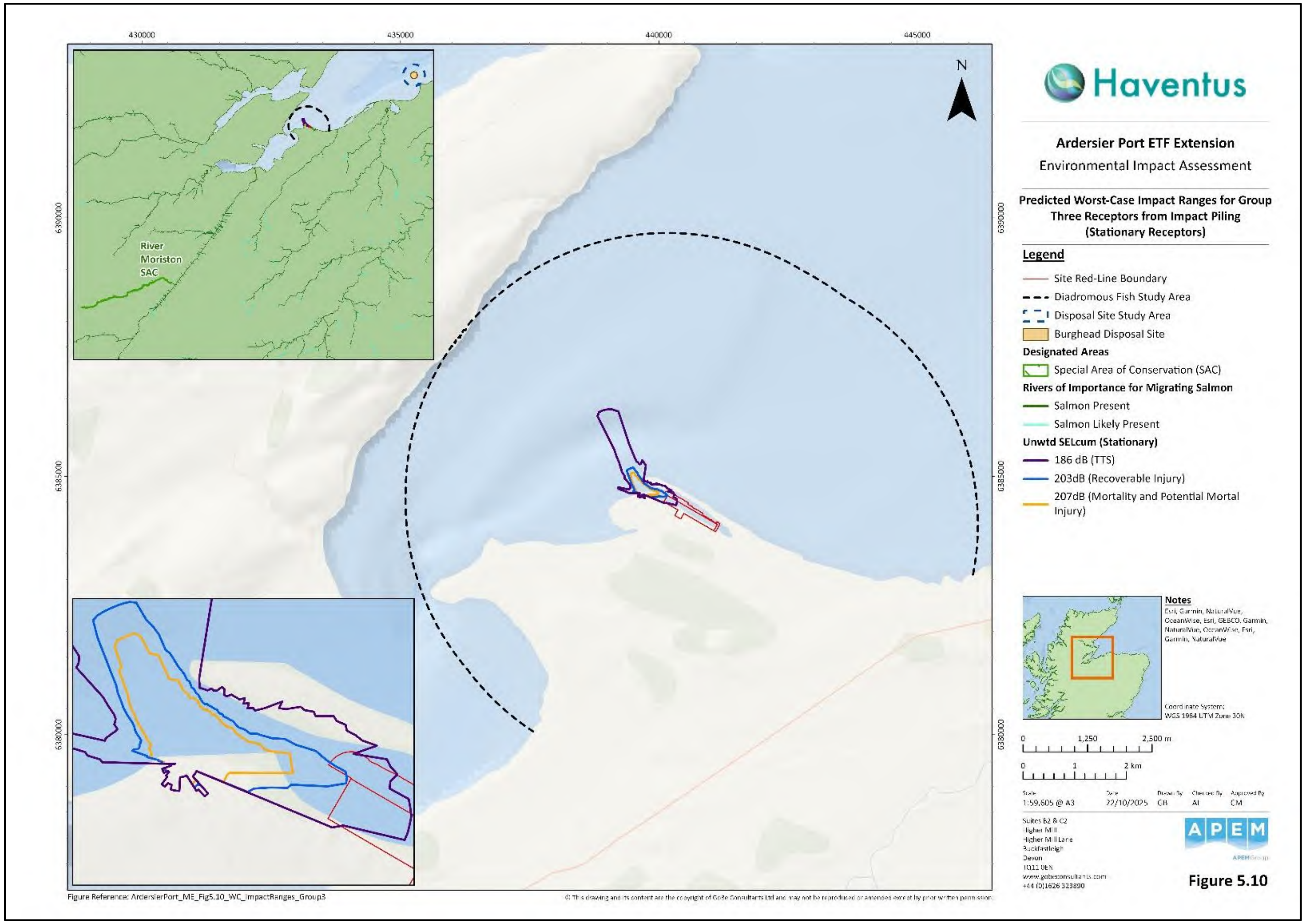

Figure 5.10. Predicted Worst-Case Impact Ranges for Group Three Receptors from Impact Piling (Stationary Receptors).

Sensitivity of VERs

Sea lamprey and river lamprey (Group 1 receptors, as classified using the Popper *et al*. (2014) criteria) lack a swim bladder and are therefore considered less sensitive to UWN than other species. Based on their low vulnerability to UWN impacts, and their mobile nature (potentially transiting the Study Areas during migration), these receptors are expected to recover quickly following exposure to UWN. Taking this into account, the receptors are deemed to be of low vulnerability, high recoverability, and of national to international importance. The sensitivity of these receptors to UWN impacts is therefore considered to be **low**.

Atlantic salmon and sea trout are Group 2 receptors (as classified using the Popper *et al*., (2014) criteria) and are therefore considered to primarily sense UWN through particle motion despite the presence of a swim bladder (Popper *et al*., 2014). Given the mobile nature of Atlantic salmon and sea trout (potentially transiting the Study Areas during migration), they are anticipated to be able to adapt their behaviour and move away from the piling location during soft-start and ramp-up procedures (as detailed in the MMMP) prior to the use of the highest hammer energies, which will reduce the number of individuals at risk of injurious effects. Few studies have investigated behavioural reactions of Atlantic salmon and sea trout to piling noise, providing inconclusive results, with some studies showing a lack of behavioural responses and others reporting changes in the abundance and distribution of Atlantic salmon due to avoidance reactions (reviewed by Gillson *et al*. (2022)). There is, however, evidence that behavioural responses in fish as a result of UWN might be reduced when fish are engaged in life history critical activities such as spawning and feeding (e.g. Doksaeter *et al*., 2009; Pena *et al*., 2013; Skaret *et al*., 2005). While a similar damping of behavioural reactions might occur in Atlantic salmon and sea trout during migration, the implications of experiencing temporary avoidance or stress responses remain not fully understood, and it cannot be excluded that such responses could delay migration in the short-term. However, given the transient nature of the receptors through the Study Areas around the Proposed Development and the Burghead disposal site, and the availability of unaffected waters within the broader migratory corridor (the entrance to the Inverness Firth is approximately 4 km wide at the port entrance, and the Moray Firth is approximately 22.5 km wide at Burghead) any temporary displacement from disturbance would not result in a barrier effect to any upstream or outgoing migration, as the available space would ensure free passage to migrating receptors. Taking this into account, and considering the international importance of Atlantic salmon, the sensitivity of this receptor to UWN is rated as **medium**. Considering the regional importance of sea trout, the sensitivity of sea trout to UWN from impact piling is deemed to be **low**.

European eel, allis shad and twaite shad are all Group 3 receptors (as classified using the Popper *et al*. (2014) criteria) and are therefore considered to be sensitive to UWN, with direct detection of sound pressure, rather than just particle motion. The presence of a swim bladder makes them highly susceptible to tissue damage, and given their good hearing ability, they are also at higher risk to physiological and behavioural effects ((Popper *et al*. (2014); Popper and Hawkins (2019)). Given the mobile nature of these receptors (transiting the Study Area during migration), they are anticipated to be able to adapt their behaviour and move away from the piling location during soft-start and ramp-up procedures (detailed within the MMMP) prior to the use of the highest hammer energies, which will reduce the number of individuals at risk of mortal or recoverable injuries. Further to this, given the transient nature of the receptors through the Study Areas around the Proposed Development and the Burghead disposal site, and the availability of unaffected waters within the broader migratory corridor any temporary displacement from disturbance would not result in a barrier effect to any upstream or outgoing migration, as the available space would ensure free passage to migrating receptors. Taking this into account and considering the international importance of European eel and allis shad, and the national importance of twaite shad, the sensitivity of these receptors to UWN is rated as **medium**.

Significance of Effect

Overall, the magnitude of impact of UWN, on diadromous fish receptors is assessed as **low** for all noisy activities (impact piling, vibropiling and dredging). The sensitivity of all receptors affected is assessed as **low** to **medium**. The significance of the effect is therefore concluded to be **negligible** to **minor**, which is not significant in EIA terms.

Atlantic salmon are a qualifying feature of the River Moriston SAC (located 56.24 km from the proposed development, and 85.71 km from the Burghead disposal site), which has connectivity to the Inverness Firth. Considering the mobile nature of Atlantic salmon across the Study Areas (which reduces their exposure to UWN), and the localised nature of the impacts from UWN from impact piling, vibro-piling and dredging activities, relative to the width of the Inverness Firth at the port entrance (approximately 4 km wide), the available space in the Inverness Firth is considered to be suitable to ensure free passage to migrating smolts, juveniles and adults during the migration period (should piling or dredging occur during this period). Therefore, no significant effects are anticipated on salmon as a qualifying feature of this designated site.

6.2.1.2 Temporary increases in SSC and sediment deposition from capital dredging and disposal

Capital dredging activities are proposed within the harbour at the proposed development to deepen the port basin and approach channel to accommodate larger vessels. Additional capital dredging is also proposed to the west of Tern Island located just outside of the harbour entrance. Spoil disposal is anticipated to occur at Burghead disposal site (a licenced disposal ground, located approximately 32 km from the proposed development, and 2km offshore of Burghead). These works are expected to result in temporary and localised increases in SSC and associated sediment deposition. Sediment plumes from dredging operations, and spoil disposal have the potential to cause barrier effects to the migration of diadromous fish.

Magnitude of impact

The proposed dredging within the port will deepen the inner harbour (approximately 800 m to 1,800 m inside the harbour entrance) to 12.4 mCD, with an area in the east of the harbour dredged to approximately -6 mCD. These works will result in the removal of approximately 2,000,000 m^3 of sediment, which will be disposed of approximately 2 km offshore, at a licenced disposal site near Burghead. A discrete area to the west of Tern Island is also proposed to be dredged (with approximately 200 - 500 m^3 of sand to be removed and an approximate dredging footprint of 200 m^2). The spoil from dredging operations at Tern Island may be removed by conventional land-based plant (excavator and dumper) and taken ashore, or if in less readily accessible areas (further from shore) be excavated by barge mounted backhoe and disposed of at the Burghead disposal ground.

The dredging operations are proposed to take place between March and November in either 2027 or 2028, over an approximate duration of 12 weeks. The dredging operations will be undertaken using a CSD and/or TSHD, both of which are known to generate sediment plumes.

In the absence of sediment plume modelling for the proposed development, the tidal excursion distances in the vicinity of the proposed development, and the disposal site at Burghead have been used as proxies, to determine the maximum extent at which sediments may be transported after disturbance, and deposition. The tidal excursion distance surrounding the Riff Bank (located proximal to the proposed development), is approximately 1.1 km, and the tidal excursion distance at the Burghead disposal site is approximately 1.3 km. It is therefore assumed that sediments disturbed through dredging operations within the proposed development could be transported up to 1.1 km, with sediments deposited at the existing Burghead disposal site being transported up to 1.3 km from the site, although most suspended sediments are expected to be deposited much closer to the disturbance activity. Sediment characteristics within the port support the expectation of limited plume dispersion from dredging and disposal activities. The seabed is largely composed of sands, with gravel also present, with approximately 2% silt. Given the relatively coarse nature of the dredge material, the limited extent of the tidal excursions at both the proposed Development, and the Burghead disposal site, it is considered that any plumes generated as a result of the dredging works in the port, and spoil disposal at Burghead will be very localised and short term in duration.

Further to this, EnviroCentre conducted sediment transport monitoring at five sites at Whiteness Sands (located just beyond the entrance of Ardersier Port) between 2022 and 2025. The monitoring analysed baseline conditions of TSS up to March 2025, just prior to the phase 1 capital dredge of the outer harbour, which commenced in April 2025. TSS was then analysed again in June 2025, during the phase 1 capital dredge operations. The results indicated that TSS concentrations recorded during the phase 1 capital dredge were within the lower end of the baseline range, indicating no significant increases in TSS from dredging operations (Chapter 9: Hydrology and Hydrogeology; Chapter 10: Coastal Processes and Geomorphology). Additionally, turbidity data was also collected from a monitoring buoy installed in March 2025, located just beyond the entrance of Ardersier Port. Results of turbidity data indicated that during the phase 1 capital dredge, concentrations fluctuated, with an average of 3.9 NTU recorded. These fluctuations could be the result of a range of factors including weather, tidal or wave conditions, or the phase 1 capital dredge. However, the majority of readings fell with the range of baseline readings, and concentrations remained generally low following the capital dredge.

Considering the limited tidal excursion distances proximal to the proposed development and Tern Island, the coarse nature of the sediments within the port, and the outputs of the sediment transport monitoring and turbidity data, the magnitude of impact from sediment discharge and dispersion from dredging operations at the Proposed Development is considered to be **low**.

The material removed from the proposed development and west of Tern Island during dredging operations will largely consist of sand and gravel, which will be disposed of at an existing disposal site at Burghead. Given the coarse nature of these substrates, and the limited tidal excursion at the disposal site, it is anticipated that the sediment will fall out of suspension rapidly, with any generated plumes being of short term duration, and localised to the disposal event. The magnitude of impact from sediment discharge and dispersion from disposal at the Burghead disposal site is therefore also considered to be **low**.

Sensitivity of VERs

Diadromous fish species, including Atlantic salmon, European eel, sea lamprey, river lamprey, allis shad and twaite shad, migrate through estuarine environments as part of their life cycles. These habitats are naturally dynamic and often characterised by elevated SSC, meaning that these diadromous receptors are generally adapted to turbid conditions. Further to this, diadromous fish species are highly mobile and would be able to relocate to nearby unimpacted areas. Localised avoidance reactions have the potential to occur in areas of high SSC during the duration of the plumes. A study by Carlson *et al*. (2001) documented the behavioural responses of salmonids to dredging activities and observed avoidance responses of migrating salmon upon encountering sediment plumes. However, given the transient nature of the diadromous receptors through the Study Areas around the Proposed Development and the Burghead disposal site, and the availability of unaffected waters within the broader migratory corridor (the entrance to the Inverness Firth is approximately 4 km wide at the port entrance, and the Moray Firth is approximately 22.5 km wide at Burghead) any displacement would not result in a barrier effect to any upstream or outgoing migration, as the available space should ensure free passage to migrating receptors. Taking this into account, diadromous fish are considered to have **low** sensitivity to increased SSC and deposition as a result of the proposed development construction activities.

Significance of effect

Overall, the magnitude of impact of increased SSC and deposition from dredging operations at the Proposed Development and Tern Island, on diadromous fish receptors is assessed as **low**. The sensitivity of all receptors affected is assessed as **low**. The significance of the effect from dredging operations is therefore concluded to be **negligible**, which is not significant in EIA terms.

The magnitude of impact of increased SSC and deposition from spoil disposal at the Burghead disposal site, on diadromous fish receptors is assessed as **low**. The sensitivity of all receptors affected is assessed as **low**. The significance of the effect from spoil disposal is therefore concluded to be **negligible**, which is not significant in EIA terms.

Atlantic salmon are a qualifying feature of the River Moriston SAC, (located 56.24 km from the proposed development, and 85.71 km from the Burghead disposal site), with connectivity to the Inverness Firth. Considering the mobile nature of Atlantic salmon, and the localised nature of the impacts from increased SSC and deposition from dredging activities and spoil disposal, relative to the width of the Inverness Firth at the port entrance (approximately 4 km wide) and the width of the Moray Firth (approximately 22.5 km wide at Burghead), the available space is considered to be suitable to ensure free passage to migrating smolts, juveniles and adults during the migration period. Therefore, no significant effects are anticipated on salmon as a qualifying feature of the River Moriston SAC.

6.2.1.3 Seabed disturbance leading to release of sediment contaminants

Capital dredging, and spoil disposal will re-suspend sediments into the water column. While in suspension, there is the potential for sediment-bound contaminants, such as metals, hydrocarbons and organic pollutants, to be released into the water column, which could lead to an impact on diadromous fish receptors.

Magnitude of impact

Sediment sampling undertaken within the boundary of Ardersier Port in 2013, identified the presence of fine to medium sand, and gravelly substrates within the port, with sampling in 2018 also identifying the presence of gravelly silt. Contaminants analysis in 2013 revealed no sediment contaminants exceeding Cefas Action Level 2, with Cefas Action Level one exceedances recorded in five grab samples for PAHs and one sample with an exceedance in zinc concentration. Pre-construction sediment sampling of contaminants within the capital dredge area of the proposed development has been completed in 2025 with the results reported in the BPEO submitted along with the disposal licence application.

Following sediment disturbance resulting from dredging activities, the majority of re-suspended sediments are expected to settle within the immediate vicinity of the works due to the predominance of coarse material. Contaminants, where present, typically adsorb to the finer silt and clay fractions of sediment. However, these finer fractions constitute only a small proportion of the seabed substrate in the area (approximately 2%), thereby limiting the potential for contaminant mobilisation. Any contaminants released from these fine sediments are expected to disperse rapidly through tidal and current-driven mixing. Notwithstanding this, if contaminants are recorded as present within the proposed dredge area (as reported in the BPEO (sediment risk assessment)), a suitable dredge strategy will be developed to ensure no spread of material with elevated concentrations of contaminants. Consequently, the impact is predicted to result in either a very slight or no measurable change to baseline conditions, given the localised spatial extent, short-term duration and proposed measures if contaminants are present. The magnitude of impact from dredging operations is therefore **low**.

Regarding disposal at the Burghead disposal site, as aforementioned, the dredged material will predominantly consist of coarse materials (sands and gravels), which contaminants do not typically adsorb to, which thereby limits the potential for deposition of contaminants at the disposal site. Furthermore, if contaminants are recorded as present within the proposed dredge area (as informed by the upcoming analysis of the site-specific pre-construction sediment sampling within the BPEO), a suitable dredge strategy will be developed if necessary, whereby no material with elevated concentrations of contaminants will be disposed of at the Burghead disposal site. This will be secured within the Marine Licence application. Therefore, the impact is not predicted to result in a measurable change to baseline conditions at the disposal site, and therefore the magnitude of impact from spoil disposal is **low**.

Sensitivity of VERs

Construction activities leading to the resuspension of sediments will have varying levels of impact dependent on the species present and pollutants involved. Due to their increased mobility while transiting the Study Areas during migration, juvenile and adult diadromous fish are less likely to be affected by marine pollution and are therefore not considered to be vulnerable to the release of sediment bound contaminants, and as such the sensitivity of these VERs is **low**.

Fish eggs and larvae are likely to be particularly sensitive, with pollutants having potentially toxic impacts on fish eggs and larvae (Westerhagen, 1988). The resuspension of sediment-bound contaminants (e.g., heavy metals and hydrocarbon pollution) have been found to impact fish eggs and larvae and can lead to abnormal development, delayed hatching and reduced hatching success (Bunn *et al*., 2000). However, given that all diadromous VERs (with the exception of European eel which spawn in the Sargasso Sea) spawn in rivers and streams, eggs and larvae will not be present in the defined Study Areas. The potential for impacts to eggs and larvae are therefore not assessed further as there is no pathway for effect.

Significance of effect

Overall, the magnitude of impact on diadromous fish from the release of sediment bound contaminants is assessed as **low** for both dredging at the proposed development and disposal at the Burghead disposal site. The sensitivity of all receptors is assessed as **low**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

Atlantic salmon are a qualifying feature of the River Moriston SAC, located 56.24 km from the proposed development, and 85.71 km from the Burghead disposal site), which has connectivity to the Inverness Firth. Considering the mobile nature of Atlantic salmon, and the localised nature of the impacts from the release of sediment bound contaminants from dredging and disposal activities, relative to the width of the Inverness Firth at the port entrance (approximately 4 km wide), the available space in the Inverness Firth is considered to be suitable to ensure free passage to migrating smolts, juveniles and adults during the migration period. Therefore, no significant effects are anticipated on salmon as a qualifying feature of this designated site.

6.2.2 O&M

No impacts have been scoped in for diadromous fish receptors during the operation and maintenance phase of the proposed development.

7. Cumulative Effects Assessment

Impacts from the proposed development alone are generally spatially restricted to the inner harbour area, however, certain impacts have the potential to be observed over a wider area. Cumulative effects are effects of the proposed development, combined with the effects from other projects, on the same receptor or group of receptors. Chapter 14: Cumulative Effects Assessment details how potential cumulative effects will be assessed for the proposed development through a Cumulative Effects Assessment (CEA).

Certain impacts assessed for the proposed development alone are also not considered in the cumulative assessment, due to the following reasons:

- The highly localised nature of the impacts; and
- Mitigation measures (embedded commitments (see Section 5.3)) in place at the proposed development and on other projects will reduce the risk of cumulative effects occurring.

The impacts excluded from the marine and coastal ecology CEA are listed in Table 5.19, for marine and coastal habitats and diadromous fish respectively.

Table 5.19. Impacts screened out from further consideration in the CEA with justification for screening.

Impact	Justification
Marine and coastal habitats	
Loss of habitat from capital dredging (construction phase)	Potential loss of habitat is expected to be highly localised across all projects. As such, the potential for significant cumulative effects is minimal and, therefore, this impact was not considered further.
Temporary habitat loss/disturbance (construction phase)	Potential disturbance or loss of habitat is expected to be highly localised across all projects. As such, the potential for significant cumulative effects is minimal and, therefore, this impact was not considered further.
Seabed disturbance leading to release of sediment contaminants (construction phase)	Due to the coarse nature of the substrates within the proposed development, and the proposed measures that will be implemented if contaminants are present, the potential for contaminant mobilisation from the proposed development alone is highly limited, and therefore there is minimal potential for cumulative effects from other projects or plans in the area. This impact was therefore not considered further.
Increased risk of introduction and/or spread of marine INNS (construction and	Due to the development of an INNS biosecurity management plan which will outline measures to be taken to prevent the introduction and/or spread of INNS, there is not considered to be any potential for cumulative effects from

Impact	Justification
operation and maintenance phases)	other projects or plans in the area. This impact was therefore not considered further.
Permanent and/or long term habitat loss/alteration from introduction of hard substrates	Permanent and/or long term habitat loss/alteration from introduction of hard substrates is expected to be highly localised across all projects. As such, the potential for significant cumulative effects is minimal and, therefore, this impact was not considered further.
Changes in physical processes resulting from capital dredging and installation of hard substrates (e.g. changes in wave/tidal current regimes	Changes in physical processes is expected to be highly localised across projects. As such, the potential for significant cumulative effects is minimal and, therefore, this impact was not considered further,
Diadromous fish	
Seabed disturbance leading to release of sediment contaminants (construction phase)	Due to the coarse nature of the substrates within the proposed development, and the proposed measures that will be implemented if contaminants are present, the potential for contaminant mobilisation from the proposed development alone is highly limited, and therefore there is minimal potential for cumulative effects from other projects or plans in the area. This impact was therefore not considered further.

Certain impacts have the potential to affect marine and coastal habitats or diadromous fish over a larger area and therefore have the potential to result in cumulative effects. The impact considered in the marine and coastal habitats CEA is therefore as follows:

- Cumulative temporary Increases in SSC and sediment deposition from capital dredging and disposal.

The impacts that are considered in the diadromous fish CEA are as follows:

- Cumulative temporary Increases in SSC and sediment deposition from capital dredging and disposal; and
- Cumulative mortality, injury and behavioural changes resulting from UWN.

A CEA screening process has identified the relevant other plans, projects, and activities which are to be included in the assessment. Those plans/projects relevant to the CEA for marine and coastal habitats and diadromous fish receptors are indicated in Table 5.20 and Table 5.21 respectively, and shown in Figure 5.11 relative to the proposed development and the Burghead disposal site. For each of these relevant plans/projects, the most up-to-date publicly available project parameters have been used to inform the CEA. These plans or projects may present different levels of potential cumulative effect when combined with the proposed development, informed by other plan/project's readiness and likelihood for actual operation.

This CEA has considered the worst-case design scenario for each of the proposed development plans and activities. For potential effects on marine and coastal habitats and diadromous fish, planned projects were screened into, or out of the assessment based on screening ranges that encapsulate the defined Study Areas (for both marine and coastal habitats and diadromous fish), and potential cumulative impacts from UWN on diadromous fish receptors (from the proposed development). A screening range of 2 km has therefore been applied around the Burghead disposal site (a precautionary screening range to encapsulate potential cumulative impacts from sediment dispersion and deposition, as informed by the tidal excursion distances at the site), and a screening range of 15 km has been applied around the proposed development (to encapsulate potential cumulative UWN impacts). These screening ranges are shown in Figure 5.11 below.

Each project, plan or activity within the screening ranges, have been considered and screened in or out based on effect–receptor pathways, data confidence and the temporal and spatial scales involved. Projects were therefore screened out, if they had the following:

- No temporal overlap with the proposed works at the proposed development site (2027-2028);
- No physical effect-receptor overlap; and
- No effect-receptor pathway.

Operational/active projects were also screened out, as they were considered to be existing impacts included within the baseline (this includes all shipping ports, shipping routes and oil and gas pipelines), or if no construction timeline was available.

Table 5.20 Other plans/projects included in the marine and coastal habitats CEA.

Plan/Project	Summary	Distance from the proposed development	Distance from the Burghead disposal site	Dates of proposed works	Operational by (if relevant)	Summary of interaction with proposed development
Ardersier ETF Expansion	Port Expansion	N/A	N/A	Piling operations – 2027 Piling and dredging-2028	2030	N/A
Port of Cromarty Firth	Maintenance Dredging	9.45 km	30.49 km	Dredging operations-2025-2028	2029	Dredging operations have a temporal interaction with dredging operations at the proposed development in 2026-2028.

Table 5.21. Other plans/projects included in the diadromous fish CEA.

Plan/Project	Summary	Distance from the proposed development	Distance from the Burghead disposal site	Dates of proposed works	Operational by (if relevant)	Summary of interaction with proposed development
Ardersier ETF Expansion	Port Expansion	N/A	N/A	Piling operations – 2027 Piling and dredging- 2028	2029	N/A
Port of Cromarty Firth	Maintenance Dredging	9.45	30.49 km	Dredging operations- 2025-2028	2029	Dredging operations have a temporal interaction with dredging and piling operations at the proposed development in 2026-2028.
Invergordon Phase 5	Dredging operations and Quay extension	14.32 km	38.95 km	Dredging operations- 2025 Piling operations - 2026-2027	2028	Piling operations have a temporal interaction with piling operations at the proposed development.

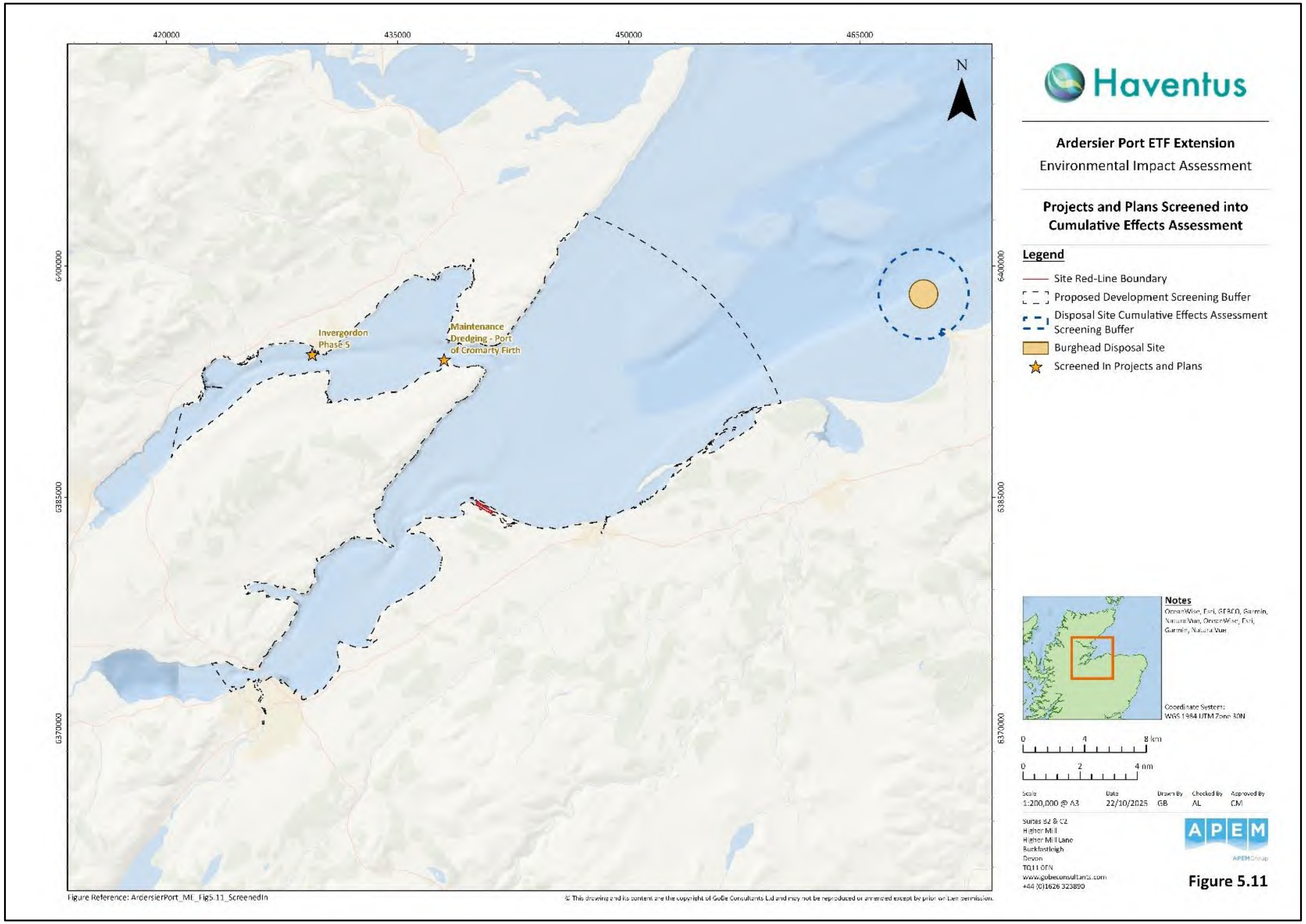

Figure 5.11. Projects and Plans Screened into Cumulative Effects Assessment.

7.1 Marine and Coastal Habitats CEA

Projects which were screened into the CEA for marine and coastal habitats are detailed Table 5.20 and displayed in Figure 5.11.

7.1.1 Cumulative increases in SSC and deposition of disturbed sediments to the seabed

There is potential for cumulative increases in SSC and deposition of disturbed sediments to the seabed as a result of construction activities associated with the proposed development and all stages of other projects.

Magnitude of impact

Dredging and disposal operations will result in temporary and localised increases in SSC and also associated sediment deposition. Sediment plumes from dredging and disposal operations have the potential to adversely affect marine and coastal habitats. Dredging and disposal operations at the proposed development alone, and dredging at the Port of Cromarty Firth, have the potential to result in cumulative impacts on marine and coastal habitat receptors.

Maintenance dredging works at the Port of Cromarty Firth are proposed to be undertaken at the same time as the dredging operations at the proposed development (located 9.45 km from the proposed development). The proposed works at the Port of Cromarty Firth will consist of dredging operations undertaken between 2025-2028, during which dredging works at the proposed development are proposed. As detailed in the Port of Cromarty Firth EIAR (Affric Limited, 2018), observations of the Phase 3 development construction operations at the Port of Cromarty Firth, reported the creation of sediment plumes at both the dredging and disposal sites, although the observed plumes were relatively small, dispersed quickly and at no point occluded the Cromarty Firth.

Given the highly localised spatial extent of impacts from the dredging works at the proposed development alone (see Section 6.1.1.3), and at the Port of Cromarty Firth, and the distances between the projects (the Port of Cromarty Firth is located 9.45 km from the proposed Development), the magnitude of cumulative impacts is considered to be **low**.

Sensitivity of receptors

The sensitivity of marine and coastal habitat receptors to increased SSC and deposition are detailed in Section 6.1.1.3 of this Technical Appendix and is assessed as **negligible** to **low** sensitivity depending on the receptor.

Significance of Effect

Overall, the magnitude of impact of cumulative effects from increased SSC and deposition on marine and coastal habitat receptors is assessed as **low**. The sensitivity of all receptors affected is assessed as **negligible** to **low**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

7.2 Diadromous fish

Projects which were screened into the CEA for diadromous fish receptors are detailed in Table 5.21 and displayed in Figure 5.11.

7.2.1 Cumulative Mortality, injury and behavioural changes resulting from UWN

There is potential for cumulative mortality, recoverable injury, TTS, masking and behavioural changes from noise and vibration as a result of construction activities associated with the proposed development and all stages of other projects (see Table 5.21).

Magnitude of Cumulative Impact

The Port of Cromarty Firth is the closest project that is also undertaking construction works at the same time as the proposed development (located 9.45 km from the proposed development). The proposed works at the Port of Cromarty Firth will consist of dredging operations undertaken between 2025-2028, during which piling works at the proposed development are proposed. As detailed in Section 6.2.1.1 of this Technical Appendix, dredging operations can cause an increase in UWN, although any UWN from dredging operations is anticipated to be highly localised (as noise from dredging operations is continuous rather than impulsive).

Piling operations are proposed at Invergordon Phase 5 (located 14.32 km from the proposed development), from 2026-2027, during which piling operations at the proposed development are proposed. As detailed in the Invergordon Phase 5 EIAR (Affric Ltd. 2024), recoverable injury and avoidance behaviour of diadromous fish (the impact assessment focussed on potential impacts to migrating sea trout and Atlantic salmon) from UWN from impact piling has the potential to occur up to 370 m from the source, with mortality and potential mortal injury anticipated to occur up to 50 m from the source, although these impact ranges are based on a stationary receptor (i.e. not a mobile receptor transiting the site during migration) and so are inherently precautionary.

On account of the localised range of impacts from the proposed works at the proposed development alone (see Section 6.2.1.1), and from the screened in projects, and the distances between the proposed development and the screened in projects (the nearest project is located 9.45 km from the Port), the cumulative magnitude of cumulative impact is considered to be **low**.

Sensitivity of Receptors

The sensitivities of the diadromous fish receptors to UWN are detailed in Section 6.2.1.1 of this Technical Appendix and are assessed as having a **low** to **medium** sensitivity.

Significance of Effect

Overall, the magnitude of impact of cumulative impacts from UWN on diadromous fish receptors is assessed as **low**. The sensitivity of all receptors affected is assessed as **low** to **medium**. The significance of the effect is therefore concluded to be **negligible** to **minor**, which is not significant in EIA terms.

Atlantic salmon are a qualifying feature of the River Moriston SAC, SAC (located 56.24 km from the proposed development, and 85.71 km from the Burghead disposal site), which has connectivity to the Inverness Firth. Considering the mobile nature of Atlantic salmon, and the localised nature of the impacts from UWN from the proposed development alone, and cumulatively from other developments, relative to the width of the Inverness Firth at the port entrance (approximately 4km wide), the available space in the Inverness Firth is considered to be suitable to ensure free passage to migrating smolts, juveniles and adults during the migration period. Therefore, no significant cumulative effects are anticipated on the receptor of this designated site.

7.2.2 Cumulative increases in SSC and deposition of disturbed sediments to the seabed

There is potential for cumulative increases in SSC and deposition of disturbed sediments to the seabed as a result of construction activities associated with the proposed development and disposal and the Burghead disposal site, and all stages of other projects.

Magnitude of Cumulative Impact

Dredging and disposal operations will result in temporary and localised increases in SSC and associated sediment deposition. Sediment plumes from dredging and disposal operations have the potential to result in barrier effects to the migration of diadromous fish. Dredging operations proposed at the proposed development alone, disposal at the Burghead disposal site, and dredging at the Port of Cromarty Firth have the potential to result in cumulative impacts on diadromous fish receptors.

Maintenance dredging works at the Port of Cromarty Firth (located 9.45 km from the proposed development) are proposed to be undertaken at the same time as the proposed works at the proposed development and at the Burghead disposal ground. The proposed works at the Port of Cromarty Firth will consist of dredging operations undertaken between 2025-2028, during which piling and dredging works at the proposed development, and disposal at the Burghead disposal site are proposed. As detailed in the Port of Cromarty Firth EIAR (Affric Ltd, 2018), observations of the Phase 3 Development construction operations at the Port of Cromarty Firth, reported the creation of sediment plumes at both the dredging and disposal sites, although the observed plumes were relatively small, dispersed quickly and at no point occluded the Cromarty Firth.

On account of the localised range of impacts from the proposed works at the proposed development and the Burghead disposal ground (see Section 6.2.1.2), and at the Port of Cromarty Firth, and the distances between the projects (the Port of Cromarty Firth is located 9.45 km from the Port), the magnitude of cumulative impact is considered to be **low**.

Sensitivity of Receptors

The sensitivities of the diadromous fish receptors to increased SSC and deposition are detailed in Section 6.2.1.2 of this Technical Appendix and are assessed as having **low** sensitivity.

Significance of Effect

Overall, the magnitude of impact of cumulative impacts from increased SSC and deposition on diadromous fish receptors is assessed as **low**. The sensitivity of all receptors affected is also assessed as **low**. The significance of the effect is therefore concluded to be **negligible**, which is not significant in EIA terms.

Atlantic salmon are a qualifying feature of the River Moriston SAC, SAC (located 56.24 km from the proposed development, and 85.71 km from the Burghead disposal site), which has connectivity to the Inverness Firth. Considering the mobile nature of Atlantic salmon, and the localised nature of the impacts from increased SSC and deposition from the proposed development alone and at the disposal site, and cumulatively from other developments, relative to the width of the Inverness Firth at the port entrance (approximately 4km wide), the available space in the Inverness Firth is considered to be suitable to ensure free passage to migrating smolts, juveniles and adults during the migration period. Therefore, no significant cumulative effects are anticipated on the receptor of this designated site.

8. Assessment Summary

A summary of the assessment of impacts alone undertaken in Section 6, and the CEA undertaken in Section 7 is provided in Table 5.22 and

Table **5.23** respectively.

Table 5.22. Summary of assessment of effects of marine and coastal habitats, and diadromous fish.

Impact	Receptor	Magnitude	Sensitivity	Significance
Construction				
Loss of habitat from capital dredging	Marine and coastal habitats	Low	Medium	Minor (not significant)
Temporary habitat loss/disturbance	Marine and coastal habitats	Negligible	Low	Negligible (not significant)
Temporary increases in SSC and sediment deposition from capital dredging and disposal	Marine and coastal habitats	Low	Negligible to Low	Negligible (not significant)
	Diadromous fish	Low	Low	Negligible (not significant)
Seabed disturbance leading to release of sediment contaminants	Marine and coastal habitats	Low	Medium	Minor (not significant)
	Diadromous fish	Low	Low	Negligible (not significant)
Increased risk of introduction and/or spread of marine INNS	Marine and coastal habitats	Negligible	High	Negligible (not significant)
Mortality, injury, behavioural changes and auditory masking arising from noise and vibration	Diadromous fish	Low	Low to Medium	Negligible to Minor (not significant)
Operation & Maintenance				
Permanent and/or long-term habitat loss/alteration from introduction of hard structures	Marine and coastal habitats	Negligible	High	Negligible (not significant)
Changes in physical processes resulting from capital dredging and installation of hard structures (e.g., changes in wave/tidal current regimes)	Marine and coastal habitats	Negligible	Negligible to High	Negligible (not significant)
Increased risk of introduction and/or spread of marine INNS	Marine and coastal habitats	Negligible	High	Negligible (not significant)

Table 5.23. Summary of Assessment of Cumulative Effects on marine and coastal habitats, and diadromous fish.

Impact	Receptor	Magnitude	Sensitivity	Significance
Cumulative increases in SSC and deposition of disturbed sediments to the seabed	Marine and coastal habitats	Low	Negligible to Low	Negligible (not significant)
	Diadromous fish	Low	Low	Negligible (not significant)
Cumulative mortality, injury and behavioural changes resulting from UWN	Diadromous fish	Low	Low to Medium	Negligible to Minor (not significant)

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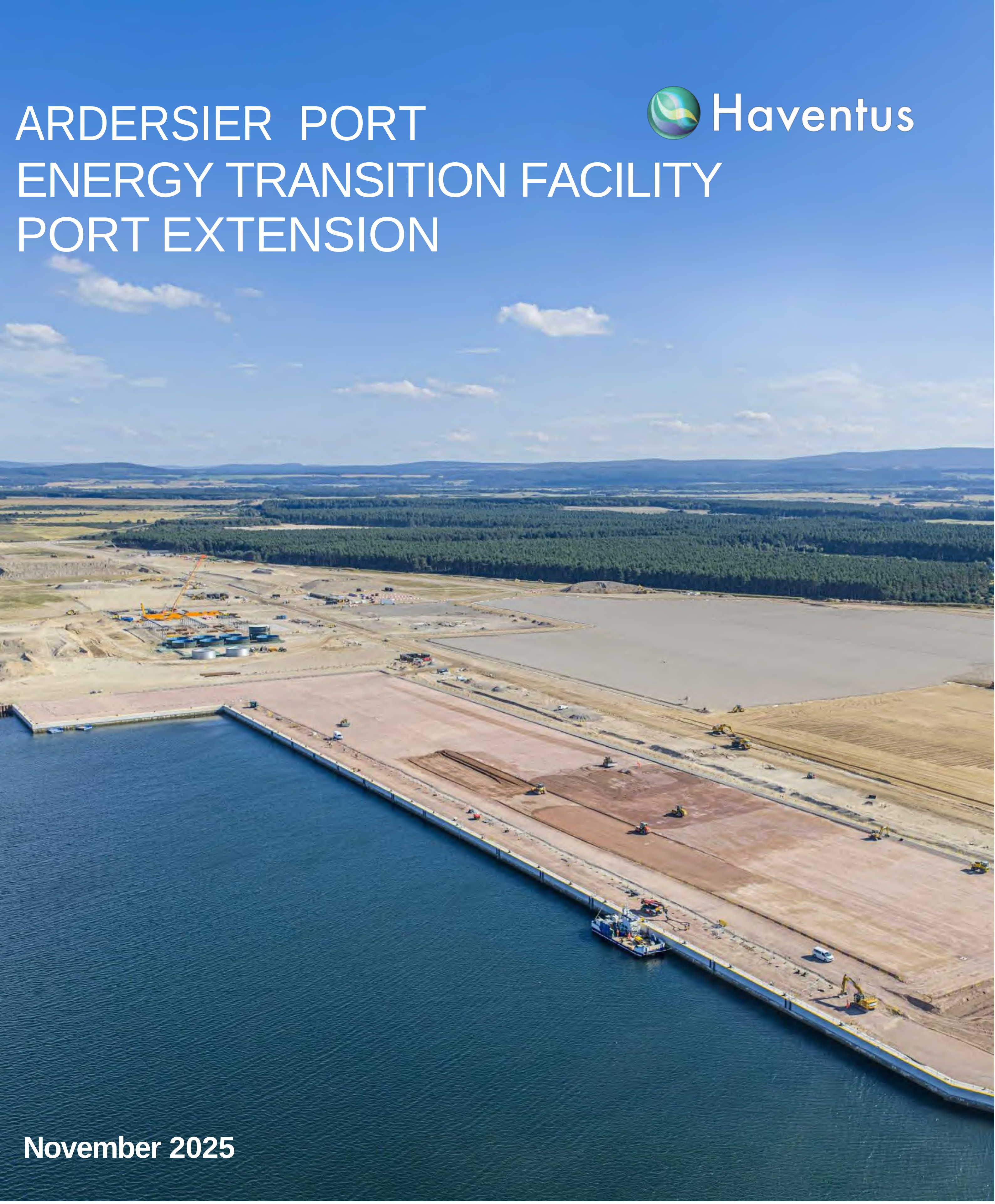
ARDERSIER PORT
ENERGY TRANSITION FACILITY
PORT EXTENSION

Haventus



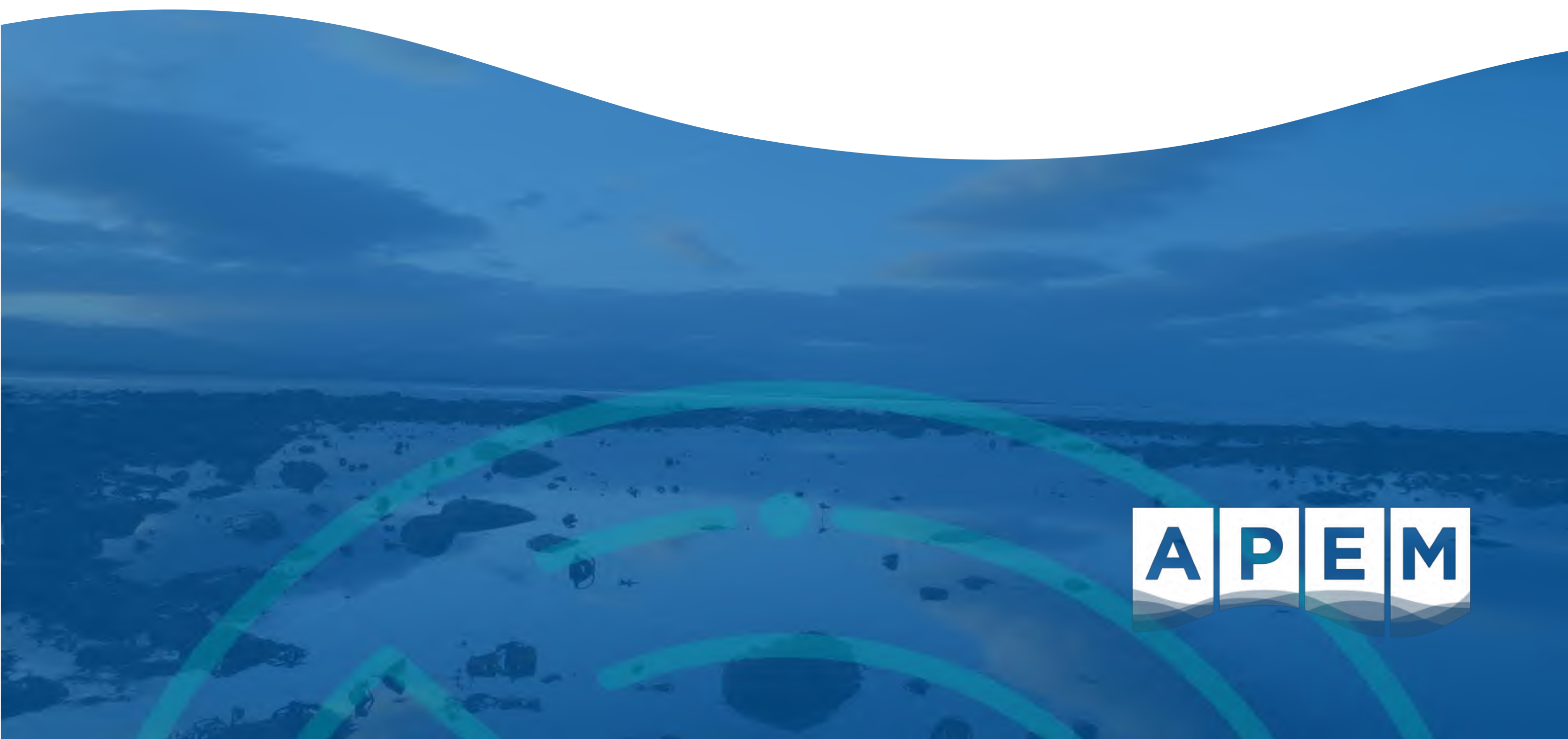
November 2025

Appendix 5.9 Interim Biosecurity Plan

Haventus

Interim Marine Invasive Non-Native Species Biosecurity Management Plan

APEM Group Ltd.



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	IV2 7QX
Project reference:	**P00019141**
Date of issue:	**November 2025**

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Revision and Amendment Register

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v1.0	10/10/2025	All	All	Draft	APEM Ltd.
v2.0	04/11/2025	All	All	Addressed client comments on draft	APEM Ltd.
v3.0	13/11/2025	All	All	Additional client comments addressed	APEM Ltd.

Contents

List of Tables

Acronyms and Abbreviations

Term	Definition
AFS	Antifouling system
BWMP	Ballast Water Management Plan
CSD	Cutter Suction Dredger
eDNA	Environmental DNA
EIA	Environmental Impact Assessment
ETF	Energy Transition Facility
GB	Great Britain
GEF	Global Environment Facility
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
JUV	Jack-up Vessel
MBA	Marine Biological Association
MCA	Maritime and Coastguard Agency
NBN	National Biodiversity Network
nm	Nautical Miles
NNS	Non-Native Species
OWF	Offshore Wind Farm
PPE	Personal Protection Equipment
ROV	Remotely Operated Vehicle
TSHD	Trailer Suction Hopper Dredger
UK	United Kingdom
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation

1. Scope

Invasive non-native species (INNS) have major impacts on the environment and can also have financial implications for industry. For clarity, Non-Native Species (NNS) are those which occur outside of their natural (i.e., native) range. INNS are those which have known negative impacts, although all NNS have the potential to become INNS.

This document is an interim marine INNS biosecurity plan for Ardersier Port, located in the Moray Firth, Scotland. It covers both operational activities and the proposed development (Phase 2). This plan will be used as the foundation for a specific, succinct Ardersier Port action plan.

The document provides a summary of NNS recorded in the Moray Firth (Section 2), an overview of activities undertaken at the port and an assessment of the risks of INNS introduction and spread via these activities (Section 3). This document is underpinned by best practice guidance to reduce the risk of the introduction and spread of INNS in the form of practical and feasible biosecurity actions to be undertaken by port users and development contractors (Section 4). This approach is precautionary and proactive, focussing on prevention of introduction and spread to reduce current and future risks, even if those risks are somewhat uncertain (i.e due to limited INNS monitoring). The biosecurity actions referenced are those which are deemed feasible and practical to implement by Ardersier Port. For completeness, the document also includes relevant information on INNS awareness raising (Section 5), monitoring and reporting (Section 6), and contingency planning (Section 7).

2. Non-Native Species in the Moray Firth

Eight NNS have been recorded within the Moray Firth: Bonnemaison's hook weed (*Bonnemaisonia hamifera*); Darwin's barnacle (*Austrominius modestus*); Japanese skeleton shrimp (*Caprella mutica*); orange ripple bryozoan (*Schizoporella japonica*); slipper limpet (*Crepidula fornicata*); the soft-shelled clam (*Mya arenaria*), the orange cloak sea squirt (*Botrylloides violaceus*) and siphoned Japan weed (*Dasysiphonia japonica*). For further information on these species and data sources please see Annex 1.

An intertidal walkover survey conducted to inform an Environmental Impact Assessment (EIA) of Ardersier Port in 2018, noted that wireweed (*Sargassum muticum*) was present on the north shore of the Whiteness Head spit exposed to the Moray Firth. This species was washed up on the shore and not attached to substrate (EnviroCentre Limited, 2018), therefore establishment is not confirmed, but considered likely. For further information on this species see Annex 1. Subtidal benthic sampling was also conducted to inform a previous EIA for construction and dredging at Ardersier Port in 2013 (Savills, 2013), however, no NNS were recorded.

Five of the species outlined above are considered UK Priority marine INNS (GBNNSS, 2020) due to their high risk of spread, establishment and negative impact: Japanese skeleton shrimp, orange ripple bryozoan, Bonnemaison's hook weed, slipper limpet and wireweed. While not all the recorded NNS have known negative impacts, their presence indicates that activities and pathways for the introduction and spread of INNS exist in the area. Furthermore, there is a risk that activities that take place at Ardersier Port could spread INNS to, within and from the site (see Section 3).

2.1 Horizon Invasive Species Desktop Study

Horizon species are INNS predicted to arrive, become established and impact biodiversity and ecosystem services in the future. A horizon scanning exercise which involved analysis of pathways of INNS introduction into Scotland was conducted in 2023 to identify INNS with the highest likelihood of arrival and establishment, and assess their impact (Scottish Government, 2023). The worm wart weed (*Agarophyton vermiculophyllum*) and the American lobster (*Homarus americanus*) were identified as potential horizon INNS for Scotland.

For more information on NNS found within the Moray Firth and those posing potential future threat, see Annex 1.

It should be noted that different INNS pose different levels of risk in terms of potential impacts on local ecological communities. Species-specific risk management requires specialist data and knowledge. In the absence of such data and knowledge, this biosecurity plan adopts a precautionary pathway-focused approach (as opposed to a species-based approach) in which all potential INNS are treated with the same level of precaution.

3. Hazard Identification and Risk Analysis

Ardersier Port Energy Transition Facility (ETF) is a facility with a commercial focus. Potential hazards, i.e. occurrences or activities which pose a risk of introducing INNS to Ardersier Port or risk of spreading INNS within or outside of Ardersier Port, if not controlled, can be broadly grouped into four categories: i) vessel movements, ii) dredging, iii) assembly and deployment of floating wind turbine foundations, and iv) general port maintenance and construction (including the introduction, relocation and maintenance of infrastructure).

Table 3-1 provides an overview of each category and the factors influencing the potential risk of introduction and spread of INNS. In line with the precautionary approach and biosecurity best practice, all potential risks factors are described, which may or may not be realised.

Fishing, particularly potting and creeling, occurs within the local vicinity of Ardersier Port. Additionally, recreational activities occur within the wider Moray Firth, including boating, supported by clubs including Nairn Sailing Club and Chanonry Sailing Club, sea kayaking, rowing, angling, wildlife watching tours and swimming. While fishing and recreational water use are known pathways that lead to the introduction/spread of INNS, they will not be considered further in this document due to these activities occurring outside of the Ardersier Port limits. However, it should be highlighted that these activities can lead to the introduction of INNS into the local area, which may then spread via natural dispersal into the Ardersier Port limits.

Table 3-1. Hazards and risk factors associated with activity categories within the Ardersier Port Energy Transition Facility (ETF) which influence the potential risk of introduction and spread of Invasive Non-Native Species (INNS).

Category	Overview	Risk Factor	Hazard/Risk Factor Description
Vessel movements	Vessel activity within the Ardersier Port includes a wide variety of vessel types, supported by berthing facilities: carrier vessels (e.g., general cargo vessels), construction vessels associated with energy sectors (e.g., foundation and turbine installation vessels, heavy lift vessels, cable-laying vessels), support vessels (pilot boats, barges, tugboats), dredging vessels (trailer suction hopper dredger (TSHD) and cutter suction dredger (CSD)), floating structures (e.g., jack-up vessels (JUVs), offshore drilling and production units, sheerleg cranes, and floating wind turbine foundations). Floating structures, including floating wind turbine locations, are considered vessels while not connected to the seabed. Generally, vessel movements in relation to energy sector operations are anticipated to be between 250-350 per annum (possibly up to 400). Some vessel activity is expected to be higher during months of better weather (March to September), particularly dredging and floating wind turbine deployment.	**Ballast water**	INNS may be transported in ballast water used to maintain the stability of vessels. There is risk of INNS introduction and spread if INNS are taken up in ballast water and released with discharged ballast in a different location. Risk of INNS spread through ballast water exchange is mitigated for ships operating internationally via compliance with the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022 which require ballast water to be treated to remove viable organisms, or exchanged at least 200 nautical miles (nm) from land in water at least 200 m deep, or in a designated ballast water exchange area. More specifically, vessels operating in international waters are required to have a Ballast Water Management Plan (BWMP) detailing their ballast water treatment protocol, and Record Book which documents their ballast water uptake, treatment and discharge. Vessels which carry out ballast water management in accordance with the Regulations are issued with an International Ballast Water Management Certificate. The Maritime and Coastguard Agency (MCA) is responsible for monitoring a vessel's compliance with these Regulations. Vessels which only operate within UK waters or on the high seas do not need to comply with the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations, 2022. For full details on the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations, 2022 please see the published regulations[1]
		Biofouling	INNS may be attached to (i.e. foul) the hull or other submerged niche areas (e.g. seawater intake and outflows, positioning thrusters, vents and grills, prop shafts and other complex hull structures) of vessels arriving into, moving within, and leaving Ardersier Port. There is risk of INNS introduction and spread if attached

[1] https://www.legislation.gov.uk/uksi/2022/737/pdfs/uksi_20220737_en.pdf

Category	Overview	Risk Factor	Hazard/Risk Factor Description
			organisms detach from vessels (including release of viable fragments and life stages) in locations where the INNS have not previously been recorded. For larger vessels, risk of INNS spread through biofouling is mitigated by following the International Maritime Organisation (IMO) Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species 2023.
		Vessel origin and route	The origin of the vessel influences which INNS may be transported. Vessels from points of origin with a similar biogeographic region (or similar climate) to Ardersier Port (i.e. cold temperate regions) are considered higher risk as species are more likely to survive transportation and become established within Ardersier (Challinor *et al.*, 2014). Vessel origin and geographic scale of operation also affect the need to comply with the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022. These regulations do not legally require vessels which only operate within the UK (and high seas) to undertake ballast water management.
		Vessel speed / time stationary	Organisms are more likely to attach and stay attached to stationary and slow-moving vessels (including those stored outside of their seasonal operation). The longer a vessel is stationary in the water, the more likely biofouling is to occur, and to occur at higher levels. Therefore, vessels that can remain stationary for prolonged periods, such as JUVs, may be particularly prone to biofouling. Vessels travelling slowly, and/or stationary for long periods of time, present higher risk of INNS transfer.

Category	Overview	Risk Factor	Hazard/Risk Factor Description
		Vessel maintenance and cleaning	Maintenance and cleaning of vessels, in particular the removal of biofouling organisms, can pose risk of introduction and spread of INNS if dislodged debris or wastewater containing INNS is allowed to re-enter the marine environment.
		Vessel dry-docking schedule	Specialist vessels such as JUVs may be less regularly dry-docked than standard vessels due to some docking facilities being impractical for such vessels, or due to operational requirements, potentially making them more susceptible to biofouling (UNESCO and GEF-UNDP-IMP GloFouling Partnerships, 2024).
		Vessel antifouling system presence/ schedule	An antifouling system (AFS) is a coating, paint, surface treatment, surface or device that is used on a vessel to control or prevent attachment of unwanted organisms. Specialist vessels that have components that are in contact with the seabed for prolonged periods of time, such JUVs, may be partly coated with abrasion/corrosion-resistant epoxies (as opposed to an AFS), since protection of the foundations is a high operational priority (UNESCO and GEF-UNDP-IMP GloFouling Partnerships 2024). AFS's typically require maintenance/reapplication as dictated by manufacturer instructions to minimise biofouling risk: deviation from this schedule can increase the likelihood and level of biofouling.
		Seasonality of vessel movement	Some vessel activity is expected to be higher during months of better weather (March to September), particularly vessels associated with dredging and floating wind turbine deployment. Heightened periods of vessel activity may increase the risk of INNS introduction during those times.
Dredging	Dredging (i.e. the removal of sand and gravel from the seabed) is carried out within Ardersier Port to deepen and maintain the channels and berths for safe navigation. Specifically, a capital dredging campaign is planned to deepen the harbour mouth,	**Excavation, extraction and transportation**	Excavation to loosen aggregate/material may dislodge INNS or disperse larvae, thereby increasing the risk of spreading any INNS present at the dredging site. All life-history stages (i.e. adults, juveniles, larvae and eggs) may be extracted from the seabed within the dredged material (which may include large volumes of water) and transported to new locations.

Category	Overview	Risk Factor	Hazard/Risk Factor Description
	and routine maintenance dredging of the approach channel is undertaken as needed. Dredged material disposal may include offshore sea disposal and beneficial use. Also, dredged sediment has previously been pumped into settlement lagoons onsite for construction use at the port. It should be noted that dredged material is typically subject to sampling and testing, and that dredging activity requires a marine licence which would usually include conditions to prevent the spread of INNS.		The method of dredging may affect the likelihood of INNS being extracted and surviving the extraction process. For example, forces experienced by organisms extracted via suction dredging may include mechanical buffeting, high velocity and changes in hydrostatic pressures which could result in mortality. INNS may be transported within dredged material to new locations. Transport conditions and duration (influenced by the proximity of the disposal site to the dredge site) may influence the likelihood of INNS surviving. For example, organisms may be smothered by, or crushed under, the dredged material, or may suffer desiccation, starvation or anoxia during transport. The environmental tolerances of the INNS may also impact the likelihood of them surviving excavation, extraction and transportation.
		Disposal of material	INNS may be introduced into a new location when dredged material is disposed of or deposited for beneficial use. INNS may be crushed or smothered during disposal. Establishment of an INNS at the disposal site will also be affected by conditions such as temperature, salinity, depth and current speed, which may differ markedly from the dredge site.
Assembly and deployment of floating wind turbine foundations	It is anticipated that offshore wind turbines and their foundations (including floating foundations) will be assembled at Ardersier Port and deployed to offshore wind farm (OWF) array areas (it is also possible that floating foundations are deployed to an intermediate in-water storage area i.e., a “wet storage” area before moved to the array area). Wind turbine and associated foundation components are transported to Ardersier Port on transport vessels	**Biofouling**	INNS may become attached to floating foundations which are submerged in water prior to deployment (biofouling can occur in a matter of hours and days). There is risk of INNS introduction and spread if fouling organisms detach from foundations (including release of viable fragments and life stages) in locations where the INNS have not previously been recorded. When being towed, floating foundations are categorised as vessels and so biofouling is mitigated by following IMO Guidelines for the Control and Management of Ships’ Biofouling to Minimise the Transfer of Invasive Aquatic Species 2023 (see Vessel Movements category).

Category	Overview	Risk Factor	Hazard/Risk Factor Description
	or via land for assembly. Once assembled, offshore wind turbines and associated foundations will be deployed from Ardersier Port on a transport vessel or will be towed in water. It is anticipated that wind turbine foundations are primarily fabricated/assembled on land. The expected timeframe from launch to tow out is expected to be 1-3 days. For floating foundations, the final assembly stage will occur in-water, where foundations may remain for a few days up to two weeks depending on the structure type and assembly method. Floating foundations will then be towed out to an intermediate or destination. It is important to note that any offshore wind structures being towed in water or under self-propulsion are considered vessels (see Vessel Movements category).	**Ballast water**	Some floating foundations, such as semi-submersibles and spar buoys, contain ballast water for stabilisation during in-water transport and/or at the installation site. There is risk of INNS introduction and spread if INNS are taken up in ballast water and released with discharged ballast in a different location. Ballast discharge could be intentional (e.g., the planned exchange of water ballast for solid ballast at the offshore wind farm (OWF) array area) or accidental (i.e., leakage on route to, or at, the OWF array area). When being towed in water, floating foundations are categorised as vessels (see Vessel Movements category).
General port maintenance and construction (including the introduction, relocation and maintenance of infrastructure)	Infrastructure at the port includes moored ancillary plants (and associated mooring systems and marker buoys), Aids to Navigation and a recently installed pontoon. General maintenance of port infrastructure could involve the inspection, cleaning and localised movement of any port infrastructure (e.g. if additional pontoons are required or existing pontoons require replacement, and if marker buoys	**Biofouling**	INNS can attach to artificial hard substrate. Movement of port infrastructure risks introducing INNS to locations where they have not previously been recorded.
		Contamination	Contamination refers to the instance of marine INNS being caught on temporarily immersed surfaces, for instance construction equipment or PPE (or non-PPE clothing) that has been previously immersed in seawater before reaching the location of use. Marine INNS may be caught on the surface or in water absorbed by or trapped within the equipment/ PPE. Movement of equipment/PPE risks introducing INNS to locations where they have not previously been recorded.

Category	Overview	Risk Factor	Hazard/Risk Factor Description
	require replacement to reflect changes to controlled areas).	**Maintenance and cleaning of structures**	Maintenance and cleaning of structures may result in the detachment of biofouling containing INNS, facilitating their spread on tidal currents or via human mediated pathways.
	As of 2025, construction of the quay wall and main port activity area is being undertaken to enhance the port's capacity to support the renewable energy sector. This will involve the extraction and installation of a range of materials and hard structures. Specifically, it is anticipated that old sheet piles to the north of the new quay wall will be removed which may involve the use of temporary sand bunds. Old sheet piles will be pulled onto land and recycled. Piled berthing structures (mooring dolphins) will also be installed as well as a crushed rock mattress in the east of the harbour. It is also possible that a slipway will be constructed, and that scour protection (rock armour) will be installed in the inner harbour. It is anticipated that construction materials will not have been in-water prior to use (i.e., they will be "new" and of terrestrial origin) and will therefore present no risk of marine INNS introduction. However, the construction phase will involve the use of a range of equipment, including plant, handheld tools and personal protective equipment (PPE) which could present an INNS risk if it has previously been in contact with water (PPE that is never exposed to water is not a concern).	**Construction equipment origin**	Most plant is expected to be based at the Ardersier Port, although it is possible that some specialist equipment comprising floating structures and/or temporarily immersible equipment, would need to be sourced from elsewhere for a period of time. The origin of equipment influences which INNS may be transported. Equipment from points of origin, and following routes, from a similar biogeographic region (or similar climate) to Ardersier Port (i.e. cold temperate regions) are considered higher risk as species are more likely to survive transportation and become established within Ardersier Port (Challinor *et al*., 2014). When being towed or self-propelled in water, equipment is considered a vessel (see Vessel Movements category).
		Contamination	Contamination refers to the instance of marine INNS being caught on temporarily immersed surfaces, for instance construction equipment or PPE (or non-PPE clothing) that has been previously immersed in water before reaching the location of use. Marine INNS may be caught on the surface or in water absorbed by or trapped within the equipment/ PPE. Movement of equipment/PPE risks introducing INNS to locations where they have not previously been recorded.

4. Biosecurity

4.1 General Biosecurity Actions

The implementation of effective biosecurity actions will reduce the risk of introduction and spread of INNS within Ardersier Port. General biosecurity actions, for ongoing implementation are summarised in Table 4-1.

Table 4-1. General biosecurity actions that should be undertaken on an ongoing basis.

Biosecurity Action	How	Why	Responsibility
Assign a Biosecurity Lead and ensure roles and responsibilities are clearly communicated to all personnel.	See Awareness Raising (Section 5).	To oversee and coordinate biosecurity actions.	Ardersier Port
Develop and implement INNS monitoring.	See Monitoring and Reporting (Section 6).	To facilitate the detection of INNS, and the implementation of timely and thereby effective biosecurity action.	Ardersier Port
Raise awareness of INNS risks, as well as how to identify them and record/report them.	See Awareness Raising (Section 5), and Monitoring and Reporting (Section 6).	To facilitate the detection of INNS, and the implementation of timely and thereby effective biosecurity action.	All port staff
Report possible INNS or concerns regarding INNS risks to the Biosecurity Lead.	See Monitoring and Reporting (Section 6).	To facilitate the detection of INNS, assessment of the level of risk the movement of structures/equipment presents, and the implementation of biosecurity action.	All port staff
Identify and implement biosecurity actions relevant to activities you undertake.	See Activity-Specific Biosecurity Actions (Section 4.2).	To facilitate the implementation of biosecurity action.	All port staff

Biosecurity Action	How	Why	Responsibility
Follow check, clean, dry principles.	Follow CCD Biosecurity Guidance[2]: **Check:** for sediment, aquatic animals, plant material. Remove anything you find and leave it at the site. **Clean:** clean everything as thoroughly as you can, paying attention to areas that are damp or hard to access. Use hot water if possible. **Dry:** Dry everything for as long as you can before using elsewhere. (As a minimum, checking and cleaning should be carried out where drying is not possible.)	To reduce the likelihood of marine INNS being present on/in equipment. Some life stages of INNS are tiny and can be transported in/on damp material where they can potentially survive for days.	All port staff

[2] https://www.nonnativespecies.org/what-can-i-do/check-clean-dry

4.2 Activity-Specific Biosecurity Actions

Different activities, together with their associated risk factors, carry varying levels of risk with regards to the introduction and spread of INNS, and therefore require tailored biosecurity measures, although some measures will be common across activities. The proposed biosecurity actions to mitigate these activity-specific risks are presented in Table 4-2 to Table 4-10. These activities reflect those outlined in Table 3-1 and are defined as follows:

- Vessel Movements;
- Assembly and Deployment of Floating Wind Turbine Foundations;
- Dredging;
- General Port Maintenance and Construction; and
- Introduction/Relocation/Maintenance of Port Infrastructure (including tethered floating and mobile structures such as pontoons & buoys).

Although the likelihood of some risk scenarios occurring is low, they have been included on a precautionary basis to support biosecurity best practice.

Within the biosecurity tables, ’Potential Risk’ refers to the maximum potential risk of INNS introduction or spread associated with a defined scenario, considering both the nature of the hazard and the likelihood of that scenario occurring. ‘Risk with Control’ refers to the estimated risk level when control measures are fully implemented.

The anticipated risk with and without these biosecurity actions is indicated for each scenario, along with the timing for implementing the action(s) and the parties responsible. It crucial that all sectors and stakeholders play their part in ensuring effective biosecurity. To support this, the tables below can be used to develop action plans, where appropriate.

Vessel Movements

Table 4-2. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to vessel movements and ballast water.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Planned arrival of vessels from international origin.	High	Risk of transfer of INNS by ballast water differs between vessels, depending on their origin and the location of ballast water uptake, e.g. ballast from a similar biogeographic region (or similar climate) (Challinor *et al.*, 2014) to Ardersier Port poses an increased likelihood of an INNS surviving and establishing in Ardersier Port if introduced.	Prior to arrival, the Marine Operations Manager or designate will request confirmation from the Vessel Master of their compliance with the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations, 2022 – i.e. that they perform ballast water treatment (See Table 3-1 for information on compliance).	Low	Prior to vessel arrival.	Vessel Master & Marine Operations Manager or designate.
Planned arrival of vessels from domestic origin.	High	Risk of transfer of INNS by ballast water differs between vessels, depending on their origin and the location of ballast water uptake, e.g. ballast from a similar biogeographic region (or similar	Prior to arrival, the Marine Operations Manager or designate will request confirmation from the Vessel Master of their compliance with the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations, 2022 – i.e. that they perform ballast water	Low	Prior to vessel arrival.	Vessel Master & Marine Operations Manager or designate.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
		climate) (Challinor *et al.*, 2014) to Ardersier Port poses greater risk.	treatment (See Table 3-1 for information on compliance). Note that vessels operating within international waters are required to comply with the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations, 2022, even if their previous port is within UK waters.			
Unplanned / short notice vessel arrival (e.g., due to an emergency).	Moderate	Vessels may arrive into Ardersier Port with very little, or no, warning (i.e., not time to check vessel compliance with relevant legislation and guidelines). There is potentially a high risk of INNS being in the ballast water of the vessel. The risk of transfer of INNS is greater if the vessel originates from a similar biogeographic region (or similar climate) (Challinor *et al.*, 2014) to Ardersier Port.	Vessels should be requested not to discharge ballast within Ardersier Port until the Vessel Master has confirmed their compliance with the Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations, 2022 (if applicable) or that they exchanged ballast water offshore prior to arrival.	Moderate (reactive rather than proactive control possible only)	On vessel arrival.	Vessel Master & Marine Operations Manager or designate.

Table 4-3. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to vessel movements and biofouling.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Planned vessel arrival.	High	The majority of vessels maintain clean hulls for efficient travel through the water. However, there is risk of INNS being attached to the hull and other submerged surfaces of vessels. The risk of successful transfer is greater for vessels from a similar biogeographic region (or similar climate) (Challinor *et al.*, 2014) to Ardersier Port.	Prior to arrival, the Marine Operations Manager or designate will request confirmation from the Vessel Master of their adherence to the 2023 IMO Biofouling Guidelines.	Low	Prior to vessel arrival.	Vessel Master & Marine Operations Manager or designate.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Unplanned/ short notice vessel arrival (e.g., due to an emergency).	Moderate	Vessels may arrive into Ardersier Port with very little, or no, warning (i.e., no time to check vessel compliance with relevant legislation and guidelines). There is potentially a high risk of INNS being attached to a vessel's hull and other submerged surfaces and entering Ardersier Port. The risk of transfer of INNS is greater if the vessel originates from a similar biogeographic region (or similar climate) (Challinor *et al.*, 2014) to Ardersier Port.	The Vessel Master should conduct a visual inspection of the hull / niche areas on arrival. If biofouling is seen, any vessel activities which could potentially result in detachment of fouling and its release into the marine environment should be minimised where possible (e.g. the vessel should not be manoeuvred more than is necessary).	Moderate (reactive rather than proactive control possible only)	On vessel arrival.	Vessel Master & Marine Operations Manager or designate.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Stationary and slow-moving vessels.	High	Biofouling, including attachment of INNS, is more likely on ships which are stationary or slow moving.	The Vessel Master should regularly inspect the hull and niche areas on their stationary or slow-moving vessel operating within Ardersier Port. Port Staff (i.e. he environmental advisor) may conduct random checks of slow moving or stationary vessels at 6-month intervals. See planned and unplanned vessel arrival sections for information on control measures required for the arrival of slow-moving vessel into Ardersier Port.	Low	At all times within Ardersier Port.	Vessel Master & Ardersier Port.

Assembly and Deployment of Floating Wind Turbine Foundations

Table 4-4. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to the assembly and deployment of floating wind turbine foundations and ballast water.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Movement of ballasted floating wind turbine foundations from Ardersier Port to wet storage area or to offshore wind farm (OWF) array area. Subsequent deballasting or accidental leakage at location of arrival.	High	Risk will depend on floating foundation type (only some designs, such as semi-submersible and spar-buoy, may contain ballast water). The risk of transfer of INNS is greater if the floating foundation is deployed to a location in a similar biogeographic region (or similar climate) (Challinor *et al.*, 2014) to Ardersier Port (or where ballast water taken up).	When being towed in water, floating foundations are categorised as vessels (see Vessel movements category) and as such the requirements of the Merchant Shipping Regulations 2022 must be met. Domestically operating vessels (i.e., towed floating foundations) are not subject to the requirements of the Merchant Shipping Regulations 2022 (other exemptions may also apply under certain conditions).	Moderate	Prior to floating foundation	‘Vessel’ Master & Activity Operator (e.g., offshore wind operator).

Table 4-5. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to the assembly and deployment of floating wind turbine foundations and biofouling.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Movement of floating wind turbine foundations from Ardersier Port to wet storage area or to the OWF array area.	Low	INNS can be transferred on any structure that has been submerged for a period of hours, days or weeks. The risk of fouling is greater the longer the structure is submerged. The risk of transfer of INNS is greater if the structure originates from a location in a similar biogeographic region (or similar climate) (Challinor *et al.*, 2014) to the wet storage area of the OWF array. Floating foundations will likely be towed slowly which can further increase biofouling risk. However, the floating foundation components will be constructed from new materials (not previously exposed to water), and the expected timeframe from launch to tow-out is only 1–3 days, thus reducing biofouling risk.	Minimise the length of time during which floating foundations and offshore infrastructure are submerged in water at assembly locations before being moved to the installation site.	Low	Prior to floating foundation deployment	Vessel Master & Marine Operations Manager or designate.

Dredging

Table 4-6. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to dredging and excavation, extraction, transportation and disposal.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Disposal of dredged material at disposal sites located within, adjacent to or outside of Ardersier Port.	Moderate	INNS may be dispersed during excavation and spread to new locations within / adjacent to / outside of Ardersier Port in dredged material.	If INNS are suspected to be present at the dredge site (in particular high-risk INNS) an INNS survey will be conducted at the site using appropriate methodology (e.g. Drop-Down Video (DDV) survey). If an INNS is detected via the survey, a species-specific dredge pathway risk assessment should be conducted and a mitigation strategy developed. Survey, risk assessment and mitigation strategy guidance can be sought from external experts as well as The Marine Directorate of Scottish Government[3].	Low	Prior to dredging.	Marine Operations Manager & Environmental Advisor.

[3] https://www.gov.scot/policies/wildlife-management/invasive-non-native-species/

General Port Maintenance and Construction

Table 4-7. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to general port maintenance and construction, and the use of machinery, equipment, Personal Protective Equipment (PPE) and/or non-PPE clothing.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Use of machinery, equipment, Personal Protective Equipment (PPE) and/or non-PPE[4] clothing from outside of Ardersier Port is used in Ardersier Port.	High	There is potential risk of introduction of INNS into Ardersier Port if they are attached to machinery, equipment, PPE and/or non-PPE clothing being used in Ardersier Port and become dislodged and enter the marine environment.	The origin of the machinery and equipment should be checked and enquiries regarding INNS at the origin location made. If there are concerns regarding INNS at the origin, machinery and equipment from a different location could be sought. Machinery, equipment, PPE and non-PPE clothing should be visually inspected for fouling/ dirt prior to being used. If fouling or dirt is present it should be cleaned and dried.	Low	Prior to use.	Contractor and/or user of machinery, equipment, PPE and/or non-PPE clothing.

[4] Only PPE and clothing that come into contact with the marine environment pose a risk of transferring INNS, including, for example, wet suits, life jackets and deck gear. Items that retain moisture, such as neoprene, heavy fabrics, or absorbent materials, present a higher risk because trapped organisms may survive longer on them.

Risk			Biosecurity Considerations			
Scenario	Potential Risk	Scenario Risk Comment	Action	Risk with Control	Timing	Responsibility
			Machinery, equipment, PPE and/or non-PPE clothing should be cleaned and dried after use also (cleaning should be conducted following the principles of the Check, Clean, Dry Biosecurity Guidance[2]). Wastewater and cleaning debris should not enter the marine environment.			
Machinery, equipment, PPE and/or non-PPE clothing is used at different locations within Ardersier Port.	Moderate	There is potential risk of localised spread of INNS if they are attached to machinery, equipment, PPE and/or non-PPE clothing being moved within Ardersier Port, and become dislodged and enter the marine environment.	The machinery, equipment, PPE and non-PPE clothing should be visually inspected for fouling/dirt prior to being used. If fouling or dirt is present, machinery, equipment, PPE and non-PPE clothing should be cleaned and dried. Machinery, equipment, PPE and/or non-PPE clothing should be cleaned and dried after use also (cleaning should be conducted following the principles of the Check, Clean, Dry Biosecurity Guidance[2]). Wastewater and cleaning debris should not enter the marine environment.	Low	Prior to use.	User of machinery, equipment, PPE and/or non-PPE clothing.

Risk			Biosecurity Considerations			
Scenario	Potential Risk	Scenario Risk Comment	Action	Risk with Control	Timing	Responsibility
Plant, equipment and PPE moved off site to elsewhere outside of Ardersier Port.	High	There is potential risk of localised spread of INNS if they are attached to machinery, equipment, PPE and/or non-PPE clothing being moved off site to elsewhere outside of Ardersier Port, and become dislodged and enter the marine environment.	All plant, equipment and PPE coming into contact with the water column should be inspected for biofouling after use and cleaned where possible. The principles of the Check, Clean, Dry Biosecurity Guidance[2] must be followed.	Low	Following use.	All staff working on site & Environmental Advisor.

Table 4-8. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to general port maintenance and construction, and the introduction and relocation of hard structures.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Hard structures, such as berthing structures, scour protection and a rock mattress are introduced are relocated within Ardersier Port.	Moderate	Potential risk of localised spread of INNS if they are attached to materials and become dislodged during relocation and installation.	Consider removing materials from water and drying on quay side for as long as possible prior to installation/relocation, allowing for the eradication of INNS, e.g. through drying and exposure to sunlight. Additionally, eradication guidance can be sought from The Marine Directorate of Scottish Government[3].	Low	Prior to the introduction of hard structures during construction.	All staff working on site & Environmental Advisor.

Introduction/Relocation/Maintenance of Port Infrastructure (including tethered floating and mobile structures such as pontoons & buoys)

Table 4-9. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to port structures and their introduction, and relocation.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Structure is introduced into waters of Ardersier Port.	High	There is potential risk of the introduced structure being contaminated with INNS.	Structures should be visually inspected prior to introduction. If there is evidence of fouling on the structure, it should be cleaned and air-dried ensuring that wastewater and cleaning debris does not enter the marine environment.	Low	Prior to structure being introduced.	Contractor responsible for structure introduction.
Structure is moved within waters of Ardersier Port.	Moderate	There is a potential risk of localised spread of INNS if they are attached to the structure being moved and become dislodged.	Prior to movement, the structure should be visually inspected for fouling (e.g., using an underwater camera, or hauling onto a boat). If fouling is present and an INNS is suspected within the fouling community, movement of the structure should be delayed. If the presence of an INNS is confirmed, a risk assessment should be conducted to determine the risk of the INNS being dislodged during the relocation. If the risk is concluded to be very low, the relocation should proceed. If concluded to be	Low	Prior to structure being moved.	Contractor responsible for structure move; Marine Operations Manager or designate.

Risk			Biosecurity Considerations			
Scenario	Potential Risk	Scenario Risk Comment	Action	Risk with Control	Timing	Responsibility
			moderate or high risk, effort should be made to eradicate the INNS prior to its relocation. Survey, risk assessment and eradication guidance can be sought from external experts as well as The Marine Directorate of Scottish Government[3]. Note that when untethered, a structure is considered a vessel. In this instance control measures under the Vessel movements category.			

Table 4-10. Invasive Non-Native Species (INNS) hazard categories, scenarios and proposed biosecurity actions in relation to port structures and the maintenance and cleaning of structures.

Risk			Biosecurity Considerations			
Scenario	**Potential Risk**	**Scenario Risk Comment**	**Action**	**Risk with Control**	**Timing**	**Responsibility**
Structures within Ardersier Port are maintained and cleaned.	Moderate	There is potential risk of localised spread of INNS if they are attached to the structure being maintained/cleaned and become dislodged.	Prior to maintenance or cleaning, the structure should be visually inspected for fouling (e.g., using an underwater camera, or hauling onto a boat). If fouling is present and an INNS is suspected within the fouling community, maintenance or cleaning of the structure should be delayed. If the presence of an INNS is confirmed, a risk assessment should be conducted to determine the risk of the INNS being dislodged during the maintenance or cleaning activity. If the risk is concluded to be very low, the activity should proceed. If concluded to be moderate or high risk, effort should be made to eradicate the INNS prior to maintenance or cleaning. Survey, risk assessment and eradication guidance can be sought from external experts as well as The Marine Directorate of Scottish Government[3].	Low	Prior to structure being maintained and cleaned.	Contractor responsible for structure maintenance.

5. Awareness Raising

A strong awareness of INNS, biosecurity and this Plan among Port staff is needed. Awareness raising should focus on INNS and their impacts, biosecurity measures and roles and responsibilities. Increasing awareness of INNS and their impacts can improve speed of detection, potentially enhancing the effectiveness of subsequent responses. Greater awareness of biosecurity and its benefit can increase uptake of practical measures and compliance. Biosecurity implementation reduces risks associated with INNS, lessening their impact on the environment and key sectors, including reducing economic costs.

5.1 Nationally Produced INNS Identification Guides

Identification guides provide useful information on INNS, including visual guides to help with identification of suspected INNS detected within in and around Ardersier Port:

- Marine INNS identification guide (Cefas):https://www.nonnativespecies.org/assets/ID_guide_2020.pdf.
- Identification guide for selected marine NNS (MBA): MBA-NNS-Guide-2020-1.6-MB.pdf.
- GBNNSS identification sheets: https://www.nonnativespecies.org/non-native-species/id-sheets/.
- NatureScot's NNS of concern: https://www.environment.gov.scot/get-involved/submit-your-data/invasive-non-native-species/#concern.

5.2 Biosecurity Lead

The role of Biosecurity Lead will be covered by the Environmental Advisor or their delegate at Ardersier Port. The Environmental Advisor will help with information dissemination and aid streamlining of response to any concerns by members of staff. They will oversee biosecurity actions to ensure consistency of approach. The Environmental Advisor will also help facilitate training, e.g. outsourcing training and workshops if possible and appropriate, to improve INNS detection capacity.

The Environmental Advisor may wish to develop and implement a communications and awareness raising plan, to include sharing of this Plan, awareness raising of their role, the installation of signage and educational talks to key port staff/ contractors.

It is acknowledged that external expertise may be required to support INNS identification or incident response. It is the responsibility of the Environmental Advisor to seek this support as appropriate. Port contact details are included in Annex 2.

6. Monitoring and Reporting

In addition to surveys conducted as part of impact assessments, all staff of Ardersier Port can play a part in looking out for, or monitoring, INNS. Where possible, monitoring for INNS should be incorporated into routine checks and inspections which are already being conducted. For example, monitoring for INNS should be undertaken during vessel haul outs (where possible / if vessels are small enough), infrastructure surveys, mooring maintenance and around piers and slipways at low tide. Early identification can deliver swifter resolutions and minimise impacts to native wildlife.

A selection of monitoring methods and important considerations are presented in Table 6-1. Monitoring should focus on areas with hard substrates and high likelihood of species introduction, such as pontoon and berthing areas.

Identification guides are available (see Section 5.1) to help identify INNS.

Staff of Ardersier Port are requested to report:

- Any major changes in the abundance of INNS already recorded within the Moray Firth.
- INNS already in Ardersier Port if found in a new location.
- Potential newly introduced INNS, e.g. noting unusual growth patterns, or areas recently and rapidly overgrown (see Section 7 for additional information on what to do if you suspect you have found a new INNS).

To report an INNS:

- Take photos of the organism.
- Record location information such as a grid reference.
- Estimate the number of organisms / area covered.
- Report any concerns to the Environmental Advisor.
- With guidance from the Environmental Advisor, submit a record of the organism following instructions on the Scottish Government's website[5] or email Marine Scotland Science: marinescotland@gov.scot.

[5] https://www.environment.gov.scot/get-involved/submit-your-data/invasive-non-native-species/

Table 6-1. Methods than can be used for monitoring marine Invasive Non-Native Species (INNS), along with the respective primary target species group and key considerations.

Method	Primary Target Species Group	Key Considerations
Rapid Assessment Surveys	Sessile/fouling animals, attached plants	• Relatively quick and low cost, with surveyor time being the main expense. • Standardised and well-established method. • Requires taxonomic identification expertise. • Laboratory analysis may be necessary for certain species.
Settlement panels	Sessile/fouling animals, attached plants	• Panels can be self-built to reduce costs. • Deployment requires minimal expertise. • Panel analysis requires taxonomic identification skills. • Laboratory analysis may be necessary for certain species. • Placement location is critical for effectiveness. • Panels are sensitive to extreme weather, which can cause detachment and loss.
Trapping	All mobile/benthic animals	• Relatively low cost, with surveyor time as the main expense. • Requires a bespoke approach tailored to the target species. • Standardised and established trapping methods exist for some species. • Challenges include trapping non-target organisms or predation within traps. • Licences or certification may be required for trapping certain species.
Imaging	All species	• Can be as simple or sophisticated as required, depending on capabilities and cost. • Image quality directly affects data accuracy. • Image analysis requires some species identification expertise. • Processing images from camera stations can be time-consuming.

Method	Primary Target Species Group	Key Considerations
eDNA	All species	• Sample acquisition does not require specialist training. • Sample processing and analysis requires specific expertise, with associated costs. • The interpretation of a DNA signal of a species in the absence of physical sighting needs consideration for reporting.
Intertidal walkover survey	Intertidal species	• Quick and relatively inexpensive to implement. • Can be designed to target one or multiple species. • Requires specialist expertise for accurate species identification. • Not suitable for locations that are difficult to access.
Zooplankton trawls	Pelagic, including early life stages	• Relatively simple and low cost to deploy. • Very seasonally sensitive if deployed for the detection of early life stages. • Mesh size needs to account for target organism size. • Small mesh vulnerable to becoming blocked by non-target organisms / particles in the water body. • Samples often require laboratory analysis. • Samples need to be stored in a way that reduces sample degradation - e.g. in freezer.
Sediment grabs (e.g. Ekman) and bottom dredges	Benthic	• Specialist equipment needed. • Relatively straight forward to deploy, though some training on equipment use is needed. • Sieving and sample processing can take some time. • Samples may require laboratory analysis.
Kick sampling	Benthic	• Relatively straight forward to deploy. • Relies on water current. • Samples may require laboratory analysis.

Method	Primary Target Species Group	Key Considerations
Sweep netting	Benthic	• Relatively straight forward to deploy. • Can be deployed in still water. • Samples may require laboratory analysis.
Remotely Operated Vehicles (ROVs)	Mobile, sessile/fouling animals, anchored attached plants.	• Specialist equipment is required. • Specialist training is necessary. • High capital cost and potentially high maintenance costs. • Enables coverage of large areas quickly. • Provides high-quality, real-time imagery. • Water quality and visibility can affect data accuracy.

7. Contingency Planning

Contingency planning should also be in place to ensure effective and consistent response to both incidents associated with high risk of introduction and spread of INNS, and the detection of a new or priority INNS within the Moray Firth.

7.1 New INNS Detection

Even with good biosecurity procedures in place, there is potential for new INNS to be detected within Ardersier Port. Rapid response to eradicate or contain an INNS is fundamental to reducing the risk of its establishment, spread and potential impact on the local environment and wildlife. Instructions on what to do in the event that an INNS (not previously recorded in Ardersier Port) is detected within Ardersier Port are provided in Table 7-1. For INNS already present in the Moray Firth, the monitoring guidance above (see Section 6) should be followed.

Table 7-1. Contingency Plan for detection of new INNS within the Ardersier Port Energy Transition Facility (ETF).

Action	Responsibility
Take photographs of the organism suspected to be an INNS. If possible and safe to do so, collect the whole organism, or a sample, in a sealable vessel (zip lock bag, screw top jar).	All Ardersier Port staff.
Check organism against identification sheets (see the INNS Identification guide links within the Section 5 above). To report a suspected marine INNS, follow the instructions on the Scottish Government's website[6] or email Marine Scotland: marinescotland@gov.scot.	All Ardersier Port staff.
Make the relevant Ardersier Port Biosecurity Lead (i.e. the Environmental Advisor) aware of the incursion. With support from the Environmental Advisor (and external expertise if required), initiate immediate containment measures, including restricted vessel movements if possible, and make staff aware of the incursion.	All Ardersier Port staff & the Environmental Advisor.
Carry out wider survey of vessels and port infrastructure and equipment, as relevant.	Environmental Advisor.
Seek advice from external experts, Marine Scotland Science or GBNNSS on additional measures and appropriate management actions for longer term control, where appropriate.	Environmental Advisor.

[6] https://www.gov.scot/policies/marine-environment/invasive-non-native-species/

8. Plan Evaluation and Review

This Plan is considered a live document. It will be subject to an annual review and revised as required, for example, to reflect changes to operations and identified INNS within the Ardersier Port. Ardersier Port is responsible for this Plan.

9. References

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Annex 1 Non-Native Species and Horizon Species

Non-Native Species recorded within the Moray Firth


Credit: APEM

Darwin's barnacle (*Austrominius modestus*) is a small sessile barnacle native to Australasia. It is commonly found in mid-shore to subtidal areas of estuaries and sheltered marine habitats. It attaches to a variety of natural and artificial hard substrate including rocks, stones, hard shelled animals and submerged surfaces of ships. It has a wide salinity and temperature tolerance range. Its fast growth and development, high reproductive output and environmental tolerance gives it a competitive advantage over native species. It is known to displace native barnacles, and its fouling of vessels, equipment and infrastructure has resulted in increased cleaning and fuel costs. Attachment to vessel hulls is deemed the most likely pathway for its spread, with other potential pathways including movement of shellfish stock and equipment, and natural dispersal of larvae on ocean currents. It was first recorded in GB in 1946 in Chichester Harbour and is now widespread. With respect to the Moray Firth, it was recorded in Balintore, Avoch, Fortrose Invergordon and Cromarty in 2012. For further information see Nall *et al*, (2015) and the GB Non-Native Species Secretariat's (GBNNSS) Information Portal[7].


Credit: APEM

Japanese skeleton shrimp (*Caprella mutica*) is a large skeleton shrimp native to north-east Asia. It is typically found in areas of high human activity, attached to natural substrate such as seaweed and hydroids, and artificial hard substrate such as pontoons, buoys, ropes and submerged surfaces of ships. Japanese skeleton shrimp have been shown to display aggressive and competitive behaviour with potential to displace native species and impact benthic communities. They are also known to block intake pipes and foul mussel lines resulting in increased cleaning and maintenance costs. A number of potential pathways for translocation have been suggested, including attachment to ships hulls, in ballast water, or on shellfish stock and equipment. It was first recorded in GB in 2000, in the Lyne of Lorn near Oban. It has since been recorded in numerous locations throughout Scotland, England and

[7] https://www.nonnativespecies.org/non-native-species/information-portal/view/1301

Wales. With respect to the Mory Firth, it was recorded in Fortrose, Invergordon and Cromarty in 2012. For further information see NBN Atlas and the GBNNSS Information Portal[8].


Credit: Chris Wood. Marine Biological Association

Orange Ripple Bryozoan (*Schizoporella japonica*) is a bright orange encrusting bryozoan, native to the north-western Pacific. It is typically found on artificial substrates such as piers, buoys and ships, in harbours and marinas, and on rocks, boulders and shellfish in intertidal areas. It has broad environmental tolerances. It competes for space and inhibits the growth of species in close proximity. It can also foul aquaculture equipment and lines, and smother commercially grown species resulting in economic costs. The introduction and spread of this species has been attributed to aquaculture stock movements and transfer on vessel hulls. The species may also disperse by rafting on weed. This species was first recorded in GB in Wales in 2010. Its distribution remains limited across Wales, England and Scotland. With respect to the Moray Firth, it was recorded in Cromarty and Invergordon in 2012. For further information see NBN Atlas Nall *et al*, (2015) and the GBNNSS Information Portal[9].


Credit: Judith Oakley, Oakley Intertidal

Orange cloak sea squirt (*Botrylloides violaceus*) is an orange, colony-forming tunicate native to the north-western Pacific. It is commonly found in harbours and marinas on submerged man-made surfaces such as pontoons, ropes and fenders. It may also be found in sheltered natural shores, attached to seaweed and other solid surfaces. It forms very large colonies which overgrow existing sessile communities and reduce the abundance and habitat occupancy of shallow-water suspension feeding sessile invertebrates. This species can also foul aquaculture equipment and lines, smother commercially grown species and block intake pipes, resulting in economic impacts. The introduction and spread of this species is primarily associated with two pathways: the movement of shellfish stock and vessel hull fouling. This species may also disperse by rafting on weed and attached to mobile species such as crabs. The species was first recorded in GB in 2006 on the South Coast of England. It is now recorded throughout England, Wales and Scotland. With respect to the Moray Firth, it was recorded in Fortrose

[8] https://www.nonnativespecies.org/non-native-species/information-portal/view/647
[9] https://www.nonnativespecies.org/non-native-species/information-portal/view/4322

and Invergordon in 2012. For further information see NBN Atlas Nall *et al*, (2015) and the GBNNSS Information Portal[10].

Credit: M.D. Guiry, seaweed.ie

Siphoned Japan Weed (*Dasysiphonia japonica*) (Synonym: *Heterosiphonia japonica*) is a bushy red seaweed native to the north-west Pacific. It is typically found in sheltered to semi-exposed subtidal areas, either on natural shores or in artificial habitats such as marinas and harbours. It can grow as a dense turf on rocks, boulders and cobbles, or on other species of algae, and can also be found free floating. Its wide environmental tolerances and ability to establish dense populations rapidly negatively impacts native communities, reducing species richness and abundance, including species of conservation importance such as seagrass. It may also overgrow shellfish, resulting in loss of yield with financial implications for the aquaculture industry. Its spread is attributed to a number of different anthropogenic pathways including commercial shellfish movements, transfer on equipment, in ballast water and attached to ship's hulls. Fragments may also be transported on ocean currents or attached to drifting algae and marine debris. The species was first recorded in GB in 1999 in Wales. It has since been recorded in numerous locations throughout Wales, England and Scotland. With respect to the Moray Firth, it was recorded in Cromarty and Wick in 2012. For further information see NBN Atlas and Nall *et al*, (2015) and the GBNNSS Information Portal[11].

Credit: APEM

Slipper Limpet (*Crepidula fornicata*) is a filter-feeding, asymmetrical smooth-shelled sea snail native to the east coast of the Americas between Canada and Mexico. It is most commonly found in sheltered areas of muddy seabed with shells and cobbles. This species quickly dominates. It competes with native and commercially important species for food and habitat, and reduces the mobility and survival of organisms to which it attaches. At high abundances slipper limpets can disturb water flow and trap fine suspended particles. This species may be transported in ballast as larvae or attached to vessel hulls or man-made structures. The slipper limpet can also be transported when attached to mobile organisms. It was first recorded in GB in the early 1870s in Liverpool Bay. Though identified as a horizon

10 https://www.nonnativespecies.org/non-native-species/information-portal/view/514
11 https://www.nonnativespecies.org/non-native-species/information-portal/view/1716

species for Scotland in 2023, there have been reports of this species in Scotland in 2024 and 2025, including a reports of this species at Fortrose. For further information on this species see NBN Atlas the GBNNSS Information Portal[12] and a recent alert[13] produced following the increase in reports of this species.

Credit: APEM

Sand gaper (*Mya arenaria*) is a large soft-shelled long-lived clam native to North America. It is commonly found in intertidal and shallow subtidal areas, growing fastest in sand or sandy mud sediment. It has a broad environmental tolerance including tolerance to low salinities typical of estuaries. Its initial introduction into Europe (as far back as the 16th Century) has been attributed to its use as food or bait. Other potential pathways include transfer in ship's ballast and dispersal of larvae on ocean currents. The impact of this species is unknown. It was first recorded in GB in 1899 in Wales. It is widespread across GB. With respect to the Moray Firth, it has been widely recorded from Findhorn Bay to Beauly Firth and up to Loch Fleet, with the most recent record in 2008. For further information see NBN Atlas and the GBNNSS Information Portal[14].


Credit: APEM

Wireweed (*Sargassum muticum*) is a wiry-stemmed olive brown seaweed, which is highly distinctive. It is found in rockpools and on hard surfaces particularly in intertidal areas although it can tolerate estuarine/ brackish areas and can detach and float freely. Native to north western pacific region it was introduced potentially with commercial oysters into Europe before spreading either by fouling or natural dispersal and was first recorded in the UK in 1973 With respect to Ardersier Port locality, this species was recorded on the north shore of the Whiteness Head spit exposed to the Moray Firth, during walkover surveys conducted as part of previous EIA for Ardersier Port in 2018. For further information on the species see GBNNSS Information Portal[15].

[12] https://www.nonnativespecies.org/non-native-species/information-portal/view/1028
[13] https://www.nonnativespecies.org/assets/Uploads/Slipper-Limpet-poster.pdf
[14] https://www.nonnativespecies.org/non-native-species/information-portal/view/2274
[15] https://www.nonnativespecies.org/non-native-species/information-portal/view/3141

Horizon Invasive Non-Native Species

Two marine species were identified within the top 30 INNS predicted to arrive, establish and impact biodiversity and ecosystem services in Scotland: worm wart weed (*Agarophyton vermiculophyllum*) and the American lobster (*Homarus americanus*) (Scottish Government, 2023).

Worm wart weed has been recorded in England, Wales and Northern Ireland but is not widespread. For further information on this species see NBN Atlas[16] and the GBNNSS Information Portal[17].

American lobster has been recorded in England and Wales, and one record exists in Scotland, in the Moray Firth north of Buckie. The introduction of this species into UK waters is linked to deliberate release of animals. Given their risk to native lobsters and the potential financial impact of their establishment, an American lobster 'Retain and Report' campaign[18] has been in operation in Scotland (and England) since 2020. For further information on this species see NBN atlas and GBNNSS Information Portal[19].

There are also high impact species recorded in Scotland but not yet within the Moray. These include (but are not limited to) the carpet sea squirt (*Didemnum vexillum*), Chinese mitten crab (*Eriocheir sinensis*) (a species of special concern under the Invasive Alien Species Regulations), leathery sea squirt (*Styela clava*) *and* Wakame (*Undaria pinnatifida*).

It should be noted that in the absence of a comprehensive survey of the Moray Firth, there is limited confidence in INNS distribution data for the area. In addition, impacts of INNS are often not realised prior to their establishment, making assessment of threats on the horizon challenging. However, the biosecurity actions proposed within this Plan will mitigate the risk of introduction and spread of INNS not yet detected, as well as those already recorded.

Data Citations

All data is CC-BY Creative Commons Attribute 4 or similar and Open Government License (OGL).

Mya areanaria:

DASSH Data Archive Centre Academic Surveys by Marine Biological Association under licence CC-BY Released under DASSH terms and conditions; See http://www.dassh.ac.uk/terms-and-conditions [Accessed 30 September 2025]

16 https://species.nbnatlas.org/species/NHMSYS0021587687
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Verified marine records from Indicia-based surveys by Marine Biological Association and Biological Records Centre under licence CC BY. Released under DASSH terms and conditions. See http://www.dassh.ac.uk/terms-and-conditions [Accessed 30 September 2025]

Annex 2 Key Contacts and Additional Information

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Responsibility for marine INNS in Scotland lies with Marine Scotland Science, within the Marine Directorate of Scottish Government.

Further information on INNS distribution within Scotland can be found on the National Biodiversity Network www.nbnatlas.org.