Appendix A13.3
Drainage Design Basis Statement

Table of Contents

SECTION 1: INTRODUCTION

1.1 Purpose of the Report

The aim of this report is to establish the drainage strategy and design criteria to be used as part of the Drainage Design of the BusConnects Galway: Dublin Road development.

1.1 Background and Overview of the Project

BusConnects is the National Transport Authority's (NTA) programme to improve bus and sustainable transport services. It is a key part of the Government's policies to improve public transport and address climate change. BusConnects Galway: Dublin Road arises from the Galway Transport Strategy (GTS), Bus Connects Infrastructure Program and Project Ireland 2040.

BusConnects Galway Cross City Link (CCL) is associated with the Galway Transport Strategy (GTS), Bus Connects Infrastructure Program and Project Ireland 2040. The aim of the BusConnects programme is to transform Galway City's bus system, with the Cross-City Link project providing dedicated space to serve all proposed city bus services, by providing bus priority through the city centre core. The objective of the Cross-City link is to prioritise walking, cycling and public transport along its length, whilst facilitating essential private traffic on appropriate alternatives. This project is fundamental to addressing the congestion issues in the Galway City region with the population due to grow by 50-60% by 2040, an increase of up to 50,000 more people.

The development aims to implement an optimum project cross-section to include footpaths and bus lanes on both sides of the road throughout the development network where feasible. Cycle Tracks will also be introduced, where feasible. In some instances, this will necessitate a Compulsory Purchase Order (CPO) process to include portions of private land to achieve the project objectives. This proposed route can be viewed in Figure 1.1 below.

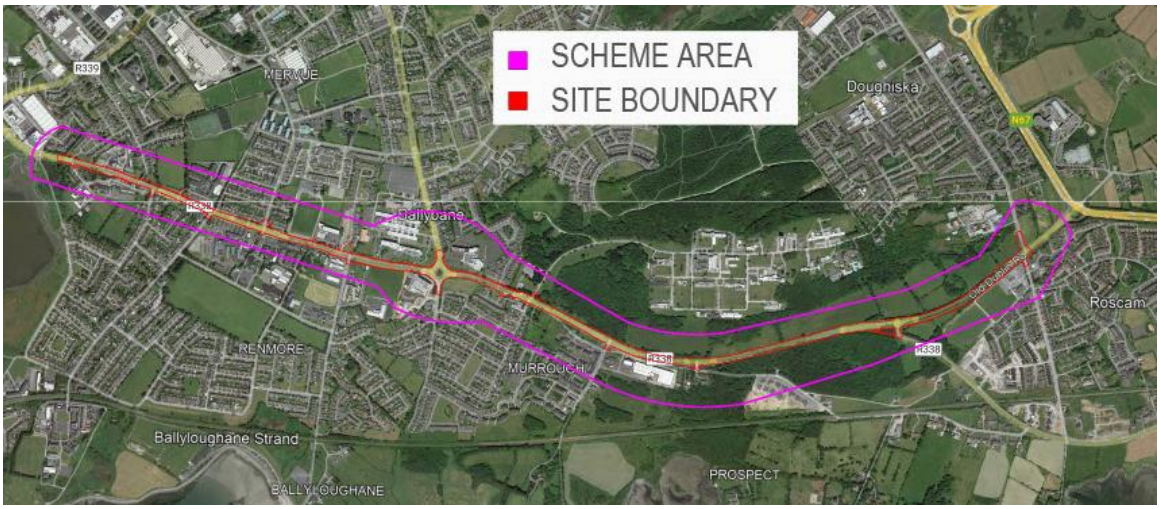

Figure 1.1: Existing R338 (Old Dublin Road) and Development Area

1.2 General Principles of Drainage Design

The main general principles considered as part of the drainage design are as follows:

- The existing drainage network will be maintained and used as the main discharge point for the new drainage system. The idea of the design is replicating the existing situation. Where new multiple gully connections discharging to a combined sewer are required, a new surface water pipe is being provided where possible and connected to the combined sewer. This is applicable in areas where kerbs are changing, and gullies are being relocated as a result.
- One of the principal objectives of the road drainage system is to minimise the impact of the runoff from the roadways on the surrounding environment via the provision of Sustainable Drainage Systems (SuDS).
- The design was developed based on assessment of existing drainage records, topographical survey and google street view and aerial imagery, along with some specific targeted surveys if required. Additional GIS utility records from Galway City Council (GCC) and Irish Water (IW) were also reviewed. A site visit was also undertaken.
- The primary design aim is to maintain the existing network flow regime, prevent surcharge and flooding. In areas where impermeable areas increase, SuDS and attenuation measures will be provided. The design incorporates several attenuation measures; the final details of which will be determined at detailed design stage. The current design complies with all relevant standards and guidance documents. Where spatial or other constraints make the use of SuDS impractical, or when SuDS do not provide enough attenuation, oversized pipes or attenuation tanks have been provided.
- The proposed drainage elements were cross checked against available utility records. Where clashes were identified, the drainage or utility design was updated. Narrow filter drains or fin drains are not proposed for inner city roads.
- Existing drainage gullies located in the bus lane are proposed to be removed when necessary and reused where possible. Side-entry kerb drainage/side entry gullies are being proposed where practical, especially along bus lanes to be shared with cyclists. Conventional road gullies will be required in some areas, such as in recessed areas like loading bays. Other areas will be determined on a case-by-case basis.

SECTION 2: PROPOSED DRAINAGE STRATEGY

2.1 Relevant Standards and Guidance

The following guidance documents and standards were referenced during the preparation of the Preliminary Drainage Design:

- TII Drainage Documents
- Greater Dublin Strategic Drainage Study (GDSDS)
- Greater Dublin Regional Code of Practice (GDRCoP)
- The SuDS MANUAL (C753) – CIRIA
- Galway City Development Plan 2023-2029

Table 2-.1: Design Standards

Parameter & Feature	Allowable Discharge Rate
Permitted Discharge Rates	
Combined New/Existing Paved Catchment Areas	Existing runoff rates maintained based on: - the existing paved areas to 1 in 5-year flow, - 2l/s/ha for the existing grassed areas catchments to be paved (additional catchments). For operational purposes, it is recommended that the minimum throttle size for a pipe should be 75mm and the minimum allowable flow rate should be 2l/s.
Attenuation / SuDS Measures	
Combined new/existing paved areas	Attenuation/SuDS measures sized to contain the 1 in 30-year storm with a 20% allowance for future climate change

In areas where the catchment remains unchanged which implies that no additional impermeable areas are proposed, the design consists of relocating the gullies to a suitable location.

2.2 Pipeline Network Design Criteria

The following inputs sourced mainly from Met Éireann and GDSDS Volume 2 are used in the development of the drainage design for new catchment areas. Table 2 below shows Rainfall Design Criteria Variables.

Table 2-.2: Rainfall Design Criteria Variables

Variable	Value
Region	Scotland/Ireland
New attenuation sizing	1 in 30 Year (+20%)
M5-60 (Met Eireann, Return Period Rainfall Depths for sliding Durations)	14.1 (mm)
Ratio R (Met Eireann, Return Period Rainfall Depths for sliding Durations)	0.3
Minimum Global Time of Entry (Recommendation for Site Development Works for Housing Areas)	4 minutes
Max. Rainfall (Calculated using localised Met Eireann data)	75 (mm/hr)
Max. Time of Concentration (Wallingford Procedure States the Modified Rational Method has only been tested for time of concentration not greater than 30 minutes)	30 minutes
Climate Change (TII and Galway City Council consultation)	20%

Table 2-3 below summarizes the Surface Water Drainage Pipes Design Criteria which states minimum pipe sizes, minimum depth of cover, minimum velocity, roughness coefficient and minimum slope.

Table 2-.3: Runoff Permeability Factors

Runoff Permeability Factors	
Location	Value
Grassed Areas (GDSDS Vol 2-Appendix E)	0%
Paved (GDSDS Vol 2-Appendix E)	80%

Table 2-.4: Surface Water Drainage Pipes Design Criteria

Parameter	Surface Water Sewers
Minimum depth (of cover)	0.6m under grassed areas 0.9m under footpaths 1.2m under carriageways 0.75m under carriageways (with concrete surround)
Maximum depth (of cover)	6m
Minimum sewer size	225mm, or 150mm for gully connections
Flooding	Must accommodate a one-year storm in-bore without surcharge (TII) Design must be checked against a five-year storm intensity to ensure that surcharge levels do not exceed the levels of chamber covers.
Roughness - ks	0.6mm for carrier drains 1.5mm for filter drains
Minimum slope	1 in 500 or steeper, Self-cleansing velocity will take preference

In accordance with TII, Volume 4, Section 2, Part 3, NRA HD 33/15 Drainage Systems for National Roads the length of pipework from manhole to manhole should not exceed 100 metres.

2.3 Sustainable Drainage Systems (SuDS)

The drainage system design must manage on site the quality of runoff to prevent pollution in receiving waters and groundwaters. Where possible, and in new areas of public realm gained as part of the design, a sustainable drainage system should be considered in the form of rain gardens, bioretention areas, filter drains, swales, tree pits, permeable paving etc. SuDS will also be considered in existing areas where practicable and possible.

The Greater Dublin Strategic Drainage Study introduces SuDS and the available techniques to control the quantity and quality of runoff. It provides guidance on the selection of SuDS for particular sites and discusses issues such as operation and maintenance, cost effectiveness, recreation and amenity, habitat potential and safety.

Possible proposed SuDS details to be adopted on the BusConnects Galway: Dublin Road development are outlined below and on drawings BCGDR-BTL-DNG_RD-XX-M2-CD-00002_SuDS_Standard_Details.

2.3.1 Rain gardens

As defined in CIRIA SuDS Manual 2015, bioretention systems, such as rain gardens, are shallow landscaped depressions that can reduce runoff rates and volumes and treat pollution using engineered soils and vegetation. They are particularly effective in delivering interception. Runoff collected by the systems ponds temporarily on the surface and then filters through the vegetation and underlying soils.

2.3.2 Tree pits

Trees contribute to effective surface water management strategies. They also reduce annual building energy consumption by moderating the local climate, filter harmful pollutants from the air, and absorb and store atmospheric carbon dioxide (carbon sequestration). In the process of drawing water from the soil, trees also take up trace amounts of harmful chemicals, including metals, organic compounds, fuels and solvents that are present in the soil. Inside the tree, these chemicals can be transformed into less harmful substances, used as nutrients and/or stored in roots, stems, and leaves.

2.4 Gullies

In accordance with Greater Dublin Regional Code of Practice for Drainage Works Section 14, the following criteria will be adhered to:

- Gullies, gratings, and frames shall conform to EN 124, Class D400 or equivalent. Gullies shall be provided for every 200m^2 of paved area at a minimum, except for low points which may require additional gullies (SuDS design may eliminate the need for gullies in various locations). (GDRCoP Section 14.1)
- Connections from gullies discharging to a combined sewer shall be sealed and from gullies discharging to surface water sewers can be unsealed.
- Interconnection between gullies shall not be permitted. Gully connections shall not exceed 10m in length and shall connect to sewers in the direction of the flow. An additional manhole shall be provided on gullies where the length of the connection pipework is greater than 30m. If gullies are connected to manholes, they shall connect at the benching level or a maximum of 500mm above the invert of the main pipe (GDRCoP Section 14.7).