Morrison's Island

Public Realm and Flood Defence Project

Response to Request for Further Information

Section 177AE of the Planning and Development Act 2000 (as Amended)

11 July 2019

Cork City Council
Comhairle Cathrach Chorcaí

OPW
The Office of Public Works

thepaulhogarthcompany

ARUP

Contents

Appendices

Introduction

This report details Cork City Council's response to a Request for Further Information (RFI) from An Bord Pleanála (dated 31 May 2019), in relation to the proposed Morrison's Island Public Realm and Flood Defence Project (Planning Ref ABP-303247-18).

This report should be read in conjunction with the RFI. The section numbering in this report corresponds to the queries in the RFI, and the section titles summarise the relevant issue/query in question.

1(a) Morrison's Island as a Standalone Project

The proposed Morrison's Island Public Realm and Flood Defence Project (Morrison's Island Project) is a standalone project which functions first and foremost as a public realm scheme as well as providing flood protection for the local area, without negative consequences for the city environs. As discussed in Section 5 of the Planning Report submitted as part of the application, it is an objective of the Cork City Development Plan (2015 – 2022) to improve amenities in the areas along the City centre including Morrison's Island.

The Lower Lee (Cork City) Drainage Scheme (LLFRS) as exhibited in December 2016 included measures for the protection of Morrison's Island from flooding as well as the remainder of Cork city. Prior to the exhibition of the Scheme, Cork City Council and OPW had agreed in principle that defences in the Morrison's Island area would be advanced as quickly as possible, as the majority of the regular tidal flooding in the city centre originates from this area.

Cork City Council subsequently resolved to proceed with Morrison's Island as a standalone public realm project incorporating flood defences as identified by the OPW in the LLFRS. The flood defence measures were included so as to provide a cohesive approach to the development of Morrison's Island and minimise disruption to the city during the construction phase.

It is noted that a detailed phasing report was produced during the development of the LLFRS. In this report, the works which now form part of the proposed Morrison's Island project were contemplated as an advance phase of the LLFRS. Therefore, the assessment in the Phasing report is equivalent to a scenario where the rest of the LLFRS did not proceed. A copy of the Phasing Report is included in Appendix F. The sections relevant to the assessment of Morrison's Island as a standalone project are 4.4.1 to 4.4.3. Note that the phasing report has been publicly available on the LLFRS website (www.lowerleefrs.ie) since March 2017. The following summarises the main relevant conclusions:

- The flood defences at Morrison's Island provide significant flood alleviation benefits up to the circa 1 in 100 year tidal standard (refer to figure 1 below). The modelled peak flood level in the channel at Morrison's Island in this event was circa 2.9mOD. (Note that this is equivalent to the peak level of the major tidal flood event of January/February 2014).

- The hydraulic model runs carried out indicate that circa 374 properties would benefit from the scheme in the 1 in 100 year tidal event.

All of the above benefits would be delivered by the Morrison's Island project alone, i.e. without the LLFRS in place.

In relation to other aspects of the interrelationship between the two projects, we comment as follows:

- In a scenario where the Morrison's Island project does not proceed as planned, the phasing of the main Lower Lee scheme works will be unaffected, as work can proceed in the fluvially dominated reach (phase 1 and phase 2), without impacting tidal flood risk in the city centre.
- The flood defence walls and pumping stations constructed under the Morrison's Island scheme will not require any physical modification to integrate with LLFRS, should that project proceed.
- The defended area would remain at risk from extreme fluvial flood events (i.e. events of similar magnitude to the November 2009 event) until the completion of the LLFRS. However, hydraulic modelling has shown that provision of defences for Morrison Island would not cut-off any significant beneficial escape routes for flood waters during such events.

In summary, the Morrison's Island project does not rely on any constituent element of the Lower Lee scheme to function effectively. The scheme as submitted to the Board has been designed to be functionally independent from the LLFRS. For further clarity, each major element of the exhibited LLFRS is separately itemised below:

Table 1: Summary table

	Constituent Element of Exhibited LLFRS	Dependence of Morrison's Island Project on LLFRS Constituent Element within the design 1 in 100 year tidal standard
1	Alterations to the management of the ESB dams	None. This measure will only affect fluvial flood risk. Existing fluvial flood risk will not be impacted by the Morrison's Island scheme. Flood risk at Morrison's Island is tidally-driven.
2	Fluvial flood forecasting system	None. Flood risk at Morrison's Island is tidally-driven. The operation of the Morrison's Island Scheme will be informed by the existing tidal flood forecasting system currently in operation.
3	Upstream washlands	None. This measure will only affect fluvial flood risk. Flood risk at Morrison's Island is tidally-driven.
4	South Channel flow control structure	None. This measure will only affect fluvial flood risk. Flood risk at Morrison's Island is tidally-driven.
5a	Direct defences (at Morrison's Island)	Yes (included as part of proposed Morrison's Island project)
5b	Direct defences (elsewhere)	None. Hydraulic model runs have shown that the proposed defended area on the central island is fully enclosed up to the 100 year tidal event standard by virtue of the proposed Morrison's Island defences, and a combination of existing ground levels and existing quay walls around the perimeter of the defended area (refer to figure 1 below)
6a	Surface water pumping (at Morrison's Island)	Yes (included as part of proposed Morrison's Island project)
6b	Surface water pumping (elsewhere)	None.

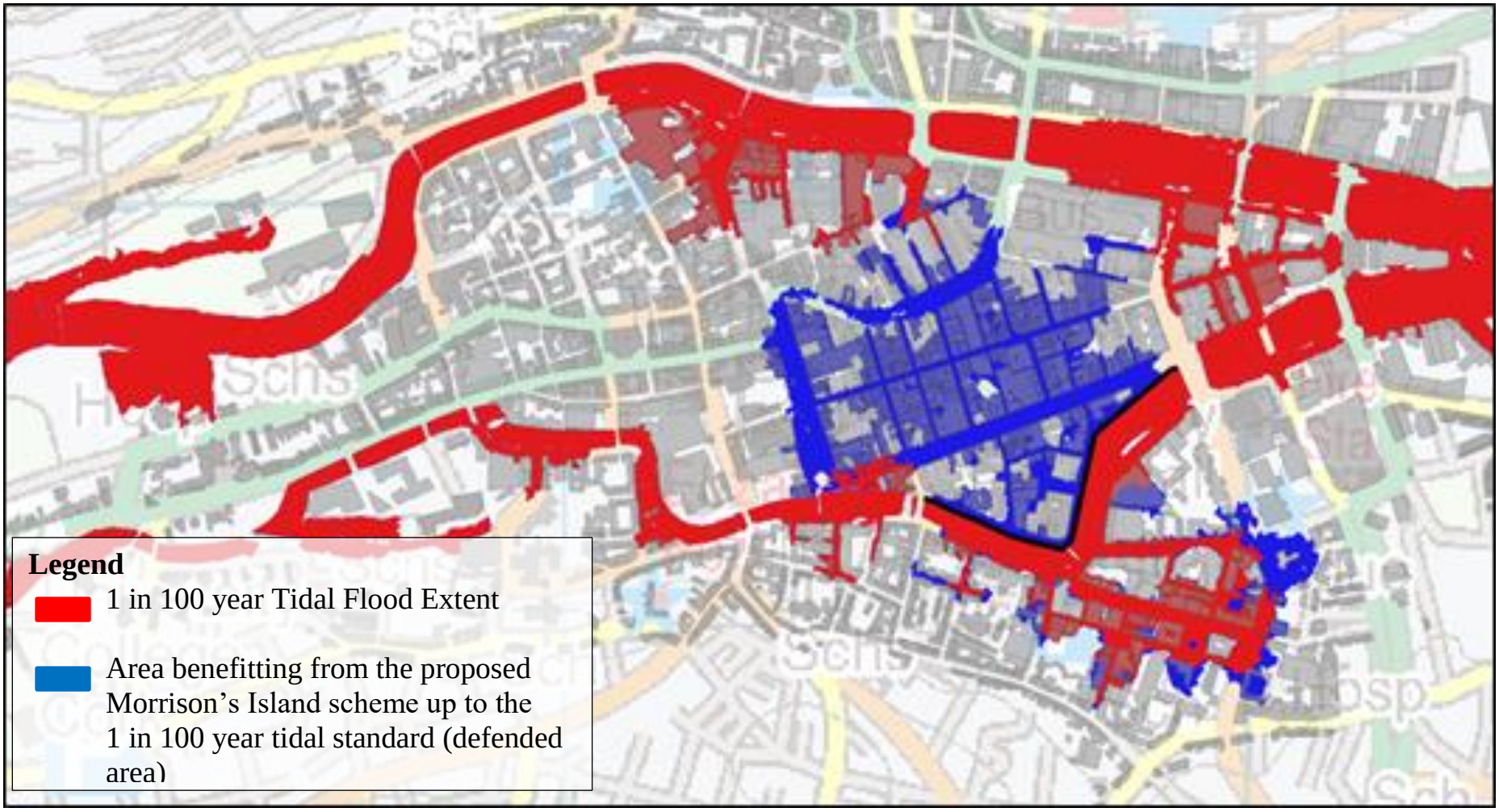

Figure 1: Modelled flood extents for a 1 in 100 year tide scenario (combined with a 150m^3/s Inniscarra Discharge)

1(b) EIA Screening - Assessment of Cumulative effects

Screening for EIA is carried out with regard to EC (2017), Environmental Impact Assessment of Projects. Guidance on Screening (Directive 2011/92/EU as amended by 2014/52/EU and Annex III of the 2014/ 52/EU Directive as transposed into Irish Law as SI No. 296/2018 European Union (Planning and Development (Environmental Impact Assessment) Regulations 2018.

As outlined in the EC Guidance Document, Annex II criteria relate specifically to cumulative impact and notes:

A Project's characteristics must be assessed, inter alia, in relation to its cumulative effects with existing and/or approved Projects. Failure to take account of a Project's cumulative effects with other Projects may mean, in practice, that it escapes the assessment obligation when, taken together with the other Projects, it may have significant effects on the environment.

When considering the proposed Project in combination with other flood schemes, it is noted at this juncture, that there is one approved flood scheme in Cork City: the Douglas River Flood Scheme. There are no other approved flood or drainage schemes along the Lower Lee or its tributaries. However, for the purpose of this discussion and response to further information request, the following Schemes, notwithstanding the fact that they have no legal approval to proceed at this stage, will be considered in cumulation with Morrison's Island.

- The Lower Lee (Cork City) Drainage Scheme
- The River Bride (Blackpool) Certified Drainage Scheme
- River Glashaboy (Glanmire/Sallybrook) Drainage Scheme
- The Douglas Flood Relief Scheme (Approved 2017 due to commence construction 2019). *

*The Douglas Flood Relief Scheme is to the south east of Morrison's Island and flows into Lough Mahon. The project is over 3km from Morrison's Island and has no direct linkages hydrologically or otherwise. The Douglas flood scheme is due to commence construction in 2019, given that there will be no overlap with this Scheme and Morrison's Island, and therefore no potential for cumulative effects, this project is not considered further in the report.

Cork city is currently being transformed by a series of developments aimed to boost employment content and attraction to visitors. Developments that have been considered cumulatively with the proposed project including the following:

Recently completed developments:

- The Capitol
- One Albert Quay
- Navigation Square

- Amnis House Student Accommodation
- 88 South Mall (Office)
- Maldron Hotel (South Mall)

Currently under construction:

- Horgan's Quay development
- Beamish site Student Apartments
- Penrose Quay Development

Planning Approved (not yet commenced construction):

- Trinity Quarter
- Sullivan's Quay Hotel
- Cork Events Centre
- Prism site development
- Parnell Place Hotels

These projects have been chosen for assessment due to their relevance in proximity to Morrison's Island and the size and scale of the development.

Biodiversity, Flora and Fauna

The impact on Terrestrial Biodiversity as a result of Morrison's Island is limited to loss of trees and flora on the quay walls. Both habitats are of local importance only. All trees removed will be replaced and therefore in the long term there will be no cumulative impact as a result of tree loss. Loss of habitat as a result of grouting is considered a permanent slight negative impact on quay wall flora, as no protected species are found at this location. The Lower Lee Scheme, should it be approved will potentially result in the further loss of flora on the quay walls, however no protected species will be removed or lost as part of the Morrison's Island Scheme or in combination with others. No other existing or proposed scheme will impact on the city quay walls.

Aquatic Environment

There will be a temporary slight negative potential impact on water quality and aquatic biodiversity as a result of the Morrison's Island Project as a result of construction of the scheme. Mitigation measures set out in the Environmental Report and the NIS will mitigate against temporary and long terms impacts. There is increased risk of impact on water quality as a result of the scheme in cumulation with other construction projects which may be ongoing during construction of these schemes. The construction of any development within the city and environs of Morrison's Island will be required to comply with relevant Water Quality regulations and best practice construction measures to minimise the impact on the River.

Once operational there will be no impact on the instream habitat and water quality of the River Lee.

There will be no loss of habitat instream and no impediment of passage for fisheries as a result of Morrison's Island Public Realm Scheme, therefore there will be no cumulative impact with other projects in place including the Lower Lee scheme and other flood schemes.

Invasive Species

No invasive species have been identified within the Morrison's Island Scheme. No potential for cumulative impacts are therefore identified for the proposed scheme.

Mammals and Birds

Otters are known to use the general area of the River Lee around Morrison's Island. However, no resting or holting sites have been identified. Impacts during construction are temporary slight negative, with mitigation in place to protect the water quality and therefore food sources of mammals and birds that use the River. There is potential for impact on Otter as a result of the Lower Lee (Cork City) Drainage Scheme. As part of the Planning consent for that scheme, mitigation will be required to minimise disturbance and loss of habitat for Otter and a derogation licence may be required for the temporary disturbance to their resting place. Any disturbance to otter will be minimal and temporary and once complete there will be no impact on the specie at Morrison's Island. There will be no cumulative impact with otter using the Morrison's Island area. The River Bride (Blackpool) Certified Drainage Scheme has identified potential impact on otters as a result of the Project and will require mitigation to minimise the impact. The Glashaboy Drainage Scheme is a significant distance from Morrison's Island and there is no overlap in otter populations. The otter populations on the River Bride are unlikely to overlap with those using the River Lee at Morrison's Island, therefore there will be no cumulative impact on Otter.

Other developments within the city may have the potential to impact temporarily on otters during construction phase. Impacts are on local populations and will require mitigation as appropriate.

There will be some disturbance to bird species during construction at Morrison's Island. However, the impact is localised, temporary and slight. All trees to be removed will be replaced and there will be no net loss of nesting opportunity. Works to the quay walls at Morrison's Island will not result in the permanent loss of nesting habitat. The Lower Lee, Blackpool, Douglas, Glashaboy and other projects will require appropriate mitigation for bird species to mitigate against localised impact as a result of loss of nesting opportunity.

Soils and Geology

The impact on soils, economic and heritage geology and contaminated land is considered slight or imperceptible as a result of Morrison's Island Public Realm project. In combination with existing and proposed schemes there will be increased requirements for material importation as well and risk of exposure and mismanagement of contaminated land. Proper management of materials, their disposal and sourcing of imported material will result in no significant cumulative impact in the long term.

Water, including surface water quality, hydrogeology and hydrology

Morrisons Island Public Realm Scheme will result in a potential for temporary moderate negative impacts as a result of silt laden runoff and increase in suspended solids during construction. However, with mitigation in place this impact will be temporary slight negative. Similarly, with appropriate mitigation in place for construction of developments including building works in and around the Morrisons Island Area this impact cumulatively will be temporary slight negative. Should the Lower Lee Drainage Scheme, River Bride Drainage Scheme and the Glashaboy Drainage Scheme be approved for construction, the works will be carried out with appropriate mitigation in place for the protection of surface water. It is unlikely that these flood schemes will be carried out in unison with Morrisons Island. The Lower Lee Scheme, given the size and scale of the development, will be carried out in phases thereby minimising the potential localised impact on water quality at any one time.

With mitigation in place (as outlined in the Morrison Island Environmental Report) which will minimise the potential for polluting substances infiltrating ground water during construction, there will be a potential negligible impact on Hydrogeology. There will be no impact on hydrogeology in combination with any other developments in the area.

Hydrology and Flooding

As part of the LLFRS phasing report, several runs of the hydraulic model were carried out for scenarios with only the Morrison's Island defences in place, for a variety of fluvial discharges from Inniscarra dam. These model runs were compared with the equivalent scenarios without the Morrison's Island defences in place to assess the potential for increases in flood risk elsewhere in the city during a flood event on the River Lee.

Table 2: LLFRS Phasing report model runs with Morrison's Island Defences in place

Inniscarra Discharge (i.e. main component of fluvial hydraulic boundary)	Tidal Boundary	Comment
80m^3/s	1 in 100 year	**Fluvial boundary:** Typical discharge from Inniscarra dam during electricity generation (regular occurrence) **Tidal boundary:** Major flood conditions (rare occurrence)
150m^3/s	1 in 100 year	**Fluvial boundary:** Current maximum discharge from Inniscarra which would not flood property downstream in the fluvially-dominated reach (has typically occurred circa 10 days per year over the last decade). **Tidal boundary:** Major flood conditions (rare occurrence)

Inniscarra Discharge (i.e. main component of fluvial hydraulic boundary)	Tidal Boundary	Comment
250m^3/s	1 in 100 year	**Fluvial boundary:** Significant flood conditions (has only been exceeded on one or two occasions in the past 10 years, i.e. rare occurrence) **Tidal boundary:** Major flood conditions (rare occurrence)

For the 80m^3/s and 150m^3/s scenarios above, the model showed no increase in flood risk elsewhere in the city. The model suggested a marginal increase in flood extent for the scenario combining a 250m^3/s Inniscarra discharge with the 1 in 100 year tidal flood. However, the probability of such significant floods from independent sources (i.e. a fluvial flood and a tidal flood) coinciding in this manner is very low, likely in the order of 1 in 1000 years. Therefore, the off-site impact on tidal flood risk is considered to be negligible.

The defended area will remain at risk from extreme fluvial flood events (i.e. events of similar magnitude to the November 2009 event). However, in the phasing report, model runs showed that the provision of defences at Morrison's Island would not block any significant overland flow routes for flood waters during such events, and as such would not increase fluvial flood risk in the city.

Therefore, within a wide range of fluvial and tidal flood scenarios, the proposed Morrison's Island scheme will not increase the incidence / extent / severity of flooding in Cork City.

Air Quality and Climate

The construction phase of the proposed development, in combination with the construction phases of existing and proposed projects as listed above will have the potential to negatively impact on air quality of the area. The mitigation measures employed during the construction phase of the proposed development will minimise as much as possible the contribution that it will make towards impacting on air quality. There is the potential for a short-term imperceptible negative impact in terms of air quality and dust for reasons discussed in Section 8 of the Environmental Report. A Dust Minimisation Plan is available in Appendix B. The proposed development, in combination all the with the projects listed above (including the aforementioned flood schemes, recent developments and proposed development) will have the potential to have a short-term imperceptible negative cumulative impact on climate as a result of vehicle emissions on any site.

Noise and Vibration

In the unlikely event of all of the projects listed in the beginning of this section (flood schemes, proposed developments and recently completed developments) being constructed simultaneously, there is a potential for a moderate short-term negative cumulative noise impact. The construction phase of the proposed development will implement the mitigation measures listed in Section 8 of the Environmental Report, thereby minimising the potential cumulative impact that this project could have. Any impacts from the proposed development will most

likely be temporary and transient in nature as the works progress along the river channel. Impacts will also differ between receptors, depending on distance to the works areas, and the type of works being carried out in the area. Given the mitigation measures being implemented for this project, and depending on the receptor in question, there is potential for no impact or a short-term imperceptible to slight negative cumulative impact.

Landscape

Projects that were considered in the Cumulative Impact Assessment for Landscape & Visual Impact are listed in the beginning of Section 1(b) above.

It is considered that while many of these projects are themselves large scale projects, the combination of the proposed Morrison's Island Public Realm and Flood Defence Works will not have a significant negative cumulative landscape or visual effect in the short or long term. The cumulative visual effects of the project with the proposed Lower Lee (Cork City) drainage scheme, and the proposed River Bride (Blackpool) certified drainage scheme, are generally as a result of linear works in localised areas. Construction works will be phased, so will not be visible in their entirety from the any one location. In the event that any of the cumulative projects in the vicinity of the Morrison's Island Public Realm and Flood Defence Works area will be constructed at the same time at this proposed project, these visual impacts would be temporary. It is considered that there may be a potential temporary Imperceptible to Slight negative impact on visual amenity.

In terms of cumulative landscape effects, the changes to the landscape character and fabric as a result of this scheme, in addition to the large scale projects mentioned above, will not be significant and are anticipated to be Imperceptible.

Cultural Heritage

Projects that were considered in the Cumulative Impact Assessment for Cultural Heritage Impact are the proposed Morrison's Island Project along with urban development listed in the beginning of this section along with the proposed Lower Lee (Cork City) drainage scheme and the proposed River Bride (Blackpool) Certified Drainage Scheme.

While these are large scale projects, the combination of the proposed Morrison's Island Project will not give rise to a significant negative cumulative cultural heritage effect. Given the adoption of appropriate mitigation measures combined with (a) the absence of any identified impacts on the recorded archaeological resource and (b) no predicted significant negative impacts on built heritage resources arising from the proposed scheme, it is concluded that it will not contribute to any significant cumulative impacts on the cultural heritage resource.

In terms of cumulative cultural heritage effects, the changes to the cultural heritage resource as a result of this scheme, in addition to the large-scale projects mentioned above, will not be significant and are anticipated to be imperceptible.

Material Assets

With appropriate mitigation as outlined in the Environmental Report there will be a neutral impact on services as a result of the project. Avoidance of services will minimise potential risk and diversions where necessary will be planned and agreed with Irish Water, Bord Gais, ESB, broadband providers etc and Cork City Council in advance of construction to ensure services are maintained during construction. Similarly, all other developments in the vicinity of Morrison's Island will be required to consults with relevant utility providers and Cork City Council to ensure minimal disturbance occurs. The cumulative impact during construction will be managed though mitigation. There will be no residual impacts as a result of the Morrison's Island Project alone or in combination with other projects including the Lower Lee or Blackpool Schemes.

There will be an imperceptible temporary negative cumulative impact on waste services during the construction phase should the Morrison's Island Project be carried out in parallel with other local projects. The cumulative construction waste may place a slight additional pressure on the waste sorting/recycling services, however this would be an insignificant impact, particularly in the context of the waste produced throughout Cork City.

There will be a predicted temporary slight negative cumulative impact on land use during the construction phase in the event that the Morrison's Island Project area carried out in parallel with other local projects. This will be a result of areas which will need to be used for site compounds/storage, as well as the works areas themselves being unavailable for public use while construction is underway. Post construction during the operational phase, there will be a long term moderate positive cumulative impact on land use as additional areas will be protected from flooding, and the public realm works will improve the usability of the areas for the general public.

1(c) Drainage Modifications and Pumping Stations

In the existing situation, surface water at Morrison's Quay and Fr Mathew Quay typically runs off directly to the River Lee (South Channel) through opes in the existing concrete parapet walls. As a result of the proposed reprofiling of ground levels on Fr Mathew Quay and Morrison's Quay, it will be necessary to install new gravity surface water drainage as shown on drawing MOR-6000 included with the planning application. This drainage system will be designed in accordance with standard practice and will normally discharge to the River Lee through new outfalls through the quay walls.

In the context of flood situations, the Scheme has been designed to ensure that existing sewers and culverts will not convey flood water from the river into the defended area, by means of the following measures:

- All surface water outfalls to the river will be fitted with non-return valves, to protect against rising river levels backing-up through the drainage system.
- Overflow manholes will be constructed on the existing surface water drainage lines, which will each incorporate a side weir. In times where river levels are high and the non-return valves are closed, water levels in the drainage system will naturally rise due to incoming surface water flow from the upstream catchment. Given a sufficiently large flood, the water level in the drainage system will reach the crest of the weir, and it will then begin discharging to the proposed overflow drains.
- The overflow drainage will convey the "excess" surface water to the proposed pumping stations.
- The pumps will kick in automatically as required, based on predefined trigger levels measured within the pump sump by an ultrasonic level meter. The pumps will operate in a duty-assist arrangement with the following control philosophy:
    - If the level in the wet well rises to P1 (Pump 1) Start, the duty pump will be called to run. P1 will continue to run until the P1 Stop level is reached. If P1 outflow is beaten by the inflow, then the level in the wet well rises to P2 start, the assist pump will be called to run. Both pumps P1 and P2 will continue to run until P1 and P2 Stop levels are reached respectively. If the station incorporates more than two pumps and P2 outflow is beaten by the inflow, then the level in the wet well rises to P3 start, the second assist pump will be called to run. Pumps P1, P2 and P3 will continue to run until P1, P2 and P3 Stop levels are reached respectively.
    - Failure of the duty pump will bring on the assist pump.
    - The station will be configured to provide automatic duty changeover after every cycle (adjustable) to ensure even running of the pumps.

As requested by the Board, further details of the pumping stations are supplied in Appendix A (drawings MOR-6001 and MOR-6002). We have also taken the opportunity to provide a revised drawing MOR-6000 to account for some design

development since the lodgement of the application, including minor adjustment to the positions and orientations of the pumping stations.

As requested, specifications of the pumps are also included in Appendix A.

The scheme proposals also include new back of wall filter drainage which is intended to minimise net hydrostatic pressure on the back of the quay wall during normal times. It is envisaged that these drains will be connected to the existing quay wall weep holes, which discharge to the River Lee. These drains will not be connected to the proposed pumping stations.

No groundwater pumping is proposed as part of the Morrison's Island project. The proposed pumping stations will only receive flows from surface water sources. Numerical seepage modelling (based on extensive geotechnical site investigation data) has been undertaken, which indicates that underground seepage will not emerge above ground level within the defended area during the design flood. Therefore, pumping of seepage/groundwater is not necessary as part of this project.

1(d) Consideration of Alternative Finishes/Materials and Reversibility

Working closely with the City Architect, Conservation Officer and other Council Directorates, the Design Team evaluated a number of design options, leading to the development of the preferred, proposed detail that comprises an exposed aggregate concrete base, stone cope and railing above.

In evaluating options, the relationship that people have with the river from the quaysides was considered to be particularly important. Proposals identify the removal of the existing rough concrete low wall (approx. 400mm high) that currently sits on top of the quay wall. The proposed concrete wall will have its cope approximately 600mm above the footway surface on the quayside. The relative height is only 200mm above that which people currently experience. Above the proposed wall, it is proposed to integrate railings that provide guarding to a height of 1.2m above surface level. This is required to mitigate public safety risks along this open quayside and is facilitated with an elegant detail that has minimal visual prominence.

In developing the proposed wall detail, options were considered which would, in accordance with best-practice conservation, provide clear differentiation between the historic elements and the proposed new work. A high quality, deep, tooled ashlar stone coping, in proportion with the proposed wall, will be the prominent visual feature. Granite has been chosen to affect a subtle complement to Cork limestone which is widely used throughout the city quays.

The proposed use of exposed aggregate concrete wall below the coping will differentiate the proposed new elements from the historic, with the colour of aggregate and texture specified and constructed to complement the adjacent materials. In considering the aggregate finish a number of construction methods were used for the prototype panel to achieve a finish that was considered appropriate in texture and colour. These included sand blasting, surface retarder and the one which was agreed with the City Architect, which was a bush hammered finish. The prototype panel (see **Figure 2**) that was constructed for use in the public consultation for the previous Part 8 process demonstrated this.

Figure 2: Prototype panel exhibited during the previous Part 8 process

The face of the proposed parapet wall will be set back by 150mm from the existing face of the historic quay capping stone (reflected on layouts MOR-1000 to MOR-1004 and detail MOR-3005). This approach ensures that the new construction, with its high quality of detailing and materials is clearly differentiated from the historic structure. Proposals have been developed in accordance with best-practice conservation principles, including reversibility, achieved by incorporating a separating board between the base of the proposed new wall and the top face of the historic stonework of the quay wall (illustrated on MOR-3005-P02 included in Appendix A).

Interventions which are not readily reversible are limited to:

- The introduction of a new concrete backing wall, which will be bonded to the rear of the existing wall,

- The proposed changes to the existing drainage outfalls through the walls, which include the installation of non-return valves on the face of the wall.
- Removal of a limited number of fenders as shown on the planning drawings (refer to drawings MOR-4000 to MOR-4008)

Note that the existing, historic timber fenders have been the subject of detailed consideration. Cork City Council is concerned about the existing parlous condition of the fenders. Whilst not specifically related to the proposed works, Cork City Council is currently developing a detailed strategy in relation to the remaining fenders. The study which is being carried out will identify a number of alternative approaches for dealing with the fenders.

1 (e) Pedestrian/Cycle Path

The proposed development will result in the introduction of a one-way system for vehicles within Morrison's Island. The introduction of this one-way system, together with the replacement of existing perpendicular parking spaces with parallel parking spaces, permits the reduction of the width of the vehicular carriageway to 3.0m wide and the width of the parking bays to 2.2m wide, allowing for a redistribution of road space to pedestrian and cycle facilities.

As stated in the transport assessment report which accompanied the planning application:

This development will result in the Morrison's Island area becoming more attractive to pedestrian and cyclist usage and it is anticipated that the scheme will aid to induce additional city centre trips by sustainable modes. The footpath will be widened and made a shared surface for pedestrians and contra-flow cyclists. Cyclists travelling in the same direction of vehicular traffic will use the carriageway and will benefit from the reduced speed of the traffic resulting in a more comfortable environment for cycling.

The standard cross section proposed along Morrison's Quay and Fr. Mathew Quay is a 2.0m wide footpath on the building side of the road to ensure there is a dedicated footway to access the entrances to buildings, a 3.0m wide vehicular lane, a 2.2m wide parallel parking bay at selected locations along this street and the remainder of the space available allocated to a shared pedestrian and cyclist path. This shared path varies in width from 2.85m to approximately 6.0m.

The primary purpose of permitting contra flow cyclists along this section is to enable access to the Coke Zero Bike Share Scheme station and local destinations such as the College of Commerce.

The Draft Cork Metropolitan Area Transport Strategy 2040 and the Cork Cycle Network Plan 2015 were both consulted with regard to the proposed cycling facilities for Fr. Mathew Quay and Morrison's Quay. Both plans were consistent with regard to network mapping. The Cork Cycle Network Plan provides descriptions of both routes. These descriptions are as follows:

Table 3: Extract from Cork Cycle Network Plan 2015

	Fr. Mathew Quay – Route Code: CCC-U29	Morrison's Quay – Route Code: CCC-U38
Road Name	Parliament Street Bridge and Father Mathew Quay	Morrison's Quay
Section (where applicable)	George's Quay to Trinity Bridge	Father Mathew Quay to South Mall
Existing Facility and Quality of Service	There are currently no dedicated cycle facilities along this route.	There are currently no dedicated cycle facilities along this route.
Proposed Infrastructure Type	This is proposed as a primary route with a mixed street environment including the existing footbridge that links from College of Commerce to Union Quay.	This is proposed as a secondary route with a mixed street facility providing improved signage and road markings to alert motorists to cyclists.
Key Locations Served	Cork City Centre, Cork College of Commerce, incorporates two connections across the River Lee.	Cork College of Commerce, City Centre commercial premises.
Pinch Points/Constraints	Appropriate signage, traffic management and road markings will be required to alert motorists to the presence of cyclists and manage driver behaviour particularly in the context of the perpendicular parking that currently occurs along this route. Significant parking on river side of this link could be relocated to provide a more attractive environment to cyclists.	Significant parking on river side of this link could be relocated to provide a more attractive environment to cyclists.

The Cork Cycle Network Plan identified that a mixed street facility is appropriate for both of these streets, albeit this is based on the existing two-way arrangements between Parliament Bridge and Fr. Mather Street and between Catherine Street and South Mall, while only the section between Fr. Mathew Street and Catherine Street is currently a one-way facility.

The Cycle Network Plan also identifies that a significant quantum of perpendicular parking on the river side could be relocated to provide a more attractive environment to cyclists. This measure is being provided as part of this proposed development.

The Design Manual for Urban Roads and Streets (DMURS) and the National Cycle Manual (NCM) were consulted with regard to the space necessary to facilitate contra-flow cycling mixed with pedestrians. While no guidance for this type of facility is provided in these documents, DMURS identifies that the minimum width for a pedestrian footpath is 1.8m while the NCM identifies the width necessary for single-file cycling is 0.75m (excluding edge treatments) or 1.25m including a 0.25m edge treatment on both sides.

Combining both of these widths, a combined width of 3.05m is considered to be the desirable minimum width for this scheme.

Pinch Points

The proposed layout as submitted for planning permission was re-examined in order to identify any pinch points on the shared pedestrian / cycle path whereby the effective width was reduced to below 3.05m.

In total 12 no. locations were identified where the effective width of the shared path was below 3.05m. Of these 12 no. locations, 2 no. were as a result of proposed seating, 2 no. were due to proposed Litter bins, 2 no. were due to proposed public lighting columns, 2 no. were due to the road alignment / cross-section and 4 no. were due to proposed sign poles.

Minor rearrangement of proposed street furniture in the affected areas permits the removal of 11 of the 12 no. pinch points.

However, one pinch point remains, relating to a proposed lighting column located opposite Moore's Hotel (ref location 5 on **Figure 3**). A number of options were considered including:

- the relocation of the proposed column to the opposite side of the road,
- the relocation of the lighting column away from the pinch point,
- the splitting of the proposed parallel parking bay to facilitate an internal build-out or,
- the retention of the pinch point.

It was considered that the relocation of the lighting column to the opposite side of the road would negatively impact the aesthetic consistency of the streetscape.

The relocation of the lighting column along the same side of the road would compromise the lighting provision along the street.

It was also considered by the design team that the construction of an internal build-out and a further reduction in parking / loading space would also impact negatively the proposed layout.

The design team proposes, with the permission of An Bord Pleanála, to retain the proposed lighting column in its location which results in a pinch point with an effective width of 2.75m between the column and the flood defence wall. As a localised pinch point, it is considered that a one-off reduction in effective width will not compromise the overall scheme and the purpose of the shared path.

A table setting out the identified pinch points and proposed mitigation measures is shown below in **Table 4**:

Table 4: Pinch Points Summary

No.	Location	Type	Mitigation Proposed
1	Morrison's Quay (between Irish Life Building and River Lee)	Proposed Seating	Seating to be relocated
2	Morrison's Quay (between Irish Life Building and River Lee)	Proposed Seating	Seating to be relocated
3	North-eastern corner of Morrison's Quay and Fitton Street East	Litter Bin	Litter bin to be relocated by 100mm
4	South-eastern corner of Morrison's Quay and Fitton Street East	Sign Post	Sign post to be relocated south by approximately 3.0m
5	Opposite Moore's Hotel	Lighting Column	Lighting column and pinch-point of 2.75m proposed to be retained
6	North-eastern corner of Morrison's Quay and Catherine St. junction	Sign Post	Sign post to be relocated north-west by approximately 300mm
7	Morrison's Quay (opposite College of Commerce)	Road Alignment	Realign cross section to provide 1.8m wide footway on College of Commerce side, 3.0m wide lane, 2.2m wide parking bay and 3.1m wide shared path.
8	Trinity Bridge	Lighting Column	Relocated lighting column south by approximately 300mm
9	Fr. Mathew Street (opposite MDP Architects)	Litter Bin	Relocate to eastern end of parking bay
10	Fr. Mathew Quay opposite RTE)	Sign Post	Relocate approximately 2.0m south-east
11	Fr. Mathew Quay (western end)	Sign Post	Relocate sign post by approximately 400mm north
12	Fr. Mathew Quay (western end)	Road Alignment	Realign cross section to provide 1.8m wide footway northern side, 3.0m wide lane, and 3.1m wide shared path.

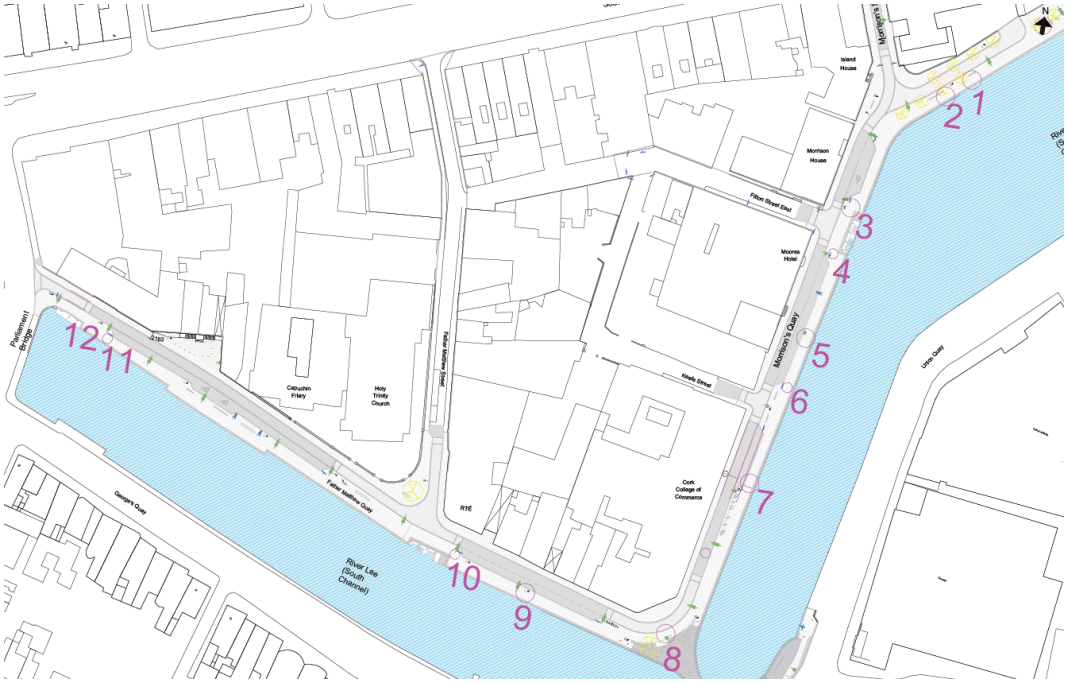

Figure 3: Pinch Points Key Plan

2 (a) NIS - Ecological Surveys

Initial assessment of the Morrison Island was considered as part of the options assessment for the Lower Lee FRS project and subsequently as part of the proposed design of the Lower Lee (Cork City) Drainage Scheme. The information gathered from commencement of the ecological assessment for the Lower Lee (Cork City) Drainage Scheme in 2014 was used to inform the Morrison's Island Project. This survey data and information allowed a targeted assessment of Morrisons Island which was scoped in detail as part of the Lee Scheme. Other information essential in the assessment of the Morrison Island scheme with regard to European Sites was gained from NPWS and the Conservation Objects for those sites.

Desk Study

A desk study was undertaken to determine the proximity of the project to designated areas of conservation utilising the National Parks and Wildlife Service (NPWS) website database. Site synopses, conservation objectives, conservation management plans, site reports etc. were reviewed to identify qualifying interests of relevant sites. The NPWS database and Biodiversity Ireland database were also consulted regarding the occurrence of protected species of flora and fauna in the vicinity of the proposed scheme. Consultations were carried out with the NPWS and Inland Fisheries Ireland (IFI) for the Lower Lee (Cork City) Flood Scheme including the area of Morrison's Island, requesting information on protected species and habitats within the study area as well as comments on the proposed project in relation to survey, assessment and specific mitigation requirements. A review of aerial photography over the study was undertaken to prepare a preliminary habitat map and to identify potential ecologically important habitats. The review also aimed to determine the proximity of the proposed scheme to ecologically important sites in the general vicinity that may be subject to indirect impacts through severance of connecting corridors, pollution run-off during construction, etc. Existing sources of information and records on ecological interests were sourced and reviewed. Specifically, the following documents were examined to determine the potential for impact on the qualifying interests and their conservation objectives of the construction proposals upstream of the designated sties.

- NPWS (2014) Conservation Objectives for Cork Harbour SPA,
- NPWS (2014) Cork Harbour SPA. Conservation objective supporting document,
- NPWS (2014), Conservation Objectives for Great Island Channel SAC
- NPWS (2014), Conservation objectives supporting document – coastal habitat
- NPWS (2014), Conservation objectives supporting document – marine habitats

Field Survey

Following on from the desk study and as part of the Lower Lee (Cork City) Flood Relief Scheme (including Morrison's Island) a series of site surveys were undertaken of the study area, encompassing the River Lee main channel. During

the survey, habitat mapping was undertaken and the suitability of the works area to support plants, animals or habitats of note was considered. The river within the proposed works areas was examined with a view to determining presence of species of note and potential ecological risks associated with the proposed scheme. The flora was surveyed through direct observation on-site and the habitats were classified initially from aerial photographs and subsequently ground-truthed at the site. Fauna were surveyed through direct observation of bird and mammal species or of their signs and calls.

As part of the Lower Lee (Cork City) Flood Relief Scheme (including Morrison's Island), a number of site specific targeted surveys were carried out following consultation with NPWS and IFI for the following: bats, otter (*Lutra lutra*), kingfisher (*Alcedo atthis*), floating river vegetation, fish species and Japanese knotweed (*Fallopia japonica*) and other invasive plant species. Additional field surveys were carried out at Morrison's Island to verify the findings of the assessments. Surveys assessing the ecological baseline were carried out between 2014 and 2018.

A Field Survey was carried out in November 2018 to supplement and update existing information within the study area of Morrison's Island. Habitat mapping was carried out according to Smith et all (2011) Best Practice Guidance for Habitat Survey and Mapping.

The Habitat Assessment and Mapping at Morrison's Island in 2018, confirmed that no habitats identified as part of the Conservation Objectives for Great Island Channel are present within the footprint of the Works (i.e. Mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows). Similarly, no Habitat or Species for which Cork Harbour SPA is designated were identified within the footprint of Morrison's Island or immediately downstream of the works. The Natura Impact Statement therefore made an assessment of the impacts of the works largely based on recorded information including the Conservation Objectives and their supporting documentation for the relevant European Sites.

Table 5: Field Survey carried out and used to inform the NIS

Survey	Date	Assessment Methodology
Lower Lee (Cork City) Floating River Vegetation Survey	2014 - 16	Preliminary surveys were carried out during late summer 2014, followed up with bank surveys of the River Lee channel between the 20th and 30th of June 2015. Quadrats were performed in triplicate and the percentage cover of aquatic macrophytes in each was estimated.
Lower Lee (Cork City) Invasive Plant Survey and Management Plan	2016 - Present	Annual walkover surveys and treatment of alien plant species listed by the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011.
Lower Lee Bat Faunal Survey	2014	Desk top assessment of aerial photographs, visual inspection of structures and trees for evidence of bats. Review of BCI records. Desk top assessment of aerial photographs, visual

		inspection of structures and trees for evidence of bats. Review of BCI records. An onsite bat assessment undertaken on 19th and 20th October 2014. No potential bat habitat in Morrison Island.
Lower Lee Electro-Fishing Survey and License Return Report	2014	Electrofishing survey under licence from IFI. September survey. Supplemented with dive surveys where electrofishing was not feasible
Sea lamprey (Petromyzon marinus red) survey	2015	Bankside survey in May and June 2015 followed on by red scuba diving survey in areas where spanning potential occurred.
Lower River Lee & Tributaries Biological Q Sampling Report	2015	Macro-invertebrate samples were collected by 'kick' sampling on the River Lee and tributaries Curragheen, Glasheen, Glenamought and Bride between the 2nd and 5th May 2015. Where possible the macro-invertebrate sampling stations were situated in the vicinity upstream or downstream of the works areas. Collected samples were elutriated, refrigerated and identified live within 24 hours of each site visit.
Habitat mapping of the Lower Lee and Tributaries	2015/6	Walkover field survey identifying plants and habitats along the works area. Carried out considering Smith et all (2011) Best Practice Guidance for Habitat Survey and Mapping.
Lower River Lee & tributaries Kingfisher (Alcedo atthis) Surveys 2014-2016 and Breeding Bird Survey	2014 - 2017	Walkover surveys and/or boat surveys were conducted between August and October (end) 2014 to target areas where suitable nesting banks were located. As this period was not considered optimum for observing or recording breeding kingfishers (March to June/July is considered optimum), repeat breeding surveys were conducted over a threeweek period during May-June 2015. To gather additional data on kingfisher distribution, vantage surveys were undertaken at bridge sites. Further surveys were conducted in Ballincollig and the Lee Fields during 2016 and 2017.
Lower Lee (Cork City) Drainage Scheme Otter (Lutra lutra) Survey	2014 - 2018	Targeted otter surveys of the River Lee and tributaries. Dusk vantage surveys undertaken at bridge sites to document feeding otters passing the area. Day time bank walkover surveys for spraints, slides and prints using survey methodology recommended by Chanin (2003) and Bailey and Rochford (2006).
Habitat Assessment and Mapping of Morrison's Island	2018	Walkover field survey identifying plants and habitats along the works area. Carried out considering Smith et all (2011) Best Practice Guidance for Habitat Survey and Mapping.

2 (b) NIS – In-combination effects with other Schemes

The potential impact identified in the Natura Impact Statement (Section 5.2) for Morrison's Island Public Realm and Flood Defences Project on Cork Harbour SPA and Great Island Channel SAC include the following:

Cork Harbour SPA

Cork Harbour is a significant distance downstream of the proposed Project. However, taking a precautionary approach to assessment, the following mechanisms by which an adverse effect on the Conservation Objectives of the SPA might potentially occur during construction activity were identified:

- Disturbance during construction to birds designated within the SPA that are using the River Lee in proximity to Morrison's Island (e.g. Grey Herron);
- Smothering of habitats within the SPA by hydrological linkage as a result of deposition of increased suspended sediments arising from construction phase associated with the proposed works; and
- Deterioration of habitats within the SPA by hydrological linkage as a result of pollution incidences arising from construction or operation of the proposed works.

Great Island Channel SAC

Great Island Channel SAC is over 9km downstream of the project. The following mechanisms by which an adverse effect on the Conservation Objectives of the SAC might potentially occur during construction activity, when considering a precautionary approach, were identified:

- Smothering of habitats within the SAC by hydrological linkage as a result of deposition of increased suspended sediments arising from construction operations associated with the proposed works; and
- Deterioration of habitats within the SAC by hydrological linkage as a result of pollution incidences arising from construction of the proposed works.

It is considered that this development in combination with the Lower Lee (Cork City) Drainage Scheme, the Glashaboy (Glanmire / Sallybrook) Drainage Scheme and the River Bride (Blackpool) Certified Drainage Scheme could potentially lead to increased risk of the above potential impacts to downstream European Sites. However, the schemes are unlikely to be carried out in unison, furthermore the Lower Lee Scheme is likely to be carried out in a phased approach throughout its extents. Therefore, the potential impacts on the European Sites in combination are as a result of prolongation of effects that may occur as a result of longer duration of disturbance, increased deposition of suspended solids over a longer period of time or increased duration of risk of pollution events.

While the European Sites are a significant distance downstream of the proposed works, mitigation has been proposed for the project for the protection of the watercourses and Qualifying Interests of the Sites.

While the European Sties are a significant distance downstream of the proposed works, mitigation has been proposed for the project for the protection of the watercourses and Qualifying Interests of the Sites.

Potential Impacts in Combination with Lower Lee (Cork City) Drainage Scheme and the River Bride (Blackpool) Certified Drainage Scheme:

Disturbance to Birds

Birds protected as part of Cork Harbour make up wetland species and their wetland habitat. The River Bride flows into the north channel of the River Lee. Any disturbance to the protected birds, that are occasionally using the area and whose populations are protected within the SPA, is localised only and there is no overlap between this scheme and Morrison's Island. Similarly, the Glashaboy River flows into the River Lee downstream of Morrison's Island. However, works on the scheme are located a significant distance upstream from the European Sites. Disturbance (in the absence of mitigation) is unlikely to affect the same individual species located within the zone of influence of the drainage schemes. Impact on birds as a result of disturbance at Morrison's Island is considered not significant and restricted temporarily to individual birds and not on the populations for which the site is designated.

The Lower Lee (Cork City) Scheme will be carried out in phases. Disturbance will be limited to localised areas at any one time. It is likely that Morrison's Island will be completed prior to the commencement of the Lower Lee Scheme and therefore the risk of impact by disturbance will no longer be present prior to the commencement of the Lower Lee Scheme. The Lower Lee Scheme NIS will require assessment of the potential impact on bird species.

Any impact on the wetland species for which the SPA is designated will not be permanent and the scheme will be designed with appropriate mitigation.

Smothering of habitats within the European Sites as a result of deposition of increased suspended sediments arising from construction phase

There is a risk to habitats as a result of deposition of suspended sediments as a result of Morrison's Island scheme in the absence of mitigation. This risk of impact is temporary and likely to arise only during the construction phase. The Lower Lee, Glashaboy and Blackpool schemes similarly create this risk. Increased risk of deposition of material may potentially occur in more significant quantities as a result of the schemes cumulatively. Mitigation measures are required to eliminate the risk of sediment deposition. The Morrison Island Scheme identified a suite of mitigation measures that are best practice for works on or near watercourse in order to maintain water quality. The efficacy of these measures is demonstrated in a draft Construction Pollution Control Plan (CPCP) as discussed in Section 2(c) below. Future projects including Blackpool, Glashaboy and the Lower Lee require Screening for Appropriate Assessment and (as required) Natura Impact Statement which will need to demonstrate that disposition of

suspended sediments during construction will not have a negative impact on the conservation objectives of European Sites and propose mitigation as required.

Deterioration of habitats within the SPA and SAC as a result of pollution incidences arising from construction or operation of the proposed works.

There is a risk to habitats as a result of pollution incidents as a result of construction activities for Morrison's Island. The Lower Lee, Glashaboy and Blackpool schemes similarly create this risk. When considered in combination, these schemes give rise to an increased duration and scale of works, thereby extending risk of pollution events. The NIS for Morrison's Island identifies mitigation measures to eliminate the risk of pollution events. The mitigation measures identified are considered best practice and well tested when working on or near watercourse in order maintain water quality. The efficacy of these measures is demonstrated in a Draft Construction Pollution Control Plan (CPCP) as discussed in section 2(c) below. Future projects including Blackpool, Glashaboy and the Lower Lee require Screening for Appropriate Assessment and (as required) Natura Impact Statement which will need to demonstrate that pollution risk during construction will not have a negative impact on the conservation objectives of European Sites and propose mitigation as required.

2 (c) NIS - Mitigation Measures

Mitigation measures are identified in the NIS for Morrison Island Public Realm and Flood Defence Project and in the Environmental Report for the Project with regards the protection of the River Lee and downstream qualifying interests of European Sites. In order to demonstrate the effectiveness of mitigation measures, a draft Construction Pollution Control Plan and Dust Minimisation Plan are provided in Appendix B and C of this report. The measures identified are considered standard in best practice construction methodology and have regard to guidance documents including IFI (2016), Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters. In order to ensure the implementation of these measures to an appropriate standard, an Ecological Clerk of Works (EcOW) will be appointed by Cork City Council. The EcOW will oversee all measures put in place and will ensure that the measures are effective in their purpose. See Appendix B for an outline of the role of the EcOW in the project in consideration of pollution control.

3(a) Underwater Archaeology Report

See Appendix D Underwater Archaeology Survey of the sub-tidal channel of the South Channel between Parliament Bridge and Parnell Bridge (ADCO).

3(b) Flood defence at south side of Trinity Bridge

As requested, an elevation drawing showing the proposed flood defence at the south side of Trinity Bridge is provided in Appendix A (drawing MOR-4008 Rev P02). Also included is a revised drawing MOR-1003, which addresses the inconsistency noted in the RFI.

3(c) Tie-in Details at Parliament Bridge

As requested, drawings showing the details of the tie-ins at Parliament Bridge are provided in Appendix A (drawing MOR-3007).

3(d) Additional Cross Section Fr Mathew Quay

As requested, an additional cross section drawing is provided in Appendix A (drawing MOR-3006). The position of the new section is shown on revised drawing MOR-1004-P02.

Environmental Report Errata

We also now submit a document containing errata to the submitted Environmental Report. These errata correct minor errors in the original report. Refer to Appendix E.

Appendix A

Drawings and Specifications

A1 Drawings

A2 Specifications

Appendix B

Dust Minimisation Plan

B1

Appendix C

Construction Pollution Control Plan

C1

Appendix D

Underwater Archaeology Report

D1

Appendix E

Environmental Report Errata

E1

Appendix F

LLFRS Phasing Report

F1