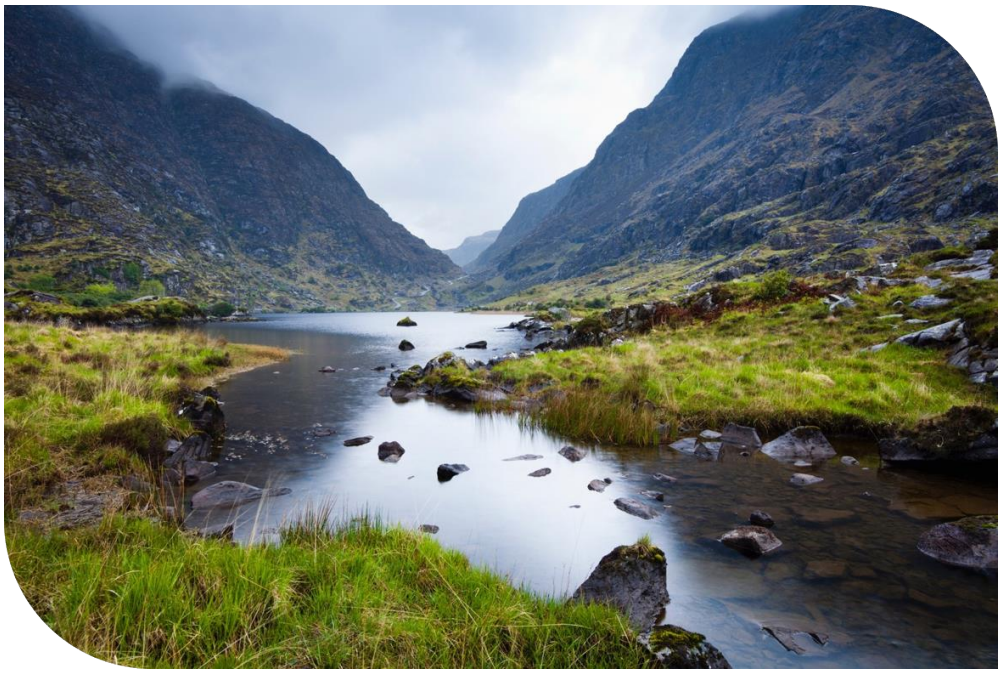
Summer 2022

Draft Regional Water Resources Plan–South West

Natura Impact Statement

Appendix D



Data disclaimer: This document uses best available data at time of writing. Some sources may have been updated in the interim period. As data relating to population forecasts and trends are based on information gathered before the Covid 19 Pandemic, monitoring and feedback will be used to capture any updates. The National Water Resources Plan will also align to relevant updates in applicable policy documentation.

Baseline data included in the draft RWRP-SW has been incorporated from numerous sources including but not limited to; National Planning Framework, Central Statistics Office, Regional Spatial and Economic Strategies, Local Authority data sets, Regional Assembly data sets and Irish Water data sets. Data sources will be detailed in the relevant sections of the draft RWRP-SW. 2019 was selected as the base year to align with the planning period (2019-2025) of the NWRP.

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Appendix D

Adverse Effects on Site Integrity Tables

Preferred Approach options TG2-SAH-179, TG2-SAH-099, TG2-SAH-094 and TG2-SAH-169 are not listed below as no LSEs were identified for these options.

Table D1.1: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAH-524 (TG2-SAH-162 and TG2-SAH-162a) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Lower River Shannon SAC (002165)	0m	**Annex I habitats** Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] Degraded raised bogs still capable of natural regeneration [7120] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Alkaline fens [7230] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Lutra lutra* (Otter) [1355]	New GW abstraction (outside of SAC), pumps, mains, WTPs. Mains cross SAC. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality risk -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are adjacent to the SAC boundary.	New GW abstraction (outside of SAC), pumps, mains, WTPs. Mains cross SAC. Option study area is hydrologically linked to this European site. No operational impacts are predicted from GW abstraction as abstraction predicted to be low risk, estimated to be c. 2% of available recharge. Agricultural grassland predominates the surrounding landscape and no qualifying interests noted within the ZOC.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.2: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAH-524 (TG2-SAH-162 and TG2-SAH-162a) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	0m	*Circus cyaneus* (Hen Harrier) [A082]	Breed	**Disturbance (including biological disturbance) -** there is potential for disturbance to hen harrier given the study area is within the SPA and due to hen harrier using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland).	No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
River Shannon and River Fergus Estuaries SPA (004077)	1.2km	*Phalacrocorax carbo* (Cormorant) [A017] *Cygnus cygnus* (Whooper Swan) [A038] *Branta bernicla hrota* (Light-bellied Brent Goose) [A046] *Tadorna tadorna* (Shelduck) [A048] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Anas acuta* (Pintail) [A054] *Anas clypeata* (Shoveler) [A056] *Aythya marila* (Scaup) [A062] *Charadrius hiaticula* (Ringed Plover) [A137] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Calidris canutus* (Knot) [A143] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] *Tringa nebularia* (Greenshank) [A164] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] Wetland and Waterbirds [A999]	Breed Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	WTP upgrade near river leading into SPA. SPA is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.3: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option grouped option TG2-SAH-512 (TG2-SAH-108 and TG2-SAH-108a) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Mount Brandon SAC (000375)	80m	**Annex I habitats** Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Increase GW abstraction. Option study area is hydrologically linked to this	Increase GW abstraction. Option study area is hydrologically linked to	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Trichomanes speciosum* (Killarney Fern) [1421]	European site. Increased GW abstraction within ZOC. **Mortality risk -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for the spread of invasive species given that the works are adjacent to the SAC boundary and the ZOC is within the SAC.	this European site Increased GW abstraction within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** An increase in abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability -** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.	• Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	

Table D1.4: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAH-038 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Akeragh, Banna and Barrow Harbour SAC (000332)	650m	**Annex I habitats** Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] European dry heaths [4030]	Increase GW abstraction. Option study area is hydrologically linked to this European site. Increased GW abstraction within ZOC in close proximity to this European site. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for the spread of invasive species given that the	Increase GW abstraction. Option study area is hydrologically linked to this European site. Increased GW abstraction within ZOC in close proximity to this European site. **Habitat degradation – hydrological/ hydrogeological changes -** An increase in abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. Therefore, there is potential for impacts on aquatic QI species	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
			works and ZOC are adjacent to the SAC boundary.	utilising this European site through a reduction in flows/water levels. **Water table/availability availability -** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. There is potential for impacts on habitats hydrologically linked to this European site through a reduction in flows/water levels due to groundwater abstraction.		

Table D1.5: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAH-038 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Kerry Head SPA (004189)	0m	*Fulmarus glacialis* (Fulmar) [A009] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed	New mains running through SPA. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to supporting habitats (e.g. foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the study area is within the SPA which is a breeding site. **Mortality -** pollution of water courses during construction (associated with	New mains running through SPA. Option study area is hydrologically linked to this European site. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
				sediment runoff, or accidental spillage) could impact prey species relied on by QI.			
Tralee Bay Complex SPA (004188)	700m	*Cygnus cygnus* (Whooper Swan) [A038] *Branta bernicla hrota* (Light-bellied Brent Goose) [A046] *Tadorna tadorna* (Shelduck) [A048] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Anas platyrhynchos* (Mallard) [A053] *Anas acuta* (Pintail) [A054] *Aythya marila* (Scaup) [A062] *Haematopus ostralegus* (Oystercatcher) [A130] *Charadrius hiaticula* (Ringed Plover) [A137] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Calidris alba* (Sanderling) [A144] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] *Arenaria interpres* (Turnstone) [A169] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] Wetland and Waterbirds [A999]	Non-b Non-b	Increase GW abstraction. Option study area is hydrologically linked to this European site. Increased GW abstraction within ZOC in close proximity to this European site. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to supporting habitats (e.g. foraging habitats) to QI species during construction works given that the works are adjacent to SPA boundary. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the proximity of the study area to the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland).	Increase GW abstraction. Option study area is hydrologically linked to this European site. Increased GW abstraction within ZOC in close proximity to this European site. No operational impacts are predicted. Although there is a groundwater abstraction, the SPA is not within the zone of contribution (ZOC). Therefore, given the distance from the site and the QI species it supports there is no impact predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.6: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAH-225 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Lower River Shannon SAC (002165)	0m	**Annex I habitats** Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130]	New GW abstraction within SAC. Option study area is hydrologically linked to this European site.	New GW abstraction within SAC. Option study area is hydrologically linked to this European site.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] Degraded raised bogs still capable of natural regeneration [7120] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Alkaline fens [7230] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Lutra lutra* (Otter) [1355]	**Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	**Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. **Water table/availability -** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. There is potential for impacts on habitats utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels due to groundwater abstraction.	With the implementation of mitigation as noted above there is no potential for AESI	

Table D1.7: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAH-225 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Stack's to Mullaghareirk Mountains,	600m	*Circus cyaneus* (Hen Harrier) [A082]	Breed	**Disturbance (including biological disturbance) -** there is potential for disturbance to hen harrier given the	No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
West Limerick Hills and Mount Eagle SPA (004161)				proximity of the study area to the SPA and due to hen harrier using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland).		With the implementation of mitigation as noted above there is no potential for AESI	

Table D1.8: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAH-531 (TG2-SAH-181, TG2-SAH-182 and TG2-SAH-204) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	0km	**Annex I habitats** Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae*) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130] Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the *Violetalia calaminariae* [6130] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the *Rhynchosporion* [7150] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Annex II species** *Geomalacus maculosus* (Kerry Slug) [1024]	Increase SW abstraction from Lough Currane within SAC and associated new mains which also cross the SAC. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary (within Lough Currane). **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the	Increase SW abstraction from Lough Currane,within SAC and associated new mains which also cross the SAC. Option study area is hydrologically linked to this European site. **Habitat degradation – hydrological/ hydrogeological changes -** An increase in abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. **Water table/availability -** There is potential for impacts on freshwater pearl mussel and other aquatic QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels due to surface water abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] *Euphydryas aurinia* (Marsh Fritillary) [1065] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Najas flexilis* (Slender Naiad) [1833] *Alosa fallax killarnensis* (Killarney Shad) [5046]	spread of invasive species given that the works are within the SAC boundary.			
Ballinskelligs Bay and Inny Estuary SAC (000335)	0m	**Annex I habitats** Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] **Annex II species** *Petalophyllum ralfsii* (Petalwort) [1395]	New mains cross SAC. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to petalwort from construction works as mains cross near recorded site. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Valencia Harbour/Portmagee Channel SAC (002262)	1km	**Annex I habitats** Mudflats and sandflats not covered by seawater at low tide [1140] Large shallow inlets and bays [1160] Reefs [1170]	Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.9: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAH-531 (TG2-SAH-181, TG2-SAH-182 and TG2-SAH-204) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Iveragh Peninsula SPA (004154)	900m	*Fulmarus glacialis* (Fulmar) [A009] *Falco peregrinus* (Peregrine) [A103] *Rissa tridactyla* (Kittiwake) [A188] *Uria aalge* (Guillemot) [A199] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed Breed Breed Breed	Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the proximity of the study area to the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland).	No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.10: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAH-065 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)	0km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	New SW abstraction from Lough Gill and new mains within SAC. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary (within Lough Gill). **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish relied on by otter for food.	New SW abstraction from Lough Gill and new mains within SAC. Option study area is hydrologically linked to this European site. **Habitat degradation – hydrological/ hydrogeological changes -** An increase in abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. **Water table/availability -** There is potential for impacts on otter utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170] Humid dune slacks [2190] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395]	**Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.			

Table D1.11: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAH-065 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Tralee Bay Complex SPA (004188)	0km	*Cygnus cygnus* (Whooper Swan) [A038] *Branta bernicla hrota* (Light-bellied Brent Goose) [A046] *Tadorna tadorna* (Shelduck) [A048] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Anas platyrhynchos* (Mallard) [A053] *Anas acuta* (Pintail) [A054] *Aythya marila* (Scaup) [A062] *Haematopus ostralegus* (Oystercatcher) [A130] *Charadrius hiaticula* (Ringed Plover) [A137] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Calidris alba* (Sanderling) [A144] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] *Arenaria interpres* (Turnstone) [A169] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] Wetland and Waterbirds [A999]	Non-b Non-b	New SW abstraction from Lough Gill and new mains within SPA. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to supporting habitats (e.g. foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the study area is within the SPA. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact prey species relied on by QI.	New SW abstraction from Lough Gill and new mains within SPA. **Habitat degradation – hydrological/ hydrogeological changes) -** Abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact QI species. **Water table/availability -** There is potential for impacts on QI bird species utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Dingle Peninsula SPA (004153)	1.5km	*Fulmarus glacialis* (Fulmar) [A009] *Falco peregrinus* (Peregrine) [A103] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed Breed	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.12: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAH-530 (TG2-SAH-177 and TG2-SAH-178) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	0km	**Annex I habitats** Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae*) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130] Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the *Violetalia calaminariae* [6130] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the *Rhynchosporion* [7150] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Annex II species** *Geomalacus maculosus* (Kerry Slug) [1024] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Euphydryas aurinia* (Marsh Fritillary) [1065] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Najas flexilis* (Slender Naiad) [1833] *Alosa fallax killarnensis* (Killarney Shad) [5046]	New SW abstraction from Lough Leane, new WTP and WTP upgrades within SAC. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary (within Lough Leane). **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	New SW abstraction from Lough Leane, new WTP and WTP upgrades within SAC. Option study area is hydrologically linked to this European site. **Habitat degradation – hydrological/ hydrogeological changes -** An increase in abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. **Water table/availability -** There is potential for impacts on freshwater pearl mussel and other aquatic QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels due to surface water abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Castlemaine Harbour SAC (000343)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170] Humid dune slacks [2190] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395]	New mains cross SAC and WTP adjacent to SAC. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish and restrict access to spawning habitat. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	New mains cross SAC and WTP adjacent to SAC. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Slieve Mish Mountains SAC (002185)	0m	**Annex I habitats** Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] **Annex II species** *Trichomanes speciosum* (Killarney Fern) [1421]	WTP upgrade within SAC. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect hydrologically connected habitats.	WTP upgrade within SAC. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Tralee Bay and Magharees	140m	**Annex I habitats** Estuaries [1130]	WTP upgrade in close proximity to SAC.	WTP upgrade in close proximity to SAC.	• General Mitigation Measures are outlined in **Section 6.3.3**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Peninsula, West to Cloghane SAC (002070)		Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170] Humid dune slacks [2190] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395]	**Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are adjacent to the SAC boundary.	No operational impacts are predicted.	With the implementation of mitigation as noted above there is no potential for AESI	
Akeragh, Banna and Barrow Harbour SAC (000332)	260m	**Annex I habitats** Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] European dry heaths [4030]	WTP upgrades. Option study area is hydrologically linked to this European site. ZOC in close proximity to this European site. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect hydrologically connected habitats.	WTP upgrades. Option study area is hydrologically linked to this European site. ZOC in close proximity to this European site. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.13: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option grouped option TG2-SAH-530 (TG2-SAH-177 and TG2-SAH-178) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Killarney National Park SPA (004038)	0km	*Falco columbarius* (Merlin) [A098] *Anser albifrons flavirostris* (Greenland White-fronted Goose) [A395]	Non-b Non-b	New SW abstraction and new WTP within SPA. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to supporting habitats (e.g. foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the study area is within the SPA.	New SW abstraction and new WTP within SPA. Option study area is hydrologically linked to this European site. No operational impacts are predicted due to QI present.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Castlemaine Harbour SPA (004029)	2.4km	*Gavia stellata* (Red-throated Diver) [A001] *Phalacrocorax carbo* (Cormorant) [A017] *Branta bernicla hrota* (Light-bellied Brent Goose) [A046] *Anas penelope* (Wigeon) [A050] *Anas platyrhynchos* (Mallard) [A053] *Anas acuta* (Pintail) [A054] *Aythya marila* (Scaup) [A062] *Melanitta nigra* (Common Scoter) [A065] *Haematopus ostralegus* (Oystercatcher) [A130] *Charadrius hiaticula* (Ringed Plover) [A137] *Calidris alba* (Sanderling) [A144] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Tringa totanus* (Redshank) [A162] *Tringa nebularia* (Greenshank) [A164] *Arenaria interpres* (Turnstone) [A169] *Pyrrhocorax pyrrhocorax* (Chough) [A346] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Tralee Bay Complex SPA (004188)	325m	*Cygnus cygnus* (Whooper Swan) [A038] *Branta bernicla hrota* (Light-bellied Brent Goose) [A046] *Tadorna tadorna* (Shelduck) [A048] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Anas platyrhynchos* (Mallard) [A053] *Anas acuta* (Pintail) [A054] *Aythya marila* (Scaup) [A062] *Haematopus ostralegus* (Oystercatcher) [A130] *Charadrius hiaticula* (Ringed Plover) [A137] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Calidris alba* (Sanderling) [A144] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] *Arenaria interpres* (Turnstone) [A169] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] Wetland and Waterbirds [A999]	Non-b Non-b	WTP upgrades. Option study area is hydrologically linked to this European site. ZOC in close proximity to this European site. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the study area is in close proximity to the SPA.	WTP upgrades. Option study area is hydrologically linked to this European site. ZOC in close proximity to this European site. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.14: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAH-148 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	0km	**Annex I habitats** Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae*) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130] Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060]	Increase GW abstraction within SAC. Option study area is hydrologically linked to this European site. Within ZOC. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter	Increase GW abstraction within SAC. Option study area is hydrologically linked to this European site. Within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. **Water table/availability -** There is a risk this groundwater abstraction will reduce water flow in the underground	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Juniperus communis formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the *Violetalia calaminariae* [6130] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the *Rhynchosporion* [7150] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Annex II species** *Geomalacus maculosus* (Kerry Slug) [1024] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Euphydryas aurinia* (Marsh Fritillary) [1065] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Najas flexilis* (Slender Naiad) [1833] *Alosa fallax killarnensis* (Killarney Shad) [5046]	from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	aquifer. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.		

Table D1.15: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAH-170 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	0m	**Annex I habitats** Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae*) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130]	New SW abstraction from Coomasaharn Lake and associated pipeline within SAC. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss	New SW abstraction from Coomasaharn Lake and associated pipeline within SAC. Option study area is hydrologically linked to this European site. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the *Violetalia calaminariae* [6130] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the *Rhynchosporion* [7150] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Annex II species** *Geomalacus maculosus* (Kerry Slug) [1024] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Euphydryas aurinia* (Marsh Fritillary) [1065] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Najas flexilis* (Slender Naiad) [1833] *Alosa fallax killarnensis* (Killarney Shad) [5046]	of/damage to QI/Annex 1 habitats, such as that of the Kerry slug, during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats such as Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae*). **Water table/availability -** There is potential for impacts on QI utilising watercourses hydrologically linked to this European site, such as otter, through a reduction in flows/water due to surface water abstraction.		
Castlemaine Harbour SAC (000343)	1.4km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310]	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170] Humid dune slacks [2190] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395]				

Table D1.16: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAH-170 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Castlemaine Harbour SPA (004029	1.2km	*Gavia stellata* (Red-throated Diver) [A001] *Phalacrocorax carbo* (Cormorant) [A017] *Branta bernicla hrota* (Light-bellied Brent Goose) [A046] *Anas penelope* (Wigeon) [A050] *Anas platyrhynchos* (Mallard) [A053] *Anas acuta* (Pintail) [A054] *Aythya marila* (Scaup) [A062] *Melanitta nigra* (Common Scoter) [A065] *Haematopus ostralegus* (Oystercatcher) [A130] *Charadrius hiaticula* (Ringed Plover) [A137] *Calidris alba* (Sanderling) [A144] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Tringa totanus* (Redshank) [A162] *Tringa nebularia* (Greenshank) [A164] *Arenaria interpres* (Turnstone) [A169] *Pyrrhocorax pyrrhocorax* (Chough) [A346] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species**.**	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Iveragh Peninsula SPA (004154)	500m	*Fulmarus glacialis* (Fulmar) [A009] *Falco peregrinus* (Peregrine) [A103] *Rissa tridactyla* (Kittiwake) [A188] *Uria aalge* (Guillemot) [A199] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed Breed Breed Breed	**Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the study area is in close proximity to the SPA which is a breeding site.	No operational impacts are predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.17: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAH-540 (TG2-SAH-215) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts. Note: the new SW abstraction from Lough Leane included in this option is the same new SW abstraction included in SAH-530, and so there is only one abstraction associated with option SAH-530 and SAH-540.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	0km	**<u>Annex I habitats</u>** Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae*) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130] Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030]	New SW abstraction from Lough Leane within SAC. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats, such as that of slender naiad, during construction works given that the works are within the SAC boundary (within Lough Leane).	New SW abstraction from Lough Leane within SAC. Option study area is hydrologically linked to this European site. **Habitat degradation – hydrological/ hydrogeological changes -** An increase in abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as slender naiad.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the *Violetalia calaminariae* [6130] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the *Rhynchosporion* [7150] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Annex II species** *Geomalacus maculosus* (Kerry Slug) [1024] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Euphydryas aurinia* (Marsh Fritillary) [1065] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Najas flexilis* (Slender Naiad) [1833] *Alosa fallax killarnensis* (Killarney Shad) [5046]	**Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	**Water table/availability -** There is potential for impacts on otter and other aquatic QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels due to surface water abstraction.		
Castlemaine Harbour SAC (000343)	8.4km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170] Humid dune slacks [2190] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395]				
Blackwater River (Cork/Waterford) SAC (002170)	2.2km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, specifically freshwater pearl mussel and lamprey which are found within the area.	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.18: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAH-540 (TG2-SAH-215) and Mitigation. Unless otherwise stated impacts are considered direct impacts. Note: the new SW abstraction from Lough Leane included in this option is the same new SW abstraction included in SAH-530, and so there is only one abstraction associated with option SAH-530 and SAH-540.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Killarney National Park SPA (004038)	0km	*Falco columbarius* (Merlin) [A098] *Anser albifrons flavirostris* (Greenland White-fronted Goose) [A395]	Non-b Non-b	New SW abstraction from Lough Leane within SPA. Option study area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to supporting habitats (e.g. foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland), as well as within the SPA given the study area is within the SPA.	New SW abstraction within SPA. Option study area is hydrologically linked to this European site. No operational impacts are predicted due to QI present.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.19: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAH-122 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Mount Brandon SAC (000375)	550m	**Annex I habitats** Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130] Northern Atlantic wet heaths with *Erica tetralix* [4010]	Increase GW abstraction. Option study area is hydrologically linked to this European site as study area is within ZOC. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically	Increase GW abstraction. Option study area is hydrologically linked to this European site as study area is within ZOC. However, the edge of the SAC which overlaps the ZOC is at c. 275m elevation whereas the abstraction source is c. 75m elevation. Significant effect ruled out as the QIs for this	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Trichomanes speciosum* (Killarney Fern) [1421]	connected habitats, such as Northern Atlantic wet heaths. **Disturbance (including biological disturbance) -** there is potential for the spread of invasive species given that the works are within the ZOC shared with the SAC.	SAC are at a higher elevation than the abstraction point and will therefore not be impacted by the abstraction. Therefore, no operational impacts are predicted.		

Table D1.20: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAH-173 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Castlemaine Harbour SAC (000343)	1.5km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170] Humid dune slacks [2190]	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395]				

Table D1.21: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAH-173 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Dingle Peninsula SPA (004153)	450m	*Fulmarus glacialis* (Fulmar) [A009] *Falco peregrinus* (Peregrine) [A103] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed Breed	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the study area is in close proximity to the SPA which is a breeding site.	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Castlemaine Harbour SPA (004029)	1.5km	*Gavia stellata* (Red-throated Diver) [A001] *Phalacrocorax carbo* (Cormorant) [A017] *Branta bernicla hrota* (Light-bellied Brent Goose) [A046] *Anas penelope* (Wigeon) [A050] *Anas platyrhynchos* (Mallard) [A053] *Anas acuta* (Pintail) [A054] *Aythya marila* (Scaup) [A062] *Melanitta nigra* (Common Scoter) [A065] *Haematopus ostralegus* (Oystercatcher) [A130] *Charadrius hiaticula* (Ringed Plover) [A137] *Calidris alba* (Sanderling) [A144] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Tringa totanus* (Redshank) [A162] *Tringa nebularia* (Greenshank) [A164] *Arenaria interpres* (Turnstone) [A169] *Pyrrhocorax pyrrhocorax* (Chough) [A346] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.22: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAH-138 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)	3km	**<u>Annex I habitats</u>** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	New GW abstraction. Option study area is hydrologically linked to this European site. European site is downstream of option study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	New GW abstraction. Option study area is hydrologically linked to this European site. European site is downstream of option study area. No operational impacts are predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170] Humid dune slacks [2190] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395]				

Table D1.23: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAH-138 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Castlemaine Harbour SPA (004029)	3km	*Gavia stellata* (Red-throated Diver) [A001] *Phalacrocorax carbo* (Cormorant) [A017] *Branta bernicla hrota* (Light-bellied Brent Goose) [A046] *Anas penelope* (Wigeon) [A050] *Anas platyrhynchos* (Mallard) [A053] *Anas acuta* (Pintail) [A054] *Aythya marila* (Scaup) [A062] *Melanitta nigra* (Common Scoter) [A065] *Haematopus ostralegus* (Oystercatcher) [A130] *Charadrius hiaticula* (Ringed Plover) [A137] *Calidris alba* (Sanderling) [A144] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Tringa totanus* (Redshank) [A162] *Tringa nebularia* (Greenshank) [A164] *Arenaria interpres* (Turnstone) [A169] *Pyrrhocorax pyrrhocorax* (Chough) [A346] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	New GW abstraction. Option study area is hydrologically linked to this European site. European site is downstream of option study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	New GW abstraction. Option study area is hydrologically linked to this European site. European site is downstream of option study area. No operational impacts are predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.24: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAH-533 (TG2-SAH-186 and TG2-SAH-187) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blasket Islands SAC (002172)	250m	**Annex I habitats** Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330] **Annex II species** *Phocoena phocoena* (Harbour Porpoise) [1351] *Halichoerus grypus* (Grey Seal) [1364]	Increase GW abstraction, upgrade WTP, new storage, new pump, lay new network. Option study area is hydrologically linked to this European site. European site is downstream of option study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to marine mammals from construction works.	Increase GW abstraction, upgrade WTP, new storage, new pump, lay new network. Option study area is hydrologically linked to this European site. European site is downstream of option study area. No operational impacts are predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D1.25: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAH-533 (TG2-SAH-186 and TG2-SAH-187) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Dingle Peninsula SPA (004153)	0m	*Fulmarus glacialis* (Fulmar) [A009] *Falco peregrinus* (Peregrine) [A103] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed Breed	Increase GW abstraction, upgrade WTP, new storage, new pump, lay new network. Option study area is hydrologically linked to this European site. European site is downstream of option study area. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to supporting habitats (e.g. foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact prey species relied on by QI. **Habitat degradation – changes in water quality (pollution) -** there is	Increase GW abstraction, upgrade WTP, new storage, new pump, lay new network. Option study area is hydrologically linked to this European site. European site is downstream of option study area. However, no operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
				potential for pollution of waterbodies during construction that could impact on the habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the study area is within the SPA which is a breeding site.			

Preferred Approach options TG2-SAI-146, TG2-SAI-212, TG2-SAI-450, TG2-SAI-486, Group TG2-SAI-820, TG2-SAI-050, TG2-SAI-102, TG2-SAI-176, TG2-SAI-239, TG2-SAI-240, TG2-SAI-273, TG2-SAI-324, TG2-SAI-410, TG2-SAI-442, TG2-SAI-455, TG2-SAI-508, TG2-SAI-526, TG2-SAI-772, TG2-SAI-774, TG2-SAI-778, TG2-SAI-780, TG2-SAI-781, and TG2-SAI-952 are not listed below as no LSEs were identified for these options.

Table D2.1: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-011 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Mullaghanish to Musheramore Mountains SPA (004162)	1.2km	*Circus cyaneus* (Hen Harrier) [A082]	Breed	New SW abstraction and upgrade WTP. Option study area is in close proximity to this European Site. **Disturbance (including biological disturbance) -** There is potential for disturbance to QI birds given the proximity of the study area to the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g., grassland, arable farmland).	New SW abstraction and upgrade WTP. Option study area is in close proximity to this European Site. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.2: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-060 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
The Gearagh SAC (000108)	14.2km	**Annex I habitats** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **Annex II species** *Lutra lutra* (Otter) [1355]	Increase SW from Bunsheelin River and upgrade WTP. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Increase SW from Bunsheelin River and upgrade WTP. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts predicted given distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.3: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-060 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
The Gearagh SPA (004109)	14.2km	*Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Anas platyrhynchos* (Mallard) [A053] *Fulica atra* (Coot) [A125] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	Increase SW from Bunsheelin River and upgrade WTP. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** There is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Increase SW from Bunsheelin River and upgrade WTP. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts predicted given distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.4: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-193 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Ballycotton Bay SPA (004022)	3.5km	*Anas crecca* (Teal) [A052] *Charadrius hiaticula* (Ringed Plover) [A137] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Arenaria interpres* (Turnstone) [A169] *Larus canus* (Common Gull) [A182] *Larus fuscus* (Lesser Black-backed Gull) [A183] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	New GW abstraction (karstic region) and new WTP to supply deficit. Option study area is in close proximity to a hydrological link to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats	New GW abstraction (karstic region) and new WTP to supply deficit. Option study area is in close proximity to a hydrological link to this European site. No operational impacts predicted as the wetland habitat is tidal dependent. GW abstraction not considered significant impact.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.5: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-457 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts. Note: no SPAs within ZOI of TG2-SAI-457.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Barley Cove to Ballyrisode Point SAC (001040)	0m	**Annex I habitats:** Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] **Annex II species:** *Petalophyllum ralfsii* (Petalwort) [1395]	Increase SW abstraction from Goleen Intake and upgrade Goleen WTP. Significant reduction in yield in 2018. Option study area is within this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for the spread of invasive species given that the works are within SAC.	Increase SW abstraction from Goleen Intake and upgrade Goleen WTP. Significant reduction in yield in 2018. Option study area is within this European site. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact QI species or habitats. Therefore, there is potential for impacts on QI species utilising this European site through a reduction in flows/water levels. **Water table/availability -** There is potential for impacts on habitats and QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.6: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-468 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Caha Mountains SAC (000093)	100m	**Annex I habitats:** Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is adjacent to European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for the	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is adjacent to European site. No operational impacts predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] **Annex II species:** *Geomalacus maculosus* (Kerry Slug) [1024] *Trichomanes speciosum* (Killarney Fern) [1421]	spread of invasive species given that the works are adjacent to SAC.			
Glengarriff Harbour and Woodland SAC (000090)	800m	**Annex I habitats:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **Annex II species:** *Geomalacus maculosus* (Kerry Slug) [1024] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]	Upgrade existing WTP for water quality improvements. Option study area is close to a hydrological link to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for disturbance to otter and bats from construction works. There is also potential for the spread of invasive species given that the works are in close proximity to the SAC.	Upgrade existing WTP for water quality improvements. Option study area is close to a hydrological link to this European site. No operational impacts predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.7: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-480 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Beara Peninsula SPA (004155)	360m	*Fulmarus glacialis* (Fulmar) [A009] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed	New GW abstraction to supply deficit and upgrade WTP. Abandon existing SW source. Option study area is close to a hydrological link to this European site. Within ZOC. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to supporting habitats (e.g., foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Habitat degradation – changes in water quality (pollution) -** There is	New GW abstraction to supply deficit and upgrade WTP. Abandon existing SW source. Option study area is close to a hydrological link to this European site. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact QI species.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
				potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** There is potential for disturbance to QI birds given the proximity of the study area to the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g., grassland, arable farmland).	**Water table/availability** - There is potential for impacts on QI bird species utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels.		

Table D2.8: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-498 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Barley Cove to Ballyrisode Point SAC (001040)	1.4km	**Annex I habitats:** Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] **Annex II species:** *Petalophyllum ralfsii* (Petalwort) [1395]	New GW abstraction and upgrade Toormore WTP to supply deficit. Option study area is close to a hydrological link to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	New GW abstraction and upgrade Toormore WTP to supply deficit. Option study area is close to a hydrological link to this European site. No impacts are predicted given distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Roaringwater Bay and Islands SAC (000101)	2.8km	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Option study area is close to a hydrological link to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could	Option study area is close to a hydrological link to this European site. No impacts are predicted given distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		European dry heaths [4030] Submerged or partially submerged sea caves [8330] **Annex II species:** *Phocoena phocoena* (Harbour Porpoise) [1351] *Lutra lutra* (Otter) [1355] *Halichoerus grypus* (Grey Seal) [1364]	affect QI species and hydrologically connected habitats.			

Table D2.9: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-498 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Sheep's Head to Toe Head SPA (004156)	6.5km	*Falco peregrinus* (Peregrine) [A103] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed	New GW abstraction and upgrade Toormore WTP to supply deficit. Option study area is close to a hydrological link to this European site. **Habitat degradation – changes in water quality (pollution) -** There is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	New GW abstraction and upgrade Toormore WTP to supply deficit. Option study area is close to a hydrological link to this European site. No operational impacts are predicted given distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.10: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-630 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Kenmare River SAC (002158)	2.2km	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] Submerged or partially submerged sea caves [8330] **Annex II species:** *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra (*Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]	New SW abstraction from Kenmare River and new WTP. Hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	New SW abstraction from Kenmare River and new WTP. Hydrologically linked to this European site. No operational impacts predicted given distance from site and size of abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.11: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-643 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Kenmare River SAC (002158)	3.5km	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	Increase SW abstraction from Lough Dromtine. Hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Increase SW abstraction from Lough Dromtine. Hydrologically linked to this European site. No operational impacts predicted given distance from site and abstraction is within sustainable limit.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] Submerged or partially submerged sea caves [8330] **Annex II species:** *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra (*Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]				
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	400m	**Annex I habitats:** Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the Rhynchosporion [7150] Old sessile oak woods with *Ilex* and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Annex II species:** *Geomalacus maculosus* (Kerry Slug) [1024] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]	Increase SW abstraction from Lough Dromtine. Option study area is in close proximity to this European site **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats **Disturbance (including biological disturbance) -** There is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are in close proximity to the SAC boundary.	Increase SW abstraction from Lough Dromtine. Option study area is in close proximity to this European site No operational impacts predicted due to lack of hydrological link from abstraction to site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Euphydryas aurinia (Marsh Fritillary) [1065] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Najas flexilis* (Slender Naiad) [1833] *Alosa fallax killarnensis* (Killarney Shad) [5046]				

Table D2.12: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-645 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Kilgarvan Ice House SAC (000364)	1.4km	**Annex II species:** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	New GW abstraction, new WTP and new mains. Option study area is hydrologically linked to this European site. Within ZOC. **Physical loss of habitats/supporting habitat -** within 1.4km of lesser horseshoe (LHS) SAC. Works within the 2.5km core foraging range from SAC. Vegetation, hedgerow or tree clearance associated with the works could sever important commuting routes for LHS bats commuting between their roost site in the SAC and foraging areas outside the confines of the SAC. This would require further assessment to ensure impacts are avoided. **Disturbance (including biological disturbance) -** There is potential for disturbance to bats from construction works.	New GW abstraction, new WTP and new mains. Option study area is hydrologically linked to this European site. Within ZOC. No operational impacts predicted due to QI present.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Kenmare River SAC (002158)	10.3km	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410]	Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Option study area is hydrologically linked to this European site. No operational impacts predicted given distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] Submerged or partially submerged sea caves [8330] **Annex II species:** *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra (*Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]				

Table D2.13: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-652 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Kenmare River SAC (002158)	2.3km	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] Submerged or partially submerged sea caves [8330] **Annex II species:**	New SW abstraction from Glenmore Lake and upgrade WTP. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats	New SW abstraction from Glenmore Lake and upgrade WTP. Option study area is hydrologically linked to this European site. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability -** There is potential for impacts on otter utilising	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Vertigo angustior (Narrow-mouthed Whorl Snail) [1014] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra (*Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]		watercourses hydrologically linked to this European site through a reduction in flows/water levels.		
Caha Mountains SAC (000093)	350m	**Annex I habitats:** Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] **Annex II species:** *Geomalacus maculosus* (Kerry Slug) [1024] *Trichomanes speciosum* (Killarney Fern) [1421]	New SW abstraction from Glenmore Lake and upgrade WTP. Option study area is in close proximity to this European site. **Disturbance (including biological disturbance) -** There is potential for disturbance to species given the proximity of the study area to the SAC and due to species using supporting habitats in areas outside of the SAC but ecologically connected to it (e.g., grassland, arable farmland).	New SW abstraction from Glenmore Lake and upgrade WTP. Option study area is in close proximity to this European site. No operational impacts predicted due to a lack of hydrological link.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.14: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-660 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Farranamanagh Lough SAC (002189)	690m	**Annex I habitats:** Coastal lagoons [1150] Perennial vegetation of stony banks [1220]	New GW abstraction and abandon existing GW source. New WTP. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats	New GW abstraction and abandon existing GW source. New WTP. Option study area is hydrologically linked to this European site. No operational impacts predicted due to QI present.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Sheep's Head SAC (000102)	440m	**Annex I habitats:** Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030]	Option study area is in close proximity to a hydrological link to this European site.	Option study area is in close proximity to a hydrological link to this European site.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Annex II species: *Geomalacus maculosus* (Kerry Slug) [1024]	**Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats **Disturbance (including biological disturbance) -** There is potential for disturbance to QI species from construction works.	**Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact QI species or habitats. Therefore, there is potential for impacts on QI species utilising this European site through a reduction in flows/water levels. **Water table/availability -** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. This groundwater abstraction is within a karstic aquifer, less than 1km from the SAC. Therefore, there is potential for impacts on QI species and habitats utilising watercourses hydrologically linked to this European site through a reduction in flows/water.	• Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	

Table D2.15: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-768 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Kenmare River SAC (002158)	260m	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	New raw water storage for this WRZ. Based on requiring 100 days' supply of 13m3/d deficit. Increased GW abstraction, WTP upgrade and new main. Option study area is hydrologically linked to European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats	New raw water storage for this WRZ. Based on requiring 100 days' supply of 13m3/d deficit. Increased GW abstraction, WTP upgrade and new main. Option study area is hydrologically linked to European site. However, no operational impacts predicted as the	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] Submerged or partially submerged sea caves [8330] **<u>Annex II species:</u>** *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra (*Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]	**Disturbance (including biological disturbance) -** There is potential for disturbance to otter and bats from construction works. There is also potential for the spread of invasive species given that the works are adjacent to the SAC boundary.	SAC is not within the ZOC for this abstraction.		

Table D2.16: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-768 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Beara Peninsula SPA (004155)	0m	*Fulmarus glacialis* (Fulmar) [A009] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed	New raw water storage for this WRZ. Based on requiring 100 days' supply of 13m3/d deficit. Increased GW abstraction, WTP upgrade and new main. Option study area is within this European site, but new infrastructure outside of SPA boundary. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to supporting habitats (e.g., foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats used for foraging breeding etc. **Disturbance (including biological disturbance) -** There is potential for disturbance to birds given the study area is within the SPA and due to birds using supporting habitats in areas	New raw water storage for this WRZ. Based on requiring 100 days' supply of 13m3/d deficit. Increased GW abstraction, WTP upgrade and new main. Option study area is within this European site, but new infrastructure outside of SPA boundary. No operational impacts predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
				outside of the SPA but ecologically connected to it (e.g., grassland, arable farmland). There is also potential for the spread of invasive species given that the works are adjacent to the SPA boundary.			

Table D2.17: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-771 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
The Gearagh SAC (000108)	7.4km	**Annex I habitats** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **Annex II species** *Lutra lutra* (Otter) [1355]	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is hydrologically linked to European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is hydrologically linked to European site. No operational impacts predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.18: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-771 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
The Gearagh SPA (004109)	8.5km	*Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Anas platyrhynchos* (Mallard) [A053] *Fulica atra* (Coot) [A125] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is hydrologically linked to European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats used for foraging breeding etc.	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is hydrologically linked to European site. No operational impacts predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.19: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-779 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Courtmacsherry Estuary SAC (001230)	11.2km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is hydrologically linked to European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect hydrologically connected habitats.	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is hydrologically linked to European site. No operational impacts predicted	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.20: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-779 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Courtmacsherry Bay SPA (004219)	11.2km	*Gavia immer* (Great Northern Diver) [A003] *Tadorna tadorna* (Shelduck) [A048] *Anas penelope* (Wigeon) [A050] *Mergus serrator* (Red-breasted Merganser) [A069] *Pluvialis apricaria* (Golden Plover) [A140] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is hydrologically linked to European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats used for foraging breeding etc.	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is hydrologically linked to European site. No operational impacts predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.21: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-784 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Barley Cove to Ballyrisode Point SAC (001040)	0m	**Annex I habitats:** Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] **Annex II species:** *Petalophyllum ralfsii* (Petalwort) [1395]	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is within this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect hydrologically connected habitats.	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Option study area is within this European site. No operational impacts predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.22: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-877 (TG2-SAI-231, TG2-SAI-293) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Ballymacoda (Clonpriest and Pillmore) SAC (000077)	9.3km	**Annex I habitats:** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410]	Increase existing GW abstraction from infiltration gallery and supply deficit. Rationalise Dungourney WTP to Mogeely WRZ. Option study area is hydrologically linked to European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Increase existing GW abstraction from infiltration gallery and supply deficit. Rationalise Dungourney WTP to Mogeely WRZ. Option study area is hydrologically linked to European site. No operational impacts predicted due to distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.23: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-877 (TG2-SAI-231, TG2-SAI-293) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Ballymacoda Bay SPA (004023)	6.7km	*Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Charadrius hiaticula* (Ringed Plover) [A137] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Calidris alba* (Sanderling) [A144] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] *Arenaria interpres* (Turnstone) [A169] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] *Larus fuscus* (Lesser Black-backed Gull) [A183] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Increase existing GW abstraction from infiltration gallery and supply deficit. Rationalise Dungourney WTP to Mogeely WRZ. Option study area is hydrologically linked to European site. **Habitat degradation – changes in water quality (pollution) -** There is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species	Increase existing GW abstraction from infiltration gallery and supply deficit. Rationalise Dungourney WTP to Mogeely WRZ. Option study area is hydrologically linked to European site. No operational impacts predicted due to distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.24: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-897 (TG2-SAI-399, TG2-SAI-434) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Bandon River SAC (002172)	1km	**Annex I habitats:** Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **Annex II species:** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Lampetra planeri* (Brook Lamprey) [1096]	Increase SW abstraction from Curraghlicky Lake and upgrade WTP. Interconnect Dunmanway and Drinagh WRZ. Supply deficit from Curraghlicky Lake. Option study area is hydrologically linked to European site and is within freshwater pearl mussel catchment zone. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, specifically freshwater pearl mussel (FWPM) as the study area is within the FWPM catchment area.	Increase SW abstraction from Curraghlicky Lake and upgrade WTP. Interconnect Dunmanway and Drinagh WRZ. Supply deficit from Curraghlicky Lake. Option study area is hydrologically linked to European site and is within freshwater pearl mussel catchment zone. No operational impacts predicted due to size of abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.25: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-923 (TG2-SAI-641, TG2-SAI-642) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	0m	**Annex I habitats:** Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the Rhynchosporion [7150] Old sessile oak woods with *Ilex* and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Annex II species:** *Geomalacus maculosus* (Kerry Slug) [1024] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Euphydryas aurinia* (Marsh Fritillary) [1065] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Najas flexilis* (Slender Naiad) [1833] *Alosa fallax killarnensis* (Killarney Shad) [5046]	Increase abstraction from Lough Currane and supply Caherdaniel.Supplement Caherdaniel from Waterville. Construction of new network within the SAC. Network would be laid in existing road network. Option study area is within this European site **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for disturbance to otter and bats from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	Increase abstraction from Lough Currane and supply Caherdaniel.Supplement Caherdaniel from Waterville. Construction of new network within the SAC. Network would be laid in existing road network. Option study area is within this European site **Habitat degradation – hydrological/ hydrogeological changes -** An increase in abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as slender naiad. **Water table/availability -** There is potential for impacts on otter and other aquatic QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels due to surface water abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**
Ballinskelligs Bay and Inny Estuary SAC (000335)	1.5km	**Annex I habitats:** Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Option study area is hydrologically linked to this European site.	Option study area is hydrologically linked to this European site.	• General Mitigation Measures are outlined in **Section 6.3.3**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Mediterranean salt meadows (Juncetalia maritimi) [1410] **<u>Annex II species:</u>** *Petalophyllum ralfsii* (Petalwort) [1395]	**Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	No operational impacts predicted due to size of abstraction.	With the implementation of mitigation as noted above there is no potential for AESI	
Kenmare River SAC (002158)	200m	**<u>Annex I habitats:</u>** Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] Submerged or partially submerged sea caves [8330] **<u>Annex II species:</u>** *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra (*Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]	Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are adjacent to the SAC boundary.	Option study area is hydrologically linked to this European site. No operational impacts predicted due to size of abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.26: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-949 (TG2-SAI-830, TG2-SAI-831, TG2-SAI-832, TG2-SAI-833) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Ballymacoda (Clonpriest and Pillmore) SAC (000077)	0m	**<u>Annex I habitats:</u>** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] *Salicornia* and other annuals colonising mud and sand	New GW abstraction (karstic) and new WTP to supply deficit. Rationalise Knockadoon, Ballymacoda and Kilcraheen to Youghal (new GW source). Option study area is within this European site. Within ZOC.	New GW abstraction (karstic) and new WTP to supply deficit. Rationalise Knockadoon, Ballymacoda and Kilcraheen to Youghal (new GW source). Option	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		[1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410]	**Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within SAC. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is also potential for the spread of invasive species given that the works are adjacent to the SAC boundary.	study area is within this European site. Within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. This groundwater abstraction is within a karstic aquifer, within the SAC. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.	With the implementation of mitigation as noted above there is no potential for AESI	
Blackwater River (Cork/Waterford) SAC (002170)	900m	**Annex I habitats:** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **Annex II species**	Option study area is hydrologically linked to this European site. Abstraction point is within ZOC. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are adjacent to the SAC boundary.	Option study area is hydrologically linked to this European site. Abstraction point is within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability -** There is a risk this	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]		groundwater abstraction will reduce water flow in the underground aquifer. This groundwater abstraction is within a karstic aquifer, less than 1km from the SAC. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.		

Table D2.27: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-949 (TG2-SAI-830, TG2-SAI-831, TG2-SAI-832, TG2-SAI-833) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Ballymacoda Bay SPA (004023)	0m	*Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Charadrius hiaticula* (Ringed Plover) [A137] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Calidris alba* (Sanderling) [A144] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] *Arenaria interpres* (Turnstone) [A169] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] *Larus fuscus* (Lesser Black-backed Gull) [A183] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	New GW abstraction (karstic) and new WTP to supply deficit. Rationalise Knockadoon, Ballymacoda and Kilcraheen to Youghal (new GW source). Option study area is within this European site. Within ZOC. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to supporting habitats (e.g., foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Mortality -** Pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact species, or breeding sites leading to mortality. **Habitat degradation – changes in water quality (pollution) -** Potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have	New GW abstraction (karstic) and new WTP to supply deficit. Rationalise Knockadoon, Ballymacoda and Kilcraheen to Youghal (new GW source). Option study area is within this European site. Within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact QI species. **Water table/availability** - There is potential for impacts on QI bird species utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
				indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** There is potential for disturbance to QI birds given the study area is within the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g., grassland, arable farmland).			
Blackwater Estuary SPA (004028)	900m	*Anas penelope* (Wigeon) [A050] *Pluvialis apricaria* (Golden Plover) [A140] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Option study area is hydrologically linked to this European site. Abstraction point within ZOC. **Habitat degradation – changes in water quality (pollution) -** Potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** There is potential for disturbance to QI birds given the study area is adjacent to the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g., grassland, arable farmland).	Option study area is hydrologically linked to this European site. Abstraction point within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact QI species. **Water table/availability** - There is potential for impacts on QI bird species utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.28: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-950 (TG2-SAI-836, TG2-SAI-837) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Ballymacoda (Clonpriest and Pillmore) SAC (000077)	2.8km	**Annex I habitats:** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Increase GW abstraction (karstic) and supply deficit. Rationalise Ballykilty to Killeagh WRZ. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	Increase GW abstraction (karstic) and supply deficit. Rationalise Ballykilty to Killeagh WRZ. Option study area is hydrologically linked to this European site. No operational impacts are predicted due to distance from abstraction to site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Mediterranean salt meadows (Juncetalia maritimi) [1410]				

Table D2.29: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-950 (TG2-SAI-836, TG2-SAI-837) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Ballymacoda Bay SPA (004023)	2.8km	*Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Charadrius hiaticula* (Ringed Plover) [A137] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Calidris alba* (Sanderling) [A144] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] *Arenaria interpres* (Turnstone) [A169] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] *Larus fuscus* (Lesser Black-backed Gull) [A183] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Increase GW abstraction (karstic) and supply deficit. Rationalise Ballykilty to Killeagh WRZ. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Increase GW abstraction (karstic) and supply deficit. Rationalise Ballykilty to Killeagh WRZ. Option study area is hydrologically linked to this European site. No operational impacts are predicted due to distance from abstraction to site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.30: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-955 (TG2-SAI-861, TG2-SAI-862, TG2-SAI-863, TG2-SAI-864, TG2-SAI-865) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Caha Mountains SAC (000093)	0m	**Annex I habitats:** Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030]	New Inchybegga Impoundment (Cullomane) and new WTP. To supply Bantry deficit and transfer west to supply WRZs full demands. Rationalise Castletownbere, Glengarriff, Adrigole and Reenmeen West to Bantry. Option study	New Inchybegga Impoundment (Cullomane) and new WTP. To supply Bantry deficit and transfer west to supply WRZs full demands. Rationalise Castletownbere, Glengarriff, Adrigole and Reenmeen	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Alpine and Boreal heaths [4060] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] **Annex II species:** *Geomalacus maculosus* (Kerry Slug) [1024] *Trichomanes speciosum* (Killarney Fern) [1421]	area is within/adjacent to this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** Pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother species. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) - T**here is potential for the spread of invasive species given that the works are within SAC.	West to Bantry. Option study area is within/adjacent to this European site. No operational impacts are predicted due to nature of works.		
Glengarriff Harbour and Woodland SAC (000090)	0m	**Annex I habitats:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **Annex II species:** *Geomalacus maculosus* (Kerry Slug) [1024] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] *Lutra lutra* (Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]	Option study area is within this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary and within lesser horseshoe (LHS) 2.5km core foraging range. Vegetation, hedgerow or tree clearance associated with the works could sever important commuting routes for LHS bats commuting between their roost site in the SAC and foraging areas outside the confines of the SAC. This would require further assessment to ensure impacts are avoided. **Mortality -** Pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother species. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats **Disturbance (including biological disturbance) -** There is potential for disturbance to otter and bats from construction works. There is also potential	Option study area is within this European site. No operational impacts are predicted due to nature of works.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
			for the spread of invasive species given that the works are within the SAC boundary.			
Roaringwater Bay and Islands SAC (000101)	20km	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330] **Annex II species:** *Phocoena phocoena* (Harbour Porpoise) [1351] *Lutra lutra* (Otter) [1355] *Halichoerus grypus* (Grey Seal) [1364]	Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats	Option study area is hydrologically linked to this European site. No operational impacts are predicted given distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.31: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-960 (TG2-SAI-882, TG2-SAI-883) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Kenmare River SAC (002158)	100m	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] European dry heaths [4030] *Juniperus communis* formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the Violetalia calaminariae [6130] Submerged or partially submerged sea caves [8330] **Annex II species:** *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014]	Rationalise Allihies to Ballydonegan GWS.Rationalise Cluain Court Allihies to Allihies. The option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for disturbance to otter and bats from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	Rationalise Allihies to Ballydonegan GWS.Rationalise Cluain Court Allihies to Allihies. The option study area is hydrologically linked to this European site. No operational impacts predicted due to nature of works.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303] *Lutra lutra (*Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365]				

Table D2.32: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-960 (TG2-SAI-882, TG2-SAI-883) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Beara Peninsula SPA (004155)	100m	*Fulmarus glacialis* (Fulmar) [A009] *Pyrrhocorax pyrrhocorax* (Chough) [A346]	Breed Breed	Rationalise Allihies to Ballydonegan GWS.Rationalise Cluain Court Allihies to Allihies. The option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats used for foraging breeding etc. **Disturbance (including biological disturbance) -** There is potential for disturbance to birds from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	Rationalise Allihies to Ballydonegan GWS.Rationalise Cluain Court Allihies to Allihies. The option study area is hydrologically linked to this European site. No operational impacts predicted due to nature of works.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.33: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-962 (TG2-SAI-887, TG2-SAI-888) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Roaringwater Bay and Islands SAC (000101)	1.7km	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330]	Upgrade Ballyhilty WTP and supply spare capacity to Skibbereen 2 - Baltimore and Schull WRZ. Upgrade Lake Cross WTP and supply deficit from Skibbereen 1 WRZ. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could	Upgrade Ballyhilty WTP and supply spare capacity to Skibbereen 2 - Baltimore and Schull WRZ. Upgrade Lake Cross WTP and supply deficit from Skibbereen 1 WRZ. Option study area is hydrologically linked to this European site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Annex II species: *Phocoena phocoena* (Harbour Porpoise) [1351] *Lutra lutra* (Otter) [1355] *Halichoerus grypus* (Grey Seal) [1364]	affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	No operational impacts predicted.		
Lough Hyne Nature Reserve and Environs SAC (000097)	3.9km	**Annex I habitats:** Large shallow inlets and bays [1160] Reefs [1170] Submerged or partially submerged sea caves [8330]	Upgrade Ballyhilty WTP and supply spare capacity to Skibbereen 2 - Baltimore and Schull WRZ. Upgrade Lake Cross WTP and supply deficit from Skibbereen 1 WRZ. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** There is the potential for the spread of invasive species given that the works are within the SAC boundary.	Upgrade Ballyhilty WTP and supply spare capacity to Skibbereen 2 - Baltimore and Schull WRZ. Upgrade Lake Cross WTP and supply deficit from Skibbereen 1 WRZ. Option study area is hydrologically linked to this European site. No operational impacts predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.34: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-963 (TG2-SAI-889, TG2-SAI-890, TG2-SAI-964) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Cork Harbour SPA (004030)	2.6km	*Tachybaptus ruficollis* (Little Grebe) [A004] *Podiceps cristatus* (Great Crested Grebe) [A005] *Phalacrocorax carbo* (Cormorant) [A017] *Ardea cinerea* (Grey Heron) [A028] *Tadorna tadorna* (Shelduck) [A048] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Anas acuta* (Pintail) [A054] *Anas clypeata* (Shoveler) [A056] *Mergus serrator* (Red-breasted Merganser) [A069] *Haematopus ostralegus* (Oystercatcher) [A130] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	New GW abstraction and upgrade Minane Bridge WTP. Rationalise Roberts Cove and Nohoval to Minane Bridge WRZ and supply deficit from Minane WRZ The option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats used for foraging breeding etc.	New GW abstraction and upgrade Minane Bridge WTP. Rationalise Roberts Cove and Nohoval to Minane Bridge WRZ and supply deficit from Minane WRZ. The option study area is hydrologically linked to this European site. No operational impacts predicted due to distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
		Vanellus vanellus (Lapwing) [A142]	Non-b				
		Calidris alpina (Dunlin) [A149]	Non-b				
		Limosa limosa (Black-tailed Godwit) [A156]	Non-b				
		Limosa lapponica (Bar-tailed Godwit) [A157]	Non-b				
		Numenius arquata (Curlew) [A160]	Non-b				
		Tringa totanus (Redshank) [A162]	Non-b				
		Chroicocephalus ridibundus (Black-headed Gull) [A179]	Non-b				
		Larus canus (Common Gull) [A182]	Non-b				
		Larus fuscus (Lesser Black-backed Gull) [A183]	Non-b				
		Sterna hirundo (Common Tern) [A193]	Breed				
		Wetland and Waterbirds [A999]					

Table D2.35: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAI-971 (TG2-SAI-939, TG2-SAI-940, TG2-SAI-941, TG2-SAI-942, TG2-SAI-943, TG2-SAI-944, TG2-SAI-945, TG2-SAI-946, TG2-SAI-947, TG2-SAI-948, TG2-SAI-949, TG2-SAI-950, TG2-SAI-951, TG2-SAI-952, TG2-SAI-953, TG2-SAI-954, TG2-SAI-955, TG2-SAI-956, TG2-SAI-957, TG2-SAI-958, TG2-SAI-959, TG2-SAI-960) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Courtmacsherry Estuary SAC (001230)	0m	**<u>Annex I habitats</u>** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Increase abstraction at Inniscarra and upgrade WTP. Interconnect with Bandon Regional and Clonakilty. Maintain allowable abstraction from Owenacurra River and supply deficit from Inniscarra for Midleton WRZ. Rationalise Knockburden, Templemartin & Garranes, Aghabullogue, Coolineagh, Corbally, Clash Leamleara, Ballincurrig Lisgoold, Walshtown, Grenagh, Stoneview Blarney, Cullen, Ballyshoneen, Vicarstown, Ballinagree, Rylane, Bayview, Tibbotstown and Clashanamid WRZs. Option Study area is within this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats used for foraging breeding etc.	Increase abstraction at Inniscarra and upgrade WTP. Interconnect with Bandon Regional and Clonakilty. Maintain allowable abstraction from Owenacurra River and supply deficit from Inniscarra for Midleton WRZ. Rationalise Knockburden, Templemartin & Garranes, Aghabullogue, Coolineagh, Corbally, Clash Leamleara, Ballincurrig Lisgoold, Walshtown, Grenagh, Stoneview Blarney, Cullen, Ballyshoneen, Vicarstown, Ballinagree, Rylane, Bayview, Tibbotstown and Clashanamid WRZs. Option Study area is within this European site. No operational impacts predicted due to distance from site to abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
			Disturbance (including biological disturbance) - There is potential for the spread of invasive species given that the works are within the SAC boundary.			
Great Island Channel SAC (001058)	1.5km	**Annex I habitats** Mudflats and sandflats not covered by seawater at low tide [1140] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Option Study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats used for foraging breeding etc.	Option Study area is hydrologically linked to this European site. No operational impacts predicted due to distance from site to abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D2.36: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAI-971 (TG2-SAI-939, TG2-SAI-940, TG2-SAI-941, TG2-SAI-942, TG2-SAI-943, TG2-SAI-944, TG2-SAI-945, TG2-SAI-946, TG2-SAI-947, TG2-SAI-948, TG2-SAI-949, TG2-SAI-950, TG2-SAI-951, TG2-SAI-952, TG2-SAI-953, TG2-SAI-954, TG2-SAI-955, TG2-SAI-956, TG2-SAI-957, TG2-SAI-958, TG2-SAI-959, TG2-SAI-960) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Courtmacsherry Bay SPA (004219)	0m	*Gavia immer* (Great Northern Diver) [A003] *Tadorna tadorna* (Shelduck) [A048] *Anas penelope* (Wigeon) [A050] *Mergus serrator* (Red-breasted Merganser) [A069] *Pluvialis apricaria* (Golden Plover) [A140] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Increase abstraction at Inniscarra and upgrade WTP. Interconnect with Bandon Regional and Clonakilty. Maintain allowable abstraction from Owenacurra River and supply deficit from Inniscarra for Midleton WRZ. Rationalise Knockburden, Templemartin & Garranes, Aghabullogue, Coolineagh, Corbally, Clash Leamleara, Ballincurrig Lisgoold, Walshtown, Grenagh, Stoneview Blarney, Cullen, Ballyshoneen, Vicarstown, Ballinagree, Rylane, Bayview, Tibbotstown and Clashanamid WRZs. Option Study area is within this European site. **Physical loss of habitats/supporting habitat -** There is potential for some loss of/damage to supporting habitats (e.g., foraging habitats) to QI species during construction works given that the works are within the SPA boundary. boundary. **Mortality -** Pollution of water courses during construction	Increase abstraction at Inniscarra and upgrade WTP. Interconnect with Bandon Regional and Clonakilty. Maintain allowable abstraction from Owenacurra River and supply deficit from Inniscarra for Midleton WRZ. Rationalise Knockburden, Templemartin & Garranes, Aghabullogue, Coolineagh, Corbally, Clash Leamleara, Ballincurrig Lisgoold, Walshtown, Grenagh, Stoneview Blarney, Cullen, Ballyshoneen, Vicarstown, Ballinagree, Rylane, Bayview, Tibbotstown and Clashanamid WRZs. Option Study area is within this European site. No operational impacts predicted due to distance from site to abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
				(associated with sediment runoff, or accidental spillage) could impact species, or breeding sites leading to mortality. **Habitat degradation – changes in water quality (pollution) -** Potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats used for foraging breeding etc. **Disturbance (including biological disturbance) -** There is potential for disturbance to birds given the study area is within the SPA and due to birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g., grassland, arable farmland). There is also potential for the spread of invasive species given that the works are adjacent to the SPA boundary.			
Cork Harbour SPA (004030)	1km	*Tachybaptus ruficollis* (Little Grebe) [A004] *Podiceps cristatus* (Great Crested Grebe) [A005] *Phalacrocorax carbo* (Cormorant) [A017] *Ardea cinerea* (Grey Heron) [A028] *Tadorna tadorna* (Shelduck) [A048] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Anas acuta* (Pintail) [A054] *Anas clypeata* (Shoveler) [A056] *Mergus serrator* (Red-breasted Merganser) [A069] *Haematopus ostralegus* (Oystercatcher) [A130] *Pluvialis apricaria* (Golden Plover) [A140] *Pluvialis squatarola* (Grey Plover) [A141] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] *Chroicocephalus ridibundus* (Black-headed Gull) [A179] *Larus canus* (Common Gull) [A182] *Larus fuscus* (Lesser Black-backed Gull) [A183] *Sterna hirundo* (Common Tern) [A193] Wetland and Waterbirds [A999]	Non-b Breed	Option Study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** There is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Option Study area is hydrologically linked to this European site. No operational impacts predicted due to distance from site to abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Sovereign Islands SPA (004124)	11.9km	*Phalacrocorax carbo* (Cormorant) [A017]	Breed	Option Study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** There is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Option Study area is hydrologically linked to this European site. No operational impacts predicted due to distance from site to abstraction.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Preferred Approach options TG2-SAJ-295, TG2-SAJ-287, TG2-SAJ-304, TG2-SAJ-294 and TG2-SAJ-141 are not listed below as no LSEs were identified for these options.

Table D3.1: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-291 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	2.6km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.2: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAJ-291 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Estuary SPA (004028)	6.5km	*Anas penelope* (Wigeon) [A050] *Pluvialis apricaria* (Golden Plover) [A140] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149]	Non-b Non-b Non-b Non-b	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area.	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
		Limosa limosa (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	**Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	No operational impacts are predicted.		

Table D3.3: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-223 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	4.8km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as lamprey, as well as freshwater pearl mussel as the study area is within the FWPM catchment area.	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Trichomanes speciosum (Killarney Fern) [1421]				

Table D3.4: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAJ-223 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Estuary SPA (004028)	13.8km	*Anas penelope* (Wigeon) [A050] *Pluvialis apricaria* (Golden Plover) [A140] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.5: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-272 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	2.4km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	WTP upgrade. Option study area is in close proximity to a hydrological link to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the	WTP upgrade. Option study area is in close proximity to a hydrological link to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	study area is within the FWPM catchment area.			

Table D3.6: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-128 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092]	Increase GW abstraction, WTP upgrade, new storage, upgrade pumping station. Option study area is hydrologically linked to this European site. Study area within SAC. Within ZOC. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI	Increase GW abstraction, WTP upgrade, new storage, upgrade pumping station. Option study area is hydrologically linked to this European site. Study area within SAC. Within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. This groundwater abstraction is within a karstic aquifer, which the SAC overlies. Therefore, there is	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Petromyzon marinus (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.		

Table D3.7: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAJ-128 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Estuary SPA (004028)	14.8km	*Anas penelope* (Wigeon) [A050] *Pluvialis apricaria* (Golden Plover) [A140] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	Increase GW abstraction, WTP upgrade, new storage, upgrade pumping station. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Increase GW abstraction, WTP upgrade, new storage, upgrade pumping station. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.8: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-188 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	2.8km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	WTP upgrades. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	WTP upgrades. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.9: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-262 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	2.5km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand	WTP upgrade. Option study area is in close proximity to a hydrological link to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area.	WTP upgrade. Option study area is in close proximity to a hydrological link to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		[1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	**Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.			

Table D3.10: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-162 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	2km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British	Increase GW abstraction and WTP upgrade. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	Increase GW abstraction and WTP upgrade. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. No operational impacts are predicted as the abstraction ZOC does not overlap with the SAC.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]				

Table D3.11: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-167 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	1.8km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095]	Increase GW abstraction and WTP upgrade. Option study area is in close proximity to a hydrological link to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	Increase GW abstraction and WTP upgrade. Option study area is in close proximity to a hydrological link to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. No operational impacts are predicted as the abstraction ZOC does not overlap with the SAC.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Lampetra planeri (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]				

Table D3.12: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with option TG2-SAJ-281 and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	1.8km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	WTP upgrade. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	WTP upgrade. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.13: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with option TG2-SAJ-281 and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	8.9km	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	WTP upgrade. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.14: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-531 (TG2-SAJ-260 and TG2-SAJ-325) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092]	Increase GW abstraction, WTP upgrade, new mains, decommission different WTP and abstraction. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. SAC is not within the ZOC, but there is a hydrological link between the ZOC and the SAC. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to	Increase GW abstraction, WTP upgrade, new mains, decommission different WTP and abstraction. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. SAC is not within the ZOC, but there is a hydrological link between the ZOC and the SAC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability -** There is a risk this increased groundwater abstraction will reduce surface water flows in the SAC due to the hydrological link between the ZOC	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Petromyzon marinus (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	and the SAC. Therefore, there is potential for impacts on QI habitats and species utilising watercourses hydrologically linked to this European site through a reduction in flows/water levels due to the groundwater abstraction. However, the abstraction is not expected to impact any GWDTHs due to the distance from the abstraction to the habitats, and due to the impact being on the surface water flow.		

Table D3.15: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-531 (TG2-SAJ-260 and TG2-SAJ-325) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	6km	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	Increase GW abstraction, WTP upgrade, new mains, decommission different WTP and abstraction. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Increase GW abstraction, WTP upgrade, new mains, decommission different WTP and abstraction. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.16: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-601 (TG2-SAJ-425 and TG2-SAJ-426) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	3.9km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	Increase GW abstraction, two WTP upgrades, decommission different WTP. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	Increase GW abstraction, two WTP upgrades, decommission different WTP. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.17: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-601 (TG2-SAJ-425 and TG2-SAJ-426) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	9km	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156]	Non-b Non-b Non-b Non-b	Increase GW abstraction, two WTP upgrades, decommission different WTP. Option study area is hydrologically linked to this European	Increase GW abstraction, two WTP upgrades, decommission different WTP. Option study area is hydrologically linked to this European site. European	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
		Wetland and Waterbirds [A999]		site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	site is downstream of study area. No operational impacts are predicted.		

Table D3.18: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-597 (TG2-SAJ-406, TG2-SAJ-407, TG2-SAJ-408, TG2-SAJ-409, TG2-SAJ-411, TG2-SAJ-412, TG2-SAJ-413, TG2-SAJ-414 and TG2-SAJ-415) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096]	Increase GW abstraction from karstic region, WTP upgrades, decommission different WTPs, new mains run within or adjacent to SAC. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. SAC not within ZOC. SAC is adjacent to ZOC, both of which are within karst aquifer. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -**	Increase GW abstraction from karstic region, WTP upgrades, decommission different WTPs, new mains run within or adjacent to SAC. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. SAC not within ZOC. SAC is adjacent to ZOC, both of which are within karst aquifer. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk this increased groundwater abstraction will reduce water flow in the underground aquifer. This groundwater abstraction is within a	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** In addition to general mitigation measures outlined above, options specific measures have been identified for **SAJ-597** (see **Section 6.3.4**) as follows: Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI). *Note it is not anticipated that there would be any direct impacts on FWPM indirect effects only by impacting on their host species.*	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Lampetra fluviatilis (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	karstic aquifer adjacent to the SAC, and the SAC overlies this aquifer. However, the ZOC for the abstraction does not overlap with the SAC, so the SAC is less likely to be impacted by the abstraction, but impacts cannot be ruled out at this stage. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.	With the implementation of mitigation as noted above there is no potential for AESI	

Table D3.19: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-597 (TG2-SAJ-406, TG2-SAJ-407, TG2-SAJ-408, TG2-SAJ-409, TG2-SAJ-411, TG2-SAJ-412, TG2-SAJ-413, TG2-SAJ-414 and TG2-SAJ-415) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	17.5km	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	Increase GW abstraction, WTP upgrades, decommission different WTPs, new mains. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Increase GW abstraction, WTP upgrades, decommission different WTPs, new mains. Option study area is hydrologically linked to this European site. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.20: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-520 (TG2-SAJ-154, TG2-SAJ-155 and TG2-SAJ-278) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	3.2km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	Increase two GW abstractions, two WTP upgrades, decommission different WTP and abstraction, new mains, new pumps. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. SAC not within ZOC. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	Increase two GW abstractions, two WTP upgrades, decommission different WTP and abstraction, new mains, new pumps. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. SAC not within ZOC. No operational impacts are predicted given that the ZOC and SAC do not overlap, and due to the abstraction being sustainable.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.21: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-611 (TG2-SAJ-455, TG2-SAJ-456, TG2-SAJ-457 and TG2-SAJ-458) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140]	Increase GW abstraction, WTP upgrade, decommission different WTPs, new mains, new mains, new pumps, new storage. Mains cross SAC. Option study area is	Increase GW abstraction, WTP upgrade, decommission different WTPs, new mains, new mains, new pumps, new storage. Mains cross SAC. Option study area is	• General Mitigation Measures are outlined in **Section 6.3.3** In addition to general mitigation measures outlined above, options specific measures have been identified	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Further trial well tests will be required but due to there being no overlap between the ZOC and the SAC, it is predicted that the increased GW abstraction will not impact the SAC, therefore no operational impacts are predicted.	for **SAJ-611** (see **Section 6.3.4**) as follows: Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI). *Note it is not anticipated that there would be any direct impacts on FWPM indirect effects only by impacting on their host species.* With the implementation of mitigation as noted above there is no potential for AESI	

Table D3.22: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-611 (TG2-SAJ-455, TG2-SAJ-456, TG2-SAJ-457 and TG2-SAJ-458) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Estuary SPA (004028)	465m	*Anas penelope* (Wigeon) [A050] *Pluvialis apricaria* (Golden Plover) [A140] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149]	Non-b Non-b Non-b Non-b	Increase GW abstraction, WTP upgrade, decommission different WTPs, new mains. Option study area is hydrologically linked to this European site.	Increase GW abstraction, WTP upgrade, decommission different WTPs, new mains. Option study area is	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
		Limosa limosa (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	**Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the proximity of the study area to the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland).	hydrologically linked to this European site. No operational impacts are predicted.		

Table D3.23: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-627 (TG2-SAJ-511, TG2-SAJ-512 and TG2-SAJ-513) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel)	Increase two GW abstractions, WTP upgrades, new mains run within or adjacent to SAC. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Within ZOC. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel.	Increase two GW abstractions, WTP upgrades, new mains run within or adjacent to SAC. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk these groundwater abstractions will reduce water flow in the	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** In addition to general mitigation measures outlined above, options specific measures have been identified for **SAJ-627** (see **Section 6.3.4**) as follows: Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI).	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		[1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	**Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	underground aquifer. These groundwater abstractions are within the SAC and overlie a karstic aquifer. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.	*Note it is not anticipated that there would be any direct impacts on FWPM indirect effects only by impacting on their host species.* With the implementation of mitigation as noted above there is no potential for AESI	

Table D3.24: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-627 (TG2-SAJ-511, TG2-SAJ-512 and TG2-SAJ-513) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	1.3km	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	Increase two GW abstractions, WTP upgrades, new mains. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the proximity of the study area to the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland).	Increase two GW abstractions, WTP upgrades, new mains. Option study area is hydrologically linked to this European site. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.25: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-609 (TG2-SAJ-449, TG2-SAJ-450 and TG2-SAJ-451) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	150m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	New GW abstraction, new WTP, new mains, new mains, new pumps, new storage, decommission different WTPs. Option study area is hydrologically linked to this European site. Abstraction from same karst region SAC is within. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are in close proximity to the SAC boundary.	New GW abstraction, new WTP, new mains, new mains, new pumps, new storage, decommission different WTPs. Option study area is hydrologically linked to this European site. Abstraction from same karst region SAC is within. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. This groundwater abstraction is adjacent to the SAC, and both the abstraction and the SAC overly a karstic aquifer. The aquifer and the river may be linked, and so a reduction of water flow in the aquifer may reduce the surface water flow of the river within the SAC. The impacts are unlikely due to the depths the boreholes will be drilled at and the scale of the abstraction (3% of Q95) but cannot rule out impacts at this stage. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.26: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-609 (TG2-SAJ-449, TG2-SAJ-450 and TG2-SAJ-451) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Estuary SPA (004028)	10.3km	*Anas penelope* (Wigeon) [A050] *Pluvialis apricaria* (Golden Plover) [A140] *Vanellus vanellus* (Lapwing) [A142] *Calidris alpina* (Dunlin) [A149] *Limosa limosa* (Black-tailed Godwit) [A156] *Limosa lapponica* (Bar-tailed Godwit) [A157] *Numenius arquata* (Curlew) [A160] *Tringa totanus* (Redshank) [A162] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b Non-b Non-b Non-b Non-b	New GW abstraction, new WTP, new mains, new mains, new pumps, new storage, decommission different WTPs. Option study area is hydrologically linked to this European site. European site is downstream of study area. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	New GW abstraction, new WTP, new mains, new mains, new pumps, new storage, decommission different WTPs. Option study area is hydrologically linked to this European site. European site is downstream of study area. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	

Table D3.27: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-595 (TG2-SAJ-396, TG2-SAJ-397, TG2-SAJ-398, TG2-SAJ-399, TG2-SAJ-400 and TG2-SAJ-401) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	Increase GW abstraction, upgrade WTP, new mains, decommission different WTPs. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Within ZOC. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to	Increase GW abstraction, upgrade WTP, new mains, decommission different WTPs. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Within ZOC. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk this groundwater abstraction will	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Annex II species *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	reduce water flow in the underground aquifer. This groundwater abstraction is within the SAC, and both the abstraction and the SAC overly a karstic aquifer. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.		

Table D3.28: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-595 (TG2-SAJ-396, TG2-SAJ-397, TG2-SAJ-398, TG2-SAJ-399, TG2-SAJ-400 and TG2-SAJ-401) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	415m	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	Increase GW abstraction, upgrade WTP, new mains, decommission different WTPs. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the proximity of the study area to the SPA and due to QI birds using supporting habitats in areas outside of the SPA	Increase GW abstraction, upgrade WTP, new mains, decommission different WTPs. Option study area is hydrologically linked to this European site. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
				but ecologically connected to it (e.g. grassland, arable farmland).			

Table D3.29: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-616 (TG2-SAJ-466) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	5.9km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	Increase GW abstraction, upgrade WTP, new mains, decommission different WTP. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	Increase GW abstraction, upgrade WTP, new mains, decommission different WTP. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.30: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-617 (TG2-SAJ-467 and TG2-SAJ-468) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	6.8km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	New GW abstraction, new WTP, WTP upgrades, decommission different WTP, new mains. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	New GW abstraction, new WTP, WTP upgrades, decommission different WTP, new mains. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.31: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-617 (TG2-SAJ-467 and TG2-SAJ-468) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	7.7km	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156]	Non-b Non-b Non-b Non-b	New GW abstraction, new WTP, WTP upgrades, decommission different WTP, new mains. Option study area	New GW abstraction, new WTP, WTP upgrades, decommission different WTP, new mains. Option study area	• General Mitigation Measures are outlined in **Section 6.3.3**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
		Wetland and Waterbirds [A999]		is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	is hydrologically linked to this European site. No operational impacts are predicted.	With the implementation of mitigation as noted above there is no potential for AESI	

Table D3.32: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-614 (TG2-SAJ-462) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	610m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103]	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Option is associated with SAJ and SAK. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Option is associated with SAJ and SAK. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI species utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. This groundwater abstraction is within 1km of the SAC, and the SAC overlies both a karstic aquifer and productive fissured bedrock. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Salmo salar (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	invasive species given that the works are in close proximity to the SAC boundary.	site through a reduction in flows/water.		

Table D3.33: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-614 (TG2-SAJ-462) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	615m	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156] Wetland and Waterbirds [A999]	Non-b Non-b Non-b Non-b	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is hydrologically linked to this European site. Option is associated with SAJ and SAK. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species. **Disturbance (including biological disturbance) -** there is potential for disturbance to QI birds given the proximity of the study area to the SPA and due to QI birds using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland).	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is hydrologically linked to this European site. Option is associated with SAJ and SAK. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.34: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-613 (TG2-SAJ-461) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Lower River Suir SAC (002137)	9.8km	**Annex I habitats**	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is	• General Mitigation Measures are outlined in **Section 6.3.3**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] *Hydrophilous* tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]	study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	hydrologically linked to this European site. No operational impacts are predicted.	With the implementation of mitigation as noted above there is no potential for AESI	
Blackwater River (Cork/Waterford) SAC (002170)	15.1km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel)	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area.	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		[1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]				

Table D3.35: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-613 (TG2-SAJ-461) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Blackwater Callows SPA (004094)	19.6km	*Cygnus cygnus* (Whooper Swan) [A038] *Anas penelope* (Wigeon) [A050] *Anas crecca* (Teal) [A052] *Limosa limosa* (Black-tailed Godwit) [A156] Wetland and Waterbirds [A999]	Non-b Non-b Non-b	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is hydrologically linked to this European site. **Habitat degradation – changes in water quality (pollution) -** there is potential for pollution of waterbodies during construction that could impact on the wetland habitat used by QI bird species. Potential pollution of watercourses during construction could have indirect effects on QI bird species through impacts upon prey species.	Increase GW abstraction, upgrade WTP, decommission different WTP, new mains. Option study area is hydrologically linked to this European site. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

Table D3.36: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-600 (TG2-SAJ-423 and TG2-SAJ-424) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Lower River Shannon SAC (002165)	0m	**Annex I habitats** Sandbanks which are slightly covered by sea water all the time [1110]	Upgrade WTP, decommission different WTP, new mains, new storage, new pump. Option study	Upgrade WTP, decommission different WTP, new mains, new storage, new pump. Option study area	• General Mitigation Measures are outlined in **Section 6.3.3**	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Lutra lutra* (Otter) [1355]	area is hydrologically linked to this European site. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	is hydrologically linked to this European site. No operational impacts are predicted.	In addition to general mitigation measures outlined above, options specific measures have been identified for **SAJ-600** (see **Section 6.3.4**) as follows: Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI). *Note it is not anticipated that there would be any direct impacts on FWPM indirect effects only by impacting on their host species.* With the implementation of mitigation as noted above there is no potential for AESI	

Table D3.37: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SPAs) with grouped option TG2-SAJ-600 (TG2-SAJ-423 and TG2-SAJ-424) and Mitigation. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount	0m	*Circus cyaneus* (Hen Harrier) [A082]	Breed	Upgrade WTP, decommission different WTP, new mains, new storage, new pump. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage	Upgrade WTP, decommission different WTP, new mains, new storage, new pump. No operational impacts are predicted.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Breeding (Breed)/ Non-breeding (Non-b)	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
				Construction	Operation		
Eagle SPA (004161)				to supporting habitats (e.g. foraging habitats) to QI species during construction works given that the works are within the SPA boundary. **Disturbance (including biological disturbance) -** there is potential for disturbance to hen harrier given the study area is within the SPA and due to hen harrier using supporting habitats in areas outside of the SPA but ecologically connected to it (e.g. grassland, arable farmland).			

Table D3.38: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-628 (TG2-SAJ-514) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Lower River Shannon SAC (002165)	19km	**Annex I habitats** Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species**	New pump, new storage, new mains, upgrade existing pump, decommission WTP and abstraction. Option study area is hydrologically linked to this European site. This option has screened in for LSEs despite the distance from the site due to the extent of the works required which will cross numerous waterbodies. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats.	New pump, new storage, new mains, upgrade existing pump, decommission WTP and abstraction. Option study area is hydrologically linked to this European site. This option has screened in for LSEs despite the distance from the site due to the extent of the works required which will cross numerous waterbodies. No operational impacts are predicted due to distance from site.	• General Mitigation Measures are outlined in **Section 6.3.3** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Lutra lutra* (Otter) [1355]				

Table D3.39: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-629 (TG2-SAJ-515, TG2-SAJ-516 and TG2-SAJ-517) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]	Three new GW abstractions, new pumps, new mains, new storage, upgrade WTPs, decommission different WTP. Mains cross the SAC. Abstractions from same karst region that SAC is within. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Abstraction pressures on surface flows unknown and require further site investigation. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI	Three new GW abstractions, new pumps, new mains, new storage, upgrade WTPs, decommission different WTP. Mains cross the SAC. Abstractions from same karst region that SAC is within. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Abstraction pressures on surface flows unknown and require further site investigation. **Habitat degradation – hydrological/ hydrogeological changes -** Abstractions which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk these groundwater abstractions will reduce water flow in the underground aquifer. These groundwater abstractions are all within 2km of the SAC, and the SAC overlies both a karstic aquifer and	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** In addition to general mitigation measures outlined above, options specific measures have been identified for **SAJ-629** (see **Section 6.3.4**) as follows: Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI). *Note it is not anticipated that there would be any direct impacts on FWPM indirect effects only by impacting on their host species.* With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Trichomanes speciosum (Killarney Fern) [1421]	species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	productive fissured bedrock. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.		

Table D3.40: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-630 (TG2-SAJ-518 and TG2-SAJ-519) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	3.9km	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099]	New GW abstraction, new WTP, new pumps, new mains, new storage, decommission different WTPs. Abstraction from same karst region that SAC is within. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Abstraction pressures on surface flows unknown and require further site investigation. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for the spread of invasive species.	New GW abstraction, new WTP, new pumps, new mains, new storage, decommission different WTPs. Abstraction from same karst region that SAC is within. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Abstraction pressures on surface flows unknown and require further site investigation. **Habitat degradation – hydrological/ hydrogeological changes -** Abstraction which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk this groundwater abstraction will reduce water flow in the underground aquifer. This groundwater abstraction	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
		Alosa fallax fallax (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]		is within 5km of the SAC, and the SAC overlies a karstic aquifer. Therefore, there is potential for impacts on QI utilising watercourses hydrologically linked to this European site through a reduction in flows/water.		

Table D3.41: Source-Pathway- Receptor Analysis – potential impact pathways connecting European Sites (SACs) with grouped option TG2-SAJ-631 (TG2-SAJ-520, TG2-SAJ-521, TG2-SAJ-522, TG2-SAJ-523, TG2-SAJ-524, TG2-SAJ-525, TG2-SAJ-526, TG2-SAJ-527 and TG2-SAJ-528) and Mitigation Measures. Unless otherwise stated impacts are considered direct impacts.

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
Blackwater River (Cork/Waterford) SAC (002170)	0m	**Annex I habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Annex II species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421]	Two new GW abstractions, new pumps, new mains, new storage, new WTP, upgrade WTPs, decommission different WTPs. Mains cross the SAC. Abstraction from same karst region that SAC is within. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Abstraction pressures on surface flows unknown and require further site investigation. **Physical loss of habitats/supporting habitat –** There is potential for some loss of/damage to QI/Annex 1 habitats during construction works given that the works are within the SAC boundary. **Mortality -** pollution of water courses during construction (associated with sediment runoff, or accidental spillage) could impact fish, restrict access to spawning habitat and smother freshwater pearl mussel. **Habitat degradation – changes in water quality (pollution) -** potential pollution of watercourses during construction could affect QI species and hydrologically	Two new GW abstractions, new pumps, new mains, new storage, new WTP, upgrade WTPs, decommission different WTPs. Mains cross the SAC. Abstraction from same karst region that SAC is within. Option study area is hydrologically linked to this European site, and is within freshwater pearl mussel catchment zone. Abstraction pressures on surface flows unknown and require further site investigation. **Habitat degradation – hydrological/ hydrogeological changes -** Abstractions which could lead to hydrological changes (reduced flows – impacting on water quality) that could impact aquatic QI species or habitats, such as alluvial forests or water courses of plain to montane levels. Therefore, there is potential for impacts on aquatic QI utilising this European site through a reduction in flows/water levels. **Water table/availability-** There is a risk these groundwater abstractions will reduce water flow in the underground aquifer. One of these groundwater abstractions is within 1km of the SAC, and the SAC overlies both a karstic aquifer and productive fissured bedrock. Therefore, there is potential for impacts on QI utilising	• General Mitigation Measures are outlined in **Section 6.3.3** • Hydrogeological modelling as in **Section 6.3.5** • Hydrological modelling as in **Section 6.3.5** In addition to general mitigation measures outlined above, options specific measures have been identified for **SAJ-631** (see **Section 6.3.4**) as follows: Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI). *Note it is not anticipated that there would be any direct impacts on FWPM indirect effects only by impacting on their host species.* With the implementation of mitigation as noted above there is no potential for AESI	**N**

European Sites	Distance from Option Study Area (Km)	Qualifying Interests	Potential Impact Pathway		Mitigation Measure Conclusion	Adverse Effects on Site Integrity (Y/N)
			Construction	Operation		
			connected habitats, such as freshwater pearl mussel as the study area is within the FWPM catchment area. **Disturbance (including biological disturbance) -** there is potential for disturbance to otter from construction works. There is also potential for the spread of invasive species given that the works are within the SAC boundary.	watercourses hydrologically linked to this European site through a reduction in flows/water.		