



RIVER BRIDE (BLACKPOOL) CERTIFIED DRAINAGE SCHEME

ENVIRONMENTAL IMPACT STATEMENT

- VOLUME 1 -

NON-TECHNICAL SUMMARY

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In Association With:



NON-TECHNICAL SUMMARY

Introduction to the River Bride (Blackpool) Certified Drainage Scheme

This Environmental Impact Statement (EIS) has been prepared by Ryan Hanley in association with McCarthy Keville O'Sullivan Ltd. on behalf of the Office of Public Works (OPW). The Office of Public Works (OPW) is the lead agency for flood risk management in Ireland. The coordination and implementation of the Government's policy on the management of flood risk in Ireland, in conjunction with its responsibilities under the Arterial Drainage Acts, 1945-1995, form one of the four core services of the OPW.

The proposed scheme will consist of a combination of flood walls, culverting a section of open channel, bridge replacement, embankment construction and other minor works. The Preferred Option will be designed to cater for the 1% Annual Exceedance Probability (AEP) flood event (also known as the 100 year flood event). The design of the proposed works has considered the future adaptability of the scheme for the potential impacts of future climate change in accordance with Office of Public Works guidance in relation to climate change and also includes an allowance for freeboard.

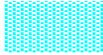
Initially, the River Bride (Blackpool) Certified Drainage Scheme formed part of the greater Lower Lee Flood Relief Scheme. A constraints study was carried out as part of this larger project. The Study Area at this constraints study stage was described as 'the channel, floodplain and immediate surrounding areas of the River Lee from the Inniscarra Dam extending along the main channel of the river'. When the River Bride (Blackpool) Certified Drainage Scheme was pursued as a separate project to the Lower Lee Flood Relief Scheme, the Study Area for the proposed scheme encompassed a large area covering the entire catchment of the River Bride (including its tributaries, the Glenamought and the Glen) in order to allow for the consideration of all potential scheme options and their various impacts on the receiving environment (Figure 1.1). For most studies conducted as part of this EIS, the Study Area was reduced to the channel and immediate surrounding areas of the River Bride extending from downstream of Kilnap Bridge, downstream through Blackpool, to the confluence with the River Lee at the Christy Ring Bridge. The Study Area for each aspect of the receiving environment is defined in each chapter of the EIS in order to clarify the extent of the area assessed for impacts relating to the proposed works.

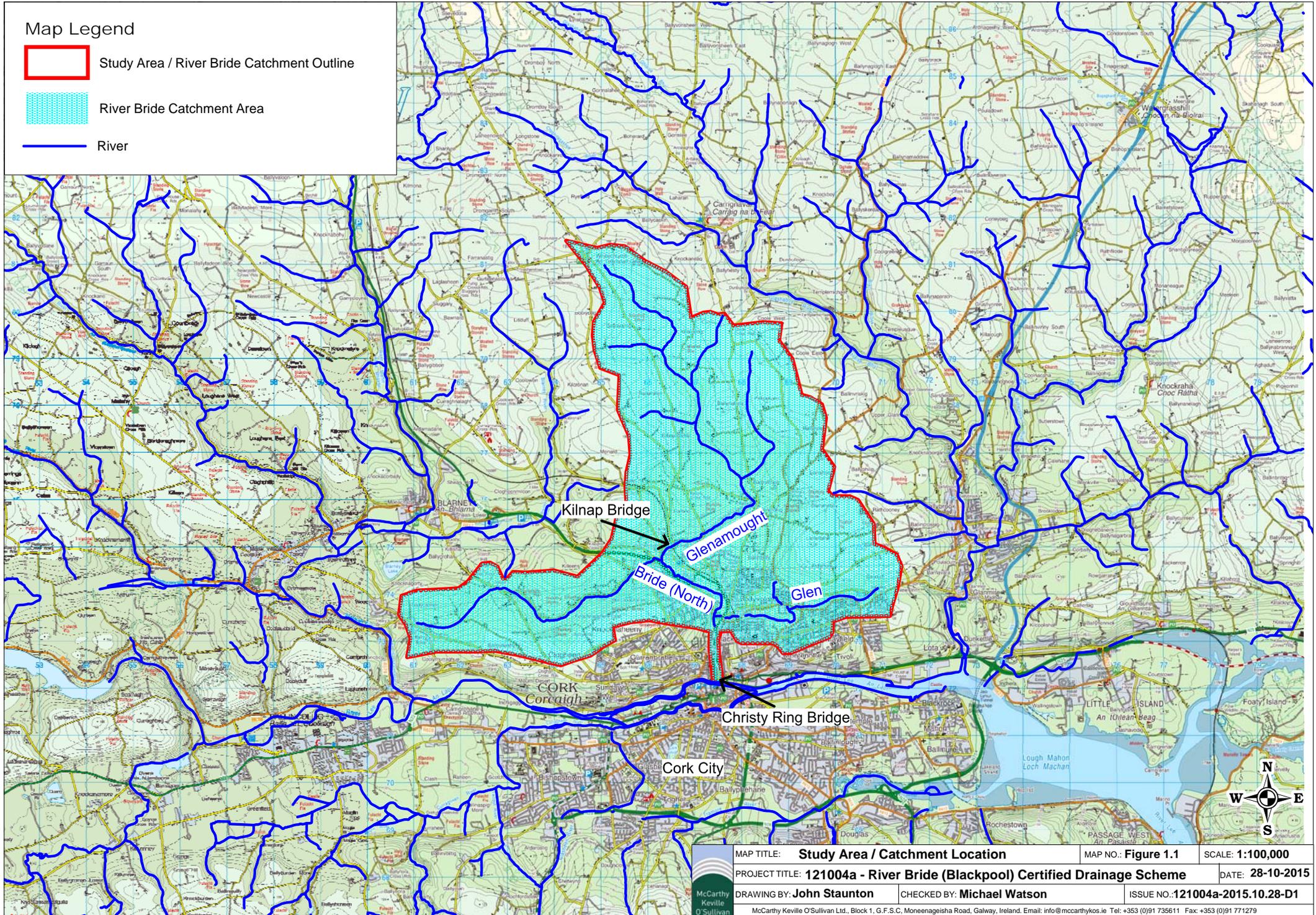
Scheme Background

The site of the proposed drainage works is located almost completely within the environs of Cork City, with a small part of it located within the townlands of Killeens and Rathpeacon County Cork. The overall study area, which covers the full catchment area for the River Bride (North) extends into both Cork City and County. Where the 'site' is referred to in this Environmental Impact Statement (EIS), this refers to the Study Area for the assessments undertaken in order to prepare the EIS. The proposed development site is accessed via several routes along the length of the works. Various local roads provide most of the direct site access, while the N20 national road runs in a northwest-southeast direction near the site. In addition, the R535 regional road approaches the eastern side of the study area.

The Grid Reference co-ordinates for the approximate centre of the catchment study area are E168,000 N76,000. The land within the Study Area falls generally towards the river Bride and its tributaries, the Glenamought and Glen Rivers. The Rivers have a relatively flat gradient within the Cork City area, where

Map Legend

-  Study Area / River Bride Catchment Outline
-  River Bride Catchment Area
-  River



	MAP TITLE: Study Area / Catchment Location	MAP NO: Figure 1.1	SCALE: 1:100,000
	PROJECT TITLE: 121004a - River Bride (Blackpool) Certified Drainage Scheme	DATE: 28-10-2015	
	DRAWING BY: John Staunton	CHECKED BY: Michael Watson	ISSUE NO: 121004a-2015.10.28-D1
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the proposed works will take place. The culverted system in Blackpool has been incrementally constructed since the early the 1980s as part of the Glen-Bride-Kiln River Improvement Scheme which was commissioned by Cork Corporation in 1981. There has been an extensive history of flooding in the Blackpool area of Cork City in recent years. Flooding is primarily due to heavy rainfall in the catchment of the Bride River and of its tributaries, the Glenamought and Glen Rivers. Prior to the early 2000s, the primary source of flood risk came from the Glen River, while after this time main source of flood risk has been the River Bride. The risk of flooding may increase with time. Future changes, which have the potential to affect the risk of flooding include:

- Climate change resulting in higher rainfall
- Geomorphological processes, such as (i) Sedimentation transport, which affects the area of conveyance of the river channel and (ii) Erosion
- Development within the catchment of the Bride River, which does not conform with the principles of Sustainable Drainage, and which adversely affect the response of the catchment to rainfall
- Changes in land use, including forestation and land drainage

The following steps have been completed in the design and assessment process:

- Constraints Study
- Hydrology Study
- Hydraulic Modelling
- Site Investigation
- Flood Risk Assessments
- Selection of Preferred Option
- Appropriate Assessment Screening
- Cost Benefit Analyses
- Environmental Impact Assessment

The possible flood risk management (FRM) methods were initially screened to identify those that would be applicable and viable considering the risks to society, the environment, cultural heritage and the economy and the objectives of the flood risk management plan for the project. The potentially viable options were developed so that they could be evaluated in more detail. This involved hydraulic modelling of options where flood levels and extents had to be considered. The options were assessed against the flood risk management objectives with the use of local weightings. The preferred option (Option 4: Conveyance improvements and direct defences (with culvert through Orchard Court)) was then identified following discussion with the OPW and steering group. This option was marginally the most favourable in terms of MCA benefit/cost ratios, MCA Benefit Score and Option Selection Benefit Score. It also had the second strongest cost benefit ratio of the options assessed (after the storage option). When this option was reviewed holistically in the context of the other options, it was clear that this option had the least amount of drawbacks while still achieving the objectives of the project. In addition, there was no viable alternative to the culvert to address the concerns of the local community. Consultation in relation to the project has been completed on a number of occasions at various stages in the design process. These have included broad general consultation at the Constraints Study stage and an associated Public Information Event and Questionnaire. Subsequently, the emerging preferred option was presented to the public in another

Information event in Blackpool and formal scoping as part of the Environmental Impact Assessment process was undertaken.

Description of the Scheme

The proposed works for the River Bride (Blackpool) Certified Drainage Scheme will comprise the following:

- Site investigation,
- Construction of new culverts (c0.5km),
- Replacement of existing bridges/ culverts,
- Construction of new flood walls/ earthen embankments (c2km, see table below),
- Constructing bridge parapets,
- Local channel widening of the River Bride over approximately 80m,
- Construction of a sedimentation trap on the left bank of the River Bride at the Sunbeam Industrial Estate,
- Removal of approximately 100m of existing culvert and restoration of open channel (River Bride) at this location,
- Construction of a new trash screen and roughing screens, and removal of existing trash screens on the River Bride, and the Glen and Glenamought Rivers,
- Modifications to the existing foul and surface water collection networks in the vicinity of the proposed works, including construction of pumping stations, in order to prevent flooding,
- Removal of an existing sluice structure in the channel of the River Bride to the rear of the Dulux factory,
- Localised regrading of ground levels to facilitate pedestrian/ vehicular access to and around flood defences, or to redirect overland surface water flow paths,
- Erection of fencing and access gates and boundary treatment,
- Introduction of a flow control structure on the entrance to the Brewery culvert on the River Bride and the Spring Lane culverted branch of the River Glen, and
- Regular maintenance of the river channel/ culverts (c6.2km) and pumping stations.

The scheme will include construction of new flood walls/ earthen embankments as follows:

Location of Defence	Flood Defence Type	Height of Defence (m)
Woodview (Glenamought River), downstream of the railway viaduct on the Cork-Limerick railway line.	137m of earthen embankment.	1.1m above existing ground levels (typically)
"Rose Cottage" [adjacent to the Lower Killeens Road (River Bride)].	122m of flood wall.	1.7m above existing ground levels (typically)
North and West of the Commons Inn Hotel.	31m of flood wall.	0.45m above existing ground levels
North and West of the Commons Inn Hotel.	105m of earthen embankment.	0.8m above existing ground levels (typically)

Location of Defence	Flood Defence Type	Height of Defence (m)
Bride Villas (Fairhill Stream)	74m of flood wall	1.2m above existing ground levels (typically)
Right bank of the River Bride between Bride Villas and the 'Topaz' filling station	244m of flood wall	0.8 / 1.34m above existing ground levels (varies)
Right bank of the River Bride between the Dulux factory and the Sunbeam Industrial Estate (raising existing wall)	387m of flood wall	0.35 / 0.68m above existing ground levels (varies)
Left bank of the River Bride between the Dulux factory and the Sunbeam Industrial Estate (raising existing wall)	330m of flood wall	Height varies significantly along the length (up to 1.27m above existing ground level). Refer to Appendix 3A for heights of individual sections.
Right bank of the River Bride between the Dulux factory and the Sunbeam Industrial Estate (new wall)	139m of flood wall	0.93m above existing ground levels (typically)
Left bank of the River Bride between the Dulux factory and the Sunbeam Industrial Estate (new wall)	223m of flood wall	0.5 / 0.88m above existing ground levels (varies)
Blackpool Retail Park, along the left river bank at the location of a proposed trash screen.	115m of earthen embankment.	1.15m above existing ground levels (typically)
On the left bank of the River Bride alongside to the Blackpool Retail Park/ Heron Gate and River House.	212m of flood wall.	Height varies significantly along the length (up to 1.2m above existing ground level). Refer to Appendix 3A for heights of individual sections.
On the left bank of the River Bride between the Commons Road (N20) and the carpark of the Blackpool Shopping Centre.	Repair and/or reconstruct existing river wall to flood defence level (45m)	1.53m above existing ground levels (varies)

Construction works will be preceded by geotechnical investigations. The construction works themselves will last approximately eighteen months and will be subject to the following programme constraints:

- Instream works (include preparatory work) on all watercourses supporting salmonids will be undertaken from May to October (inclusive) and in consultation with Inland Fisheries Ireland to avoid accidental damage or siltation of spawning beds.

- To avoid impacting on bird nesting sites, the vegetation removal within the defined working area will not be carried out during the peak bird nesting season of March to August (inclusive) prior to the onset of works.
- Christmas non-working time is from the beginning of the second week of December to the end of the second week of January.

The estimated cost of the River Bride (Blackpool) Certified Drainage Scheme is € 8.5M, excluding VAT, and Non Contract Costs. The total project budget is currently estimated at € 14M, excluding VAT.

Human Beings

It has been decided to define the Study Area for the Human Beings Section of this EIS as all those DEDs in which the EIS Study Area is located. The site of the proposed development lies within the Commons, Fair Hill C, Farranferris A, The Glen A, The Glen B, Blackpool A, Blackpool B, Whitechurch and St. Marys DEDs. The total Study Area has a combined population of 23,002 persons, and comprises of a total land area of 53.63 square kilometers. The major settlement within the Study Area is Blackpool, though most of the study area is within the environs of Cork City.

If the proposed development were not to proceed, the opportunity to protect Blackpool and surrounding areas in Cork City from future flooding events would be lost. The construction phase of the proposed development will last approximately 18 months. Potential impacts from the project are both positive and negative, and range both from short term to long term and from insignificant to slight

Many construction workers and materials will be sourced locally, thereby helping to sustain employment in the construction trade, and an increase in household spending and demand for goods and services in the local area. There will also be an influx of skilled people into the area, bringing specialist skills for both the construction and operational phases that could result in the transfer of these skills into the local workforce, thereby having a long-term positive impact on the local skills base. There is also the potential for short term moderate negative impact on economic activity due to the proposed construction activities. This would predominantly be as a result of traffic and access issues which could have the potential to reduce footfall into local businesses, with noise and dust from the works adding to this impact on local businesses. Angling does not form a significant part of the industry in Blackpool, and any impacts the proposed works will have on tourism will be imperceptible. Potential increases in noise and dust levels, traffic issues and temporary impacts on visual amenity related to the works are likely to deter and/or disturb visitors during the construction phase.

A traffic management plan (such as rolling traffic management) will be prepared and implemented for the duration of the works in order to ensure that any impacts on traffic mobility are minimised. This will also result in a minimised potential impact on local businesses, as traffic management will only implement restrictions to local businesses only when necessary and only for the shortest possible time. In addition, works will be limited to normal working hours, and will account for peak business periods, such as the Christmas shopping period. Therefore, the residual impacts will be short term and slight.

There will be an increase in noise levels in the vicinity of the proposed development site during the construction phase, as a result of machinery and construction work. These impacts will be short-term in

duration on any particular day and temporary (for the duration of the construction phase). Construction noise at any given noise sensitive location will be variable throughout the construction project, depending on the activities underway and the distance from the main construction activities to the receiving properties. Best practice measures for noise control will be adhered to onsite during the construction phase of the proposed development in order to mitigate the slight short-term negative impact associated with this phase of the development. Impacts on each service will vary, but overall the proposed drainage scheme will have a short-term moderate negative impact on services.

Flora and Fauna

The location of the proposed works is in a largely urbanised area. The upper reaches of the Bride (north), close to its confluence with the Glenamought River and within the vicinity of North Point Business Park are the least urbanised sections of the river. This section of the river is short and features a riparian zone containing Scrub (WS1), open grassy areas categorised as Dry meadow and grassy verge (GS2), amenity grassland (GA2), improved agricultural grassland (GA1), hedgerow (WL1) and buildings and artificial surfaces (BL3) and Mature treelines (WL2).

Downstream of Commons Inn, the river flows through a series of operational and derelict industrial areas and is typically retained by flood walls. Riparian species here are more typical of waste ground. Further downstream habitats adjacent to the Bride (north) within the works area include recreational parkland including scattered trees and amenity grassland categorised as scattered trees and parkland (WD5).

The Glenamought River is a less modified river than the Bride (North), flowing through rural areas for much of its length. The river downstream of the Glenamought viaduct flows through an area of mixed broadleaved woodland (WD1), amenity grassland (GA2) and built land (BL3).

Small localised stands of *Ranunculus* sp. with very low cover, *Fontanalis* moss with low cover and *Calitriche* sp. with low cover were recorded as present on the River Bride and the Glenamought River. While these examples of Floating River Vegetation habitat exist, the percentage cover is low and therefore they are not considered good examples of the habitat. Within the Bride (north) and Glenamought rivers the Floating River Vegetation was not of Annex I habitat quality given the extent of fragmentation.

Japanese knotweed and giant rhubarb, were recorded in the works area for the Blackpool, Japanese knotweed is common along the Bride (north) and Glenamought river channel

A low diversity and abundance of fish species was recorded from the study area River Lamprey, were recorded in low numbers in both the Bride River (North) and The Glenamought River. Brown Trout was the most frequently recorded species throughout the Bride (north) and in the Glenamought River this species is abundant. European eel was recorded in the Bride (north) in low numbers.

The river and surrounding vegetation provide Otter and Kingfisher foraging habitat. Kingfisher was recorded on the Glenamought River, whereas Otter was recorded along the Bride (north). All bat species are protected under Annex IV of the EU Habitats Directive and some are likely to use the area for foraging.

The impact of the works on habitats, flora and fauna is considered slight for most species. However the impact on aquatic species and their habitat namely brown trout, lamprey and eel is significant due to the permanent loss of instream habitat as a result of culverting, sediment traps and maintenance regiments.

Mitigation measures will minimise the impact on fisheries from the construction phase, however the permanent loss of habitat cannot be mitigated in the context of this assessment. Compensatory measures will be carried out in agreement with IFI with regard to salmonid habitat. However impact on Fisheries within the Bride (North) catchment remains a Permanent Significant Negative Impact.

Screening for Appropriate Assessment (AA) under Article 6(3) of the EU Habitats Directive has been completed and is included in Appendix 5. The following summarises the information from the AA Screening Document. The nearest Natura 2000 sites (cSAC's or SPA's) are:

- Great Island Channel SAC (Site Code:004219)
- Cork Harbour SPA (Site Code 004030)

Cork Harbour SPA is located >5km downstream of the works area. The SPA site comprises most of the main intertidal areas of Cork Harbour designated for its overwinter bird species which occur there. Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl, for which it is amongst the top five sites in the country.

The Great Island Channel SAC is located >10km downstream of the works area. It stretches from Little Island to Middleton, with its southern boundary being formed by Great Island. The site is a Special Area of Conservation (SAC) selected for Tidal Mudflats and Sandflats and Atlantic Salt Meadows.

The Appropriate Assessment screening concluded that impacts on the Great Channel Island SAC and Cork Harbour SPA could be precluded on the basis of their distance (>5km downstream) from the proposed Drainage Scheme at Blackpool and the nature and scale of the proposed works, its design and mitigation measures.

Soils and Geology

Work carried out to date on the project has included a preliminary ground investigation which consisted of boreholes, trial pits and slit trench excavations spread throughout the Study Area.

The majority of the Study Area is underlain by Devonian "Old Red Sandstone" rocks which comprises the Ballytrasna Formation purple mudstone and sandstone and Gyleen Formation sandstone with mudstone and siltstone. A portion of the Study Area to the north of Blackpool is underlain by Old Head Sandstone Formation which comprises flaser-bedded sandstone and minor mudstone. Another portion of the study area to the south is underlain by Cuskinny Member which comprises flaser-bedded sandstone and mudstone. The bedrock in the Study Area is primarily overlain by made ground, till derived from mixed Devonian sandstones, and alluvium. There are no active quarries within the Study Area.

The findings of the ground investigation, which was carried throughout the proposed Study Area are broadly in line with the bedrock and soils description described above. Bedrock encountered in rotary core boreholes in the study area comprised purple/brown Mudstone and purple Siltstone and Sandstone

with quartz veining. The works will involve excavation of approximately 13,700m³, however the permanent impacts on the above soils and geology are considered imperceptible.

The sediment controls proposed as part of the scheme will affect the hydromorphology of the river most significantly between the proposed sediment trap at the Sunbeam Industrial Estate and the existing culvert at Old Commons Road, limiting sediment deposition over a distance of approximately 1km incorporating culverts and open channel. In addition, the proposed sediment controls will reduce the sediment contribution from the catchment of the River Bride to the intertidal zone of the River Lee downstream of the point of confluence at Christy Ring Bridge (N20). The impact on river channel hydromorphology is considered moderate to significant, however the significant negative impact is localised to a 1km section of channel downstream of the sediment trap and upstream of Blackpool Church, including the newly culverted section. Sediment controls upstream of Commons Inn, which have been included in the scheme on a provisional basis, have the potential to enhance natural sediment controls at this location and over the stretch of river downstream to the sediment trap at Sunbeam (a total length of 1,160km) and promote more diverse channel morphology as a result.

Water, Hydrology and Hydrogeology

The study area encompasses three major water courses: the Bride (North), the Glenamought and the Glen. The total catchment area upstream of Blackpool Village is c40km².

The Bride (North) rises in the townland of Ballycannon, near Healy's Bridge, before flowing in an easterly direction towards Cork City. It is the most easterly tributary of the River Lee joining it east of Ovens. The Glenamought River rises in Whitechurch and flows in a southerly direction before making an abrupt right-turn in the townland of Ballincrokig. The Bride (North) and the Glenamought meet each other in a culverted system at the North Point Business Park on the N20. The Glen River flows in a westerly direction from Mayfield, through the Glen River Park, before entering a culvert under Spring Lane. It then merges with the Bride (North) in a large culvert junction under Madden's Buildings, 100m downstream of Blackpool Church. Downstream of the confluence of the Bride (North) and the Glen, the watercourse has traditionally been known as the Kiln River. The Kiln River discharges to the River Lee at Christy Ring Bridge.

Surface water quality at sites on the River Bride (North) were indicative of Q3-4 moderate status, slightly polluted water. However the Glenamought River is rated as Q4 unpolluted, good status water quality. Impact on water quality will be limited to the construction phase and short term in nature. With proper mitigation in place for the protection of watercourse during construction this impact will be minimal.

As noted above, the Study Area is underlain by Devonian Old red sandstone with dinantian mudstone and sandstone. The site is locally important aquifer with bedrock which is moderately productive only in Local Zones. Groundwater flows through fractures, fissures or joints in the bedrock. The groundwater body is generally covered by till derived from its sandstone parent material. There are numerous substances that will be used during the construction phase such as fuel, oil, lubricants, cement, silt, soil and other hydrocarbons which have the potential to pollute ground water. Washing of construction vehicles and machinery also poses a risk of polluting ground water. The impacts to hydrogeology as a result of the River Bride (Blackpool) Certified Drainage Scheme are temporary and not significant. Any impacts associated with the scheme will occur during the construction or maintenance phase. Taking into account standard pollution control measures, it is considered that the impact will constitute a Negligible Impact.

There has been a history of extensive flooding in the Blackpool area of Cork City in recent years. The River Bride (Blackpool) Certified Drainage Scheme proposes a combination of flood defence measures at specific locations and a rigorous and organised channel maintenance programme through the reach of the catchment. The River Bride (Blackpool) Certified Drainage Scheme improves flood protection with the provision of a suite of measures including replacement of culverts, embankment works and defence wall improvements and therefore reduces the risk of water levels overtopping the bank and flooding the surrounding area.

Air Quality & Climate / Noise & Vibration

The proposed works will not have any air quality or noise and vibration impact during its operational phase. As a result, it is only considered necessary to assess the potential noise and vibration impact on the surroundings during the construction phase. The site of the proposed development lies within Zone B, which represents Cork city and its environs. County Cork has a temperate oceanic climate, resulting in mild winters and cool summers.

During the construction phase, noise impacts at all receptors will be temporary and localised. At most of these, impacts will be imperceptible. At a small number of dwellings, particularly those immediately adjacent to dredging or embankment construction works, impacts will range from slight negative to noticeable negative. Given the benefit which will accrue to these dwellings in particular, the overall long term impact is expected to be positive. Vibration impacts are expected to be imperceptible where pressed-in piles are used. Any other piling methods are likely to result in temporary community-wide impacts, ranging from noticeable negative to substantial negative depending on separation distance.

In order to ensure that no dust nuisance occurs, a series of measures will be implemented which include: cleaning, washing/watering and maintaining roads as appropriate, restricting speeds on hard surfaces and covering any vehicles delivering materials with tarpaulin at all times to restrict the escape of dust. Noise emissions associated with the construction phase will in general be satisfactory at most receptors. At each work zone, operations will be confined to a relatively short period, extending to several months at most. Apart from a small number of exceptions, noise emissions at each zone will comply with the daytime guideline limits. Many potential noise impacts may be readily mitigated by erecting hoarding between the operations area and nearby receptors. For others, it is recommended that the contractor liaises with the occupants of these dwellings prior to undertaking works. With respect to sheet piling, no mitigation measures are considered necessary where pressed-in piles are used. There are no residual impacts expected on air quality and climate from the proposed development. Noise and vibration impacts during the construction phase, inclusive of mitigation, are expected to be temporary, localised and imperceptible at most locations. At dwellings close to proposed works zones, particularly adjacent to dredging and embankment construction areas, impacts are likely to be slight negative to noticeable negative.

Landscape

There are a number of proposed types of flood defence works and these types of works and locations vary throughout the Study Area. Likewise, the impacts of these works vary and range from imperceptible impacts where there is little change, to Moderate impacts in some areas where works are more apparent and result in greater changes to the visual environment.

Impacts are both positive and negative. Negative impacts include vegetation removal and the construction of flood walls and a trash screen. Positive impacts are predicted in areas such as Orchard Court which will benefit from an improved public realm and openness of views while maintaining access to the Old Commons Road. The extended plaza adjacent to Blackpool Church also represents a positive impact on the urban fabric.

The most noticeable locations of the works, where they will be noticed by the largest amount of people are likely to be in the areas of Blackpool Retail Park, Orchard Court and Blackpool Church. The height of the walls allows the retention of views in most areas, and the extent of vegetation to be removed will be minimised where possible. In general the impacts will be localised and only visible in the immediate vicinity of the works, and in most cases the proposed changes are consistent with the character of the environment.

Cultural Heritage

The proposed scheme will primarily involve a series of interventions along the line of the River Bride as it extends through a study area dominated by commercial/industrial premises in the north end while the south end extends through the centre of Blackpool village. This area was developed as one of the main early industrial centres on the outskirts of the city during the 18th and 19th centuries. The siting of various water-powered industries in this area was largely due to the presence of the River Bride, which provided a consistent water supply not afforded by the tidal channels of the River Lee within the low-lying city centre. The study area has been extensively impacted by modern road, commercial and residential schemes during recent decades and these have resulted in the widespread removal of the historical industrial building stock within the area. The channel of the River Bride has also been subject to widespread modern impacts including the installation of concrete channels/culverts, diversion channels and the replacement of masonry bridges with modern concrete structures. The section of the watercourse within the study area has also been subject to cleaning projects in recent decades many of which were undertaken following flooding events.

Three sites within the study area can be found on the Record of Monuments and Places and these are the two former mills (a former flax mill at the site of the current Sunbeam Industrial Estate and a former flour/corn mill downstream of the Viaduct) and a distillery overlooking Madden's Buildings.

In addition to these archaeological sites, Cork City Development Plan lists five protected structures within the study area for the scheme: James Barry House (PS666), The Church of the Annunciation (PS1139), Madden's Buildings (PS491), Kilnap House (PS616) and Kilnap Viaduct (PS617). The proposed scheme will not result in any direct physical impacts on or any material alteration to any of these structures although elements of the proposed works will be undertaken in their vicinity. Five of the buildings in the general environs of the proposed scheme are included in the National Inventory of Architectural Heritage (NIAH).

The Blackpool Village Architectural Conservation Areas (ACA) as defined in the Cork City Development Plan 2014 encompasses the area centred on the main thoroughfare running south-north from Old Chapel Lane and Cathedral Street to Thomas Davis Street and the Link Road. It is bounded to the east by the western boundary of Watercourse Road and to the west by the rear of properties fronting onto the area's central spine of Gerald Griffin Street, Great William O'Brien Street and Thomas Davis Street. It also takes in the terraces and narrow laneways of the area's southwest section radiating out from Farren Street, the

buildings fronting onto Seminary Road, Arthur Villas and Foley's Row to the east of Watercourse Road, and the buildings to the east of Thomas Davis Street.

Generally, the alleviation of flooding events will reduce potential flood damage to Protected Structures and the building stock within the Blackpool ACA, which is considered a positive impact of the scheme on Cultural Heritage in the area, however it is noted that without any mitigation in place, the scheme has the potential to cause significant impact on unrecorded archaeology, for example in the channel of the River Bride and moderate negative impacts to other Cultural Heritage features.

Mitigation measures will include archaeological monitoring of the works areas and in the case of the Sunbeam Industrial Estate, pre development testing of the works area. In the event that any potential features of architectural and/or archaeological heritage are encountered in any areas the Archaeologist will consult with the appropriate authorities in order to determine further mitigation measures.

Following implementation of these mitigation measures, the scheme has the potential to result in no more than a slight permanent negative impact on the Cultural Heritage features described above.

The proposed construction of a flood defence embankment within the garden of Kilnap Glen House will not physically impact on any of the protected cultural heritage structures, or curtilage structures, within the property. The proposed creation of an earth embankment within the garden is deemed consistent with a landscaped garden intervention and will not create any material alteration to the protected structure. Neither will the replacement of the masonry bridge structure will materially impact on the character of the protected structure. The works will also have a neutral impact on the setting and character of the Kilnap Viaduct and Bridge structures, any associated curtilage features, nor will the scheme materially impact on the character of the Church of the Annunciation, Madden's Buildings or any associated curtilage features.

Material Assets

Material assets are generally considered to be the physical resources in the environment, which may be of human or natural origin. This chapter details the impact of the proposed River Bride (Blackpool) Certified Drainage Scheme on these resources, namely transport infrastructure, subterranean infrastructure, traffic and the management of waste.

The proposed scheme, comprises mainly of works to and in the vicinity of the River Bride North and Glenamought River. As such, potential impacts to material assets are restricted to these areas. The proposed scheme will have potential to impact on the following:

- Roads Network (incl. increased traffic);
- Existing Bridges;
- Drainage Network;
- Water Distribution Network;
- Bord Gáis Distribution Network;
- Electricity Network;
- Broadband Network;

- Telecommunications Network.

The road network within the study area comprises a national road (N20), regional and local roads. The main artery through Blackpool is the national primary route (N20) which conveys traffic from Patrickswell in County Limerick to Cork City. Traffic flows will be impacted for the duration of construction activities at the following locations;

1. Watercourse Road and the Blackpool Bypass (N20) (C01_B03), Blackpool Church (C06_B07), and Old Commons Road (C06_B05) as a result of works proposed to the existing culvert,
1. Orchard Court as a result of culvert construction, and
2. Alongside the Glenamought River between Sweeney's Hill and the North Point Business Park (C08-B01 and C08_B02), and alongside the River Bride between the North Point Business Park and Commons road (C06_B01 and C06_B02) due to the replacement of four bridges.

Construction works in the vicinity of Blackpool Church and Maddens Buildings along Watercourse Road and at the junction of Watercourse Road and the Blackpool Bypass will be planned to take place over the summer in order to minimise traffic disruption. Any road and lane closures will be timed to minimise the impact to the flow of traffic, and if possible work will be carried out at off peak times to reduce the impact, particularly on heavy goods vehicles. All residents and interested parties will be consulted when planning these road closures to optimise the timing of same. A complete schedule of road closures will be published in advance of the works commencing to facilitate residents in making alternative arrangements where necessary.

Following implementation of mitigation measures, the permanent impact on existing underground and overground utilities (including drainage networks, water and gas distribution networks, electricity supply networks among other utilities) and from waste generated during the construction and operation phases will be imperceptible.

Interaction

All of the potential impacts of the proposed development and the measures proposed to mitigate them have been outlined under the preceding headings above. However, for any development with the potential for significant environmental impact there is also the potential for interaction amongst these impacts. The result of interactive impacts may either exacerbate the magnitude of the impact or ameliorate it.

There was found to be an interaction between Human Beings and both Landscape and Flora & Fauna. The scheme was initially designed to retain as much open channel as possible in order to minimise the impact on the fishery. When modelled, this required high flood retaining walls in Orchard Court which were found by the public to be unacceptable for predominantly visual reasons. Therefore, an alternative option was pursued which involves a pressurised culvert through Orchard Court. There was no viable alternative to the culvert to address the concerns or the local community about the negative impacts of the high walls, whereas it is considered that there are opportunities further upstream in the catchment to compensate or mitigate any local loss of fish habitat in the short length of culverted section through Orchard Court.

The construction phase of the project will give rise to road closures and restrictions of traffic movements at times, and will create some short-term inconvenience for road users. By ensuring that these impacts occur at off-peak times during the summer when possible, this will be mitigated as much as possible.