TOBIN

South Dublin County Council

Lucan Demesne Public Realm – Upgrade of Park Entrance

Preliminary Construction Erosion and Sediment Control Plan

Comhairle Contae
Átha Cliath Theas
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BUILT ON KNOWLEDGE

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1. INTRODUCTION

Situated on the outskirts of Lucan village within the South Dublin administrative region, Lucan Demesne stands as a testament to the area's rich natural heritage. The demesne is currently undergoing significant infrastructural improvements as part of the Destination Town initiative, which seeks to bolster the appeal and functionality of towns as tourist destinations.

TOBIN were appointed by South Dublin County Council to prepare a preliminary construction erosion and sedimentation plan for the proposed development as part of the planning submission. The development relates to the upgrading of the Lucan demesne pedestrian entrance.

The purpose of this document is to provide outline guidance and practices for the implementation of erosion and sediment control practices during the construction phase of this project.

As outlined in the brief a key consideration is the preservation of the area's natural habitat.

The existing routes into Lucan Demesne are via narrow entrances and narrow, steep pathways. Access to Lucan demesne is constrained, as such, it is proposed to install a raised walking boardwalk to improve access. This project will provide accessible pathways and platforms which will make the area more inclusive to people in wheelchairs and those with restricted mobility as well as people with bicycles, buggies and other modes of transport, improving universal accessibility in accordance with all relevant guidance and standards, during all stages of design.

The envisioned entrance to Lucan Demesne is designed to be not only accessible but also visually appealing, harmonizing with the park's inherent scenic beauty to draw more visitors and enhance their experience. This enhancement is part of a broader strategy to improve ingress to both Lucan Demesne and the adjacent Liffey Valley, as well as to facilitate connection to a medium-to-long distance off-road route that spans from Lucan Demesne to St. Catherine's Park in Fingal and further extends to the Royal Canal in Kildare.

The project aims to augment the westward access into the park and along the Liffey Valley, thereby promoting increased utilization of the extensive off-road pathway that meanders alongside the River Liffey, interconnecting Lucan Demesne with St. Catherine's Park via an existing pedestrian and cycle bridge and continuing towards the Royal Canal.

Project Description

The Project Involves:

- The construction of a timber boardwalk from the plaza to the existing river side path of approximately 105m in length, ranging from 150mm to 900mm in elevation, and generally 2m in width, widening in places up to 3m.
- The removal of the existing path, this area will be allowed to revert to its original state.
- A short area of no dig gravel at the end/start of the proposed boardwalk.
- All related hard and soft landscape works including associated planting.
- All ancillary works.

The site is quite sensitive to erosion and sedimentation given its location with regard to the River Liffey, the project objectives and the mature wooded area where it is to be constructed. As it is proposed to construct an elevated walking platform through the wooded area in order to minimise the impacts of foundations and bases on the existing trees.

Stakeholders

Prior to the finalisation of detailed design and the commencement of construction, the following organisations should be notified to inform them of the works and program as well as allow for inspection of the design and erosion and sediment control plans:

- The Office of Public Works (OPW)
- The Environmental Protection Agency (EPA)
- Fisheries Ireland

2. ENVIRONMENTAL CHARACTERISTICS

2.1 OVERVIEW

Hydrology

The River Liffey, Dublin's primary waterway, traverses the city centre before discharging into Dublin Bay. Key tributaries contributing to the Liffey's flow include the Dodder, Poddle, and Camac. Notably, the Liffey serves as a crucial water source for Dublin and provides a platform for diverse recreational activities.

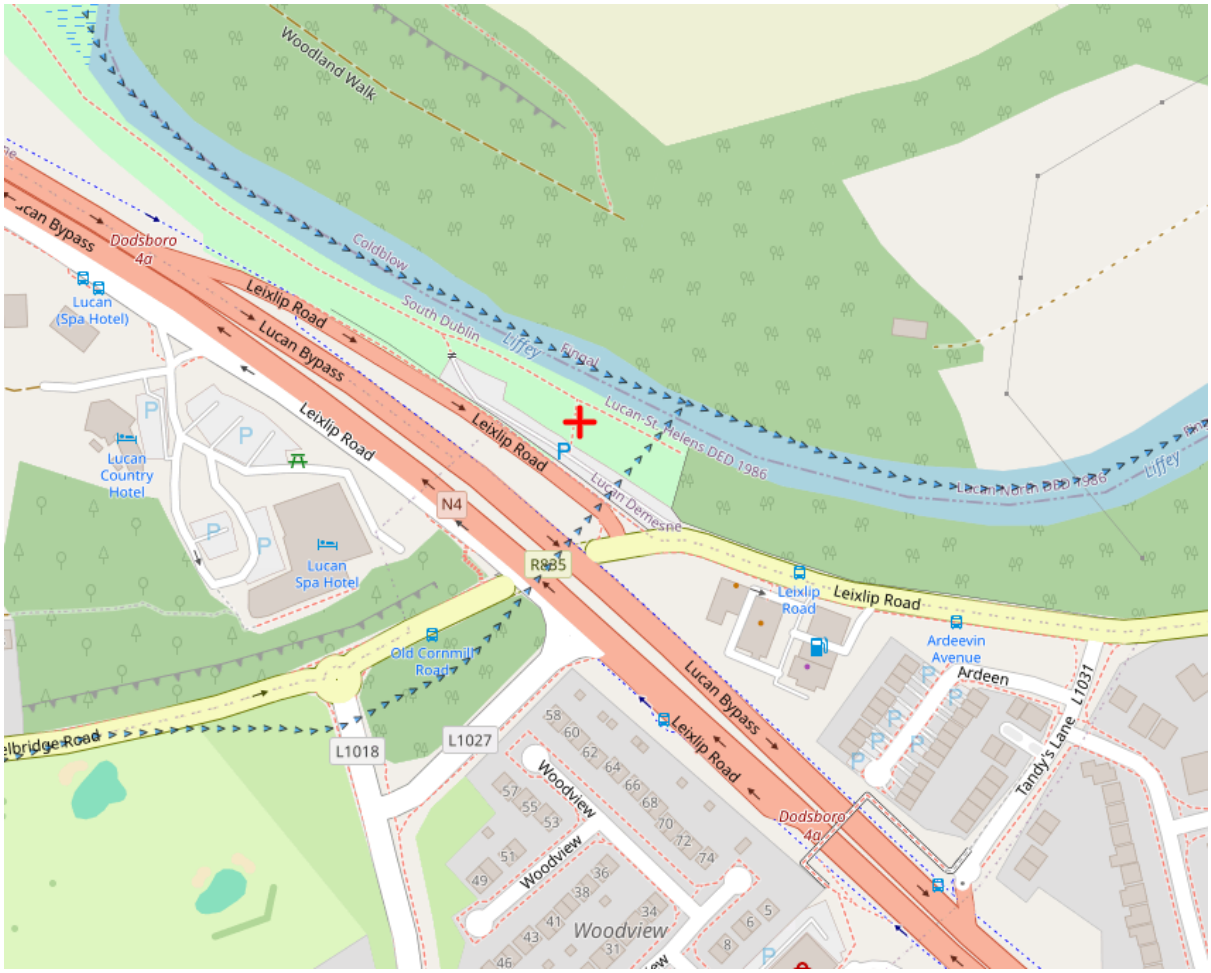

Figure 1 - River Mapping (source: epa.ie) showing a local rivers and streams to the project area.

Flooding

The OPW's National Flood Information Portal provides past flood event mapping with records of flooding reports, meeting minutes, photos, and/or hydrometric data. Several flood events are noted approximately 0.7km north-east of the subject site and are attributed historical fluvial events at the Grifeen River. The events are not hydraulically linked to the subject site.

Figure 2 https://www.floodinfo.ie/map/floodmaps/ showing project site and flood sites

Water Quality

The Environmental Protection Agency (EPA) maintains a programme of carrying out river water quality samples on the River Liffey on a regular basis. Samples include both river water and riverbed material. Kick Samples are also taken to examine the macro-invertebrate communities as there is a relationship between the quality of water and the diversity of the macro - invertebrate communities in that, generally, the more diverse the community the better the quality of water.

Key parameters monitored include:

- Alkalinity,
- Biochemical Oxygen Demand 5 (BOD5),
- Chloride,
- Colour,
- Conductivity,
- Dissolved oxygen (DO),
- Hardness,
- Ammonia,
- Phosphate,
- Nitrogen, and
- Temperature.

The data collected and collated by the EPA is processed to form a numerical representation and classification of the water quality via Biotic indices ("Q Values)."

Q Value*	WFD Status	Pollution Status	Condition**
Q5, Q4-5	*High*	*Unpolluted*	*Satisfactory*
Q4	*Good*	*Unpolluted*	*Satisfactory*
Q3-4	*Moderate*	*Slightly polluted*	*Unsatisfactory*
Q3, Q2-3	*Poor*	*Moderately polluted*	*Unsatisfactory*
Q2, Q1-2, Q1	*Bad*	*Seriously polluted*	*Unsatisfactory*

The most recent survey data available via EPA (2022) yielded consistent results to 2019.

Table 1

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS09L010500	1km d/s Ballymore Br	IE_EA_09L010600	292150	210336	Kildare County Council
RS09L010600	New Br (La Touche)	IE_EA_09L010600	287016	209865	Kildare County Council
RS09L010700	Kilcullen Br	IE_EA_09L010700	284189	209702	Kildare County Council
RS09L010800	Athgarvan Bridge	IE_EA_09L010850	282165	212155	Kildare County Council
RS09L010850	Connell Ford	IE_EA_09L010850	281396	213613	Kildare County Council
RS09L010900	LIFFEY - Br in Newbridge	IE_EA_09L011000	280735	215346	Kildare County Council
RS09L011000	2.5 km d/s Newbridge	IE_EA_09L011000	281860	217762	Kildare County Council
RS09L011050	Victoria Br	IE_EA_09L011050	284236	219445	Kildare County Council
RS09L011100	Caragh Br	IE_EA_09L011200	285423	220755	Kildare County Council
RS09L011200	Castlekeely Ford (RHS)	IE_EA_09L011200	286940	221639	Kildare County Council
RS09L011400	Millicent Br	IE_EA_09L011500	288105	224561	Kildare County Council
RS09L011500	Alexandra Br Clane (d/s side)	IE_EA_09L011500	287970	227044	Kildare County Council
RS09L011600	Straffan Turnings Lr (RHS & Mid)	IE_EA_09L011600	292451	229184	Kildare County Council
RS09L011610	Straffan Turnings Lr (LHS)	IE_EA_09L011600	292464	229180	Kildare County Council
RS09L011700	Br in Celbridge	IE_EA_09L011700	297359	232864	Kildare County Council
RS09L011900	Leixlip Br (RHS)	IE_EA_09L011900	300825	235806	Kildare County Council
RS09L012000	D/s Leixlip STP	IE_EA_09L012040	301927	235845	South Dublin County Council
RS09L012100	Lucan Br	IE_EA_09L012100	303497	235516	South Dublin County Council
RS09L012327	LIFFEY - Mill Lane Studio	IE_EA_09L012350	309260	234957	South Dublin County Council
RS09L012330	LIFFEY - 1km u/s Chapelizod Br (Glenaulin Park)	IE_EA_09L012350	309848	234973	Fingal County Council
RS09L012360	LIFFEY - 0.2 km d/s Chapelizon Br (Lynch's Lane)	IE_EA_09L012360	310423	234138	Dublin City Council
RS09L012400	LIFFEY - Islandbridge-UCD Boat Club	IE_EA_09L012360	312253	234213	Dublin City Council

Table 2

Station Code	1973	1974	1977	1978	1979	1981	1983	1986	1988	1991	1995	1998	2002	2005	2007	2010	2013	2016	2019	2022
RS09L011500	3-4	4		4		4	4-5		4-5	3-4	3	3-4	4	3-4	3-4	4	4	4	4	4
RS09L011600	4	4		3-4		4	4-5		4	3-4	3-4	3-4	4	3-4	3-4	4	4	4	4	4
RS09L011610											1	3-4	4							
RS09L011700	4	4		3-4		4	4-5		4	3	3-4	3-4	4	4	3-4	4	4	4	4	4
RS09L011900	3-4	4	2-3		3	3	4	3-4	3-4	3-4		3	3-4*	3	3	3	3	4	4	4
RS09L012000						3	3-4	3-4	3-4	3										
RS09L012100	4	4	3		3	3	3-4	3-4	3-4	2-3	2-3	2-3	3	3	3-4	3-4	3-4	4	3-4	3-4
RS09L012327													3							
RS09L012330														3						
RS09L012360															3-4	3-4	3-4	3-4	3	3
RS09L012400	3	3	3		3	3	3	2-3	2-3	3										

It can be noted that the water quality does deteriorate further downstream of the project site (Station Code RS09L012000) however, the water quality is consistent at project site.

Landscape

The project area is a mature wooded area located on the banks of the River Liffey. The project is bounded by an existing car park to the south and an existing made walking path at the bottom of the riverbank. There is an existing walkway from the car park to the path at the bottom of the riverbank.

Figure 3 earth.google.com showing project location

Hydrogeology

The Project is located within the Dublin Groundwater Body (GWB). The bedrock at the site is classified as the Lucan Fomation being Dark Limestone & Shale. The groundwater vulnerability is classified as High to Extreme which is a measure of the potential of groundwater contamination by human activities. Downstream of the project area the groundwater vulnerability has varying vulnerability measures, from low to extreme along the River Liffey. The EPA classifies the Dublin GWB as good status. The bedrock aquifer is described as locally important aquifer bedrock which is moderately productive only in local zones.

Geology

The project area is mostly located within the floodplain of the River Liffey with dark limestone and shale formations and sediments of till derived from limestone and Alluvium.

Soils

The Subsoil Permeability of the area is considered high being glaciofluvial sands and gravels overlain by well-drained soil. There are some made lands located within close proximity to the project area (such as the car park, existing steps and walking paths). Subsoils consist of Till derived from limestones and alluvium.

Localised site investigation works are to be undertaken as part of the detailed design stage which will provide further classification of the underlying soils.

3. KEY ECOLOGICAL RECEPTORS

Key Ecological Receptors (KERs) that have been identified in the Ecological report that could be impacted by sediment laden water i.e. those in relation to aquatic ecology and fisheries include:

Table 3

Number	Name	Location
1	Otter	River Liffey
2	Salmon	River Liffey
3	Brown Trout	River Liffey
4	Eel	River Liffey
5	Lamprey species	River Liffey
6	Rare Plants from the Liffey Valley	Liffey Valley

4. EROSION AND SEDIMENT CONTROLS

4.1 GENERAL PRINCIPLES

Key erosion and sediment control measures are essential components of any construction project to prevent the degradation of soil and water quality. These measures are designed to address the various ways in which construction activities can expose soil to erosion by wind and water, leading to sedimentation issues. Some fundamental strategies include the minimization of disturbed areas during excavation, the diversion of stormwater away from exposed soils, and the installation of sediment barriers such as silt fences or turf buffer strips to filter out sediments before they can enter water bodies. Additionally, controlling site runoff through methods like ditching, grading, and the use of sedimentation ponds is crucial. Sediment ponds, for instance, allow eroded soil to settle before the water is discharged, thus maintaining water quality.

CIRIA C649 "Control of Water Pollution from Linear Construction Projects" outlines a number of control measures that should be considered.

The stabilising of exposed soils is another critical measure, which can be achieved through temporary seeding, mulching, or the use of erosion control blankets until permanent vegetation can be established. Permanent vegetative buffer strips alongside waterways also play a significant role in trapping sediments. Furthermore, maintaining the hydrological balance by installing culverts under access roads and managing stormwater effectively helps in sediment control. Isolating in-stream work areas from flowing water is vital to prevent sediment from entering downstream environments.

For the effective implementation of these measures, proper planning, scheduling, and maintenance are key. This includes phasing construction activities to ensure that land exposure is minimized and disturbed areas are restored to a stable condition as soon as possible. Regular inspections and maintenance of erosion and sediment control facilities are necessary to ensure their effectiveness throughout the construction process. Training for workers on the proper installation and maintenance of these measures is also an important aspect of a successful erosion and sediment control plan.

In summary, the key measures for controlling erosion and sedimentation involve a combination of physical barriers, stabilization techniques, water management practices, and ongoing maintenance and monitoring to protect the soil and water quality during construction activities. These practices not only comply with environmental regulations but also contribute to the sustainability and long-term success of construction projects. Implementing these measures effectively requires a comprehensive understanding of the site-specific conditions and the potential impacts of construction activities on the environment.

4.2 HIERARCHICAL CONTROL

There are 3 stages of control with regard to Sediment and Erosion:

1. Principal Avoidance Measures
2. Principal Control Measures

3. Site Specific Requirements

A risk-based approach needs to be developed during detailed design to ensure sufficient mitigation to erosion is to be implemented ahead of construction.

4.2.1 Principal Avoidance Measures

Through design and construction methods, principal avoidance measures will be implemented to effectively prevent erosion occurring in the first instance by minimising land disturbances, persevering existing vegetation, scheduling construction to minimise the duration of exposed soil and adopting construction methods that will reduce the likelihood of the occurrence of erosion.

Consideration has been given, at concept design stage, for the implementation of principal avoidance measures on this project. In order to minimise the impacts on the existing vegetation it is proposed to install an elevated platform constructed on mini piles which are to be excavated by low impact construction methods which in turn will reduce the overall amount of excavation on site.

Further consideration is required at detailed design stage as to the specific details of foundations, construction methods, scheduling of works.

4.2.2 Principal Control Measures

Although significant efforts will be made to implement principal avoidance measures, principal control measures will also be required in the event that principal avoidance measures cannot be implemented/ maintained. Examples of control measures that may be suitable include silt fencing, erosion control blankets. Stormwater diversion control and sediment basins.

4.2.3 Site Specific Requirements

The site is quite sensitive to erosion and sedimentation given its location with regard to the River Liffey, the project objectives and the mature wooded area where it is to be constructed. As it is proposed to construct an elevated walking platform through the wooded area in order to minimise the impacts of foundations and bases on the existing trees, it will not be permitted to excavate the foundations via methods which would entail machinery causing damage to the existing trees or tree roots. Therefore, it is likely that that only excavation and construction via hand tools will only be permitted.

Given the proximity of project to the Liffey River, excavated material and fill material will not be permitted to be stored within the site and will therefore need to be located outside of the riverbanks. Stockpiles, if permitted, will need to slope to 1:3 or flatter and be no more than 2m in height and bunded with silt fencing.

A silt fence should be erected on the down slope of the project area to capture any sediment runoff from the site.

5. MONITORING AND AUDIT

All control measures and site-specific requirements must be implemented ahead of construction and inspected and maintained regularly during construction. As part of the detailed design stage, a site-specific Erosion and Sediment and Control Plan is to be prepared by the contractor for consideration by the client prior to construction. The Principal Avoidance Measures, Principal Control Measures and Site-Specific Requirements shall be informed via a risk-based approach for their implementation and the determination of their monitoring and auditing requirements.

The contractor is responsible for the design installation and maintenance of all of the Erosion and Sediment Control devices during the construction phase of the project.

6. EMERGENCY PROCEDURES

As part of the detailed design stage, a site-specific Incident Response Plan shall be prepared and issued to the Client for consideration prior to construction, the Incident Response Plan shall contain procedures and processes to mitigate hazards in relation to sediment and erosion as identified as part of a risk assessment with regard to erosion and sediment.

7. CONCLUSION

This preliminary document provides outline guidance and practices for the implementation of erosion and sediment control practices during the construction phase of this project. Once detailed design commences, a detailed construction and sediment and erosion control plan shall be prepared which, upon carrying out a site-specific risk assessment with regard to erosion and sediment control based on construction methods and other mitigation methods identifies and locates:

- Principal Avoidance Measures
- Principal Control Measures
- Site Specific Requirements
- Construction methods
- Incident Response Plan

CIRIA C649 "Control of Water Pollution from Linear Construction Projects" outlines a number of control measures that should be considered as part of detailed design process and construction period.

8. REFERENCES

Epa.ie

Geological Survey Ireland

CIRIA C649

Floodinfo.ie

Google. Earth

www.tobin.ie