Glashaboy River
(Glanmire/Sallybrook) Drainage Scheme

NTS

Environmental Impact Statement
Non- Technical Summary

November 2016

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

Cork County Council
Comhairle Contae Chorcaí

ARUP

Cork County Council and Office of Public Works

Glashaboy River (Glanmire/Sallybrook) Drainage Scheme

Environmental Impact Statement - Non-Technical Summary

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Arup
One Albert Quay
Cork
T12 X8N6
Ireland
www.arup.com

ARUP

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		Name			
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Introduction

Cork County Council in conjunction with the Office of Public Works (OPW) intends to undertake engineering works along the Glashaboy River and its tributaries with the objective of minimising the risk of flooding in the Glanmire/Sallybrook area.

The proposed Glashaboy River (Glanmire/Sallybrook) Drainage Scheme will include the construction of direct flood defences such as flood walls and embankments. In addition, conveyance improvements such as channel widening, channel deepening and the introduction of culverts are proposed on the Glashaboy River tributaries.

Flood defences and conveyance improvements are proposed at a number of locations in the Glanmire/Sallybrook area. The overall location of the proposed scheme is presented in **Figure 1 Drainage Scheme Overview** and **Figure 2 Site Location Overview**.

The full Environmental Impact Statement, of which this is a non-technical summary, will be put on public display in accordance with the Arterial Drainage Act (1945) and Amendment Act (1995), in Glanmire Public Library and in Cork County Council's Regional office in Ballinglanna for a period of four weeks. A full copy of the EIS including the public exhibition drawings may be viewed online on the project website (www.glashaboyfrs.ie). Copies of the EIS on CD will also be available to purchase from the OPW.

Office of Public Works and Cork County Council

The Office of Public Works (OPW) is the lead agency for flood risk management in Ireland. Implementation of the EU Floods Directive and Government policy on the management of flood risk in Ireland, in conjunction with statutory obligations under the Arterial Drainage Acts 1945 - 1995, form one of the three core services of the OPW. Other services include Buildings and Architecture and Heritage Services.

The OPW has statutory responsibility for the maintenance of completed arterial drainage schemes and completed flood relief schemes comprising over 11,500km of channel, 730km of embankments, some 18,500 bridges and 750 ancillary structures such as sluice gates, pumping stations and tidal barrages. Annually, approximately 2,000km of channels are maintained by the OPW, with circa 200 structures repaired.

The OPW in the South Region is working closely with Cork City and County Councils to bring forward measures to address the severe flooding that occurred in Cork in November and December 2009, 2012 and more recently in the winter of 2015-2016.

Cork County Council is acting as an agent for the OPW to develop the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme. The scheme is located within the functional area of Cork County Council.

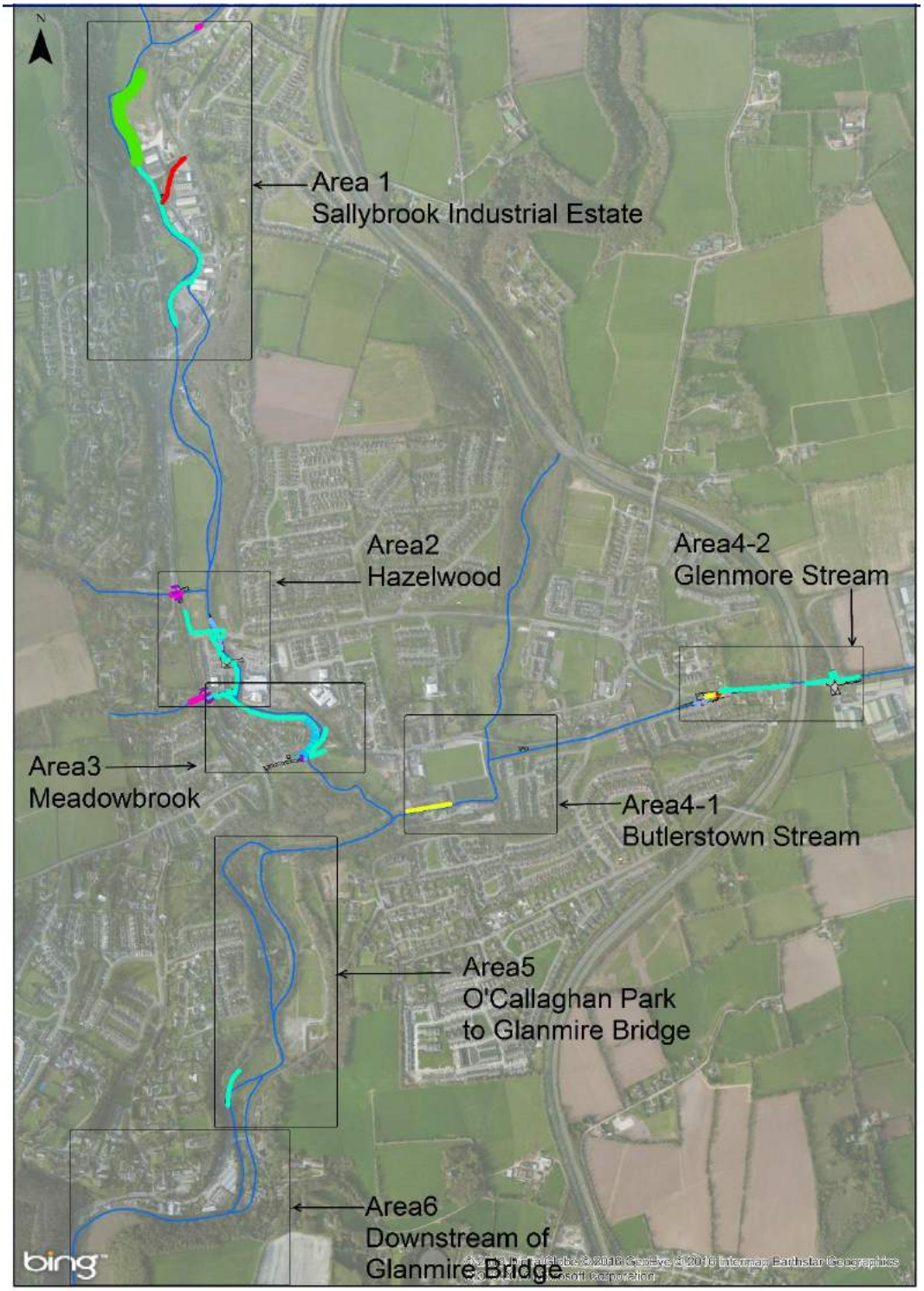

Figure 1: Drainage Scheme Overview (not to scale © Bing maps)

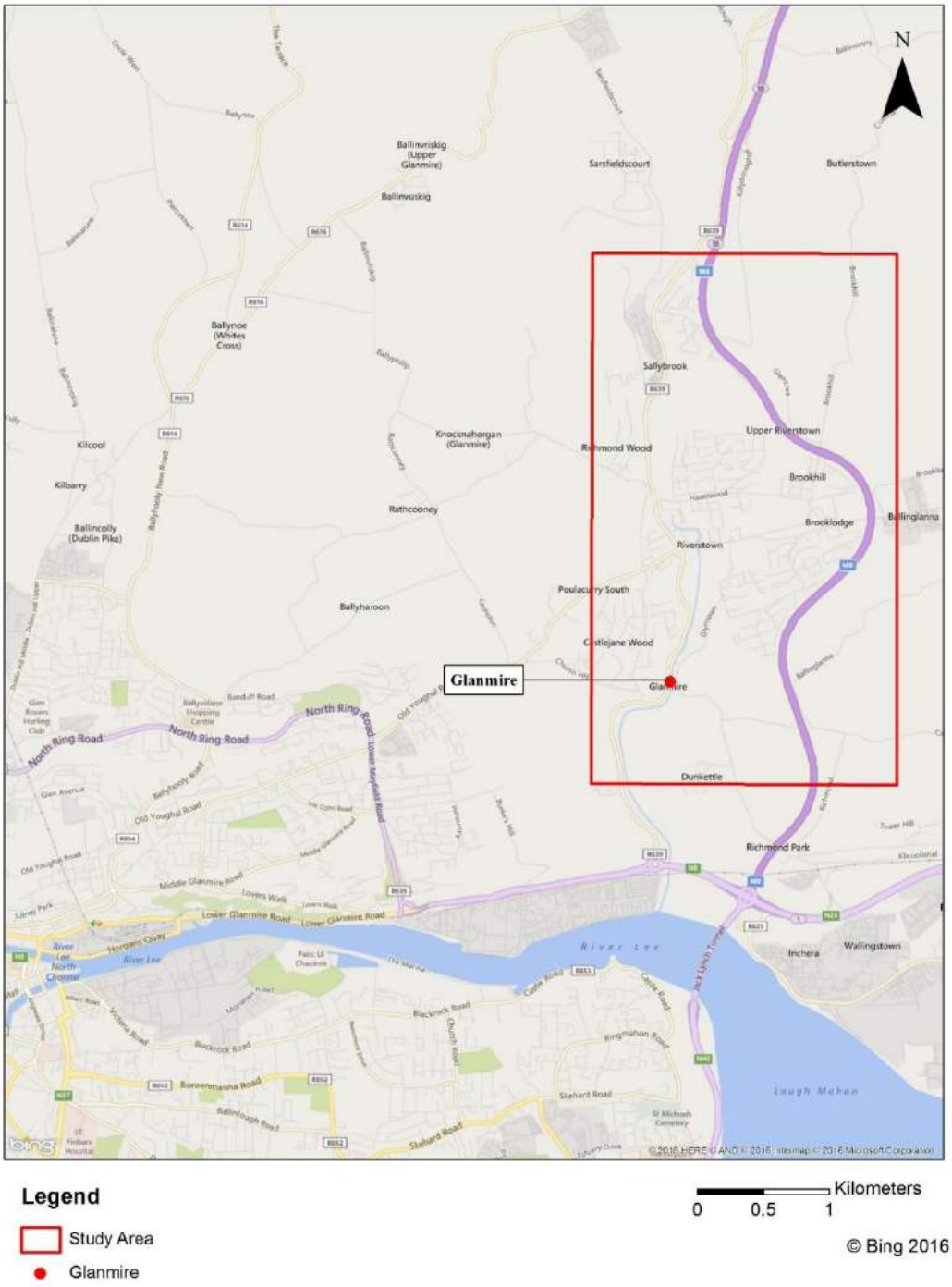

Figure 2: Site Location - Overview

Environmental Impact Statement

The Environmental Impact Statement has been prepared in order to report the findings of an appraisal of the environmental effects of the proposed drainage scheme and to support the exhibition drawings for the proposed scheme.

The Environmental Impact Statement has been prepared in accordance with the relevant provisions, set out in the Planning and Development Regulations 2001, as amended and the EIA Directive 2011/92/ EU. Moreover, although the requirements of Directive 2014/52/ EU have not yet been transposed into Irish law, this EIS has had regard to the provisions of Directive 2014/52/EU. Due regard has also been given to guidelines and advice notes for the preparation of environmental impact statements, published by the Environmental Protection Agency.

In addition, a Natura Impact Statement has been submitted with the application for consent, so as to enable the competent authority to carry out the Stage One and Stage Two assessments required pursuant to Article 6(3) of the Habitats Directive (1992/43/EU).

Need for the Proposed Development

The OPW in partnership with Cork City and Cork County Councils carried out a Catchment Flood Risk Assessment and Management (CFRAM) Study for the Lee Catchment. The Draft Catchment Flood Risk Management Plan (CFRAM) for the Lee Catchment was published in February 2010. The CFRAM recommended the following for the Glashaboy sub-catchment:

- Fluvial[1] and tidal forecasting system, combined with a targeted public awareness and education campaign and individual property protection / flood proofing; and
- Permanent flood walls/embankments (to manage fluvial risk).

There is a history of flooding in the Glashaboy River catchment. Numerous significant flood events have occurred in the Glanmire/Sallybrook area, necessitating the proposal to introduce flood defence works. In recent years, there was a significant flood event in June 2012 in the Glanmire/Sallybrook area which occurred following extremely heavy rainfall. This significant flooding resulted in considerable damage to residential and commercial properties throughout the area.

Flooding also recently occurred during the winter of 2015. There was a considerable amount of flooding experienced in the Glanmire/Sallybrook area and in particular in the Meadowbrook estate, The Grove, Copper Valley View and Hazelwood shopping centre. The 2015 flood event also resulted in considerable damage to properties in the area.

In the future, the risk of flooding may increase. Future changes which have the potential to affect the risk of flooding include:

- Climate change resulting in higher rainfall and higher tide levels;
- Geomorphological processes, such as sedimentation transport, which affects the area of conveyance of the river channel, and erosion;
- Development within the catchment of the Glashaboy River and its tributaries, which does not conform to the principles of sustainable drainage, and which adversely affects the response of the catchment to rainfall; and

[1] Fluvial refers to Rivers

- Changes in land use, including forestation and land drainage.

As a result of the findings of the CFRAM study and the recent flood events in the area, Cork County Council, acting as Agents for the OPW, commissioned Arup in association with JBA Consulting to develop a Drainage Scheme for Glanmire/Sallybrook. The purpose of the scheme was to assess and develop a viable, cost effective and sustainable drainage scheme to alleviate flooding in the Glanmire and Sallybrook area. The drainage scheme design presented in the EIS is as a result of this detailed analysis.

Alternatives Considered

The development of the proposed scheme up to this stage was a process requiring an extensive assessment of different options for flood relief scheme design. The process included the assessment of the validity of all potential flood alleviation measures for each of the segments of the study area. In order to arrive at the final scheme design, a number of stages were followed. These required co-ordinated collaboration between the engineering and environmental teams. The design process required the following assessments:

- Constraints Study;
- Hydrology Study;
- Hydraulic Modelling;
- Site Investigations;
- Flood Risk Assessment Report;
- Options Assessment Report;
- Information required for Appropriate Assessment Screening and Natura Impact Statement; and
- Environmental Impact Statement.

Input was required from each of the preliminary reports in order to finalise the design for the scheme that is being considered as part of the EIS.

A constraints study was carried out during 2014 and 2015 in order to identify the main constraints that could either be affected by possible flood alleviation measures or issues that could constrain the viability or design of these measures. Information for the constraints study was gathered with regard to the likely environmental impacts of the proposed scheme and statutory requirements for EIA. The constraints study can be downloaded at www.glashaboyfrs.ie.

The process for the selection of the preferred flood relief options is outlined below:

- An initial screening of a long list of possible flood risk management measures against a predetermined set of criteria, was carried out to determine their potential viability;
- A technical assessment of potentially viable flood risk management measures was undertaken; and
- Potential flood relief options were developed using combinations of flood risk management measures which were determined to be technically viable.

These flood relief options were then subjected to multi-criteria assessments, allowing a preferred flood relief option to be selected.

The options assessment report can be downloaded at www.glashaboyfrs.ie

Significant public consultation was carried out throughout the project and has been a vitally important part of the evolution of the proposed scheme and the ultimate decision on a preferred option. This consultation consisted of two Public Information Days (PID), both at early Constraints Stage, and at Emerging Preferred Options Stage, as well as statutory consultation with all relevant stakeholders, extensive face to face landowner consultation and active and regular formal residents meetings. The feedback from this consultation process was carefully considered and taken on board in finalising the scheme. The PID information can be downloaded at www.glashaboyfrs.ie.

The options were also holistically reviewed by the project team as they were developed, and relevant issues were discussed with the Steering Group which include representatives from Cork County Council, Office of Public Works and the designers. The preferred options were further developed during 2016.

A final decision on the preferred option was made based on a holistic evaluation of the following key aspects:

- Findings of Cost Benefit Analysis;
- Findings of Multi-Criteria Analysis;
- Consideration of the key core messages which arose during the stakeholder consultation process;
- Consideration of Key Risks;
- Consideration of Climate Change Adaptability; and
- Combined professional judgement of the steering group members.

Outline of the Proposed Drainage Scheme

Main elements of the proposed drainage scheme

The proposed drainage scheme consists of the following:

- Replacement of a number of existing culverts;
- Replacement of Hazelwood Shopping Centre bridge with a larger vehicular bridge;
- A new flood relief channel and culvert at Hazelwood Avenue;
- Replacement of existing flood defence walls and construction of new flood defence walls;
- Enhancement of an existing earthen flood defence embankment by the construction of a new earthen flood defence embankment to east of existing embankment;
- New surface water pumping stations and foul pumping station;
- Localised in-channel conveyance improvements at culvert/bridge structures;
- Provision of civil works such as road/footpath re-grading at a number of locations;

- Protecting drainage outlets along the line of flood defence works with non-return flap valves;
- Non – flood defence retaining walls; and
- Flow control structure on a millrace.

It is also noted that many of the linear defences will require the temporary removal of boundary walls and fences to facilitate construction access (generally parallel with watercourses). These boundary walls/fences will be reinstated on completion in agreement with the landowners. There will also be a number of trees and other vegetation which will require removal to facilitate the works throughout the scheme area. Replanting of trees and vegetation will take place, where feasible.

A number of photomontages have been prepared so as to more fully illustrate the physical and visual nature of aspects of the proposed development. These have been prepared to represent a time period of approximately 5-7 years (when planting has matured). A selection of the photomontages is included in this Non-Technical Summary and are from/of the following locations:

- View 1 – View of Hazelwood Centre commercial complex at Riverstown from adjoining car park;
- View 2 – View of Hazelwood Avenue bridge from the multiuse games area;
- View 3 – View from within Meadowbrook residential estate, south of the Hazelwood Centre;
- View 4 – View of Riverstown Bridge and adjacent entrance area to Meadowbrook residential estate.
- View 5 – View from Brooklodge Grove

Description of the proposed drainage scheme by Area

As presented on **Figure 1** the proposed drainage scheme is geographically divided into a number of Areas. The proposed flood defences are summarised Area by Area in the sections below. The left and right banks are described as one looks downstream. Future channel maintenance is also described below.

Area 1 **Sallybrook Industrial Estate**

Area 2 **Hazelwood**

Area 3 **Meadowbrook**

Area 4-1 **Butlerstown Stream**

Area 4-2 **Glenmore Stream**

Area 5 **O'Callaghan Park to Glanmire Bridge**

Area 6 **Downstream of Glanmire Bridge**

Area 1 Sallybrook Industrial Estate

Bleach Hill Stream

- Replacement of twin culverts located beneath the access road into the Cúil Chluthair residential estate by a new larger culvert.

Glashaboy River

- Enhancement of existing embankment on left bank of the Glashaboy River by the construction of new embankment to east of existing embankment. The proposed embankment will be approximately 270m in length;
- Construction of a new reinforced concrete flood defence wall on left bank of the Glashaboy River. The proposed flood defence wall will be approximately 530m in length;
- Construction of a new surface water pumping station and associated infrastructure for operation during a flood event; and
- Construction of a flow control structure to restrict peak flows in the Mill Race.

Sallybrook Stream

- The Sallybrook stream consists of an open channel approximately 50m in length at the downstream end where it meets the Glashaboy River. The stream is then culverted further upstream for a distance of approximately 100m. During flood events, water from the Glashaboy River backs up the Sallybrook Stream and overflows the channel. It is proposed that the stream channel will be culverted along a new alignment for a distance of 150m to minimise flooding in the area.
- The existing stretch of open channel of the Sallybrook stream will be backfilled and flow will be diverted through the new culvert. The existing culvert will also be removed and flow diverted through the new culvert.
- Construction of a new 130m long boundary fence to be provided around Sallybrook House.

Area 2 Hazelwood

Cois na Gleann Stream

- Replacement of two culverts located beneath the R615 and R639 with single 26m long culvert. Removal of trash screen, construction of new retaining wall and local road regrading.

Glashaboy River

- Construction of a new reinforced concrete flood defence wall along east side of R639, extending eastwards onto Hazelwood Avenue and crossing over the north side of Hazelwood Avenue Bridge. The wall will be approximately 159m long.
- Construction of a new flood relief channel and culvert underneath Hazelwood Avenue. The total length of the new flood relief channel and culvert will be approximately 112m long. Fencing will be provided.

- Construction of a new reinforced concrete flood defence wall across the south side of Hazelwood Avenue Bridge and extending southwards along the right bank of the Glashaboy River. The wall will be approximately 121m long.
- Replacement of the existing Hazelwood Shopping Centre Bridge with a new reinforced concrete bridge. The surrounding ground will be regraded and parking layout revised.
- Downstream of Hazelwood Shopping Centre Bridge, construction of a new reinforced concrete flood defence wall along the right bank of the Glashaboy River. The wall will be approximately 108m long.
- Construction of a new surface water pumping station and associated infrastructure for operation during a flood event.

Springmount Stream

- Replacement of twin culverts located beneath the R639 with a new larger culvert. Localised road regrading, modifications to boundary wall and gate and construction of retaining wall also proposed.
- Construction of a new reinforced concrete flood defence wall along the right bank of the Springmount stream before it enters the Glashaboy River. The wall will be approximately 80m long.

Area 3 Meadowbrook

Glashaboy River

- Construction of a new reinforced concrete flood defence wall along the right bank of the Glashaboy River along the entire length of the Meadowbrook Estate. The wall will be approximately 334m long.
- Construction of a new reinforced concrete flood defence wall along the left bank of the Glashaboy River opposite to the Meadowbrook Estate, close to Riverstown Bridge. The wall will be approximately 90m long.
- Construction of a new surface water pumping station and associated infrastructure for operation during a flood event.
- Construction of a new foul water pumping station and associated infrastructure for operation when required to pump foul wastewater trapped in Meadowbrook Estate into the foul sewer network downstream of the estate.
- Modification to the existing Riverstown Bridge parapet wall to provide protection to pedestrians. Localised regrading of the road will take place in same area. Recambering of the road will also take place to divert surface water runoff during a flood event southwards into the Glashaboy River via O'Callaghan Park, downstream of Riverstown Bridge.
- Along the approach to Riverstown Bridge, from the west, a proposed reinforced concrete retaining wall will be constructed to retain the raised footpath.
- Clearance of Riverstown Bridge arches of built up silt and vegetation and removal of the manhole from the bridge arch.

Area 4-1 Butlerstown Stream

- South of Sarsfield GAA Club, in the Lidl parking area, it is proposed to modify the existing boundary wall to allow overland flow to pass through it and into the Butlerstown Stream.
- Minimal landscaping and regrading of ground levels, to facilitate overland flow from the Butlerstown stream back into the Glenmore Stream.

Area 4-2 Glenmore Stream

- Replacement of the existing culverts at Brooklodge Grove with a new culvert. Channel deepening, road regrading and construction of a new reinforced concrete flood defence wall on left and right bank of Glenmore stream.
- Replacement of existing culvert with new larger culvert at the Copper Valley Vue entrance.
- Local road regrading, channel widening and deepening of the Glenmore Stream.
- Strengthening of existing wall along Brooklodge Grove and replacement of culvert of the New Line (slip road to M8). Local road regrading.
- Construction of a new surface water pumping station and associated infrastructure for operation during a flood event.

Area 5 O'Callaghan Park to Glanmire Bridge

Glashaboy River

- Construction of a new reinforced concrete flood defence wall along the east side of the R639 at The Grove. The wall will be approximately 101m long.
- Construction of a new surface water pumping station and associated infrastructure for operation during a flood event at The Grove.

Area 6 Downstream of Glanmire Bridge

Glashaboy River

- No construction works proposed in this area. Channel maintenance only is proposed for this section.

Channel Maintenance

Under Section 37 of the Arterial Drainage Act 1945, the Office of Public Works (OPW) is statutorily obliged to maintain all rivers, embankments and urban flood defences on which it has executed works since the 1945 Act, in "*proper repair and effective condition*".

Channel and embankment maintenance operations can encompass a variety of activities, including silt and vegetation management, aquatic vegetation cutting, bank protection, bush cutting/branch trimming, tree cutting, mulching, mowing and structure maintenance.

Future channel maintenance will apply to the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme. All OPW maintenance work is undertaken in accordance with Environmental Management Protocols and Standard Operating Procedures (SOPs) along with additional measures where the SOPs show deficiencies, to ensure adverse impacts on the environment are considered and minimised.

Construction Activities

The construction of the drainage scheme will be undertaken using industry standard construction methodologies.

Where possible, it is expected that the Contractor will primarily gain access from the river banks; however temporary working areas within the river channel may be required for certain works. It is expected that access to construct the proposed flood defences which are located away from the river's edge will be from the landward side in order to avoid any impact to the river. Where in-stream works are proposed, machine movements in the river will be minimised.

Where access to the river channel is required, detailed method statements will be drawn up which deal specifically with the works proposed. The method statements will be drawn up in consultation with the supervising ecologist and will be agreed with the National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI) prior to the commencement of works.

Construction of some of the linear defences will require the temporary removal of boundary walls and fences to facilitate construction access (generally parallel with watercourses). These boundary walls/fences will be reinstated on completion in agreement with the landowners. There will also be a number of trees and other vegetation which will require removal to facilitate the works throughout the scheme area. Replanting of trees and other vegetation will take place, where feasible.

Traffic management will be set up for the works as required. Temporary road diversions and closures are likely to be required. Alternative access routes will be agreed with Cork County Council and An Garda Siochána.

Construction works are expected to commence in Quarter 3 of 2017 and the proposed construction period is estimated at circa 18 months. The total 18 month construction period has been estimated to allow for poor weather over the winter months, mobilisation between sites and seasonal ecological restrictions.

Normal construction working hours will be observed. These are 08.00 – 19.00 Monday to Friday; 09.00 – 16.00 on Saturday. It may be necessary to work outside these hours, including at weekends and at night, at certain stages. Working outside normal hours may be necessitated through consideration of safety or weather and sub-contractor availability.

Heavy or noisy construction activities will be avoided outside normal hours and the amount of work outside normal hours will be strictly controlled. Approval from Cork County Council will be obtained for works outside normal hours.

It is envisaged that the average number of construction personnel on site will be circa 30 personnel but this will vary depending on the construction activities required, seasonal constraints, and will likely peak during the summer months when up to 50 construction personnel is envisaged.

A construction environmental management plan (CEMP) will be prepared prior to construction commencing. The CEMP will comprise all of the construction mitigation measures, which are set out in this EIS, and any additional measures which are required by any conditions attached to the Minister for Public Expenditure's statutory confirmation of the Scheme under the Arterial Drainage Acts.

Implementation of the CEMP will ensure disruption and nuisance are kept to a minimum. The plan will have regard to the guidance contained in the handbook published by Construction Industry Research and Information Association (CIRIA) in the UK, Environmental Good Practice on Site Guide, 4th Edition (CIRIA 2015).

It is anticipated that, with the proper implementation, phasing and management of construction activities, the construction phase of the development will have no significant or long-term impact on the surrounding environment.

Impact on Human Beings

There is the potential for short term negative impacts on people during the construction phase arising from construction activities. Potential impacts include air, noise, dust and vibration. Implementation of the CEMP will ensure disruption and nuisance are kept to a minimum and that proposed drainage scheme will not have a significant negative impact on people during the construction phase.

There is also the potential for short term economic impacts, in particular in the Hazelwood shopping centre area during the construction works, due to the replacement of the bridge and due to road closures/restrictions. The impact on local economic activity can be reduced by ensuring access to local businesses is maintained. A construction traffic management plan will be prepared and implemented. Traffic restrictions will be limited in time and to ensure that impacts are only felt for the shortest possible period of time.

The overall impacts of the proposed drainage scheme will be permanent and positive as the risk of flooding of residential, retail and commercial properties, local amenities, tourist facilities etc. will be reduced once the scheme is completed.

The increase flood protection as a result of this proposed scheme will contribute to securing businesses and jobs in the area. Existing properties will benefit from the greater flood protection and this will also contribute towards attracting additional investment and jobs to the area as properties become more attractive to rent or buy.

Landscape and Visual Impact

The proposed drainage scheme was assessed with regard to its visual impact and its impact on the character of the landscape.

The wooded river corridor is a defining aspect to the landscape character, along with the associated narrow valley, enclosed views and the sporadic tree tunnels along roads in the area. The wider landscape character is recognised in the County Development Plan 2014 as having very high value and sensitivity. The most northerly section of the study area around Cúil Chluthair marginally extends into an adjacent landscape character type "Fissured Fertile Middleground" which is associated with medium value, high sensitivity and county level importance.

The area also possesses a rich built and industrial heritage, with a number of protected structures including mills and alms houses scattered throughout the study area. A scenic route, S41, runs along the main thoroughfare of the R639, parallel to a section of the Glashaboy River which also includes a protected view towards the entrance of Glanmire Town. In general, views within the landscape are very limited and localised due to the topography of the narrow valley, sharp river meanders, and the screening from the wooded river corridor.

A small number of public and residential viewpoints will experience increased yet temporary to short term impacts, particularly with regard to the construction works, new walls and tree removal. New planting and design mitigation will ensure the significant reduction in these impacts.

Despite the extensive scale of the proposed drainage scheme, impacts will generally be moderate and negative during construction, with design and mitigation reducing these to slight and negative for the most part, particularly as existing and new planting matures and the elements of the river corridor become reinstated. A number of significant positive impacts will additionally emerge from the proposal with regard to the enhancement of degraded walls and public realm, the protection of townscapes and historical structures from flooding. Further measures around areas of built heritage will ensure that the integrity and character of these aspects remains unaffected. Overall the landscape is deemed capable of accommodating the changes arising from the proposed scheme, and without adverse impacts to the valued elements and sensitivities that define the area at local and wider scales.

Roads and Traffic

The potential traffic impacts due to the proposed drainage scheme will be primarily associated with the construction phase of the works. It is estimated that construction will take approximately 18 months, and that the scheme will be delivered in a number of individual works areas or phases.

Construction impacts will largely be associated with the movement of construction vehicles both from importing or exporting material and the movements of construction workforce staff to and from the works areas.

The increase in traffic flows on the local road network due to construction vehicles and construction workforce traffic movements are expected to be minor.

However, there will be restrictions or closures on the road network to accommodate numerous works elements including the replacement of the Hazelwood shopping centre bridge, replacement of a number of existing culverts, construction of a new culvert and the construction of a number of pumping stations. These works may require either partial or full road closures, and will therefore have a temporary significant impact on the local road network in the absence of mitigation measures. However, the use of construction traffic management planning, with appropriate works phasing and the use of the extensive local road network for diversion routes where necessary will minimise the significance of the impacts.

Post construction, while there will be infrequent maintenance works at some of the works areas, these will have a negligible impact on the local road network. As a result of the works, there will also be no reduction in the capacity of the existing road network post-construction. Therefore, there will be no residual impacts associated with the scheme.

Noise and Vibration and Air Quality and Climate

The impacts of the predicted noise and vibration and air quality and climate from the proposed development were appraised. The potential impacts during the construction phase and during the operational phase were considered.

During the construction phase, the potential noise and vibration impacts will be associated with site preparation works, construction activities, and construction vehicle movements. All noise emissions and vibration are predicted to be in compliance with the relevant standards.

The construction phase of the development may have a short-term impact on air quality in the immediate vicinity of the site due to activities including excavations, general construction activities and construction traffic. All emissions will be required to be in compliance with air quality standards.

Post construction, while there will be infrequent maintenance works at some of the works areas, the resulting noise, vibration and air impacts will be negligible.

The construction and operation of the proposed drainage scheme will not have a significant effect on the local or global climate.

Biodiversity

To assess the ecological impacts of the proposed Glashaboy River (Glanmire/Sallybrook) Drainage Scheme a range of assessments and surveys were undertaken. These surveys were conducted to identify the presence or likely presence of protected species and habitats within the study area. The value of these ecological receptors were determined and the possible impacts that the proposed scheme may have upon them were assessed. Mitigation measures were proposed in order to offset any identified negative impacts.

Consultation meetings were also held with the National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI).

The assessments and field surveys undertaken as part of this project identified that two Natura 2000 sites are located in, or within 2km, of the proposed scheme; Cork Harbour Special Protection Area (SPA) and Great Island Channel Special Area of Conservation (SAC). No Natural Heritage Areas (NHAs) are located in, or within 2km of the proposed scheme, however four proposed Natural Heritage Areas (pNHAs) are; Glanmire Wood pNHA, Dunkettle Shore pNHA, Douglas River Estuary pNHA and Great Island Channel pNHA. Cork Harbour SPA and the Great Island Channel SAC are of International value, while the pNHAs are of National importance.

Most of the habitats within the study area were of local value, however, the estuarine and intertidal habitats of the Glashaboy estuary and Cork Harbour are of International value as they form part of the designated sites and are of considerable importance. The field surveys also identified the presence of notable wetland bird populations in the estuary and riparian birds of importance along the Glashaboy River, Otter (including holts and a couching site), bat populations along the river corridor and within associated buildings and structures, salmonid, eel and lamprey populations in the Glashaboy River and Japanese Knotweed along a considerable length of the main channel.

Overall, the majority of ecological impacts will arise during the construction phase as a result of disturbance to Otter, fish, birds and bats, damage to and loss of small areas of notable habitats, including hedgerows, and potential water pollution incidents and sediment mobilisation. The significance of construction impacts (in the absence of mitigation) range from moderate negative to minor negative in relation to the designated bird species of Cork Harbour SPA. The potential operational impacts identified range from a major negative impact to a minor negative impact in terms of otters and tree removal that is planned as part of channel maintenance activities. A moderate negative impact is also predicted in terms of the tree loss as a result of the proposed scheme. However, a range of mitigation measures have been proposed in the EIS to offset potential negative impacts, including appropriate timing of the works, replacement planting, pollution prevention measures and habitat reinstatement. All construction works and mitigation measures relating to ecology will be monitored by a suitably qualified ecologist.

Consequently, the residual impact for the majority of identified impacts has been reduced to neutral or of minor negative significance only. It can therefore be concluded that the ecological impact of the construction and operation of the proposed drainage scheme will be neutral or minor negative only, provided that the identified mitigation measures are fully implemented and monitored.

Following a comprehensive evaluation of the potential direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for the Cork Harbour SPA and Great Island Channel SAC and ensuring that avoidance and mitigation measures are implemented as proposed in the EIS and Natura Impact Statement (NIS), it has been concluded by the authors of the NIS that the proposed drainage scheme will not have an adverse effect on the integrity of the above Natura 2000 sites.

Soils and Geology, Surface water and Groundwater

During construction there will be considerable quantities of soil, including river bank material, excavated for the proposed flood defence structures. It is proposed that as much of this excavated material as possible will be reused within the scheme for flood defence works. The residual material will require removal off-site to a suitable licenced facility.

There is potential for the contamination of groundwater and surface water as a result of construction activities, however the implementation of the CEMP and in particular pollution prevention control measures will minimise the risk of pollution of soils, groundwater or surface water during construction.

The proposed scheme will significantly reduce the risk of fluvial and tidal flooding in the Glanmire / Sallybrook area in the future.

A wide range of mitigation measures have been specified for the construction and operational phase of the project. These mitigation measures seek to ensure that construction and operational discharges are controlled to prevent potential pollution impacts to all receiving surface water systems, groundwater bodies and their downstream catchment areas. The mitigation measures also seek to ensure the risk of flooding from all sources is not exacerbated during the construction and operational phases.

Archaeology, Architectural and Cultural Heritage

There are a total of 26 recorded archaeological sites listed in the Record of Monuments and Places for Co Cork and the Sites and Monuments Record Database of the National Monuments Service within 1km of the proposed drainage scheme. These sites reflect human activity in the landscape extending back to the Bronze Age (circa 2,400-500BC). There are 23 protected structures listed in the Cork County Development Plan (2014) within 1km of the proposed scheme. There are 46 buildings included in the National Inventory of Architectural Heritage within 1km of the proposed scheme.

A wading and metal detector survey was undertaken on three of the smaller watercourses where works are proposed within the scheme and no features of archaeological potential were revealed. A dive and metal detector survey were undertaken on seven areas of the Glashaboy watercourse where works are proposed and twenty cultural heritage sites were identified. Three other features of cultural heritage significance were identified during site inspections.

Two recorded monuments which are also protected structures will be impacted by the proposed scheme. These are Sallybrook Mills in Riverstown, and Riverstown Bridge in Riverstown, Poulacurry North and Poulacurry South. Of the twenty features of cultural heritage significance identified during the dive survey of the Glashaboy River, eight may be impacted by the works associated with the proposed scheme and six of these, subsurface archaeological deposits may survive. The three features of cultural heritage significance which were identified during site inspections for the scheme will be impacted by the proposed works. The proposed works will impact all of the channels in the drainage scheme and adjoining ground in multiple locations. The watercourses themselves are features of archaeological potential due to their importance throughout the prehistoric period as sources or food, resources, transportation, boundary markers and for ritual reasons and into the historic period for transportation and energy generation, in particular.

Mitigation will be by licensed archaeological monitoring in multiple areas where it is considered possible that in situ subsurface deposits may be present or by licenced archaeological monitoring by an experienced underwater archaeologist where it is considered possible that underwater archaeological deposits may survive. These areas extend throughout the scheme.

Mitigation by licenced archaeological testing in advance of works will take place at Riverstown Bridge. Mitigation by avoidance will take place at the weir and sluice gate to the mill race for Glansillagh Mills and in the area of the weir and headrace of Riverstown Flour Mill. Mitigation by compilation of an archaeological survey will take place at Riverstown Bridge. Mitigation by compiling a record of the river revetment wall will take place at Sallybrook Industrial Estate and the three features of cultural heritage significance identified during site inspections; the well structure in Cois na Gleann stream, the random rubble culvert in the Glenmore stream and the weir in the Glenmore Stream. No mitigation is required for the operation of the scheme.

Material Assets

There is potential for temporary disruption to utilities during the construction phase. However, with the appropriate mitigation, impacts are not predicted to be significant.

During the operational phase, the surface water stations and foul water station will reduce the risk flooding of properties due to surface water and foul water when flood waters prevent normal discharge. Similarly, the implementation of the drainage scheme (flood defence walls, conveyance improvements, etc.) will reduce the risk of flooding of properties in the area. This will result in a residual positive impact on properties.

The proposed development is not predicted to have any significant adverse impacts on material assets.

Other Impact Headings, Cumulative Impacts and Interactions

Two main areas have been identified, within which interactions of impacts could occur. These are:

- The interaction of construction related impacts on air, water and noise and human beings; and
- The interaction of construction related impacts on the material assets and human beings.

These interactions between the recorded environmental effects are assessed within the individual chapters of the EIS where relevant, and summarised in this non-technical summary.

Potential cumulative impacts are addressed in the individual chapters of the EIS. During the construction phase, construction traffic, dust, noise and impact on residential amenity are the main areas where there is the potential for cumulative impacts. However these will be of short duration and no significant cumulative effects are anticipated.

Viewing and Purchasing the Environmental Impact Statement

The full Environmental Impact Statement, of which this is a non-technical summary, will be put on public display in accordance with the Arterial Drainage Act (1945) and Amendment Act (1995), in Glanmire Public Library and in Cork County Council's Regional office in Ballinglanna for a period of four weeks. A full copy of the EIS including the public exhibition drawings may be viewed online on the project website (www.glashaboyfrs.ie). Copies of the EIS on CD will also be available to purchase from the OPW.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
Project Name:	GLASHABOY FRS	Document Title:	PHOTOMONTAGES	Date:	11 November 2016

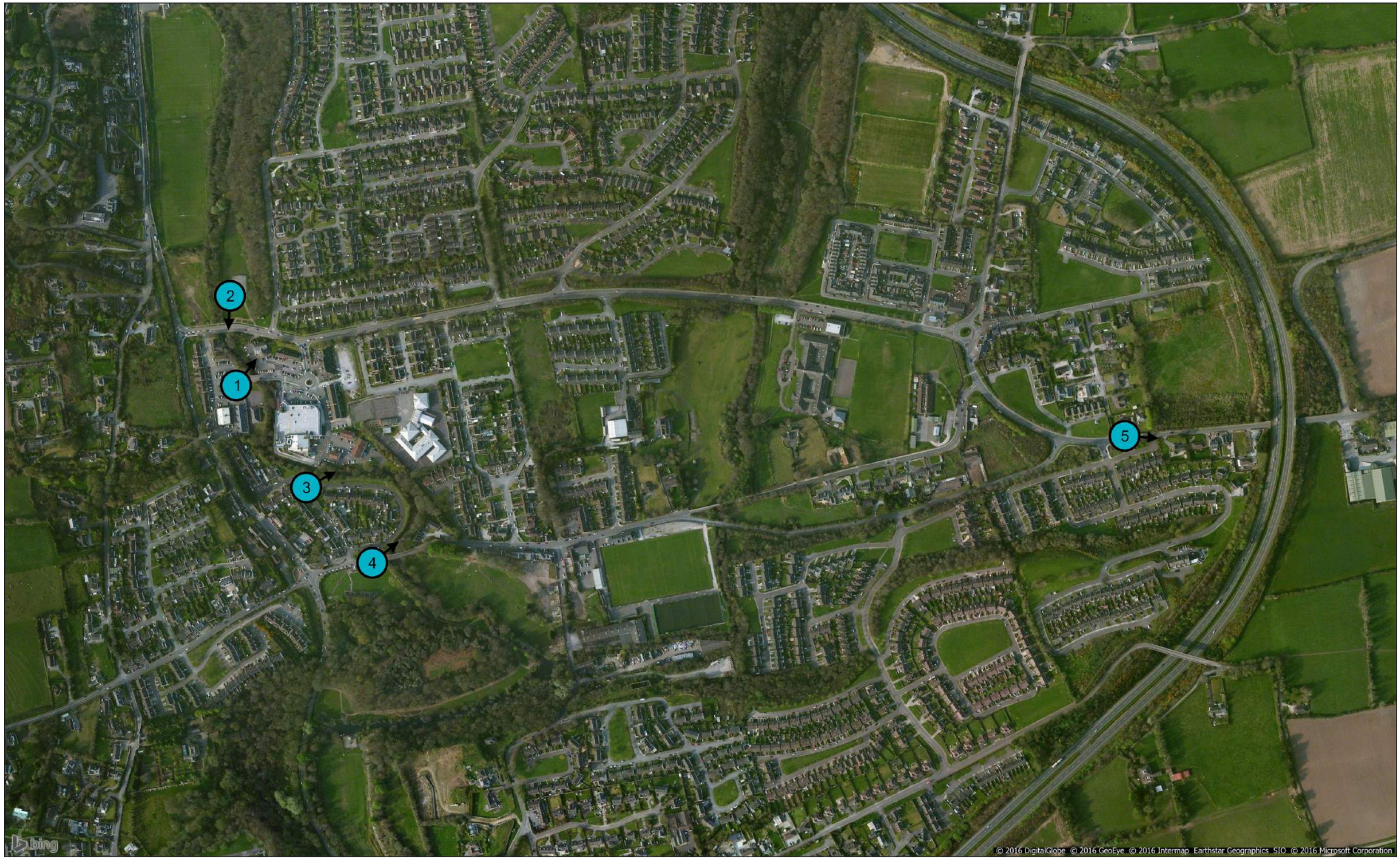

Figure: 7.1.0 **Rev: 01**
Photomontage View Location Map

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
Project Name:	GLASHABOY FRS	Document Title:	PHOTOMONTAGES	Date:	11 November 2016

< 73.7° / 24mm	< 65.5° / 28mm	< 54.4° / 35mm	< 39.6° / 50mm	< 28.8° / 70mm	ANGLE OF VISION / LENS FOCAL LENGTH	70mm / 28.8° >	50mm / 39.6° >	35mm / 54.4° >	28mm / 65.5° >	24mm / 73.7° >

Figure: 7.1.1.1 **Rev: 00**

View 1 from Hazelwood Centre, Riverstown
As Exisitng

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
Project Name:	GLASHABOY FRS	Document Title:	PHOTOMONTAGES	Date:	11 November 2016

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Figure: 7.1.1.2 **Rev: 01**

View 1 from Hazelwood Centre, Riverstown
As Proposed

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
Project Name:	GLASHABOY FRS	Document Title:	PHOTOMONTAGES	Date:	11 November 2016

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Figure: 7.1.2.1 **Rev: 00**

View 2 north of Hazelwood Centre near Basketball Court
As Exisitng

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

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Figure: 7.1.2.2 **Rev: 01**

View 2 north of Hazelwood Centre near Basketball Court
As Proposed

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

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Figure: 7.1.3.1 **Rev: 00**

View 3 from Meadowbrook Estate
As Exisitng

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
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Figure: 7.1.3.2 **Rev: 01**

View 3 from Meadowbrook Estate
As Proposed

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
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Figure: 7.1.4.1 **Rev: 00**
View 4 from L3010 approaching Riverstown Bridge
As Exisitng

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
Project Name:	GLASHABOY FRS	Document Title:	PHOTOMONTAGES	Date:	11 November 2016

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Figure: 7.1.4.2 **Rev: 05**

View 4 from L3010 approaching Riverstown Bridge
As Proposed

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
Project Name:	GLASHABOY FRS	Document Title:	PHOTOMONTAGES	Date:	11 November 2016

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Figure: 7.1.5.1 **Rev: 00**

View 5 from Brooklodge Grove
As Exisitng

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Project Number:	6075	Document Number:	Appendix 7.1	Revision:	05
Project Name:	GLASHABOY FRS	Document Title:	PHOTOMONTAGES	Date:	11 November 2016

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Figure: 7.1.5.2 **Rev: 02**

View 5 from Brooklodge Grove
As Proposed

BSM Brady Shipman Martin. Built. Environment. Est. 1968