Appendix A Environmental Effects of the Options

A.1 Area 1&2 – Tir Cluain to Riverside Way

Table 59 Area 1&2 – Population and Human Health

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	 This option would provide protection to the following features: 281 residential properties in the area and 26 non-residential properties. First Steps Creche, located in Tír Cluain. The scenic walkway that stretches from Broomfield Ridge to Northern Relief Road, and a portion of the walkway that extends from Willowbank to Water Rock. Darling Buds pre-school, located on Mill Road Midleton GAA Club Midleton Community Hospital Midleton Medical Centre My Place Community Centre Midleton Courthouse and Garda Station
OPTION 1&2B - Direct defences only	As above
OPTION 1&2C - Upstream Storage and Direct Defences	As above

Table 60 Area 1&2 – Biodiversity

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	This option would require in channel dredging to occur, downstream of Moore's Bridge, which could directly impact invertebrate habitats within the channel. As dredging would become a maintenance requirement, biodiversity loss in the area designated for dredging would be significant and on-going.
	There is a potential impact on the change in sediment flux over time to the downstream Great Island Channel Special Area of Conservation (SAC) of which "Maintain/Restore Natural Circulation of sediments" is a conservation objective for the Atlantic Salt Marsh. The change in sediment flux may also negatively affect the Cork Harbour Special Protection Area (SPA) objectives, specifically surrounding the species reliant on wetlands.
	This option does not present the possibility of direct impacts at this stage on any qualifying habitat. The potential for indirect impacts from sediment release or pollutants from construction phase works can be avoided or ameliorated with suitable mitigation measures. Salmon are Annex II species and while not a QI for the SAC, their ecology is related to good status water quality. Otters, Bats and Lamprey are Annex IV species and indirect impacts on water quality and fish as food sources would need to be mitigated. Otter habitats may be impacted where riverside works are required.
	Proposed flood defence wall construction would impact on fish (Salmonids, Lamprey and Eels). Downstream of construction, fish species would also be negatively impacted due to the reduced water quality during the in-stream construction period. Suitable mitigation measures are technically feasible.
	Medium to long-term alteration of fisheries habitat in sensitive waterbody due to proposed walls that will require excavation and restoration of banks. Potential Impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated.
	The replacement of the bridge upstream of Clohessy's Bridge and the removal of the bridge downstream of Northern Relief Road would likely result in the release of fine sediments and local disruption to flora and fauna. These fine sediments may smother downstream gravels during construction, but this would be a temporary feature.
	The construction of embankments and walls would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats.
	The proposed flow control structure at mill race entrance on site north of Northern Relief Rd may alter hydraulics as well as water quality locally, which would negatively impact on fish habitats in the area.
OPTION 1&2B - Direct defences only	This option does not include dredging or bridge removal or replacement, but in-channel works for the construction of walls and embankments could still result in a change to sediment flux entering the downstream SAC/SPA, but to a significantly lesser degree than Option 1A&2A.
	This option does not present the possibility of direct impacts at this stage on any qualifying habitat. The potential for indirect impacts from sediment release or pollutants from construction phase works can be avoided or ameliorated with suitable mitigation measures. Salmon are Annex II species and while not a QI for the SAC, their ecology is related to good status water quality. Otters, Bats and Lamprey are Annex IV species and indirect impacts on water quality and fish as food sources would need to be mitigated. Otter habitats may be impacted where riverside works are required.
	Proposed flood defence wall construction would impact on fish (Salmonids, Lamprey and Eels). Downstream of construction, fish species would also be negatively impacted due to the reduced water quality during the in-stream construction period. Suitable mitigation measures are technically feasible.
	Medium to long-term alteration of fisheries habitat in sensitive waterbody due to proposed walls that will require excavation and restoration of banks. Potential Impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated.
	The construction of embankments and walls would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats.

Option Description	Environmental Effects
	The proposed flow control structure at mill race entrance on site north of Northern Relief Rd may alter hydraulics as well as water quality locally, which would negatively impact on fish habitats in the area.
OPTION 1&2C - Upstream Storage and Direct Defences	This option would require the introduction of a flow control structure and river realignment, with the loss of sinusoidal meanders at the upstream storage embankment. This would have a significant impact on WFD objectives.
	This option does not present the possibility of direct impacts at this stage on any qualifying habitat of the SAC/SPA. The potential for indirect impacts from sediment release or pollutants from construction phase works can be avoided or ameliorated with suitable mitigation measures. Salmon are Annex II species and while not a QI for the SAC, their ecology is related to good status water quality. Otters, Bats and Lamprey are Annex IV species and indirect impacts on water quality and fish as food sources would need to be mitigated. Otter habitats may be impacted where riverside works are required.
	Proposed flood defence wall and embankment construction would impact on fish (Salmonids, Lamprey and Eels). Downstream of construction, fish species would also be negatively impacted due to the reduced water quality during the in-stream construction period. Suitable mitigation measures are technically feasible.
	Permanent loss or removal of fisheries habitat due to channel realignment downstream of storage area was considered. Potential Impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated.
	The construction of embankments and walls would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats.
	Inside the storage area, the lands are currently in use as either agricultural or recreational. As such, the loss of biodiversity during a flood event in these areas is perceived to be minimal.
	The proposed flow control structure at mill race entrance on site north of Northern Relief Rd may alter hydraulics as well as water quality locally, which would negatively impact on fish habitats in the area.

Table 61 Area 1&2 – Land and Soil

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	Localised excavation of alluvial sediments (900m ³) associated with channel widening and deepening.
OPTION 1&2B - Direct defences only	There are no significant issues identified in relation to this option for Land and Soils
OPTION 1&2C - Upstream Storage and Direct Defences	Potential impact on soil quality associated with recurring flooding in the storage areas including the potential for the deposition of fines (silt and clay) on the land and dis-improvement in the soil drainage and productivity as a result.

Table 62 Area 1&2 – Hydrogeology

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	There are no significant issues identified in relation to this option for hydrogeology.
OPTION 1&2B - Direct defences only	There are no significant issues identified in relation to this option for hydrogeology.
OPTION 1&2C - Upstream Storage and Direct Defences	There is a potential to induce groundwater flooding on adjacent land with the flooding of storage area due to groundwater underflow through the gravels underlying the embankment, particularly if the storage area remains full for a prolonged period of time. Mitigation measures, including sheet pile cut-offs, are technically viable.

Table 63 Area 1&2 – Water

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	In-channel dredging could directly impact invertebrate habitat in the channel. There is also the potential impact on the change in sediment flux over time to the downstream SAC of which "Maintain/Restore Natural Circulation of sediments" is a conservation objective for the Atlantic Salt Marsh. Detailed sediment transport modelling would be required to confirm magnitude, duration and extent of impact on sediment flux.
	Channel deepening and widening further downstream could negatively impact hydromorphology, and the associated physical habitat within the channel. Proposed deepening and widening will increase channel cross sectional area and are likely to influence flow velocity, hydraulic habitat and alter sediment storage and transport. Damage is likely to occur to existing bed forms and sediment structure.
	The dredged section downstream of Moore's Bridge will require ongoing maintenance with regular dredging likely to be required and would represent an on-going impact.
	The removal of Moore's Bridge is likely to have a minor short-term, localised impact on hydromorphological condition, sediment mobilisation, and fish and invertebrate habitat during construction. Construction would release fine sediment and possibly lead to smothering of gravels downstream. Over time, the river is likely to return to a more natural geometry as sediment is more likely to be deposited in deeper / low energy sections of the channel. Following construction, the removal of the bridge would improve lateral connectivity and riparian habitat.
	The proposed flow control structure at mill race entrance on site north of Northern Relief Rd may alter hydraulics as well as water quality locally.
OPTION 1&2B - Direct defences only	This option includes more limited in-channel works and no realignment of the river. The downstream SAC includes conservation objectives relating to maintaining sediment flux characteristics which could be impacted by proposed works.
	Maintenance and upgrades to embankments which are existing and/or set back from the channel are unlikely to directly impact upon the river channel or riparian zone or restrict lateral connectivity to the immediate floodplain (when compared to the existing scenario).

Midleton Flood Relief Scheme

Option Description	Environmental Effects
	Tree clearance poses the greatest risk to the degradation of riparian corridor degradation and the environment under this option, which could destabilise and alter the form of the bank which helps to protect the material from erosion, runoff and flow.
	It is understood that the length of channel within this flood cell is already heavily modified therefore alterations may not necessarily reduce the hydromorphological status of the waterbody.
	The proximity of direct defences to the river channel and the associated impacts on the riparian corridor are a key issue.
	The implementation of the flow control structure may lead to localised impacts on channel hydraulics and water quality, and limit water entering the mill race during flood events. The proposed weir is likely to affect flow regime, sediment transport and longitudinal connectivity for fish.
OPTION 1&2C - Upstream Storage and Direct Defences	Flow control structure and the realignment of the river downstream of the storage area would be a significant impact on WFD objectives in relation to hydromorphology. This could impact the natural planform of the river, alter the form of the banks, increase flow velocity and cause localised erosion.
	The proposed 3 m high online storage embankment will significantly alter river form, continuity, and floodplain connectivity. This structure will lead to the direct loss of river length under the footprint of the embankment and alteration of the river upstream and downstream the river connects to the embankment / flow control.
	There will be a need to cut and fill upstream of the embankment to enable functionality of the flood storage area. The embankment will contain a flow control structure to limit water flowing downstream during flood events. Dependent on design, the flow control structure has the potential to form a barrier to sediment transport and fish passage. Further regrading works may also be required to ensure that levels and gradients are suitable.
	The proposed flow control structure at mill race entrance on site north of Northern Relief Rd may alter hydraulics as well as water quality locally.

Table 64 Area 1&2 – Air

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	Potential for significant temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors. Also, potential for odour impacts during dredging.
OPTION 1&2B - Direct defences only	Potential for significant temporary adverse noise impacts during the construction phase due to works occuring in close proximity to residential receptors.
OPTION 1&2C - Upstream Storage and Direct Defences	Greater separation from sensitive receptors for this option.

Table 65 Area 1&2 – Climate

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.
OPTION 1&2B - Direct defences only	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.
OPTION 1&2C - Upstream Storage and Direct Defences	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.

Table 66 Area 1&2 – Material Assets

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	Midleton Railway Station and railway lines.
	Foul sewer and watermain infrastructure running along the R626 road, with connections servicing a mixture of residential, commercial, and industrial areas in Midleton.
	Extensive network of medium and low power (38kV and 110kV) power lines present underground in this area. This area also features numerous overhead powerlines. These are located through Water Rock Golf Course and a large number of the agricultural fields to the north. These are powered by a 110kV substation located between Water Rock Golf Course and East Cork Golf Club.
	The area is serviced by ENET infrastructure, with 4 ducts having been laid along the R626, Cork Road, Connolly Street and Main Street. EIR services are also present beneath these roads, and further extend into the adjacent areas.
	An extensive underground gas distribution system is present in the area, with gas mains located beneath the majority of roads in the study area.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
	Drainage networks are present in these areas. A large network runs down Mill Road, through Millbrook Estate and discharges to the Owenacurra River. A smaller network runs along a section of Mill Road further south, before discharging to the river adjacent to Riversdale Service Centre. A section of drainage network also discharges into the river from Market Green Shopping Centre Car Park.
OPTION 1&2B - Direct defences only	Midleton Railway Station and railway lines.
	Foul sewer and watermain infrastructure running along the R626 road, with connections servicing a mixture of residential, commercial, and industrial areas in Midleton.
	Extensive network of medium and low power (38kV and 110kV) power lines present underground in this area. This area also features numerous overhead powerlines. These are located through Water Rock Golf Course and a large number of the agricultural fields to the north. These are powered by a 110kV substation located between Water Rock Golf Course and East Cork Golf Club.

Option Description	Environmental Effects
	The area is serviced by ENET infrastructure, with 4 ducts having been laid along the R626, Cork Road, Connolly Street and Main Street. EIR services are also present beneath these roads, and further extend into the adjacent areas.
	An extensive underground gas distribution system is present in the area, with gas mains located beneath the majority of roads in the study area.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
	Drainage networks are present in these areas. A large network runs down Mill Road, through Millbrook Estate and discharges to the Owenacurra River. A smaller network runs along a section of Mill Road further south, before discharging to the river adjacent to Riversdale Service Centre.
OPTION 1&2C - Upstream Storage and Direct Defences	Midleton Railway Station and railway lines.
	Foul sewer and watermain infrastructure running along the R626 road, with connections servicing a mixture of residential, commercial, and industrial areas in Midleton.
	Extensive network of medium and low power (38kV and 110kV) power lines present underground in this area. This area also features numerous overhead powerlines. These are located through Water Rock Golf Course and a large number of the agricultural fields to the north. These are powered by a 110kV substation located between Water Rock Golf Course and East Cork Golf Club.
	The area is serviced by ENET infrastructure, with 4 ducts having been laid along the R626, Cork Road, Connolly Street and Main Street. EIR services are also present beneath these roads, and further extend into the adjacent areas.
	An extensive underground gas distribution system is present in the area, with gas mains located beneath the majority of roads in the study area.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
	Drainage networks are present in these areas. A large network runs down Mill Road, through Millbrook Estate and discharges to the Owenacurra River. A smaller network runs along a section of Mill Road further south, before discharging to the river adjacent to Riversdale Service Centre.

Table 67 Area 1&2 – Resources and Waste

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	Import 9,000m ³ material for proposed embankments. Export of material from 3 locations, embankment at Clohessey's Yard and Embankment upgrade at Millbrook and Willowbank. Quantities from these not known at this stage. Dredging works downstream of Moore's Bridge (1m deep and 8m widening in parts) is estimated to generate 900m ³ material for disposal.
OPTION 1&2B - Direct defences only	Import 11,000m ³ material for proposed embankments. Export of material from 2 locations at embankment at Clohessey's Yard and Embankment upgrade at Millbrook and Willowbank. Quantity from these not known at this stage.
OPTION 1&2C - Upstream Storage and Direct Defences	Import of 50,000m ³ material. Export of existing material proposed from Embankment upgrade at Millbrook and Willowbank. Quantity from these not known at this stage.

Table 68 Area 1&2 – Cultural Heritage

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	Objective 3. F. (i)
	Clonmullin House – Broomfield West
	Negative Effect: The setting of Clonmullin House (NIAH 20906519) would be altered by the construction of 0.7m high walls on the east bank of the river.
	Positive Effect: Proposed works would protect Clonmullin House and grounds from damaging flood events. This would have a positive effect by securing its future preservation.
	Cork Rd Bridge
	Negative Effect: There would be a direct negative effect on Cork Bridge listed in the NIAH (NIAH 20830013; RMP CO076-106) by the construction of walls which would tie into the parapet of the bridge both upstream and downstream. The works would also have a negative visual effect on the bridge.
	Positive Effect: Proposed works would protect Cork Bridge from damaging flood events. This would have a positive effect by securing its future preservation.
	Objective 3. F. (ii)
	Mill Complex – Mill Road
	Negative Effect: There would be a direct negative effect on the mill complex (RMP CO076-112) off Mill Road. The proposed construction of a 0.5m wall at the boundary to the complex would have a direct negative effect on two features associated with the mill complex which were identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These comprise a substantial random rubble wall, 6m in height with two blocked window opes (CHS 12) and a section of the tail race (CHS 14). In addition, proposed works would alter the setting of the mill complex.
	Positive Effect: Proposed works would protect the remains of the mill complex from damaging flood events. This would have a positive effect by securing its future preservation.

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Option Description	Environmental Effects
	Cork Bridge
	Negative Effect: There would be a direct negative effect on the Cork Bridge listed in the RMP (RMP CO076-106; NIAH 20830013) by the construction of walls which would tie into the parapet of the bridge both upstream and downstream. The works would also have a negative visual effect on the bridge.
	Positive Effect: Proposed works would protect Cork Bridge from damaging flood events. This would have a positive effect by securing its future preservation.
	Potential Subsurface Archaeological sites
	The construction of embankments; 0.4m, 0.7m, 1.2m and 2m high over a distance of approximately 1.2km could have a negative effect on potential subsurface archaeological sites and features.
	Areas of Archaeological Potential
	Proposed works would have a direct effect on the Owenacurra River which has been assessed as an Area of Archaeological Potential (AAP 1). This is particularly the case in Area 1 where an approx. 200m stretch of the river between the townlands of Knockgriffin and Broomfield West would be deepened by 1m and widened by up to 8m.
	Cultural Heritage
	Negative Effect: This option would have a direct negative effect on the Carrigogna Bridge depicted on OS 1st edition map (1841) and eight Cultural Heritage Sites identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These consist of the following;
	CHS 04: Tailrace of Broomfield Woollen Mill
	CHS 05: Weir of Avoncore Corn Mill
	CHS 06: Headrace of Avoncore Corn Mill
	CJS 07: Stone culvert, not evident but remains may survive within the riverbank
	CHS 08: Concrete and stone revetment walls
	CHS 09: Weir of Avoncore Corn Mill
	CHS 10: Buildings on east bank which contain remains of 19th century Avoncore Corn Mill
	CHS 11: Mill race and sluice not evident in survey but may survive within the riverbank
OPTION 1&2B - Direct defences only	Objective 3. F. (i)
	Clonmullin House – Broomfield West
	Negative Effect: The setting of Clonmullin House (NIAH 20906519) would be altered by the construction of 1.2m high walls on the east bank of the river.
	Positive Effect: Proposed works would protect Clonmullin House and grounds from damaging flood events. This would have a positive effect by securing its future preservation.

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Option Description	Environmental Effects
	Cork Bridge
	Negative Effect: There would be a direct negative effect on the Cork Bridge listed in the NIAH (NIAH 20830013; RMP CO076-106) by the construction of walls which would tie into the parapet of the bridge both upstream and downstream. The works would also have a negative visual effect on the bridge.
	Positive Effect: Proposed works would protect Cork Bridge from damaging flood events. This would have a positive effect by securing its future preservation.
	Objective 3. F. (ii)
	Mill Complex – Mill Road
	Negative Effect: There would be a direct negative effect on the mill complex (RMP CO076-112) off Mill Road. The proposed construction of a 0.5m wall at the boundary to the complex would have a direct negative effect on two features associated with the mill complex which were identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These comprise a substantial random rubble wall, 6m in height with two blocked window opes (CHS 12) and a section of the tail race (CHS 14). In addition, proposed works would alter the setting of the mill complex.
	Positive Effect: Proposed works would protect the remains of the mill complex from damaging flood events. This would have a positive effect by securing its future preservation.
	Cork Bridge Negative Effect: There would be a direct negative effect on the Cork Bridge listed in the RMP (RMP CO076-106; NIAH 20830013) by the construction of walls which would tie into the parapet of the bridge both upstream and downstream. The works would also have a negative visual effect on the bridge.
	Positive Effect: Proposed works would protect Cork Bridge from damaging flood events. This would have a positive effect by securing its future preservation.
	Potential Subsurface Archaeological sites
	The construction of embankments; 0.4, 0.7m, 1.2m and 2m high over a distance of approximately 1.4km could have a negative effect on potential subsurface archaeological sites and features.
	Area of Archaeological Potential
	Proposed works would have a direct effect on the Owenacurra River which has been assessed as an Area of Archaeological Potential (AAP 1).
	Cultural Heritage
	This Option would have a direct negative effect on eight Cultural Heritage Sites identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These consist of the following;
	CHS 04: Tailrace of Broomfield Woollen Mill
	CHS 05: Weir of Avoncore Corn Mill
	CHS 06: Headrace of Avoncore Corn Mill
	CJS 07: Stone culvert, not evident but remains may survive within the riverbank

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Option Description	Environmental Effects
	CHS 08: Concrete and stone revetment walls
	CHS 09: Weir of Avoncore Corn Mill
	CHS 10: Buildings on east bank which contain remains of 19th century Avoncore Corn Mill
	CHS 11: Mill race not evident in survey but may survive within the riverbank
OPTION 1&2C - Upstream Storage and Direct Defences	Objective 3. F. (i).
	Cork Bridge
	Negative Effect: There would be a direct negative effect on the Cork Bridge listed in the NIAH (NIAH 20830013; RMP CO076-106) by the construction of walls which would tie into the parapet of the bridge both upstream and downstream. The works would also have a negative visual effect on the bridge.
	Positive Effect: Proposed works would protect Cork Bridge from damaging flood events. This would have a positive effect by securing its future preservation.
	Objective 3. F. (ii).
	Mill Complex – Mill Road
	Negative Effect: There would be a direct negative effect on the mill complex (RMP CO076-112) off Mill Road. The proposed construction of a 0.5m wall at the boundary to the complex would have a direct negative effect on two features associated with the mill complex which were identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These comprise a substantial random rubble wall, 6m in height with two blocked window opes (CHS 12) and a section of the tail race (CHS 14). In addition, proposed works would alter the setting of the mill complex.
	Positive Effect: Proposed works would protect the remains of the mill complex from damaging flood events. This would have a positive effect by securing its future preservation
	Cork Bridge
	Negative effect: There would be a direct negative effect on Cork Bridge listed in the RMP (RMP CO076-106; NIAH 20830013) by the construction of walls which would tie into the parapet of the bridge both upstream and downstream. The works would also have a negative visual effect on the bridge.
	Positive Effect: Proposed works would protect Cork Bridge from damaging flood events. This would have a positive effect by securing its future preservation.
	Potential Subsurface Archaeological sites
	The construction of embankments; 0.5m, 0.7m, 2m and 3m high over a distance of approximately 3.1km could have a negative effect on potential subsurface archaeological sites and features
	Area of Archaeological Potential
	Proposed works would have a direct negative effect on the Owenacurra River which has been assessed as an Area of Archaeological Potential (AAP 1).

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Option Description	Environmental Effects
	Cultural Heritage
	This Option would have a direct negative effect on three Cultural Heritage Sites identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These consist of the following;
	CHS 09: Weir of Avoncore Corn Mill
	CHS 10: Buildings on east bank which contain remains of 19th century Avoncore Corn Mill
	CHS 11: Mill race not evident in survey but may survive within the riverbank

Table 69 Area 1&2 – Landscape

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	The receiving landscape for this area was assigned a local sensitivity weighting of 4 on the basis that it is designated as a High value Landscape (HVL) in the Cork CDP. There is also an aspirational Riverside Walkway shown on CDP maps. This sensitivity weighting applies to all three options set out below.
	Option 1A
	The provision of a 1.1m embankment upstream of the northern bridge and walls downstream of southern bridge (Moore's bridge) will result in the loss of some dense riparian vegetation and minor loss of visual connection to the river for 2-3 dwellings on opposite side of the road at Broomfield Ridge.
	The north-western 1.2m embankment will not result in any material loss or residential visual amenity in the direction of Water Rock Golf Course, nor will 0.4m embankment unduly interrupt river views within Tir Cluain housing estate.
	The consolidation of bridges to the housing estates will be beneficial and replacement of the existing northern bridge at Broomfield Ridge will be of little consequence to landscape character / views. There will be some loss of mature riparian vegetation and riverside visual amenity for several houses due to conveyance works at the southern end of the scheme.
	Option 2A
	There will be a loss of some riparian vegetation due to the new walls, but this will potentially open up views of the river for dwellings adjacent to southernmost sections. The provision of the Millrace represents a potential enhancement of amenity views from adjacent houses. The bridge removal will reduce clutter and confusing adjacent relationship with the main bridge.
	Overall, this option was assigned a score of -1.
OPTION 1&2B - Direct defences only	Option 1B
	The provision of 2m embankment upstream of the northern bridge and walls downstream of the southern bridge (Moore's bridge) will result in the loss of some dense riparian vegetation and visual connection to river for 2-3 dwellings on opposite side of the road at Broomfield Ridge.
	The north-western 1.2m embankment will not result in any material loss or residential visual amenity in the direction of Water Rock Golf Course, nor will 0.4m embankment unduly interrupt river views within Tir Cluain housing estate.

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Option Description	Environmental Effects
	Retention of the two adjacent southern bridges to the housing estates will remain visually complex.
	Option 2B
	There will be a loss of some riparian vegetation due to new walls, but this will potentially open up views of the river for dwellings adjacent to southernmost sections. Provision of the Millrace represents a potential enhancement of amenity views from adjacent houses.
	Overall, this option was assigned a score of -1.
OPTION 1&2C - Upstream Storage and Direct Defences	Option 1C
	Blocking of the southern end of designated scenic route S43 due to the construction of a roadside 3m embankment as well as the amenity countryside/river views of several houses on opposite side of the road will result in a potentially significant impact. The southern leg of the same embankment also serves to truncate the river corridor and reduce borrowed views across golf course from housing estate to the southeast. There will be a potential loss of mature treeline vegetation from two 3m high embankments to the northwest of the golf course. Reduced river views within golf course will occur as a result of the 0.7m embankment adjacent to the watercourse.
	The provision of a 2m high embankment to the east of the golf course at Broomfield Ridge will result in the loss of some dense riparian vegetation and visual connection to the river for dwellings on opposite side of the road.
	Option 2C
	There will be a loss of some riparian vegetation due to new walls, but this will potentially open up views of the river for dwellings adjacent to southernmost sections. The provision of the Millrace is a potential enhancement of amenity views from adjacent houses.
	Predominantly on the basis of the potential obstruction of views from southern portion of scenic route designation S43 and associated adjacent dwellings, this option has been assigned a score of -3.

Table 70 Area 1&2 – Vulnerability to major accidents and/or disasters

Option Description	Environmental Effects
OPTION 1&2A - Direct Defences and Conveyance improvements	No impact on the vulnerability of the study area to a major accident or disaster.
OPTION 1&2B - Direct defences only	No impact on the vulnerability of the study area to a major accident or disaster.
OPTION 1&2C - Upstream Storage and Direct Defences	No impact on the vulnerability of the study area to a major accident or disaster.

A.2 Area 3 – Town Centre and Bailick Road

Table 71 Area 3 – Population and Human Health

Option Description	Environmental Effects
OPTION 3A - Direct defences only	This option would seek to protect the following features:
	130 residential properties in the area and 81 non-residential properties.
	IDL Heritage Centre
	Imokilly Medical Centre
	Main Street Medical Centre
	Midleton Lodge Park
	Midleton Library
	John F. Kennedy Memorial Park

Table 72 Area 3 – Biodiversity

Option Description	Environmental Effects
OPTION 3A - Direct defences only	This area would require significant in-stream works for the construction of walls and embankments, however this option does not present the possibility of direct impacts at this stage on any qualifying habitat. Potential indirect impacts on SAC/SPA habitats but not on conservation objectives were considered. Suitable mitigation measures are technically feasible and the careful location of works will avoid impacts on the Conservation Objectives of the 2 adjacent European sites.
	Potential localised loss of or disturbance to flora/fauna would be possible. Otters, Bats and Lamprey are Annex IV species and indirect impacts on water quality and fish as food sources would need to be mitigated. Otter habitats may be impacted where riverside works are required.
	Proposed flood defence wall construction would impact on fish (Salmonids, Lamprey and Eels). Downstream of construction, fish species would also be negatively impacted due to the reduced water quality during the in-stream construction period. Suitable mitigation measures are technically feasible. This is a non-sensitive water body (WB) as the confluence of the Dungourney is saline and so the potential effects on fisheries value was considered lower than in upstream areas.
	The construction of embankments and walls would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats. It is noted that some mature trees would require felling.

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Table 73 Area 3 – Land and Soil

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Option Description	Environmental Effects
OPTION 3A - Direct defences only	There are no significant impacts for land and soil expected for this option.
Table 74 Area 3 – Hydrogeology	
Option Description	Environmental Effects
OPTION 3A - Direct defences only	There are no significant impacts for hydrogeology expected for this option.
Table 4 Area 3 – Water	
Option Description	Environmental Effects
OPTION 3A - Direct defences only	Potential temporary construction impacts on water quality associated with in-stream works and works within floodplains.
	Construction works have the potential to result in tree removal where bankside works are proposed. Clearance could destabilise and alter the form of the bank which helps to protect the material from erosion, runoff and flow.
	Some changes to hydromorphology would be expected during the construction phase where in-stream works occur, however no permanent changes are

Table 75 Area 3 – Air

Option Description	Environmental Effects
OPTION 3A - Direct defences only	Potential for significant temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors.

Table 76 Area 3 – Climate

Option Description	Environmental Effects
OPTION 3A - Direct defences only	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.

Table 77 Area 3 – Material Assets

Option Description	Environmental Effects
OPTION 3A - Direct defences only	Foul sewer and watermain infrastructure running along Youghal Road, St. Mary's Road and Bailick Road with connections servicing a mixture of residential and commercial areas in Midleton. These run south into Ballinacurra.
	Extensive network of medium and low power (38kV and 110kV) power lines present underground in this area. This area also features overhead powerlines. These are predominantly located to the east in this area, beyond Woodbury Lawn through the agricultural areas.
	The area is serviced by ENET infrastructure, with 4 ducts having been laid along Connolly Street, Main Street, Youghal Road and Saint Mary's Road. Further ducts follow the East Cork Parkway. EIR services are also present beneath these roads, and further extend into the adjacent areas below ground.

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envisioned as bankside walls would only be replaced.

Option Description	Environmental Effects	
	An extensive underground gas distribution system is present in the area, with gas mains located beneath the majority of roads in the study area.	
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.	
	The N25/ East Cork Parkway crosses through the middle of this area. This road is a vital commuter road to and from Cork City.	
A number of drainage networks are present in this area. A large network runs along Main Street, Distillery Walk and Church Lane; prior to c into the Owenacurra River. Another large network drains The Cotswolds, the R629 Road and Dark Road before discharging to the estuary. S networks are present along Bailick Road and through John F. Kennedy Memorial Park.		

Table 78 Area 3 – Resources and Waste

Option Description	Environmental Effects
OPTION 3A - Direct defences only	3,000m ³ import of material envisaged. No export of material.

Table 79 Area 3 – Cultural Heritage

Option Description	Environmental Effects
OPTION 3A - Direct defences only	Objective 3. F. (i)
	Lewis Bridge– Midleton Town
	Negative Effect: There would be a direct negative effect on the Lewis Bridge a Protected Structure (PS40; CO076-073002) by the construction of a 1m high wall which would tie into the bridge parapet upstream. The works would also have a negative visual effect on the bridge.
	Positive Effect: Proposed works would protect the bridge from damaging flood events. This would have a positive effect on its future preservation.
	Midleton House – Midleton Town
	Negative Effect: The setting of Midleton House (PS 51) on the north bank of the river would be altered by the construction of 1m high walls which would tie into the parapet of Lewis Bridge.
	Positive Effect: These works would protect the house and grounds from damaging flood events. This would have a positive effect on its future preservation.
	Midleton Distillery – Midleton Town
	Negative Effect: The setting of outbuilding (NIAH 20830064) which is part of the Midleton distillery complex (PS 1; CO076-025) would be altered by the construction of a 1m high wall adjacent to the south of the structure.
	Positive Effect: The wall would provide protection to the outbuilding and the distillery complex as a whole from damaging flood events and add to the security of the overall complex. This would have a positive effect on the future perseveration of the distillery complex.
	Quayside Warehouse - Bailick Road
	Negative Effect: There would be a direct negative effect on the curtilage/boundary walls of Quayside warehouse (PS00517; NIAH 20907624; CO076-111;).

Option Description	Environmental Effects
	Positive Effect: Proposed works would protect the boundary walls of the complex from damaging flood events. This would have a positive effect by securing its future preservation.
	Charleston Maltings – Bailick Road
	Negative Effect: There would be a direct negative effect on the curtilage/boundary walls of Charleston Maltings (PS00521; NIAH 20907627; CO076-074).
	Positive Effect: Proposed works would protect the boundary walls of the complex from damaging flood events. This would have a positive effect by securing its future preservation.
	Objective 3. F. (ii)
	Lewis Bridge– Midleton Town
	Negative Effect: There would be a direct negative effect on Lewis Bridge an RMP (CO076-073002; PS40) by the construction of a 1m high wall which would tie into the bridge parapet upstream. The works would also have a negative visual effect on the bridge.
	Positive Effect: These works would protect the bridge from damaging flood events. This would have a positive effect by securing its future preservation.
	Midleton Distillery – Midleton Town
	Negative Effect: The setting of outbuilding (NIAH 20830064) which is part of the Midleton distillery complex (CO076-025; PS1) would be altered by the construction of a 1m high wall adjacent to the south of the structure.
	Positive Effect: The wall would provide protection to the individual building and the distillery complex as a whole from damaging flood events and add to the security of the overall complex. This would have a positive effect by securing its future preservation.
	Quayside Warehouse - Bailick Road
	Negative Effect: There would be a direct negative effect on the curtilage/boundary walls Quayside warehouse an RMP (CO076-111; PS00517; NIAH 20907624)
	Positive Effect: Proposed works would protect the boundary walls of the complex from damaging flood events. This would have a positive effect by securing its future preservation.
	Charleston Maltings – Bailick Road
	Negative Effect: There would be a direct negative effect on the curtilage/boundary walls of Charlestown Maltings an RMP (CO076-074; PS00521; NIAH 20907627)
	Positive Effect: Proposed works would protect the boundary walls of the complex from damaging flood events. This would have a positive effect by securing its future preservation.
	Maltings – South Quay, Ballinacurra
	Negative Effect: The construction of a 0.8m wall to the north of the maltings an RMP (CO07-080) would have a direct negative effect on views to and from the building.
	Positive Effect: Proposed works would protect the maltings and grounds from damaging flood events. This would have a positive effect by securing its future preservation.
	Potential Subsurface Archaeological sites
	1

Option Description	Environmental Effects
	The construction of embankments; 0.6m, 0.8m and 1.2m high over a distance of approximately 650m could have a negative effect on potential subsurface archaeological sites and features.
	Areas of Archaeological Potential
	Proposed works would have a direct negative effect on three Areas of Archaeological Potential; Owenacurra River (AAP 1), Dungourney River (AAP 2) and Owenacurra Estuary (AAP 4).
	Cultural Heritage
	Negative Effect: There would be a direct negative effect on 19th century quays which are part of the cultural heritage of the Owenacurra Estuary and Ballinacurra and its former prominence as a major trading port. The setting of the quays would be altered by the construction of 1.2-1.3m high walls along the estuary.
	Positive Effect: Proposed works would protect the remains of quays from damaging flood events. This would have a positive effect by securing their future preservation.

Table 80 Area 3 – Landscape

Option Description	Environmental Effects
OPTION 3A - Direct defences only	There is a designated scenic route that runs across the Ballincurra Bridge in addition to several riverside walkway sections. There will be a loss of a corridor of mature woodland trees and division of woodland from northern 1m embankment section through People's Park.
	There will also be some potential loss of mature riverside trees due to the introduction of the north-western section of 0.7m high wall to the rear of the Funeral Home and resultant reduction of visual connection to river from road at northern end of this wall.
	There will be some intrusion on estuarine / river views to the south of the Cork Road (on Bailick Road) in the vicinity of the slipway resulting from new and raised walls sections.
	Embankment section of <1m have limited impacts throughout this option (e.g. Choctaw park, South Quays). Overall, this option was assigned a score of -1.

Table 81 Area 3 – Vulnerability to major accidents and/or disasters

Option Description	Environmental Effects	
OPTION 3A - Direct defences only	Presence of Upper Tier Seveso Establishment - Irish Distillers Ltd. Moderate reduction in the vulnerability of the study area to a major accident or disaster, i.e. fluvial flooding for Q100 and tidal flooding for T200.	

A.3 Area 4 – Lauriston & Rugby Club

Table 82 Area 4 – Population and Human Health

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	 This option would seek to protect the following features: 13 residential properties in the area and 5 non-residential properties. Midleton Rugby Club Midleton Cricket Club The proposed Midleton to Youghal Greenway The proposed Northern Relief Road Extension
OPTION 4B - Pumping and Direct Defences	As above
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	As above
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	As above
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	As above

Table 83 Area 4 – Biodiversity

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	No apparent impacts on Annexed habitats or species. Potential temporary disturbance to Wintering birds. However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity.
	The construction of the embankment would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats. Potential impacts on bats will need to be mitigated.
	No fisheries potential in this area.
	Some minor potential loss of existing vegetation where embankment runs adjacent to hedgerows and where it crosses proposed Greenway / Railway corridor.
OPTION 4B - Pumping and Direct Defences	No apparent impacts on Annexed habitats or species.
	The construction of the embankment would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats. Potential impacts on bats will need to be mitigated.
	No fisheries potential in this area.

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Option Description	Environmental Effects
	Some minor potential loss of existing vegetation where embankment runs adjacent to hedgerows and where it crosses proposed Greenway / Railway corridor.
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	No apparent impacts on Annexed habitats or species. Potential temporary disturbance to Wintering birds. However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity.
	The construction of the embankment would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats. Potential impacts on bats will need to be mitigated.
	No fisheries potential in this area.
	Minor potential loss of existing vegetation where embankment runs adjacent to hedgerows and where it crosses proposed Greenway / Railway corridor.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	No apparent impacts on Annexed habitats or species. Potential temporary disturbance to Wintering birds. However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity.
	The construction of the embankment would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats. Potential impacts on bats will need to be mitigated.
	No fisheries potential in this area.
	Minor potential loss of existing vegetation where embankment runs adjacent to hedgerows and where it crosses proposed Greenway / Railway corridor.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	No apparent impacts on Annexed habitats or species. Potential temporary disturbance to Wintering birds. However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity.
	The construction of the embankment would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats. Potential impacts on bats will need to be mitigated.
	No fisheries potential in this area.
	Potential loss of existing vegetation where embankment runs adjacent to hedgerows and Greenway, and where it crosses proposed Greenway / Railway corridor.

Table 84 Area 4 – Land and Soil

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	There is no significant likely impact associated with this option on Land and Soils.
OPTION 4B - Pumping and Direct Defences	There is no significant likely impact associated with this option on Land and Soils.
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	There is no significant likely impact associated with this option on Land and Soils.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	There is no significant likely impact associated with this option on Land and Soils.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	There is no significant likely impact associated with this option on Land and Soils.

Table 85 Area 4 – Hydrogeology

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	There is a potential for up-gradient groundwater flooding of the cut-off however there are limited sensitive receptors in this area and therefore it is not considered a significant impact.
OPTION 4B - Pumping and Direct Defences	There is a potential that the cut-off could lead to groundwater flooding in the IDL site due to increased water level along the northern boundary. The underlying clay confining the limestone may mean there is a good vertical cut-off but this would need to be confirmed. Considerable risk associated with this option.
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	There is a potential for up-gradient groundwater flooding of the cut-off however there are limited sensitive receptors in this area and therefore it is not considered a significant impact.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	There is a potential for up-gradient groundwater flooding of the cut-off however there are limited sensitive receptors in this area and therefore it is not considered a significant impact.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	There is a potential for up-gradient groundwater flooding of the cut-off however there are limited sensitive receptors in this area and therefore it is not considered a significant impact.

Table 86 Area 4 – Water

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	There are no significant potential impacts on water quality associated with this option. In channel works in the wet associated with flow control structure upgrade will have a temporary impact on water quality.
	This option will result in increased in-channel flows due to groundwater cut-off and restriction of the floodplain, this could result in an increase in-channel flow speeds during high flow events which could mobilise sediment leading to increased turbidity and sediment deposition downstream.
	Construction works will result in tree removal where the embankment is proposed. Clearance could destabilise and alter the land form which helps to protect the material from erosion, runoff and flow.
OPTION 4B - Pumping and Direct Defences	There are no significant potential impacts on water quality associated with this option. In channel works in the wet associated with flow control structure upgrade will have a temporary impact on water quality.
	It is outlined that outflows from the pumping station will not be directed to the river channel, but back upstream within the same floodplain. This crucially does not interfere with channel flows or morphology.
	Construction works will result in tree removal where the embankment is proposed. Clearance could destabilise and alter the land form which helps to protect the material from erosion, runoff and flow.
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	There are no significant potential impacts on water quality associated with this option. In channel works in the wet associated with flow control structure upgrade will have a temporary impact on water quality.
	This option will result in increased in-channel flows due to groundwater cut-off and restriction of the floodplain, this could result in an increase in-channel flow speeds during high flow events which could mobilise sediment leading to increased turbidity and sediment deposition downstream.
	Construction works will result in tree removal where the embankment is proposed. Clearance could destabilise and alter the land form which helps to protect the material from erosion, runoff and flow.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	There are no significant potential impacts on water quality associated with this option. In channel works in the wet associated with flow control structure upgrade will have a temporary impact on water quality.
	This option will result in increased in-channel flows due to groundwater cut-off and restriction of the floodplain, this could result in an increase in-channel flow speeds during high flow events which could mobilise sediment leading to increased turbidity and sediment deposition downstream.
	Construction works will result in tree removal where the embankment is proposed. Clearance could destabilise and alter the land form which helps to protect the material from erosion, runoff and flow.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	There are no significant potential impacts on water quality associated with this option. In channel works in the wet associated with flow control structure upgrade will have a temporary impact on water quality.

Option Description	Environmental Effects
	This option will result in increased in-channel flows due to groundwater cut-off and restriction of the floodplain, this could result in an increase in-channel flow speeds during high flow events which could mobilise sediment leading to increased turbidity and sediment deposition downstream.
	Construction works will result in tree removal where the embankment is proposed. Clearance could destabilise and alter the land form which helps to protect the material from erosion, runoff and flow.

Table 87 Area 4 – Air

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	Works removed from sensitive receptors and no significant extent of works.
OPTION 4B - Pumping and Direct Defences	Works removed from sensitive receptors and no significant extent of works.
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	Works removed from sensitive receptors and no significant extent of works.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	Works removed from sensitive receptors and no significant extent of works.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	Works removed from sensitive receptors and no significant extent of works.

Table 88 Area 4 – Climate

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	Minimal structures and embodied carbon.
OPTION 4B - Pumping and Direct Defences	Minimal structures and embodied carbon.
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Extent may be reduced should combination with Northern Relief Road Extension occur.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Extent may be reduced should combination with Northern Relief Road Extension occur.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.

Table 89 Area 4 – Material Assets

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct	No foul sewer or watermain infrastructure have been identified in the vicinity of this area.
Defences	Overhead powerlines are located on the north and south of the area. These run adjacent to the R627 and along the private road leading to Cahermone Castle respectively. A high voltage powerline runs through the IDL site but is not located near where works are proposed for this option.
	ENET records show that there is a Fibre Backhaul located on the south side of the area, which runs into Midleton south of the IDL site. There are also ENET cables below Connolly Street.
	Neither EIR nor Gas Networks Ireland services are recorded in this area.
	Land use in this area is predominantly agricultural, with the exception of the IDL site, which is industrialised. There are sports grounds located to the east and a small number of residential properties to the west.
	The construction of the Midleton to Youghal Greenway is ongoing in this area.
	The Northern Relief Road Extension would be constructed through this area, should the project be constructed.
OPTION 4B - Pumping and Direct Defences	No foul sewer or watermain infrastructure have been identified in the vicinity of this area.
	Overhead powerlines are located on the north and south of the area. These run adjacent to the R627 and along the private road leading to Cahermone Castle respectively. A high voltage powerline runs through the IDL site but is not located near where works are proposed for this option.
	ENET records show that there is a Fibre Backhaul located on the south side of the area, which runs into Midleton south of the IDL site. There are also ENET cables below Connolly Street.
	Neither EIR nor Gas Networks Ireland services are recorded in this area.
	Land use in this area is predominantly agricultural, with the exception of the IDL site, which is industrialised. There are sports grounds located to the east and a small number of residential properties to the west.
	The construction of the Midleton to Youghal Greenway is ongoing in this area.
	The Northern Relief Road Extension would be constructed through this area, should the project be constructed.
OPTION 4C-1 – Combined Design with	No foul sewer or watermain infrastructure have been identified in the vicinity of this area.
Embankment at Greenway Crossing	Overhead powerlines are located on the north and south of the area. These run adjacent to the R627 and along the private road leading to Cahermone Castle respectively. A high voltage powerline runs through the IDL site but is not located near where works are proposed for this option.
	ENET records show that there is a Fibre Backhaul located on the south side of the area, which runs into Midleton south of the IDL site. There are also ENET cables below Connolly Street.
	Neither EIR nor Gas Networks Ireland services are recorded in this area.

Option Description	Environmental Effects
	Land use in this area is predominantly agricultural, with the exception of the IDL site, which is industrialised. There are sports grounds located to the east and a small number of residential properties to the west.
	The construction of the Midleton to Youghal Greenway is ongoing in this area.
	The Northern Relief Road Extension would be constructed through this area, should the project be constructed.
OPTION 4C-2 – Combined Design with Flood	No foul sewer or watermain infrastructure have been identified in the vicinity of this area.
Barrier at Greenway Crossing	Overhead powerlines are located on the north and south of the area. These run adjacent to the R627 and along the private road leading to Cahermone Castle respectively. A high voltage powerline runs through the IDL site but is not located near where works are proposed for this option.
	ENET records show that there is a Fibre Backhaul located on the south side of the area, which runs into Midleton south of the IDL site. There are also ENET cables below Connolly Street.
	Neither EIR nor Gas Networks Ireland services are recorded in this area.
	Land use in this area is predominantly agricultural, with the exception of the IDL site, which is industrialised. There are sports grounds located to the east and a small number of residential properties to the west.
	The construction of the Midleton to Youghal Greenway is ongoing in this area.
	The Northern Relief Road Extension would be constructed through this area, should the project be constructed.
OPTION 4E - Groundwater Cut-offs and Direct	No foul sewer or watermain infrastructure have been identified in the vicinity of this area.
Defences along Greenway	Overhead powerlines are located on the north and south of the area. These run adjacent to the R627 and along the private road leading to Cahermone Castle respectively. A high voltage powerline runs through the IDL site but is not located near where works are proposed for this option.
	ENET records show that there is a Fibre Backhaul located on the south side of the area, which runs into Midleton south of the IDL site. There are also ENET cables below Connolly Street.
	Neither EIR nor Gas Networks Ireland services are recorded in this area.
	Land use in this area is predominantly agricultural, with the exception of the IDL site, which is industrialised. There are sports grounds located to the east and a small number of residential properties to the west.
	The construction of the Midleton to Youghal Greenway is ongoing in this area.
	The Northern Relief Road Extension would be constructed through this area, should the project be constructed.

Table 90 Area 4 – Resources and Waste

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	20,000m ³ import of material envisaged. No export of material.
OPTION 4B - Pumping and Direct Defences	700m ³ import envisaged. No export
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	20,000m ³ import of material envisaged. No export of material. Quantity of material required may be reduced should combination with Northern Relief Road Extension be progressed.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	15,000m ³ import of material envisaged. No export of material. Quantity of material required may be reduced should combination with Northern Relief Road Extension be progressed.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	40,000m ³ import of material envisaged. No export of material.

Table 91 Area 4 – Cultural Heritage

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct	Objective 3. F. (i)
Defences	Midleton Distillery
	Negative Effect: A proposed embankment, 1.6m high would have a direct impact on a section of a millrace associated with Midleton Distillery (PS 1; CO076-025).
	Cahermone Castle
	Negative Effect: There would be a limited negative visual effect on the setting of Cahermone Castle (PS 00855; CO076-027001) situated 200m to the east of a proposed 1.6m high embankment.
	Objective 3. F. (ii)
	Midleton Distillery
	Negative Effect: A proposed embankment, 1.6m high would have a direct impact on a section of a millrace associated with Midleton Distillery (CO076-025; PS 1). Cahermone Castle – Cahermone
	Negative Effect: There would be a limited negative visual effect on the setting of Cahermone Castle (CO076-027001; PS 00855) situated 200m to the east of a proposed 1.6m high embankment.
	Potential Subsurface Archaeological sites
	The construction of a 1.6m embankment over a distance of approximately 550m could have a negative effect on potential subsurface archaeological sites and features. A burnt mound (CO076-134) excavated in advance of development in 2007 is situated 150m to the west of the embankment and a fulacht fia (CO076-026) found during construction of gas pipeline in 1987 (unexcavated) is situated 110m to the southwest. Similar type subsurface archaeological sites may exist in this low-lying area.

Option Description	Environmental Effects
OPTION 4B - Pumping and Direct Defences	Objective 3. F. (i)
	There are no known/recorded architectural sites in the area of proposed works.
	Objective 3. F. (ii)
	There are no known/recorded archaeological sites in the area of proposed works. The proposed 1.6m high embankment would extend over a distance of approximately 35m, substantially less than Option 4A.
OPTION 4C-1 – Combined Design with	Objective 3. F. (i)
Embankment at Greenway Crossing	Midleton Distillery
	Negative Effect: A proposed embankment, 2.5m high would have an indirect impact on a section of a millrace associated with Midleton Distillery (PS 1; CO076-025). The flood defence embankment would not directly cross the millrace.
	Cahermone Castle
	Negative Effect: There would be a limited negative visual effect on the setting of Cahermone Castle (PS 00855; CO076-027001) situated 280m to the east of the proposed 2.5m high embankment.
	Objective 3. F. (ii)
	Midleton Distillery
	Negative Effect: A proposed embankment, 2.5m high would have an indirect impact on a section of a millrace associated with Midleton Distillery (CO076-025; PS 1). Cahermone Castle – Cahermone. The flood defence embankment would not directly cross the millrace.
	Negative Effect: There would be a limited negative visual effect on the setting of Cahermone Castle (CO076-027001; PS 00855) situated 280m to the east of a proposed 2.5m high embankment.
	Potential Subsurface Archaeological sites
	The construction of a 2.5m high embankment over a distance of approximately 600m could have a negative effect on potential subsurface archaeological sites and features. A burnt mound (CO076-134) excavated in advance of development in 2007 is situated 80m to the west of the embankment and a fulacht fia (CO076-026) found during construction of gas pipeline in 1987 (unexcavated) is situated in close proximity to the south. Similar type subsurface archaeological sites may exist in this low-lying area.
OPTION 4C-2 – Combined Design with Flood	Objective 3. F. (i)
Barrier at Greenway Crossing	Midleton Distillery
	Negative Effect: A proposed embankment, 2.5m high would have an indirect impact on a section of a millrace associated with Midleton Distillery (PS 1; CO076-025). The flood defence embankment would not directly cross the millrace.
	Cahermone Castle
	Negative Effect: There would be a limited negative visual effect on the setting of Cahermone Castle (PS 00855; CO076-027001) situated 280m to the east of the proposed 2.5m high embankment.

Option Description	Environmental Effects
	Objective 3. F. (ii)
	Midleton Distillery
	Negative Effect: A proposed embankment, 2.5m high would have an indirect impact on a section of a millrace associated with Midleton Distillery (CO076-025; PS 1). Cahermone Castle – Cahermone. The flood defence embankment would not directly cross the millrace.
	Negative Effect: There would be a limited negative visual effect on the setting of Cahermone Castle (CO076-027001; PS 00855) situated 280m to the east of a proposed 2.5m high embankment.
	Potential Subsurface Archaeological sites
	The construction of a 2.5m high embankment over a distance of approximately 600m could have a negative effect on potential subsurface archaeological sites and features. A burnt mound (CO076-134) excavated in advance of development in 2007 is situated 80m to the west of the embankment and a fulacht fia (CO076-026) found during construction of gas pipeline in 1987 (unexcavated) is situated in close proximity to the south. Similar type subsurface archaeological sites may exist in this low-lying area.
OPTION 4E - Groundwater Cut-offs and Direct	Objective 3. F. (i)
Defences along Greenway	Midleton Distillery
	Negative Effect: A proposed embankment, 3.1m high would have an indirect impact on a section of a millrace associated with Midleton Distillery (PS 1; CO076-025). The flood defence embankment would not directly cross the millrace.
	Cahermone Castle
	Negative Effect: There would be a limited negative visual effect on the setting of Cahermone Castle (PS 00855; CO076-027001) situated 280m to the east of the proposed 3.1m high embankment.
	Objective 3. F. (ii)
	Midleton Distillery
	Negative Effect: A proposed embankment, 3.1m high would have an indirect impact on a section of a millrace associated with Midleton Distillery (CO076-025; PS 1). Cahermone Castle – Cahermone. The flood defence embankment would not directly cross the millrace.
	Negative Effect: There would be a limited negative visual effect on the setting of Cahermone Castle (CO076-027001; PS 00855) situated 280m to the east of a proposed 3.1m high embankment.
	Potential Subsurface Archaeological sites
	The construction of a 3.1m high embankment over a distance of approximately 600m could have a negative effect on potential subsurface archaeological sites and features. A burnt mound (CO076-134) excavated in advance of development in 2007 is situated 80m to the west of the embankment and a fulacht fia (CO076-026) found during construction of gas pipeline in 1987 (unexcavated) is situated in close proximity to the south. Similar type subsurface archaeological sites may exist in this low-lying area.

Table 92 Area 4 – Landscape

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP. There is also a proposed Greenway along the disused railway corridor. This sensitivity rating applies to all options.
	There will be some minor potential loss of existing vegetation where the embankment runs adjacent to hedgerows and where it crosses the proposed Greenway / Railway corridor.
OPTION 4B - Pumping and Direct Defences	There will be some very minor potential loss of existing vegetation where the embankment crosses the proposed Greenway / Railway corridor. There will also be a minor visual impact from the pumping station within the rugby club grounds.
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP. There is also a proposed Greenway along the disused railway corridor. This sensitivity rating applies to all options.
	There will be some minor potential loss of existing vegetation where the embankment runs adjacent to hedgerows and where it crosses the proposed Greenway / Railway corridor.
	It should be noted that the Northern Relief Road Extension may already cause the loss of visual amenity should that project progress, and a combination of schemes may reduce the overall impact, as opposed to the two schemes being constructed within close proximity of each other.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP. There is also a proposed Greenway along the disused railway corridor. This sensitivity rating applies to all options.
	There will be some minor potential loss of existing vegetation where the embankment runs adjacent to hedgerows and where it crosses the proposed Greenway / Railway corridor.
	It should be noted that the Northern Relief Road Extension may already cause the loss of visual amenity should that project progress, and a combination of schemes may reduce the overall impact, as opposed to the two schemes being constructed within close proximity of each other.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP. There is also a proposed Greenway along the disused railway corridor. This sensitivity rating applies to all options.
	There will be some significant potential loss of existing vegetation where the embankment runs adjacent to hedgerows and the Greenway, and where it crosses the proposed Greenway / Railway corridor.

Table 93 Area 4 – Vulnerability to major accidents and/or disasters

Option Description	Environmental Effects
OPTION 4A - Groundwater Cut-off and Direct Defences	Presence of Upper Tier Seveso Establishment - Irish Distillers Ltd. Moderate reduction in the vulnerability of the study area to a major accident or disaster, i.e. fluvial flooding for Q100 and tidal flooding for T200.
OPTION 4B - Pumping and Direct Defences	Presence of Upper Tier Seveso Establishment - Irish Distillers Ltd. Moderate increase in the vulnerability of the study area to a major accident or disaster: Potential for Groundwater Flooding in IDL due to embankment underflow. Although flooding occurred within IDL site during 2015/2016 event, it is unclear if it was groundwater flooding. It may have been mitigated due to natural barrier in the form of the low permeability clays under the gravels or due to IDL groundwater control infrastructure
OPTION 4C-1 – Combined Design with Embankment at Greenway Crossing	Presence of Upper Tier Seveso Establishment - Irish Distillers Ltd. Moderate reduction in the vulnerability of the study area to a major accident or disaster, i.e. fluvial flooding for Q100 and tidal flooding for T200.
OPTION 4C-2 – Combined Design with Flood Barrier at Greenway Crossing	Presence of Upper Tier Seveso Establishment - Irish Distillers Ltd. Moderate reduction in the vulnerability of the study area to a major accident or disaster, i.e. fluvial flooding for Q100 and tidal flooding for T200.
OPTION 4E - Groundwater Cut-offs and Direct Defences along Greenway	Presence of Upper Tier Seveso Establishment - Irish Distillers Ltd. Moderate reduction in the vulnerability of the study area to a major accident or disaster, i.e. fluvial flooding for Q100 and tidal flooding for T200.

A.4 Area 5 – Ballinacurra

Table 94 Area 5 – Population and Human Health

Option Description	Environmental Effects
OPTION 5A - Direct Defences	This option would seek to protect the following features:30 residential properties in the area and 9 non-residential properties.Rainbow Montessori
OPTION 5B - Upstream Storage	As above
OPTION 5B-1 – Refined Storage Area and Overpumping	As above
OPTION 5C – Optimised Direct Defences and Overpumping	As above
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	As above

Table 95 Area 5 – Biodiversity

Option Description	Environmental Effects
OPTION 5A - Direct Defences	Due to in-stream works, there is a potential for short-term or intermittent impediment to the achievement of waterbody objectives.
	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures.
	Short-term minor impacts to fisheries habitat in a non-sensitive waterbody. Potential impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated. Potential localised loss of or disturbance to flora/fauna limited by the already modified nature of the channel.
	The construction of the walls and embankments would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats.
OPTION 5B - Upstream Storage	Due to in-stream works, there is a potential for medium-term or recurring impediment to the achievement of waterbody objectives due to minor channel realignment works.
	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity.
	Short-term minor impacts to fisheries habitat in a non-sensitive waterbody. Potential impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated. Potential localised loss of or disturbance to flora/fauna limited by the already modified nature of the channel.
	The construction of the walls and embankments would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats.

Option Description	Environmental Effects
OPTION 5B-1 – Refined Storage Area and Overpumping	Due to in-stream works, there is a potential for medium-term or recurring impediment to the achievement of waterbody objectives due to minor channel realignment works.
	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity.
	Short-term minor impacts to fisheries habitat in a non-sensitive waterbody. Potential impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated. Potential localised loss of or disturbance to flora/fauna limited by the already modified nature of the channel.
	The construction of the walls and embankments would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats.
	This area would require a significant amount of in-stream works for the construction of the embankments. The reduction in water quality would likely adversely affect Fisheries Habitats downstream during the construction. Mitigation measures would be required.
OPTION 5C – Optimised Direct	Due to in-stream works, there is a potential for short-term or intermittent impediment to the achievement of waterbody objectives.
Defences and Overpumping	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures.
	Short-term minor impacts to fisheries habitat in a non-sensitive waterbody. Potential impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated. Potential localised loss of or disturbance to flora/fauna limited by the already modified nature of the channel.
	The construction of the walls and embankments would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats.
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	Due to in-stream works, there is a potential for medium-term or recurring impediment to the achievement of waterbody objectives due to minor channel realignment works.
	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity.
	Short-term minor impacts to fisheries habitat in a non-sensitive waterbody. Potential impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated. Potential localised loss of or disturbance to flora/fauna limited by the already modified nature of the channel.
	The construction of the walls and embankments would require the removal of trees in some areas. This would likely negatively impact on bat and bird habitats.

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Table 96 Area 5 – Land and Soil

Option Description	Environmental Effects
OPTION 5A - Direct Defences	There is no significant likely impact associated with this option on Land and Soils.
OPTION 5B - Upstream Storage	Potential minor impact on soil quality associated with recurring flooding in the storage areas including the potential for the deposition of fines (silt and clay) on the land and dis-improvement in the soil drainage and productivity as a result. This area is however already prone to flooding and the soil quality is relatively poor as a result.
OPTION 5B-1 – Refined Storage Area and Overpumping	Potential minor impact on soil quality associated with recurring flooding in the storage areas including the potential for the deposition of fines (silt and clay) on the land and dis-improvement in the soil drainage and productivity as a result. This area is however already prone to flooding and the soil quality is relatively poor as a result.
OPTION 5C – Optimised Direct Defences and Overpumping	There is no significant likely impact associated with this option on Land and Soils.
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	Potential minor impact on soil quality associated with recurring flooding in the storage areas including the potential for the deposition of fines (silt and clay) on the land and dis-improvement in the soil drainage and productivity as a result. This area is however already prone to flooding and the soil quality is relatively poor as a result.

Table 97 Area 5 – Hydrogeology

Option Description	Environmental Effects
OPTION 5A - Direct Defences	There is no significant likely impact associated with this option on hydrogeology.
OPTION 5B - Upstream Storage	There is no significant likely impact associated with this option on hydrogeology.
OPTION 5B-1 – Refined Storage Area and Overpumping	There is no significant likely impact associated with this option on hydrogeology.
OPTION 5C – Optimised Direct Defences and Overpumping	There is no significant likely impact associated with this option on hydrogeology.
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	There is no significant likely impact associated with this option on hydrogeology.

Table 98 Area 5 – Water

Option Description	Environmental Effects
OPTION 5A - Direct Defences	No significant and permanent potential impacts on water quality. In-channel works could lead to temporary construction impacts on water quality.
	Due to the tightly constrained area, these defences will be placed onto or close to the riverbank, requiring in-channel structures if they do not already exist. However, since this portion is already heavily modified, replacements of floodwalls may not necessarily decrease the hydromorphological status of the waterbody.
	Channel realignment works also have the potential to cause in-channel damage to morphology (e.g. by utilising in-channel structures during construction which damage the riverbed) and ecology (e.g. by potentially removing valuable invertebrate assemblages and utilised fish spawning areas that could contain eggs or recently hatched fish). However, this is a relatively limited extent therefore potential impact is limited.
OPTION 5B - Upstream	No significant impact on water quality as a result of proposed option. In-channel works could lead to temporary construction impacts on water quality.
Storage	Flow control structure could impede sediment transport and reduce light over a stretch of the channel. This would also alter the natural hydromorphology.
	Channel realignment works also have the potential to cause in-channel damage to morphology (e.g. by utilising in-channel structures during construction which damage the riverbed) and ecology (e.g. by potentially removing valuable invertebrate assemblages and utilised fish spawning areas that could contain eggs or recently hatched fish). However, this is a relatively limited extent therefore potential impact is limited.
OPTION 5B-1 – Refined	No significant impact on water quality as a result of proposed option. In-channel works could lead to temporary construction impacts on water quality.
Storage Area and Overpumping	Flow control structure could impede sediment transport and reduce light over a stretch of the channel. This would also alter the natural hydromorphology.
	Channel realignment works also have the potential to cause in-channel damage to morphology (e.g. by utilising in-channel structures during construction which damage the riverbed) and ecology (e.g. by potentially removing valuable invertebrate assemblages and utilised fish spawning areas that could contain eggs or recently hatched fish). However, this is a relatively limited extent therefore potential impact is limited.
OPTION 5C – Optimised	No significant and permanent potential impacts on water quality. In-channel works could lead to temporary construction impacts on water quality.
Direct Defences and Overpumping	Due to the tightly constrained area, these defences will be placed onto or close to the riverbank, requiring in-channel structures if they do not already exist. However, since this portion is already heavily modified, replacements of floodwalls may not necessarily decrease the hydromorphological status of the waterbody.
	Channel realignment works also have the potential to cause in-channel damage to morphology (e.g. by utilising in-channel structures during construction which damage the riverbed) and ecology (e.g. by potentially removing valuable invertebrate assemblages and utilised fish spawning areas that could contain eggs or recently hatched fish). However, this is a relatively limited extent therefore potential impact is limited.
OPTION 5D – Optimised	No significant and permanent potential impacts on water quality. In-channel works could lead to temporary construction impacts on water quality.
Direct Defences, Upstream Storage and Overpumping	Due to the tightly constrained area, these defences will be placed onto or close to the riverbank, requiring in-channel structures if they do not already exist. However, since this portion is already heavily modified, replacements of floodwalls may not necessarily decrease the hydromorphological status of the waterbody.
	Channel realignment works also have the potential to cause in-channel damage to morphology (e.g. by utilising in-channel structures during construction which damage the riverbed) ecology (e.g. by potentially removing valuable invertebrate assemblages and utilised fish spawning areas that could contain eggs or recently hatched fish). However, this is a relatively limited extent therefore potential impact is limited.
	Flow control structure could impede sediment transport and reduce light over a stretch of the channel. This would also alter the natural hydromorphology.

Table 99 Area 5 – Air

Option Description	Environmental Effects
OPTION 5A - Direct Defences	Potential for significant temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors.
OPTION 5B - Upstream Storage	Potential for significant temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors. Extent is less with this option, as works would predominantly occur away from residential areas.
OPTION 5B-1 – Refined Storage Area and Overpumping	Potential for significant temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors. Extent is less with this option, as works would predominantly occur away from residential areas.
OPTION 5C – Optimised Direct Defences and Overpumping	Potential for significant temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors.
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	Potential for significant temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors.

Table 100 Area 5 – Climate

Option Description	Environmental Effects
OPTION 5A - Direct Defences	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.
OPTION 5B - Upstream Storage	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.
OPTION 5B-1 – Refined Storage Area and Overpumping	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Operation of pumping station would also result in the indirect generation of carbon emissions.
OPTION 5C – Optimised Direct Defences and Overpumping	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Operation of pumping station would also result in the indirect generation of carbon emissions.
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Operation of pumping station would also result in the indirect generation of carbon emissions.

Table 101 Area 5 – Material Assets

Option Description	Environmental Effects
OPTION 5A - Direct Defences	Foul sewer and watermain infrastructure are present along Lower Road and Upper Road, with connections to residential properties and businesses in Ballinacurra. A watermain is present along Geragh Road, without a foul sewer.
	Low and medium power (38kV and 110kV) power lines are present underground in some locations. These are primarily along Upper Road and Rose Lane. An extensive network of overhead cables runs through the area, covering Upper Road, Lower Road, Geragh Road, Rocky Road and Bailick Road. Overhead cables are also located through many of the agricultural fields to the east of Ballinacurra.
	No ENET or EIR services have been identified in this area.
	An extensive network of underground gas mains is present throughout the urban section of the scheme area. These cover most roads, with the exception of Geragh Road east of Kearney's Cross and South Quay Road. A gas compressor station is located to the south, approximately 800m from the area.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
OPTION 5B - Upstream Storage	Foul sewer and watermain infrastructure are present along Lower Road and Upper Road, with connections to residential properties and businesses in Ballinacurra. A watermain is present along Geragh Road, without a foul sewer.
	Low and medium power (38kV and 110kV) power lines are present underground in some locations. These are primarily along Upper Road and Rose Lane. An extensive network of overhead cables runs through the area, covering Upper Road, Lower Road, Geragh Road, Rocky Road and Bailick Road. Overhead cables are also located through many of the agricultural fields to the east of Ballinacurra.
	No ENET or EIR services have been identified in this area.
	An extensive network of underground gas mains is present throughout the urban section of the scheme area. These cover most roads, with the exception of Geragh Road east of Kearney's Cross and South Quay Road. A gas compressor station is located to the south, approximately 800m from the area.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
OPTION 5B-1 – Refined Storage Area and Overpumping	Foul sewer and watermain infrastructure are present along Lower Road and Upper Road, with connections to residential properties and businesses in Ballinacurra. A watermain is present along Geragh Road, without a foul sewer.
	Low and medium power (38kV and 110kV) power lines are present underground in some locations. These are primarily along Upper Road and Rose Lane. An extensive network of overhead cables runs through the area, covering Upper Road, Lower Road, Geragh Road, Rocky Road and Bailick Road. Overhead cables are also located through many of the agricultural fields to the east of Ballinacurra.
	No ENET or EIR services have been identified in this area.
	An extensive network of underground gas mains is present throughout the urban section of the scheme area. These cover most roads, with the exception of Geragh Road east of Kearney's Cross and South Quay Road. A gas compressor station is located to the south, approximately 800m from the area.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
OPTION 5C – Optimised Direct Defences and Overpumping	Foul sewer and watermain infrastructure are present along Lower Road and Upper Road, with connections to residential properties and businesses in Ballinacurra. A watermain is present along Geragh Road, without a foul sewer.

Option Description	Environmental Effects
	Low and medium power (38kV and 110kV) power lines are present underground in some locations. These are primarily along Upper Road and Rose Lane. An extensive network of overhead cables runs through the area, covering Upper Road, Lower Road, Geragh Road, Rocky Road and Bailick Road. Overhead cables are also located through many of the agricultural fields to the east of Ballinacurra.
	No ENET or EIR services have been identified in this area.
	An extensive network of underground gas mains is present throughout the urban section of the scheme area. These cover most roads, with the exception of Geragh Road east of Kearney's Cross and South Quay Road. A gas compressor station is located to the south, approximately 800m from the area.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	Foul sewer and watermain infrastructure are present along Lower Road and Upper Road, with connections to residential properties and businesses in Ballinacurra. A watermain is present along Geragh Road, without a foul sewer.
	Low and medium power (38kV and 110kV) power lines are present underground in some locations. These are primarily along Upper Road and Rose Lane. An extensive network of overhead cables runs through the area, covering Upper Road, Lower Road, Geragh Road, Rocky Road and Bailick Road. Overhead cables are also located through many of the agricultural fields to the east of Ballinacurra.
	No ENET or EIR services have been identified in this area.
	An extensive network of underground gas mains is present throughout the urban section of the scheme area. These cover most roads, with the exception of Geragh Road east of Kearney's Cross and South Quay Road. A gas compressor station is located to the south, approximately 800m from the area.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.

Table 102 Area 5 – Resources and Waste

Option Description	Environmental Effects
OPTION 5A - Direct Defences	2,000m ³ import envisaged. No export of material.
OPTION 5B - Upstream Storage	8,000m ³ import envisaged. No export of material.
OPTION 5B-1 – Refined Storage Area and Overpumping	4,000m ³ import envisaged. No export of material.
OPTION 5C – Optimised Direct Defences and Overpumping	2,000m ³ import envisaged. No export of material.
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	3,000m ³ import envisaged. No export of material.

Limited

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Table 103 Area 5 – Cultural Heritage

Option Description	Environmental Effects
OPTION 5A - Direct Defences	Objective 3. F. (i)
	There are no known/recorded architectural sites in the area of proposed works.
	Negative Effect: Direct impact on five features of architectural/cultural heritage note (CHS 18-CHS 22) identified by the Underwater Survey.
	Positive Effect: The proposed works would increase the level of protection from flooding for architectural sites included in RPS and NIAH to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Objective 3. F. (ii)
	There are no known/recorded archaeological sites in the area of proposed works.
	Positive Effect: The proposed works would increase the level of protection from flooding for archaeological sites included in the RMP to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Potential Subsurface Archaeological sites
	The construction of a 0.9m high embankment over a distance of approximately 250m could have a negative effect on potential subsurface archaeological sites and features.
	Area of Archaeological Potential
	Proposed works would have a direct negative effect on the Ballinacurra River which has been assessed as an Area of Archaeological Potential (AAP 3).
	Cultural Heritage
	Negative Effect: This Option would have a direct negative effect on five Cultural Heritage Sites identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These consist of the following;
	CHS 18: Wall of coursed roughly squared limestone up to 2m in height and 0.3m in width.
	CHS 19: Culvert beneath Lower Road
	CHS 20: Culvert beneath Lower Road
	CHS 21 - Canalised section of the Ballinacurra river with well-preserved walls 1.5m in height
	CHS 22 – Causeway/bridge
OPTION 5B - Upstream Storage	Objective 3. F. (i)
	There are no known/recorded architectural sites in the area of proposed works.
	Positive Effect: The proposed works would increase the level of protection from flooding for architectural sites included in RPS and NIAH to the south of the river in the village of Ballinacurra and would also increase the level of protection on five features of architectural/cultural heritage note (CHS 18-CHS 22) identified by the Underwater Survey. This would have a positive effect by securing their future preservation.
	Objective 3. F. (ii)

Cork County Council

Option Description	Environmental Effects
	Fulacht fia – Castleredmond
	Negative Effect: Fulacht fia (CO076-064) adjacent to a proposed 2m high embankment. The site was partially excavated in 1982. The remainder of the site may be preserved in situ following minor changes to the embankment location.
	Burial – Coppingerstown
	Negative Effect: The site of burial in a stone-lined cist (CO076-052) situated in a proposed storage area. The burial was excavated in 1961 and therefore removed and preserved by record.
	Castle - Coppingerstown
	Negative Effect: The construction of a 1.3m high embankment could have a negative visual effect on a tower house (CO076-051) situated to north.
	Positive Effect: The proposed works would increase the level of protection from flooding for archaeological sites included in the RMP to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Potential Subsurface Archaeological sites
	The construction of three embankments; 0.6m high, 1.3m high and 2m high over a distance of approximately 1.1km could have a negative effect on potential subsurface archaeological sites and features.
	Area of Archaeological Potential
	Proposed works would have a direct negative effect on a small section of the Ballinacurra River which has been assessed as an Area of Archaeological Potential (AAP 3).
	Cultural Heritage
	Positive Effect: Proposed works would increase the level of protection from flooding on five cultural heritage features identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These consist of the following;
	CHS 18: Wall of coursed roughly squared limestone up to 2m in height and 0.3m in width.
	CHS 19: Culvert beneath Lower Road
	CHS 20: Culvert beneath Lower Road
	CHS 21 - Canalised section of the Ballinacurra river with well-preserved walls 1.5m in height
	CHS 22 – Causeway/bridge
OPTION 5B-1 – Refined Storage	Objective 3. F. (i)
Area and Overpumping	There are no known/recorded architectural sites in the area of proposed works.
	Positive Effect: The proposed works would increase the level of protection from flooding for architectural sites included in RPS and NIAH to the south of the river in the village of Ballinacurra and would also increase the level of protection on five features of architectural/cultural heritage note (CHS 18-CHS 22) identified by the Underwater Survey. This would have a positive effect by securing their future preservation.
	Objective 3. F. (ii)

Option Description	Environmental Effects
	Fulacht fia – Castleredmond
	Positive Effect: Fulacht fia (CO076-064) downstream of 1.9m high embankment. The site was partially excavated in 1982. The remainder of the site may be preserved in situ following minor changes to the embankment location.
	Burial – Coppingerstown
	Negative Effect: The site of burial in a stone-lined cist (CO076-052) situated in a proposed storage area. The burial was excavated in 1961 and therefore removed and preserved by record.
	Castle - Coppingerstown
	Negative Effect: The construction of a 0.5m high embankment could have a negative visual effect on a tower house (CO076-051) situated to north.
	Positive Effect: The proposed works would increase the level of protection from flooding for archaeological sites included in the RMP to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Potential Subsurface Archaeological sites
	The construction of four embankments; 0.4m high, 1.9m high, 0.5m high and 1.4m high over a distance of approximately 0.5km could have a negative effect on potential subsurface archaeological sites and features.
	Area of Archaeological Potential
	Proposed works would have a direct negative effect on a small section of the Ballinacurra River which has been assessed as an Area of Archaeological Potential (AAP 3).
	Cultural Heritage
	Positive Effect: Proposed works would increase the level of protection from flooding on five cultural heritage features identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These consist of the following;
	CHS 18: Wall of coursed roughly squared limestone up to 2m in height and 0.3m in width.
	CHS 19: Culvert beneath Lower Road
	CHS 20: Culvert beneath Lower Road
	CHS 21 - Canalised section of the Ballinacurra river with well-preserved walls 1.5m in height
	CHS 22 – Causeway/bridge
OPTION 5C – Optimised Direct	Objective 3. F. (i)
Defences and Overpumping	There are no known/recorded architectural sites in the area of proposed works.
	Negative Effect: Direct impact on five features of architectural/cultural heritage note (CHS 18-CHS 22) identified by the Underwater Survey.
	Positive Effect: The proposed works would increase the level of protection from flooding for architectural sites included in RPS and NIAH to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Objective 3. F. (ii)

Cork County Council

Option Description	Environmental Effects
	There are no known/recorded archaeological sites in the area of proposed works.
	Positive Effect: The proposed works would increase the level of protection from flooding for archaeological sites included in the RMP to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Potential Subsurface Archaeological sites
	The construction of a 0.9m high embankment over a distance of approximately 250m could have a negative effect on potential subsurface archaeological sites and features.
	Area of Archaeological Potential
	Proposed works would have a direct negative effect on the Ballinacurra River which has been assessed as an Area of Archaeological Potential (AAP 3).
	Cultural Heritage
	Negative Effect: This Option would have a direct negative effect on five Cultural Heritage Sites identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These consist of the following;
	CHS 18: Wall of coursed roughly squared limestone up to 2m in height and 0.3m in width.
	CHS 19: Culvert beneath Lower Road
	CHS 20: Culvert beneath Lower Road
	CHS 21 - Canalised section of the Ballinacurra river with well-preserved walls 1.5m in height
	CHS 22 – Causeway/bridge
OPTION 5D – Optimised Direct	Objective 3. F. (i)
Defences, Upstream Storage and Overpumping	There are no known/recorded architectural sites in the area of proposed works.
o terpamping	Negative Effect: Direct impact on four features of architectural/cultural heritage note (CHS 18,19,21 and 22) identified by the Underwater Survey.
	Positive Effect: The proposed works would increase the level of protection from flooding for architectural sites included in RPS and NIAH to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Objective 3. F. (ii)
	Fulacht fia – Castleredmond
	Positive Effect: Fulacht fia (CO076-064) downstream of 1.1m high embankment. The site was partially excavated in 1982. The remainder of the site may be preserved in situ following minor changes to the embankment location.
	Burial – Coppingerstown
	Negative Effect: The site of burial in a stone-lined cist (CO076-052) situated in a proposed storage area. The burial was excavated in 1961 and therefore removed and preserved by record.
	Castle - Coppingerstown
	Negative Effect: The construction of a 1.0m high embankment could have a negative visual effect on a tower house (CO076-051) situated to north.

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Option Description	Environmental Effects
	Positive Effect: The proposed works would increase the level of protection from flooding for archaeological sites included in the RMP to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Positive Effect: The proposed works would increase the level of protection from flooding for archaeological sites included in the RMP to the south of the river in the village of Ballinacurra. This would have a positive effect by securing their future preservation.
	Potential Subsurface Archaeological sites
	The construction of a 0.9m high embankment over a distance of approximately 250m could have a negative effect on potential subsurface archaeological sites and features.
	Area of Archaeological Potential
	Proposed works would have a direct negative effect on the Ballinacurra River which has been assessed as an Area of Archaeological Potential (AAP 3).
	Cultural Heritage
	Negative Effect: This Option would have a direct negative effect on four Cultural Heritage Sites identified in the Underwater Survey (O'Donoghue and Haskins, 2020). These consist of the following;
	CHS 18: Wall of coursed roughly squared limestone up to 2m in height and 0.3m in width.
	CHS 19: Culvert beneath Lower Road
	CHS 21 - Canalised section of the Ballinacurra river with well-preserved walls 1.5m in height
	CHS 22 – Causeway/bridge

Table 104 Area 5 – Landscape

Option Description	Environmental Effects
OPTION 5A - Direct Defences	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP. There is also a designated scenic route that runs across the Ballincurra Bridge. This applies to all scheme options.
	There will be a very minor intrusion on river views for local residents at Gearagh Road from increased height of walls and bridge parapets. There will also be some minor visual impacts arising from the above ground elements of the pumping stations.
OPTION 5B - Upstream Storage	There will be a potential loss of hedgerow and treeline vegetation and associated visual impact from 2m and 1.3m high embankments around retention area. There will be minor visual impacts from above ground elements of the pumping stations.
OPTION 5B-1 – Refined Storage Area and Overpumping	There will be a potential loss of hedgerow and treeline vegetation and associated visual impact from 1.9m and 1.4m high embankments around retention area. There will be minor visual impacts from above ground pumping stations. The extents would be more limited than Option 5B.
OPTION 5C – Optimised Direct Defences and Overpumping	There will be a very minor intrusion on river views for local residents at Gearagh Road from increased height of walls and bridge parapets. There will also be some minor visual impacts arising from the above ground pumping stations.

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Option Description	Environmental Effects
OPTION 5D – Optimised Direct Defences, Upstream Storage and	There will be a very minor intrusion on river views for local residents at Gearagh Road from increased height of walls and bridge parapets. There will also be some minor visual impacts arising from the above ground pumping stations.
Overpumping	There will be a potential loss of hedgerow and treeline vegetation and associated visual impact from 1.1m and 1.0m high embankments around retention area. There will be minor visual impacts from above ground pumping stations.

Table 105 Area 5 - Vulnerability to major accidents and/or disasters

Option Description	Environmental Effects
OPTION 5A - Direct Defences	No impact to the vulnerability of the study area to a major accident or disaster.
OPTION 5B - Upstream Storage	No impact to the vulnerability of the study area to a major accident or disaster.
OPTION 5B-1 – Refined Storage Area and Overpumping	No impact to the vulnerability of the study area to a major accident or disaster.
OPTION 5C – Optimised Direct Defences and Overpumping	No impact to the vulnerability of the study area to a major accident or disaster.
OPTION 5D – Optimised Direct Defences, Upstream Storage and Overpumping	No impact to the vulnerability of the study area to a major accident or disaster.

A.5 Area 6 – Water Rock to Dwyer's Rd

Table 106 Area 6 – Population and Human Health

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	This option would seek to protect the following features:9 residential properties in the area and 5 non-residential properties.Gaelscoil Mhainistir Na Corann
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	As above
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	As above
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	As above

Table 107 Area 6 – Biodiversity

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	This area would require in-stream works for the construction of the embankments and the flow control structure upstream. Short-term or intermittent impediment to the achievement of waterbody objectives. Flow diversion is considered limited impact as will only be operational in extreme flood events. Potential impact from in-channel works
	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity. This will be a requirement for control of water quality during construction using suitable mitigation measures.
	Potential localised loss of low value biodiversity areas.
	Short-term minor impacts to non-sensitive waterbody of low fisheries value.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	This area would require in-stream works for the construction of the embankments and the flow control structure upstream. Short-term or intermittent impediment to the achievement of waterbody objectives. Flow diversion is considered limited impact as will only be operational in extreme flood events. Potential impact from in-channel works
	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity. This will be a requirement for control of water quality during construction using suitable mitigation measures.
	Potential localised loss of low value biodiversity areas.
	Short-term minor impacts to non-sensitive waterbody of low fisheries value.

Limited

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Option Description	Environmental Effects
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	This area would require in-stream works for the construction of the embankments and the flow control structure upstream. Short-term or intermittent impediment to the achievement of waterbody objectives. Flow diversion is considered limited impact as will only be operational in extreme flood events. Potential impact from in-channel works
	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity. This will be a requirement for control of water quality during construction using suitable mitigation measures.
	Potential localised loss of low value biodiversity areas. Long lengths of new open channel may facilitate new biodiversity opportunities however.
	Short-term minor impacts to non-sensitive waterbody of low fisheries value.
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct	Permanent impediment to the achievement of waterboady objectives. Change in channel hydromorphology where the Water Rock stream emerges would see an open channel replace a section of the natural stream, in a new alignment.
Defences	No apparent impacts on Annexed habitats or species. However there may be potential temporary disturbance to Wintering birds. However this can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds given the existing level of farming activity. This will be a requirement for control of water quality during construction using suitable mitigation measures.
	Potential localised loss of low value biodiversity areas. Long lengths of new open channel may facilitate new biodiversity opportunities however.
	Permanent loss or removal of fisheries habitat within non sensitive watercourse due to channel realignment and introduction of short lengths of culverts.

Table 108 Area 6 – Land and Soil

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	No significant impacted expected for Land and Soils with the proposed option.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	No significant impacted expected for Land and Soils with the proposed option.
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	No significant impacted expected for Land and Soils with the proposed option.
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	No significant impacted expected for Land and Soils with the proposed option.

Table 109 Area 6 – Hydrogeology

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	There is a potential reduction in groundwater flooding due to diversion of flood waters to the Owenacurra however there remains some uncertainty on the hydrogeological processes and hydraulic connection between the swallow hole and spring as dye tracing experiments have not proved conclusive. As such the beneficial impact is scored as relatively minor, residual groundwater flooding issues may persist at the spring outlet.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	There is a potential reduction in groundwater flooding due to diversion of flood waters to the Owenacurra however there remains some uncertainty on the hydrogeological processes and hydraulic connection between the swallow hole and spring as dye tracing experiments have not proved conclusive. As such the beneficial impact is scored as relatively minor, residual groundwater flooding issues may persist at the spring outlet.
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	There is a potential reduction in groundwater flooding due to diversion of flood waters to the Owenacurra however there remains some uncertainty on the hydrogeological processes and hydraulic connection between the swallow hole and spring as dye tracing experiments have not proved conclusive. As such the beneficial impact is scored as relatively minor, residual groundwater flooding issues may persist at the spring outlet.
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	There is a potential reduction in groundwater flooding due to diversion of flood waters to the Water Rock Stream downstream of springs, however there remains some uncertainty on the hydrogeological processes and hydraulic connection between the swallow hole and spring as dye tracing experiments have not proved conclusive. As such the beneficial impact is scored as relatively minor, residual groundwater flooding issues may persist at the spring outlet.

Table 110 Area 6 – Water

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	Flow diversion is considered limited impact as will only be operational in extreme events. Water volumes are not expected to be large enough to cause significant sediment erosion at the confluence of the culverted diversion into the Owenacurra River.
	The upgrades in this option to embankments are not expected to alter the hydromorphological status of the river.
	Temporary potential impact on water quality from in-channel works during construction.
	Culvert existing open channel at the WWTP is a potential permanent impact on channel morphology, however this, plus the upgradient embankment will prevent water quality impacts on the SAC by limiting the potential for flooding of wastewater during storm events.
	Construction works could result in tree removal where the embankment is proposed. Clearance could destabilise and alter the form of the bank which helps to protect the material from erosion, runoff and flow.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	Flow diversion is considered limited impact as will only be operational in extreme events. Water volumes are not expected to be large enough to cause significant sediment erosion at the confluence of the culverted diversion into the Owenacurra River.
	The upgrades in this option to embankments are not expected to alter the hydromorphological status of the river.
	Temporary potential impact on water quality from in-channel works during construction.

Option Description	Environmental Effects
	Culvert existing open channel at the WWTP is a potential permanent impact on channel morphology, however this, plus the upgradient embankment will prevent water quality impacts on the SAC by limiting the potential for flooding of wastewater during storm events.
	Construction works could result in tree removal where the embankment is proposed. Clearance could destabilise and alter the form of the bank which helps to protect the material from erosion, runoff and flow. This option would discharge directly into a floodplain.
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct	Flow diversion is considered limited impact as will only be operational in extreme events. Water volumes are not expected to be large enough to cause significant sediment erosion at the confluence of the culverted diversion into the Owenacurra River.
Defences	The upgrades in this option to embankments are not expected to alter the hydromorphological status of the river.
	Temporary potential impact on water quality from in-channel works during construction.
	Culvert existing open channel at the WWTP is a potential permanent impact on channel morphology, however this, plus the upgradient embankment will prevent water quality impacts on the SAC by limiting the potential for flooding of wastewater during storm events.
	Construction works could result in tree removal where the embankment is proposed. Clearance could destabilise and alter the form of the bank which helps to protect the material from erosion, runoff and flow.
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	Flow diversion is considered limited impact as will only be operational in extreme events. Water volumes are not expected to be large enough to cause significant sediment erosion at the confluence of the culverted diversion into the Water Rock Stream downstream of the spring outlet.
	The upgrades in this option to embankments are not expected to alter the hydromorphological status of the river.
	Temporary potential impact on water quality from in-channel works during construction.
	Culvert existing open channel at the WWTP is a potential permanent impact on channel morphology, however this, plus the upgradient embankment will prevent water quality impacts on the SAC by limiting the potential for flooding of wastewater during storm events.
	Construction works could result in tree removal where the embankment is proposed. Clearance could destabilise and alter the form of the bank which helps to protect the material from erosion, runoff and flow.

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Table 111 Area 6 – Air

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	Potential for temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	Potential for temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors.
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	Potential for temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors.
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	Potential for temporary adverse noise impacts during the construction phase due to works occurring in close proximity to residential receptors.

Table 112 Area 6 – Climate

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.

Table 113 Area 6 – Material Assets

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	An Irish Rail railway line runs through this area. The East Cork Parkway is present in this area. This road connects commuters to Cork City. Watermains are present throughout North Point Business Park, with one notably located between the business park and the railway line to the south. Another notable watermain is currently present underneath Castle Rock Avenue. A network of foul sewers run throughout the southern parts of the scheme area, through the agricultural lands adjacent to Water Rock Stream. These connect to the Midleton Wastewater Treatment Plant (WWTP) in the area. As part of the Lihaf project, a storm culvert and foul sewer are proposed in this area. A rising main is also being proposed by Irish Water as part of the Midleton Wastewater Load Diversion project.

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Option Description	Environmental Effects
	Low and medium power (38kV and 110kV) power lines are present underground in this area. They are present throughout North Point Business Park, the L3619 Road and along the East Cork Parkway, south of the road. They are also noted in the WWTP and along the railway line. Overhead power lines are present in the area, predominantly through the agricultural land.
	ENET ducts are present along the East Cork Parkway and Cork Road.
	EIR services are present in North Point Business Park and on both sides of the East Cork Parkway at the WWTP.
	Gas mains are present underground throughout the area, servicing the business park and residential areas.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
	Drainage infrastructure is present along The Green, Cork Road and Millbrook Crescent. Another drainage system is located through Europa Business Park, which discharges to Water Rock Stream south of the East Cork Parkway.
OPTION 6B – Flood Diversion Culvert South of	An Irish Rail railway line runs through this area.
Railway	The East Cork Parkway is present in this area. This road connects commuters to Cork City.
	Watermains are present throughout North Point Business Park, with one notably located between the business park and the railway line to the south. Another notable watermain is currently present underneath Castle Rock Avenue. A network of foul sewers run throughout the southern parts of the scheme area, through the agricultural lands adjacent to Water Rock Stream. These connect to the Midleton Wastewater Treatment Plant (WWTP) in the area. As part of the Lihaf project, a storm culvert and foul sewer are proposed in this area. A rising main is also being proposed by Irish Water as part of the Midleton Wastewater Load Diversion project.
	Low and medium power (38kV and 110kV) power lines are present underground in this area. They are present throughout North Point Business Park, the L3619 Road and along the East Cork Parkway, south of the road. They are also noted in the WWTP and along the railway line. Overhead power lines are present in the area, predominantly through the agricultural land.
	ENET ducts are present along the East Cork Parkway and Cork Road.
	EIR services are present in North Point Business Park and on both sides of the East Cork Parkway at the WWTP.
	Gas mains are present underground throughout the area, servicing the business park and residential areas.
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.
	Drainage infrastructure is present along The Green, Cork Road and Millbrook Crescent. Another drainage system is located through Europa Business Park, which discharges to Water Rock Stream south of the East Cork Parkway.
OPTION 6C - Flood Diversion Channel (bypassing	An Irish Rail railway line runs through this area.
Cave System) and Direct Defences	The East Cork Parkway is present in this area. This road connects commuters to Cork City.
	Low and medium power (38kV and 110kV) power lines are present underground in this area. They are noted in the WWTP and along the railway line. Overhead power lines are present in the area, predominantly through the agricultural land.
	ENET ducts are present along the East Cork Parkway and Cork Road.

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Option Description	Environmental Effects	
	EIR services are present on both sides of the East Cork Parkway at the WWTP.	
	Gas mains are present underground throughout the area, servicing the business park and residential areas.	
	Land use and ownership in the area varies significantly. There is a mixture of public, private, residential, commercial and recreational land in this area.	

Table 114 Area 6 – Resources and Waste

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	1,500m ³ import of material envisaged. 6,000m ³ export of material envisaged.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	1,500m ³ import of material envisaged. 6,000m ³ export of material envisaged.
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	1,500m ³ import of material envisaged. 7,000m ³ export of material envisaged.
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	1,500m ³ import of material envisaged. 8,000m ³ export of material envisaged.

Table 115 Area 6 – Cultural Heritage

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct	Objective 3. F. (i)
Defences	There are no known/recorded architectural sites in the area of proposed works.
	Objective 3. F. (ii)
	There are no known/recorded archaeological sites in the area of proposed works.
	The closest recorded archaeological sites to the proposed works are;
	A section of the Claidh Buidhe (CO076-092), a linear earthwork which forms the townland boundary between Water-rock and Baneshane.
	A limekiln (CO076-018) in the townland of Water-Rock. The site is situated 50m to the west of a proposed culverted flood diversion (1.8m wide by 2.4m deep). The construction of the culvert would have no direct effect on the limekiln.
	Potential Subsurface Archaeological sites
	The construction of embankment 2.3m high, over a distance of approximately 236m could have a negative effect on potential subsurface archaeological sites and features. In addition, the construction of a culverted and open flood diversion channels over a distance of approximately 1.2km could have a negative effect on potential subsurface archaeological sites and features.
	Area of Archaeological Potential
	Proposed works would have a direct negative effect on small sections of the Water Rock Stream, an Area of Archaeological Potential.

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Option Description	Environmental Effects							
OPTION 6B-1 - Flood Diversion Culvert South of	Objective 3. F. (i)							
Railway and Direct Defences	There are no known/recorded architectural sites in the area of proposed works.							
	Objective 3. F. (ii)							
	There are no known/recorded archaeological sites in the area of proposed works.							
	The closest recorded archaeological sites to the proposed works are;							
	A section of the Claidh Buidhe (CO076-092), a linear earthwork which forms the townland boundary between Water-rock and Baneshane.							
	A limekiln (CO076-018) in the townland of Water-Rock. The site is situated 50m to the west of a proposed culverted flood diversion (2m wide by 2m deep). The construction of the culvert would have no direct effect on the limekiln.							
	Potential Subsurface Archaeological sites							
	The construction of embankment 2.3m high, over a distance of approximately 236m could have a negative effect on potential subsurface archaeological sites and features. In addition, the construction of a culverted and open flood diversion channels over a distance of approximately 1.26km could have a negative effect on potential subsurface archaeological sites and features.							
	Area of Archaeological Potential							
	Proposed works would have a direct negative effect on small sections of the Water Rock Stream, an Area of Archaeological Potential.							
OPTION 6B-2 - Flood Diversion Channel/Culvert	Objective 3. F. (i)							
South of Railway and Direct Defences	There are no known/recorded architectural sites in the area of proposed works.							
	Objective 3. F. (ii)							
	There are no known/recorded archaeological sites in the area of proposed works.							
	The closest recorded archaeological sites to the proposed works are;							
	A section of the Claidh Buidhe (CO076-092), a linear earthwork which forms the townland boundary between Water-rock and Baneshane.							
	A limekiln (CO076-018) in the townland of Water-Rock. The site is situated 50m to the west of a proposed culverted flood diversion (1.8m wide by 2.4m deep). The construction of the culvert would have no direct effect on the limekiln.							
	Potential Subsurface Archaeological sites							
	The construction of embankment 2.3m high, over a distance of approximately 236m could have a negative effect on potential subsurface archaeological sites and features. In addition, the construction of a culverted and open flood diversion channels over a distance of approximately 1.26km could have a negative effect on potential subsurface archaeological sites and features.							
	Area of Archaeological Potential							
	Proposed works would have a direct negative effect on small sections of the Water Rock Stream, an Area of Archaeological Potential.							

Option Description	Environmental Effects
OPTION 6C - Flood Diversion Channel (bypassing	Objective 3. F. (i)
Cave System) and Direct Defences	There are no known/recorded architectural sites in the area of proposed works.
	Objective 3. F. (ii)
	There are no known/recorded archaeological sites in the area of proposed works.
	The closest recorded archaeological sites to the proposed works are;
	A section of the Claidh Buidhe (CO076-092), a linear earthwork which forms the townland boundary between Water-rock and Baneshane. The earthwork is situated to the west of a proposed culvet in the townland of Baneshane. The construction of the culvert would have no direct effect on the Claidh Buidhe.
	A limekiln (CO076-018) in the townland of Water-Rock.
	Potential Subsurface Archaeological sites
	The construction of embankment 2.3m high, over a distance of approximately 236m could have a negative effect on potential subsurface archaeological sites and features. In addition, the construction of a culverted and open flood diversion channels over a distance of approximately 1.4km could have a negative effect on potential subsurface archaeological sites and features.
	Area of Archaeological Potential
	Proposed works would have a direct negative effect on small sections of the Water Rock Stream, an Area of Archaeological Potential.

Table 116 Area 6 – Landscape

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP.
	There will be a very minor loss of vegetation in the immediate vicinity of open channel and culvert construction corridors There will also be some very localised loss of vegetation from the 'S' shaped 1.3m high embankment upstream of the WwTP.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP.
	There will be a very minor loss of vegetation in the immediate vicinity of open channel and culvert construction corridors. There will also be some very localised loss of vegetation from the 'S' shaped 1.3m high embankment upstream of the WwTP.
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP.
	There will be a very minor loss of vegetation in the immediate vicinity of open channel and culvert construction corridors. There will also be some very localised loss of vegetation from the 'S' shaped 1.3m high embankment upstream of the WwTP.

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Option Description	Environmental Effects
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	This landscape setting has been assigned a local sensitivity rating of 4 on the basis that it is Designated as a High value Landscape (HVL) in the Cork CDP.
	There will be a very minor loss of vegetation in the immediate vicinity of open channel and culvert construction corridors. There will also be some very localised loss of vegetation from the 'S' shaped 1.3m high embankment upstream of the WwTP.

Table 117 Area 6 - Vulnerability to major accidents and/or disasters

Option Description	Environmental Effects
OPTION 6A - Flood Diversion Channel and Direct Defences	No impact to the vulnerability of the study area to a major accident or disaster.
OPTION 6B-1 - Flood Diversion Culvert South of Railway and Direct Defences	No impact to the vulnerability of the study area to a major accident or disaster.
OPTION 6B-2 - Flood Diversion Channel/Culvert South of Railway and Direct Defences	No impact to the vulnerability of the study area to a major accident or disaster.
OPTION 6C - Flood Diversion Channel (bypassing Cave System) and Direct Defences	No impact to the vulnerability of the study area to a major accident or disaster.

Appendix B Multi-Criteria Analysis Summary

Core Criteria	Objective	Sub objective	Code		Local Weighting	Local Weighting Rationale	OF	PTION 1&2A - Direct Defences and Conveyance improvements		OPTION 1&2B - Direct defences only		OPTION 1&2C - Upstream Storage and Direct Defences Note
						(to be based on calculated						
						assessment adjusted by						
	Minimise risk to human health and life - residents	(i) Minimise risk to human health and life residents	1.A.(i)	0	0	professional judgement)	5	Option to provide full protection from design flood risk 0	5	Option to provide full protection from design flood risk 0	5	Option to provide full protection from design flood risk 0
						(to be based on calculated						
	Minimise risk to human health and life - high vulnerability properties	(ii) Minimise risk to high vulnerability properties	1.A.(ii)	0	0	assessment adjusted by professional judgement)	5	Option to provide full protection from design flood risk 0	5	Option to provide full protection from design flood risk	5	Option to provide full protection from design flood risk
	Tumerability properties	(in minimum risk to high functionity properties	20 0(1)	0				option to provide rail protection norm design nood have		option to provide tail protection noin design nood have		option to provide rail protection norm design hood have
						A Golf course, Midleton Health Centre, My Place (Community						
						Centre), a library, Market Green						
						and a Garda Station are at risk from flooding within the affected						
	Minimise risk to community - social infrastructure and		1.0 (1)		-	area. Important area of industry						
	amenity		1.B.(i)	10	5	and social infrastructure. Important area of local	5	Option to provide full protection from design flood risk 250	5	Option to provide full protection from design flood risk 250	5	Option to provide full protection from design flood risk 250
						employment with a large number						
						of non-residential (i.e., commercial) properties at risk						
						including SuperValu, Maxol						
						Service Station, Midleton Community Hospital and a large						
						number of commercial properties						
						(Shops, Restaurants and Pubs) on Main Street and south of the Rail						
	Minimise risk to community - local employment		1.B.(ii)	10	5	Line	5	Option to provide full protection from design flood risk 250	5	Option to provide full protection from design flood risk 250	5	Option to provide full protection from design flood risk 250
-												
Socie												
												Based on feedback from PPD Option 1C received a net of 13 positive responses, Option 2C received a net of 15
												positive responses. Resulting in a total net of 28
												positive responses received. There was a number of written responses received after the PPD2 (9) which
												were strongly opposed to this option. Accounting for
								Based on feedback from PPD Option 1A received a net		Based on feedback from PPD Option 1B received a net		these responses the total net of positive responses is reduced to 19 made up of 30 positive responses and 11
								of 11 positive responses, Option 2A received a net of 5		of 5 positive responses, Option 2B received a net of 4		negative ones.
								positive responses. Resulting in a total net of 16 positive responses received.		positive responses. Resulting in a total net of 9 positive responses received.		Majority of submissions in favour of the option versus
								positive responses received.		responses received.		those against. Public perception is that the option is
	Minimica project delivery risk by consideration of social	Ensure flood risk management option is socially acceptable				Considered to be an important		Significantly greater number of submissions in favour of the option versus those against. Public perception of		Significantly greater number of submissions in favour of the option versus those against. Public perception of		acceptable but there is significant opposition. Project delivery risk identified, possible significant delays to the
	acceptability of option	to public	1.C	15	5	factor in this area	5	option is very positive. No project delivery risk. 375	5	option is very positive. No project delivery risk. 375	0	programme for statutory consent process. 0
								Option requires the removal of Moores Bridge and the provision of an alternative access route, there is some				A delivery risk to the option being considered has been
								opposition to this from some local residents.				identified in the area of the proposed storage area.
								Minimal delivery risk to the option being considered –				Most impacted landowners are in favour of the option however there is some vocal opposition. In the
		Minimise impact on private landowners who are not at risk	c					most impacted landowners are in favour of the option		No delivery risk to the option being considered – all		professional judgement of the Steering committee, a
	Minimise project delivery risk by consideration of the proportionality of option on impacted community	of flooding but who may be adversely affected during construction and operation of scheme	1.D	15	5	Considered to be an important factor in this area	3	with limited opposition, as per the feedback received to date. 225	5	impacted landowners are in favour of the option as per the feedback received to date 375	1	way forward through statutory consent process is deemed to be viable with limited delays. 75
		Provide opportunities for additional social infrastructure						Option incorporates/ facilitates the proposed Linear Park and pedestrian/ cycle scheme from Midleton to		Option incorporates/ facilitates the proposed Linear Park and pedestrian/ cycle scheme from Midleton to		Option incorporates/ facilitates the proposed Linear Park and pedestrian/ cycle scheme from Midleton to
		and amenity. Promote health and well being. Enhance						Ballinacurra, these projects have a wider societal value		Ballinacurra, these projects have a wider societal value		Ballinacurra, these projects have a wider societal value
	Maximise wider benefit of project	opportunities for local investment. Catalyst for regeneration of area.	1.E	10	5	Considered to be an important factor in this area	3	which will have a very significant positive impact on local health and well being. 225	3	which will have a very significant positive impact on local health and well being. 225	3	which will have a very significant positive impact on local health and well being. 225
				60				Social Score 1325		Social Score 1475		Social Score 800
	Reduce economic damages	Minimise economic risk	2.A	24	5	AAD for the SSA/€75000 A number of key transport routes	5	Option to provide full protection from design flood risk 600	5	Option to provide full protection from design flood risk 600	5	Option to provide full protection from design flood risk 600
						are at risk including the R626 in						
į						several locations, Main Street and the Midleton to Cork Rail						
nonc	Minimise risk to transport infrastructure	Minimise risk to transport infrastructure	2.B	10	5	Line	5	Option to provide full protection from design flood risk 250	5	Option to provide full protection from design flood risk 250	5	Option to provide full protection from design flood risk 250
Ect						Considered to be an important						
	Minimise risk to utilities infrastructure	Minimise risk to utilities infrastructure	2.C	14	5	area for utility services and assets	5	Option to provide full protection from design flood risk 350	5	Option to provide full protection from design flood risk 350	5	Option to provide full protection from design flood risk 350
						Considered to be of Minor / Local						
						importance. Small area of						
						Agricultural land adjacent to the Waterrock Golf Course on the left		No increase in the negative impact of flooding on		No increase in the negative impact of flooding on		Proposed storage area will impact the agricultural land during flood events. Proposed embankments to retain
	Manage risk to agriculture	Minimise risk to agriculture	2.D	12	2	bank of the Owenacurra	0	agricultural production 0	0	agricultural production 0	-3	water may also have a temporary negative impact72
				60				Economic Score 1200		Economic Score 1200		Economic Score 1128
								In shannal deadains could directly investigated in the				
								In channel dredging could directly impact invertebrate habitat in the channel. There is also the potential				
								impact on the change in sediment flux over time to the				
								d/s SAC of which "Maintain/Restore Natural Circulation of sediments" is a conservation objective for the				Flow control structure and especially Realignent of
		Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement				Constant and equal to 5, as per TMN Option Appraisal and MCA		Atlantic Salt Marsh. May require sediment transport modelling to confirm magnitude, duration and extent of		Limited in-channel works and no realignment but d/s		River d/s of Storage area with the loss of sinusiodal meanders would be a significiant impact on WFD
	Support the objectives of the WFD	of water body objectives	3.A	15	5	Sept 2018	-4	impact on sediment flux -300	-2	SAC with CO relating to sediment conservation -150	-5	objectives -375

	Support the objectives of the Habitats and Birds Directives	Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones.	3.B	9	5	There are two European sites located adjacent to the general study area: Great Island Channel SAC (Site code 001058) Cork Harbour SPA (Site code 004030). The Great Island Channel SAC is designated for the presence of two QIs; Mudflats and sandflats not covered by seawater at low tide [1140] Atlantic salt meadows (Glauco- Puccinellietalia maritimae) [1330]. Cork Harbour SPA is designated for 23 SCIs and Wetlands. This MCA has regard to Article 6, Artice 10 and Article	-2	The FRS does not present the possibility of direct impacts at this stage on any qualifying habitat. The overall effects of changes in sediment dynamics in the estuary area either from accretion or will be addressed at the ELRR stage. The potential for indirect impacts from sediment release or pollutants from construction phase works can be avoided or ameliorated with suitable mitigation measures. Salmon are Annex II species and while not a QI for the SAC, their ecology is related to good status water quality and they are considered further in 3D below. Otters, Bats and Lamprey are Annex IV species and indirect impacts on water quality and fish as food sources would need to be mitigated. The score is marginally lower for this option given the potential for instream works to present a greater impact downstream on the estuarine habitat,	-90	-1	The FRS does not present the possibility of direct impacts at this stage on any qualifying habitat. The overall effects of changes in sediment dynamics in the estuary area either from accretion or will be addressed at the ELRA stage. The potential for indirect impacts from sediment release or pollutants from construction phase works can be avoided or ameliorated with suitable mitigation measures. Salmon are Annex II species and while not a QI for the SAC, their ecology is related to good status water quality and they are considered further in 3D below. Otters, Bats and Lamprey are Annex IV species and indirect impacts on water quality and fish as food sources would need to be mitigated.	-120
	Avoid damages to, and where possible enhance, the flora and fauna of the catchment	Avoid damage to, and where possible enhance, legally protected sites / habitats and other sites / habitats of national, regional and local nature conservation importance	3.C	4	5	Presence of Fish (Salmonids, Lamprey, Eels) Otters and Bats. Otters and Lamprey species are Habitat Directive Annexed species. These areas support habitats for Otters and the presence of salmonids as food sources is important. The presence of an number of species of bats is also a driving factor in these areas.	-5	Potential localised loss of or disturbance to flora/fauna. Potential Impacts on Fish (Salmonids, Lamprey, Eels) Otters and Bats will need to be mitigated. Suitable mitigation measures are technically feasible. The score is marginally lower for this option given the potential for instream works to present a greater impact downstream on the estuarine habitat including salt marsh.	-100	-4	Potential localised loss of or disturbance to flora/fauna. Potential Impacts on Fish (Salmonids, Lamprey, Eels) Otters and Bats will need to be mitigated. Suitable mitigation measures are technically feasible.	-120
	Protect and where possible enhance fisheries resource within the catchment	Maintain existing and where possible create new fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species	3.D	10	3	Presence of Fish (Salmonids, Lamprey, Eels) and Otters. Otters and Lamprey species are Habitat Directive Annexed species. The water courses are of regional value for fishing/angling.	-5	Medium to long-term alteration of fisheries habitat in senstive wb due to proposed walls that will require excavation and restoration of banks. Potential Impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated. The score is marginally higher for this option given the potential for instream works to present a greater impact downstream on fish species in a wider area.	-150	-4	Medium to long-term alteration of fisheries habitat in senstive wb due to proposed walls that will require excavation and restoration of banks. Potential Impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated.	-120
Environmental	Protect, and where possible enhance, landscape character and visual amenity within the river corridor/zone of influence.	Protect, and where possible enhance, visual amenity, landscape protection zones and views into/from designated scenic areas in the river corridor/zone of influence	3.E	7	4	Designated as a High value Landscape (HVL) in the Cork CDP. Aspirational Riverside Walkway also shown on CDP maps	-1	1A - Provision of 1.1m embankment upstream of northern bridge and walls downstream of southern bridge will result in the loss of some dense riparian vegetation and minor loss of visual connection to River for dwellings on opposite side of the road. Northwestern 1.2m embankment will not result in material loss or residential visual amenity in direction of Water Rock Golf Course nor will 0.4m unduly interupt river views in same estate. Consolidation of bridges to housing estates will be beneficial and replacement of existing northern bridge of little consequence to landscape character / views. Loss of mature riparian vegetation and riverside visual amenity for several houses due to conveyance works. 2A - Loss of some riparian vegetation due to new walls, but this will potentially open up views of the river for dwellings adjacent to southernmost sections. Provision of the Millrace a potential enhancement of amenity views from adjacent houses. Bridge removal will reduce clutter and confusing adjacent relationship with the main bridge.	-28	-1	1B - Provision of 2m embankment upstream of northern bridge and walls downstream of southern bridge will result in the loss of some dense riparian vegetation and visual connection to river for dwellings on opposite side of the road. Northwestern 1.2m embankment will not result in material loss or residential visual amenity in direction of Water Rock Golf Course nor will 0.4m unduly interupt river views in same estate. Bridges to housing estates will be remain visually complex. 2B - Loss of some riparian vegetation due to new walls, but this will potentially open up views of the river for dwellings adjacent to southernmost sections. Provision of the Millrace a potential enhancement of amenity views from adjacent houses.	-28
	Avoid damage to or loss of features, institutions, and collections of cultural heritage importance and their setting and improve their protection from extreme floods	(i) Avoid damage to or loss of features, institutions and collections of architectural value and their setting and improve their protection from extreme floods where this is beneficial	3.F.(i)	4	2	Based on the number and type of recorded arcitectural features in the area and professional judgment	-2	Direct impact on one NIAH structure; Cork Bridge (NIAH 20830013; RMP CO076-106). Direct Impact on the setting of Clonmullin House (NIAH 20906519). Direct Impact on mill complex (RMP CO076-112). Increased level of protection from flooding for architectural features included in RPS and NIAH	-16	-2	Direct impact on one NIAH structure; Cork Bridge (NIAH 20830013; RMP CO076-106). Direct Impact on the setting of Clonmullin House (NIAH 20906519). Direct impact on mill complex (RMP CO076-112). Increased level of protection from flooding for architectural features included in RPS and NIAH	-16
	Avoid damage to or loss of features, institutions, and collections of cultural heritage importance and their setting and improve their protection from extreme floods	(ii) Avoid damage to or loss of features, institutions and collections of archaeological value and their setting and improve their protection from extreme floods where this is beneficial	3.F.(ii)	4	2	Based on the number and type of recorded archaeological features in the area and professional judgment	-3	Direct Impact on two RMPs; Cork Bridge (CO076-106; NIAH 20830013) and Mill Complex (CO076-112). The construction of a wall will have a direct impact on two features associated with the Mill Complex identified in the Underwater Survey, a substantial wall (CHS 12) and a section of a tailrace (CHS 14). Direct impact on eight additional cultural heritage features (CHS04, 05, 06, 07, 08, 09, 10 and 11) identified by Underwater Survey. Direct Impact on Carrigogna Bridge depicted on the OS 1st edition map (1841). Direct impact on Owenacurra River (AAP 1), greater impact than other options due to dredging. Increased level of protection from flooding for archaeological sites included in RMP	-24	-2	Direct Impact on two RMPs; Cork Bridge (C0076-106; NIAH 20830013) and Mill Complex (C0076-112). The construction of a wall will have a direct impact on two features associated with the Mill Complex identified in the Underwater Survey, a substantial wall (CHS 12) and a section of a tailrace (CHS 14). Direct impact on eight additional cultural heritage features (CHS04, 05, 06, 07, 08, 09, 10 and 11) identified by Underwater Survey. Direct impact on Owenacurra River (AAP 1). Increased level of protection from flooding for archaeolgical sites included in RMP	-16
	Protect land, soil and bedrock and improve their protection from extreme floods Avoid changes to hydrogeology	Avoid damage to or erosion of land, soil and solid geology, and improve their protection from extreme floods Avoid changes to hydrogeology	3G 3H	1	2	(by professional judgement, taking account of local advice) Regionally important aquifer	-1	Potential localised loss of land, soil and geology: loss of alluvial sediments with channel widening and deepening No impact on existing national, regional and local aquifers, groundwater dependent ecosystems or groundwater resource as a result of flood risk management measures.	-1	0	No impact on existing national, regional and local geological sites and no impact on land, soil and geology as a result of flood risk management measures. No impact on existing national, regional and local aquifers, groundwater dependent ecosystems or groundwater resource as a result of flood risk management measures.	0
	Avoid negative impact on air Avoid measures which would increase the rate of climate change	Avoid measures which would have a negative impact on air and, if possible, adopt measures which would improve air Avoid measures which would increase the rate of climate change and, if possible, adopt measures which would reduce the rate climate change	31	1	4	500+ dwellings and presence of habitats and species designated as of national importance Constant and equal to 5, as per Midleton FRS MCA Framework Modification Note, March 2021	-3	Potential for significant temporary adverse noise impacts during the construction phase due to works occuring in close proximity to residenital receptors. Also potential for odour impacts during dredging. Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions.	-12 -10	-3	Embodied carbon associated with the proposed structures will result in the indirect generation of	-12 -10

The FRS does not present the possibility of direct impacts at this stage on any qualifying habitat. The overall effects of changes in sediment dynamics in the estuary area either from accretion or will be addressed at the EIAR stage. The potential for indirect impacts from sediment release or pollutants from construction phase works can be avoided or ameliorated with suitable mitigation measures. Salmon are Annex II species and while not a QI for the SAC, their ecology is related to good status water quality and they are considered further in 3D below. Otters, Bats and Lamprey are Annex IV species and indirect impacts on water quality and fish as food sources would need to be mitigated.	-45
Potential localised loss of or disturbance to flora/fauna. Potential Impacts on Fish (Salmonids, Lamprey, Eels) Otters and Bats will need to be mitigated. Suitable mitigation measures are technically feasible. Footprint is less than Option 1&28.	-60
Permanent loss or removal of fisheries habitat due to channel realignment d/s of storage area. Potential Impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated.	-150
1C - Blocking of southern end of designated scenic route S43 by roadside 3m embankment as well as amenity countryside/river views of several houses on opposite side of the road will result in a potentially significant impact. The southern leg of the same embankment also serves to truncate the river corridor and reduce borrowed views across golf course from housing estate to the southeast. Potential loss of mature treeline vegetation from two 3m high embankments to the northwest of the golf course. Reduced river views within golf course from 0.7m embankment. Provision of 2m embankment east of golf course will result in the loss of some dense riparian vegetation and visual connection to river for dwellings on opposite side of the road. 2C - Loss of some riparian vegetation due to new walls, but this will potentially open up views of the river for dwellings adjacent to southermost sections. Provision of the Millace a potential enhancement of amenity views from adjacent houses.	-84
Direct impact on one NIAH structure; Cork Bridge (NIAH 20830013; RMP CO076-106). Direct impact on mill complex (RMP CO076-112). Increased level of protection from flooding for architectural features included in RPS and NIAH	-16
Direct Impact on two RMPs; Cork Bridge (CO076-106; NIAH 20830013) and Mill Complex (CO076-112). The construction of a wall will have a direct impact on two features associated with the Mill Complex identified in the Underwater Survey, a substantial wall (CHS 12) and a section of a tailrace (CHS 14). Direct impact on three additional cultural heritage features (CHS 09, 10 and 11) identified by Underwater Survey. Direct impact on Owenacurra River (AAP 1). Increased level of protection from flooding for archaeological sites included in RMP	-16
Potential localised loss of land, soil and geology: Impact on soil quality associated with recurring flooding in storage area, potential for increasing fines and disimprovement of drainage quality	-1
potential to induce groundwater flooding on adjacent land with flooding of storage area (underflow) through the gravels underlying this area.	-4
Greater separation from sensitive receptors for this option. Embodied carbon associated with the proposed circuitors will could be be indirect appropriate of	-4
structures will result in the indirect generation of carbon emissions.	-10

			_	-								
		Minimise waste generation. Where materials are				Waste management considered		Generation of wastes (dredging) which are suitable for				
	Minimise waste generation	generated their reuse should be incorporated into the scheme where possible.	зк	1	5	to be relevant to all construction projects	-1	recovery or disposal and for which capacity exists within the region5	0	Generation of quantities of wastes in line with current industry practice	n	0
		into the scheme where possible.	31	1	5	projects	-1		0	industry practice	0	0
	Avoid increasing the vulnerability of the study area to	Avoid increasing the vulnerability of the study area to				No presence of high vulnerability		No impact on the vulnerability of the study area to a		No impact on the vulnerability of the study area to a		
	major accidents or disasters	major accidents or disasters	3L	1 60	0	establishments	0	major accident or disaster 0 Environmental Score -736	0	major accident or disaster Central Score	0 -592	0
				00								
	Ensure flood risk management options are operationally robust	Ensure flood risk management options are operationally robust	4.A.	20	5	Constant and equal to 5, as per TMN Option Appraisal and MCA Sept 2018	3	Some operational risk, potential maintenance dredging requirements. This option has a greater operational risk than Option 1&28 and the score should be reduced accordingly relative to Option 1&28 300 Very low to low residual risk, i.e. - Increased conveyance where maintenance required, failure of which would result in localised or minor flooding - Direct defences option, failure of which would result in localised or minor flooding - Decrease in residual risk due to conveyance	4	Some operational risk exists, e.g. non return valves/ pump stations	400	-1
	Minimise risk of failure of option	Minimise risk of failure of option	4.B	15	5	Midleton FRS MCA Framework Modification Note, March 2021	2	improvements and removal/replacement of bridge structures 150	1	- Direct defences option, failure of which would result in localised or minor flooding	75	o
Technical	Ensure flood risk management options are adaptable to impacts of climate change, and can be managed effectively and sustainably into the future		4.C	15	5	Constant and equal to 5, as per Midleton FRS MCA Framework Modification Note, March 2021	4	Option is readily adaptable to 3 future pathways with limited difficulty, cost and impact. The option provides no impediment to future interventions to address future risk. Direct defences can be built to permit an acceptable extension in height in a future scenario in order to maintain the required level of protection (less than 1.5m in height in public realm areas after being adapted in a High End Future Scenario). The required level of protection can also be achieved through other means such as upstream storage instead of increasing wall heights. 300	4	Option is readily adaptable to 3 future pathways with limited difficulty, cost and impact. The option provides no impediment to future interventions to address future risk. Direct defences built to permit an acceptable extension in height in a future scenario in order to maintain the required level of protection (less than 1.5m in height in public realm areas after being adapted in a High-End Future Scenario). The required level of protection can also be achieved through other means such as upstream storage instead of increasing wall heights.	300	4
	Maximise benefit in case of scheme design exceedance events		4.D	5	5	Professional judgement applied to scoring	2	Option can reduce a portion of the residual risk associated with exceedance events (Q200) in some areas in particular Willowbank as the wall height defending this area will be defined by the minimum guard height (1.1m) and not the Q100 defence height (0.7m). Similarly the wall heights defending the Mill Race development and The Woodlands Estate will be increased beyond the required SoP to comply with guard height requirements. The conveyance improvements around structures will also reduce flood risk during exceedance events. It is estimated that circa 55% of properties currently at risk of flooding will be protected beyond the SoP.	1	Option can reduce a portion of the residual risk associated with exceedance events (Q200) in some areas in particular Willowbank as the wall height defending this area will be defined by the minimum guard height (1.1m) and not the Q100 defence height (0.7m). Similarly the wall heights defending the Mill Race development and The Woodlands Estate will be increased beyond the required SoP to comply with guard height requirements. It is estimated that circa S0% of properties currently at risk of flooding will be protected beyond the SoP.	25	3
	Minimise project delivery risk by consideration of third party stakeholder interaction and/or existing infrastructure	Minimise interaction with critical infrastructure	4.E	5 60	5	Critical infrastructure in area - OH power lines	2	There is interaction with existing infrastructure but it can be managed through design of diversions. 50 Technical Score 350	2	There is interaction with existing infrastructure but it can be managed through design of diversions. Technical Score		1
							SCORING	Rationale MCA SCORE MCA Benefit Score 1789 Option Selection Benefit Score 2639 Total Capital Costs (ME) 10.70 MCA Benefit/Cost Ratio 0.17 Economic Benefit (ME) 11.11 Economic Benefit/Cost Ratio 1.04	SCORING	Rationale MCA Benefit Score 2 Option Selection Benefit Score 2 Total Capital Costs (ME) 1 MCA Benefit/Cost Ratio 0 Economic Benefit (ME) 1 Economic Benefit (Cost Ratio 1	2933 10.00 0.21 11.11	SCORING

MCA Benefit Score	1789
Option Selection Benefit Score	2639
Total Capital Costs (M€)	10.70
MCA Benefit/Cost Ratio	0.17
Economic Benefit (M€)	11.11
Economic Benefit/Cost Ratio	1.04

Fully Achieving Aspirational Target 5 Partially Achieving Aspirational Target 3 Exceeding Basic Requirement 1 Meeting Basic Requirement (No Change) 0 Just Failing Basic Requirement -1 Partially Failing Basic Requirement -3 Totally Failing Basic Requirement (Illegal/Unacceptable) -999	MCA Scoring performance	
Exceeding Basic Requirement 1 Meeting Basic Requirement (No Change) 0 Just Failing Basic Requirement -1 Partially Failing Basic Requirement -3	Fully Achieving Aspirational Target	5
Meeting Basic Requirement (No Change) 0 Just Failing Basic Requirement -1 Partially Failing Basic Requirement -3	Partially Achieving Aspirational Target	3
Just Failing Basic Requirement -1 Partially Failing Basic Requirement -3	Exceeding Basic Requirement	1
Partially Failing Basic Requirement -3	Meeting Basic Requirement (No Change)	0
	Just Failing Basic Requirement	-1
Totally Failing Basic Requirement (Illegal/Unacceptable) -999	Partially Failing Basic Requirement	-3
	Totally Failing Basic Requirement (Illegal/Unacceptable)	-999

	Generation of quantities of wastes in line with current	
	industry practice	0
	No impact on the vulnerability of the study area to a	
	major accident or disaster Environmental Score	0 -765
	Potentially significant operational risk with an upstream	
	storage option. As there are some unknowns around	
	the flow control approach, it is assumed that the	
	operation of this option would be complex and require significant operational and maintenance input.	
-1		-100
	Moderate residual risk, i.e.	
	- Storage option, failure of which would result in	
0	significant flooding	0
	Option is readily adaptable to 3 pathways with limited difficulty, cost and impact. The option provides no	
	impediment to future interventions to address future	
	risk.	
	Direct defences built to permit an acceptable extension in height in a future scenario in order to maintain the	
	required level of protection (less than 1.5m in height in	
	the town centre after being adapted in a High End	
	Future Scenario). The required level of protection can also be achieved through other means such as	
	additional direct defences, conveyance improvements	
4	or increased upstream storage.	300
	Option can reduce a significant portion of the residual	
	risk associated with exceedance events (Q200) in a number of areas including Tir Cluain and Willowbank. In	
	areas where direct defences would still be required a	
	number of these will be increased beyond the required SoP to comply with guard height requirements. The	
	Mill Race development and The Woodlands Estate will	
	benefit from the this increased SoP. It is estimated that	
3	circa 70% of properties currently at risk of flooding will be protected beyond the SoP.	75
-		
	There is interaction with existing infrastructure which is	
	more significant than the other two options but it can	
1	be managed through design of diversions. Technical Score	25 300
CORING	Rationale	MCA SCORE
	MCA Benefit Score	1163
	Option Selection Benefit Score	
	Total Capital Costs (M€)	
	MCA Benefit/Cost Ratio Economic Benefit (M€)	
	Economic Benefit/Cost Ratio	

Area 3

ore				Refer				Global	Local			
riteria	Objective	Sub objective	Code	to GN	Indicator	Basic Requirement	Aspirational Target	Weighting	g Weighting	Local Weighting Rationale		OPTION 3A - Direct defences only
	Minimise risk to human health and life - residents	(i) Minimise risk to human health and life residents	1.A.(i)	OPW, Sept 2018	Annual Average Number of residential properties at risk from flooding	Number of properties at risk is not increased	100% reduction in number of residential properties at risk	0		(to be based on calculated assessment adjusted by professional judgement)		0
	Minimise risk to human health and life - high vulnerability propoerties	(ii) Minimise risk to high vulnerability properties	1.A.(ii)		Number and type of high vulnerability properties at risk from flooding	Number of high vulnerability properties at risk not increased	100% reduction in number of high vulnerability properties at risk	0		(to be based on calculated assessment adjusted by professional judgement)		•
	Minimise risk to community - social infrastructure and amenity		1.B.(i)	OPW, Sept 2018	Number of social infrastructure assets at risk from flooding	Number of social infrastructure assets at risk not increased	100% reduction in number of social infrastructure assets at risk	10	5	Important area of social infrastructure.	5	Option to provide full protection from design flood risk 25
	Minimise risk to community - local employment		1.B.(ii)	OPW, Sept 2018	Number of non-residential (i.e., commercial) properties at risk not increased.	Number of non-residential properties at risk not increased	100% reduction in number of non- residential properties at risk	10	5	Significant area of local employment with substantial number of non-residential (i.e., commercial) properties at risk	5	Option to provide full protection from design flood risk 25
Social												Based on feedback from PPD Option 3A received a net of 14 positive responses.
	Minimise project delivery risk by consideration of social acceptability of option	Ensure flood risk management option is socially acceptable to public	1.C	Arup, March 2021	Feedback from public and landowners	Acceptable level of negative feedback	No negative feedback	15	F	Considered to be an important factor in this area		Significantly greater number of submissions in favour of the option versus those against. Public perception of option is very positive. No project delivery risk. 37
	Minimise project delivery risk by consideration of the	acceptable to public Minimise impact on private landowners who are not at risk of flooding but who may be adversely affected during construction and operation of scheme	1.C	Arup, March	Feedback from public and landowners	Acceptable level of negative reedback Acceptable level of impact to affected private landowners	No negative reedback Private landowners who do not benefit from the scheme are not impacted by the construction or operation of the scheme	15	5	Considered to be an important factor in this area	5	option is very positive. No project derivery risk. 37 No delivery risk to the option being considered – all impacted landowners are in favour of the option, as per the feedback received to date 37
		Provide opportunities for additional social infrastructure and amenity. Promote health and well being. Enhance opportunities for local investment. Catalyst for regeneration of area.	1.E		Number of other projects enhanced/facilitated by option	Ensure compatibility with social objectives in Local Area Development Plan	Enhance opportunities for other projects and enable synergies with other projects	10	5	Considered to be an important factor in this area	5	Option incorporates/ facilitates the proposed Babys Walk/ Peoples park, Public Realm/ Bus Corndor Works on Main Street and pedestrian/ cycle scheme from Midleton to Ballinacura, these projects have a very significant positive impact on local health and well being. Option is a catalyst for the improvement of the area. 2
					Low and the second s			60				Social Sco

					Annual Average Damage (AAD) expressed in								
				OPW,	Euro / year, calculated in accordance with the								
				Sept	economic risk assessment methods, but with no								
	Reduce economic damages	Minimise economic risk	2.A	2018	allowance for social / intangible benefits	AAD is not increased	100% reduction in AAD	24	5	AAD for the SSA/€75000	5	Option to provide full protection from design flood risk	600
				OPW,						A number of key transport routes			
ž				Sept	Number and type of transport routes at risk		Reduce risk to transport infrastructure			are at risk including the Main			
ē	Minimise risk to transport infrastructure	Minimise risk to transport infrastructure	2.B	2018	from flooding	No increase in risk to transport infrastructure	to zero	10	5	Street and Bailick Rd	5	Option to provide full protection from design flood risk	250
8				OPW,						Considered to be an important			
				Sept	Number and type of infrastructure assets at risk		Reduce risk to utility infrastructure to			area for utility services and			
	Minimise risk to utilities infrastructure	Minimise risk to utilities infrastructure	2.C	2018	from flooding	No increase in risk to utility infrastructure	zero	14	5	assets	5	Option to provide full protection from design flood risk	350
				OPW,									
				Sept		No increase in the negative impact of flooding	Provide the potential for enhanced						
	Manage risk to agriculture	Minimise risk to agriculture	2.D	2018	Agricultural production	on agricultural production	agricultural production	12	0	No agricultural land in this area	0	N/A	0
			. —					60		·		Economic Score	1200

	Provide no impediment to the achievement of water body		OPW,				Constant and equal to 5, as per			
	objectives and, if possible, contribute to the achievement		Sept	Provide no constraint to the achievement of	Contribute to the achievement of water		TMN Option Appraisal and MCA		Instream Works with immediate d/s SAC Estuary with	1.1
Support the objectives of the WFD	of water body objectives		2018 -	water body objectives.	body objectives	15	5 Sept 2018	-2	sediment related CO	-1
							There are two European sites			
							located adjacent to the general			
							study area: Great Island Channel			
							SAC (Site code 001058) Cork			
							Harbour SPA (Site code 004030).			
							The Great Island Channel SAC is			
							designated for the presence of			
							two QIs; Mudflats and sandflats			
							not covered by seawater at low			
							tide [1140]			
							Atlantic salt meadows (Glauco-			
							Puccinellietalia maritimae)			
							[1330]. Cork Harbour SPA is			
							designated for 23 SCIs and			
							Wetlands. This MCA has regard			
							to Article 6, Artice 10 and Article			
							12 of the Habitats Directive in		The FRS does not present the possibility of direct	
							relation to the Conservation		impacts at this stage on any qualifying habitat.	
							Objectives of designated site in		Potential indirect impacts on SAC/SPA habitats but not	Jt
							the Zone of Influence of the		on conservation objectives were considered. Suitable	2
	Avoid detrimental effects to, and where possible enhance,						Project and both in situ and ex		mitigation measures are technically feasible and the	
	Natura 2000 network, protected species and their key		OPW,	No deterioration in the conservation status of	Improvement in the conservation status		situ potential effects on habitats		careful location of works will avoid impacts on the	
Support the objectives of the Habitats and Birds	habitats, recognising relevant landscape features and		Sept	designated sites as a result of flood risk	of designated sites as a result of flood		and species such as those listed		Conservation Objectives of the 2 adjacent European	
Directives	stepping stones.	3.B	2018 -	management measures.	risk management sites.	9	5 in Annex IV.	-3	sites.	

		_							Presence of Fish (Salmonids,		
Avoid damages to, and where possible enhance, the flora and fauna of the catchment	Avoid damage to, and where possible enhance, legally protected sites / habitats and other sites / habitats of national, regional and local nature conservation importance	3.C	OPW, Sept 2018		ation in the condition of existing the implementation of flood risk	Creation of new or improvement in condition of existing sites due to the implementation of flood risk management option	4 5		Lamprey, Eels) and Otters. Otters and Lamprey species are Habitat Directive Annexed Species. These areas support habitats for Otters and the presence of salmonids as food sources is improtant.	-3	Potential localised loss of or disturbance to flora/fauna. Potential indirect on SAC/SPA habitat but not on conservation objectives. Suitable mitigation measures are technically leasible.
Protect and where possible enhance fisheries resource within the catchment	Maintain existing and where possible create new fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species	3.D	OPW, Sept 2018		I ntegrity of fisheries habitat.	No loss of fisheries habitat. Improvement in habitat quality / Juantity. Enhanced upstream accessibility	10 3	1 8 5	Presence of Fish (Salmonids, Lamprey, Eels) and Otters. Otters and Lamprey species are Habitat Directive Annexed species. The water courses are of regional value for fishing/angling.	-3	Potential Impacts on Fish (Salmonids, Lamprey, Eek) will need to be mitigated. This is a non sensitive water body (WB) as the confluence of the Dungourney is saline.
Protect, and where possible enhance, landscape Character and visual amenity within the river corridor/route of influence.	Protect, and where possible enhance, visual amenity, landscape protection zones and views into/from designated scenic areas in the river corridor/zone of influence	3.E	OPW, Sept 2018	(protected si landscape fo measures. No significan	nt change in the quality of existing f haracteristics of the receiving	No change to the existing landscape form. nhancement of existing landscape or andscape feature	7 4	8	Designated as a High value Landscape (HVL) in the Cork CDP. Designated scenic route across Ballincurra Bridge. Riverside Walkway sections		Loss of corridor of mature woodland trees and division of woodland from northern 1m embankment section. Potential loss of mature riverside trees due to northwestern section of 0.7m high wall and reduction of visual connection to river from coad an orthern end of this wall. There will be some intrusion on estuarine (river views south of Cork Road in the viscinity of the signway from new an drainsed walls. Embankment section of 1m have limited impacts throughout this politon. 22
Avoid damage to or loss of features, institutions, and collections of cultural heritage importance and their setting and improve their protection from extreme floods	(i) Avoid damage to or loss of features, institutions and collections of architectural value and their setting and improve their protection from extreme floods where this is beneficial	3.F.(i)	OPW, Sept 2018	features, inst from floodin No detrimen management	a in the risk to architectural stitutions and collections at risk rg. ntal impacts from flood risk t measures on architectural i	Complete removal of all relevant architectural features, institutions and collections from the risk of harm by externer floods. Enhanced protection and value of architectural features, institutions and ollections arising from the mplementation of the selected measures.	4 3	i a	Based on the number, type and ating (NIAH) of recorded architectural features in the area and professional judgment		Impacts on Protected Structures (PS) in the town of Midleton, Direct Impact on Lewis Bridge (PS40; C0076- 073002), Impact on the setting of Midleton House (PS 51), Impact on the setting of outbuilding (NIAH 20830064) and warehouse (NAH 20830066) which are part of the Midleton distillery compare (PS 1: C0076- 025). Impacts on curtillage of PSs on Ballick Road. Direct impact by Hood defence walls on the boundary walls of the Quayside warehouse (PS 00517; C0076-074) and also direct impact on 19th century quays. Increased level of protection from flooding for architectural sizes included in RPS and NIAH 22
Avoid damage to or loss of features, institutions, and collections of cultural heritage importance and their setting and improve their protection from extreme floods	(ii) Avoid damage to or loss of features, institutions and collections of archaeological value and their setting and improve their protection from extreme floods where this is beneficial	3.F.(ii)	OPW, Sept 2018	features, inst from floodin No detrimen management	in the risk to archaeological e stitutions and collections at risk g rg. e ntal impacts from flood risk e t measures on archaeological i	Complete removal of all relevant archaeological features, institutions and collections from the risk of harm by extreme floods. Inhanced protection and value of archaeological features, institutions and collections aring from the mplementation of the selected measures.	4 3	r	Based on the number, type and ating (NIAH) of recorded archaeological features in the area and professional judgment		Impacts on RMP sites in the town of Midleton; Direct impact on Lewis Bridge (COO76-073002; P540). Impact on the setting of cubuilding (NM-102830064) and warehouse (NAH 20830060) which are part of the Midleton distlient comblex (COO76-025; P51). Impacts on ZAP of RMP sites on Ballick Road. Direct (impact by flood deface wails on the boundary walls of the Quayaide warehouse (COO76-111; P500517) Charleston Mathrag; (CO776-0276; P50521), and mailtings (CO76- 080), Direct impact on 19th century quays which are part of the cultural heritage of the Covenacura Estuary and Ballinacura, a former mijor trading port. The setting of the quays would be aitered by the construction of wails along the estuary. Direct impact on Ovenacura Ristary (AAP 1). Lonceased level of protection from flooding for archaeolgical features included in RMP.
Protect land, soil and bedrock and improve their protection from extreme floods	Avoid damage to or erosion of land, soil and solid geology, and improve their protection from extreme floods	3G	Arup, March 2021	soil or solid g		Enhancement of land, soil and bedrock condition, stability, fertility, economic value	1 1		(by professional judgement, taking account of local advice)	0	No impact on existing national, regional and local geological sites and no impact on land, soil and geology as a result of flood risk management measures.
Avoid changes to hydrogeology	Avoid changes to hydrogeology Avoid measures which would have a negative impact on	зн	Arup, March 2021 Arup,	No increased hydrogeolog	d risk of negative effect on gy E	Enhancement of hydrogeology	1 2		Regionally important aquifer		No impact on existing national, regional and local aquifers, groundwater dependent ecosystems or groundwater resource as a result of flood risk management measures. Potential for significant temporary adverse noise
Avoid negative impact on air Avoid measures which would increase the rate of climate change	air and, if possible, adopt measures which would improve air Avoid measures which would increase the rate of climate change and, if possible, adopt measures which would reduce the rate climate change	31	Arup, March 2021 Arup, March 2021			Enhance air Rate of climate change reduced	1 5 2 5	1 2 1	habitats and species designated as of national importance Constant and equal to 5, as per Midleton FRS MCA Framework Modification Note, March 2021	-3	Transition of agrimant ethipping average hole impacts during the construction phase due to works occuring in close proximity to residenital receptors. Imbodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. II
Minimise waste generation	Minimise waste generation. Where materials are generated their reuse should be incorporated into the scheme where possible.	зк	Arup, March 2021	Avoid genera	ating waste for which there is be regional capacity for treatment,	Zero waste projects	1 5	1	Waste management considered to be relevant to all construction projects	0	Generation of quantities of wastes in line with current industry practice 0
Avoid increasing the vulnerability of the study area to major accidents or disasters	Avoid increasing the vulnerability of the study area to major accidents or disasters	3L	Arup, March 2021		on the vulnerability of the study s or accidents or disasters c	Reduction in the vulnerability of the study area to major accidents or disasters	1 5		Presence of Upper Tier Seveso Establishment - Irish Distillers Ltd.	3	Moderate reduction in the vulnerability of the study area to a major accident or disaster, i.e. fluvial flooding for Q100 and tidal flooding for T200 15 Environmental Score 55

Image: space of the s			Ensure flood risk management options are operationally robust Minimise risk of failure of option	4.A. 4.B	OPW, Sept 2018 Arup, March 2021	perform successfully Minimise consequences of failure of option.	action or decision, but which, with the allocation of adequate resources, could be operated with an acceptable degree of risk of failure Moderate to high, but acceptable and	No operational risk, i.e., no reliance on mechanical, electrical or electronic systems, or on human intervention, action or decision for the option to operate or perform successfully Negligble inherent safety risk post construction	20	5	Constant and equal to 5, as per TMN Option Appraisal and MCA Sept 2018 Constant and equal to 5, as per Midleton FRS MCA Framework Modification Note, March 2021	2	Low risk, i.e., there is a requirement for systems or interventions for the option to operate, with regular monitoring and maintenance required, and / or a low to complex flood forecasting and warning systems, with a limited number (34No) of najdyl deployed in-situ flood defences, i.e., flood gates at Baby Walk and Balick Rd Some operational risk, e.g., non return valves/ pump stations. Low residual risk, i.e. – Direct defences option, failure of which would result in localised or minor flooding
Maximise benefit in case of scheme design exceedance 4.D Arup, Number of properties at current risk is not for properties that are at risk beyond to require the scheme design exceedance Number of properties at current risk is not for properties that are at risk beyond to scheme design exceedance Professional judgement applied to scoring Professional judgement applied to scoring are proposed are above the T1000 max water level. Minimise project delivery risk by consideration of third Arup, Number of properties at current risk is not for properties that are at risk beyond to scoring So for the current risk is not for properties that are at risk beyond to scoring Professional judgement applied to scoring are proposed are above the T10000 max water level.	Technical	impacts of climate change, and can be managed		16	March	Compatible with robust \$5748	required standard of protection at acceptable	adaptation pathways with flexibility to respond to multiple CC scenarios and	15		Midleton FRS MCA Framework		significant cost, difficulty and impact. It provides no impediment to future interventions to address future flood risk. Direct defences can be built to permit an extension in height to maintain the required dandard of protection / risk reduction for the MRSF, this would be acceptable locally. However, these adaptation measures would have other negative implications / costs e.g. more than a 1.7 m high direct defences in public areas with demonstrable defences necessary to provide protection above 1.7 m. This option would not be adaptable for the HEFs as the required defence height would have significant negative implications with defence heights greater than 2.2 m in public areas. It is noted that there are no reasonable alternative options for this area and that Direct Defences is the only viable current option. Alternative options may be viable when adapting the scheme for the MRFs and
Minimise project delivery risk by consideration of third gas line in Peoples' Park, treated		Maximise benefit in case of scheme design exceedance		4.D	Arup, March	Number and type of additional properties that would be defended in a design exceedance	Number of properties at current risk is not	Increase in the Standard of Protection for properties that are at risk beyond	5	5	Professional judgement applied		The majority of the defences in this area are defined by the tidal risk. In most cases the required T200 level is lower than the Q200 exceedance event max water level. Therefore almost all the properties do not experience flooding during the Q200 fluvial exceedance events. However, there is very little reduction in flood extent during a tidal exceedance event (T1000). There are some areas south of the N25 where defences will be increased beyond the required Soft to comply with guard height requirements. In these areas there will be some additional benefit
party stakeholder interaction with existing								No interaction with critical		-	Critical infrastructure in area, HP	-	There is interaction with existing infrastructure but it

SCORING Rationale

MCA SCORE MCA Benefit Score 2179 Option Selection Benefit Score 2579 Total Capital Costs (M€) 14.30 MCA Benefit/Cost Ratio 0.15 Economic Benefit (M€) 26.63 Economic Benefit/Cost Ratio 1.86

MCA Scoring performance Fully Achieving Aspirational Target Partially Achieving Aspirational Target Exceeding Basis Requirement Meeting Basis Requirement Just Failling Basis Requirement Totally Failing Basis Requirement Totally Failing Basis Requirement 5 3 1 0 -1 -3 -999

		Rafer		Global Leo	al					
Chilechee	Sub objective	Code to GN indicator ODW, Sopt Annual Average Number of residential propert	Basic Beoultement	Assizational Taxeet Weighting Weight	It is be based on calculated assessment adjusted by	OPTION 4A - Groundwater Cut off and Direct Defences	OPTION 48 - Pamalos and Direct Defences	OPTION 4C - Combined Design with Embankment at Greenware Crossing	OPTION40 - Combined Desirn with Road Barrier at Greenware Cossion	OPTION 45 - Groundwater Cut-offs and Direct Defences alone Greet
Minimise risk to human health and life - anddents	© Minimise risk to human health and life residents	1 A II 2018 at risk from floodine	Number of properties at risk is not increased	properties at risk 0	professional indexment) (to be based on calculated	• • • • • • • • • • • • • • • • • • •	•	• • • • • • • • • • • • • • • • • • •	• •	• •
Minimise risk to human health and life - high vulnerability propoerties	y All Minimiae risk to hish vulnerability properties	Sept Number and type of high vulnerability propert 1.4.01 2018 at risk from flooding	ies Number of high vulnerability properties at risk not increased	202% induction in number of high vulnerability properties at risk 0	Its be based on calculated assessment Adjutted by explosional luberment A gm, Miditas Rugh Club and its facilities are it in k too Flooding within the affected area. Important area of accial Infrastrum, Proposed Miditator to Youghal Censmay not to Youghal Censmay read Effect on the second second second Effect on the second second second second to the second second second second second second to the second second second second second second to the second second second second second second second to the second second second second second second second to the second second second second second second second second to the second second second second second second second second to the second second second second second second second second to the second second second second second second second to the second second second second second second second to the second second second second second second second second to the second second second second second second second second second to the second	•	•	•	•	
					flooding within the affected area. Important area of social infrastructure. Proposed Midleton					
Minimise risk to community - social infrastructure and amenity		OPW, Sept Number of social infrastructure assets at risk 1.8.01 2018 from floodine	Number of social infrastructure assets at risk not increased	102% reduction in number of social infrastructure assets at tisk 10 1	to Youghal Greenway not considered impacted due to its flood compatible nature as specified in the project FPA.	5 Oction to provide full protection from deview flood risk 25	5 Option to provide full protection from design flood risk. 23	5 Option to provide full protection from devian flood risk 25	5 Option to provide full protection from design flood risk 25	Qation to provide full protection from devian fixed risk
					Some areas of local employment with a number of non-residential (i.e., commercial) properties at rick including warehouses in Park North Induntial Estate					
Minimise risk to community - local employment		OPW, Sept Number of non-residential (i.e., commercial) 18.61 2018 properties at risk not increased	Number of non-residential properties at risk not increased	100% reduction in number of non- residential properties at risk 10 5	(Le., commercial) properties at risk including warehouses in Park North industrial Estate	Cotion to provide full protection from design flood risk 250	Getion to provide full protection from design flood risk - 250	S Option to provide full protection from desim flood risk 220	Option to provide full protection from design fixed risk 250	Gation to provide full protection from dealer flood risk 25
Minimia payet delawy nik by condension of social accordination of action	Druwn Rood fulk managament option is socially acceptable to solide	Alag, March 17 - Wat, Fredhard from aubile and hockaurons	Accessible load of wateries feedback	No remote fordiant 25 5	Considered to be an important Factor in this area	Assed on the Back Trans 1970 Option A4 microards a net of 25 pointine magnetise. 	Based on Indexto Turn VID Option 68 received a net of 4 parties response. General routing of advantances in forces of the option parties and there is tabled opposites. Microal property 4 photo-of advances.	This sigtion was developed part POV due to the independent of the such handback can be updated for the application of the such handback can be updated for the part bar to the second of the such as the such as the such as the proposed extended for the space with the proposed extended for the space of the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the such as the mention plot bart bart as the such as	This option was developed point 90 data to the experiment, and a such freedomic and a such resolution paids are or benericand. Lacation of approprint enclosed methods are applied from the paids are or benericand. Lacation of approprint enclosed methods are applied with the proprint enclosed method in a public method on a proprint enclosed method on a public method on a proprint enclosed method on a public method on a public of the such and instantion method on a such and instantic any suggests public method on a public of the such and instantic any suggests public method on a such and instantic any suggests public method on a such and instantic any suggests public	This special was developed part IPO due to the requirements to encoder interacting projects. NARE algebrain, and a such franklast on the optical strate to pack the set to be not readed. In the optical strate of 2D packs are represent. The set of the set of the additional to obtain the optical set of the optical set of the additional to obtain the optical set of the optical set of the additional to obtain the optical set of the optical set of the optical set of the optical set of the optical set of the additional to obtain the optical set of the optical set of the optical set of the optical set of the optical set of the optical set of the optica
Minimia project delawy vik by consideration of the association of union and incention commute	adviction impact on private landowners who are not at this of floating bat who may be advected as imp concentration and occuration of informer	Ang, Ang, 10 201 Feedbact from impacted landsquares	Acceptable level of impact to affected private bodyname	Prisate landowners who do not benefit fran the schema are not impacted by the contraction or sectorized of the stream. 35 5	Considered to be an important Factor in this was	Location of program demonstration and impairs registricate franctions multiply apprendict anomae agreement multiple with this damains franction for impacted indexements to set bin france of the program.	Leartine of progenit gamp ratios will regars lead the from Middland age of 20 years. Upged of 20 years and a second second second second with Charged of the second second second second second second Protection for program second seco	Licotia of prograd influentinest wald compared with the propertiest technical technical technical for the state alone. The state of technical technical more tracket alone. The state of technical technical more regions to technical technical technical appresents region with the dames. Natural Technical 2010;100:100:100:100:100:100:100:100:100:	Location of program demonstrate would correspond with the program demonstrate fraction of the con- ference of the second second second second second fractional second second second second second second report of the SEE of the SEE of the SEE of the SEE of the Report of the SEE of the SEE of the SEE of the SEE of the second second second second second second second sequences in special of the SEE of the SEE of the SEE of the proceeding second seco	Location of program f embodyment will regard regificate its of the multiple potential currence regressions sugged with the output of the output of Presential for programs and output of the in Factor of Presential for programs and the in Factor of P
Machine wider benefit of gröject	Provide opportunities for additional social infrastructure and annexity. Promote health and well being Collaxes opportunities for toroid uneversel. Catalyst for opportunities for toroid	Ang, Marci Number of after projects enhanced/facilitate 11 201 option	dby Ensure compatibility with social objectives in Local Area Development Plan	Enhance opportunities for other projects and enable symmetries with other projects. 20 5- 60	Considered to be an important factor in this area	Option Incorporator / Incidence the Madvace In Trugbell Greenway, the project will have avoid a social value which will have a signification provide the local health and well hering. Option could care technical chartering and musik in each consume for the proposed MBE due to the Generatory myrgeling regularments. This would have a set succession inspect. Security 2014	Caption intergraterial / facilitates the Middoon to Tragingli Generatory, Mitpoing et all have a setter accessi wake and with a three as weighted caption prior impact a prior caption and workshop facilitation and workshop	Spring here programments of functional to the definition to the optimal design of the spring of the	Darian Incorporates / Notifice the Middlen to Yought Generary and MIC, Bohl of active Million works Incore of while. However cargins wait/refer to an of Generary Aurige 50 a feed reset: Social Law 500 500 500	Option incorporates / Sociations the Maderson to Youghed Generatives MMSE, both of which will have value a sociation white. Sociation of the Sociation of Sociati
Badura economia demaese	Misinia atoontii nk	Arcial Average Company Disruga (M4C) represented In Di OPV, vy. vyru, chaldraffer Arconomics with the second characteristic association of the second second characteristic association of the second 2.4 2018 allowance for social / intraction benefits 0000, 0000, 0000, 0000 Number and type of transport routes at disk th 1000 for	AD is not increased	1975 Induction in AND 24 5 Reduce risk to transport infrastructure to area	AND for the SSAY25000 Moderate threshold of floading on regional read RSD, Proposed Midletion to Toughild Greenway net conditioned impacted due to in fload compatible nature as use Circlet the Scheme FIA.	Centers to previde full protection from decars flood risk Centers to previde full protection from decars flood risk 20	Section to availab full contraction from distant fload risk Section to availab full contraction from distant fload risk	Antine to anythe following to the state for the state of state	Option to sympler bit extension from disport face (rise Option Source to sympler bit extension from faces (rise Option	Option to provide full exploration from decise fixed risk Option to provide full exploration from decise fixed risk
Minimise risk to utilities infrastructure	Alimimiae risk to utilities infrastructure	DPW, Sept Number and type of infrastructure assets at ri 2.C 2018 from flooding	isk No increase in risk to utility infrastructure	Reduce risk to utility infrastructure to zero 24 2	A number of infrastructure assets in area. Professional judgement applied to scoring.	5 Option to provide full protection from design flood risk 340	5 Option to provide full protection from design flood risk 340	S Option to provide full protection from design flood risk	S Option to provide full protection from design flood risk 240	5 Option to provide full protection from design flood risk
Marsae fak to anfordure	Microw risk to arriculture	0000, Appr 20 2018 Aerouhurit anducton	No increase in the negative impact of floading on anticularul anotaction	Provide the potential for enhanced anticultural production 12 2	Considered to be of Minor / Local anarthese.	Lection of prograd enhancement may have as longert an anter lawles as applicational lawd to the set. Papaged enhancement in this location will also require applicant lawd task. Papaging of contraction singles at sits application table and research of sector may as the lawd on results for the contraction site of the sector may be to an increase in distant may as the lawd on results for the sector sector site of the sector sect	Legation of proposed entendenced lines likely to have an impact on work index on generalization of the weat like it the real and action of the probability of the second lines of the second lines of the second lines description description d	Inscription of program of endown from the type have an impact an antity transition approximate fixed by the sease. Anappand endownkers of this functions of distance built static, as in all and static and the Static Status and the approximate for stand to an increase in the state status and approximate state state state state state state state approximate state state state state state state state approximate state state state state state state state approximate state state state state state state state state approximate state sta	Location of proposed embedievent may have in inpact on water haves an equilatorial table to be user. Proposed embeddeminent at this location with weak the distribution table, as the of content water with weak the distribution of the embeddeminent at the distribution of the distrebuticion of the distreb	Lacation of prograd embadement may have as impact an awar involve, a specialized indi of the set. Prograd embadement of the set. Registration of the set. Registration of the set of the set of the set of the set of constrations register, at the option results in a site create in dispersion and write lead.
Support the objectives of the WED	Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives	OPW, Sept 3.A 2018 -	Provide no constraint to the achievement of water body objectives.	Contribute to the achievement of water body objectives 15 5	Constant and equal to 5, as per TMN Option Appraisal and MCA Sect 2018	0 No constraint to the achievement of wb objectives	0 No constraint to the achievement of we objectives	0 No constraint to the achievement of wb objectives	0 No constraint to the achievement of wb objectives	0 No constraint to the achievement of wb objectives
Support the objectives of the Habitats and Birds Directives	Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their kny habitat, recogning relevant landscape features and theories thrones.	СРИ, 5ирт 3.8 2018 -	No deterioration in the conservation status of designated sites as a result of fibod risk management measures.	Improvement in the conservation status of designated sites as a result of ficod noise measurement sites. 9 1	There are no Annexed habitats under the footprint works areas. It is its potential for Wittering Annexed birds was considered to be a low level driver in this reservd.	Potential temporary disturbance to Writering bins. However can be avoided by tening and usibable mitigation measures. The value of these graned improved granulands in relatively low to avisering binds -1 adventise solutions lowed of fermine activity0	0 No scorrent instacts on America fability or service.	Potential temporary disturbance to Writering bind. Neuwervir can be availed by finning and utilable improved granitation in relativity (our to winning bind improved granitation) and the second second second second all where the relative and of formits articles. 30	Potential temporary disturbance to Wotering binds. However can be avoided by timing and suitable miligation measures. The value of these grand improved granulesh, in relatively to be statistical better -1 aluen the aviation level of families activity. 0	Petential temporary diturbance to Wetering birds. However can be wolded by timing and suitable mitigation measures. The sales of these grazed improved grassitical is relatively be as which the birds absenties asking level of fermine activity.
Avoid damages to, and where possible enhance, the flort and fauna of the catchment	Avoid damage to, and where possible enhance, legally a protected sites / habitats and other sites / habitats of national, resistent and local nature conservation importance.	0PW, Sept 3.C 2018 -	No deterioration in the condition of existing sites due to the implementation of flood risk management option	Creation of new or improvement in condition of existing sites due to the implementation of fiberdrisk management action 4 2 No loss of fiberdrisk babata, improvement in babata quality /	Areas of Woodland,Nedgrerow may provide roosting habitat for Bats	Potential impacts on Bats will need to be mitigated. The proposed magnitude of works in this option are relatively larger than 48 and so a marginelly lower score as an extended.	1. Petertial inspects on Bats will need to be millested.	Potential impacts on Bats will need to be mitigated. The proposed mappingle draws in this option are similar to 44 not on a similar score is assumed. 45	Potential impacts on Bats will need to be mitigated. The proposed magnitude of works in this option are imilar to dA and or a similar score in surface of	Potential impacts on Bats will need to be mitigated. The proposed magnitude of works in this option are larger in scale than 6A and so a mangically lower score is animod
Protect and where possible enhance fisheries resource within the catchment	Maintain existing and where possible create new Faberies habitat including the maintenance or improvement of conditions that allow spattery minimized on for fab previou	OPW, Sept 3.0 2018 -	No loss of integrity of faberies habitat. Maintenance of upstyram accessibility	No loss of fisheries habitat. Improvement in habitat quality / quantity. Enhanced upstream accessibility 20 0	No fisheries optential	0 No fabrics potential	0 No fisheries optential	0 No fabrics appential	Q No faberies potential	Q No februirs potential
Protect, and altern possible reharce, landscape character and initial faithing within the new consider/zone of influence.	Protect and where possible enhances, shall attenting and the possible possible enhances with the station of the possible and possible possible attention of the possible end of the possib	000, 600 - 36 -	No significant impact on landscape designation protected site, scenic route/amenity, natural landscape form within care of visibility of messares. No significant change in the quality of existing landscape characteristics of the receiving environment	No charge to the existing landcape form. Surdiaceners of enabling landcape or fundament of enabling landcape or Complete neurood of all elevent	Designated as a High value Landscape (HVL) in the CoS CDP. Proposed Termany along railway certifier	Sens minur priorital law of noticing separation where Sense minure of one adjoined to adoption and where it -1 creases areased Greenewy ratios.	Serve way which participations from of induity experiptions where are inductive of comma proposed Generoxy earlier. New your cluail impact from purping action of the induity of an early	terne missi principali e finali geografia e viene estabellere e ca a giune la biografia e debene e control e contron	Some mitro potential tos el minito especializa subve existencienan una algunar la indepensa a sel alema a crossa progessi Greenary condor. 21	Peterfailing of earling segration where enhancement runs algeres to bedgenese, and of ennews/black) and where it crosses proposed f-ennews/contents. The proposed regulated are too its to begins are always in all the book sectors are segrated tower cores in always.
Acod damage to or loss of features, institutions, and collections of cultural heritage importance and their certificat and intercent their antientics. Then instreme field	(i) Avoid damage to or loss of Festures, institutions and collections of architectural value and their setting and improve their protection from solvene floods where this is invertical	OPW, Sept. 17.0.1	No increase in the risk to architectural features, institutions and collections at risk from flooding. No destimate impacts from flooding of risk ranagement massures on architectural features. Institutions and collections.	Indicator feature 7 4 4 scholaros of all relevant scholaros fastares, incluidos and collections from the scholaros and collections from the scholaros and collections and value of antibiotical features, incluidos and collections and value of inglementation of the selected material scholaros and Conglete mercul of all relevant antibiotical collections and use of collections and scholaros and	Ensed on the number and type of recorded architectural features in the area and professional believers.	Pagosad embarikanet could have a direct impact on a succion of a militane associated with Mildeton Datility (951; CO20-420). Lenter patential for affects on the sufficient of Calencous Castle (PSC0005): C020; C020001	No transvirusidad antibactural alter in the area of a managard antiba	Unship potential for effects on the setting of Coherence Camp (MSCBD), COOK 4070020. This requires with the new Health Star for Shift and Shift (Shift and Shift and Shift Shift and Shift Shi	Linded potential for effects on the arting of Calemare Cashing PODDSC CODE 420000. This equal with more interplation for other option, due to all difference as an article.	Program di endandiment could have a direct impact ena section al a millione associate dui Middano Dataliny (2012)
Avoid durage to or loss of features, institutions, and collections of cultural herizage importance and their articles and interven their sestection hore network flood	(i) Avoid damage to or loss of features, institutions and collections of archaeological value and their setting and improve their protection from extreme floods where this is a terraficial	09W, 5at 80 2018 -	No increase in the risk to archaeological features, institutions and collections at risk from feoding. No detrimental impacts from flood risk management measures on archaeological features, institutions and collections.	surbarological features, institution and collections from the function and externer flood. Entranced presences in advance of anchesological features, institution and collections and value of inglementation of the selected dimensions. 4 1	Based on the number and type of recorded achaeological monuments/Veatures in the area and professional isdement	Programs of enhancement would have a direct impact on a section of a millione associated with Middeto Distliny (COOP-GR, 95 1), Linked peterelarifor effects on the article of Columnous Carlie (COOP-GO2000-95 00050). 4	No known/wcorded anthaeological sites in the area of antescard antha	Linited padoratal for effects on the utility of Cahermone Carelin (9506655, CODF-627001). This impact will be none limited than for other options, due 0 to difference in acculately. 0	United patiential for effects on the entire of Caherroore Carlos P500855; CODFG-2020). This inquar: will be more limited than for other options, due to difference is benaimby. 0	Proposed enhancement would have a direct impact on a rectant of a millione associated with Midleton Ostilating (P51:C0076-005), Limited potential for effects on the atting of Charmone Castle (P5:00055; C0076-0075001; C
Protect land, soil and bedrock and improve their protection from extreme floods	Avoid damage to or erosion of land, soil and solid geology, and improve their protection from extreme floods	Anp, March 36 2021 -	No increased risk of negative effect on land, soil or solid geology, or of erosion of land or soil, or negative effect on soil fertility	Enhancement of land, soil and bedrock condition, stability, fortility, economic value 1 2	Mideton Distilery Springs - geological heritage feature on a county scale	No impact on existing national, regional and local geological sites and no impact on land, soil and geology a samult of flood risk management measures.	No impact on existing national, regional and local geological tales and no impact on tand, soil and geology 0 as a result of flood risk management measures. 0	No impact on existing national, regional and local geological titles and no impact on land, toil and geology 0 as a result of flood risk management measures.	No impact on existing national, regional and local geological sites and no impact to land, soil and geology as a result of flood risk management measures.	No impact on existing national, regional and local geological sites and no impact on land, soil and geology a sa mult of flood risk management measures.
Avoid charges to hydra ecology	Avoid charges to Justicepolary	Asp, March 24 (20)	No increased rak of negative effect on Autoreactary	Enhancement of hydraecology 8 2	Referally important another	Returbition for fixed engines in registron, providentier (Tooding: searce in groundwater ficeding -1. But the similarity recention2	Patental localized registric instant on any Fern, groundwater fooding: Rotential for providenter fooding in the differing dual to instantial water level along the endernie Nuclearity for a subscripting of a structure of the structure of the structure of the 2 section of all dat this analytime to be a conformed.	Patientia lacatural anglite tagato sugatos, processario ficados gastese procedurar ficados 3. Sur os aleríans montes. 4	Resetut lostant explate inpat or autors, genotester Toolig uptara groutester Toolig J. Int a terfatt exeteri.	Perietar landar diagnata ingenta ingenta ingentari, granutarian finantari, suarana grundavar fisodag 1. aki as aterfalast ancetan.
Avoid negative impact on air	Avoid measures which would have a negative impact on air and if possible adopt measures which would improve air and ensures which would improve the rate of climate	Anp, March 2021 -	No increased tak of negative effect on air	Enhance air 1 2	200- devellings and presence of habitats and species designated as of local importance Constant and equal to 5, as per Mideton FRS MCA Framework	Works removed from sensitive receptons and not similicant osters of works	Works removed from sensitive receptors and not sensiticant extent of works	Warks removed from sensitive receptors and not admificant extent of works	Works removed from sensitive receptors and not almificant extent of works 0	Works removed from sensitive receptors and not a similicant extent of works
Avoid measures which would increase the rate of climat	Avoid measures which would increase the rate of climate a change and, if possible, adopt measures which would induce the rate climate chance	Anup, March 20 2021 -	Rate of climate change does not change	Rate of climate change reduced 2 5	Mideton FRS MCA Framework Modification Note, March 2021	Minimal structures and embodied carbon	0 Minimial structures and embodied carbon 0	0 Minimial structures and embodied carbon 0	0 Minimial structures and embodied carbon 0	Minimal structures and embodied carbon

Motion and granting for the set grant set of the set of t	and the matrix of a start of a st	Constant of particular of watters have we cannot be a constant of particular of watters have we cannot be a constant of particular of watters have we cannot be a constant of particular of watters have we cannot be a constant of particular of the constant of particular of particular of the constant of particular of the constant of	Constraint of question of waters into web current Constraint of question of waters
In the field of the second sec	An ender sing and an ender sin	Particle services and services	The physical sector of a state 1, 1, 191 up that is the physical sector of the physical sec
Pg Kan find of a management region on an adjustive to the second	An Anna Anna Anna Anna Anna Anna Anna A	April 1 adaption of the matched to regulaters and adapting selections: The parameters in the parameters in the end parameters of the matched to regulaters and adaption of the matched to regulaters a	Spins is statution to applicant out, affairs is statution
Nacrina band's sparal closes degressablers Am Nacrina band's sparal closes degressablers and Maximum Nacrina band's sparal closes degressablers and many data degressablers Nacrina band's sparal closes degressablers Nacrina band's sparal closes	unari oficia con la particular de la constante de la particular de la constante de la particular de la constante de la constan	The nut associated with gravabatic fragmatic gravity of the second secon	The dia menutication with provide the strate for the 2 is a strategies of the 2 is a strategies
Manina paga dalam sita kasatalan atala paga galadam sita kasatalan atala paga galadam sita kasatalan atala dalam yang dalakati mang dalakati kasatalan atala dalam yang dalakati mang dalakati kasatalan atala dalam yang dalakati kasatalan atala kasatalan atala dalakati kasatalan atala kasatalan atalakati kasatalan atal	No interaction with orbital infrastructure 5 6 Recommissionine of rail line -4 Init to the option4 Technical Score 2	Note with the second	Here getificed allows visits to for spins here manufacture and individual set of the spins of the spins where differences in the spins of the spins to find the spins of the spins of the here the spins where the spins of the spins of the here the spins where the spins of the spins of the here the spins of the spins of the spins of the here the spins of the spins of the spins of the here the spins of the spins of the spins of the here the spins of the spins of the spins of the here the spins of the spins of the here the spins of the spins of the here the spin of the spin of the here the spin of the here the spin of the here the spin of the spin of the here the
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Criteria	Objective	Sub objective	Code to C	GN Indicator	Basic Requirement W	Veighting Weightin	(to be based on calculated	OPTION SA - Direct defences	GPTION SB - Upstream Storage		TION 58-1 - Upitream Storage - Refined Storage Area and Overpumpi	g OPTION SC - Optimised Direct Defences and Overpumping	CP/Troi	I SD - Optimised Direct Defences, Upstream Storage and Overpamp
	Minimise risk to human health and life - residents	(I) Minimise risk to human health and life residents	1.A.(i) 201	ot Annual Average Number of residential propertie 18 at risk from flooding	Number of properties at risk is not increased O		assessment adjusted by professional judgement)	•	•		•	•	_	•
	Minimise risk to human health and life - high vulnerability		OPI Sep	W, pt Number and type of high vulnerability propertie	Number of high vulnerability properties at risk		(to be based on calculated assessment adjusted by							
	propoerties	(ii) Minimise risk to high vulnerability properties	0P	18 at risk from flooding W,	not increased 0		professional judgement) No social infrastructure or amenities impacted by flooding in Ballinacurra. Professional judgement							
	Minimise risk to community - social infrastructure and amenity		5ep 1.0.01 203	ot Number of social infrastructure assets at risk 18 from floodine	Number of social infrastructure assets at risk not increased		applied to scoring.	0 N/A 0	• N/A •		a N/A 0	0 N/A 0	•	N/A 0
							Some areas of local employment with a number of non-residential							
			OPI Sep	W, st Number of non-residential (i.e., commercial) 18 properties at risk not increased.	Number of non-residential properties at risk not		(i.e., commercial) properties at risk including the Dairygold Co Op Store, a hair salor, a bar, a take away and a							
Social	Minimise risk to community - local employment		1.0.00 203	18 properties at risk not increased.	increased 1	0 15	number of warehouses	S Dotion to provide full protection from dealen flood risk. Sased on feedback from PPD Option SA received a net of 4 positive responses.	S Dotion to provide full protection from dealern flood risk Based on freedback from PPD Oction 58 received a ret of	-	5 Option to provide full protection from dealern flood risk 175	 Dotion to provide full protection from dealen flood risk. 175 This potion was not presented at the PPD2. 	5	Dation to provide full protection from design flood risk 175 This option was not presented at the PPD2.
								Greater number of submissions in favour of the option versus those against. Public perception of option is positive and there is limited opposition. Minimal project	14 positive responses.		This option was not presented at the PPD2.	As this optimized solution further reduces the scale of		As this optimised solution further reduces the scale of direct defences required in the urban area, it is considered public preception would be positive and therefore project delivery risk is further reduced.
	Minimise project delivery risk by consideration of social acceptability of option	Ensure flood risk management option is socially acceptable to oublic	1.C 200	rch 21 Feedback from public and landowners	Acceptable level of negative feedback	5 5	Considered to be an important factor in this area	positive and there is limited opposition. Minimal project delivery risk. 225	Significantly greater number of submissions in favour of the option versus those against. Public perception of 4 option is very positive. No project delivery risk. 200		As this option is a refinement of Option 5B, it is assumed that the reduction in the number of landowners impacted further reduces the risk of nerative feedback. 375	anicci derences required in the urban area, it is considered project delivery risk is further reduced. Minimal project delivery risk.		therefore project delivery risk is further reduced. Minimal project delivery risk. 200
											Detential delivery risk with the option, some negative	Martin distances in bidentified as seen to dearback		Potential delivery risk with the option, some negative
								Minimal delivery risk identified, as negative feedback	Potential delivery risk with the option, some negative feedback received from landowners during site investigations. However limited impact in the urban		feedback received from landowners during site Investigations.	from impacted landowners has not been received to date.		feedback received from landowners during site Investigations.
	Minimise project delivery risk by consideration of the proportionality of option on impacted community	Minimixe impact on private landowners who are not at risk of flooding but who may be adversely affected during construction and operation of scheme	1.0 200	ip, irch 21 Feedback from impacted landowners	Acceptable level of impact to affected private landowners	5 5	Considered to be an important factor in this area	Minimal delivery rink identified, as negative feedback from impacted landowners has not been received to date. However there is impact on a significant number of a properties in the urban area. 235	investigations. However limited impact in the urban area. 150		Fewer landowners impacted when compared to Option 58. 225	Fewer landowners in the urban area impacted when compared to Option SA. 225	2	However there is impact on a number of properties in the urban area.
		Provide opportunities for additional social infrastructure and amenity. Promote health and well being, Enhance opportunities for local investment. Catalyst for researce through a reas		_										
	Maximise wider benefit of project	opportunities for local investment. Catalyst for regeneration of area.	1.5 200	inch Number of other projects enhanced/facilitated b 21 option	y Ensure compatibility with social objectives in Local Area Development Plan		Considered to be an important factor in this area	0 N/A 0 Social S	This option could facilitate a project of social value within the storage area. 20 Social Score 175		This option could facilitate a project of social value within the storage area. 20 Social Score 198	0 N/A O		This option could facilitate a project of social value within the storage area. 50 Social Score 75
				Annual Average Damage (AAD) expressed in Eur W, / year, calculated in accordance with the economic risk assessment methods, but with no	•	~		Social Score (25	Social Score (1)		secial Score	Sadal Score 000		social Score (*)
	Reduce economic damages	Minimike economic risk	0Pl Sep 2.A 201	18 allowance for social / intargible benefits	AAD is not increased 2	я s	AAD for the SSA/K75000	S Option to provide full protection from design flood risk eco	5 Option to provide full protection from design flood risk. 600		Coption to provide full protection from design flood risk.	s Option to provide full protection from design fload risk coo		Option to provide full protection from design flood risk
	Minimise risk to transport infrastructure	Minimike risk to transport infrastructure	0P1 Sep 2.8 201	W, pt Number and type of transport routes at risk from 18 flooding	n No increase in risk to transport infrastructure 3		Moderate threshold of flooding on	5 Option to provide full protection from design flood risk 50	S Option to provide full protection from design flood risk. 52		5 Option to provide full protection from design flood risk 50	S Option to provide full protection from design flood risk 50		Option to provide full protection from design flood risk 50
ž.	Minimizer with the utilities informations	Minimite risk to utilities infrastructure	0P1 Sep 2.C 201	W, V, Number and type of infrastructure assets at risk 18 from flooding	No income in side in stills inferences		Ballinacurra Main Street A number of Infrastructure assets in area. Professional judgement applied to scoring.	Coption to provide full protection from design flood risk 240	Option to provide full protection from design flood risk		Option to provide full protection from design fload risk	Coption to provide full protection from design flood risk		Option to provide full protection from design flood risk 140
fond	WARRANT OF AD ADDIDES INTERPACTORS	manage and to uplice invaling the	201	an and work wooding	the maximum in risk to utility intrastructure		system to scoring.	 supuch to provide rull protection from delight flood risk. 140 	 Uption to provide tuil protection from delign fload risk. 246 		 Operant or provide rull protection from design flood risk. 140 	Upson to provide rul protection from design flood risk: 140		Nysker wyrwydd fai protection from belign nood risk
							Complete the band beau ()				Proposed storage area will impact the agricultural land during flood events, the proposed embankments to retain water may also have a negative impact.	Direct Defences may have an impact on water levels on		Proposed storage area will impact the agricultural land during flood events, the proposed embankments to retain water may also have a negative impact.
			OP	w,			Considered to be of Minor / Local Importance. There is an area of Agricultural Land upstream of Ballinacurra and adjacent to	Direct Defences may have an impact on water levels on agricultural land at Keamey's Cross. Proposed embanisment at this location will also impact agricultural	Proposed storage area will impact the agricultural land		retain water may also have a negative impact.	Direct Defences may have an impact on water levels on agricultural land at Kearney's Cross. Proposed embankment at this location will also impact land.		retain water may also have a negative impact.
	Manage risk to agriculture	Minimike risk to agriculture	2.D 201	at 18 Agricultural production	No increase in the negative impact of flooding on agricultural production 1	2 2	Ballinacurra and adjacent to Kearney's Cross.	-3 land72 Economic Score 211	Proposed storage area will impact the agricultural land during flood events, the proposed embarkments to retain water may also have a negative impact		4 Compared to Option Sil. 406 Economic Score 604	Despite the extent of direct defences being reducd, -3 works are still required at Kearney's Cross72 Economic Score 210	-4	Extent of agricultural lands impacted reduced when compared to Option SB
		Provide no impediment to the achievement of water body	OP	w,			Constant and equal to 5, as per TMN Option Appraisal and MCA Sept							
	Support the objectives of the WFD	Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives	0Pl Sep 3.A 203	ot	Provide no constraint to the achievement of water body objectives.	5 5	2018	-2 Short-term or intermittent impediment to the achievement of wb objectives due to in-stream works -150	Medium-term or recurring impediment to the achievement of wb objectives due to minor Channel -3 Realignment Works -225	-1	Medium-term or recurring impediment to the achievement of wb objectives due to minor Channel Realignment Works and pumping -223	Short-term or intermittent impediment to the achievement of whickjectives due to in-stream works -3 and pumping -225	4	Medium-term or recurring impediment to the achievement of wb objectives due to minor Channel Realignment Works, in-stream works and pumping -300
							There are no Annexed habitats under the footprint works areas.							
							under the footprint works areas. The potential for indirect impacts in terms of aquatic connectivity to the Annexed habitats in the Estuary was considered. The primary necessing habitat is Sandfats and Muditate. Is situ potential for Wintering Annexed							
		Avoid detrimental effects to, and where possible enhance,					considered. The primary receiving habitat is Sandflats and Mudflats. Ex	Potential temporary disturbance to Wintering birds. However can be avoided by timing and suitable	Potential temprary disturbance to Wintering birds. However can be avoided by timing and suitable		Potential temprary disturbance to Wintering birds. However can be avoided by timing and suitable	Potential temporary disturbance to Wintering birds. However can be avoided by timing and suitable mitigation measures. The value of these grazed		Potential temporary disturbance to Wintering birds. However can be avoided by timing and suitable
	Support the objectives of the Habitats and Birds Directives	Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitato, recognising relevant landscape features and stepping stores.	0Pl Sep 3.8 201	w, st 18 -	No deterioration in the conservation status of designated sites as a result of flood risk management measures. 9	1	situ potential for Wintering Annexed birds was also considered to be a low level driver in these options.	Petential temporary disturbance to Westering binds. However can be avoided by timing and utable mitigation measures. The value of these grazed improved grasulated is relatively low to windering binds -1 eliven the existing level of farming activity9	Potential temporar disturbance to Withering birds. However can be avoided by the time and subtable religization measures. The value of these grazed improved grasulands is relatively loss to wintering birds alware the existing level of deminance activity. 20	-1	Potential temprary disturbance to Wintering birds. However can be avoided by timing and suitable mitigation measures. The value of these graced improved grassiants in relatively low to wintering birds elven the existing level of farmine activity.	mitigation measures. The value of these grazed improved grasslands is relatively low to wintering birds elven the existine level of farmine activity.	-1	Potential temporary disturbance to Winbring bids. However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasulands in relatively low to wintering birds eiven the existing level of farming actility. 4
									Potential impacts on Eah (Salmonida, Lamorae, Eah) will					Potential Imparts on Eich (Salmonids amoreur Eels) will
	Avoid damages to, and where possible enhance the form	Avoid damage to, and where possible enhance, legally protected sites / habitats and other sites / habitats of	OPI Service	w, at	No deterioration in the condition of existing sites due to the implementation of flood risk management option 4		Presence of Fish (Salmonids, Lamprey, Eels). The water courses are of local value for fishing/angling.	Potential impacts on Fish (Salmonids, Lamprey, Telk) will need to be mitigated. Potential localised loss of or disturbance to flora/fauna limited by the already	need to be mitigated. Potential localised loss of or disturbance to floca/futura limited by the siteady modified return of the channel. However, the featurest		need to be mitigated. Potential localised loss of or disturbance to flora/fauna limited by the already modified externel the channel. Jinsever, the factorist	Potential Impacts on Fish (Salmonids, Lamprey, Eels) will need to be mitigated. Potential localised loss of or disturbance to flora, flauna limited by the already		need to be mitigated. Potential localised loss of or disturbance to flora/fauna limited by the already modified nature of the channel. Measurer, the footnoist
	woold damages to, and where possible ennance, the nora and fauna of the catchment	a protected sizes / nacitatis and other sizes / nacitatis of national, regional and local nature conservation importance	3.C 203		management option 4	2	are of local value for fishing/angling.	-1 modfled nature of the channel1	-2 area is slightly more extensive than in Option 5.4.	-2	area is slightly less extensive than in Option 5816	-1 modified nature of the channel.	-2	area is slightly less extensive than in Option 52.
	Protect and where possible enhance fisheries resource within the catchment	Maintain existing and where possible create new fisheries habitat including the maintenance or improvement of conditions that allow upstream mirration for fish species	0Pl Sep 3.D 203	w, st 18 -	No loss of integrity of fisheries habitat. Maintenance of upstream accessibility 1/	0 2	The waterbody supports possible numery habitat for fish.	Short-term minor impacts to fluheries habitat in a non- -1 sensitive WB23	Short-term minor impacts to fisheries habitat in a non- sensitive Will but with a larger footprint. 40	-2	Short-term minor impacts to fisheries habitat in a non- sensitive Will but with a larger footprint than direct defence options. 40	Short-term minor impacts to fisheries habitat in a non- sensitive WB20	-2	Short-term minor impacts to fisheries habitat in a non- sensitive Will but with a larger footprint than direct defence cotions alone. 40
					No significant impact on landscape designation (protected site, scenic route/amenity, natural landscape form) within zone of visibility of									
	Protect, and where possible enhance, landscape	Protect, and where possible enhance, visual amenity,	OP	w,	insic cape form) within zone or visuality of measures. No significant change in the quality of existing landscape characteristics of the receiving		Designated as a High value Landscape (HVL) in the Cork CDP. Designated scenic route across Ballinacurra Bridee.	Very minor reduction in river views for local residents from increased height of walls and bridge parapets.	Potential loss of hedgerow and treeline vegetation and visual impact from 2m and 1m high embankments		Visual impact from 1.5m and 1.4m high embankments around retention area. Minor visual impacts from above	Very minor reduction in river views for local residents. from increased height of walk and bridge parapets.		Potenzia iola de negariou and treema vegatados and visual impactions 1.5 ma da 15 milghe metavimenta around reterition area. Minor visual impacts from above ground elevents of 1 pumping tation. Educate its more binited than Detion 58 due to smaller footerist28
	Protect, and where possible enhance, landscape character and visual amenity within the river corridor/zone of influence.	Protect, and where possible enhance, visual amenity, landscape protection zones and views into/from designated scenic areas in the river corridor/zone of influence	3.E 203	21 18 -	landscape characteristics of the receiving environment 7	4	Designated scenic route across Ballinacurra Bridee.	Very minor reduction in river views for local residents from increased height of walk and bridge parapets. Minor visual impacts from above ground elements of 6 0 ournoire stations 0	- Voluminaria to Crimego volumi e volumi registrata in ar Visual impacts from 2 mar di Im high embarthments around retention area. Milor visual impacts from above -2 eround elements of 2 ournoine stations	-1	ground elements of 2 pumping stations. Extent is more limited than Oction 58 due to smaller footorint. 28	Very simular induction in more writen as a local measurement from increased height of writen and bridge parapets. Millions visual impacts from above ground elements of 1 0 cumpler station 0	-1	ground elements of 1 pumping station. Extent is more limited than Option 58 due to smaller footorint28
					No increase in the risk to architectural features,									
Sertal	traditional tradition of the tradition o	() Avoid damage to or loss of features, institutions and			Institutions and collections at risk from flooding. No detrimental impacts from flood risk management measures on architectural		Based on the number, type and	No effect on known/recorded architectural features. Increased level of protection from flooding for excitations alian indicated in DEC and MEM. Disease				No effect on known/recorded architectural features. Increased level of protection from flooding for architectural lifes included in RPS and NAH. Girect Impact on S features of architectural/cubural heritage		No effect on known/recorded architectural features. Increased level of protection from flooding for architectural rise studied in Research 1014, Do
(miro mn	Avoid damage to or loss of features, institutions, and collections of cultural heritage importance and their setting and improve their protection from extreme floods	(i) Avoid damage to or loss of features, institutions and collections of architectural value and their setting and improve their protection from extreme floods where this is beneficial	OPI Sep 3.F.(I) 201	er, 21 18 -	No detrimental impacts from flood risk management measures on architectural features, institutions and collections. 4		Based on the number, type and rating (NIAH) of recorded architectural features in the area and professional judgment	Increased level of protection from flooding for architectural sizes included in RPS and NAM. Direct Impacton 5 features of architectural/cultural heritage -1 note (DIS 18-CH5 22) identified by Underwater Survey12	No effect on known/recorded architectural features. Increased level of protection from flooding for 2 architectural features included in RPS and NIAH 24	2	No effect on known/recorded architectural features. Increased level of protection from flooding for architectural features included in RPS and NAH 24	architectural sites included in RPS and NAH. Direct Impact on 5 features of architectural/cultural heritage -1 note (OIS 18-CHS 22) identified by Underwater Survey. 012	-4	No effect on known/recorded architectural features. Increased level of protection from flooding for architectural altas included in RPS and NUAH. Direct impact on 4 features of architectural/outbrand heritage note (CHS 18-CHS 22) identified by Underwater Survey. 12
-														
									adjacent to a proposed 2m high embankment. The bural was fully escavated and therfore removed and		Direct impact on one RMP site; a burial (CO076-052) in a			Direct Impact on one RMP site; a burial (CD076-052) in a
					No increase in the risk to archaeological features, institutions and collections at risk			No known/recorded archaeolgical sites in vicinity of proposed works. Increased level of protection from	Detect impact on two MMP sites, a hard (CODF-6-02) as a proposed tangen are and a funch tai CoDF-6-64), where the second second second second second second means taby reconstrained and the functor tains are parallely executed. The remainder of the functor tains are parallely executed. The remainder prior changes to the preserved its run (short age resonance) to the preserved its run (short age resonance) to the taken howers (CODF-6013) shorted to north all proposed embedrated (CODF-6013) shorted to north all proposed		Direct impact on one WMP site; a burial (COO76-052) in a proposed storage area. The burial was fully excusated and therfore removed and preserved by reaccut. Potential for mixor visual effect on town house (COO76- 051) situate in one-tho i proposed embarkment (0.5m high). No inspact os 5 cultural heritage sites identified in Underwater zurwy. No percision impact to fluckth fa	No known/recorded archaeolgical sites in vicinity of proposed works. Increased level of protection from		Direct impact on one RMP tilter, a burial (CO076-052) in a proposed storage area. The burial was fully excaused and therefore environd and preserved by record. Potential for minor visual effect on tower house (CO076- 052) situated on ortho of proposed machinemer (1m high). Direct impact on 4 cultural heritage sites identified in turburante survey. No proceived impact to the state of the
	Avoid damage to or loss of features, institutions, and collections of cultural heritage importance and their	(II) Avoid damage to or loss of features, institutions and collections of archaeological value and their setting and improve their protection from extreme floods where this is	OPI Sep	W, pt	No increase in the risk to archaeological features, institutions and collections at risk from flooding. No detrimental impacts from flood risk management measures on archaeological		Based on the number and type of recorded archaeological monuments/Neatures in the area and professional ludement.	No know/records a changigal tites in vicinity of proposed works. Increased level of protection from flocoling for anchenological little included in the RAP. Direct impact on Balthacerra Rive (AVP 3) and on 5 Cultural Heritage Silos (105136-C16522) Identified in -2 Underwater survey48	embarkment location. Potential for visual effect on tower house (CDO76-051) situated to north of proposed embarkment (1.3m high). No impact on 5 cultural		051) situated to north of proposed embankment (0.5m high). No impact on 5 cultural heritage sites identified in Underwater survey. No percieved impact to fluacht fla	No known/recorder archaeolgical atter in vicinity of proposed works. Increased level of protection from flooding for archaeological atter includes in the IAVE. Direct Impact on Balinsuum New (AVP 3) and on 5 Cultural Heritegica State (2015 at 6-015 22) identified in -2 Underwater survey		051) situated to north of proposed embankment (1m high). Direct impact on 4 cultural heritage sites identified in Underwater survey. No percieved impact to
	collections of cultural heritage importance and their setting and improve their protection from extreme floods	s beneficial	3.F.M1 203	18 -	features. institutions and collections. 4	2	professional ludement		heritare sites identified in Underwater survey. Potential localised loss of land, soil and geology:	0	CC076-054i identified downstream. 0 Potential localised loss of land, soil and geology:	-2 Underwater survey16 No impact on existing national, regional and local	-1	Ruscht fla (CD076-054) identified downstream. 24
	Protect land, soil and bedrock and improve their protection from extreme floods	Avoid damage to or erosion of land, soil and solid geology, and improve their protection from extreme floods	3G 203	erch 21 -	No increased risk of negative effect on land, soil or solid geology, or of erosion of land or soil, or negative effect on soil fertility 1	1	(by professional judgement, taking account of local advice)	No impact on moting national, regional and local proligical sites and to impact on hard, call and geology o us a result of flood risk management messures. O No impact on moting national, regional and local aquifers, goundwater dependent ecosystems or groundwater resource as a result of flood risk o management messures. O	Distructurement of soil quality in storage area is minor	-1		No impact on existing national, regional and local geological sites and no impact on land, soil and geology 0 as a result of flood risk management measures.	-1	No impact on existing actionation, social and geology Dising revenue of in oil quality in storage area in minor as the area is already prone to flooding Vio impact on existing national, regional and local aquifers, groundwater depondence ecorystems or groundwater resource as a result of flood risk
			Aru Ma	ар, arch	No increased risk of negative effect on			no impact on existing national, regional and local aquifers, groundwater dependent ecosystems or groundwater resource as a result of flood risk	-1 as the area is already prore to flooding -1 No impact on existing rutional, regional and local aquifers, groundwater dependent ecosystems or groundwater resource as a result of flood risk		Disimprovement of old quality in storage area is minor as the area is already prone to flooding. No impact on existing radioals, regional and local aquifers, groundwater dependent ecosystems or groundwater resource as a result of flood risk magaement measures. 0	No impact on existing national, regional and local aquifers, groundwater dependent ecosystems or		no impact on existing national, regional and local aquifers, groundwater dependent ecosystems or groundwater resource as a result of flood risk
	Avoid changes to hydrogeology	Avoid changes to hydrogeology Avoid measures which would have a negative impact on air	3H 200 Aru Ma	21 - ap, arch	hydrogeology 1	2	Regionally important aquifer 100+ dwellings and presence of habitats and species designated as of local importance	government frequency in stream of isodor mix management measures. Potential for significant temporary adverse noise impacts during the construction phase due to works -3 occuring in close proximity to residential receptors. -4	O management measures. Potential for temporary adverse noise impacts during the construction phase due to works occuring in close -1 prosimity to residential receptors2	0	Potential for temporary adverse noise impacts during the control of the temporary adverse noise impacts during the control to impact adverse noise impacts during in dose presimity to residential receptors. 2	Brocknowner resources a resource role management resources Potential for significant temporary adverse noise impacts during the construction phase due to works -3 occuring in close proximity to residential receptor. 4	0	Potential for significant temporary adverse noise
	Avoid negative impact on air	and, if possible, adopt measures which would improve air	31 200	21 -	No increased risk of negative effect on air 1	2	of local importance	-3 occuring in close proximity to residential receptors.	Embodied carbon associated with the proposed	-1	proximity to residential receptors.	-3 occuring in close proximity to residential receptor6	-2	occuring in close proximity to residential receptors.
									Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Use of pumps will also have an adverse environmental impact.		Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Use of pumps will also have an adverse environmental impact.			
		Avoid measures which would increase the rate of climate	Anu	19.			Constant and equal to 5, as per	Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emission. Use of pumps will also have an adverse environmental impact, Larger quantity of direct -3 defences required increases embodied carbon amount33	Assumed selection of earthwork material will carry less			Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Larger site of pumps required increases		Embodied carbon associated with the proposed structures will result in the indirect generation of carbon emissions. Larger size of pumps required increases
	Avoid measures which would increase the rate of climate change	change and, if possible, adopt measures which would reduce the rate climate change Minimike waste externation. Where materials are externated	3J 200	ech 21 - 25.	Rate of climate change does not change 2 Avoid penerating waite for which there is	s	Midleton FRS MCA Framework Modification Note, March 2021 Waste management considered to	-3 defences required increases embodied carbon amount30	embodied carbon than concrete used to construct direct -2 defences20	-1	Reduced nature of storage option limits embodied carbon amount10	emissions. Larger size of pumps required increases -3 embodied carbon during operation30	-1	emissions. Larger size of pumps required increases embodied carbon during operation30
	Minimise waste seneration	Minimia wate generation. Where materials are generated their reuse should be incorporated into the scheme where possible.	Aru Ma 3K 200 Aru Ma	ech 21 -	Avoid generating waste for which there is unlikely to be regional capacity for treatment, recovery or discosal.	5	Waste management considered to be relevant to all construction projects	Generation of quantities of wastes in line with current Industry practice	Generation of quantities of wastes in line with current Industry practice	0	Generation of quantities of wastes in line with current industry practice	Generation of quantities of wastes in line with current Industry practice	0	Generation of quantities of wastes in line with current industry oractice
	Avoid increasing the vulnerability of the study area to major accidents or disasters	Avoid increasing the vulnerability of the study area to major accidents or disasters	Aru Ma 3L 200	49. erch 21 -	No impact on the vulnerability of the study area to major accidents or disasters 1		No presence of high vulnerability establishments	No impact on the vulnerability of the study area to a major accident or disaster o	No impact on the vulnerability of the study area to a		No impact on the vulnerability of the study area to a major accident or disaster 0 Environmental Score 2107			No impact on the vulnerability of the study area to a major accident or disaster Environmental Score 464
			_			6		Environmental Score	Environmental Score 219		Environmental Score 307	Environmental Score 226		Environmental Score 464
					Moderate to high, but manageable, degree of									
				Level of operational risk of option	Moderate to high, but manageable, degree of operational risk, i.e., an option with a high degree of relaxence on mechanical, electrical or electronic systems, or on human intervention, action or decision, but which, with the allocation of adequate resources, could be operated with an acceptable degree of risk of plane.				Potentially significant operational risk with an upstream storage option. At there are some unknown around the flow control approach, it is assumed that there is a some operational risk with the option.		Potentially significant operational risk with an upstream storage option. As there are some unknowns around the flow control approach, it is assumed that there is a some operational risk with the option.			Potentially significant operational risk with an upstream storage option. As there are some unknowns around the flow control approach, it is assumed that there is a some operational risk with the option.
	Freurs flood risk management options are	Enurs Bood risk management options are completed	OP	Level of operational risk of option - Degree of reliance on mechanical, electrical or W, electronic systems, or on human intervention, ot action or decision, for the option to operate or	action or decision, but which, with the allocation of adequate resources, could be coverated with an acceptible degree of which of		Constant and equal to 5, as per TMN Option Appraisal and MCA Sept		operational risk with the option.		operational risk with the option.			operational risk with the option.
	robust	robust	4.A. 201	18 perform successfully	falure 2	10 S	2018	3 Very low operational risk- failure of pumping system. 300	2 system is also present. 200		2 system is also present. 200	 Very low operational risk-failure of pumping system. 	2	system is also present. 200

Minimus risk of failure of option	Minimiter risk of failure of option	Aug, Ministrie consequences of failure of option. Moderate to high, but acceptable and March Backare related in big degining set risk where manageable, level of residual 42. 2021: peakles	Constant and equal to 5, as per Mideton FR5 MCA Framework 5 Modification Note, March 2021	Low residual risk, i.e. - Direct defences copion, failure of which would result in to coaland or mixor flooding. 72	Moderate residualitik, Le. - Stonge optios, fallwe of which would result in Nyjeritare flooding - 4. Pump system fallwar would result in significant flooding -72	Moderate residual risk, Le. - Storage option, failure of which would result in significant flooding. -1. d-unya pystem failure would result in significant flooding. -22	Moderate residual risk, Le. - Direct deference option, fullure of which would result in localized or mixor flooding - Turno system fullure would result in significant flooding - due to defenso having them optimized 25	Moderate residual risk, Le. - Storage option, failure of which would result in significant toxing - Zhang puttient the storage factor is significant floating. - 25
Ensure Road club management options are adjusted managed of distance drange, and can be managed withouthy of management options.	6	Aug. Compatible with indexem 15 Compatible with indexem 16 Compatible with indexem 15 Compatible with	Combinit and equal To 5, in part Madeus FE MAA Transmook Madeus Tes MAA Transmook	Notes a definition or another the generation of the sector of the sector of the sector of the sector of the the sector of the	Option is adapted or molecules to regulator test, difficulty and regard. It provides no superflowers to factors between this is allowed in factor factor and in the properties of product of the start factor and designed is assessment to work of the start start of the factor and interaction. See the start start of the factor and interaction, show the start and and interaction and interaction. See the start of the start and the start start and and the start product the start start and start and start products the start of the start and start and start products the start start and start start and start and start products the start and start and start and start and start products the start and start and start start start and start the start products the start and start and start start and start the start products the start and start and start and start start and start the start products the start and start and start and start and start and start products the start and start and start and start and start and start products the start and start and start and start and start and start and start products the start and	Options a single data or motion to togethere it as differely and impact. To providen no impedanties to before interventions in address from the data to the provide and with the option of the single and disruption to accommodation with difficult of the single and disruption to accommodation with difficult or address and family and intervention. Name with the single and accommodation throws in present disruption to accommodation to the provide single and the single accommodation to the single accommodation of a could accommodate accommodation accommodation with difficult and provide accommodation accommodation accommodation with difficult accommodation a	China to adaptation framework to spin-frame and, China to advance a set to be address of the spin-framework failer information adaptation to adaptation the framework failer information and advance to the spin-framework failer information and advance to the spin-framework failer information and advance to the spin-framework advance to the spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- dent on moneying to provide advance to the spin- al spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- al spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- se of the spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- se of the spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- se of the spin-framework and advance to the spin- tent of the spin-framework and advance to the spin- te	Spectra shadpener i spectra se spectra en est Spectra shadpener i spectra se spectra en est Spectra se spectra se shadpener i spectra se spectra en est en est derivera ca se las altra parrele an estatarian en es- rel en derivera ca se las altra parrele an estatarian en es- rel en derivera ca se las altra parrele an estatarian en est estataria estataria estataria estataria estataria est estataria e
Matinia bareft is case of scheme design exceedure		Ang, Number and sport of additional properties that the second subdivided additional properties and additional to a second secon	5 contra	Cyline can reading a particle of the resolution, associated with associated areas areas (2020) in some areas in particle in fast altificance as the valid high definiting this area will be defined by the minimum D. The min the billhauk and do not are the pitt basis. It is associated at a circle 300 of properties currently at rule at the data and a second of properties currently at rule of the data and a particular billy and the data.	Option can reduce a significant portion of the resultat real associated with researchers are not to (2020) regression the design of the strategy areas (also in the energy and reducing the strategy areas (also in the energy and the option of the strategy areas) with the energy and the option of the strategy areas (also in the energy and the option of the strategy areas) and the option of the option of the strategy areas (also in the energy areas) and the option of the strategy areas (also in the provide option of the strategy areas).	Option con relative a significant portion of the residual real associated with researchers avents (2023) thoughout billinearus provided as assumptive a oppravid in indicated for horizon activities and Johnson 70	Option could be subject to significant residual via an End distinctors where seen denote events (2000) course of whether the second second second second second of whether the second se	Option can reduce a significant period of the residual real associative site executions are well (2020) arguments of the signing the integra real tables. A research risk to fait all distances a three executions events cancerpoint all BM biological with the significant difference in the area have been induced in high and a seture.
Minimise project delivery risk by consideration of this party stateholder interaction and/or easing infrastructure	d Minimus interaction with critical infrastructure	Aron, Aron, Aron and a second stabilities Aron and aron aron aron aron aron aron aron aron	Critical Infrastructure In area: Irinh Water assets, GNA assets, ISS assets. Critical Interactions at PS rising main crossing Dairygold site and RG30 read	Minimal delivery risk to the option being considered. Urbans area - interaction with ortical infrastructure at d direct delivers and IS BM. Technical Score 35	Movinal delivery rule to the option being considered. Urban area - interaction with critical infrastructure at PS RM. LCS3 Med voltage devenion may be required in upphram. 4 area Technical Scient 40	Molecular Molecular Action Metal Social Action Metal Social Action Metal Action Met	Minimal delivery risk to the option being considered. Urban area - Netraction with critical influentivisture at direct delivers and PSIM. G Technical Gare 30	Minimal delivery risk to the option being considered. Urban areaintraction with critical infrastructure at direct delexes and 55 83A. E33 Mod voltage diversion may be required in upstream de area Technical Score 310
				SCORW Rationale MCA SCORE MCA Benefit Score 120 Option Section Banefit Score 122 Test Ceptite Centre (MO 5.10 MCA Benefit (Score Min 3.21 Economic Benefit) (Score Min 3.21 Econ	SOBING RESIDENT MCASCORE MCABenefit Scare 1926 Option Scales Search Scare 1926 Testal capital Costs (MG 122 MCABenefit) (Scatt Sing 56 Economic Result (MG 422 Economic Result (MG 423)	SCORNG Retirents MCA Score ACA Search Score 1222 Option Section Search Score 1222 Total Capital Casts MG 123 MCA Search Score 123 Section Section	SCORNE Retirents MAC SCORE MCC Reveals Score 1002 Quption Education Reveal Score 1002 Table Capitre Carls (Md) 1.10 MCC Reveals(Carls Md) 1.10 MCC Reveals(C	SCOBING Reliance MCA SCOBE MCA Benefit Score 305 Option Selection Benefit Score 3055 Total Capitro Casts (Md, 110 MCA Senset(Casts 1040, 110 MCA Senset(Casts 1040, 110 Castronic Senset(Casts 1040, 110

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(ective	Sub objective	Refer Code to GN	J Indicator	Basic Requirement	Aspirational Target	Global Local Weighting Weighting	g Local Weighting Rationale	ортко	ON 6A - Flood Diversion Channel/Culvert North of Railway and I defences	Direct	TION 68-1 - Flood Diversion Cultert South of Railway and Direct Defenc		68-2 - Flood Diversion Channel/Culvert South of Ballway an	d Direct Defences	OPTION 6C - Flood Diversion Channel (bypassing Cave System) and I Defences
nimise risk to human health and life - residents	(i) Marining with the business baselify and life antidants	CIPW, Sept	Annual Average Number of residential properties at risk from flooding	Number of properties at risk is not increased	200% reduction in number of residential properties at risk		(to be based on calculated assessment adjusted by professional iudeement)								
Inimise risk to human health and life - high		OPW,	Number and hose of high volgerability	Number of hish substability properties at r			(to be based on calculated								
ulnerability propoerties	(ii) Minimise risk to high vulnerability properties	Sept 1.A.(ii) 2018 OPW,	Number and type of high vulnerability properties at risk from flooding	Number of high vulnerability properties at ri not increased	sk 100% reduction in number of high vulnerability properties at risk	0	professional judgement) No social infrastructure or			_	o				o
Animise risk to community - social infrastructure and menity		Sept 1.8.() 2018	properties at risk from flooding Number of social infrastructure assets at risk from flooding	Number of social infrastructure assets at risk not increased	: 100% reduction in number of social infrastructure assets at risk	20 0	amenities impacted by flooding in Waterrock. Some areas of local employment with a number of non-		N/A 0		<u>o N/A</u>		N/A		0 N/A 0
		OPW,	Number of non-residential (i.e., commercial)	Number of non-residential properties at risk	1000 extention in some of sea		with a number of non- residential (i.e., commercial) properties at risk including		Option to provide full protection from design flood		Centres to execute full excitation from during front		Option to provide fall protection from design flood		Option to provide full protection from design flood
Minimise risk to community - local employment		CPW, Sept 1.8.(ii) 2018	Number of non-residential (i.e., commercial) properties at risk not increased.	not increased	residential properties at risk	20 5	mechanics garage	5	risk 250	•	5 risk 250		risk	50	5 risk 230
									Based on feedback from PPD Option 6A received a net		This option was developed post PPD and as such feedback on the option from the public has not been revealed		This option was developed and DPD and as such		This option was developed post PPD and as such feedback on the option from the public has not been
									of 5 positive responses.		As the option is a derivative of Option 6A, it is		This option was developed post PPD and as such feedback on the option from the public has not been received.		received.
Minimise project delivery risk by consideration of	Ensure flood risk management option is socially	Anup, Mard					Considered to be an important		Greater number of submissions in favour of the option versus those against. Public perception of option is positive and there is limited opposition.		assumed that a similar response would be received. Due to the increased number of private landowners impacted however, a conservative reduction in score		The alignment follows that of Option 68-1, and therefore impacts on the same number of private		However it is considered that it is likely to score similarly to the other options due to the limited interation with the public realm and the number of
social acceptability of gotion	acceptable to public	1.0 2021	Feedback from public and landowners	Acceptable level of nezative feedback	No nezative feedback	15 5	factor in this area		Minimal project delivery risk. 225	5 2	2 has been applied. 110	2	landowners.	50	2 private landowners impacted . 134
											Potential delivery risk to the option as the diversion		Potential delivery risk to the option as the diversion		Potential delivery risk to the option as the diversion channel interacts with a number of different land owners, including trish Rail and TR. Timing of construction works under the Middeton-Cork railway line would require doct excellutation with Irish Rail.
									Potential delivery risk to the option as the diversion channel/culvert impacts a number of different land revenue including the Nerdic Business Park. Option		Potential delivery risk to the option as the diversion cubert interacts with a runther of different land owners, in particular initia Real. Timing of construction works under the Mideton-Cork railway line would require close coordination with hish Ruil. Works on		Potential delivery risk to the option as the diversion channel/culvert interacts with a number of different land owners, in particular Irish Rail. Timing of construction works under the Midleton-Cork railway line would require close coordination with Irish Rail.		construction works under the Midleton-Cork railway line would require close coordination with Irish Rail. Works on the line are being planned by Irish Rail
	Minimise impact on private landowners who are not at	Arup,			Private landowners who do not benefit from the scheme are not	:			owners including the Nordic Business Park. Option also clashes with Lihaf and Irish Water planned infrastructure and would require close coordination		the line are being planned by Irish Rail however, so				however, so impact has potential to be eliminated based on timines and coordination. Channel also
Minimise project delivery risk by consideration of the proportionality of option on impacted community	risk of flooding but who may be adversely affected during construction and operation of scheme	Mard 1.D 2021	h Feedback from impacted landowners	Acceptable level of impact to affected privat landowners	e impacted by the construction or operation of the scheme	25 5	Considered to be an important factor in this area	2	during construction so as to ensure infrastruture fits in constrained area.	•	impact has potential to be eliminated based on 1 timings and coordination. 75		however, so impact has potential to be eliminated based on timings and coordination.	5	impacts land which is not at flood risk so there could be some opposition to the option
															Option facilitates and provides flood protection to the
									Option facilitates and provides flood protection to the planned Weterrock UNLE Development		Option facilitates and provides flood protection to the property Watermy's UNAT Development		Option facilitates and provides flood protection to the proposed Waterrock UNAL Development		Option facilitates and provides fleod protection to the proposed Watermook UNIV Development. Option also enroves slaves with the proposed with inference on the project and the proposed within inference of the proposed protection of the Option also facilitates Basehane housing depresentation states and the provides the proposed protection also facilitates Basehane housing depresentation states and the proposed protection of the depresentation of the protection of the proposed protection depresentation of the protection of the protection of the depresentation of the protection of the protection of the depresentation of the protection of the protection of the depresentation of the protection of the protection of the protection of the depresentation of the protection of the protection of the protection of the depresentation of the protection of the protection of the protection of the depresentation of the protection of the protection of the protection of the depresentation of the protection of the protection of the protection of the depresentation of the protection of the protection of the protection of the protection of the depresentation of the protection of the protection of the protection of the depresentation of the protection of the
	Provide opportunities for additional social infrastructure and amenity. Promote health and well being. Enhance	Arup,			Enhance opportunities for other				Option facilitates and provides flood protection to the planned Waterrook LIMA Development. Nowever it clashes with the planned IW wastewater Lead Diversion project and the planned LiMaf infratructure. These projects have a significant wider ranket under		Option facilitates and provides flood protection to the proposed Waterrock LIMA? Development. Option also removes dashes with the proposed IW Watewater Load Oversion project and the proposed Uhal infrantecture. These projects have a significant radius excellent of the project of the proposed Uhal infrantecture.		Option facilitates and provides flood protection to the proposed Waterrock LHAF Development. Option also nemoves dashes with the proposed IW Watewater Load Diversion project and the proposed Lhaf infrastructure. These projects have a significant orders cented under		Libaf infrastructure. These projects have a significant wider societal value.
Maximise wider benefit of project	Provide opportunities for additional social infrastructure and amenity. Promote health and well being. Enhance opportunities for local investment. Catalyst for regeneration of area.	Mard 1.5 2021	Number of other projects enhanced/facilitated by option	d Ensure compatibility with social objectives in Local Area Development Plan	Enhance opportunities for other projects and enable synergies with other projects	10 5	Considered to be an important factor in this area		infrastructure. These projects have a significant wider societal value. 50		Uhaf infrastructure. These projects have a significant sider societal value. 250 Social Score		Lihaf infrastructure. These projects have a significant wider societal value.	50	Option also facilitates Baneshane housing 5 development. 22 Social Score (2
		_	Annual Average Damage (AAD) expressed in			-			Jocai scene 6/2				30031 2009		Social Score 19
Teduce economic damages	Minimise economic risk	2.A 2018	Annual Average Damage (AAD) expressed in , Euro / year, calculated in accordance with the economic risk assessment methods, but with n allowance for social / intargible banefits	AAD is not increased	100% reduction in AAD	24 0.1	AAD for the 55A/675000 Moderate threshold of flooding		Option to provide full protection from design flood risk 22	_	Option to provide full protection from design flood 5 risk 22		Option to provide full protection from design flood risk	2	Option to provide full protection from design flood
							on local road (Castle Rock Ave and L3619), High threshold of								
Minimise risk to transport infrastructure	Minimise risk to transport infrastructure	CIPW, Sept 2.8 2018	, Number and type of transport routes at risk from flooding	No increase in risk to transport infrastructur	Reduce risk to transport infrastructure to zero	10 S	flooding of the rail line and a low threshold of flooding of Dwyers Road	,	Option to provide full protection from design flood		Option to provide full protection from design flood		Option to provide full protection from design flood risk	50	Option to provide full protection from design flood
Minimise risk to utilities information	Minimise risk to utilities infrastructure	CIPW, Sept	Number and type of infrastructure assets at ris	isk	Reduce risk to utility infrastructure to		Dwyers Road Moderate threshold of flooding of WWTP. Professional indement anniari to scretter		Option to provide full protection from design flood		Option to provide full protection from design flood		Option to provide full protection from design flood	50	Option to provide full protection from design flood
Minimise risk to utilities infrastructure	The rest of sources in Altoreture	OPW,	from flooding	No increase in risk to utility infrastructure			Judgement applied to scoring. Considered to be of Minor / Local importance. There is an area of Agricultural Land south of www.	,	risk 300 No increase in the negative impact of flooding on				risk No increase in the negative impact of flooding on		
Manage risk to agriculture	Minimise risk to agriculture	2.D 2018	Agricultural production	no increase in the negative impact of floodin on agricultural production	agricultural production	12 2 60	area of Agricultural Land south of N25.		No increase in the negative impact of flooding on agricultural production 0 Economic Score 632	2	No increase in the negative impact of flooding on agricultural production 0 Economic Score 612		No increase in the negative impact of flooding on agricultural production Economic Score	12	No increase in the negative impact of flooding on agricultural production 0 Economic Score 65
	Provide no impediment to the achievement of water	OPW,					Constant and equal to 5, as per TMN Option Appraisal and MCA		Short-term or intermittent impediment to the achievement of wb objectives. Flow diversion is considered limited impact as will only be operational in extreme events. Potential impact from in-channel		Short-term or intermittent impediment to the achievement of wb objectives. Flow diversion is considered limited impact as will only be operational in extreme events. Potential impact from in-channel		Short-term or intermittent impedment to the achievement of wb objectives. Flow diversion is considered limited impact as will only be operational in extreme events. Potential impact from in-channel		Permanent impediment to the achievement of wb objectives. Change in channel hydromorphology where the Water Rock stream emerges would see an open channel replace a section of the natural stream,
Support the objectives of the WFD	body objectives and, if possible, contribute to the achievement of water body objectives	3.A 2018		Provide no constraint to the achievement of water body objectives.	Contribute to the achievement of water body objectives	25 5	Sept 2018	-2	in extreme events. Potential impact from in-channel works -13	-2	In extreme events. Potential impact from in-channel works -150	-2	in extreme events. Potential impact from in-channel works	150	open channel replace a section of the natural stream, -5 in a new alignment3
							There are no Annexed habitats under the footprint works areas The potential for indirect impacts in terms of aquatic								
									Potential temporary disturbance to Wintering birds.		Potential temporary disturbance to Wintering birds.		Potential temporary disturbance to Wintering birds.		Potential temporary disturbance to Wintering birds.
							habitats in the Estuary was considered. The primary receiving habitat is Sandflats		However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering		However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering		However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering		However can be avoided by timing and suitable mitigation measures. The value of these grazed improved grasslands is relatively low to wintering
	Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and	OPW,		No deterioration in the conservation status	of Improvement in the conservation		receiving habitat is Sandflats and Mudflats. Ex situ potential for Wintering Annexed birds was also considered to be a low		birds given the existing level of farming activity. The score reflects the requirement for control of water		birds given the existing level of farming activity. The score reflects the requirement for control of water		birds given the existing level of farming activity. The score reflects the requirement for control of water		birds given the existing level of farming activity. The score reflects the requirement for control of water
Support the objectives of the Habitats and Birds Directives	enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepoine stones. Avrid dense to and where nearble enhance. Inseliv	5ept 3.8 2018	-	designated sites as a result of flood risk management measures.	status of designated sites as a result of flood risk management sites.	9 1	was also considered to be a low level driver in these options.	-1	quality during construction using suitable mitigation measures0	-4	quality during construction using suitable mitigation measures.	-4	quality during construction using suitable mitigation measures.	,	quality during construction using suitable mitigation -1 measures.
Avoid damages to, and where possible enhance, the fora and fauna of the catchment	features and stepping stones. Avoid damage to, and where possible enhance, legally protected sites / habitats and other sites / habitats of national, regional and local nature conservation	OPW, Sept		No deterioration in the condition of existing sites due to the implementation of flood risk management option	of Improvement in the conservation status of designated sites as a result of flood risk management sites. Creation of new or improvement in condition of existing sites due to the improvement pontion		The areas are of low local		Potential localised loss of low value biodiversity		Potential localised loss of low value biodiversity		Potential localised loss of low value biodivenity areas. Long lengths of new open channel may facilitate new biodiversity opportunities however.		Potential localised loss of low value biodiversity areas. Long lengths of new open channel may facilitate new 1 biodiversity opportunities however. 4
ness and tauna of the catchment	Importance Maintain existing and where possible create new fisheries habitat including the maintenance or improvement of conditions that allow upstream	3.C 2018 CIPW, Sept		management option	management option No loss of fisheries habitat. Improvement in habitat quality/	- 1	blodiversity value.	-2	4	-2	and. 4	1	recoulte new organerary opportunities however.		biodiversity opportunities however. Permanent loss or removal of fisheries habitat within
Protect and where possible enhance fisheries resource within the catchment	improvement of conditions that allow upstream migration for fish species	3.D Sept	-	No loss of integrity of fisheries habitat. Maintenance of upstream accessibility No significant impact on landscape	quantity. Enhanced upstream accessibility	20 1	Low fisheries value.	-1	Short-term minor impacts to non-sensitive water course10	-1	Short-term minor impacts to non-sensitive water course10	-1	Short-term minor impacts to non-sensitive water course.	20	-4 and introduction of short lengths of culverts.
	Protect, and where possible enhance, visual amenity,			designation (protected site, scenic route/amenity, natural landscape form) within zone of visibility of measures.	No change to the existing landscape										
Protect, and where possible enhance, landscape character and visual amenity within the river	landscape protection zones and views into/from designated scenic areas in the river corridor/zone of	CIPW, Sept		No significant change in the quality of existin landscape characteristics of the receiving	form. Enhancement of existing landscape or		(by professional judgement,		Very minor loss of vegetation due to open channel and culvert construction and also from direct defences construction downsream		Very minor loss of vegetation due to culvert construction and also from direct defences		Very minor loss of vegetation due to open channel and culvert construction and also from direct		Minor loss of vegetation due to open channel and culvert construction and also from direct defences,
corridor/zone of influence.	Influence	3.0 2018	-	environment	landscape feature Complete removal of all relevant architectural features, institutions and	7 4	taking account of local advice)	0	defences construction downsream 0	0	construction downsream 0	0	defences construction downsream		-2 open channel and culvert construction downsream
				No increase in the risk to architectural features, institutions and collections at risk	architectural features, institutions and collections from the risk of harm by extreme floods. Enhanced protection and value of architectural features, institutions and collections rating from the implementation of the selected										
Avoid damage to or loss of features, institutions, and collections of cultural heritage importance and their setting and improve their protection from extreme	(i) Avoid damage to or loss of features, institutions and collections of architectural value and their setting and	OPW,		from flooding. No detrimental impacts from flood risk	architectural features, institutions and collections arising from the		Based on the number and type of recorded architectural								
etting and improve their protection from extreme foods	Improve their protection from extreme floods where this is beneficial	Sept 3.F.(i) 2018		management measures on architectural features, institutions and collections.	implementation of the selected measures. Complete removal of all relevant	4 0	features in the area and professional judgment.	0	No known/recorded architectural sites in the area of proposed works.	0	No known/recorded architectural sites in the area of proposed works.	0	No known/recorded architectural sites in the area of proposed works.		No known/recorded architectural sites in the area of proposed works.
				No increase in the risk to archaeological features, institutions and collections at risk from flooding.	by extreme floods. Enhanced protection and value of archaeological features institutions		Based on the sumber and have								
Avoid damage to or loss of features. Institutions and	(II) Avoid damage to or loss of features institutions and			No increase in the risk to archaeological features, institutions and collections at risk from flooding. No detrimental impacts from flood risk management measures on archaeological features. institutions and collections.	archaeological textures, institutions and collections from the risk of harm by extreme floods. Enhanced protection and value of archaeological features, institutions and collections arising from the implementation of the selected		Based on the number and type of recorded archaeolgical features in the area and		No known/recorded archaeological sites in the area of		No known/recorded archaeological sites in the area of		No known/recorded archaeological sites in the area of		No known/recorded archaeological sites in the area of
Avoid damage to or loss of features, institutions, and celections of cultural heritage importance and their setting and improve their protection from extreme	(ii) Avoid damage to or loss of features, institutions and collections of archaeological value and their setting and improve their protection from extreme floods where this into other setting and the setting and the setting and the setting and setting and setting and setting and setting and setting and setting and setting and setting and setting and setting and setting and setting and setting and setting seting setting setting setting setting seting setting	CIPW, Sept			CITEMPATES.	1 0	professional judement.	0	orocosed works. 0 No impact on existing national, regional and local geological sites and no impact on land, sof and geology as a result of flood risk management	0	proposed works. No impact on existing national, regional and local geological lites and no impact on land, soil and geology as a result of flood risk management	0	processed works. No impact on existing national, regional and local geological sites and no impact on land, soil and geology as a result of flood risk management		D oroposed works. No impact on existing national, regional and local geological sites and no impact on land, soil and geology as a result of flood risk management
Avoid damage to or loss of features, institutions, and califictions of cultural heritage importance and their acting and improve their protection from extreme foods	is beneficial	OPW, Sept 3.7.(ii) 2028 Arup,		resource, metriciding and correctorie.	Enhancement of land, soil and bedrock				geology as a result of flood risk management		geology as a result of flood risk management				
floods	(11) Avoid damage to or loss of features, institutions and collections of archaeological value and their stating and improve their protection from extreme floods where this is beneficial Avoid damage to or encoisn of land, soil and solid grology, and improve their protection from extreme floods.	CPW, Sept 3.7.185 2018 Arup, Mard 3G 2021		No increased risk of negative effect on land, soil or solid geology, or of erosion of land or soil, or negative effect on soil ferbility	Enhancement of land, soil and bedrock condition, stability, fertility, economic value	1 2	Baneshane Quarry - geological heritage feature on a county scale	0	measures.		measures.	0	geology as a result of flood risk management measures.		geology as a result of flood risk management 0 measures. 0
floods	is beneficial	CPW, Sept 3.7.185 2028 Anup, March 3G 2021		No increased risk of negative effect on land,	Enhancement of land, soil and bedrock condition, stability, fertility, economic value	1 2	heritage feature on a county scale	0	Potential reduction in groundwater flooding due to	Ů	Potential reduction in groundwater flooding due to	0	Potential reduction in groundwater flooding due to		D measures.
food. Protect land, soil and bedrock and improve their redection from extreme Boofs	is beneficial Aveid damage to or erosion of land, soil and solid goology, and improve their protection from extreme floods.	3.5.(8) 2028 Arup, 3G 2021 Arup, Mard		No increased risk of negative effect on land, soil or solid geology, or of erosion of land or soil, or neestive effect on soil fertility No increased risk of negative effect on	value	1 2	scale	0	Potential reduction in groundwater flooding due to diversion of flood waters to the Owenacurra - but uncertainty on how significant a change this will bring due to kann nature of aquifer so beneficial impact is		Potential reduction in groundwater flooding due to diversion of flood waters to the Owenacurra - but uncertainty on how ugrificant a change this will bring due to kart nature of age/free to beneficial impact is	0	Potential reduction in groundwater flooding due to diversion of flood waters to the Owenacurra - but uncertainty on how significant a change this will bring due to kant nature of aquicties to beneficial impact is		O rressure. O Potential reduction in groundwater flooding due to diversion of flood waters to the downstream of cave system - but uncertainty on how significant a change this will bring due to have nature of aquifer so
food. Protect land, soil and bedrock and improve their redection from extreme Boofs	is beneficial	3.7.(8) 2018 3.7.(8) 2018 Anup, Mard 3G 2021 Anup, Mard 3H 2021	· ·	No increased risk of negative effect on land, soil or solid geology, or of emission of land or soil, or negative effect on soil fertility	Enhancement of land, soil and bedrook condition, stability, fertility, economic value Enhancement of hydroaectory	3 2	scale Realonally important aquifer	2	Potential reduction in groundwater flooding due to diversion of flood waters to the Owenacura - but uncertainty on how significant a charge this will bring	2	Potential reduction in groundwater flooding due to diversion of flood waters to the Owenscurra - but uncertainty on how significant a change this will bring	2	measures. Potential reduction in groundwater flooding due to diversion of flood waters to the Owenacurra - but uncertainty on how significant a change this will bring		0 measures. 0 Potential reduction in groundwater flooding due to diversion of flood waters to the downstream of cave yatem - but uncertainty on how genificant a change
toon Protect Land, soil and bedrock and improve their motinicition from exitence fiteds	In territorial accord damages or ensuine of land, soil and solid geology, and improve their protection from extreme book Accord characes to hobosendow. Accord characes to hobosendow.	CPW, Sept 3.5.18) 2028 Anup, 362 2021 Anup, Mard 314 2021 Anup, Mard		The International of angelite effect on Lind, out or sold goolog, or of ensists of Lind or out or neurophysical strategy of the second strategy of an excessed role of negative effect on holoanslew.	value	3 2	Restonally insortant acuifer 100+ dwellings and Gael Scoll Primary School and presence of hubitab	2	Petercial reduction in groundwater fixeding due to Petercial reduction in groundwater fixeding due to devisite of fixed waters is the Owenaums - but due to hear nature of aquifer to beneficial impact in scored as relatively rener Patiential for temporary adverse noise impacts during the costruction due due to york scores in scheder.	2	Peterstail reduction in groundwater fisciling due to deversion of fiscel waters to the Demoscrarebut anterching on how agridients a change this will bring scored as relatively mercer Potential for temporary adverse noise impacts during the costructions where and the impacts to during the costructions where are the impacts during	2	measure. Partenial induction in groundwater flooding due to diversion of flood waters to the Owenscorra - but uncertainty on how significant to Swendow Impacts source as rulation error Partenial for temporary advence mobe impacts during the contractions due due to waters in close		O measure Potential induction in groundwater flooding due to development of flood waters to the downstream of ow prime. Not optimized by the measurement of the optimized by potential for temporery adverse mole impact during the methical instance of the optimized by Potential for temporery adverse mole impact during the methical measurement on the impact.
tech Intest land, topi and bedrack and improve their restriction from extension filedal. Lond channes to hadrosenbare	Is territorial activity of the service of the service probage, activity of the protection from extreme fixed. Avoid changes to hydrosenillery. Avoid changes to hydrosenillery. Avoid measure shick word have a negative impact on or excell product activity of the service of the servic	3H 2021 Anup, March 3G 2021 3H 2021 Anup, March 3H 2021 Anup, March March March	· · · · · · · · · · · · · · · · · · ·	No increased risk of negative effect on land, soil or solid geology, or of erosion of land or soil, or neestive effect on soil fertility No increased risk of negative effect on	value	3 2 3 2	sole Resonally insortant soufer 100+ dwillings and Gael Scol Primary School and presence of habitats and specie designated as of local importance	-1	Network Patiential Induction In provinduator Ronding due to devision of flood waters to the Overnacure - Just concentration on two significant ad superflue will have due to been relative a seguine to beneficial impact in some an availability retrain the statistically retrain the statistically retrained and the seguine the statistically retrained and the statistical became and the statistical retrained and the provided of the statistical retrained and the provided of the statistical retrained and the statistical retrained and the statistical retrained and the statistical retrained and the statistical retrained and statistical retrained and statis	2	meaning the second seco	2	measure. Potential reduction in groundwater flooding due to diversion of flood waters to the Owenscore - but screening on how applicants a dwarp this will hange due to tark not hange of applies to beneficial impacts is somed as extrained in more Potential for temporary advence noise impacts during the constructions phase due to works excerting in dees Traineder actives associetaries the recovered		One access Preserves
Anoted persongs to trans the set of another set of the	La bandia dan di sanga tau or unioni of land, sui and sulf gening, and dan yan tau protection fore others band Antif Anama tau hushanadhana a nagata mgada na antif Anama ta hushandhana a nagata mgada na Antif Anama subah wada hana a nagata mgada na Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na mga na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama Antif Anama subah wada hana a nagata na di anama subah wada Antif Anama subah wada hana a nagata na di anama subah wada hana subah wada hana subah wada hana a nagata na di anama subah wada hana a nagata na di anama subah wada hana a nagata na di anama subah wada hana subah na di anama subah wada hana a nagata na di anama subah wada hana a nagata na di anama subah	Arup, March		No normani nik of negative affect on land, uni or nalid gesleg, or of answin of land or all or nazione offset an auf freetry his increased nik of negative affect on hostosectore his increased nik of negative affect on all	tohance air	1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	sale Rationally insortant analier 200+ dealings and Gael Scot Inimary School and presence halons and specia dealers constant and equal to 5, as pro- Maliston PES MCA Pranework Marifilication RS MCA Pranework	2 -1	There is a second secon	-1	Material Postarial Information Postaria de la Alteriaria informa esperandonar Destador de la deveraria forda antera ta de Destamana - Sari aurentarior ya hera general de la velación de la velación de la de la deveración de la departe a beneficia forma este antera de autobiente a como del la deveración de la de la deveración de la deveración de la deveración de la de la deveración de la deveración de la deveración de la de la deveración de la deveración de la deveración de de la deveración de la deveración de la deveración de de la deveración de la deveración de la deveración de de la deveración de de de la deveración de de de de de de de de de de	0 2 -1 -1	Tensions Tensio	2	Otherwise Protection (induction to granumentation facilities to a discussion of faced waters to the discussion of a face discussion of the discussion of a discussion
from Protect (and, sail and bedrinsk and improve their exerticities from activation files). Avoid chargers to horizontary. Avoid chargers to horizontary. Avoid chargers in impact to an Avoid chargers which would increase the rate of	Is territorial activity of the service of the service probage, activity of the protection from extreme fixed. Avoid changes to hydrosenillery. Avoid changes to hydrosenillery. Avoid measure shick word have a negative impact on or excell product activity of the service of the servic	3F.41 2028 3F.41 2028 Anup, Margin Margin Margin Margin 31 2021 31 2021 31 2021 31 2021 32 2021 33 2021 34 2021		The International of angelite effect on Lind, out or sold goolog, or of ensists of Lind or out or neurophysical strategy of the second strategy of an excessed role of negative effect on holoanslew.	tohance air	1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	sole Reconsilv insortant acufer 200+ dwellings and Gael Soll Primary School and parsance of habitats and species designated as of local importance. Constant and equal to 3, as per Medison (FRSACA Framework)	2 -1 -1	Particular Medicine Insprondentiar Reading due to diversion of Morel waters to the Desenting due to diversion of Morel waters to the Desentiary. But inspection of Morel waters and the More due to be not nature of applier to beneficial impacts due to read an antibiative more Patterial for transmort applier to beneficial impacts due to more applied and the service association in the antibioticano phase due to works association in the antibioticano phase due to works association in the antibioticano phase due to works association in Childred radeos associated with the indexet generation of antibioticano of Head and the Indexet generation of	2 -1 0	Interesting discription of the second	2 -1 -1 0	Persona Patential relation in genurheaster flashing, as in scorentarity the two significant is alwage the well long due to loave universe. The second second second second and the second second second second second second second Patential for temporary adverse noise impacts during the conduction plane due to work exacuting in clean Exhibited orderse associated second second second second Exhibited orderse associated second second Exhibited orderse associated second	, , ,	Contents Housestin indextation to groundwater Associate data to device the device of the device the set of t

Avoid increasing the vulnerability of the study area t major accidents or disasters	 Avoid increasing the vulnerability of the study area to major accidents or disasters 	Arup, Mard 3L 2021	h	No impact on the vulnerability of the study area to major accidents or disasters	Reduction in the vulnerability of the study area to major accidents or disasters	1 60	0	No presence of high vulnerability establishments	0	No impact on the vulnerability of the study area to a major accident or disaster Environmental Score 215	0	No impact on the vulnerability of the study area to a major accident or disaster Environmental Score 210	0	No impact on the vulnerability of the study area to a o major accident or disaster 0 Environmental Score 172	D	No impact on the vulnerability of the study area to a major accident or disaster 0 Environmental Score 455
Ensure flood risk management options are operationally robust	Ensure Bood nik management options are operationally	OPW, Sept 4.A. 2018	Level of operational risk of option - Dugges of reliance on mechanical, electrical electronic system, or on human intervention, action or decision, for the option to operate o perform successfuly	allocation of adequate resources, could be	No operational risk, i.e., no reliance or mechanical, electrical or electronic systems, or on human intervention,	20		Constant and equal to 5, as per TAM Option Appraisal and MCA Sept 2018	3	Very low operational risk- blockage of flow divension colvery drawnal and colvert at WWTP 200	3	Very four operational Init- biochage of flow diversion outent and culvert at WWTP 10	3	Ney low operational role Madage of New diversion scalent - 2000 with gene diversion between them and calent - 41 WUT7 2000		Noticities operational trub. Monkage of flow diversion phase-off advanced - efforts with operation sharehows them and advanced WWTP 200
Minimum risk of failure of option	Mministernik of failure of option	Anup, Marci 4.8 2021	Minimise consequences of failure of option. In Reduce residual risk by designing out risk whe possible.	Moderate to high, but acceptable and e manageable, level of residual risk sost construction	Negligible inherent safety risk post construction	15		Constant and equal to 5, as per Midleton FRS MCA Framework Modification Note. March 2021	1	Lew residual risk, Le. - Direct definese option, fastere of which would result in localised or motion floading - Rise devision channel option, failure of which would result in localised or minor floading 75		Low residual risk, Lee. - Direct diverses option, failure of which would result in localised or mixor flooding. - Flow diversion outwre option, failure of which would result in localised or mixor flooding. 22		Leve residual risk, i.e. Concet defenses option, faiture of which would result in localised or misor floading Thios devening homefoldwein option, faiture of which would result in treatment present floating 75		Lew residual risk, Le. - Oncet defenses option, failure of which would result is localised or minor flooding. Here devision in herenel option, failure of which would result in localised or minor flooding. 22
The second secon		Arup, Mard 4.C 2021	Gorgatible with relevant SCCAP.	Option to be adaptable and maintain the required standard of protection at acceptable out	Option to be adaptable to multiple adaptation pathways with flexibility to respond to multiple CC scenarios and timelines.	8		Constant and equal to 5, as per Miditoon IRS MCA Pramework Modification Netes, March 2021		Option is adaptable at moderate to significant cost, difficulty and impact. It provides no impediment to future intervention to address future food risk. It is proposed that the flow diversion calvert/future! could be designed using the assumption as future instandard of protocols / rule in address in a future instandard of protocols / rule in address in a future intervention, however there will be an increase in present dar cytopial costs.		Option is adaptable at moderate to significant cost, difficulty and impact. It provides no impactment to future interventions to address future for don'tik. It is proposed that the few denominon collect could be designed using the assumptive apparent to the de- present day that can maintain the required standard of protocolidar / how decision in a falsem servation. Nonverse there will be an increase in present day applied costs.		Option in adoptable at moderate to significant cost, difficulty and impost. It provides no impadiment to future interventions address future foot risk. It is programs that the flow densities colored (based) and be designed on the assumption approach in the present day that can material in the required and address of the site of the required intervented of approach in the site of the site of the intervented of approach in the site of the site of the site of the intervented as a particulars.		Option is adaptable at moderate to superfloaret cost, difficulty and impact. It provides no impactiment to focus interventions address future focus of nk. It is programed that the flow diversion shared could be derayed using the samptive approach in the present of providencial in a failure area. In presente of providencial in a failure areamen. However them will be at increase in present day applied costs.
Mastiniae benefit in case of scheme design exceedan	a	Arup, Mard 4.D 2021	Number and type of additional properties tha would be defended in a design exceedance event (Q2C0 / T1000)	Number of properties at current risk is not increased	Increase in the Standard of Protection for properties that are at risk beyond the scheme SCP (Q100 / T200)	5	5 1	Professional judgement applied to scoring		Option can reduce a significant portion of the residual risk associated with excerdance events (1200) throughout Wetenois provided an assomptive approach. In designing the first diversion channel is taken. It is estimated that crice 30% of properties currently at risk of flooding will be protected bypond the 50°. There is no additional reductions the titlah risk to properties no beyen's road during a titlah excertaince event (Totob) 22		Sprion can reduce a significant portion of the madual mix associated with exceedance events (2000) thoroughout Wearendo provided an association suproversity of the filter devision channel is summity at mix of floading will be prostreted beyond the Soft. There in additional reduction is the total mix to properties on Devert to end channel a total mix to properties on Devert to end channel a total	-	Options can reduce a significant portion of the medical risk monitorial with necessbara events (LODO) hypothypothyteiteres provided in assumptive apprach to despiration plan despiration durante is takawa. Thi an elimited that can SSO of properties currently at skal of floating will be protected beyond the SP. These is no additional reductions that taid risk to properties an Object's radia durary a taidal mark to properties an Object's radia durary a taida		Option can reduce a significant portion of the residual risk associated with necessbara energies (2000) throughout Waterwork portion of an annu program approach to designing the flow devices on dannel is taken. This actimated that can 200 of poperties currently at the off Booling will be produced beyond the Soft. There is no exclusion reductions in the total risk to properties no Owyer's read during a total match to poperties no Owyer's read during a total concentration (TOD). 200
Minimus project differry risk by consideration of the party stateholder interaction and/or existing infeaturchare	rd Minimise interaction with critical infrastructure	Anup, Mard 4.5 2021	h Interaction with concerned stateholders Including utility companies	Acceptable level of interaction with existing	No interaction with critical infrastructure	5		Critical infrastructure in area: Inth Water assets, existing and proposed. Inth Rail existing assets	4	A significant delivery risk to the option being considered is identified. There is interactions with existing and planned infrastructure which may not leave the space required for construction. Multiple Castres detected.	-1	A delivery risk to the option barry considered is benefitied. As undergrined rating consisting is required which would require coordination with trick. Ref. 30 Technical Score 55	-1	A delivery risk to be gratical being considered is described. An indiregratical relevance and the second region of the requires which would require coordination with hink field		A significant delivery nik to the option being considered is identified. As underground railway conserving it requires outside to a second-state required which would require significant coordination with Tit
									sconw	s Testionale MCA MCA Benefit Score 1922 Option Selection Benefit Score 1922 Total Capital Cost 1940 MCA Benefit Cost 1940 (2) Economic Benefit (MC) scot Economic Benefit (MC) scot		Mich Bendit Scott 332 Option Mich Inneh Scott 332 Total Capital Casts (M) 1.60 MCA Bendit Scott 6.07 Total Capital Casts (M) 1.60 MCA Bendit Scott 6.07 Economic Rendit (MO) 1.03 Economic Rendit (MO) 1.03		Related MCA SCORE MCA Restrict som 1864 Option Sektion Restrict Score 1864 Teat Capital Cetal (MR) 22.00 MCA Restrict/Ceta Istain 6.10 Economic Restrict (MR) 5.13 Economic Restrict (MR) 5.13		Instantik MCA SCORE MCA Search som 725 Optics Setterlan search som 1218 Total Capital Cetti MCA Score MCA Search(Cetti Mta) 6.05 Economic Kendlis (MC) 5.12 Economic Kendlis (MC) 5.13 Economic

MCA Scoring pe	formance	
Fully Achieving A	Aspirational Target	
Partially Achievi	ng Aspirational Target	
Exceeding Basic	Requirement	
Meeting Basic R	equirement (No Change)	
Just Failing Basis	Requirement	

Appendix C

Cost Estimates of Options and Emerging Preferred Option

Midleton Flood Relief Scheme Project Cost Estimate for the Options in each Area

Option	Option 1A: Conveyance Improvements and Direct Defences	Option 1B: Direct Defences	Option 1C: Upstream Storage and Direct Defences	
Gross Construction Cost Estimate	€2,058,618.25	€1,720,230.90	€1,868,488.00	
Prelims (15%)	€308,792.74	€258,034.63	€280,273.20	
Unmeasured Items (20%)	€411,723.65	€344,046.18	€373,697.60	
Subtotal	€2,779,134.63	€2,322,311.71	€2,522,458.80	
Archaeology & Environmental (15%)	€416,870.19	€348,346.76	€378,368.82	
Baseline Construction Cost	€3,196,004.83	€2,670,658.47	€2,900,827.62	
Contingency (20%)	€639,200.97	€534,131.69	€580,165.52	
Construction Cost Subtotal	€3,835,205.79	€3,204,790.16	€3,480,993.14	
Land Acquisition (15%)	€479,400.72	€400,598.77	€435,124.14	
Fees and Supervision (10%)	€319,600.48	€267,065.85	€290,082.76	
Art (1% or cap)	€20,833.33	€20,833.33	€20,833.33	
Site Investigation & Surveys	€66,666.67	€66,666.67	€66,666.67	
Capital Cost Total	€4,721,707.00	€3,959,954.78	€4,293,700.05	
Maintenance (NPV)	€823,885.99	€688,458.94	€747,793.37	
Project Cost Total	€5,545,592.99	€4,648,413.72	€5,041,493.42	

Area 2

Option	Option 2A: Conveyance Improvements and Direct Defences	Option 2B: Direct Defences	Option 2C: Upstream Storage and Direct Defences	
Gross Construction Cost Estimate	€1,939,348.04	€1,861,560.44	€1,357,160.44	
Prelims (15%)	€290,902.21	€279,234.07	€203,574.07	
Unmeasured Items (20%)	€387,869.61	€372,312.09	€271,432.09	
Subtotal	€2,618,119.85	€2,513,106.59	€1,832,166.59	
Archaeology & Environmental (15%)	€392,717.98	€376,965.99	€274,824.99	
Baseline Construction Cost	€3,010,837.83	€2,890,072.58	€2,106,991.58	
Contingency (20%)	€602,167.57	€578,014.52	€421,398.32	
Construction Cost Subtotal	€3,613,005.39	€3,468,087.10	€2,528,389.90	
Land Acquisition (15%)	€451,625.67	€433,510.89	€316,048.74	
Fees and Supervision (10%)	€301,083.78	€289,007.26	€210,699.16	
Art (1% or cap)	€20,833.33	€20,833.33	€20,833.33	
Site Investigation & Surveys	€66,666.67	€66,666.67	€66,666.67	
Capital Cost Total	€4,453,214.85	€4,278,105.24	€3,142,637.79	
Maintenance (NPV)	€776,152.49	€745,020.87	€543,153.39	
Project Cost Total	€5,229,367.34	€5,023,126.11	€3,685,791.17	

Area 3

Option	Option 3A: Direct Defences
Gross Construction Cost Estimate	€5,344,068.25
Prelims (15%)	€801,610.24
Unmeasured Items (20%)	€1,068,813.65
Subtotal	€7,214,492.13
Archaeology & Environmental (15%)	€1,082,173.82
Baseline Construction Cost	€8,296,665.95
Contingency (20%)	€1,659,333.19
Construction Cost Subtotal	€9,955,999.14
Land Acquisition (15%)	€1,244,499.89
Fees and Supervision (10%)	€829,666.60
Art (1% or cap)	€20,833.33
Site Investigation & Surveys	€66,666.67
Capital Cost Total	€12,117,665.63
Maintenance (NPV)	€2,138,766.12
Project Cost Total	€14,256,431.75

Area 4

Option	Option 4A: Groundwater Cut-off and Direct Defences	Option 4B: Pumping and Direct Defences	Option 4C: Groundwater Cut-off and Direct Defences with NRRE embankment	Option 4D: Groundwater Cut-off and Direct Defences with NRRE embankment and flood gate across Greenway	Option 4E: Groundwater Cut-off and Direct Defences extending along Greenway
Gross Construction Cost Estimate	€1,342,918.00	€1,151,698.00	€1,459,982.40	€1,324,449.60	€2,096,880.00
Prelims (15%)	€201,437.70	€172,754.70	€218,997.36	€198,667.44	€314,532.00
Unmeasured Items (20%)	€268,583.60	€230,339.60	€291,996.48	€264,889.92	€419,376.00
Subtotal	€1,812,939.30	€1,554,792.30	€1,970,976.24	€1,788,006.96	€2,830,788.00
Archaeology & Environmental (15%)	€271,940.90	€233,218.85	€295,646.44	€268,201.04	€424,618.20
Baseline Construction Cost	€2,084,880.20	€1,788,011.15	€2,266,622.68	€2,056,208.00	€3,255,406.20
Contingency (20%)	€416,976.04	€357,602.23	€453,324.54	€411,241.60	€651,081.24
Construction Cost Subtotal	€2,501,856.23	€2,145,613.37	€2,719,947.21	€2,467,449.60	€3,906,487.44
Land Acquisition (15%)	€312,732.03	€268,201.67	€339,993.40	€308,431.20	€488,310.93
Fees and Supervision (10%)	€208,488.02	€178,801.11	€226,662.27	€205,620.80	€325,540.62
Art (1% or cap)	€20,833.33	€20,833.33	€20,833.33	€20,833.33	€20,833.33
Site Investigation & Surveys	€66,666.67	€66,666.67	€66,666.67	€66,666.67	€66,666.67
Capital Cost Total	€3,110,576.28	€2,680,116.16	€3,374,102.88	€3,069,001.61	€4,807,838.99
Maintenance (NPV)	€537,453.38	€460,924.63	€584,304.08	€530,062.08	€839,198.84
Project Cost Total	€3,648,029.66	€3,141,040.79	€3,958,406.96	€3,599,063.69	€5,647,037.83

Midleton Flood Relief Scheme Project Cost Estimate for the Options in each Area

Area 5

Option	Option 5A: Direct Defences	Option 5B: Upstream Storage	Option 5B-1: Revised Upstream Storage	Option 5C: Optimised Direct Defences and Overpumping	Option 5D: Optimised Direct Defences, Upstream Storage and Overpumping
Gross Construction Cost Estimate	€1,868,980.91	€421,984.00	€346,242.00	€1,255,248.30	€1,054,005.42
Prelims (15%)	€280,347.14	€63,297.60	€51,936.30	€188,287.24	€158,100.81
Unmeasured Items (20%)	€373,796.18	€84,396.80	€69,248.40	€251,049.66	€210,801.08
Subtotal	€2,523,124.22	€569,678.40	€467,426.70	€1,694,585.20	€1,422,907.32
Archaeology & Environmental (15%)	€378,468.63	€85,451.76	€70,114.01	€254,187.78	€213,436.10
Baseline Construction Cost	€2,901,592.86	€655,130.16	€537,540.71	€1,948,772.98	€1,636,343.42
Contingency (20%)	€580,318.57	€131,026.03	€107,508.14	€389,754.60	€327,268.68
Construction Cost Subtotal	€3,481,911.43	€786,156.19	€645,048.85	€2,338,527.58	€1,963,612.10
Land Acquisition (15%)	€435,238.93	€375,000.00	€375,000.00	€292,315.95	€375,000.00
Fees and Supervision (10%)	€290,159.29	€65,513.02	€53,754.07	€194,877.30	€163,634.34
Art (1% or cap)	€20,833.33	€20,833.33	€20,833.33	€20,833.33	€20,833.33
Site Investigation & Surveys	€66,666.67	€66,666.67	€66,666.67	€66,666.67	€66,666.67
Capital Cost Total	€4,294,809.64	€1,314,169.21	€1,161,302.92	€2,913,220.82	€2,589,746.44
Maintenance (NPV)	€747,990.64	€168,883.52	€138,570.58	€502,366.81	€421,826.78
Project Cost Total	€5,042,800.28	€1,483,052.73	€1,299,873.50	€3,415,587.63	€3,011,573.22

Area 6

Aleao	المراجع المراجع المراجع	1	الاستقاد والمتعادية	م ب ب ب ب ب م	
	Option 6A: Flood Diversion Channel /	Option 6B-1: Flood Diversion Culvert	Option 6B-2: Flood Diversion Channel	•	
Option	Culvert - North of Rail line & Direct	South of Rail line & Direct Defences	/ Culvert - South of Rail line & Direct	Culvert to Water Rock Stream &	
	Defences	south of half line & brieff belefites	Defences	Direct Defences	
Gross Construction Cost Estimate	€4,864,152.41	€5,964,010.47	€4,483,506.92	€5,421,971.17	
Prelims (15%)	€729,622.86	€894,601.57	€672,526.04	€813,295.67	
Unmeasured Items (20%)	€972,830.48	€1,192,802.09	€896,701.38	€1,084,394.23	
Subtotal	€6,566,605.75	€8,051,414.13	€6,052,734.35	€7,319,661.07	
Archaeology & Environmental (15%)	€984,990.86	€1,207,712.12	€907,910.15	€1,097,949.16	
Baseline Construction Cost	€7,551,596.61	€9,259,126.25	€6,960,644.50	€8,417,610.23	
Contingency (20%)	€1,510,319.32	€1,851,825.25	€1,392,128.90	€1,683,522.05	
Construction Cost Subtotal	€9,061,915.93	€11,110,951.50	€8,352,773.40	€10,101,132.28	
Land Acquisition (15%)	€1,132,739.49	€1,388,868.94	€1,044,096.67	€1,262,641.54	
Fees and Supervision (10%)	€755,159.66	€925,912.62	€696,064.45	€841,761.02	
Art (1% or cap)	€20,833.33	€20,833.33	€20,833.33	€20,833.33	
Site Investigation & Surveys	€66,666.67	€66,666.67	€66,666.67	€66,666.67	
Capital Cost Total	€11,037,315.09	€13,513,233.06	€10,180,434.52	€12,293,034.84	
Maintenance (NPV)	€1,946,697.51	€2,386,875.11	€1,794,358.20	€2,169,943.88	
Project Cost Total	€12,984,012.60	€15,900,108.17	€11,974,792.72	€14,462,978.72	

Final | 11 July 2023 | Ove Arup Partners Ireland Limited Appendix C | Project Cost Estimates of Options and Emerging Preferred Option

Midleton Flood Relief Scheme Emerging Preferred Option Project Cost Estimate

Area	Area 1 – Tír Cluain to Willowbank	Area 2 – Northern Relief Road to Riverside Way	Area 3 – Town Centre and Bailick Road	Area 4 – Lauriston Estate / Rugby Club / East of IDL	Area 5 – Ballinacurra
	WINOWDANK	to Riverside way	Ballick Road	Option 4E:	
	Option 1B:	Option 2B:	Option 3A:	Groundwater Cut-off and Direct	Option 5B-1:
Option	Direct Defences	Direct Defences	Direct Defences	Defences extending along	Revised Upstream Storage
				Greenway	
Gross Construction Cost Estimate	€1,975,542.64	€1,056,942.83	€10,635,913.98	€2,698,287.09	€679,859.33
Prelims (15%)	€296,331.40	€158,541.42	€1,595,387.10	€404,743.06	€101,978.90
Unmeasured Items (20%)	€395,108.53	€211,388.57	€2,127,182.80	€539,657.42	€135,971.87
Subtotal	€2,666,982.56	€1,426,872.82	€14,358,483.87	€3,642,687.57	€917,810.10
Archaeology & Environmental (15%)	€400,047.38	€214,030.92	€2,153,772.58	€546,403.14	€137,671.51
Baseline Construction Cost	€3,067,029.95	€1,640,903.74	€16,512,256.45	€4,189,090.70	€1,055,481.61
Contingency (20%)	€613,405.99	€328,180.75	€3,302,451.29	€837,818.14	€211,096.32
Construction Cost Subtotal	€3,680,435.94	€1,969,084.49	€19,814,707.74	€5,026,908.85	€1,266,577.94
Land Acquisition (15%)	€460,054.49	€246,135.56	€2,476,838.47	€628,363.61	€360,000.00
Fees and Supervision (10%)	€306,702.99	€164,090.37	€1,651,225.64	€418,909.07	€105,548.16
Art (1% or cap)	€25,000.00	€25,000.00	€25,000.00	€25,000.00	€25,000.00
Site Investigation & Surveys	€80,000.00	€80,000.00	€80,000.00	€80,000.00	€80,000.00
Capital Cost Total	€4,552,193.42	€2,484,310.43	€24,047,771.85	€6,179,181.52	€1,837,126.10
Maintenance (NPV)	€790,638.04	€423,002.37	€4,256,632.10	€1,079,889.84	€272,088.61
Project Cost Total	€5,342,831.47	€2,907,312.80	€28,304,403.95	€7,259,071.36	€2,109,214.71
Sub Total per Area	€5,400,000.00	€3,000,000.00	€28,400,000.00	€7,300,000.00	€2,200,000.00
Total]	€46,300,000.00