intertek
Total Quality. Assured.

DEPARTMENT OF THE ENVIRONMENT, CLIMATE AND COMMUNICATIONS

Irish Offshore Strategic Environmental Assessment 6

Strategic Environment Assessment - Environmental Report

R2510_R5923_Rev1 | 25 November 2022

Intertek Energy & Water Consultancy Services
Exchange House, Station Road, Liphook, Hampshire GU30 7DW, United Kingdom

APPENDIX D

Full Assessment Results

D.1 OPTION A

To proceed with issuing authorisations, as well as permitting petroleum (oil and gas) activities up to the maximum levels of activity presented in Table D-1, subject to modifications to the regulatory regime which may derive from the SEA process. These modifications represent the proposed mitigation measures resulting from the SEA assessment, e.g. restriction of timing of activities.

Table D-1 Option A maximum levels of activity

Activity	Maximum over duration of plan	Maximum in any one year
Wells drilled	15	3
2D seismic survey acquired	8,000km^2	2,000km^2
3D seismic survey acquired	4,000km^2	1,000km^2

The full assessment of Option A against the SEOs is presented in Table D-2.

Table D-2 Assessment of Option A

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
Air Quality	1. Minimise emissions to the air.	**Support SEO**	**Seismic:** During seismic surveying the use of fuel from the survey and support vessels (2 vessels in total) and helicopters (1 per week) will causes release of SO_2 and NO_X which can cause a direct impacts on air quality. This impact will be short term for the duration of the survey (4 weeks maximum). Due to the small extent of the IOSEA6 Study Area (blocks in which activity is permitted to take place) the effects will take place in a smaller geographic area. Ireland currently has good air quality, however it did not meet the new World Heritage Organisation (WHO) Air Quality guidelines for health in 2021 (EPA, 2022). The emissions of greenhouse gases from the energy sector (which includes oil and gas) has reduced since 1990. Compared to the Previous Plan, Option A represents a significant reduction in the extent of permitted seismic survey activity (92% reduction in 2D and 95% reduction in 3D seismic survey activity per year) and, therefore, minimises the amount of emissions released. Under the Climate Action and Low Carbon Development (Amendment) Act 2021, Ireland has committed to become net zero by 2050. Option A supports the SEO, the Option supports the delivery of the objective but not substantially as the option still adds to atmospheric emissions.
		Support SEO	**Drilling:** During drilling, vessel combustion and flaring will result in emissions of oxides of nitrogen (NO_x) and sulphur (SO_x). Small amounts of nitrous oxide (N_2O) are also released. Due to the huge amount of power during drilling, a large volume of CO_2 is released into the atmosphere, therefore, contributing directly to atmospheric emissions. The time taken to undertake exploration drilling is dependent on rig type, water depth and drilling depth and may take approximately 2 months and involve up to 5 vessels. Therefore, the impact will be direct, negative, temporary and short term. As Option A permits significantly less exploration wells to be drilled than under the Previous Plan (70% reduction per year) this Option, therefore, supports the SEO. In addition targets on emissions set by IPPC, EU and Government of Ireland these emissions will decrease overtime on help to deliver the SEO objective, as carbon emissions from oil and gas activities will decrease in line with these targets.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
Biodiversity, Flora and Fauna	2. Avoid damage to the biodiversity, flora and fauna of Ireland, its seas and transboundary waters, particularly EU designated sites and protected species.	**Neutral contribution to SEO**	**Seismic:** During seismic survey the key impacts will be underwater noise changes, disturbance, collision and temporary habitat disturbance (e.g. abrasion). These impacts will be temporary and short term for the duration of the survey (4 weeks maximum). Due to the small IOSEA6 Study Areas (blocks in which activity is permitted to take place) the effects will take place in a smaller geographic area. Compared to the Previous Plan this represents a significant reduction in the extent of permitted seismic survey activity (92% reduction in 2D and 95% reduction in 3D seismic survey activity per year) and, therefore, reduced underwater noise, disturbance and likelihood of collision and amount of habitat disturbance. For underwater noise changes marine mammals and fish are most sensitive to high intensity noise produced by air guns. High intensity noise can cause temporary or permanent changes to animals' hearing as noted by Slabberkoorn et al., (2019; and Carroll et al., (2017). Disturbance effects to fish receptors in the area resulting from impulsive sound sources during seismic surveys will be brief to temporary and have been assessed not significant. Hearing specialist fish may experience temporary displacement from the immediate area surrounding the survey, however, individuals will return to the area quickly based on the transient and brief nature of the survey activities. Underwater noise generated from air guns during seismic surveys have the potential to impact marine mammals, with harbour porpoises being most sensitive to this very high frequency (Southall et al., 2019). Thompson et al. (2013) and Sarnocinska et al., (2020) found that there was a temporary behavioural response during seismic surveys but activity resumed after several hours. Birds and marine mammals are most likely to be impacted by visual disturbance. For marine mammals the type of vessel and speed it is traveling at are the important factors in the level of disturbance. The majority of negative reactions to vessels were caused by high-speed planing-hulled vessels (Oakley et al. 2017). Physical presence of vessels may cause short term disturbance to birds that spend time offshore, however, this is unlikely to affect species at a population level. Fish, basking shark, marine mammals and birds are mostly sensitive to above and below water collision. Seismic survey vessels will be travelling at slow speeds and, therefore, will not lead to collision. Benthos may be impacted by temporary habitat disturbance through anchoring or placement of equipment on the seabed. The use of OBNs and OBC surveys could cause localised areas of seabed, and associated benthos, to be disturbed. Potential effects on the benthos include localised direct disturbance. Any immobile eggs, juveniles and shellfish present on the seabed around the operation area will be subject to direct seabed disturbance. Overall impacts during seismic survey will be negative, small in scale, temporary and short term (for the duration of the survey i.e. 4 weeks). However Option A represents a significant reduction in the amount of permitted activity (92% reduction in 2D and 95% reduction in 3D seismic survey activity per year) comparted to the Previous Plan. While the nature of the impact remains the same the extent and duration of the impact is decreased when compared to the Previous Plan. A Natura Impact Statement (NIS) has been carried out for the Plan and determined following introduction of mitigation there will be no Likely Significant Effect (LSE) on EU designated sites (SAC and SPAs) from seismic survey activities. Therefore Option A on balance has a neutral contribution to the SEO.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
		Detracts from SEO	**Drilling:** While much of Irelands marine ecosystem (including birds, marine mammals and fish) is in generally good condition (where information is available) concerns such as anthropogenic disturbance, overexploitation, pollution and climate change are leading to biodiversity and habitat loss and ecosystem degradation. During drilling operations there will be direct and indirect impacts on plankton, benthos, fish and shellfish, marine and other mammals, birds, marine reptiles, designated habitats and species from the presence of vessels, placement of equipment (e.g. anchors, wellhead etc), contaminated cuttings discharge and mud/cement/cuttings discharge, drilling, flaring and accidental events. These can lead to underwater noise changes, visual and above water noise disturbance, smothering and siltation rate changes, physical change (to another sediment type), deterioration of water quality / toxic effects on species, sediment contamination / potential for bioaccumulation in food chain, disturbance and potential Hydrocarbon & PAH contamination. The vast majority of the impacts from drilling will be negative, temporary, local and short term. The impacts do not last beyond the exploration drilling period (i.e. 2 months). The underwater noise impacts on fish and marine mammals will be less than during seismic survey (discussed above). Visual disturbance may occur during exploration drilling, with up to 5 vessels involved (including the rig itself) and up to 5 helicopter trips per week. This could impact birds and marine mammals but will be small in scale and limited to the drilling period (i.e. 2 months). In addition birds may be disturbed during flaring. Drilling and pile driving are two anthropogenic activities that directly impact the seabed and cause significant vibrations that could affect benthic invertebrates. This impact would be negative, small scale and permeant. Routine rig or vessel discharges will be controlled through compliance with various MARPOL requirements. Therefore significant impacts on biodiversity, flora and fauna are unlikely. The release of mud, cement and cuttings, oil, chemicals etc could have impacts on water quality and indirectly habitats and species. This would be small scale and within the background concentrations. A NIS has been carried out for the Plan and determined following introduction of mitigation there will be no LSE on EU designated sites (SAC and SPAs) from exploration drilling activities. The largest impact during the drilling phase is determined to be in the event of a catastrophic accidental oil spill event (e.g. well blowout), such an event would have the potential to have a large impact and directly impact surrounding species and habitats in both Irish waters and transboundary waters. Impacts from oil spill are mainly considered with birds, through fouling of the feathers leading to loss of insulation and interference with flight. Marine mammals will be mainly affected if they breathe in oil or vapour- effects depend on height of blowhole/nostrils above water when they breathe in. Fish are generally less likely to be affected as they do not breathe on the surface, therefore, the impact is through dissolved phase material and uptake of contaminated food (including oil droplets). Oil Spill modelling shows that depending on the location of the spill (from within the IOSEA6 Study Area) there is the potential for oil to arrive at the shoreline from County Mayo to County Dublin in Ireland and coast of Cornwall, England; West coast of Wales from Pembrokeshire to Anglesey; County Down, Northern Ireland; Isle of Man; Lancashire and Cumbria, England and County of Wigtownshire, Dumfries and Galloway; Scotland. This would have the potential to impact a wide range of habitats and species. However by reducing number of rigs and exploration wells (70% reduction per year) this is reducing the likelihood of well blowout, but the effects remain the same. Therefore Option A has the potential to detract from the SEO.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
Climatic Factors	3. Contribute to the delivery of the Climate Action Plan and green economy, including the objectives set out in the Climate Action Plan.	**Support SEO**	**Seismic:** During seismic surveying the use of fuel from the survey and support vessels (2 vessels in total) and helicopters (1 per week) will causes release of greenhouse gases, including carbon dioxide (CO_2), carbon monoxide (CO) and methane (CH_4) all of which have differing levels of global warming potential (GWP) and direct impacts on climate change. This impact will be negative, short term for the duration of the survey (4 weeks maximum). Due to the small extent of the IOSEA6 Study Area (blocks in which activity is permitted to take place) the effects will take place in a smaller geographic area. The emissions of greenhouse gases (GHG) from the energy sector (which includes oil and gas) has reduced since 1990 (EPA, 2022). However Ireland has the third highest level of GHGs per capita in the EU accordingly to latest estimates (Eurostat, 2022).Compared to the Previous Plan represents a reduction in the volume of permitted seismic survey activity (92% reduction in 2D and 95% reduction in 3D seismic survey activity per year) and therefore minimises the impact on climate change. This subsequent reduction of emissions also supports delivery of the goals set out in the Climate Action Plan. Therefore Option A supports the delivery of the objective. The Option allows for oil and gas authorisations to continue in a small number of blocks in Irish Waters (IOSEA6 Study Area), while focusing on reducing reliance on fossil fuels going forward in line with the committed to become net zero by 2050.
		Support SEO	**Drilling:** Drilling, combustion and flaring result in emissions of greenhouse gasses, predominantly carbon dioxide (CO_2), and in smaller amounts carbon monoxide (CO) and methane (CH_4) all of which have different levels of GWP and direct impacts on climate change. The impact will be negative, temporary and short term. The legislation which the Plan is based upon Climate Action and Low Carbon Development (Amendment) Act 2021 provides for a climate resilient and climate neutral economy by no later than the end of the 2050. As Option A permits significantly less exploration wells to be drilled than under the Previous Plan (70% reduction per year), Option A minimises the impact on climate change, supports delivery of the goals set out in the Climate Action Plan and therefore supports the SEO.
Cultural, Architectural & Archaeological Heritage	4. Prevent damage to or loss of heritage features including maritime heritage.	**Neutral contribution to SEO**	**Seismic:** During seismic survey there is limited potential for physical damage to submerged cultural heritage (Historic maritime and aviation wrecks and Submerged prehistoric landscapes and archaeological sites) from placement of equipment on the seabed (e.g. sea bottom cables) and anchoring. However the survey would be designed to avoid such impacts. The baseline identified 57 known wrecks in the IOSEA6 Study Area (compared to approximately 18,000 in the NMS wreck viewer), therefore the chance of impacting one is low. Any damage would be permeant and irreversible. Compared to the Previous Plan where a large areas was permitted for activity Option A covers a smaller areas and therefore has the potential for focused survey in these areas. However on balance Option A has a neutral contribution to the SEO.
		Neutral contribution to SEO	**Drilling:** During drilling there could be physical damage to submerged cultural heritage (Historic maritime and aviation wrecks and Submerged prehistoric landscapes and archaeological sites) from placement of equipment on the seabed (e.g. wellheads, anchoring, mattressing). There are no known Submerged prehistoric landscapes in the vicinity of the IOSEA6 Study Area. It is unlikely that submerged cultural heritage will be impacted from the drilling activity itself. Release of mud/cement/cuttings has a minor impacts where releases occur in close proximity but unlikely to impact submerged cultural heritage directly. Potential impacts from hydrocarbon spill on coastal archaeology and historic wrecks, impacts are primarily associated with smothering and damage from clean-up operations rather than from the spill itself. However should be noted that historic wrecks may also act as a contaminant and release chemicals and dangerous substances into the marine environment. Pre-drilling surveys are likely to identify the presence of any submerged cultural heritage features. Any damage would be permeant and irreversible. On balance Option A has a neutral contribution to the SEO.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
Economy and Material Assets	5. Protect and enhance the existing oil and gas infrastructure and ports servicing the sector.	**Neutral contribution to SEO**	**Seismic:** Undertaking seismic surveys will likely use local ports servicing the oil and gas sector by supplying helicopters (1 per week for 4 weeks) and a guard vessel. The eventual development of oil and gas infrastructure would lead to protection and enhancement of existing oil and gas infrastructure. However in comparison to the Previous Plan which allowed for a higher level of seismic activity this Option is a reduction in the extent of surveys permitted (92% reduction in 2D and 95% reduction in 3D seismic survey activity per year), therefore, on balance Option A has a neutral contribution to the SEO.
		Neutral contribution to SEO	**Drilling:** Undertaking exploration drilling will likely use local ports servicing the oil and gas sector by supplying helicopters transits (expected to be 5 per week for approximately 2 months) and vessels. Any drilling may lead to using existing oil and gas infrastructure which is already present in the IOSEA6 Study Area and, therefore, support the Objective. However in comparison to the Previous Plan which allowed for a higher level of drilling activity this Option is a significant reduction in the number of exploration wells permitted (70% reduction per year), therefore, on balance, Option A has a neutral contribution to the SEO.
	6. Avoids disruption, disturbance and nuisance to communities and their sources of income (e.g. commercial fishing, aquaculture, tourism and recreation etc).	**Support SEO**	**Seismic:** Undertaking seismic surveys may have minimal impacts on the fishing industry due to exclusions around the survey vessel and associated disturbance. In the worst case could result in loss of or damage to fishing equipment. The impact will be negative, temporary (during the duration of the survey i.e. 4 weeks) and small in scale. Compared to the Previous Plan Option A represents a significant reduction in the extent of permitted seismic survey activity (92% reduction in 2D and 95% reduction in 3D seismic survey activity per year) and, therefor,e minimises the amount of time in which disruption may occur and therefore reduces impacts. Therefore Option A supports the delivery of this objective.
		Neutral contribution to SEO	**Drilling:** During exploration drilling there will be an exclusion around the drilling rig, this can have an indirect impact on the commercial fishing industry and shipping in general. In the worst case could result in loss of or damage to fishing equipment. The impact will be negative, temporary (during the duration of the drilling activity i.e. 2 months) and small in scale. The IOSEA6 Study Area (other than Celtic Sea Basin has relatively low levels of vessel traffic (<0.5 – 0.5 vessel hours per km). There are also a number of Offshore Wind Farms in early planning in the vicinity of the IOSEA6 Study Areas, including a number within the Celtic Sea Basin authorisations. Therefore disturbance is determined to be low. As Option A permits significantly less exploration wells to be drilled than under the Previous Plan (70% reduction per year) this Option presents a positive improvement on the current situation as it will lead to less disruption and disturbance of the fishing industry, shipping and other industries. The release of mud, cement and cuttings, oil, chemicals etc could have impacts on water quality and indirectly on aquaculture, shellfish, fishing. This would be small scale and within the background concentrations. VSP/checkshot surveys could cause disturbance and displacement of mobile marine life but unlikely to impact economy. There is the potential for visual impact on coastal communities from flaring at night, but due to the distance from land this is determined to be low, small in scale and temporary. There is the potential for catastrophic accidental oil spill event (e.g. well blowout), such an event would have the potential to have a wide impact and directly impact surrounding waters and indirectly the communities and incomes of a number of sectors. However by reducing number of rigs and exploration wells (70% reduction per year) this is reducing the likelihood of well blowout. On balance Option A has a neutral contribution to the SEO.
Geology ` substrat	7. Protect the quality of the seabed,	**Support SEO**	**Seismic:** During seismic survey there is the potential for localised areas of seabed to be disturbed by the placement of survey equipment on the seabed with the potential for direct impacts. However, these will be small in scale, temporary and it is determined that there will be no significant impact to the local geology, bathymetry, seabed features or substrates. Therefore Option A supports the delivery of this objective.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
	coastline and its sediments.	**Neutral contribution to SEO**	**Drilling:** Drilling activities have a small potential to directly impact local areas of seabed through presence of subsea equipment, penetration of the seabed, release of mud/cement/cuttings and marine discharges. However exploratory drilling is unlikely to involve the deployment of significant amounts of seabed equipment, while these impacts may be permeant and irreversible (e.g. penetration of the seabed) it is considered the impact will be small in scale there will be no significant impact to the local geology, bathymetry, seabed features or substrates. Routine rig or vessel discharges will be controlled through compliance with various MARPOL requirements. Therefore significant impacts on seabed sediments and substrates is considered unlikely. There is the potential for localised areas of seabed to be contaminated by toxic substances during release of cuttings and chemicals. The largest impact is determined to be from an accidental oil spill event, such as a well blowout. Such an event would have the potential to contaminate the seabed or coastal sediment quality around the IOSEA6 Study Area. Oil Spill modelling shows that depending on the location of the spill (from within the IOSEA6 Study Area) there is the potential for oil to arrive at the shoreline from County Mayo to County Dublin in Ireland and coast of Cornwall, England; West coast of Wales from Pembrokeshire to Anglesey; County Down, Northern Ireland; Isle of Man; Lancashire and Cumbria, England and County of Wigtownshire, Dumfries and Galloway; Scotland. However by significantly reducing number of rigs and exploration wells (70% reduction per year) this is reducing the likelihood of well blowout, but the effects remain the same. On balance Option A has a neutral contribution to the SEO.
Landscape and Seascape	8. Protect the landscape/seascape character and visual amenity.	**Support SEO**	**Seismic:** Seismic surveys would not impact the landscape/seascape character or visual amenity. There will only be two vessels present in total and 1 helicopter per week. This level of activity will be insignificant compared to the background level of vessel operations within the IOSEA6 Study Area. Therefore Option A supports the delivery of this objective.
		Neutral contribution to SEO	**Drilling:** During exploration drilling the physical presence of drilling rig and associated vessels, with up to 5 vessels involved for approximately 2 months. This may lead to a small scale, minor, temporary and short term impact on visual amenity. However most of the IOSEA6 Study Area is well outside where would be visible. An accidental oil spill event, such as a well blowout, could lead to the potential for negative impacts on coastal landscape and seascape. However when compared to the Previous Plan, significantly reducing the number of rigs and exploration wells (70% reduction per year) reduces the likelihood of well blowout. On balance Option A has a neutral contribution to the SEO.
Population and Human Health	9. Ensure no adverse impact on human	**Support SEO**	**Seismic:** During seismic survey there is a small potential for indirect impacts on human health through the accidental release of diesel, chemicals etc. into the water, these would be negative, small in scale and disperse within the water column. It is considered highly unlikely that sea water would be affected enough to pass contamination though the food chain. When compared to Previous Plan Option A represents a significant reduction in the extent of permitted seismic survey activity (92% reduction in 2D and 95% reduction in 3D seismic survey activity per year) and therefore minimises the likelihood of contamination. Therefore Option A supports the delivery of this objective.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
	health and wellbeing.	**Neutral contribution to SEO**	**Drilling:** During exploration drilling there is a small potential for indirect impacts on population and human health through the release of contaminated cuttings and accidental events. These would be negative and small in scale. There is the potential for visual impact on coastal communities from flaring at night, but due to the distance from land this is determined to be low, small in scale and temporary. There is potential for death or injury of workers or other users during operations, however, the Oil and Gas sector has a good health and safety record as it is strictly regulated and controlled. A severe hydrocarbon and PAH contamination could lead to direct (e.g. restrictions to activities in the local area) or indirect (e.g. reduced amenity value, impact to water quality or marine life) impacts on population and human health. The probability of such incidents is generally small and as such it is most likely that there is a low risk to human health from hydrocarbon spills. Risks to human health from hazardous substances, well blowout, fire and explosions, personnel transfer, ship sinkage and collision are all low, due to the regulatory systems in place in order to preclude significant impacts to the health of employees and other users of the sea. When compared to the Previous Plan Option A represents a significant reduction in the number of permitted exploration wells (70% reduction per year) and therefore minimises the likelihood of any impacts. On balance Option A has a neutral contribution to the SEO.
Water	10. Minimise impacts on water quality and support the achievement of the objectives of the Marine Strategy Framework Directive (MSFD).	**Neutral contribution to SEO**	**Seismic:** During seismic survey there will be routine vessel discharges when outside the 12 NM limit, they are not considered likely to impact water quality as there is legislation in place to ensure these are controlled, e.g. MARPOL. There may also be accidental release of diesel, chemicals etc. into the water, these would be negative, small in scale and disperse within the water column. The MSFD has a descriptor relating to Contaminants (descriptor 8), where the aim is that concentrations of contaminants are at levels not giving rise to pollution effects. Ireland has achieved Good Environmental Status (GES) for concentrations of contaminants within its maritime area, for the criteria assessed which are contaminants in water and biota, acute pollution events and biological effects of contaminants (DHLGH, 2021b). The introduction of pollutants from seismic survey is unlikely to hinder the aim. Another descriptor of the MSFD is Energy (descriptor 11) which aims for introduction of energy, including underwater noise, to be at levels that do not adversely affect the marine environment. The current status of the descriptor is that Ireland has achieved GES for the anthropogenic impulsive sound element of underwater noise. The seismic survey activities will lead to introduction of underwater noise. The level of impulsive underwater noise causing activities within Ireland's maritime area were low overall during the assessment period of 2016-2018, based on data from impulsive noise activity associated with petroleum exploration (DHLGH, 2021b). However compared to the Previous Plan Option A represents a significant reduction in the extent of permitted seismic survey activity (92% reduction in 2D and 95% reduction in 3D seismic survey activity per year) and therefore minimises the likelihood of this impact. On balance Option A has a neutral contribution to the SEO.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
		Detracts from SEO	**Drilling:** During drilling there will be disturbance of sediments and release of mud/cement/cuttings to the water, this could lead to localised temporary impacts on water quality. The potential wastes and discharges produced by the oil and gas industry offshore are regulated by a suite of regulations and plans, seeking to limit the impact of those activities and operations, which seek to limit the impact. Reductions in emissions from the Oil and Gas sector have been seen in recent years and are controlled. Under the Water Framework Directive (WFD) over three-quarters of monitored coastal waterbodies and just under one-third of monitored transitional waters are at 'high' or 'good' ecological status (EPA, 2022b). Negative impacts on water quality could affect this status. The largest impact is determined to be from an accidental oil spill event, such as a well blowout. Such an event would have the potential to negatively impact water quality across the IOSEA6 Study Area and around. The MSFD aims to protect the marine environment a large oil spill event could lead to an impact on the GES of descriptor 8 – Contaminants. The main water contaminants associated with petroleum (Oil and Gas) exploration and drilling are oil, chemicals, metals and naturally occurring radioactive materials, via permitted discharges and accidental spills. Oil Spill modelling shows that depending on the location of the spill (from within the IOSEA6 Study Area) and prevailing wind conditions there is the potential for the oil to spread across the Celtic Sea and into the Irish Sea (when spill occurs from the Celtic Sea Basin). The highest chance of surface sheen is around the spill location. The Slyne-Eris basin is known to contain gas/condensate and therefore not likely to lead to oil spill and not modelled. By significantly reducing number of rigs and exploration wells (70% reduction per year) this is reducing the likelihood of well blowout, but the effects remain the same. Any impacts on water quality would indirectly impact ecology, recreation value, and also have potential impacts for human health (via food uptake routes). Therefore Option A has the potential to detract from the SEO.

D.2 OPTION B

To proceed with issuing authorisations, as well as permitting petroleum (oil and gas) activities up to the below maximum levels of activity presented in Table D-3, subject to modifications to the regulatory regime which may derive from the SEA process. These modifications represent the proposed mitigation measures resulting from the SEA assessment, e.g. restriction of timing of activities.

This represents a 50% increase in potential activities over the lifetime of the Plan and a 100% increase in activities in any one year.

Table D-3 Option A maximum levels of activity

Activity	Maximum over duration of plan	Maximum in any one year
Wells drilled	23	6
2D seismic survey acquired	12,000km	4,000km
3D seismic survey acquired	6,000km^2	2,000km^2

The full assessment of Option B against the SEOs is presented in Table D-4

Table D-4 Assessment of Option B

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
Air Quality	1. Minimise emissions to the air.	**Support SEO**	**Seismic:** During seismic surveying the use of fuel from the survey and support vessels (2 vessels in total) and helicopters (1 per week) will causes release of SO_2 and NO_X which can cause a direct impacts on air quality. This impact will be short term for the duration of the survey (4 weeks maximum). Due to the small extent of the IOSEA6 Study Area (blocks in which activity is permitted to take place) the effects will take place in a smaller geographic area. Ireland currently has good air quality, however it did not meet the new World Heritage Organisation (WHO) Air Quality guidelines for health in 2021 (EPA, 2022). The emissions of greenhouse gases from the energy sector (which includes oil and gas) has reduced since 1990. Compared to the Previous Plan Option B represents a significant reduction in the extent of permitted seismic survey activity (84% reduction in 2D and 90% reduction in 3D seismic survey activity per year) and therefore minimises the amount of emissions released. Under the Climate Action and Low Carbon Development (Amendment) Act 2021, Ireland has committed to become net zero by 2050. Option B supports the SEO, the Option supports the delivery of the objective but not substantially as the option still adds to atmospheric emissions.
		Neutral contribution to SEO	**Drilling:** During drilling, vessel combustion and flaring will result in emissions of oxides of nitrogen (NO_x) and sulphur (SO_x). Small amounts of nitrous oxide (N_2O) are also released. Due to the huge amount of power during drilling, a large volume of CO_2 is released into the atmosphere, therefore contributing directly to atmospheric emissions. The time taken to undertake exploration drilling is dependent on rig type, water depth and drilling depth and may take approximately 2 months and involve up to 5 vessels. Therefore, the impact will be direct, negative, temporary and short term. As Option B permits less exploration wells to be drilled than under the Previous Plan (40% reduction per year) this Option on balance has a neutral contribution to the SEO. In addition targets on emissions set by IPPC, EU and Government of Ireland these emissions will decrease overtime on help to deliver the SEO objective, as carbon emissions from oil and gas activities will decrease in line with these targets.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
Biodiversity, Flora and Fauna	2. Avoid damage to the biodiversity, flora and fauna of Ireland, its seas and transboundary waters, particularly EU designated sites and protected species.	**Neutral contribution to SEO**	**Seismic:** During seismic survey the key impacts will be underwater noise changes, disturbance, collision and temporary habitat disturbance (e.g. abrasion). These impacts will be temporary and short term for the duration of the survey (4 weeks maximum). Due to the small IOSEA6 Study Areas (blocks in which activity is permitted to take place) the effects will take place in a smaller geographic area. Compared to the Previous Plan this represents a significant reduction in the extent of permitted seismic survey activity (84% reduction in 2D and 90% reduction in 3D seismic survey activity per year) and therefore reduced underwater noise, disturbance and likelihood of collision and amount of habitat disturbance. For underwater noise changes marine mammals and fish are most sensitive to high intensity noise produced by air guns. High intensity noise can cause temporary or permanent changes to animals' hearing as noted by Slabberkoorn et al., (2019; and Carroll et al., (2017). Disturbance effects to fish receptors in the area resulting from impulsive sound sources during seismic surveys will be brief to temporary and have been assessed not significant. Hearing specialist fish may experience temporary displacement from the immediate area surrounding the survey, however individuals will return to the area quickly based on the transient and brief nature of the survey activities. Underwater noise generated from air guns during seismic surveys have the potential to impact marine mammals, with harbour porpoises being most sensitive to this very high frequency (Southall et al., 2019). Thompson et al. (2013) and Sarnocinska et al., (2020) found that there was a temporary behavioural response during seismic surveys but activity resumed after several hours. Birds and marine mammals are most likely to be impacted by visual disturbance. For marine mammals the type of vessel and speed it is traveling at are the important factors in the level of disturbance. The majority of negative reactions to vessels were caused by high-speed planing-hulled vessels (Oakley et al. 2017). Physical presence of vessels may cause short term disturbance to birds that spend time offshore, however this is unlikely to affect species at a population level. Fish, basking shark, marine mammals and birds are mostly sensitive to above and below water collision. Seismic survey vessels will be travelling at slow speeds and therefore will not lead to collision. Benthos may be impacted by temporary habitat disturbance through anchoring or placement of equipment on the seabed. The use of OBNs and OBC surveys could cause localised areas of seabed, and associated benthos, to be disturbed. Potential effects on the benthos include localised direct disturbance. Any immobile eggs, juveniles and shellfish present on the seabed around the operation area will be subject to direct seabed disturbance. Overall impacts during seismic survey will be negative, small in scale, temporary and short term (for the duration of the survey i.e. 4 weeks). However Option B represents a significant reduction in the amount of permitted activity (84% reduction in 2D and 90% reduction in 3D seismic survey activity per year) comparted to the Previous Plan. While the nature of the impact remains the same the extent and duration of the impact is decreased when compared to the Previous Plan. A Natura Impact Statement (NIS) has been carried out for the Plan and determined following introduction of mitigation there will be no Likely Significant Effect (LSE) on EU designated sites (SAC and SPAs) from seismic survey activities. Therefore Option B on balance has a neutral contribution to the SEO.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
		Detracts from SEO	**Drilling:** While much of Irelands marine ecosystem (including birds, marine mammals and fish) is in generally good condition (where information is available) concerns such as anthropogenic disturbance, overexploitation, pollution and climate change are leading to biodiversity and habitat loss and ecosystem degradation. During drilling operations there will be direct and indirect impacts on plankton, benthos, fish and shellfish, marine and other mammals, birds, marine reptiles, designated habitats and species from the presence of vessels, placement of equipment (e.g. anchors, wellhead etc), contaminated cuttings discharge and mud/cement/cuttings discharge, drilling, flaring and accidental events. These can lead to underwater noise changes, visual and above water noise disturbance, smothering and siltation rate changes, physical change (to another sediment type), deterioration of water quality / toxic effects on species, sediment contamination / potential for bioaccumulation in food chain, disturbance and potential Hydrocarbon & PAH contamination. The vast majority of the impacts from drilling will be negative, temporary, local and short term. The impacts do not last beyond the exploration drilling period (i.e. 2 months). The underwater noise impacts on fish and marine mammals will be less than during seismic survey (discussed above). Visual disturbance may occur during exploration drilling, with up to 5 vessels involved (including the rig itself) and up to 5 helicopter trips per week. This could impact birds and marine mammals but will be small in scale and limited to the drilling period (i.e. 2 months). In addition birds may be disturbed during flaring. Drilling and pile driving are two anthropogenic activities that directly impact the seabed and cause significant vibrations that could affect benthic invertebrates. This impact would be negative, small scale and permeant. Routine rig or vessel discharges will be controlled through compliance with various MARPOL requirements. Therefore significant impacts on biodiversity, flora and fauna are unlikely. The release of mud, cement and cuttings, oil, chemicals etc could have impacts on water quality and indirectly habitats and species. This would be small scale and within the background concentrations. A NIS has been carried out for the Plan and determined following introduction of mitigation there will be no LSE on EU designated sites (SAC and SPAs) from exploration drilling activities. The largest impact during the drilling phase is determined to be in the event of a catastrophic accidental oil spill event (e.g. well blowout), such an event would have the potential to have a large impact and directly impact surrounding species and habitats in both Irish waters and transboundary waters. Impacts from oil spill are mainly considered with birds, through fouling of the feathers leading to loss of insulation and interference with flight. Marine mammals will be mainly affected if they breathe in oil or vapour- effects depend on height of blowhole/nostrils above water when they breathe in. Fish are generally less likely to be affected as they do not breathe on the surface, therefore the impact is through dissolved phase material and uptake of contaminated food (including oil droplets). Oil Spill modelling shows that depending on the location of the spill (from within the IOSEA6 Study Area) there is the potential for oil to arrive at the shoreline from County Mayo to County Dublin in Ireland and coast of Cornwall, England; West coast of Wales from Pembrokeshire to Anglesey; County Down, Northern Ireland; Isle of Man; Lancashire and Cumbria, England and County of Wigtownshire, Dumfries and Galloway; Scotland. This would have the potential to impact a wide range of habitats and species. However by reducing number of rigs and exploration wells (40% reduction per year) this is reducing the likelihood of well blowout, but the effects remain the same. Therefore Option B has the potential to detract from the SEO.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
Climatic Factors	3. Contribute to the delivery of the Climate Action Plan and green economy, including the objectives set out in the Climate Action Plan.	**Support SEO**	**Seismic:** During seismic surveying the use of fuel from the survey and support vessels (2 vessels in total) and helicopters (1 per week) will causes release of greenhouse gases, including carbon dioxide (CO_2), carbon monoxide (CO) and methane (CH_4) all of which have differing levels of global warming potential (GWP) and direct impacts on climate change. This impact will be negative, short term for the duration of the survey (4 weeks maximum). Due to the small extent of the IOSEA6 Study Area (blocks in which activity is permitted to take place) the effects will take place in a smaller geographic area. The emissions of greenhouse gases (GHG) from the energy sector (which includes oil and gas) has reduced since 1990 (EPA, 2022). However Ireland has the third highest level of GHGs per capita in the EU accordingly to latest estimates (Eurostat, 2022).Compared to the Previous Plan represents a reduction in the volume of permitted seismic survey activity (84% reduction in 2D and 90% reduction in 3D seismic survey activity per year) and therefore minimises the impact on climate change. This subsequent reduction of emissions also supports delivery of the goals set out in the Climate Action Plan. Therefore Option B supports the delivery of the objective. The Option allows for oil and gas authorisations to continue in a small number of blocks in Irish Waters (IOSEA6 Study Area), while focusing on reducing reliance on fossil fuels going forward in line with the committed to become net zero by 2050.
		Neutral contribution to SEO	**Drilling:** Drilling, combustion and flaring result in emissions of greenhouse gasses, predominantly carbon dioxide (CO_2), and in smaller amounts carbon monoxide (CO) and methane (CH_4) all of which have different levels of GWP and direct impacts on climate change. The impact will be negative, temporary and short term. The legislation which the Plan is based upon Climate Action and Low Carbon Development (Amendment) Act 2021 provides for a climate resilient and climate neutral economy by no later than the end of the 2050. As Option B permits less exploration wells to be drilled than under the Previous Plan (40% reduction per year), Option B minimises the impact on climate change, however on balance has a neutral contribution to the SEO.
Cultural, Architectural & Archaeological Heritage	4. Prevent damage to or loss of heritage features including maritime heritage.	**Neutral contribution to SEO**	**Seismic:** During seismic survey there is limited potential for physical damage to submerged cultural heritage (Historic maritime and aviation wrecks and Submerged prehistoric landscapes and archaeological sites) from placement of equipment on the seabed (e.g. sea bottom cables) and anchoring. However the survey would be designed to avoid such impacts. The baseline identified 57 known wrecks in the IOSEA6 Study Area (compared to approximately 18,000 in the NMS wreck viewer), therefore the chance of impacting one is low. Any damage would be permeant and irreversible. Compared to the Previous Plan where a large areas was permitted for activity Option B covers a smaller areas and therefore has the potential for focused survey in these areas. However on balance Option B has a neutral contribution to the SEO.
		Neutral contribution to SEO	**Drilling:** During drilling there could be physical damage to submerged cultural heritage (Historic maritime and aviation wrecks and Submerged prehistoric landscapes and archaeological sites) from placement of equipment on the seabed (e.g. wellheads, anchoring, mattressing). There are no known Submerged prehistoric landscapes in the vicinity of the IOSEA6 Study Area. It is unlikely that submerged cultural heritage will be impacted from the drilling activity itself. Release of mud/cement/cuttings has a minor impacts where releases occur in close proximity but unlikely to impact submerged cultural heritage directly. Potential impacts from hydrocarbon spill on coastal archaeology and historic wrecks, impacts are primarily associated with smothering and damage from clean-up operations rather than from the spill itself. However should be noted that historic wrecks may also act as a contaminant and release chemicals and dangerous substances into the marine environment. Pre-drilling surveys are likely to identify the presence of any submerged cultural heritage features. Any damage would be permeant and irreversible. On balance Option B has a neutral contribution to the SEO.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
Economy and Material Assets	5. Protect and enhance the existing oil and gas infrastructure and ports servicing the sector.	**Neutral contribution to SEO**	**Seismic:** Undertaking seismic surveys will likely utilise local ports servicing the oil and gas sector by supplying helicopters (1 per week for 4 weeks) and a guard vessel. The eventual development of oil and gas infrastructure would lead to protection and enhancement of existing oil and gas infrastructure. However in comparison to the Previous Plan which allowed for a higher level of seismic activity this Option is a reduction in the extent of surveys permitted (84% reduction in 2D and 90% reduction in 3D seismic survey activity per year), therefore on balance Option B has a neutral contribution to the SEO.
		Neutral contribution to SEO	**Drilling:** Undertaking exploration drilling will likely utilise local ports servicing the oil and gas sector by supplying helicopters transits (expected to be 5 per week for approximately 2 months) and vessels. Any drilling may lead to utilising existing oil and gas infrastructure which is already present in the IOSEA6 Study Area and therefore support the Objective. However in comparison to the Previous Plan which allowed for a higher level of drilling activity this Option is a reduction in the number of exploration wells permitted (40% reduction per year), therefore, on balance, Option B has a neutral contribution to the SEO.
	6. Avoids disruption, disturbance and nuisance to communities and their sources of income (e.g. commercial fishing, aquaculture, tourism and recreation etc).	**Support SEO**	**Seismic:** Undertaking seismic surveys may have minimal impacts on the fishing industry due to exclusions around the survey vessel and associated disturbance. In the worst case could result in loss of or damage to fishing equipment. The impact will be negative, temporary (during the duration of the survey i.e. 4 weeks) and small in scale. Compared to the Previous Plan Option B represents a significant reduction in the extent of permitted seismic survey activity (84% reduction in 2D and 90% reduction in 3D seismic survey activity per year) and, therefore, minimises the amount of time in which disruption may occur and therefore reduces impacts. Therefore Option B supports the delivery of this objective.
		Neutral contribution to SEO	**Drilling:** During exploration drilling there will be an exclusion around the drilling rig, this can have an indirect impact on the commercial fishing industry and shipping in general. In the worst case could result in loss of or damage to fishing equipment. The impact will be negative, temporary (during the duration of the drilling activity i.e. 2 months) and small in scale. The IOSEA6 Study Area (other than Celtic Sea Basin has relatively low levels of vessel traffic (<0.5 – 0.5 vessel hours per km). There are also a number of Offshore Wind Farms in early planning in the vicinity of the IOSEA6 Study Areas, including a number within the Celtic Sea Basin authorisations. Therefore disturbance is determined to be low. As Option B permits less exploration wells to be drilled than under the Previous Plan (40% reduction per year) this Option presents a positive improvement on the current situation as it will lead to less disruption and disturbance of the fishing industry, shipping and other industries. The release of mud, cement and cuttings, oil, chemicals etc could have impacts on water quality and indirectly on aquaculture, shellfish, fishing. This would be small scale and within the background concentrations. VSP/checkshot surveys could cause disturbance and displacement of mobile marine life but unlikely to impact economy. There is the potential for visual impact on coastal communities from flaring at night, but due to the distance from land this is determined to be low, small in scale and temporary. There is the potential for catastrophic accidental oil spill event (e.g. well blowout), such an event would have the potential to have a wide impact and directly impact surrounding waters and indirectly the communities and incomes of a number of sectors. However by reducing number of rigs and exploration wells (40% reduction per year) this is reducing the likelihood of well blowout. On balance Option B has a neutral contribution to the SEO.
Geology ' substrat	7. Protect the quality of the seabed,	**Support SEO**	**Seismic:** During seismic survey there is the potential for localised areas of seabed to be disturbed by the placement of survey equipment on the seabed with the potential for direct impacts. However, these will be small in scale, temporary and it is determined that there will be no significant impact to the local geology, bathymetry, seabed features or substrates. Therefore, Option B supports the delivery of this objective.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
	coastline and its sediments.	**Detracts from SEO**	**Drilling:** Drilling activities have a small potential to directly impact local areas of seabed through presence of subsea equipment, penetration of the seabed, release of mud/cement/cuttings and marine discharges. However exploratory drilling is unlikely to involve the deployment of significant amounts of seabed equipment, while these impacts may be permeant and irreversible (e.g. penetration of the seabed) it is considered the impact will be small in scale there will be no significant impact to the local geology, bathymetry, seabed features or substrates. Routine rig or vessel discharges will be controlled through compliance with various MARPOL requirements. Therefore, significant impacts on seabed sediments and substrates is considered unlikely. There is the potential for localised areas of seabed to be contaminated by toxic substances during release of cuttings and chemicals. The largest impact is determined to be from an accidental oil spill event, such as a well blowout. Such an event would have the potential to contaminate the seabed or coastal sediment quality around the IOSEA6 Study Area. Oil Spill modelling shows that depending on the location of the spill (from within the IOSEA6 Study Area) there is the potential for oil to arrive at the shoreline from County Mayo to County Dublin in Ireland and coast of Cornwall, England; West coast of Wales from Pembrokeshire to Anglesey; County Down, Northern Ireland; Isle of Man; Lancashire and Cumbria, England and County of Wigtownshire, Dumfries and Galloway; Scotland. However by reducing number of rigs and exploration wells (40% reduction per year) this is reducing the likelihood of well blowout, but the effects remain the same. Therefore Option B has the potential to detract from the SEO.
Landscape and Seascape	8. Protect the landscape/seascape character and visual amenity.	**Support SEO**	**Seismic:** Seismic surveys would not impact the landscape/seascape character or visual amenity. There will only be two vessels present in total and 1 helicopters per week. This level of activity will be insignificant compared to the background level of vessel operations within the IOSEA6 Study Area. Therefore, Option B supports the delivery of this objective.
		Neutral contribution to SEO	**Drilling:** During exploration drilling the physical presence of drilling rig and associated vessels, with up to 5 vessels involved for approximately 2 months. This may lead to a small scale, minor, temporary and short term impact on visual amenity. However most of the IOSEA6 Study Area is well outside where would be visible. An accidental oil spill event, such as a well blowout, could lead to the potential for negative impacts on coastal landscape and seascape. However when compared to the Previous Plan, reducing the number of rigs and exploration wells (40% reduction per year) reduces the likelihood of well blowout. On balance, Option B has a neutral contribution to the SEO.
Population and Human Health	9. Ensure no adverse impact on human	**Support SEO**	**Seismic:** During seismic survey there is a small potential for indirect impacts on human health through the accidental release of diesel, chemicals etc. into the water, these would be negative, small in scale and disperse within the water column. It is considered highly unlikely that sea water would be affected enough to pass contamination though the food chain. When compared to Previous Plan Option B represents a significant reduction in the extent of permitted seismic survey activity (84% reduction in 2D and 90% reduction in 3D seismic survey activity per year) and therefore minimises the likelihood of contamination. Therefore, Option B supports the delivery of this objective.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
	health and wellbeing.	**Neutral contribution to SEO**	**Drilling:** During exploration drilling there is a small potential for indirect impacts on population and human health through the release of contaminated cuttings and accidental events. These would be negative and small in scale. There is the potential for visual impact on coastal communities from flaring at night, but due to the distance from land this is determined to be low, small in scale and temporary. There is potential for death or injury of workers or other users during operation,s however, the Oil and Gas sector has a good health and safety record as it is strictly regulated and controlled. A severe hydrocarbon and PAH contamination could lead to direct (e.g. restrictions to activities in the local area) or indirect (e.g. reduced amenity value, impact to water quality or marine life) impacts on population and human health. The probability of such incidents is generally small and as such it is most likely that there is a low risk to human health from hydrocarbon spills. Risks to human health from hazardous substances, well blowout, fire and explosions, personnel transfer, ship sinkage and collision are all low, due to the regulatory systems in place in order to preclude significant impacts to the health of employees and other users of the sea. When compared to the Previous Plan Option B represents a reduction in the number of rigs and exploration wells (40% reduction per year) and, therefore, minimises the likelihood of any impacts. On balance Option B has a neutral contribution to the SEO.
Water	10. Minimise impacts on water quality and support the achievement of the objectives of the Marine Strategy Framework Directive (MSFD).	**Neutral contribution to SEO**	**Seismic:** During seismic survey there will be routine vessel discharges when outside the 12 NM limit, they are not considered likely to impact water quality as there is legislation in place to ensure these are controlled, e.g. MARPOL. There may also be accidental release of diesel, chemicals etc. into the water, these would be negative, small in scale and disperse within the water column. The MSFD has a descriptor relating to Contaminants (descriptor 8), where the aim is that concentrations of contaminants are at levels not giving rise to pollution effects. Ireland has achieved Good Environmental Status (GES) for concentrations of contaminants within its maritime area, for the criteria assessed which are contaminants in water and biota, acute pollution events and biological effects of contaminants (DHLGH, 2021b). The introduction of pollutants from seismic survey is unlikely to hinder the aim. Another descriptor of the MSFD is Energy (descriptor 11) which aims for introduction of energy, including underwater noise, to be at levels that do not adversely affect the marine environment. The current status of the descriptor is that Ireland has achieved GES for the anthropogenic impulsive sound element of underwater noise. The seismic survey activities will lead to introduction of underwater noise. The level of impulsive underwater noise causing activities within Ireland's maritime area were low overall during the assessment period of 2016-2018, based on data from impulsive noise activity associated with petroleum exploration (DHLGH, 2021b). However compared to the Previous Plan Option B represents a significant reduction in the extent of permitted seismic survey activity (84% reduction in 2D and 90% reduction in 3D seismic survey activity per year) and therefore minimises the likelihood of this impact. On balance Option B has a neutral contribution to the SEO.

Topic	SEA Objective	Significance	Potential Impact and Justification of Significance Ranking
		Detracts from SEO	**Drilling:** During drilling there will be disturbance of sediments and release of mud/cement/cuttings to the water, this could lead to localised temporary impacts on water quality. The potential wastes and discharges produced by the oil and gas industry offshore are regulated by a suite of regulations and plans, seeking to limit the impact of those activities and operations, which seek to limit the impact. Reductions in emissions from the Oil and Gas sector have been seen in recent years and are controlled. Under the Water Framework Directive (WFD) over three-quarters of monitored coastal waterbodies and just under one-third of monitored transitional waters are at 'high' or 'good' ecological status (EPA, 2022b). Negative impacts on water quality could affect this status. The largest impact is determined to be from an accidental oil spill event, such as a well blowout. Such an event would have the potential to negatively impact water quality across the IOSEA6 Study Area and around. The MSFD aims to protect the marine environment a large oil spill event could lead to an impact on the GES of descriptor 8 – Contaminants. The main water contaminants associated with petroleum (Oil and Gas) exploration and drilling are oil, chemicals, metals and naturally occurring radioactive materials, via permitted discharges and accidental spills. Oil Spill modelling shows that depending on the location of the spill (from within the IOSEA6 Study Area) and prevailing wind conditions there is the potential for the oil to spread across the Celtic Sea and into the Irish Sea (when spill occurs from the Celtic Sea Basin). The highest chance of surface sheen is around the spill location. The Slyne-Eris basin is known to contain gas/condensate and therefore not likely to lead to oil spill and not modelled. By reducing number of rigs and exploration wells (40% reduction per year) this is reducing the likelihood of well blowout, but the effects remain the same. Any impacts on water quality would indirectly impact ecology, recreation value, and also have potential impacts for human health (via food uptake routes). Therefore, Option B has the potential to detract from the SEO.