CELBRIDGE TO HAZELHATCH LINK ROAD

Environmental Constraints Report

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1 INTRODUCTION

This report provides a desktop review of the constraints in the study area for the Celbridge to Hazelhatch Link Road Scheme to inform the Option Selection stage of scheme development as per Transport Infrastructure Ireland (TII) 2019 Project Management Guidelines (PE-PMG-02041). As such, this report should be read in conjunction with the Phase 1 Feasibility Report (MDT0902-RPS-00-XX-RP-Z-0005).

The study area is shown in **Figure 2-1** and has been revised as part of the Phase 2 Constraints Assessment. It is broadly similar to the Phase 1 Feasibility Study Area and is located between North Celbridge Town and the Hazelhatch and Celbridge Train Station south of Celbridge Town. The relevant study area is located predominantly within the administrative area of Kildare County Council with the south eastern section around Hazelhatch located within the administrative area of South Dublin County Council.

1.1 Geographic Context

Celbridge is situated on the River Liffey in north-east Kildare and lies approximately 3km to the west of the Kildare/Dublin county boundary and approximately 20km to the west of Dublin city centre. The northern Kildare towns of Maynooth and Leixlip are situated approximately 7km to the north and are separated from Celbridge by the M4 motorway. Naas, Sallins and Clane are located within 20km to the southwest.

Celbridge is an important regional town within Kildare and also functions as a commuter town for Dublin and other significant employment centres in the region. The location of Celbridge within the wider context of major urban areas and employment centres in the region is illustrated in **Figure 1-1**.

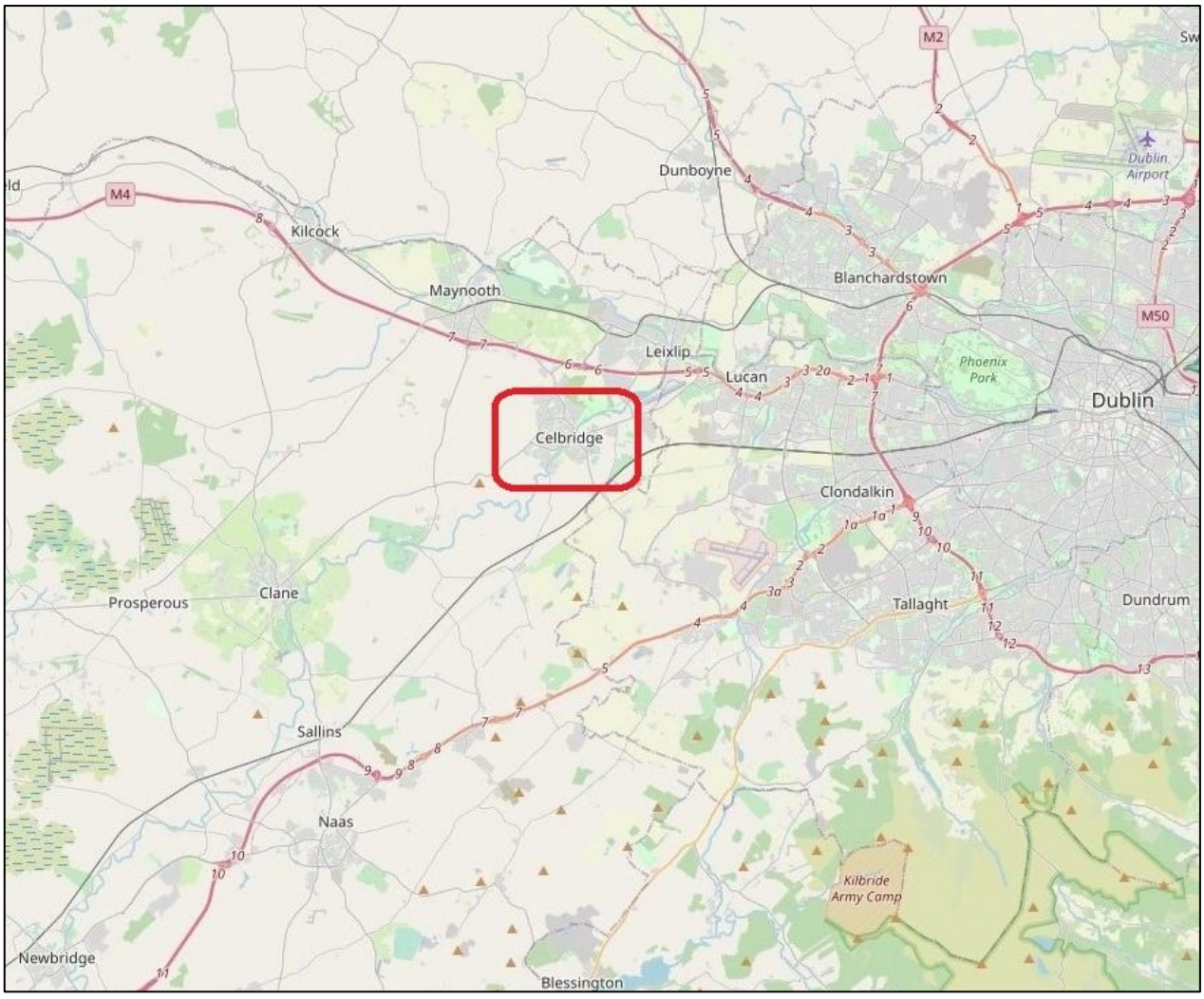


Figure 1-1: The Location of Celbridge

1.2 Background to the Scheme

1.2.1 Existing Road Network

The existing road network within the study area consists of a range of road types and qualities, reflecting their origins, era of construction and the staged nature of road improvements over the years.

The key roads that lead to and from the existing River Liffey bridge in Celbridge are the R403, the R405 and the L1016, with speed limits on all these key roads reducing from 60km/h to 50km/h on the approach to Celbridge town. The existing Celbridge road network is shown in the study area in **Figure 2-1** and the main routes are described as follows:

- The R403 approaches Celbridge from the west as Clane Road and English Row and from the east as Dublin Road.
- English Row forms part of the commercial centre of the town and is characterised as an historic urban street with narrow traffic lanes and footpaths.
- Clane Road is similarly narrow and runs parallel to the River Liffey with high historic walls along either side. Clane Road straightens and widens as it turns westwards towards Shackleton Road with additional lane width and narrow hard strips less than 0.5m wide developing and a variable width verge along the eastern side. Hard shoulders or hard strips are not present in the section parallel to the River Liffey.
- Dublin Road is generally straight with narrow hard strips less than 0.5m wide on both sides. A footpath and high stone wall are present along the northern side with a grass verge developing approximately 1.3km east of the existing bridge. Limited pedestrian facilities vary intermittently with a grass verge along the southern side.
- The R405 approaches from the north as Maynooth Road/Main Street and from the south as Hazelhatch Road. Main Street forms the core part of the commercial centre of the town and has large numbers of pedestrians. The 350m section parallel to the River Liffey comprises two traffic lanes with intermittent parking and generally wide footpaths on both sides. There are a number of traffic calming measures including refuge traffic islands and raised pedestrian crossings. As the alignment turns away from the River Liffey and towards Maynooth the traffic lane and footpath widths become variable and generally narrower. There are no on-street parking spaces and commercial premises make way for residential buildings. Cycle lanes are introduced at the junction with Shackleton Road.
- Between Celbridge town centre and Hazelhatch train station the R405 Hazelhatch Road is more urban in nature in the northern section and enters a more rural setting in the southern section. South of the existing bridge the northern end of Hazelhatch Road forms part of a poorly aligned junction with the R403 while the southern end connects to a roundabout adjacent to Hazelhatch train station. Cross sectional widths and elements vary along the route. Pedestrian facilities are present along the western side of Hazelhatch Road in the form of a footpath in the northern section and a shared path south of Hazelhatch Park. An intermittent footpath is present along parts of the eastern side and intermittent verges are present on both sides. Hard strips less than 0.5m develop in the southern section along with cycle facilities which are located on the western side.
- The L1016 Newtown Road (also known locally as the Ardclough Road) approaches Celbridge from the southwest. It is generally comprised of a two-lane road with narrow hard strips less than 0.5m wide and a footpath along the eastern side. It also has a number of constantly varying cross sectional elements such as intermittent verges, an intermittent footpath along the western side and an intermittent high stone wall immediately adjacent to the hard strip. Newtown Road also contains a narrow section of road approximately 450m in length without centreline markings starting to the west of Simmonstown Manor approximately 500m from the existing river crossing.
- The existing River Liffey bridge is a protected structure and the views upstream and downstream are protected views and therefore the improvements that can be undertaken are limited. The bridge is sub-standard in terms of cross-sectional width, vertical geometry and junction layout on both the north and south sides. Traffic counts undertaken in May 2019 show that the existing bridge carries over 15,500 vehicles per day and generates significant queuing in the AM and PM peak periods. Celbridge's single river crossing point results in a lack of circulation and permeability within the town centre and throughout the general road network in the study area.

1.2.2 Proposed Celbridge to Hazelhatch Link Road Scheme

A 2020 report by Kildare County Council (A High-level Analysis of Bridge Infrastructure in Large Towns Located on Major Rivers in Ireland) found that Celbridge was one of only two Irish towns (the other being Newbridge) situated on a major waterway with a population range between 17,100 and 30,200 that was connected by a single bridge crossing of the major river. The single river crossing is required to take all vehicular traffic travelling from Celbridge town centre to destinations south of the town centre.

The proposed scheme consists of a second river crossing of the River Liffey and carriageway with adjacent cycle and pedestrian facilities linking Celbridge to Hazelhatch train station. The scheme will include appropriate junction forms at crossing points with existing regional and local roads to allow the continued flow of traffic on the existing road network.

The proposed scheme aims to fulfil project objectives detailed in **Table 1-1**. The proposed multi modal transport link will provide improved access to train station for all road users, facilitate the development of Key Development Areas southeast of the River Liffey, improve safety and reduce traffic congestion.

Table 1-1: Celbridge to Hazelhatch Link Road Project Objectives

Project Objectives	
Economy:	• To encourage economic activity by reducing the costs of travel between the endpoints of the scheme at an investment cost that offers good value for money. • To facilitate the future reduction of traffic congestion in Celbridge Town Centre by adding a second bridge crossing of the River Liffey, so as to reduce journey times, improve journey time reliability and to facilitate future public realm improvements in the town centre.
Safety:	• To support the RSA Road Safety Strategy 2021-2030 by reducing the number of personal injuries caused by road collisions within the study area, particularly collisions involving vulnerable road users.
Integration:	• Improve multi-modal transport integration by reducing car journey times between Celbridge Town and Hazelhatch Train Station. • To facilitate the development of Key Development Areas southeast of the River Liffey in Celbridge, in line with the Local Area Plan.
Environment:	• Avoid, minimise and mitigate the impact of the scheme on the natural environment, particularly impacts to local watercourses. • To reduce the level of traffic nuisance - traffic noise and vibration, traffic pollution and severance - in Celbridge Town Centre.
Accessibility and Social Inclusion:	• To reduce social exclusion by enhancing accessibility to rail services for non-car-owners within the study area.
Physical Activity:	• To increase Active Travel within the study area by improving journey ambience for pedestrian and cycle journeys within the study area.

1.3 Aims and Objectives

The purpose of this report is to provide a desktop review of the constraints in the study area associated with the proposed Celbridge to Hazelhatch Link Road Scheme. The study area selected reflects the topography

and existing physical barriers in the vicinity of Celbridge and the existing road network and represents the area within which possible route options could be considered.

This constraints report has been compiled with reference to the TII planning guidelines[1] and has also referenced Article 3 of the EIA Directive (2014/52/EU) in terms of scope of topics considered at this feasibility stage. More detailed constraints investigations will follow as the scheme is progressed. The key environmental issues considered in this report are:

- Population and Human Health;
- Air Quality and Climate;
- Noise and Vibration;
- Biodiversity;
- Land Use (Agriculture);
- Soils and Geology;
- Water (Hydrology and Hydrogeology);
- Landscape and Visual; and
- Material Assets (Non-Agriculture).

Note that Cultural Heritage constraints have been addressed and reported as a separate report given the high sensitivity of the Celbridge area.

1.4 Methodology

The planning approach taken for the Celbridge to Hazelhatch Link Road Scheme is based on the TII 2019 Project Management Guidelines (PE-PMG-02041)[2]. These guidelines include an eight-stage approach to the development, management and delivery of Major National Road Schemes in Ireland as shown in **Table 1-2.** This constraints study relates to Phase 2 of the Project Management Guidelines[3], i.e. Options Selection.

Table 1-2: TII Project Management Guidelines – Approach to the Development, Management and Delivery of Major National Road Schemes in Ireland

Phase	2019 TII Project Management Guidelines
Phase 0	Scope and Pre-Appraisal
Phase 1	Concept & Feasibility
Phase 2	Options Selection
Phase 3	Design and Environmental Evaluation
Phase 4	Statutory Processes
Phase 5	Enabling and Procurement
Phase 6	Construction and Implementation
Phase 7	Closeout and Review

The initial step in the Phase 1 Concept and Feasibility process is to identify the nature and extent of significant constraints within the defined study area. These constraints are documented and mapped. Environmental constraints are divided into two principal categories:

[1] NRA (2008) Environmental Impact Assessment of National Road Schemes – a Practical Guide. https://www.tii.ie/technical-services/environment/planning/Environmental-Impact-Assessment-of-National-Road-Schemes-Practical-Guide.pdf

[2] https://www.tiipublications.ie/library/PE-PMG-02041-02.pdf

[3] Note that any documents or guidelines published prior to August 2015 when the National Roads Authority (NRA) merged with Railway Procurement Agency (RPA) to form Transport Infrastructure Ireland (TII), are referenced by the published title.

- Natural Constraints (naturally occurring landscapes and features); and
- Artificial Constraints (forming part of the built environment).

This constraints study is a desktop study which includes a review of publicly available data, information and mapping. The available mapping for this scheme consisted of 1:50,000 Ordnance Survey of Ireland (OSi)[4], Discovery Series, and aerial photography which provides information on the existing physical features of the study area. Geographic information systems (GIS) have been used to present the available data for the constraints study area.

In addition, several datasets from the National Parks and Wildlife Service (NPWS) ecological database, the Geological Survey Ireland (GSI) database and the Water Framework Directive (WFD) surface and groundwater characteristics, the National Monuments Service and the Archaeological Survey of Ireland SMR Database and the National Inventory of Architectural Heritage have been utilised.

[4] All maps in the report are produced under the RPS licence number EN 0005020 ©Copyright Government of Ireland

2 CONSTRAINTS

2.1 Study Area

The study area for the Phase 2 Constraints Stage is shown in **Figure 2-1**. The study area comprises a sufficiently large area (995 hectares (ha)) to ensure that constraints in the wider area may be appropriately considered. As such, the study extent is not considered to be rigidly fixed and may evolve over time as the study progresses and depending on the nature of the constraint.

The study area encompasses the majority of Celbridge town and its environs, and extends from the northern area of the town, at Maynooth Road (R405) and Beatty Grove/Rectory Avenue, approximately 3.5km south to The Lords Road, located south of Celbridge town. The study area extends approximately 3.3km from east to west in its central section from Clane Road (R403) to Loughlinstown Road, approximately 4km from the north east, at Castletown Demesne, to Newtown in the south east, and approximately 3.5km from the Oldtown area at Oldtown Mill Road in the north west to Hazelhatch Road in the south west.

A railway line traverses the southern section of the constraints study area. The Hazelhatch and Celbridge train station located on this line is also situated in the southern section of study area.

The Kildare/South Dublin County boundary lies within the study areas eastern boundary (shown as a dotted black line in **Figure 2-1**). The study area traverses the railway line and the Kildare/Dublin county boundary in the south east at Hazelhatch Road (R405), extending approximately 350m beyond the county boundary at its widest point.

A number of streams and watercourses cross the study area. The most predominant of these is the River Liffey which crosses the study area from the south west to the north east through Celbridge Town. The study area is shown with reference to the natural heritage constraints in Figure 2.2.

Figure 2.3 summarises the built and material asset constraints within the study area, and Figure 2.4 provides a consolidated view of the constraints identified and highlighted within the following sections of the report.

Figure 2-1: Study Area

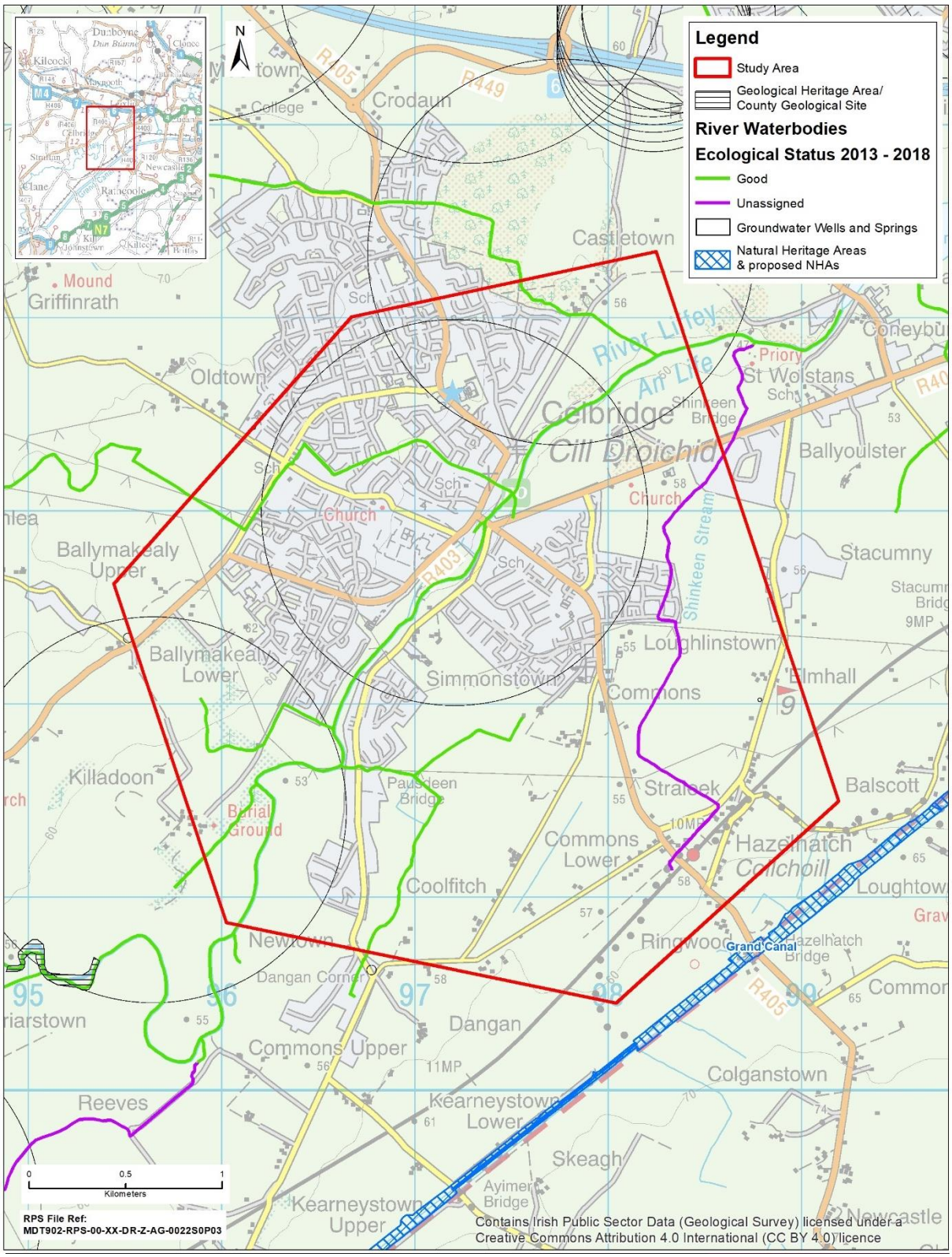


Figure 2-2: Study Area with Natural Heritage Constraints

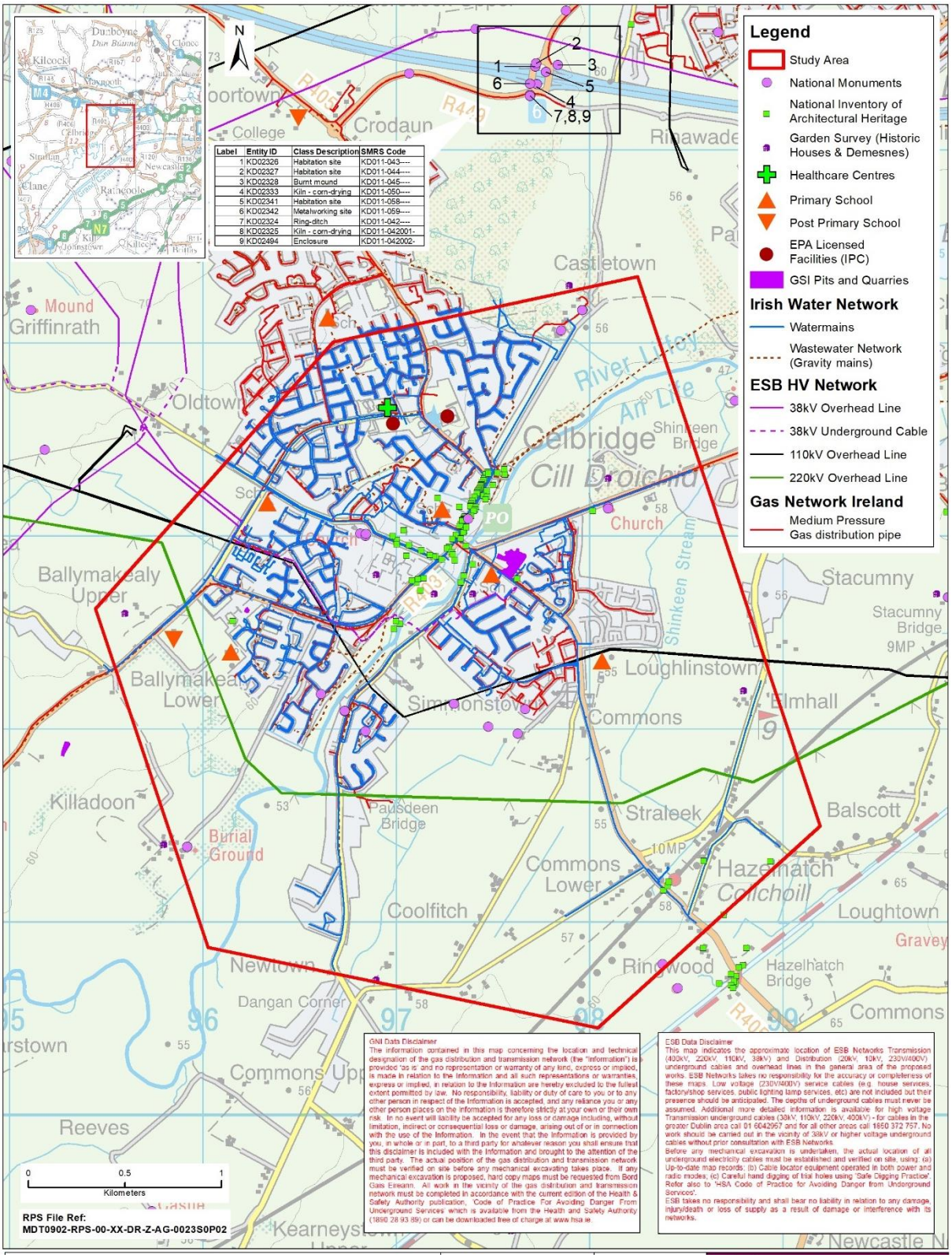


Figure 2-3: Study Area with Built Heritage & Material Assets

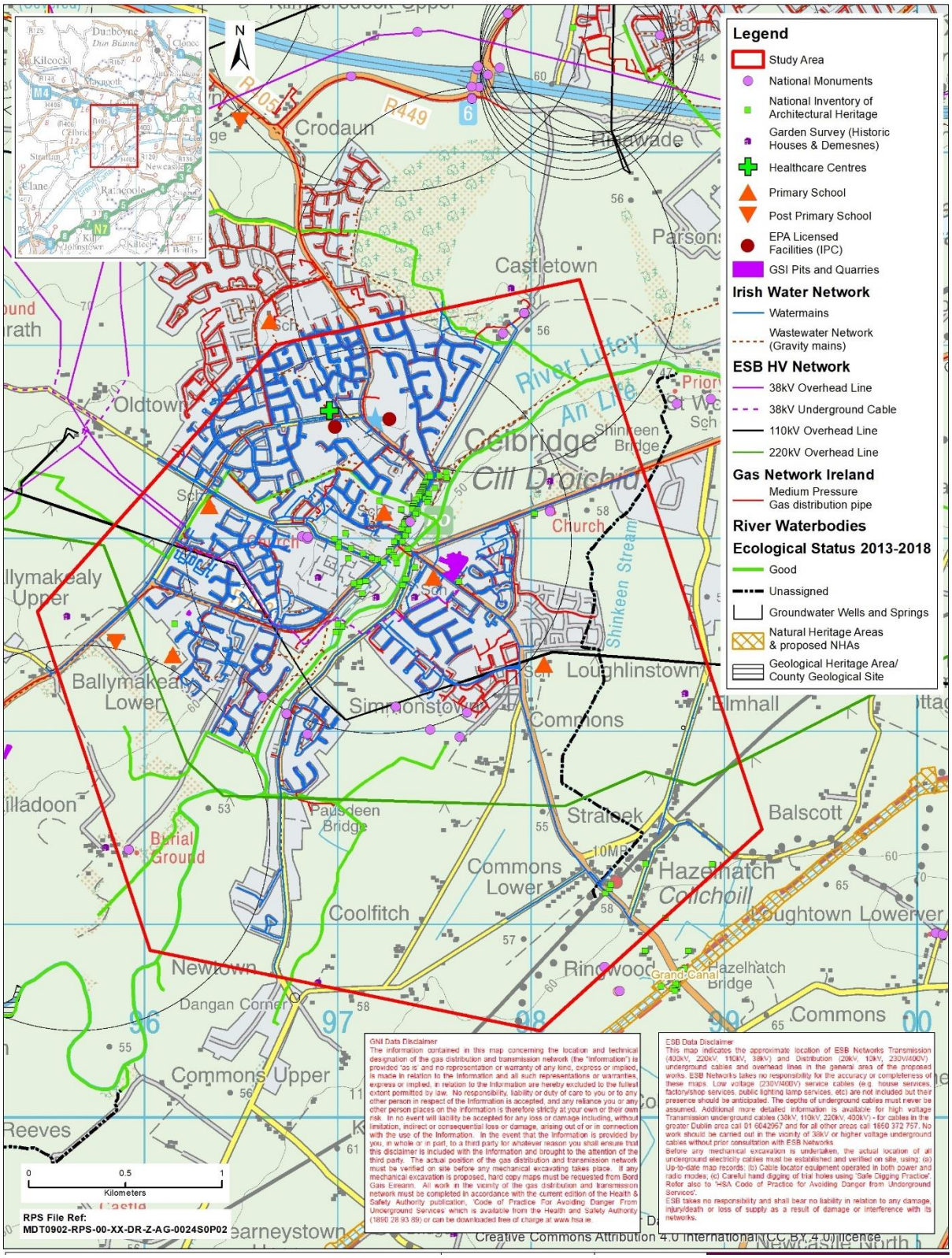


Figure 2-4: Study Area with Consolidated Constraints

2.2 Purpose of Identifying Constraints

The purpose of identifying the constraints within the proposed project study area is to ensure the integration of environmental considerations into the selection and development of potential route options. The environmental desktop assessment of the study area includes the following:

- A scope of the environmental disciplines to be assessed;
- A description of the receiving environment; and
- Identification of the constraints within the study area.

A constraints analysis for each of the environmental disciplines addressed is presented in the following sections.

2.3 Population and Human Health

2.3.1 Introduction

This section identifies the constraints aspects of the proposed project in relation to population and human health considerations. A desktop study utilising CSO Data, Kildare County Development Plan (CDP) 2017-2023[5], available mapping including aerial photography and Ordnance Survey (OSi) mapping was undertaken to identify the potential constraints.

It is noted that while the study area extends to the administrative area of South Dublin County Council south-east of Hazelhatch Railway Station, the study area lies predominately within Kildare County Council which forms the basis of this analysis.

2.3.2 Existing Environment Population and Human Health

County Kildare is located in the province of Leinster and is situated geographically inland in the central east of the island of Ireland, and is bordered by the counties of Carlow, Laois, Meath, Offaly, Dublin and Wicklow.

Kildare had a population of 210,312 in the 2011 Census, increasing to 222,504 inhabitants in the 2016 Census (CSO,2016).

The county is generally flat and occupies a land area of approximately 169,426 hectares and is 67.6 km in length and 41.9 km in width. It is predominantly a rural county in terms of land use with a large rural population. According to the 2016 census, approximately 68% (150,338) of County Kildare's population reside in town areas and 32% (72,166) reside in rural areas. Kildare is the County Town, other towns and villages include Celbridge, Leixlip, Naas, Newbridge, Maynooth, Monasterevin, Clane and Kilcullen.

The settlement of Celbridge town has a population of 20,288 people (Census 2016) and is located in north Kildare and is a bridging point over the River Liffey. Celbridge is an important regional town within Kildare and also functions as a commuter town for Dublin and other significant employment centres in the region.

Celbridge has experienced significant growth since the middle of the 20th century with census population data indicating a more than doubling of the population in the past 30 years.

According to the CSO (2016), Celbridge is listed as the 16th most populated settlement in the country. The population of Celbridge has increased from 19,537 in the 2011 census to 20,288 in 2016 census; this population change between 2011 and 2016 equates to a 3.8% increase in inhabitants. The population development of the settlement of Celbridge town is outlined in **Table 2-1.**

Table 2-1: Population Development of Celbridge (Census Data)

Parameter	1991	1996	2002	2006	2011	2016
Celbridge Population	9,629	12,289	16,016	17,262	19,537	20,288

[5] http://www.kildare.ie/countycouncil/Planning/developmentplans/KildareCountyDevelopmentPlan2017-2023/

Of the current population of the settlement of Celbridge, 14,044 identified themselves as daily commuters to work, school or college in the 2016 census (CSO, 2016) with 9,344 commuting to work and 5,337 to school or college. Of these commuters, 6,312 were car drivers and 2,314 car passengers. The breakdown of commuter means of travel is outlined in **Table 2-2**.

Table 2-2: Celbridge Commuter Population Breakdown

Mode of Transport	Car (Driver & Passenger)	Van, Motorcycle, Other.	Train, Dart, Luas	Bus, Coach, Minibus	On foot	Bicycle
No. Population	8,626	546	362	2,135	1,841	534

The constraints study area can be classified as mainly urban and falls within several Electoral Divisions (ED) which are the smallest legally defined administrative areas for which Small Area Population Statistics (SAPS) which are published from the 2016 Census. **Table 2-3** shows the ED population breakdown by SAPS (2016).

Table 2-3: Population Breakdown within the Study Area by Electoral Division

County	Electoral Division (ED)	ED Population (2016)	Males/Females	Numbers that commute daily
County Kildare	Celbridge	15,653	7,823/7,830	11,277
	Donaghcumper	6,257	3,076/3,181	4,452
County Dublin	Newcastle	4,257	2,139/2,118	2,807

2.3.2.1 Properties

The concentration of properties within the study area is illustrated in **Figure 2-5**. There are 5,763 properties identified within the study area. Of these 5,399 are residential (R), 252 commercial (C) and 112 are identified as both commercial and residential (B).

Housing stock as per 2016 CSO data for the settlement of Celbridge is 6,969 and of these 238 were noted as vacant households (excluding holiday homes).

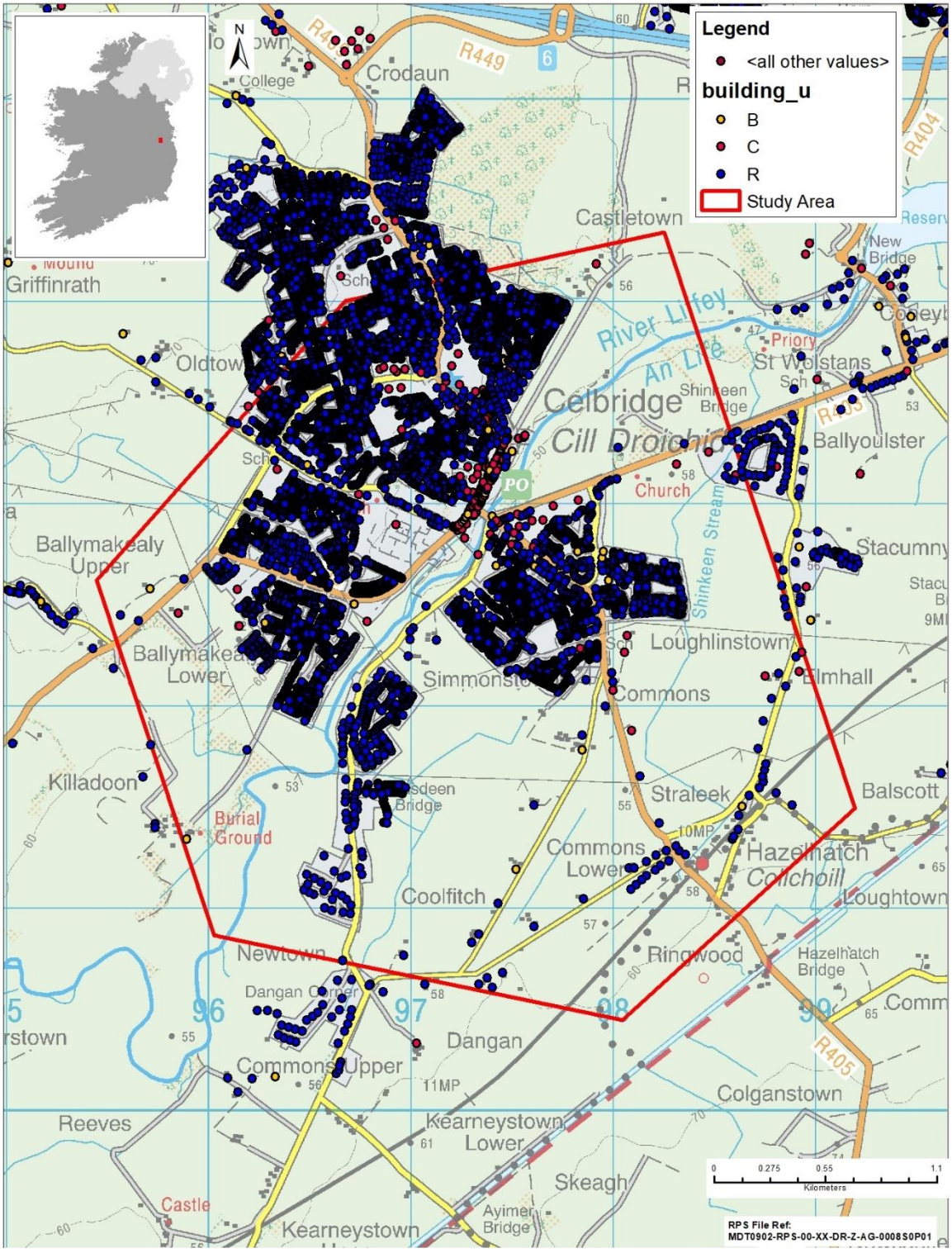


Figure 2-5: Concentration of Properties within the Study Area (Source: GeoDirectory, 2020)

2.3.2.2 Community Facilities and Amenities

In terms of community facilities within the study area the following are noted:

- Six primary schools and one secondary school were identified, these have been outlined in **Table 2-4** in **Section 2.4** of this report.
- Two churches, St. Patricks Church and Christ Church, were identified in Celbridge town, both situated on the Main Street within the town.
- Six childcare facilities were also identified within the study area and a further four were identified just outside the northern boundary of the study area.
- The nearest Garda Stations identified within the study area is Celbridge Garda Station, located on Maynooth Road (R405).
- A HSE Primary Care Centre is located off the Maynooth Road (R405) within the central north section of the study area.
- Several clinics and medical practices were identified in the area including; Centric Health Celbridge Medical & Dental Practice located off the Maynooth Road, KDoc Celbridge, Oaktree Clinic, and Whitethorn Clinic, all located along Shackleton Road. In addition, Celbridge Medical Centre and O'Reilly's Dental Practice are both located on Celbridge Main Street and Primrose Gate Medical Centre located at Willow Court, Primrose Gate. Another care facility, Glenashling Nursing Home, is located in Oldtown in the north of Celbridge town, off Oldtown Mill Road.
- In terms of sports and recreation, Celbridge GAA Club is located within the study area, just east of Hazelhatch Road (R405) south east of the town centre. Other clubs and associated pitches within the study area include the Celbridge Town AFC Senior Pitches, located at St. Patrick's Park, and the Celbridge Town AFC Schoolboy Pitches, located off Clane Road (R403) at Ballymakealy Lower. Another sports grounds, Celbridge Athletics Club, was identified within the western section of the study area off Clane Road (R403).
- In the south east section of the study area, Celbridge & District Tennis Club is located on Hazelhatch Road (R405), and Celbridge Golf Club (Elm Hall) is situated between Loughlinstown Road and the railway line, and the study area boundary traverses the golf course.
- Castletown House and Estate (managed by the OPW) is located in the north east section of the study area. The estate is open to the public and includes a parkland and river walkways.
- It should be noted that although beyond the study area, there are other notable walkways in the vicinity such as the Grand Canal walkway at the Lyons Estate and Ardclough Village (c. 1.5-3km beyond study area boundary).

No known landfill sites, recycling plants, or civic amenity sites were identified within the constraints study area. However, it is noted that Objective INFO4.2 of the Celbridge Local Area Plan 2017-2023 (LAP) is '*to provide a civic amenity site (recycling centre) in Celbridge on lands located south of the M4 Motorway and north of the R449 Regional Route to the west of Exit 6*' but this is outside the study area for the project.

2.3.2.3 Economy and Business

Agriculture is the predominant land use in Kildare and is important to the local economy and communities (see **Land Use (Agriculture) Section 2.7** and **Soils and Geology Section 2.8** for further detail on agriculture in the study area).

Kildare is home to bogland areas, with a history of peat extraction, however there are no bogland areas located within the study area. No other extractive industries such as pits and quarries, either active or non-active have been identified within the study area.

Although the constraints study area contains mainly residential properties, 252 properties were identified as commercial, and 112 properties were identified as both commercial and residential (GeoDirectory, 2020).

Following a review of the area using aerial photography (Google Maps), a number of commercial properties and enterprises were identified along the existing road network within the study area, including:

- Main Street, identified as a core retail area (KCDP 2017-2023), which includes:

  - Various Shops & Convenience Stores;
  - Pharmacies;
  - Public Houses & Bars;
  - Restaurants, Takeaways & Cafes;
  - Medical & Dental Practices & Therapy Clinics;
  - Banks;
  - Off Licence;
  - Barbers;
  - Estate Agents & Solicitors; and
  - Other Services, including repairs, grooming etc.
- Tesco Superstore & Celbridge Shopping Centre, Maynooth Rd, Celbridge;
- Applegreen, Dublin Road, Donaghcumper, Celbridge;
- Nally's Supervalu & St Wolstan's Shopping Centre, Dublin Road, Celbridge;
- Rye River Brewing, Dublin Road, St. Wolstans, Celbridge;
- Colourtrend Paint Manufacturing, Maynooth Rd, Celbridge;
- Beaufield Veterinary Centre, Dublin Road, Donaghcumper, Celbridge;
- Celbridge Industrial Estate, Shackleton Road, Aghards, Celbridge;
- Monatrea Industrial Estate, Maynooth Road, Celbridge;
- Abbey Point Service Station (Texaco/Spar), Clane Rd, Celbridge Abbey, Celbridge; and
- Tesco Express, Village Centre Willow Court, Hazelhatch Road, Celbridge.

The proximity of the Intel Ireland Campus situated in Leixlip, c.2.5km north-east of Celbridge Town, should be noted due to its close proximity to the study area. This facility is currently undergoing an expansion in its workforce from 4,500 to 6,000, with many employees living in and commute to and from Celbridge.

2.3.2.4 Tourism

Tourism and recreation can contribute greatly to the socio-economic wellbeing of the population living in towns and rural areas in Ireland as it can create various opportunities for local economic activity and employment. County Kildare is a major tourist destination within the eastern region as part of Ireland's Ancient East, and has been identified as one of ten key destinations by Fáilte Ireland for the development of tourism (KCDP 2017-2023).

In terms of tourism and recreation, the Kildare CDP cites the following as the main attractions encouraging visitors to come to the county and playing an important role in the local economy:

- Rich built and natural heritage, including renowned architectural and archaeological heritage, with many well-known structures and houses situated in Kildare, including;
  - Castletown House, which is located in Celbridge and within the study area;
  - The Wonderful Barn;
  - Maynooth Castle;
  - Leixlip Castle;
  - St Patrick's College Maynooth;
  - Conolly's Folly;
  - Carton House;
  - Moone High Cross; and

  - Castledermot Round Tower.
- Sports recreation and activity including equine industry and horse racing, golf, and fishing and angling;
- Waterways including the River Liffey, which crosses the study area from south west to north east through Celbridge Town, and the Grand Canal (c.250m south-east of study area boundary on Hazelhatch Road) and the Royal Canal (c.2.5km north of the study area boundary at Castletown) are both located within vicinity of the study area; and
- Walkways and trails, such as the Arthur's Way Heritage Trail, which traverses Celbridge and the study area.

There is evidence of B&B and tourist accommodation within the study area, including but not limited to:

- Celbridge Manor Hotel, Clane Road, Celbridge;
- Springfield Bed and Breakfast, Springfield, Killadoon Park, Celbridge;
- Castletown Gate House Holiday Home, Castletown Drive, Donaghcumper, Celbridge;
- Castletown Round House Holiday Home, Main Street, Celbridge;
- The Sheehy's at Springfield Bed and Breakfast, Springfield, Killadoon Park, (off Clane Road R403) Celbridge;
- Aranbeag Farm - Aranbeag, Straleek, Celbridge; and
- Batty Langley Lodge, Irish Landmark Trust, Parsonstown (just beyond north eastern study area boundary).

The above list is non-exhaustive and is based on both GIS databases and available aerial photography. Confirmation of their status will be verified at subsequent stages of the assessment process.

2.3.2.5 Human Health

In the 2016 Census, for County Kildare 140,402 inhabitants (63% of the 222,504 recorded) identified as being in 'very good' health with 58,752 inhabitants (26%) identified as being in 'good' health.

In the settlement of Celbridge the levels are slightly higher than the county average and of the 20,288 recorded inhabitants 13,176 (65%) identified as being in 'very good' health and 5,327 (26%) identified as being in 'good' health.

According to its HSE Health Profile 2015, the death rate for all causes and the major causes of mortality for County Kildare are average, or below, the national average death rate for all ages. In Kildare, instance rates of malignant melanoma are above the national rate for both males and females, and the incidence rate of malignant colorectal cancer in males is the highest nationally. Kildare has an above average birth rate (17.5 births/1,000 population) compared to the national birth rate (15.8 births/1,000 population).

The EPA has published a national map[6] of radon risk potential, classified on a 10km grid square basis. The study area falls within a single grid square which is classed as having an estimated 1-5% of homes exceed the reference level of 200 becquerel per cubic metre (Bq/m^3). This is therefore rated as a Low Radon Area.

2.3.2.6 Seveso Sites

The EU Directive on the control of major accident hazards, commonly known as the Seveso III Directive (2012/18/EU) is implemented in Ireland through the Control of Major Accident Hazards Involving Dangerous Substances (COMAH) Regulations (S.I. 209 of 2015). The directive aims to prevent major accident hazards involving dangerous substances and chemicals and the limitation of their consequences for people and the environment.

[6] EPA Radon Map https://www.epa.ie/radiation/radonmap/

The Health and Safety Authority (HSA) list the COMAH Establishments (Seveso Sites)[7], at Lower and Upper Tier levels, for each county in Ireland. No Seveso Sites were identified within the study area. Two Upper Tier Establishments are identified within County Kildare[8]:

- Intel Ireland Limited Collinstown Industrial Park, Leixlip located c.2.5km north east of the study area.
- Irish Industrial Explosives Clonagh, Enfield located c.17km north west of the study area.

All other Upper Tier Establishments listed in County Dublin and County Meath are all located over c.5km or further from the study area. No Lower Tier Establishments[9] were identified within the study area or County Kildare. Those listed in County Dublin and County Meath are all located over c.4km or further from the study area.

The COMAH Regulations define consultation distances within which '*there are potentially significant consequences for human health or the environment from a major accident at the establishment, including potentially significant consequences for development such as residential areas, buildings and areas of public use, recreational areas and major transport routes.*'

The Kildare County Major Emergency Plan 2010[10] states that there are '*two industries in County Kildare are affected by the Seveso II Directive under the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006 S.I. No. 74 of 2006*'. These are the two establishments listed above (Intel and Irish Industrial Explosives).

The Emergency Plan notes Intel Ireland Ltd. as a Lower Tier Site, however, as noted above this is currently classed as an Upper Tier Establishment as per the most recently available HSA list of COMAH Establishments (May 2020).

The Kildare County Major Emergency Plan states that '*there is an Internal Emergency Plan for both establishments but there is also an External Emergency Plan in place for Irish Industrial Explosives, as it is an Upper Tier Site*'.

The Kildare County Development Plan 2017-2023 also notes these two sites as industries within the county affected by the current Seveso III Directive, and states that '*The Health and Safety Authority (HSA) has been designated as the central competent authority for the enforcement of the SEVESO III Directive and has established generic consultation distances for these facilities*'.

2.3.3 Identified Key Constraints

2.3.3.1 Population

The following key constraints have been identified from the baseline environment appraisal that will need to be considered further at route selection stage:

Construction Impacts:

- Impacts due to construction traffic on journey or general amenity;
- Impacts on environmental and residential amenity;
- Purchases of local materials and services; and
- Construction employment and local expenditure by construction workers.

Operational Impacts:

- Journey characteristics: Potential impacts on local journey time, journey time reliability and travel patterns including connectivity;

[7] https://www.hsa.ie/eng/Your_Industry/Chemicals/Legislation_Enforcement/COMAH/Information_to_the_Public/

[8] https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/comah/list_of_establishments/upper_tier_sites_5th_may_2020.pdf

[9] https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/comah/list_of_establishments/lower_tier_25aug20.pdf

[10] http://www.kildare.ie/CountyCouncil/FireService/EmergencyPlanning/Full%20Public%20MEP%20for%20internet.pdf

- Community severance: Potential impacts with regard to any severance from community facilities, particularly those used by older people, children or other sensitive or vulnerable groups (this category includes both new severance and relief from existing severance);
- Amenity: Including journey amenity arising from the exposure of pedestrians and cyclists to traffic (due to proximity, safety, noise, dirt, poor air quality), as well as impacts for all road users arising from factors such as visual intrusion and congestion. In addition, impacts on general amenity are addressed where amenities and residential quality of life are affected;
- Economic impacts: Potential impacts in the context of economic development and employment, direct and indirect; and
- Cumulative Impact: Impact of road project in addition to other identified / permitted projects.

2.3.3.2 Human Health

The following key constraints have been identified from the baseline environment appraisal that will need to be considered further at route selection stage:

- Residential properties affected by changes in traffic patterns and transport emissions;
- Sensitive receptors including schools, creches, hospitals, care homes, etc. where more vulnerable members of the community may be located;
- Other commercial operations and community centres; and
- The Upper Tier Seveso site located closest to the study area, Intel Ireland Ltd.

2.4 Air Quality and Climate

2.4.1 Introduction

This section identifies the constraints aspects of the proposed project in relation to Air Quality and Climate. All road projects are largely concerned with the potential impact of road traffic emission on sensitive receptors as they are identified within the constraints study area. Identifying the potential receptors at this stage in the process allows them to be taken into account in the route selection and design process to avoid or minimise adverse impact on sensitive receptors. This assessment has been carried out by means of a desktop review of available mapping representing the proposed scheme and the designated area of study with reference to potential constraints.

2.4.2 Existing Environment

2.4.2.1 Air Quality

Air Quality and Climate constraints on a proposed project are largely concerned with the potential for human health impacts on sensitive receptors. The TII document, '*Guidance for the Treatment of Air Quality During the Planning and Construction of National Road Projects',* outlines recommended steps in the process of constraints assessment for air quality.

This document also states that where local air quality monitoring data is not available, reference should be made to measurements or studies in other comparable areas. In the assessment of constraints, the sensitive receptor locations for air quality include areas of residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present.

Under the Clean Air for Europe (CAFE) Directive, EU member states must designate 'Zones' for the purpose of managing air quality. For Ireland, four zones were defined in the Air Quality Standards Regulations (2011). The zones were amended on 1 January 2013 to take account of population counts from the 2011 CSO Census and to align with the coal restricted areas in the 2012 Regulations (S.I. No. 326 of 2012). The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). The four air quality zones in Ireland are:

- Zone A: Dublin;
- Zone B: Cork;
- Zone C: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise; and
- Zone D: Rural Ireland i.e. the remainder of the State excluding Zones A, B and C.

The proposed scheme is situated within Zone C - Other cities and large towns. There are currently 24 cities or large towns identified as Zone C in terms of their air quality. Cities or towns identified as Zone C are generally surrounded by areas designated as Zone D Rural Ireland. However, Celbridge, is one of two towns which shares borders with both Zone A Dublin and Zone D Rural Ireland air quality zones.

Existing sources of pollution in the study area include road traffic on the local road network including the R403, R405, L1022, L1016 and the M4 motorway (located c 1.5km north of Celbridge Town and the study area), diesel rail transport (railway line and Hazelhatch and Celbridge Train Station is located c.2km south of the town), agriculture (dusts, odours, etc.) and space heating (e.g. domestic heating systems).

Various receptors are present within Celbridge town and its environs. Overall, the study area is mainly urban featuring a mix of residential, commercial (retail/office/services) and industrial properties, community facilities, with some green areas and parks. The outskirts of Celbridge town within the study area is less urban in nature with fields and green areas surrounding the town's urban core.

The town consists predominantly of residential areas and features residential streets and estates, with numerous local shops, businesses, public houses, and cafes and food establishments located throughout the study area.

Receptors identified in terms of air quality are located along the existing local road network within or close proximity of the study area and include residential properties (residential streets, housing estates, care and nursing home facilities), commercial properties, retail areas, schools, churches, recreational areas, sports and community facilities, and local services.

The main non-residential receptors identified in terms of schools, churches, recreational and commercial areas where members of the public are likely to be regularly present are outlined in **Table 2-4**. It should be noted that this is a non-exhaustive list, but provides an indication of the main receptor types identified/present within the study area.

Table 2-4: Non-residential Air Quality Receptors identified within the study area

Receptor	Name	Location
Schools	Scoil Naomh Brid (St. Brigids National School)	Main Street, Celbridge
	North Kildare Educate Together School	Clane Road, Celbridge
	Primrose Hill National School	Hazelhatch Road, Celbridge
	St Patricks National School	Hazelhatch Road, Celbridge
	Scoil Na Mainistreach	Oldtown Road Celbridge
	St Raphael's Special School (St. John of Gods)	Clane Road (R403), Celbridge
	St Wolstan's Community School	Clane Road, Ballymakeely, Celbridge
Churches	St. Patricks Church	Main Street (R405), Celbridge
	Christ Church	Main Street, Castletown, Celbridge
Commercial Areas	Local Shops and Services	Main Street, Celbridge
	Local Shops and Services	Maynooth Road, Celbridge
	St Wolstan's Shopping Centre	Dublin Road, Celbridge
	Lidl Supermarket	Maynooth Road, Celbridge
	Celbridge Industrial Estate	Shackleton Road, Celbridge
	Tesco Superstore & Celbridge Shopping Centre	Maynooth Road, Celbridge
	Monatrea Industrial Estate	Maynooth Road, Celbridge, Co. Kildare

Sport, Recreation, and Community Facilities	The Mill, Celbridge Community Centre	Main Street, Celbridge Abbey, Celbridge
	Castletown House and Demesne	Castletown, Celbridge
	Celbridge GAA Club	Hazelhatch Road, Commons, Celbridge
	Celbridge & District Tennis Club	Hazelhatch Road, Loughlinstown, Celbridge
	Celbridge Library	St Patricks Park, Donaghcumper, Celbridge, Co. Kildare
	Celbridge Athletic Club	Rockbridge, Celbridge Abbey, Celbridge
	Celbridge Town AFC Senior Pitches	St Patrick's Park, Aghards, Celbridge
	Willowbrook Playground & Park	Willowbrook Lodge, Celbridge
	HSE Celbridge Primary Care Centre	Maynooth Road, Celbridge

As well as education, residential services are also provided at St. Raphael's Special School (St. John of Gods) located on Clane Road (R403). Elm Hall Nursing Home is situated just beyond the study area boundary on Loughlinstown Road and should be considered as during the construction phase this road may be utilised as a haul route during the construction phase.

Three schools were identified beyond the study area; Scoil Mochua Primary School, located just north of the study area boundary on Willowbrook Road (L1022), and Salesian College Secondary School and Celbridge Community School, both located c.1.25km north of the study area boundary on the Maynooth Road (R405) at Crodaun, Celbridge.

Baseline air quality data assessment for parameters including nitrogen dioxide (NO_2), nitrogen oxides (NO_x) and particulate matter (PM_{10} and $PM_{2.5}$) are reported by the EPA on a continuous basis at a series of monitoring stations around Ireland. In June 2019, the EPA installed a fine particulate monitor (for PM_{10} and $PM_{2.5}$) within the town of Celbridge which will be used to ascertain air quality levels and trends within the study area once this data is made available at route option stage.

The EPA air quality monitoring network for Zone C and the nearest EPA National Ambient Air Quality Monitoring locations have been reviewed and suitable representative data is presented to identify the background air quality in the study area. A summary of the EPA monitoring carried out in Zone C (other cities and large towns) is presented in the following sections.

Table 2-5 shows the aggregated annual mean value concentrations measured for NO_2, NO_x, SO_2, PM_{10}, $PM_{2.5}$, CO and Ozone in Zone C for 2017 and 2018. The table compares the annual mean measured levels with the limit values defined in the National Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). The averages are considered representative of 'other cities and large towns' in Ireland and the constraints study area.

The existing baseline levels of NO_2, NO_X, SO_2, PM_{10}, $PM_{2.5}$, CO and Ozone based on data from the EPA monitoring network are currently below annual ambient air quality limit values in Zone C.

Table 2-5: Extract of summary data from EPA Ambient Air Monitoring for Zone C in 2017 and 2018

Pollutant	Unit	Annual Mean Concentration in 2017	No. of Sites Reported	Annual Mean Concentration in 2018	No. of Sites Reported	Annual Limit for Protection of Human Health
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	8	2	10.3	3	40
Nitrogen Oxide (NO_X)	$\mu g/m^3$	11.8	2	14.7	3	30
Sulphur Dioxide (SO_2)	$\mu g/m^3$	2.9	2	3.3	3	20
Particulate Matter (PM_{10})	$\mu g/m^3$	12.65	2	14	6	40
Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	7.9	2	8.25	4	25
Ozone Concentrations (O_3)	$\mu g/m^3$	56.5	2	53.05	2	120

Pollutant	Unit	Annual Mean Concentration in 2017	No. of Sites Reported	Annual Mean Concentration in 2018	No. of Sites Reported	Annual Limit for Protection of Human Health
Carbon Monoxide (CO)	mg/m^3	0.15*	1	0.35	2	10

* One site reported

The nearest currently active EPA National Ambient Air Quality Monitoring sites to the study area are located to the east, with the closest being Blanchardstown, approximately 12.5km north east, and Tallaght, located approximately 13km south east of the study area. However, these sites all reside within Zone A Dublin, and so are not considered representative of the study area.

The nearest active Zone C EPA National Ambient Air Quality Monitoring site to the study area currently reported by the EPA in their Annual Report on Air Quality is located at Portlaoise, Co. Laois, approximately 60km south west of Celbridge and the study area. The parameters monitored at this location are NO_2, NO_X, SO_2, PM_{10}, and CO. A summary of the Air Quality monitoring results for this location are presented in the following sections.

Table 2-6 outlines the annual mean concentrations measured for NO_2, NO_X, SO_2, PM_{10}, and CO at Portlaoise for 2017 and 2018. The results from this location are considered representative of the air quality of Zone C and the study area. The table compares the annual mean measured levels for the location with the limit values defined in the National Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011).

Table 2-6: Annual Mean data from EPA Ambient Air Monitoring Site at Portlaoise in 2017 and 2018

Pollutant	Unit	Annual Mean Concentration in 2017	Annual Mean Concentration in 2018	Annual Limit for Protection of Human Health
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	10.8	11	40
Nitrogen Oxide (NOx)	$\mu g/m^3$	15.7	16	30
Sulphur Dioxide (SO_2)	$\mu g/m^3$	2.4	3	20
Particulate Matter (PM_{10})	$\mu g/m^3$	9.5	11	40
Carbon Monoxide (CO)*	$\mu g/m^3$	0.15	0.2	10

* One site reported

The majority of the study area is located within the ‘Large Town’ Region of the EPA Air Quality Index for Health (AQIH); however, Celbridge Town and its surrounds are located between the ‘Dublin City’ AQIH Region to the east and ‘Rural East’ AQIH Region to the west. The EPA Air Quality Index currently indicates that the air quality for the region is ‘2-Good’ for ‘Large Towns’ at Celbridge.

Overall, existing baseline levels of pollutants based on the data for EPA Zone C are currently below ambient air quality limit values and by extension the levels in the vicinity of the study area may also considered to be below the limit values.

In summary, from the data available, it can be concluded that the constraints study area currently experiences ‘Good’ air quality with the absence of any major sources of pollution. This trend will be confirmed once the EPA data for Celbridge is made available to the project.

2.4.3 Identified Key Constraints

At operational stage, mitigation measures to reduce impacts on air quality are generally very limited. Therefore, at the constraints study stage it is necessary to consider air quality in order that throughout the proposed project the requirement to avoid the sensitive receptors can be considered and weighted. Where feasible, this is achieved by routing of the potential route away from the sensitive human and ecological receptors.

In terms of air quality and the protection of human health, a 50-metre buffer is typically applied as the distance from a road within which a sensitive receptor may experience significant air quality impact, and as such, should be taken into consideration during the route selection process. Buffers will be used to inform decision making in relation to route options in future stages of the scheme development.

Emissions from operational road traffic also have the potential to impact on the natural environment through nitrogen deposition. In this regard, constraints within the study area will include any nitrogen sensitive ecosystem located within any EU and nationally designated sites as well as non-designated habitats.

Unlike air quality, climate is less subject to geographical constraints as climate emissions have a more regional or national impact. In this regard, there are no identified constraints pertaining to climate emissions and mitigation identified within the study area.

With respect to climate adaption, the siting of the final alignment away from climate risk areas (such as flood risk areas) will be a constraint. However, the flood risk analysis is addressed in greater detail in relation to drainage constraints.

The following key constraints have been identified from the baseline environment appraisal that will need to be considered further at route selection stage:

- The possible impact of increased air emissions within the study area;
- Residential properties affected by changes in traffic patterns and transport emissions;
- Sensitive receptors including schools (e.g. St. Raphael's Special School and St Patrick's National School), creches, hospitals, care and nursing homes (e.g. Elm Hall Nursing Home) etc. where more vulnerable members of the community may be located;
- Other commercial operations and community centres; and
- Sensitive ecosystems which are particularly sensitive to nitrogen deposition. This may include both EU and nationally designated sites as well as non-designated habitats.

2.5 Noise and Vibration

2.5.1 Introduction

This section identifies the constraints aspects of the proposed project in relation to noise and vibration. Like air quality, the constraints relating to noise and vibration on a proposed road project are largely concerned with the potential to impact sensitive receptors as they are identified within the constraints study area. Identifying the potential receptors at this stage in the process allows them to be taken into account in the route selection and design process to avoid or minimise adverse impact on sensitive receptors.

The National Road's Authority's document '*Guidelines for the Treatment of Noise and Vibration in National Road Projects' (2004*)[11] outlines recommended steps in the process of constraints assessment. These guidelines have been followed for this assessment.

2.5.2 Existing Environment

The County Kildare Third Noise Action Plan 2019-2023 (NAP) identifies Celbridge as one of fifteen population centres potentially exposed to noise from 'Major Roads' in the county. However, Celbridge was not identified as a population centre potentially exposed to noise from 'Major Railways' within the plan. One school in Celbridge was identified as noise sensitive (arising from road traffic) within the County Kildare NAP, Scoil na Mainistreach, which is located along Shackleton Road and Oldtown Mill Road.

The main source of noise in the area is currently the local road traffic and the M4 motorway to the north and general urban and business activities associated with towns, which dominates the noise climate. Other sources include typical domestic noise sources and agriculture.

The Environmental Noise Directive (END) (2002/29/EC) sets out the obligation of member states to assess and manage environmental noise and is the main EU instrument to identify noise pollution levels. The Directive mandates that Member States must prepare and publish, every five years, noise maps and noise management action plans for;

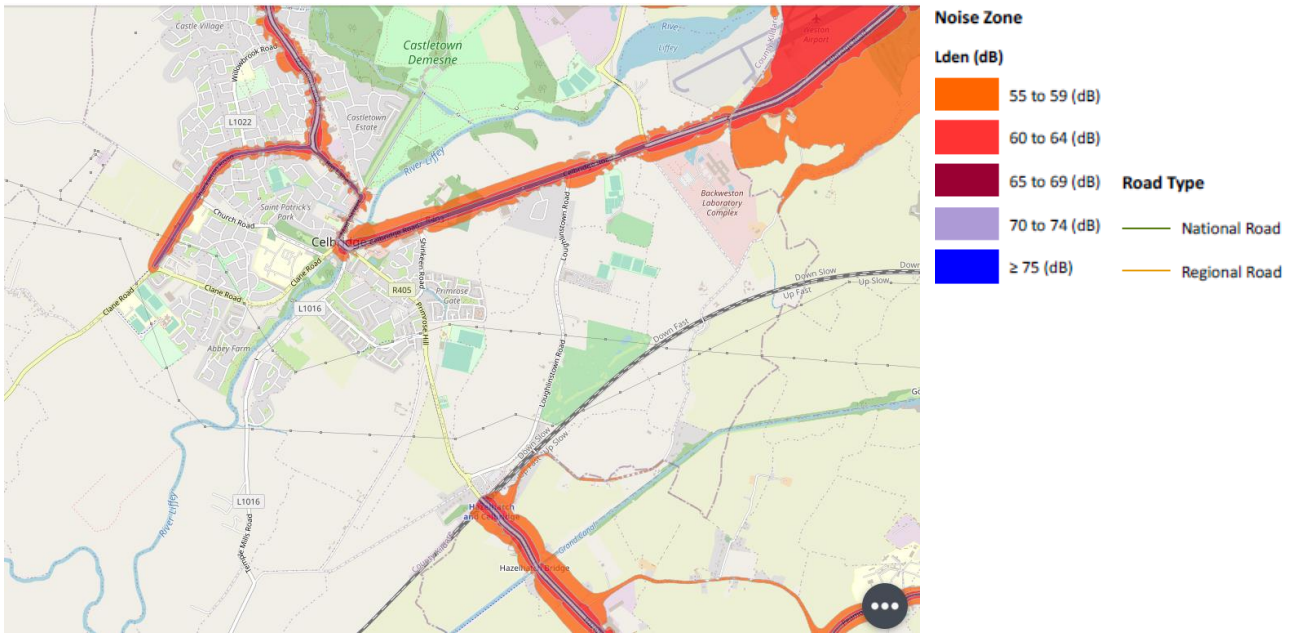
[11] https://www.tii.ie/technical-services/environment/planning/Guidelines_for_the_Treatment_of_Noise_and_Vibration_in_National_Road_Schemes.pdf

- Agglomerations with more than 100,000 inhabitants;
- Major roads (more than 3 million vehicles a year);
- Major railways (more than 30,000 trains a year); and
- Major airports (more than 50,000 movements a year, including small aircrafts and helicopters).

The extracts of the TII Strategic Noise Mapping for the east Kildare area are shown in **Figure 2-6** showing both the L_{den} (top) and L_{night} (bottom). The results indicate that the road traffic noise is generally within the immediate environs of the larger roads, in particular the M4 to the north, but also the R403 and R405.

The NAP states that, although under the Regulations it is required to delimit quiet areas within agglomerations, there is no agglomeration within County Kildare, and so there is no statutory requirement to identify quiet areas within Kildare. However, the NAP states that '*there may be public open space or recreational areas where it is deemed desirable to have relatively quiet noise levels*' and mentions examples of such areas including; recreation areas, playing fields, playgrounds, public parks and gardens, nature reserves, cemeteries, river banks, and canals.

It is also stated in the NAP that '*as the identification and delimiting of quiet areas is a means of ensuring that noise levels are preserved where they are good, it is considered appropriate to consider using the concept of quiet areas within the action plan*'. Therefore, any existing/potential quiet areas could be considered a constraint in route selection.



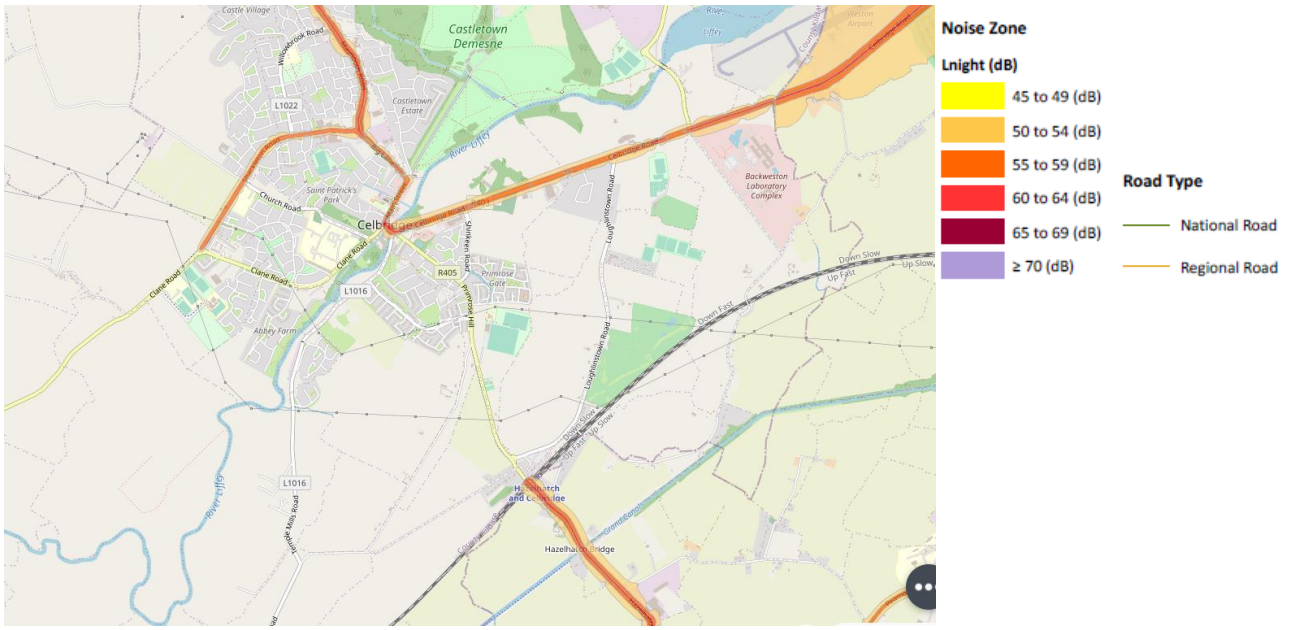


Figure 2-6: Ld_{en} (dB) and L_{night} (dB) of east Kildare (source: EPA Maps)

2.5.3 Identified Key Constraints

The sensitive receptors pertaining to noise and vibration are largely the same as those human receptors identified for air quality (**Section 2.4.2**).

Noise from heavy traffic at peak travel times has been observed in the study area. The potential impact of increased noise from the proposed roadway on the surrounding community and in particular on sensitive receptors should be considered in the route selection process.

The majority of noise sensitive receptors within the study area are residential dwellings (residential streets, housing estates, nursing homes etc.), commercial premises, and community facilities that are close or adjacent to the local roads network and situated within Celbridge Town and its environs. Other receptors will include commercial properties, retail areas, schools, churches, recreational areas, sports and community facilities, and local services located within the area.

There is existing/planned development(s) in the study area and along many of the local roads also. Any future proposed schemes will need to consider exposure to noise and the sensitivity of these properties.

In terms of traffic noise and human health, a 200-metre buffer is typically applied as the distance from a road within which a sensitive receptor may experience a significant noise impact. Buffers will be used to inform decision making in relation to route options in future stages of the scheme development.

Other potential constraints relate to sensitive properties (such as cultural heritage sites, buildings or monuments) that are particularly sensitive to the potential for ground borne noise and vibration during both construction (piling, blasting, etc.) as well as operational phase road traffic.

The following key constraints have been identified from the baseline environment appraisal that will need to be considered further at route selection stage:

- Residential properties or developments are at the greatest risk for traffic noise impact at both day and night time;
- Other sensitive human receptors for noise including schools (for example; St. Raphael's Special School and St Patrick's National School), creches, hospitals, care and nursing homes (for example; Elm Hall Nursing Home) etc. where more vulnerable members of the community are located;
- Other commercial operations, community centres, recreational areas, existing/proposed quiet areas;
- Protected buildings, site or monuments of cultural or archaeological significance; and
- Sensitive species which are particularly sensitive to noise such as birds. This may include birds associated with EU and nationally designated sites.

2.6 Biodiversity

2.6.1 Introduction

This section identifies the ecological constraints for the study area. A desktop study and appraisal of the habitats within the study area was undertaken using the following sources of information:

- The National Parks and Wildlife Service (NPWS) database (www.npws.ie), consulted for designated sites of nature conservation interest in the study area, accessed online September 2020;
- The National Parks and Wildlife Service (NPWS) (www.npws.ie), consulted for data on rare and protected species (Nelson *et al.,* 2019)[12], accessed online September 2020;
- The National Biodiversity Data Centre (NBDC) database (www.biodiversityireland.ie), consulted for records of rare, protected and invasive species, accessed online September 2020;
- Environmental Protection Agency – Watercourse and water quality - https://gis.epa.ie/EPAMaps/;
- Geological Survey of Ireland – Geology, soils and hydrogeology - www.gsi.ie;
- Information on the Eastern River Basin District;
- A review of Ordnance Survey maps and ortho-photography - www.osi.ie;
- Leixlip Local Area Plan 2020-2023 (available at http://kildare.ie/CountyCouncil/Planning/DevelopmentPlans/LocalAreaPlans/LeixlipLocalAreaPlan2020-2023/);
- Celbridge Local Area Plan 2017-2023 (available at: http://www.kildare.ie/CountyCouncil/Planning/DevelopmentPlans/LocalAreaPlans/CelbridgeLocalAreaPlan2017-2023/A%20Final%20Written%20Statement%20%20May%202018.pdf);
- Kildare County Development Plan 2017-2023 (available at http://www.kildare.ie/CountyCouncil/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2017-2023/DraftCountyDevelopmentPlan/Volume1/Volume%201.pdf); and
- South Dublin County Council Development Plan 2016-2022 (available at https://sdcc.ie/en/services/planning/development-plan/plan-2016-2022/plan-2016-2022.html).

2.6.2 Existing Environment

A review of available aerial photography indicates that the following habitats[13] and land use types are contained within the study area:

- Improved agricultural grassland (GA1)(arable and pasture);
- Amenity grassland (GA2), dry meadows and grassy verges (GS1);
- Hedgerows and treelines (WL1 & WL2);
- Woodland and Scrub (WNx and WDx & WS1);
- Rivers (FW1);
- Ponds and Springs (FLx & FPx); and
- Buildings, roads and artificial surfaces (BL3).

[12] Nelson, B., Cummins, S., Fay, L., Jeffrey, R., Kelly, S., Kingston, N., Lockhart, N., Marnell, F., Tierney, D. and Wyse Jackson, M. (2019) Checklists of protected and threatened species in Ireland. Irish Wildlife Manuals, No. 116. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

[13] Habitats groupings follow Fossit (2000) classification scheme.

A large proportion of the constraints study area is characterised by improved agricultural grassland. This habitat type, along with built areas such as houses and roads are generally considered to be of low ecological value in accordance with the definition outlined in the NRA (2009) '*Guidelines for Assessment of Ecological Impacts of National Road Projects'*.

The northern portion of the constraints study area intersects Castletown House and Demesne containing yew and oak woodlands as well as mixed throughout the south western portion of the study area. These woodlands are noted in the Celbridge LAP and there are a number of specific objectives in relation to woodlands:

> *GIO 1.2: To preserve, protect and augment trees, groups of trees, woodlands and hedgerows within the town by increasing, where appropriate, tree canopy coverage using locally native species by incorporating them within design proposals and supporting their integration into the existing Green Infrastructure network.*

Linear hedgerows are also features found throughout the study area, which are typical boundary features in an agricultural landscape and again the LAP requires specific objectives in relation to hedgerows:

> *GIO 1.4: To ensure key hedgerows identified, and the linkages they provide to larger areas of Green Infrastructure and the wider countryside, are retained where appropriate and integrated into the design of new developments.*

Woodlands, groups of trees and hedgerows are considered to be of greater ecological value, as these often achieve greater floristic diversity and can provide potential habitats for protected species.

An examination of aerial photography reveals an abundance of grassland habitats, which may have ecological importance depending on the diversity of species present within the habitat. Data from the National Biodiversity Data Centre (NBDC)[14] for Ancient Woodlands and Long-Established Woodlands (ALEW) also identified seminatural woodland at Castletown approximately 400 metres outside the study area.

The River Liffey is the principle aquatic ecological constraint and this major river flows west to east through the centre of the study area. The River Liffey and its tributaries are important fisheries habitat and are known to support Atlantic salmon, brown trout, sea trout, white-clawed crayfish, European eel and lamprey (river and brook).

2.6.2.1 European Designated Sites

Special Areas of Conservation (SACs) are sites of international importance owing to the presence of Annex I habitats and/or Annex II species listed under the EU Habitats Directive (92/43/EEC). Special Protection Areas are designated for the protection of bird species listed on Annex I of the Birds Directive (2009/147/EC), regularly occurring populations of migratory species and areas of international importance for migratory birds.

The general zone of influence applied in a constraints study is typically a 15km buffer area, which identifies European sites which may have connectivity to the study area and as such may demonstrate a pathway for impact. In some cases, a much smaller area may be more relevant and in some instances the area may be much greater (e.g. for highly mobile species), depending on the requirements of the habitat or species for which the European site has been designated.

For this assessment, a 15km buffer has been applied around the study area and all SACs within this and those with hydrological connectivity have been identified. Ten SACs were identified and are noted in **Table 2-7** and illustrated in **Figure 2-7.** Of these, five are known to have hydrological connectivity (albeit of varying distances from the study area), notably: Rye Water Valley/Carton SAC; North Dublin Bay SAC; South Dublin Bay SAC; Howth Head SAC and Rockabill to Dalkey Island SAC.

A 15km buffer around the study area identified no SPA's, however, hydrological connectivity was identified between four SPA's, notably; South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, Baldoyle Bay SPA and Dalkey Islands SPA. It is acknowledged that a number of Annex I bird species are present within the wider area such as those returned from the NBDC data search (**Table 2-9**), however, it is

[14] https://maps.biodiversityireland.ie/Map

also recognised that the majority of these birds are coastal birds and utilise habitats outside that of the study area.

For Whooper swan the same is true, many of the wetland habitats within the study area are pond habitat and do not provide large enough area for this species. Furthermore, Barn Owl, Kingfisher (Birds Directive Annex I species) and Yellowhammer (Red listed bird species) are noted in the NBDC database from the study area, although confirmation via field surveys would be required.

There are twelve nationally designated sites within 15km of the Study Area and these are shown in **Table 2-8**. Five of these sites have a hydraulic connectivity to the study area.

The study area is contained within the Liffey and Dublin Bay (09) catchment and spans the Liffey_SC_050, Liffey_SC_070, Liffey_SC_080, and Liffey_SC_090, sub-catchments. The River Liffey is a key waterbody within the study area and the proposed works intend to create a second river crossing to link Celbridge to Hazelhatch. The Liffey flows directly through the study area into Leixlip Reservoir and drains into the Liffey Estuary, located downstream in Dublin Bay. Hydrological connectivity to Dublin Bay European sites is an important consideration in this respect.

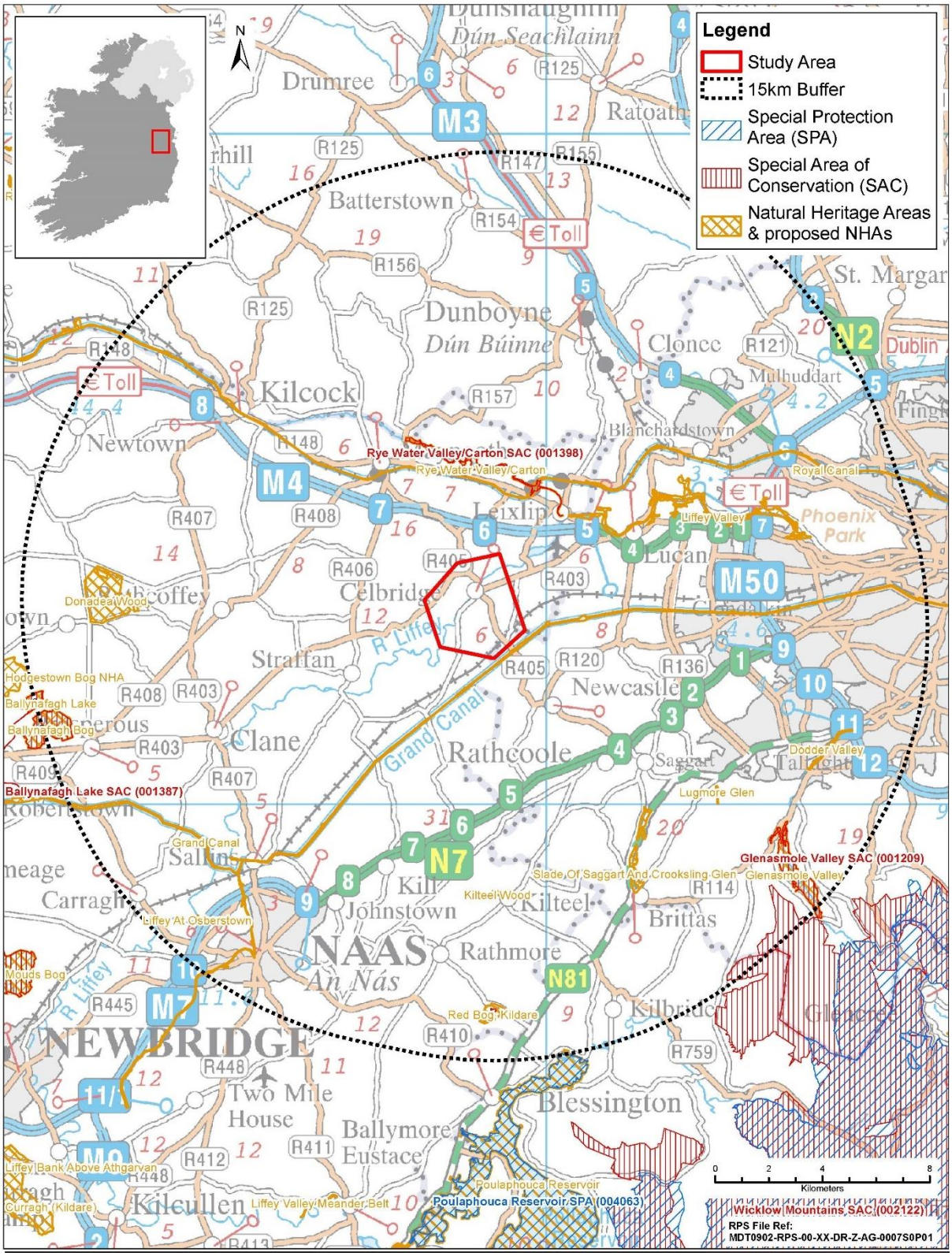


Figure 2-7: Celbridge/Hazelhatch – Sites of Conservation Importance within 15km

Table 2-7: Special Areas of Conservation within 15km of the Study Area

Site Code	Site Name	Qualifying Interest Habitats and Species (*=Priority Habitat)[15]	Distance from Study Area (km)[16]	Connectivity
		Special Area of Conservations (SACs)		
000391	Ballynafagh Bog SAC	**Conservation Objectives Generic Version 1.0 (10/11/15)** **Annex I Habitats** • Active raised bogs [7110]* • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	*c.* 14 km south west	No. There is no surface or groundwater body connectivity. This European site is located within the Kildare groundwater body and the constraints study area is located within the Dublin groundwater body therefore, there is no hydrogeological connectivity between these sites.
000397	Red Bog, Kildare SAC	**Conservation Objectives Specific Version 1.0 (17/07/19)** **Annex I Habitats** • Transition mires and quaking bogs [7140]	*c.* 13.3 km south	No. There is no surface or groundwater body connectivity. This European site is located within the Kilcullen groundwater body and the constraints study area is located within the Dublin groundwater body therefore, there is no hydrogeological connectivity between these sites.
001398	Rye Water Valley/Carton SAC	**Conservation Objectives Specific Version 7.0 (07/04/20)** **Annex I Habitats** • Petrifying springs with tufa formation (Cratoneurion) [7220]* **Annex II Species** • Narrow-mouthed Whorl Snail *Vertigo angustior* [1014] • Desmoulin's Whorl Snail *Vertigo moulinsiana* [1016]	*c.* 3.1 km north east	**Yes,** hydrogeological connectivity. This site is located 3 km north east and is located within the same Dublin groundwater body where flow paths generally lead toward the River Liffey. It has moderate porosity and will move at high velocities.
001387	Ballynafagh Lake SAC	**Conservation Objectives Specific Version 7.0 (07/04/20)** **Annex I Habitats** • Alkaline fens [7230] **Annex II Species** • Desmoulin's Whorl Snail *Vertigo moulinsiana* [1016] • Marsh Fritillary *Euphydryas aurinia* [1065]	*c.* 14.7 km south west	No. There is no surface or groundwater body connectivity. This European site is located within the Kildare groundwater body and the constraints study area is located within the Dublin groundwater body therefore, there is no hydrogeological connectivity between these sites.
001209	Glenasmole Valley SAC	**Conservation Objectives Generic Version 7.0 (07/04/20)** **Annex I Habitats** • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (* important orchid sites)* [6210] • *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] • Petrifying springs with tufa formation (Cratoneurion)* [7220]	*c.* 12.2 km south east	No. There is no surface or groundwater body connectivity. This European site is located within the Kilcullen groundwater body and the constraints study area is located within the Dublin groundwater body therefore, no hydrogeological connectivity exists between these sites.

[15] NPWS website, accessed September 2020.

[16] Distance measured 'as the crow flies'.

Site Code	Site Name	Qualifying Interest Habitats and Species (*=Priority Habitat)[15]	Distance from Study Area (km)[16]	Connectivity
002122	Wicklow Mountains SAC	**Conservation Objectives Specific Version 1.0 (31/07/17)** **Annex I Habitats** • Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] • Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] • Natural dystrophic lakes and ponds [3160] • Northern Atlantic wet heaths with *Erica tetralix* [4010] • European dry heaths [4030] • Alpine and Boreal heaths [4060] • Calaminarian grasslands of the Violetalia calaminariae [6130] • Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]* • Blanket bogs (* if active bog) [7130] • Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110] • Calcareous rocky slopes with chasmophytic vegetation [8210] • Siliceous rocky slopes with chasmophytic vegetation [8220] • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] **Annex II Species** • Otter *Lutra* [1355]	*c.* 13.7 km south east	No. There is no surface or groundwater body connectivity. This European site is located within the Kilcullen groundwater body and the constraints study area is located within the Dublin groundwater body therefore, no hydrogeological connectivity exists between these sites.
000206	North Dublin Bay SAC	**Conservation Objectives Specific Version 1.0 (06/11/13)** **Annex I Habitats** • Mudflats and sandflats not covered by seawater at low tide [1140] • Annual vegetation of drift lines [1210] • *Salicornia* and other annuals colonising mud and sand [1310] • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] • Mediterranean salt meadows (Juncetalia maritimi) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	*c.* 22.6 km north east	**Yes,** hydrological connectivity. This site is located downstream of the study area and is directly connected via the River Liffey where it enters Dublin Bay.

Site Code	Site Name	Qualifying Interest Habitats and Species (*=Priority Habitat)[15]	Distance from Study Area (km)[16]	Connectivity
		• Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]* • Humid dune slacks [2190] **Annex II Species** • Petalwort *Petalophyllum ralfsii* [1395]		
000210	South Dublin Bay SAC	**Conservation Objectives Specific Version 1.0 (22/08/13)** **Annex I Habitats** • Mudflats and sandflats not covered by seawater at low tide [1140]	*c.* 20.4 km east	**Yes,** hydrological connectivity. This site is located downstream of the study area and is directly connected via the River Liffey where it enters Dublin Bay.
000202	Howth Head SAC	**Conservation Objectives Specific Version 1.0 (06/12/16)** **Annex I Habitats** • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • European dry heaths [4030]	*c.* 30 km north east	**Yes,** hydrological connectivity. This site is located downstream of the study area and is directly connected via the River Liffey where it enters Dublin Bay.
003000	Rockabill to Dalkey Island SAC	**Conservation Objectives Specific Version 1.0 (07/05/13)** **Annex I Habitats** • Reefs [1170] **Annex II Species** • Harbour porpoise *Phocoena* [1351]	*c.* 28.3 km north east	**Yes,** hydrological connectivity. This site is located downstream of the study area and is directly connected via the River Liffey where it enters Dublin Bay.

Table 2-8: Nationally Designated Sites within 15km of the Study Area

Site code	Site Name	Site Features of Note	Distance from Study Area (km)[17]	Connectivity
Proposed Natural Heritage Areas (pNHA)				
001398	Rye Water Valley/Carton pNHA	Several rare and threatened plant and animal species and the presence of petrifying springs.	*c.* 4.2 km north	**Yes.** This designated site is located downstream of the study area but has no surface water connectivity. The groundwater body is shared with that of the constraints study area.
000455	Liffey At Osberstown pNHA	Riverside vegetation with remnants of cleared woodland. Two scarce plants are found here.	*c.* 13.8 km south west	No. There is no surface or groundwater body connectivity. This site is located within the Naas groundwater body and the constraints study area is located within the Dublin groundwater.
001394	Kilteel Wood pNHA	Deciduous woodland with mosaic of small heathy wood.	*c.* 11.1 km south	No. There is no surface or groundwater body connectivity. This site is located within the Industrial Facility (P0325-01) groundwater body and the constraints study area is located within the Dublin groundwater.
001391	Donadea Wood pNHA	The site is notable for the presence of two rare species of Myxomycete fungus, namely *Diderma chondrioderma* and *Licea testudinacea.* Deciduous trees and well established woodland.	*c.* 13.2 km west	**Yes**. The groundwater body is shared with that of the constraints study area.
001387	Ballynafagh Lake pNHA	Alkaline fens [7230], Desmoulin's Whorl Snail *Vertigo moulinsiana* [1016] and Marsh Fritillary *Euphydryas aurinia* [1065] previously noted from pNHA.	*c.* 15 km south west	No. There is no surface or groundwater body connectivity. This site is located within the Kildare groundwater body and the constraints study area is located within the Dublin groundwater body.
00128	Liffey Valley pNHA	The main terrestrial habitat is mixed deciduous woodland, marsh habitat and rough grassland. The threatened Green Figwort (*Scrophularia aurita*)is also recorded at a number of stations along this site.	*c.* 4.2 km north east	**Yes**. hydrological connectivity. This site is located downstream of the study area and is directly connected via the River Liffey where it enters Dublin Bay.
000211	Slade Of Saggart and Crooksling Glen pNHA	Wooded River valley, two small lakes (Brittas Ponds), marginal areas of freshwater marsh and wet grassland.	*c.* 9.9 km south east	No. There is no surface or groundwater body connectivity. This site is located within the Kilcullen groundwater body and the constraints study area is located within the Dublin groundwater body.
000397	Red Bog, Kildare pNHA	Transition mires and quaking bogs [7140].	*c.* 14.5 km south	No. There is no surface or groundwater body connectivity. This site is located within the Kildare groundwater body and the constraints study area is located within the Dublin groundwater body.

[17] Distance measured 'as the crow flies'.

Site code	Site Name	Site Features of Note	Distance from Study Area (km)[17]	Connectivity
000391	Ballynafagh Bog pNHA	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120]	*c.* 14.6 km south west	No. There is no surface or groundwater body connectivity. This site is located within the Kildare groundwater body and the constraints study area is located within the Dublin groundwater body.
004063	Poulaphouca Reservoir pNHA	Wetland habitat. Wet grassland areas occur in sheltered bays around the lake with diverse plant species. A range of waterfowl species occur and is an internationally important site for Greylag Goose. The reservoir also attracts roosting gulls most notably the Lesser Black-backed Gull.	*c.* 14.8 km south east	No. There is no surface or groundwater body connectivity. This site is located within the Kilcullen groundwater body and the constraints study area is located within the Dublin groundwater body.
002104	Grand Canal pNHA	Hedgerows, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The rare and legally protected (Flora Protection Order 2015) Opposite-Leaved Pondweed (*Groenlandia densa*) has been recorded at a number of locations along the canal.	*c.* 2.5 km north	**Yes**. The groundwater body is shared with that of the constraints study area.
002103	Royal Canal pNHA	Hedgerows, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The rare and legally protected (FPO 2015) Opposite-Leaved Pondweed (*Groenlandia densa*) has been recorded at a number of locations along the canal.	*c.* 3.7 km south east	**Yes.** The groundwater body is shared with that of the constraints study area.

2.6.2.2 Fisheries

Following an examination of the EPA database, the following watercourses were noted as intersecting the constraints study area: EPA River Name [EPA Waterbody Name];

- River Liffey [Liffey_140];
- BallyGoran [Liffey_150];
- Toolestown [Liffey_150];
- Ballymakealy [Liffey_140];
- Ballymakealy Upper [Liffey_140];
- Simmonstown [Liffey_140];
- Loughlinstown [Liffey_140]; and
- Castletown [Castletown (Dublin-Kildare)_010].

In addition, the following five watercourses are located a short distance outside the constraint study boundary area.

- Coneyburrow [Liffey_150];
- Kilmacredock [Liffey_150];
- Ardrass [Liffey_140];

- Rye Water [Liffey_140]; and
- Posseckstown [Liffey_140].

All of these water features, rivers and streams are contained within the Liffey and Dublin Bay catchment. The central river waterbody within this catchment is the River Liffey. The River Liffey is a key river to consider as it is the largest within the constraint study area and will be intersected by the proposed works and is connected with many important sites. The River Liffey and its tributaries are important fisheries habitat and are known to support Atlantic salmon, brown trout, sea trout, white-clawed crayfish, European eel and lamprey (river and brook), therefore making this catchment very sensitive to environmental impact[18].

In 2016 and 2019, the EPA recorded white clawed crayfish in the River Liffey at Celbridge bridge. Furthermore, in 2019 further recordings of crayfish were noted downstream at Leixlip bridge and at a number of locations upstream as far as Ballymore Eustace, giving the species a distribution through most of the River Liffey with the exception of the lower reaches. The white-clawed crayfish has been affected in recent years by outbreaks of crayfish plague. To date there has been no outbreak of crayfish plague within the River Liffey catchment and therefore the population within the Liffey would be deemed to be important as other populations have suffered declines from the plague.

Due to the sensitivity of the Liffey and other rivers at Celbridge, the LAP places a number of restrictions around any development within the areas as per the following objective:

> *GIO 1.6: To maintain a biodiversity protection zone of not less than 15 metres from the top bank of the River Liffey and of not less than 10 metres from the top bank of smaller watercourses in Celbridge, with the full extent of the protection zone to be determined on a case by case basis by the planning authority, based on site specific characteristics and sensitivities. Strategic green routes and trails will be open for consideration within the biodiversity protection zone, subject to appropriate safeguards and assessments.*

For further information on hydrology please see **Section 2.9.2** of this report.

Wetlands

There are a number of wetland areas located within and in the immediate vicinity of the study area[19]: Data was obtained from wetland surveys Ireland website and accessed in September 2020. The presence of these wetlands, some of natural origin, are considered of national importance as indicated in the summary assessment for each wetland site on the Wetlands Survey Ireland website. Others are manmade or modified and are unclassified in terms of biodiversity potential as indicated from the Wetlands Surveys Ireland database. Wetlands identified are illustrated in **Figure 2-8**.

- Quarry Pond Celbridge (WMI_KE121) is located 0.2 km south east of Celbridge bridge. A man-made pond as a result of a quarry. It is comprised of habitats such as reed swamp, calcareous spring and wet woodland (oak, ash, willow, alder). It has been classified as having moderate local conservation value.
- Celbridge Abbey/ Simmonstown House Ponds (WMI_KE120) is located 0.7 km south west of Celbridge bridge. It is an artificial pond that has been classified as having moderate local conservation value.
- Castletown Demesne Ponds (WMI_KE119). The two man made pond occur within the grounds of Castletown House Estate, west and south-east of the house. These are connected by a stream which flows into the River Liffey in the south east corner of the demesne. The western site is located within the woodland while the south east pond is currently being restored. They have been classified as having high local conservation value.
- Liffey Oxbow (WMI_KE64). A mesotrophic lake comprised of habitats including scrub and reed swamp. This site displays both an existing oxbow lake as well as a remnant oxbow lake, which are within 300 m of one another and 3.1km from the centre of Celbridge. This site is classified as being ‘Nationally Important’.

[18] Information from; WFD Fish Maps (available at http://wfdfish.ie/), NBDC desktop study and IFI consultation response.

[19]As per Wetland Surveys Ireland maps. Accessed at: http://www.wetlandsurveysireland.com/wetlands/map-of-irish-wetlands--/map-of-irish-wetlands---map/index.html (accessed September 2020).

- Kilwoghan Wetland (WMI_KE123) is located 0.6 km from northern Celbridge. It is a wet grassland that comprises a central area of Cattail (*Typha* spp*.)* and Clubrush (*Schoenoplectus* spp.) reedswamp surrounded by a margin of rush-dominated wet grassland. Much of the site has been infilled in the past and now supports dry grassland. This site has been classified as having high local conservation value.
- Celbridge Pond (WMI_KE122) is located 400 metres from northern Celbridge. This is a small eutrophic pond that is situated in a localised depression that accumulates water during the winter months. It is comprised of habitats such as reed swamp and wet grassland. This site has been classified as having moderate local conservation value.
- Parsonstown ponds (WMI_KE241) are located within Liffey Park Technology Campus and consist of three circular ponds located in amenity grassland. This artificial pond has been classified as moderate local conservation value.

Wildfowl Sanctuaries

Wildfowl Sanctuaries are areas that are protected under the Wildlife Act 1976 (as amended) and have been excluded from the 'Open Season Order' where shooting is prohibited so that game birds can rest and feed undisturbed. Again, they increase the potential for water bird habitat. Two of these sanctuaries are relevant to the study area and are part of designated sites (Ballynafagh Lake SAC and Slade of Saggart and Crooksling Glen pNHA);

- Ballynafagh Lake (Blackwood Lake) Wildfowl Sanctuary (WFS-30) is located 15 km south west; and
- Brittas Ponds Wildfowl Sanctuary (WFS-18) is located is located 9.9 km south east.

Marine Protected Areas

Under the OSPAR Convention to Protect the Marine Environment of the North East Atlantic, Ireland committed to establishing marine protected areas to protect biodiversity (i.e. OSPAR MPAs). One MPA is relevant to this study area;

- North Dublin Bay MPA (o-ie-0002968) is located 20km east of the study area.

2.6.2.3 Protected Species and Invasive Species

Records of rare and protected species of flora and fauna from within 5km of the proposed works were obtained from the National Biodiversity Data Centre (NBDC) online database and the NPWS online database as shown in **Table 2-9**. Invasive species occurring within the area are presented in **Table 2-10.**

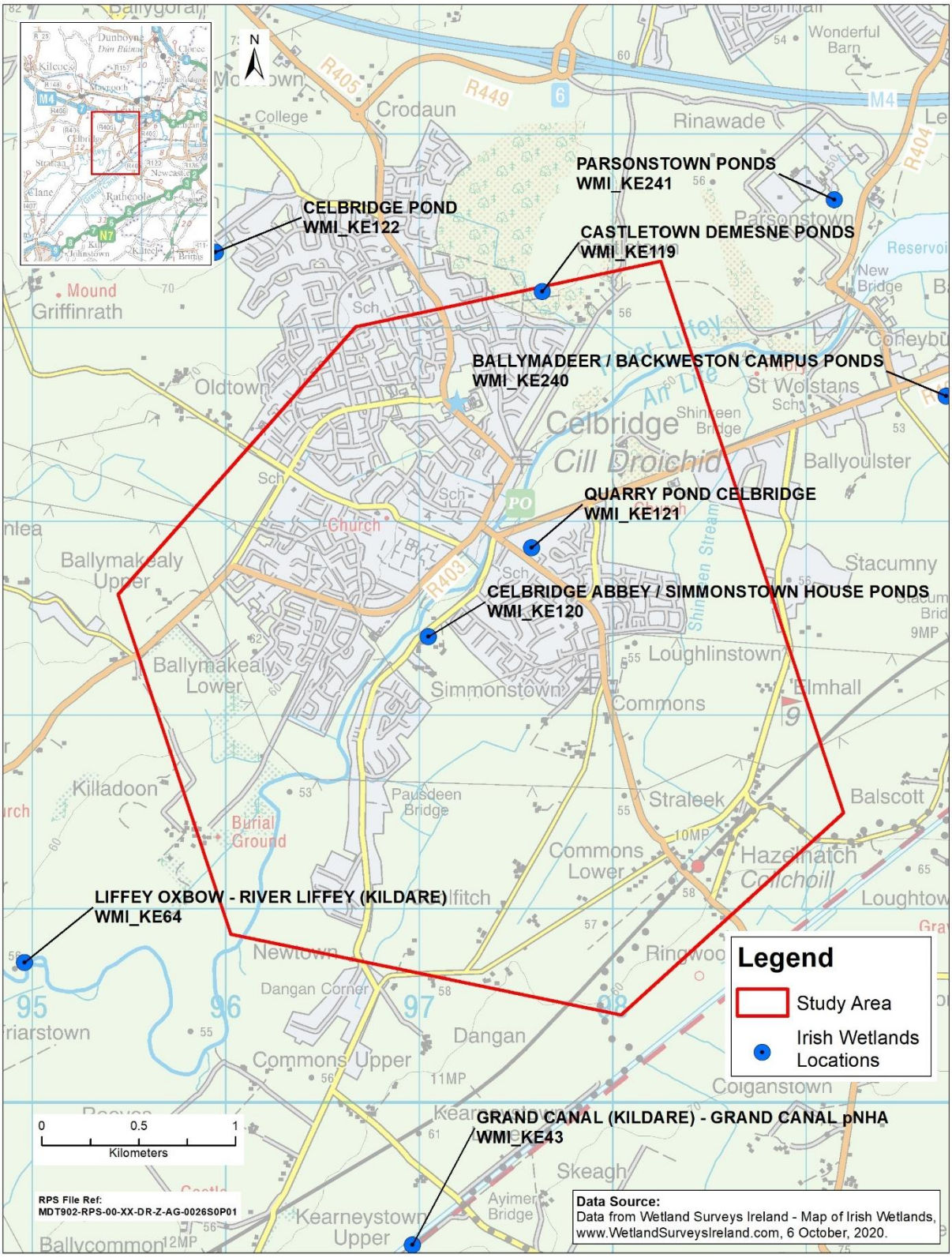


Figure 2-8: Celbridge/Hazelhatch – Identified Wetlands

Table 2-9: Records of Rare and Protected Species of Fauna and Flora.

Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences+
Mammals (Terrestrial)					
Eurasian Badger *Meles*	✓e	Threatened	47	26/09/2018	Varied habitats including grassland, woodland and Bog often near hedgerows or treelines and streams.
Eurasian Red Squirrel *Sciurus vulgaris*	✓e	-	4	21/04/2017	Conifer-dominated woodland with a mixture of age classes and species together with some berry-bearing shrubs to ensure a continuous food supply.
West European Hedgehog *Erinaceus europaeus*	✓e	-	8	28/10/2016	Irish resident in all lowland habitats where there is sufficient food to eat and ground cover for nesting, and commonest where grassland abuts mixed woodland and scrub. It appears to avoid coniferous woodland, blanket bog and other wet areas.
European Otter *Lutra*	✓b, e	Near Threatened	4	17/10/2011	Habitats include but are not necessarily limited to; Lakes and Ponds, Watercourses, Riparian woodland, Estuaries, Sea inlets and bays, Salt marshes, Swamps , Riparian. Otters in coastal areas include freshwater sources in their territories.
Pine Marten Martes	✓e	-	2	31/03/2014	Habitat specialists and require forest or scrub cover to exist in a landscape. In the west of Ireland they may have adapted to relatively open habitats due to historical clearance of woodland habitat.
Lesser Noctule *Nyctalus leisleri*	✓c,e	Near Threatened	13	08/08/2014	Woodland species but it is also to be found in parkland, along treelines, pasture and riparian habitats, over lakes, beaches and dunes and above streetlights in urban areas. Not as dependent on linear features like hedgerows as our other bat species.
Common Pipistrelle *Pipistrellus sensu lato*	✓c,e	-	13	06/05/2014	Highly adaptable species foraging along linear landscape features such as hedgerows and tree lines as well as within woodland and parkland. Roosting in old and modern structures in addition to trees and bat boxes.
Daubenton's Bat *Myotis daubentonii*	✓c,e	-	69	20/08/2014	Calm, slow-moving water is chosen by Daubenton's Bat as it makes it easier for it to locate insects on the surface. Sometimes forages in woodland, away from water. Habitats include but are not necessarily limited to; Semi-natural woodland, highly modified non-native woodland, Building and artificial surfaces, Lakes and Ponds, Watercourses.
Birds					
Barn Owl *Tyto alba*		Red List	9	31/12/2011	Scarce resident mainly in central and southern Ireland. Breeds in ruined buildings, such as castles and to a lesser extent in outbuildings (barns/sheds).
Barn Swallow *Hirundo rustica*	-	Amber List	18	31/12/2011	Summer visitor throughout Ireland. Range of habitat preferences, flocks gather at wetland sites in autumn
Black-headed Gull *Larus ridibundus*	✓d	Red List	13	31/12/2011	Resident along all Irish coasts, wintering inland also. Breading nests on the ground in wetland areas, i.e. bogs, marshes, man-made lakes. Widespread across agricultural fields, and urban areas.
Common Coot *Fulica atra*	✓d	Amber List	13	31/12/2011	Resident at ponds and lakes throughout Ireland. Wintering in lakes, coastal estuaries and river systems
Common Grasshopper	-	Amber List	5	31/12/2011	Widespread summer visitor to Ireland from April to September. Winters in tropical west Africa.

Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences+
Wabler *Locustella naevia*					
Common Kestrel *Falco tinnunculus*	-	Amber List	15	31/12/2011	Widespread resident throughout Ireland. Nests in trees, buildings or in cracks in cliffs. Will use old crow's nests. Found in wide variety of open habitats including coasts, moor land, farmland, wetlands, roadside verges and town parks.
Common Kingfisher *Alcedo atthis*	✓a d	Amber List	15	31/12/2011	Resident on Irish streams, rivers and canals. Wintering in lakes and coasts during extended periods of poor weather.
Common Linnet *Carduelis cannabina*	-	Amber List	18	31/12/2011	Widespread resident throughout Ireland. Breed in a variety of habitats, including rough grassland, uplands and in coastal areas with gorse.
Common Pochard *Aythya ferina*	✓d	Amber List	3	31/12/2011	Scarce summer visitor and widespread winter migrant between October & February to large shallow eutrophic waters i.e. well-vegetated marshes and swamps and slow flowing rivers.
Common Redshank *Tringa totanus*	✓d	Red List	1	31/12/2011	Resident and visitor populations. A common wader of wetlands throughout the country, though mainly coastal estuaries in winter. Nests in grassy tussock, in wet, marshy areas and occasionally heather. Breeds mainly in midlands.
Common Snipe *Gallinago*	-	Amber List	7	31/12/2011	Summer and winter visitor to Ireland. They forage across a variety of wetland and damp habitats. Nests on the ground, usually concealed in a grassy tussock, in or near wet or boggy terrain.
Common Starling *Sturnus vulgaris*	-	Amber List	33	04/02/2017	Widespread garden bird, Irish resident. Foraging in grassland in parks, gardens and farmland, and trees. Also found in urban environments as well as woodland and farmland
Common Swift *Apus*	-	Amber List	14	28/07/2016	Common summer visitor throughout Ireland. Nests in small recesses in buildings, both occupied and derelict. Less frequently in holes in trees or caves in uplands or coastal areas.
Eurasian Teal *Anas crecca*	✓d	Amber List	4	31/12/2011	Resident & winter migrant. Wetland preferences in covered freshwater lakes, pools and small upland streams away from the coast. Wintering in coastal lagoons and estuaries and inland marshes, lakes, ponds and turloughs.
Eurasian Tree Sparrow *Passer montanus*	-	Amber List	15	31/12/2011	Local resident in the east of Ireland, scarce along the south and west coasts. Largely associated with cereal production. Nests in cavity in building, especially under eaves or holes formed by missing brickwork.
Eurasian Wigeon *Anas penelope*	✓d	Amber List	2	31/12/2011	Fairly widespread and common winter visitor. Can be found in flocks up to and over 1000 birds on large wetlands and waterbodies. Non-breeding in Ireland.
Eurasian Woodcock *Scolopax rusticola*	-	Red List	5	31/12/2011	Resident & winter visitor to Ireland. Habitat preferences include woodland and areas of dead leaves and low vegetation, scrub and some open areas (bracken and heather-covered hills).
European Golden Plover *Pluvialis apricaria*	✓a,d	Red List	5	31/12/2011	Widespread distribution during wintering in coastal and inland habitats. Summer populations restricted to uplands in NW Ireland with heather moors, blanket bogs, and acidic grasslands.
Gadwall *Anas strepera*	✓d	Amber List	1	31/12/2011	Localised wintering distribution at a variety of inland and coastal sites. Nest on a variety of freshwater and

Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences+
					brackish wetlands, especially shallow lakes with abundant emergent vegetation, slow moving rivers and marshes.
Goosander *Mergus merganser*	-	Amber List	1	31/12/2011	Resident at larger lakes in Counties Wicklow and Donegal. Rare winter visitor throughout Ireland. Irish birds appear to be largely resident. Birds from Continental Europe can occasionally be found along coastal areas in winter.
Great Black-backed Gull *Larus marinus*	-	Amber List	3	31/12/2011	Resident along all Irish coasts. Breeds on the ground in colonies all around the coast of Ireland. Most colonies are on well-vegetated off-shore islands, or in other areas difficult of access.
Great Cormorant *Phalacrocorax carbo*	✓d	Amber List	7	31/12/2011	Irish resident either at sea or on inland lakes and rivers. Breeds in colonies mainly around the coast of Ireland, with some birds breeding inland.
Great Crested Grebe *Podiceps cristatus*	✓d	Amber List	4	31/12/2011	Winter distribution is widespread with greatest concentration in the north midlands and northeast and birds from the continent join the resident population. Outside the breeding season are often solitary with some birds moving to the coast through the winter. Breed on large, shallow eutrophic loughs, and along canals and slow flowing rivers – wetlands with emergent vegetation bordered by open water are generally selected.
Grey Heron *Ardea cinerea*	✓d	-	27	29/12/2014	Common resident at wetlands, estuaries and along rivers throughout Ireland.
Grey Wagtail *Motacilla cinerea*	-	Red List	2	31/12/2011	A widespread resident along fast flowing streams and rivers throughout Ireland, and nests under bridges. Some winter in coastal areas with large seaweed supply.
Herring Gull *Larus argentatus*	✓d	Red Listed	10	31/12/2011	Resident along all Irish coasts, breeding inland also. Widespread distribution.
House Martin *Delichon urbicum*	-	Amber List	14	31/12/2011	Common summer visitor throughout Ireland. Nests usually sited underneath the eaves of a house. Also nests on cliffs.
House Sparrow *Passer domesticus*	-	Amber List	29	31/12/2011	Widespread garden bird, Irish resident. Breeds throughout Ireland - mainly around farm buildings and built-up areas. Nests in cavity in building, especially under eaves or holes formed by missing brickwork.
Jack Snipe *Lymnocryptes minimus*	-	Amber List	1	31/12/2011	Summer and winter visitor to Irish wetlands. Feeds in dense grass and low cover.
Lesser Black-backed Gull *Larus fuscus*	✓d	Amber List	5	31/12/2011	Summer populations are distributed across the Irish coastline including off shore islands, islands in inland lakes, sand dunes and coastal cliffs. Winter visitors to more inland lakes.
Little Egret *Egretta garzetta*	✓a	-	14	31/12/2011	Resident along coasts and rivers throughout Ireland. A variety of wetland habitats are used including shallow lakes, riverbanks, lagoons, coastal estuaries and rocky shoreline.
Mallard *Anas platyrhynchos*	✓d	Amber List	27	31/12/2011	Resident across all wetland habitats in Ireland.
Mew Gull *Larus canus*	-	Amber List	5	31/12/2011	Widespread across Irish coastland. Nests on the ground in a wide variety of situations, including, islands, cliffs and shingle banks. Breeds on the coast and inland lakes in the west of Ireland.

Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences+
Mute Swan *Cygnus olor*	-	Amber List	22	31/12/2011	Resident at wetlands throughout Ireland.
Northern Lapwing *Vanellus*	✓d	Red Listed	10	31/12/2011	Irish resident and summer visitor across wetlands, pasture and rough land adjacent to bogs. Breed on open farmland and bare fields.
Northern Pintail *Anas acuta*	✓d	Red Listed	1	31/12/2011	Local winter visitor to wetlands throughout Ireland from October to March. In winter, they form large flocks on brackish coastal lagoons, in estuaries and on large inland lakes.
Peregrine Falcon *Falco peregrinus*	✓a,d	-	4	31/12/2011	Widespread resident in Ireland favouring coastal sites and cities with high vantage points.
Red Grouse *Lagopus*	-	Red List	1	31/12/2011	Resident and sedentary (non-migratory). Will move in the winter if snow is on the ground, to wind swept ridges and lower ground. In Ireland, it is a widespread breeding bird but nowhere is it numerous. Found on mountains, moorland and lowland blanket bogs and raised bogs, where it is associated with heather, requires for food, shelter and nesting.
Sand Martin *Riparia*	-	Amber List	8	31/12/2011	Widespread summer visitor throughout Ireland. Breed in burrows dug into river banks or quarries.
Sky Lark *Alauda arvensis*	-	Amber List	13	31/12/2011	Common resident throughout Ireland in uplands and areas of farmland, especially cereal. Breeds in a variety of habitats including cultivated areas, ungrazed grasslands and upland heaths. Winters in flocks on stubble fields, grasslands and coastal areas.
Spotted Flycatcher *Muscicapa striata*	-	Amber List	9	31/12/2011	A widespread summer visitor to broadleaf woodlands, well-vegetated hedgerows, parks and gardens.
Stock Pigeon/Stock Dove *Columba oenas*	-	Amber List	10	31/12/2011	A widespread resident throughout Ireland favouring areas of cereal cultivation. Breeds in lowlands of eastern and southern Ireland, almost invariably near agricultural areas, especially cereal. Nests in holes in trees.
Tufted Duck *Aythya fuligula*	-	Amber List	9	31/12/2011	Resident & winter visitor. Preference for large open lakes in lowland areas for breeding, where nests are built in waterside vegetation. Also seen on town lakes, canals and slow-moving rivers.
Water Rail *Rallus aquaticus*	-	Amber List	3	31/12/2011	Resident at wetlands throughout Ireland. Widespread.
Whooper Swan *Cygnus*	✓a,d	Amber List	1	31/12/2011	Winter visitor to wetlands and nearby open farmland throughout Ireland. Breeding in open shallow water, by coastal inlets, estuaries and rivers
Yellowhammer *Emberiza citrinella*	-	Red List	20	31/12/2011	Declining resident mainly in the east and south of Ireland. Strongly linked with the cultivation of cereals.
Crustacean					
Freshwater White-clawed Crayfish *Austropotamobius pallipes*	✓c	-	1	01/09/2016	Found in rivers, streams and lakes in Ireland particularly in those with a calcareous influence. Necessity for refuges whether this be vegetation, boulders or man-made features. Hard substrates were found to be preferable to muddy substrates.
Fish					
Atlantic salmon *Salmo salar*	✓b,g	Vulnerable	0.03 no/m^2	2014	Salmon are anadromous: adults spend their life at sea but migrate back up rivers to spawn, where juveniles live until they are large enough to migrate to sea. Salmon usually spawn between November and

Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences+
					March in well-oxygenated rivers with gravel beds. Salmon parr require rivers with good water quality, cool temperatures and adequate cover provided stony riverbeds and aquatic vegetation. Parr feed primarily on freshwater invertebrates and typically live in their natal stream for one to three years. They then transform into smolts and migrate down rivers to sea in springtime, undergoing a physiological change to enable them to live in seawater.
Brown trout *Salmo trutta*	-	-	0.003 no/m^2	2014	Brown trout thrive in lakes and rivers with at least moderately good water quality, especially with cool temperatures and high dissolved oxygen levels, although adult trout will tolerate less ideal conditions. Brown trout usually spawn between October and December in well-oxygenated gravel beds of rivers. Small trout feed primarily on freshwater invertebrates and terrestrial insects that fall into the water. As they grow larger, trout feed on small fish as well.
European eel *Anguilla anguilla*	✓$_g$	Critically endangered	0.002 no/m^2	2014	Inhabit lake bottom; live in freshwater and breed in the ocean (catadromous); believed to breed in the Sargasso Sea; the juvenile glass eel stage travels across the Atlantic to Europe; transform to elver stage in coastal waters; enter rivers to grow and feed as yellow eel; as maturation begins they descend to the marine environment again
Lamprey (river or brook) *Lampetra fluviatilis/ L. planeri*	✓$_b$	-	0.0004 no/m^2	2014	River and brook lamprey are difficult to distinguish as larvae. Both lamprey breed in freshwater rivers and stream spawning in shallow nests made of gravel and small stone. After hatching larvae drift downstream of river margins or bed with fine silt deposits and burrow into this substrate for a number of years filter feeding. River lamprey adults migrate to coastal waters and are parasitic feeding on larger fish. Brook lamprey are non-parasitic and non migratory remaining within freshwaters for their entire lives.
Minnow *Phoxinus phoxinus*	-	-	0.019 no/m^2	2014	Inhabit lake bottom; migrate within freshwater only1; found in most upland rivers and lakes and some lowland rivers; spawns on gravel in summer; can be found in schools close to the surface in summer and in deeper water in winter
Roach *Rutilus*	--	-	0.0004 no/m^2	2014	Introduced species. Occur on the bottom or midwaters of a water body; migrate within freshwater only1;inhabits lowland lakes, ponds and rivers of moderate flow; can survive in moderately polluted waters; growth is dependent on food availability; in suitable conditions can live to be 12 years old
Stoneloach *Barbatula barbatula*	-	-	0.001 no/m^2	2014	Migrate within freshwater only, usually found in small rivers and occasionally on gravel-shores of lakes; prefers clean, well-oxygenated conditions
Gudgeon *Gobio gobio*	-	-	0.0002 no/m^2	2014	Occur on the bottom or midwater of a water body; migrate within freshwater only; widespread across a variety of habitats, from lakes to slow-flowing lowland rivers to fast-flowing reaches of upland streams and occasionally in lakes; in summer it tends to be in shallow water, in winter it moves to deeper areas
Invertebrates					

Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences+
Wood White *Leptidea sinapis*.	-	Near Threatened/ Least Concern*	21	14/06/2018	Specialist on grassy forest clearings and limestone pavement. In dull weather adults may be found resting on flowerheads.
Large Red Tailed Bumble Bee *Bombus (Melanobombus) lapidarius*	-	Near Threatened	6	27/02/2019	Found in a wide range of habitats, including parks and gardens. Has declined from the agricultural landscape.
Field Cuckoo Bee *Bombus (Psithyrus) campestris*	-	Vulnerable	1	20/07/2018	Not common. Known from a range of habitat types.
Moss Carder-bee *Bombus (Thoracombus) muscorum*	-	Near Threatened	1	24/07/2016	Found in a range of flower-rich habitats, including parks and gardens. A unique form occurs on the Aran Islands.

* Legislative Protection: a = Annex I Birds Directive, b = Annex II Habitats Directive, c = Annex IV Habitats Directive, d = Special Conservation Interest bird species (within SPA), e = Wildlife Act (excluding birds); f = third schedule of the European Communities (Birds and Natural Habitats Regulations) 2011-2015.

+Habitat preferences: Birdwatch Ireland (https://birdwatchireland.ie/irelands-birds-birdwatch-ireland, accessed March and November 2019) and NBDC (https://species.biodiversityireland.ie/, accessed March and November 2019).

Table 2-10: Records of Invasive Species of Flora and Fauna

Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences+
Invasive Alien Flora					
Indian Balsam *Impatiens glandulifera*	✓f	-	4	07/08/2018	Inhabits riverbanks and areas of damp ground.
Japanese Knotweed *Fallopia japonica*	✓f	-	3	28/05/2018	Inhabits a wide range of conditions, including full shade, high temperatures, high salinity and drought. It is found near water sources, such as along river banks, low-lying and disturbed areas. It can colonise coastal shores and islands.
Invasive alien animals					
Eastern Grey Squirrel *Sciurus carolinensis*	✓f	-	14	06/12/2017	Preferred habitat is mature woodlands with a diverse understory however; in Ireland the species is common in agricultural lands, planted forests, scrub or shrublands, and urban areas.
American Mink *Mustela vison*	✓f	-	2	10/07/2017	Vegetative boundaries of lakes and rivers, along with coasts, wooded marshlands and estuaries. They may live near urban areas provided that sufficient cover and prey are available.

2.6.2.4 Key Species

Pine Marten (*Martes martes*)

As a protected species it should be considered as a possible constraint in this project. The NBDC returned a number of records for Pine Marten within the wider area (2011, 2014 and 2016) and there is potential for this species to occur in Castletown Demesne where suitable habitat such as broadleaved woodland and scrub occur.

Badger (*Meles meles*)

The NBDC returned a number of records for Badger throughout the study area, the most recent record was noted in 2015. Furthermore, given the agricultural nature of the study area there is potential for this species to occur. It is important to consider this species as a potential constraint.

Otter (*Lutra lutra*)

Otters were recorded as qualifying interests in one of the SAC sites within the 15km buffer zone (Wicklow Mountains SAC). Given the number of watercourses within the study area and records found for the otter in 2011 when four individuals were recorded, there is therefore potential for otter to occur throughout the study area. This species is well established on the River Liffey and RPS is monitoring, under NPWS licence, a known holt at Leixlip.

White-clawed Crayfish (*Austropotamobius pallipes*)

No designated sites within the study area or sites with hydrological connectivity to the study area are designated for White-clawed Crayfish. However, a number of sightings were recorded by the EPA in the River Liffey at Celbridge bridge in 2016 and 2019 including an additional sighting further downstream close to Leixlip. White-clawed crayfish as a possible constraint cannot be ruled out.

Narrow-mouthed Whorl Snail (*Vertigo angustior)* and Desmoulin's Whorl Snail (*Vertigo moulinsiana*)

These snail species are listed as qualifying features for Rye Water Valley/Carton SAC and Ballynafagh Lake SAC, located 3.1 km north east and 14.7 km south west. These species are dependent on stable and specific ground water conditions making them vulnerable to the effects of negative changes in wetness conditions. Neither European site boasts hydrological connectivity via surface waters, however groundwater pathways provide connectivity to the Rye Water Valley/Carton SAC. Groundwater flow paths are generally toward the River Liffey, but local factors may interfere with this.

Birds

A number of Annex I bird species are present within the wider area. The study area has potential to provide habitat for birds such as Barnowl, and Kingfisher where ruined buildings, cultivated land and river habitat are present. Whooper Swan are also found within the wider area but prefer coastal and wetland habitat, outside that of the study area. Peregrine Falcon is an SCI for Wicklow Mountain SPA and is known from upland areas, but can also be recorded from open farmland and coastal areas. Other birds are BoCCI red listed e.g. Yellowhammer which is a species in decline and favours large arable fields. The NBDC notes records for its presence within the general study area. Although no SPA's were identified within the study area, bird species as a constraint cannot be ruled out at this stage.

Atlantic Salmon (*Salmo salar*), Brown Trout (*Salmo trutta*), Sea Trout (*Salmo trutta trutta*) and Lamprey (river and brook)

These species are sensitive to changes in water quality and habitat and the River Liffey provides important fisheries habitat for them. The Liffey and several of its tributaries are exceptional in the area of supporting habitat which highlights the sensitivity of local watercourses and the Liffey catchment in general.

2.6.3 Identified Constraints

The land surrounding the study area is predominantly agricultural, which is often considered as floristically being of low ecological value. In terms of habitats however, there are woodlands, hedgerows and rivers to consider which are interspersed across the constraints study area, intersecting agricultural land. It is recognised that the landscape can provide essential or supporting habitat/commuting territory for protected fauna and birds. Wetlands and waterfowl sanctuaries are also found in the vicinity of the constraints study area which increases the ecological value of the area. There are a considerable number of designated sites

located in the wider vicinity of the constraints study area and for which hydrological/hydrogeological connectivity exists.

Two out of four NBDC invasive species records are flora, Indian Balsam and Japanese Knotweed, both of which occur within the study area and are designated as third schedule species under SI 477 of 2011. Without detailed field survey, it is not possible to confirm their presence nor extent. It is also recognised that these records may not provide a full account of IAPS occurring within the constraints study area. Indian Balsam *Impatiens glandulifera* has been recorded along the River Liffey in 2013 and 2018 close to Celbridge bridge and Leixlip reservoir. Japanese Knotweed *Fallopia japonica* was recorded *c.* 0.3 km south east of the Celbridge/Hazelhatch train station. Many terrestrial invasive alien plants are annual species and hence are not visible (above ground) outside of the growing season. Their occurrence and potential impact on the project, as a constraint, cannot therefore be ruled out.

One of the most significant ecological constraint is the direct hydrological link between the River Liffey which flows through Celbridge directly into Dublin Bay and multiple European sites. It is also important to consider fisheries habitat within this catchment and the sightings recorded of White-Clawed Crayfish a well as other species such as salmon, trout and lamprey. The potential water quality impacts and pathways would require further investigation once the design is known.

Aside from international and nationally designated sites within the constraints study area, there are many areas of conservation value in Kildare and South Dublin that are locally recognised for their biodiversity value.. From a local context these include steppingstones that connect the wider ecological network. Such features include watercourse, wetlands, ponds, hedgerows and woodland patches, all of which are noted within the study area.

The following key constraints have been identified from the baseline environment appraisal that will need to be considered further at route selection stage:

- Connectivity with European sites – The proposed development does not directly intersect with any European site within the study area. However, there is indirect connectivity to a number further downstream typically through the River Liffey watercourse. There is also potential connectivity with QI fauna such as Otter and SCI birds that may potentially forage *ex situ* within study area.
- The presence of Otter, a QI for the Wicklow Mountains SAC, potential home territories along suitable watercourses can range up to ~12 km for male otters and ~7.5 for female otters. This does not bring the range of this QI species within the study area but sightings of Otter have been recorded along the Grand Canal and the River Liffey, as well as along the River Liffey.
- The presence of Pine marten, an Annex II Habitats Directive species, has been noted within the wider area of Celbridge. The study area contains suitable habitat for this species such as scrub and broadleaved woodland within Castletown Demesne.
- Badger has been noted throughout the area and there is potential for this species to occur within the study area given the agricultural nature of the landscape.
- The presence of white-clawed crayfish, an Annex II species also protected under the Wildlife Act has been noted in the River Liffey.
- Fisheries - The River Liffey and several of its tributaries provide supporting habitat and good water quality for a number of species including Atlantic salmon, trout and lamprey.
- A number of distinct woodland features ranging from small discrete woodlands to long established demesne woodland with greater biodiversity potential. Castletown demesne is home to over 60 tree species including Oak trees >300 years old and the non-native Wellingtonia (*Sequoiadendron giganteum*) standing at over 30 metres tall.
- Watercourses –The study area has direct connectivity to a number of sites of conservation importance owing to the intersection of the proposed development of the River Liffey.
- Kingfisher, an Annex I species – desktop survey notes records of kingfisher throughout the study area. The study area commuting territory and potential nesting habitat along the banks of the River Liffey banks. Wetlands and Wildfowl Sanctuaries – Defined lakes and discrete ponds among topographical hollows can increase wildfowl potential within the area. Considerable numbers make direct use of the wetlands or at least can leapfrog from site to site.

- Calcareous Springs: The Calcareous spring habitat (A priority annex I habitat) within Rye Water Valley/Carton SAC (Louisa Bridge) supports a mosaic of habitats and a high biodiversity of flora and fauna species (such as the Annex II Whorl Snails which are also Qualifying Interests for the SAC). Both the study area and this SAC are located within the Dublin Groundwater body and the hydrogeological connectivity cannot be ruled out.
- Castletown House and Demesne containing yew and oak woodlands. Their presence as a woodland habitat and as a link to nearby Ancient and Long-established (ALEW) woodlands within Castletown demesne are recognised as a potential constraint.
- Linear woodland features – Hedgerows and treelines (and/or archaeological/old building potential) and commuting connectivity to bats to larger woodlands.
- Narrow-mouthed Whorl Snail (*Vertigo angustior*) and Desmoulin's Whorl Snail (*Vertigo moulinsiana*) are present within the Rye Water Valley/Carton SAC, with groundwater connectivity to the study area. These microscopic QI species are under-recorded owing to its size (and a lack of expertise in its survey).
- Karst features – subterranean hydrogeological connectivity to European sites and in particular Petrifying springs with tufa formation (Cratoneurion) habitat. The study area falls within the Lucan formation consisting of dark limestone and shale.
- The presence of known third schedule Invasive plant Species – Himalayan balsam and Japanese knotweed.

2.7 Land Use (Agriculture)

2.7.1 Introduction

This section identifies the constraints aspects of the proposed project in relation to land use and agriculture within the study area. A desktop study was undertaken using the following sources of information:

- Environmental Protection Agency (EPA)/European Environment Agency CORINE 2018 land cover mapping (http://gis.epa.ie/);
- EPA soils and subsoils (2006) mapping (http://gis.epa.ie/);
- Teagasc Irish Soil Information System mapping (http://gis.teagasc.ie/soils/map.php), accessed online September 2020;
- A review of Ordnance Survey Ireland (OSi) maps and orthophotography (www.osi.ie) accessed August/September 2020;
- A review of Google Earth and Street View imagery accessed August/September 2020; and
- Census of Agriculture 2010 – Final Results.

For the purpose of this study, constraints were considered principally in relation to agriculture with consideration of other significant land uses dealt with or discussed under **Sections 2.3, 2.8, 2.10,** Error! R eference source not found. and **2.11**Error! Reference source not found.

2.7.2 Existing Environment

The study area takes in the majority of Celbridge town and its outskirts to the east, west and south, taking in areas including Donaghcumper, Loughlinstown and Hazelhatch in the east, Celbridge Abbey and Ballymakealy in the west, and parts of Castletown Demesne in the north east and Killadoon Demesne in the west. The study area features natural and built environments, man-made amenities, green spaces, and waterways, including the River Liffey.

Celbridge is densely populated town and has a mainly urban population, living and working in the town and its environs, as well as commuting to other areas such as Dublin. Much of the land beyond the environs of Celbridge town is rural. Heading south out of the town towards Hazelhatch, the study area becomes more rural, with agriculture being the predominant land use.

The topography of the study area is relatively flat with gentle slopes. The lowest lying topography is along the River Liffey at approximately 50m above ordinance datum (mAOD). The topography increases away from the River Liffey to approximately 65mAOD in the east and west of the study area with a small hill in the south west of the study area (70mAOD).

According to the CORINE (2018) Land Cover Data for Ireland, the land cover in the study area and surrounding area is a mix of artificial surfaces, urban and industrial and commercial in nature, and agricultural and forest and semi-natural areas beyond the town's urban environment. The different CORINE land cover descriptions for the study area are described in **Table 2-11,** which demonstrates the mix of land cover types in the area. See also **Figure 2-9** for the Corine 2018 land cover map of the study area extent and surrounding area.

Table 2-11: Outline of CORINE 2018 land cover for the study area demonstrates the mix of land cover types in the area.

Study Area Location	CORINE Level 1 Description	CORINE Level 2 Description	CORINE Level 3 Description
Celbridge Town (Covering Areas in the North, East, West/South West & Central Study Area)	Artificial Surfaces	Urban Fabric	Discontinuous Urban Fabric
Castletown Demesne & North East Study Area including Donaghcumper Area	Forest and Semi-Natural Areas	Forest	Mixed forests
	Agricultural Areas	Pastures	Pastures
East Study Area - Celbridge/Dublin Road (R403) & Loughlinstown Area	Artificial Surfaces	Industrial, Commercial and Transport Units	Industrial and Commercial Units
	Agricultural Areas	Arable Land	Non-irrigated Arable Land
South & South East Study Area including Hazelhatch Area and Golf Pitch & Putt Course	Artificial Surfaces	Artificial non-agricultural vegetated areas	Sport and leisure facilities
	Agricultural Areas	Arable Land	Non-irrigated Arable Land
	Agricultural Areas	Pastures	Pastures
West & South West Study Area	Agricultural Areas	Pastures	Pastures
	Agricultural Areas	Heterogeneous agricultural areas	Land principally occupied by agriculture with significant areas of natural vegetation

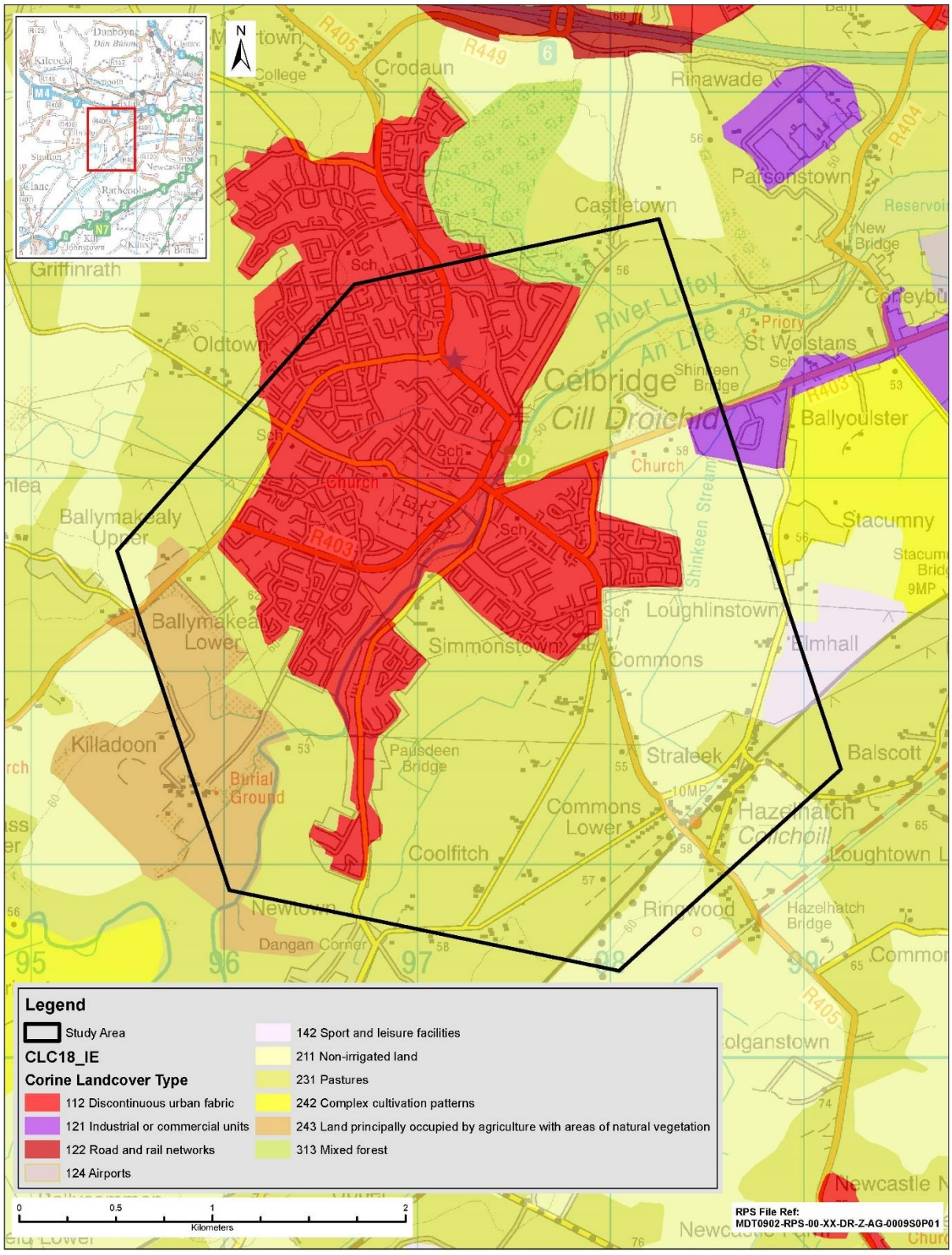


Figure 2-9: CORINE 2018 Land Cover

In most cases land take and severance are likely to be the biggest potential impact of road schemes on land use. The following are some of the aspects considered in this land use constraints analysis:

- Dairy farming - These farms require stock to be moved to and from the place of milking to the grazing area twice daily. Due to this frequency of movement difficulties such as accessing grazing areas that have been severed by a road will greatly increase the significance of impact on these holdings. Where possible dairy farms, particularly the primary grazing platforms used by the dairy herd for daily grazing should be avoided. Avoidance of areas used for silage or hay or the areas used for grazing replacement stock would be desirable, but severance of these areas would have a much lower significance.
- Horse - Horses, particularly thoroughbred horses are of a more nervous disposition than other stock types and are prone to stress caused by irregular noise. Land take and severance of land parcels may result in fields of an irregular shape (e.g. triangular shaped fields with sharp/narrow corners). These fields may be less suitable for grazing with equine stock due to an increased risk of injury.
- Dry stock - Enterprises such as beef and sheep are generally of lower constraint than dairy farms. Stock on these farms is not moved from field to field as frequently as on a dairy farm. Although land take and severance will impact farms, the farming practices on these types of farms may be better able to absorb the effects of a new road scheme.
- Tillage - This farm enterprise is generally less severely affected than livestock farms. Machinery can move from one land parcel to another although there are additional costs involved especially where the remaining areas are of a less regular shape. Furthermore, the size of the remaining areas may be considered too small or awkward to operate large machinery and therefore may require a change in enterprise type.
- Farm buildings - Removal or severance of farm buildings may significantly impact on the day-to-day management of a farm and in the case of dairy farms may make the continuation of the enterprise unviable.
- Timber - Commercial timber properties can be significantly affected by road schemes. Land take and severance can reduce properties to such an extent that they are no longer commercially viable. Furthermore, issues with 'wind blow' from new exposed timber fringes can also be an issue.
- Peat - Peat extraction on a commercial and private scale is extensive in Kildare. It is likely that any scheme proposed around/near to such activity and land type would avoid these areas due to poor ground conditions.

2.7.2.1 Agriculture

According to Census of Agriculture 2010[20], there are 2,578 farms in County Kildare, utilising 113,765 ha in total. The total number of farms and average farm sizes for the county are above the national average of 32.7 ha, with County Kildare at 44.1 ha. The distribution of farm type in the study area is shown in **Table 2-12**.

The majority of land beyond the residential and commercial properties in and around the built areas of Celbridge town are rural and mostly grass based and are mainly involved in dry stock (sheep and cattle) and tillage. No dairy farms were identified within the study area; the nearest farm identified that may have dairy operations was UCD Lyons Farm at Lyons Estate, situated c.2km south of the study area and Derrybeg Farm located c.1.25km north. The CORINE land cover types identified beyond the urban areas of the town are mainly agricultural, featuring a mixture of pasture, arable, natural vegetation and heterogeneous agricultural areas (CORINE 2018). Fields located within the study area vary in size. The field sizes would be considered average in size from a national perspective and are reflective of the quality of the lands and the typical farm size in the area. Many of the fields within the study area are bordered by low hedgerows and scattered trees or linear treelines. There is an area of forest and semi-natural land cover located in the north east of the study area at Castletown Demesne.

In terms of racing stables or stud farms, Simmonstown Stud Farm was identified along Simmonstown Manor Road. This stud farm appears to have been sold, however, it still appears to be occupied by thoroughbred horses. Springfield House, currently operating as a B&B, was identified as having horses on its grounds. A

[20] https://www.cso.ie/en/media/csoie/releasespublications/documents/agriculture/2010/full2010.pdf

riding stables, Donacumper Equestrian Centre, was also identified during the desk top survey, however it appears to no longer be in operation. No other stud farms, racing stables, or equestrian facilities, such as riding schools, were identified within the study area through the desk top survey. However, there is a tradition of horses in County Kildare and there will likely be a number of farms in the area that will have a number of horses either used for sporting purposes or breeding.

Table 2-12: Breakdown of Agricultural Enterprise in County Kildare

Enterprise Type	Number of Farms	Percentage of Total (%)
Specialist Tillage	401	15.6
Specialist Dairy	134	5.2
Specialist Beef Production	1095	42.5
Specialist Sheep	220	8.5
Mixed Grazing Livestock	371	14.4
Mixed Crops and Livestock	119	4.6
Mixed Field Crops	201	7.8
Other	37	1.4
Total	**2578**	**100**

2.7.2.2 Other Land Use

Other land use considerations that have been reviewed and/or identified with respect to the study area are presented in **Table 2-13.**

Table 2-13: Other Land Use

Type	Comment
Castletown Demesne	Part of the Castletown House and Estate (managed by the OPW) is located in the north east section of the study area. The estate is open to the public and includes a parkland and river walkways.
Killadoon Demesne	An area of cultural and heritage significance situated in the western section of the study area. This demesne lands consists of extensive parklands.
Celbridge Abbey and Grounds	Quite extensive area of cultural and heritage significance situated in the centre of Celbridge town.
Graveyard/Cemetery	Donaghcumper Cemetery is situated along the Celbridge/Dublin Road (R403) in Donaghcumper. A further graveyard, the historic Tea Lane Graveyard, was identified at Tea Lane, within Celbridge town.
Community and Sports Facilities	There are number of facilities located to the west of the town including playing fields and running tracks associated with clubs and schools (Celbridge Town AFC Schoolboy Pitches, St. Wolstans Community School, North Kildare Educate Together School, and Celbridge Athletic Club). All of these facilities are contiguous to one another and occupy an extensive area. Other facilities identified include the Celbridge Town AFC Senior Pitches, located at St. Patrick's Park and Celbridge GAA Club and pitch located south east of the town centre off Hazelhatch Road (R405).
Schools	There are number of Schools located within the study area, these have been outlined in Section 2.3.
Golf Course	Celbridge Golf Club (Elm Hall) is situated between Loughlinstown Road and the railway line, and the study area boundary traverses the golf course.
Tennis Club	Celbridge & District Tennis Club is located on Hazelhatch Road (R405) in the south east section of the study area.
Quarries and Pits (active)	No quarries or pits were identified within the study area.
Mixed Forest	Part of a larger area of forest and semi-natural (mixed forest) land (total area 52.3 ha) as classified by CORINE was identified within the north east of the study area at Castletown Demesne. See **Section 2.6** on Biodiversity.
Peat Bogs	There are no peat bogs as classified by CORINE, or peat soils as classified by Teagasc, within the study area.

Type	Comment
Timber	No commercial timber activity was identified within the study area. A company, Robert Kirwan Forestry, was identified 480m north west of the study area at Clane Road (R405).

2.7.3 Identified Key Constraints

The land use in the study area is a mix of urban (residential and commercial/industrial) and rural (agricultural and recreational). The residential, commercial and industrial areas and their associated properties/buildings identified in Celbridge and the study area are typical of a town of this size.

From the desktop survey, the rural lands identified are typical of Irish agricultural land uses. Anecdotal evidence suggests farms within this area are mainly grass based and are mainly involved in dry stock (sheep and cattle) and tillage. While drystock farms do require moving cattle on a regular basis, the frequency of movement is measured in days rather than hours as may be found in dairy farms, and as such, are better able to absorb the effects of a new road. With regard to tillage, these farms tend to be associated with larger fields and better able to absorb the affects, if any, of a new road.

In terms of horse breeding and equestrian land uses, one stud was identified in the of the study area at Simmonstown. As previously mentioned, this stud farm looks to have been sold, however it still appears to be occupied by thoroughbred horses which will need to be considered. There are no other obvious active riding schools or training stables with associated gallops in the area.

Other land uses including demesnes, green spaces and parks, community facilities, pitches and clubs, which support community recreation and amenity activity in the area, are also an important constraint. Any loss of these facilities or amenities could have direct and indirect negative effects in the area.

2.8 Soils and Geology

2.8.1 Introduction

This section identifies the constraints aspects of the proposed project in relation to land, soils and geology within the study area. A desktop study was undertaken using the following sources of information:

- Environmental Protection Agency (EPA)/European Environment Agency CORINE 2018 land cover mapping (http://gis.epa.ie/);
- Geological Survey of Ireland (GSI) – Geology, soils and hydrogeology www.gsi.ie, accessed September 2020;
- EPA soils and subsoils (2006) mapping (http://gis.epa.ie/);
- Teagasc Irish Soil Information System mapping (http://gis.teagasc.ie/soils/map.php), accessed online September 2020;
- Geological Survey of Ireland (GSI) geology mapping (www.gsi.ie), accessed September 2020; and,
- A review of Ordnance Survey Ireland (OSi) maps and orthophotography (www.osi.ie) accessed September 2020.

2.8.2 Existing Environment - Soils and Geology

The locations mentioned in this section are referenced against the townlands displayed in **Figure 2-10**.

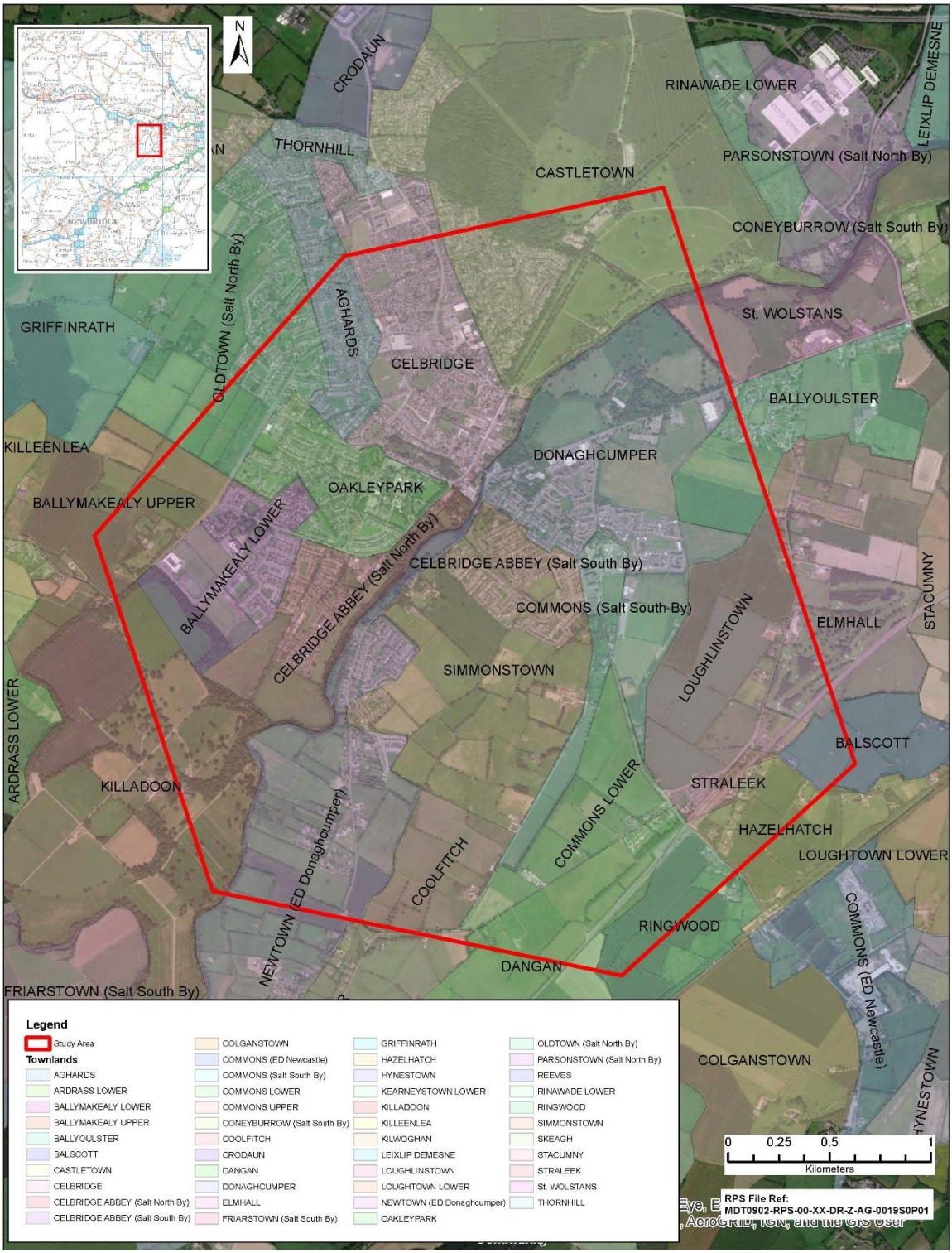


Figure 2-10: Study Area Townlands

2.8.2.1 Topography

The topography of the study area is relatively flat with gentle slopes. The lowest lying topography is along the River Liffey at approximately 50 meters above ordnance datum (mAOD). The topography increases away from the River Liffey to approximately 65mAOD in the east and west of the study area with a small hill in the south west of the study area (70mAOD).

2.8.2.2 Soils

The Teagasc Soils (Soils) in the vicinity of the study area are displayed in **Figure 2-11**. The north west of the study area is mapped by the GSI as Made-Ground in the Celbridge Town as the town is an urban area. Along the River Liffey the soil is classed as Alluvium Mineral soils (AlluvMin), there are areas within the river where outcrop or sub-crop is present at the surface.

The majority of the study area is underlain by two types of soils (**Figure 2-11**). Deep well drained, mainly basic mineral soils (BminDW) from the grey brown podzolics and brown earths soil group are dominant in the east of the study area with smaller areas of the same soil west of the River Liffey. The second dominant soil is the poorly drained, mainly basic mineral soils (BminPD) from the surface water gleys and groundwater gleys soil group, this soil is mainly located in the south of the study area.

In the south west of the study area, surrounding Newtown, the soils are classed as Made-Ground, with Alluvium deposits underlying the River Liffey. South of the Newtown is a region of shallow well drained, mainly basic mineral soils (BminSW) derived from glaciofluvial sands and gravels, these soils are from the renzinas and Lithosols soil group.

2.8.2.3 Subsoils (Quaternary Sediments)

The subsoils (Quaternary Sediments) in the vicinity of the study area are displayed in **Figure 2-12**. The figure shows that the Quaternary Sediments vary across the site. In the north west of the study area in Celbridge Town, the Quaternary Sediments are mapped as urban ground associated with the made / built ground associated with urbanised towns and cities.

The River Liffey flows from the south west of the site to the north east of the site. The Quaternary Sediments surrounding the river are mapped by the GSI as Alluvium sediments with bedrock or sub-crop exposed within the Alluvium deposits on the north bank of the River Liffey in the north of the study area. In the south of the study area, east of the River Liffey is a region of gravels derived from limestones Quaternary Sediments adjacent to the Alluvium deposits.

The remainder of the site is underlain by till derived from limestone Quaternary Sediments with isolated regions of bedrock or sub-crop at the surface in the east and west of the study area.

Soils in the area are reflective of the quality of the land and comprise mainly of poorly drained mineral soils from gley-type soils and deep well-drained grey/brown earths and podzols. There are alluvium minerals soils along the River Liffey which yield very fertile soils.

Gravel materials do not present problems for road construction, provided the road alignment is kept above the water table. Generally, gravels provide good formation for pavement construction and are generally suitable for reuse.

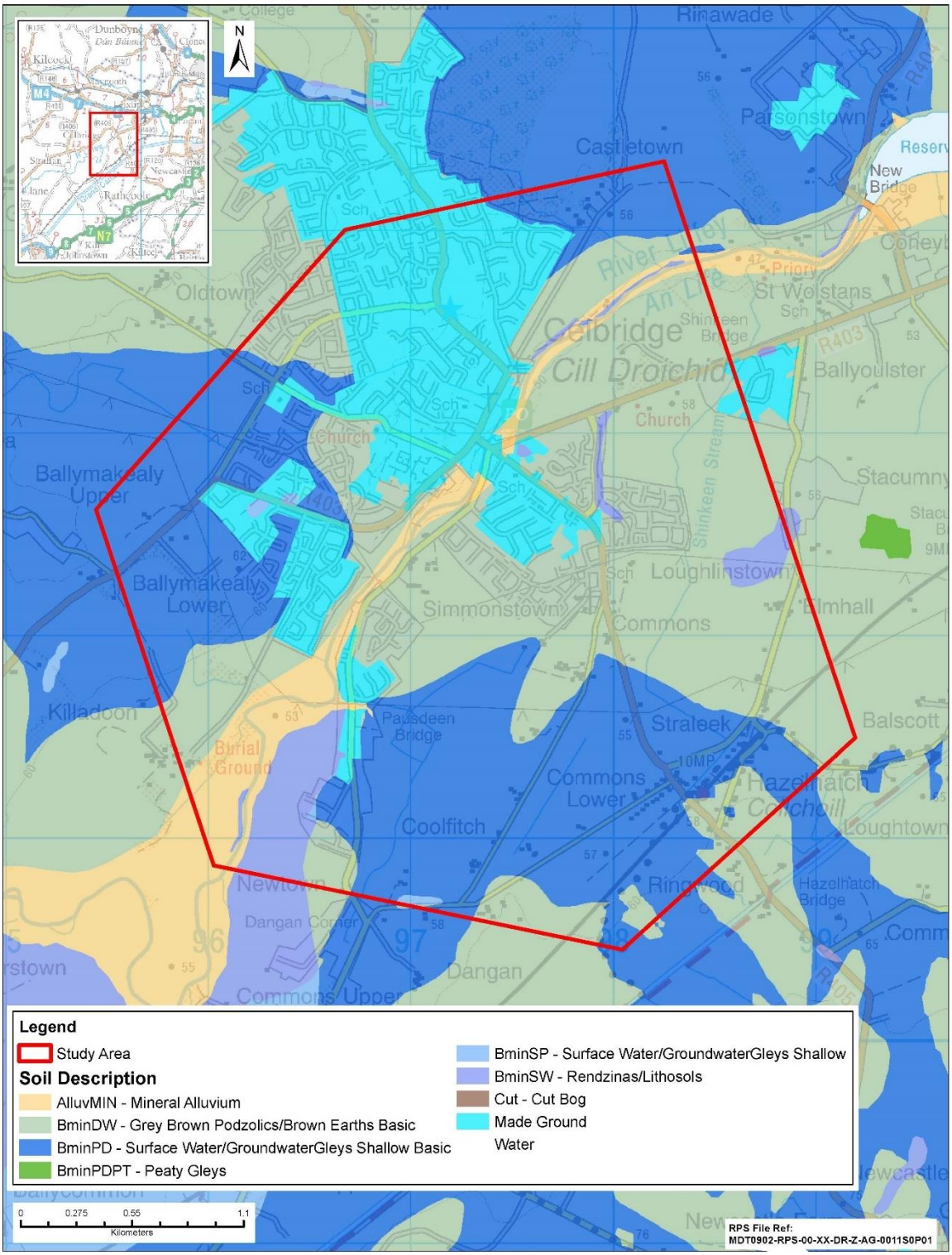


Figure 2-11: Teagasc Soils

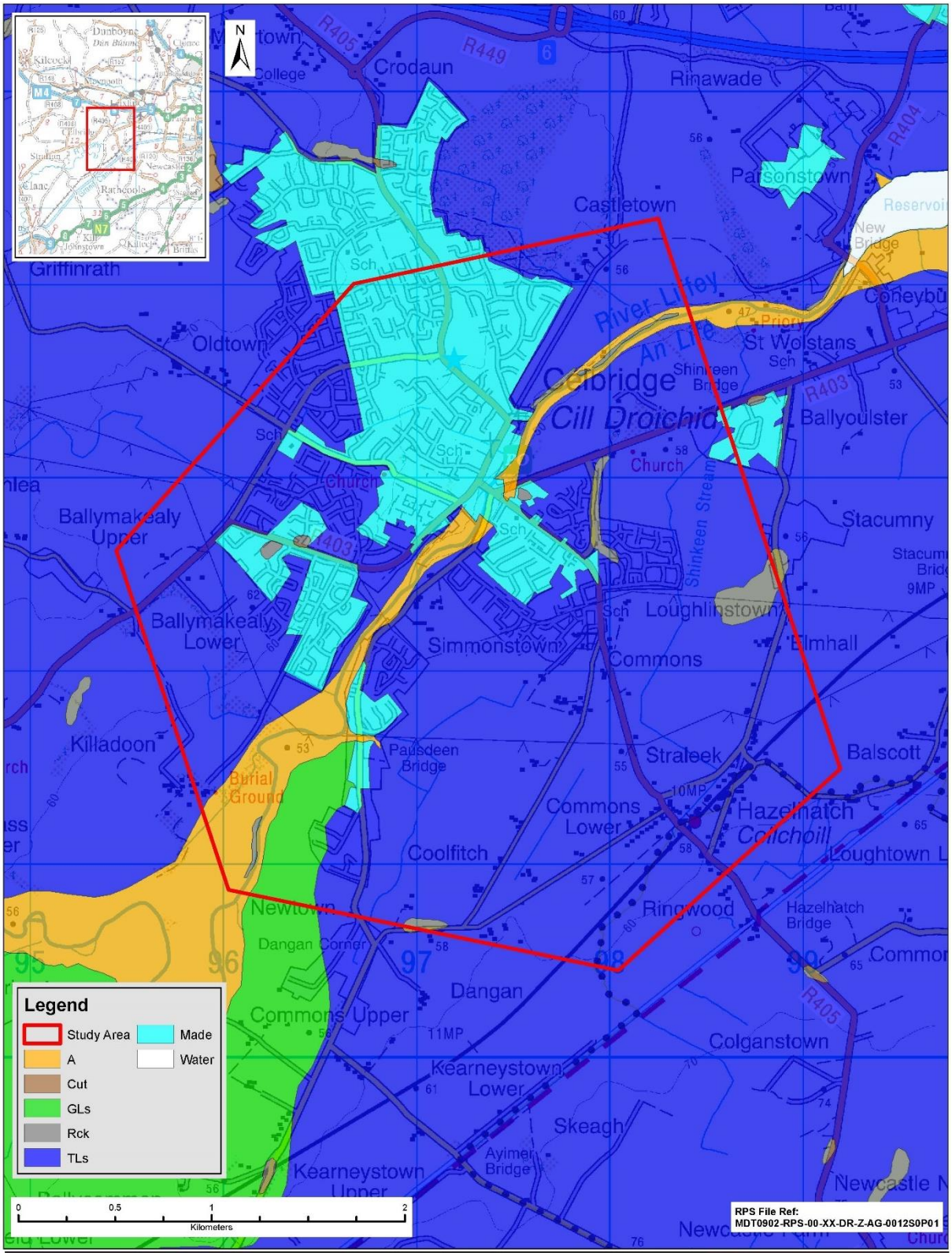


Figure 2-12: Subsoils (Quaternary Sediments)

2.8.2.4 Bedrock Geology

The bedrock geology in the vicinity of the study area is displayed in **Figure 2-14**. The study area is underlain by the Lucan Formation. The Lucan Formation is prominent in the east of Ireland, underlying large parts of County Dublin, Kildare and Meath.

The Lucan Formation comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey. The formation ranges from 300m to 800m in thickness and was formed during the Dinantian series of the Carboniferous period.

Within the study area there are areas where bedrock or sub-crop is exposed at the surface, these are displayed in **Figure 2-14**. Exposure of bedrock or sub-crop at the surface is mapped by the GSI along the R405 Regional Road, the north bank of the River Liffey and Crodaun Forest Park. Other isolated exposures of outcrop or sub-crop is mapped in the Donaghcumper, Ballyoulster and Loughlinstown townlands.

Structurally, the bedrock geology is varied across the study area. The bedrock is shallowly dipping; however, the strike of the bedrock varies across the site. According to the GSI maps, there are no mapped bedrock faults within the study area; however, there is a mapped fault striking north west – south east approximately 500m south west of the study area. There are no GSI mapped karst features within the study area.

To the west of the site is an anticlinal fold with the Boston Hill Formation (nodular and muddy limestone and shale) in the centre of the fold axis with the Waulsortian Limestones (unbedded lime-mudstone) and the Tober Colleen Formation (calcareous shale, limestone conglomerate) away from the fold axis.

2.8.2.5 Geotechnical Database

The GSI provide a Geotechnical Web-viewer database that provides borehole and trial pit logs of past geotechnical works, displayed in **Figure 2-13**.

A site investigation was undertaken at Sallins and Hazelhatch railway station in 1996 (south east of the study area). The investigation at Sallins found the site was underlain by a clayey, gravelly FILL up to 2.20mbgl followed by a gravelly CLAY up to 3.70mbgl. That was followed by a layer of stiff black gravelly CLAY which is underlain by a medium to coarse sandy GRAVEL with cobbles to depths up to 7.50mbgl. At Hazelhatch Station 1.00m of FILL was encountered and was followed by stiff brown and then stiff to hard black gravelly sandy silty CLAY (boulder clay). Obstructions were encountered between 1.90mbgl and 3.00mbgl at this station, the obstructions were assumed to be rockhead.

A site investigation was undertaken in the south of Celbridge Town, south of Pausdeen Bridge. A total of 29 No. trial pits were excavated across the site and found considerable variations in ground conditions over the site area, primarily in the composition and condition of the upper soils. The trial pits found the upper layers consisted of fill material (up to 1.70mbgl), gravelly clays, sands and gravels. Peaty deposits were also noted adjacent to the river and ranged from 1.60m to 2.50m. Over most of the site area, the variable upper soils are underlain by very stiff to hard black gravelly CLAY at depths of 2.50mbgl to 3.00mbgl.

A site investigation was undertaken in the centre of Celbridge Town in Dara Court. The trial pits encountered stiff to very stiff brown sandy gravelly CLAY, representing over-consolidated glacial clays (boulder clay). Fractured limestone bedrock was proved in the trial pits, comprising of a light to mid grey calcisiltite LIMESTONE.

A site investigation was undertaken across the River Liffey adjacent to the R405, the investigation included 4 No. boreholes. The boreholes found 1.60m and 2.40m of Made-Ground at the river banks which was underlain by compact fine to coarse GRAVEL with cobbled and boulders. A borehole within the river found 1.00m of alluvium sediment (slightly sandy GRAVEL with occasional cobbles and boulders) underlain by very compact fine to course slightly sandy GRAVEL. The east of the river was underlain by 2.00m of soft organic silt followed by compact fine to coarse GRAVEL with occasional cobbles and boulders.

A ground investigation was undertaken by IGSL in Primrose Hill, Celbridge where 20 No. trial pits were excavated and logged. The trial pit logs show that the site is underlain by predominantly competent sub soils with stiff very gravelly CLAY / clayey GRAVEL overlying the LIMESTONE bedrock. The limestone rock was noted at depths of 0.70m below ground level in places.

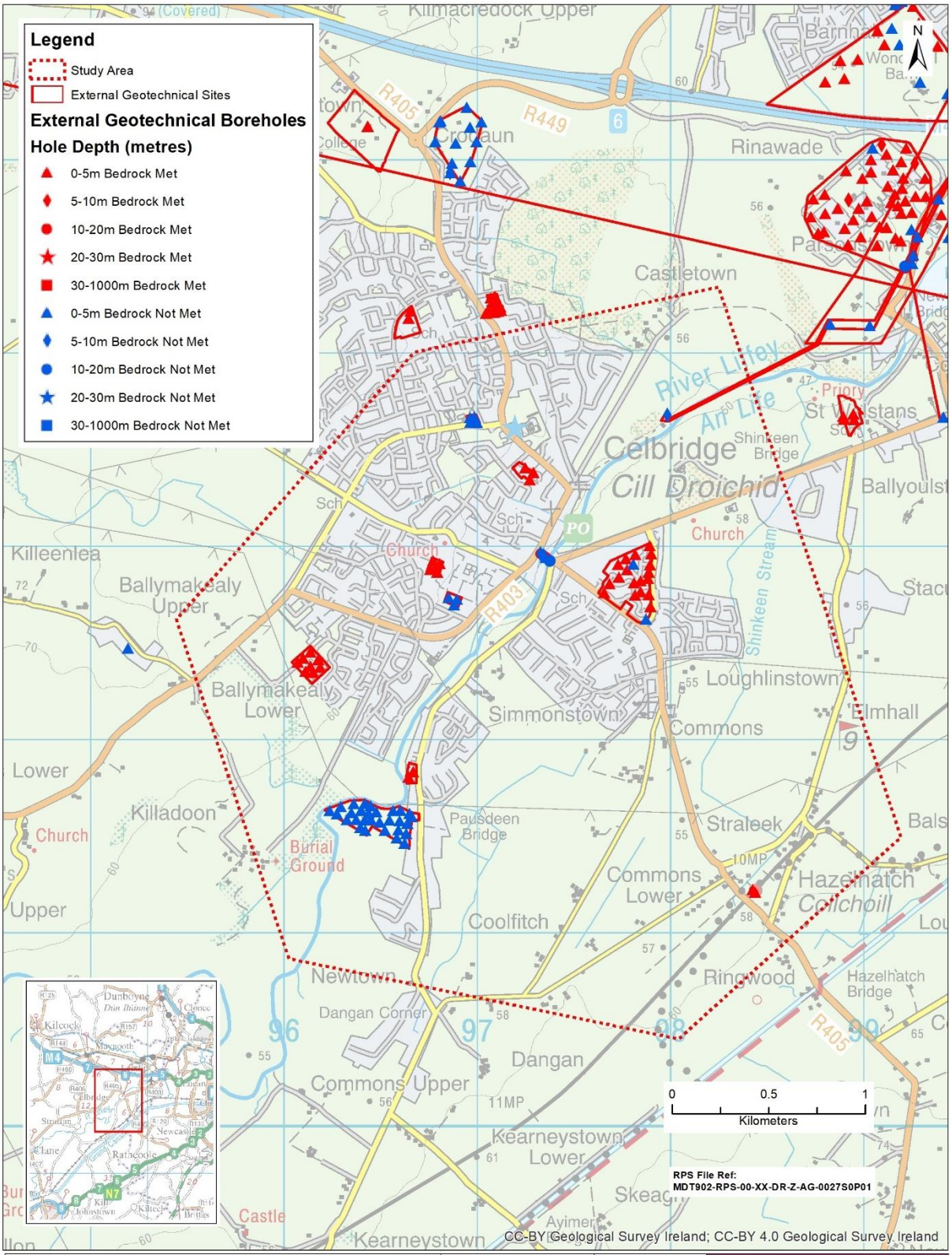


Figure 2-13: Geotechnical Investigations

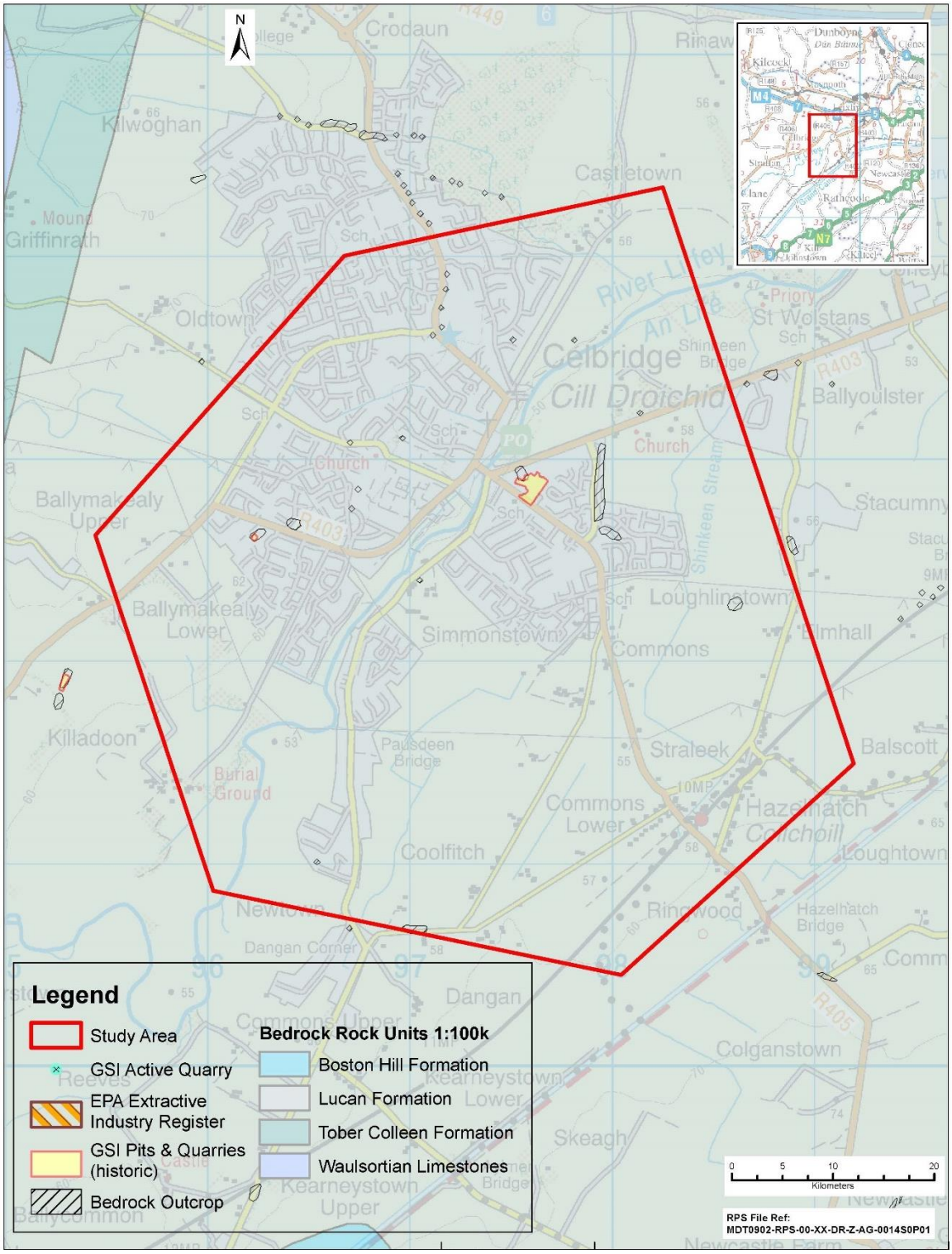


Figure 2-14: Bedrock Geology

2.8.2.6 Economic Geology

There are no GSI listed active quarries within the study area and within the vicinity of the study area.

The soils and subsoils surrounding the River Liffey have been classed by GSI as very low to moderate granular aggregate potential. The study area is largely underlain by soils and subsoils with a moderate to very high crushed rock aggregate potential.

With sand and gravel resources, land take and severance may be issues for these industries. However, there may, depending on the quality and quantity of material available, be a positive benefit of a new road scheme in the area.

2.8.2.7 Landslides

There are no GSI registered landslide events within the study area and within the vicinity of the study area.

2.8.2.8 Geological Heritage

County Geological Sites (CGS), as adopted under the National Heritage Plan are now included in County Development Plans and in the GIS of planning departments. There are no CGSs in the vicinity of the study area.

There are no GSI listed Geological Heritage Areas (Audited and Unaudited sites) within the study area. However, the Liffey Oxbow audited site is located approximately 550m south west of the study area, the Liffey Oxbow is an existing oxbow lake and a remnant oxbow lake of a River Liffey meander (Site Code: KE013).

St. Patrick's Well 2 (Site Code: KE020) is an audited geological heritage site located approximately 1500m west of the study area. The site is located at the base of St. Patrick's Hill and consists of a spring contained in a circular stone chamber which is covered with a large stone plinth.

2.8.3 Identified Key Constraints

The geological constraints affecting the study area include the soft ground present in the centre and east of the study area, i.e. peat and alluvium, particularly where sloping ground or substrate are also present. Certain soil types and structures, for example peat and alluvium deposits may necessitate extensive civil works to ensure stability and these works may result in additional resource usage and the potential for increased pollution risk and noise and traffic impacts.

The following key constraints have been identified from the baseline environment appraisal that will need to be considered further at route selection stage:

- The topography of the site is expected to increase away from the River Liffey that runs from the south west of the study area to the north east;
- The west of the site is expected to be underlain by made-ground and urban subsoils in the vicinity of Celbridge Town;
- The east and south of the site is expected to be underlain by deep well drained, mainly basic mineral soils and poorly drained, mainly basic mineral soils. These soils are expected to be underlain by till derived from limestone;
- Beneath the River Liffey, the soils and subsoils are expected to be alluvium deposits;
- The bedrock beneath the study area is expected to be the Lucan formation comprising of dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. The bedrock is expected to be encountered between the surface and <10mbgl;
- There are no GSI listed geological heritage sites, past landslides, economic geological resources or karst features within the study area;
- Consideration must be given to the water table and soil sensitivity;
- Lightly loaded structures should consider the trench fill technique to transfer loading to the boulder clay horizon;

- Heavy loaded structures should consider piling into the bedrock due to the composition and physical properties of the soils and subsoils;
- For roads, the soft organic silt should be stripped. There should be consideration into placing a capping layer on the underlying boulder clay. The soft organic silt should be stripped along lines of services to minimise settlements; and
- To ensure stability of the roads, the water level should be below the foundation level.

2.9 Water (Hydrology and Hydrogeology)

2.9.1 Introduction

This section identifies the constraints aspects of the proposed project in relation to hydrology and hydrogeology. A desktop study was undertaken using the following sources of information:

- Environmental Protection Agency (EPA) GIS Maps https://gis.epa.ie/EPAMaps/;
- Office of Public of Works (OPW) flood Mapping https://www.floodinfo.ie;
- A review of Ordnance Survey (OS) maps and ortho-photography www.osi.ie;
- EPA Catchments - https://www.catchments.ie/;
- Geological Survey of Ireland (GSI) – hydrogeology https://www.gsi.ie; and,
- All-Island Research Observatory (AIRO) - Environmental Sensitivity Mapping http://airomaps.nuim.ie/id/ESM/?mobileBreakPoint=400/.

Locations mentioned in this section are referenced against the townlands displayed in **Figure 2-10**.

2.9.2 Existing Environment – Hydrology

Since 2000, the Water Framework Directive (WFD, 2000/60/EC) has directed water management in the EU. The WFD requires that all Member States implement the necessary measures to prevent deterioration of the status of all water bodies (surface waters including rivers, lakes, transitional and coastal, as well as groundwater) and to protect, enhance and restore all waters with the aim of achieving at least Good Status. The river waterbodies and associated streams that intersect the study area are displayed in **Figure 2-15**. The river and stream names are taken from the EPA WFD River Waterbodies and Stream database and are referred to hereafter by their EPA listed name available from the EPA Mapping Database (https://gis.epa.ie/EPAMaps/). The figure also shows the Kildare County Council observed watercourses, these are not listed by the EPA, therefore the watercourse's Status and Risk is unknown.

According to the EPA, the study area is located within the Liffey and Dublin Bay WFD Catchment (Hydrometric Area No. 9). The WFD Catchments and Sub Basins are displayed in **Figure 2-16**.

The River Liffey (Code: IE_EA_09L011700) flows from the south west of the site towards the north east. The following WFD River Sub Basins are located within the study area:

- Liffey_140 (IE_EA_09L011700) – Located in the south of the study area;
- Liffey_150 (IE_EA_09L011900) – Located in the north of the study area; and
- Castletown (Dublin-Kildare)_010 (IE_EA_09C500830 – A smaller WFD Sub Basin in the north east of the site.

The Liffey_140 WFD Sub Basin includes the Simmonstown Stream, Ballymakealy Stream, Ballymakealy Upper Stream and Loughlinstown Stream. The Liffey_150 WFD Sub Catchment includes the Toolestown Stream, Kilmacredock Upper Stream, Coneyburrow 09 Stream and Ballygoran Stream. The Castletown (Dublin-Kildare)_010 includes the Castletown 09 stream. All streams listed flow towards the River Liffey in the centre of the site.

The surface water in the study area is expected to flow towards the River Liffey which flows into the Leixlip Reservoir (IE_EA_09_69) approximately 900m north east of the study area and subsequently the Liffey Estuary Lower (09_2114) and Dublin Bay (IE_EA_090_0000) Approximately 20km north east of the site.

Kildare County Council have identified further watercourses in the east of the site which include the Canal, Balscott Watercourse, Hazelhatch Watercourse and the Shinkeen Watercourse (**Figure 2-15**), all these watercourses are expected to discharge to the River Liffey.

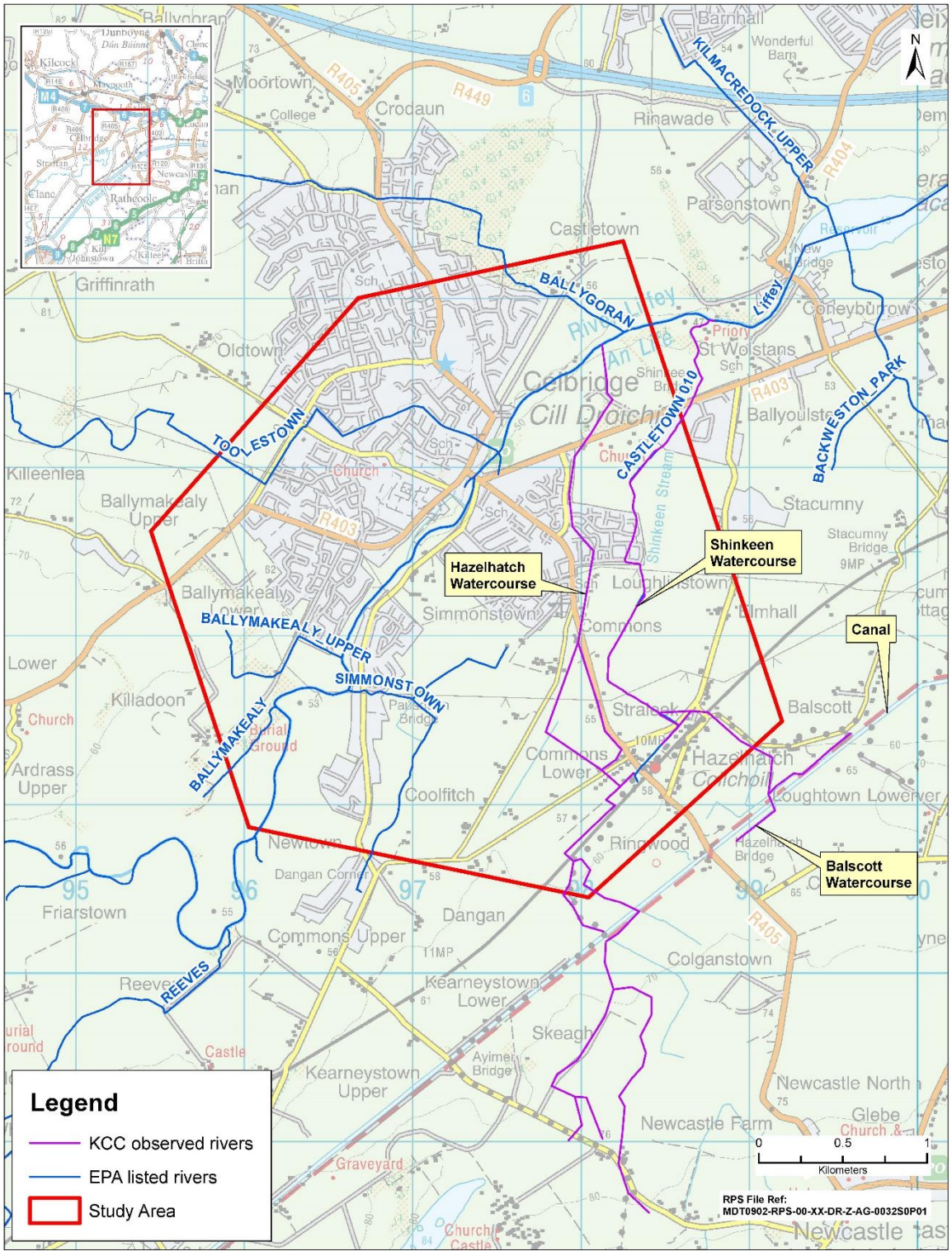


Figure 2-15: EPA Surface Waterbodies within the Study Area

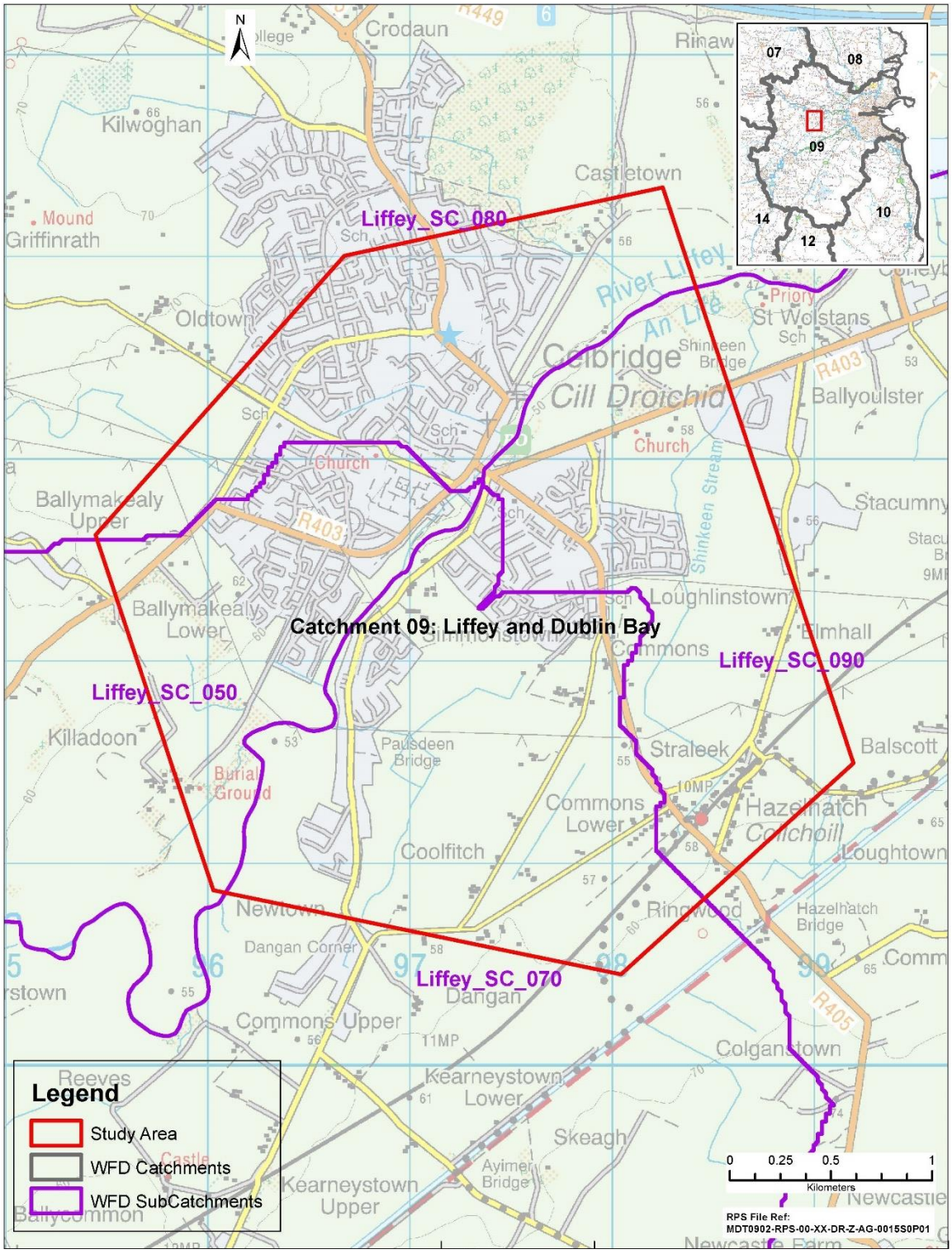


Figure 2-16: WFD Catchments and River Sub Basins

2.9.2.1 Water Quality and Status

For the purposes of assigning water quality and Ecological Status under the WFD, rivers have been divided up into contiguous sections (water bodies). Main channels, such as the River Liffey can be made up of a number of such water bodies and the tributaries/streams which drain to the Liffey. The WFD status of these waterbodies are shown in **Figure 2-17**.

The Liffey_140 river waterbody is located in the south of the study area and is currently Good WFD Status for the 2013-2018 monitoring cycle and the WFD Risk is currently 'Not at Risk' of achieving WFD objectives.

The Liffey_150 river waterbody is located in the north of the study area and is currently Good WFD Status for the 2013-2018 monitoring cycle and the WFD Risk is currently under review.

The Castletown (Dublin-Kildare)_010 river waterbody is located in the north east of the study area and flows towards the River Liffey. The WFD Status for the 2013-2018 monitoring cycle is currently unassigned and the WFD Risk is currently under review.

The Leixlip Reservoir lake waterbody is located approximately 900m north east of the site. The WFD Status for the 2013-2018 monitoring cycle is currently unassigned and the WFD Risk is currently under review.

The WFD Status and Risk for the Canal, Balscott Watercourse, Hazelhatch Watercourse and the Shinkeen Watercourse in the east of the site is unknown.

2.9.2.2 Register of Protected Areas

Under the WFD Register of Protected Areas (RPA), the Liffey River WFD Catchment is classed as a nutrient sensitive catchment of interest (IERI_EA_1994_0004). The Liffey_140 and Liffey_150 river waterbodies are classed as rivers in nutrient sensitive areas and the River Liffey is a nutrient sensitive river and a nutrient sensitive area under the Urban Waste Water Treatment Directive.

The Leixlip Reservoir approximately 900m north east of the site is classed as surface water in a nutrient sensitive area.

There are no European Sites with aquatic qualifying interests within the study area, the closest European Site is the Rye Water Valley/Carton Special Area of Conservation located approximately 3km north east of the site (Site Code: 001398). North Dublin Bay SAC (Site Code: 000206), South Dublin SAC (Site Code: 000210), North Bull Island Special Protected Area (SPA) (Site Code: 004006) and South Dublin Bay and River Tolka SPA (Site Code: 004024) are hydrologically connected to the study area by the River Liffey and are approximately 20km downgradient of the site.

There are no rivers designated as salmonid rivers under the Salmonid Regulations (S.I. 293) within the study area.

Refer to **Section 2.6** for further information on biodiversity and protected sites within and in the vicinity of the study area.

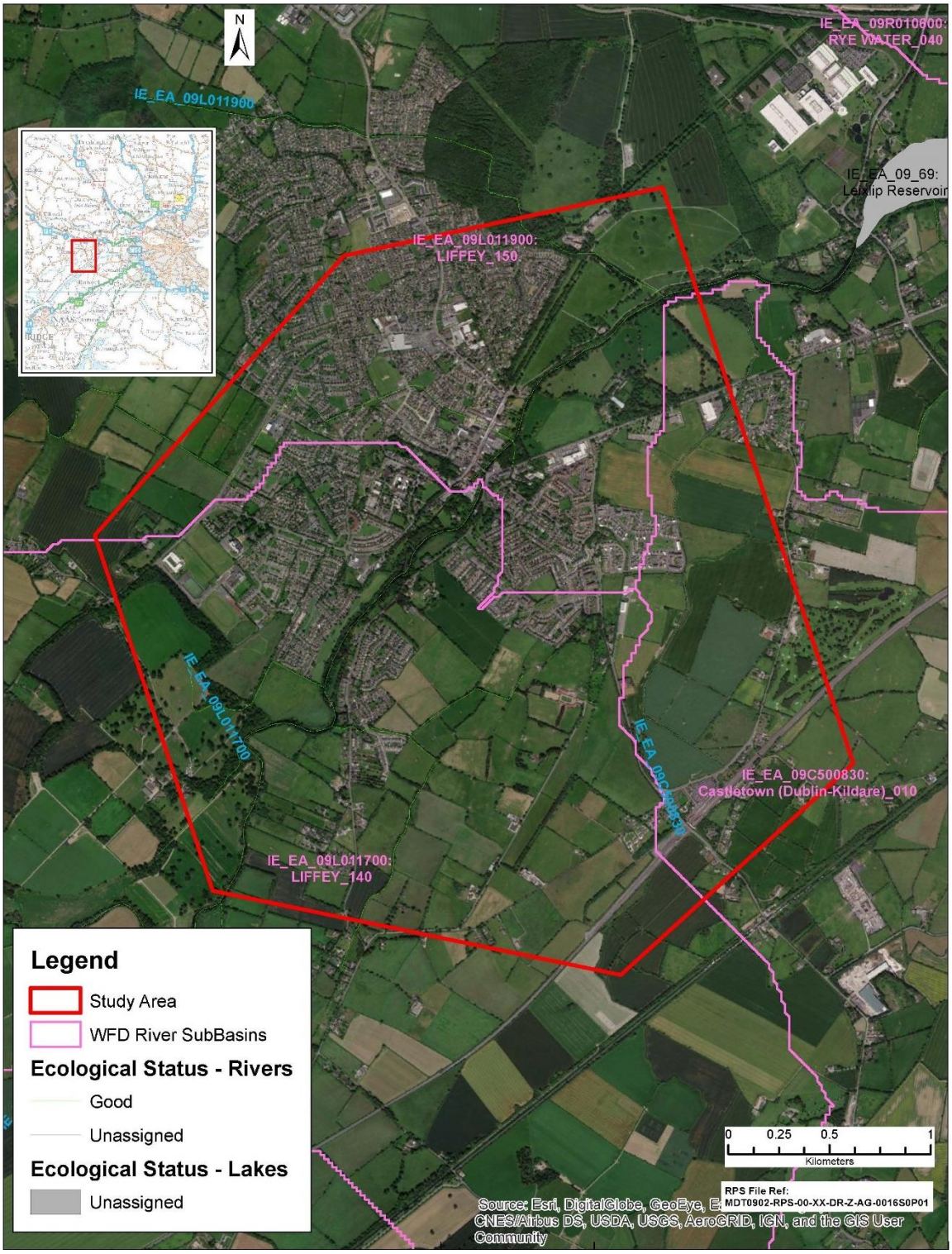


Figure 2-17: WFD Status of Surface Water

2.9.2.3 Surface Water Features, Flooding and Flood Events

The only true river (referring to a river body which is not affected by tidal changes or is estuarine in nature) within the study area is the River Liffey, which approaches the study area from the south west and flows throughout the study area to the north east.

In 2011, the Eastern Catchment Flood Risk Assessment and Management (CFRAM) study commenced in the Eastern district. One of the outputs from the study is a series of flood maps that show the predicted flood extent for flood events with a range of estimated probabilities of occurrence (0.1%, 0.5%, 1% and 10% Annual Exceedance Probability – AEP). The AEP represents the probability of an event of this, or greater, severity occurring in any given year. For the constraints study area and surrounding environment, flood maps are shown for fluvial (river) and pluvial (rainfall) events.

The Office of Public Works (OPW) Preliminary Flood Risk Assessment (PFRA) (www.floodmaps.ie) indicates the potential for fluvial flooding within the study area (**Figure 2-18**). Note that areas designated as 'Under Review' in the figure refers to the current status assigned by the OPW (November, 2020). The section of the River Liffey and Ballygoran Stream that flow through Celbridge town in the north of the study area ranges from a low (0.1% and 0.5% AEP) to high (10% AEP) probability of a river flooding close to the river banks. The River Liffey south of Celbridge town has a low to high probability of flooding up to 750m north of the river bank, affecting the areas around the Killadoon and Newtown townlands.

The Simmonstown Stream southwest of Celbridge has a low to high probability of flooding in the townlands of Simmonstown and Commons and this low probability flood zone extends up to 100m east and west of the stream's bank.

The section of the Castletown (Dublin-Kildare)_010 Stream (also known as the Shinkeen Stream) and the Hazelhatch Watercourse in the east of the study area has a low to high probability of flooding adjacent to the railway line and in the townlands of Commons and Loughlinstown (area currently under review).

The site does not reside in a coastal or rainfall (pluvial) flood zone.

The Office of Public Works (OPW) National Flood Hazard Mapping system provides details of historic flooding incidents throughout the country. It is noted that some historic flood events have been recorded near to or in the vicinity of the study area.

The OPW have a recurring flood event mapped south east of Hazelhatch Station in the south east of the study area. There are three mapped single flood events along the River Liffey within the study area and four along the Castletown (Dublin-Kildare)_010 stream. Other single flood events have been mapped in the north of the Hazelhatch townlands (south east of the study area) and in the Killadoon townlands (west of the study area).

OPW mapping indicates that the Castletown (Dublin-Kildare)_010 Stream is a watercourse that forms a part of an Arterial Drainage Scheme (ADS) that the OPW has a statutory duty to maintain. Arterial Drainage Schemes were carried out under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. The Commons and Commons Lower townlands are ADS benefited land.

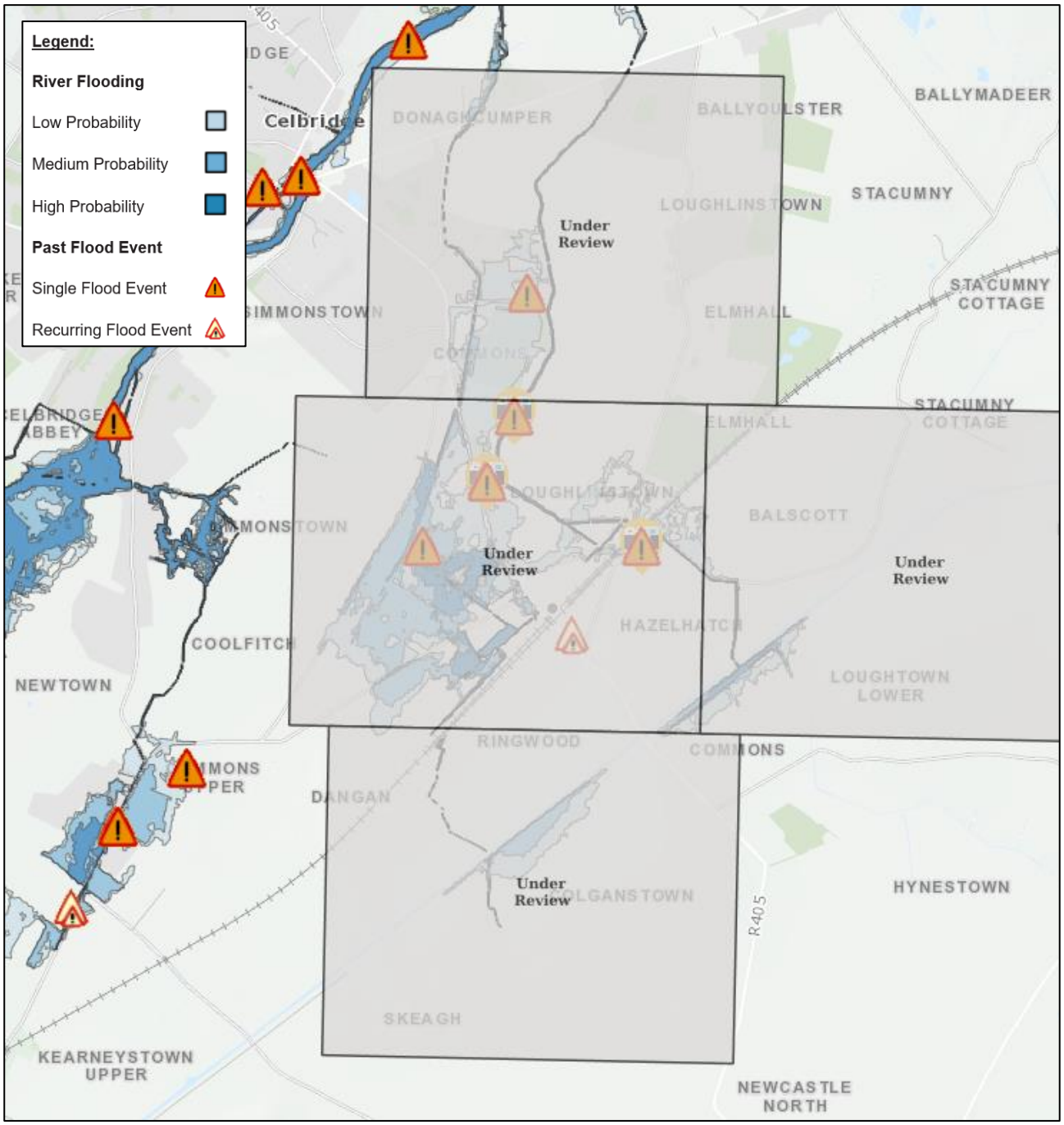


Figure 2-18: OPW Flood Mapping (Source: OPW, 2020)

2.9.3 Existing Environment – Hydrogeology

This section should be read in conjunction with **Section 2.8** on Soils and Geology.

2.9.3.1 Groundwater Bodies and Status

Groundwater Bodies (GWB) have been designated for the purpose of the Water Framework Directive (WFD) (Directive 2000/60/EC). GWBs are subdivisions of large geographical areas of aquifers that allow more effective management to protect the groundwater and link surface water or groundwater dependent features.

The study area lies within the Dublin (IE_EA_G_008) GWB which is a poorly productive bedrock GWB. The GWB is approximately 837km^2 in area and spans across Dublin City into Co. Kildare and Co. Meath in areas which are low-lying with little change in surface topography. Groundwater flow in the GWB will be towards the River Liffey and the coast, flow will have localised paths (<1km) occurring along fractures, joints and major fault zones. Most of the groundwater flow will be in the upper weathered zone but flow in conduits is commonly recorded at depths of 30 to 50mbgl.

The Dublin GWB is currently at Good WFD Status for the 2013-2018 monitoring cycle and the GWB Risk classification is currently 'Not at Risk' of not achieving WFD objectives. The Dublin GWB is classed as groundwater in a nutrient sensitive area.

2.9.3.2 Aquifer Types and Classification

The bedrock aquifer classification that occurs in the constraints study area applies to the rock types as discussed in **Section 2.8** Soils and Geology. The GSI Bedrock Aquifer mapping identifies that the constraints study area is completely underlain by a Locally Important bedrock aquifer which is moderately productive only in local zones (Ll). The bedrock aquifer is approximately 1,300km^2 and there are no bedrock aquifer structural features within the study area. Due to the nature of the soils, subsoils and bedrock aquifer, there is a 200mm/year recharge capacity on the aquifer.

Ll aquifers are described by the GSI as aquifers with a limited and relatively poorly connected network of fractures, fissures and joints, giving a low fissure permeability which tends to decrease further with depth. A shallow zone of higher permeability may exist within the top few metres of more fractured/weathered rock, and higher permeability may also occur along fault zones. These zones may be able to provide larger 'locally important' supplies of water.

2.9.3.3 Aquifer Vulnerability

In accordance with the Water Framework Directive (2000/60/EC) it is necessary to understand the groundwater vulnerability of the site, which is defined as the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface. The GSI Vulnerability Mapping Guidelines are outlined in **Table 2-14**. Groundwater vulnerability classifications are based on the type and thickness of subsoils and the presence of karst features.

Table 2-14 GSI Vulnerability Mapping Guidelines

Hydrogeological Conditions					
Vulnerability Rating	**Subsoil Permeability (Type and Thickness)**			**Unsaturated Zone**	**Karst Features**
	High Permeability (Sand/Gravel)	**Moderate Permeability (e.g. sandy subsoil)**	**Low Permeability (e.g. clayey subsoil, clay, peat)**	**(Sand/Gravel Aquifers Only)**	**(<30m Radius)**
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	>3.0m	3.0 – 10.0m	3.0 – 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 – 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

The groundwater vulnerability for the study area is displayed in **Figure 2-19**. Within the study area the groundwater vulnerability ranges from Moderate to Extreme where bedrock or sub-crop is at or close to the

surface. Areas of Extreme (X and E) groundwater vulnerability are located along the River Liffey in the north and south of the study area, along the R403 and Shinkeen Road in Celbridge Town and in the south of the study area surrounding The Lords Road.

Areas of High groundwater vulnerability follow the River Liffey and are prominent in the north of the study area. There are also areas of High groundwater vulnerability in the south west and east of the study area. Areas of Moderate groundwater vulnerability are located in the south of the study area with isolated regions in the west of the study area. North of the study area is a region of Moderate groundwater vulnerability.

2.9.3.4 Groundwater Resources

Groundwater resources include the aquifers themselves, particularly close to any feature which can be used for abstraction. This includes wells, rivers and other surface water features that are either fed by or contribute to groundwater.

GSI mapping of groundwater wells indicate that there are six wells located within the study area drilled between 1899 and 2002 (**Figure 2-20**). The total depth of the wells range from 1.2mbgl to 25.9mbgl, bedrock was encountered in three of the six wells between 1.2mbgl and 4.2mbgl. One of the wells is used for agricultural and domestic purposes, the remaining uses of the five wells are unknown. Yield was recorded in two boreholes; in the two wells the yield was classed as Moderate (53.5 – 54.6m^3/d). The exact location of the GSI listed wells are unknown, it should be assumed that the wells could be located at any location within the circles displayed in **Figure 2-20** (the circles represent the locational accuracy provided to the GSI)[21].

There is also a potential for private wells to exist in the area, however due to the Locally Important bedrock aquifer, this is considered unlikely.

There are no GSI listed karst features, Public Supply Source Protection Areas or Group Scheme Preliminary Source Protection Areas within the study area or within the vicinity of the study area.

2.9.3.5 Geotechnical Database

The GSI provide a Geotechnical Web-viewer database that provides borehole and trial pit logs of past geotechnical works.

The IGSL ground investigation at Primrose Hill encountered groundwater and seepage within their trial pits between 1.40mbgl and 2.20mbgl within the gravelly CLAY and GRAVEL horizons.

A site investigation for the widening of the existing bridge across the River Liffey in Celbridge Town encountered groundwater at 0.90mbgl, 1.00mbgl and 2.00mbgl.

A site investigation at Celbridge on behalf of Tryman Developments encountered groundwater in their trial pits between 1.00mbgl and 3.45mbgl.

[21] GSI ground water wells: the size of the circles represent location accuracy within a certain distance; larger circles represent accuracy to 2km and smaller represent accuracy to 1km.

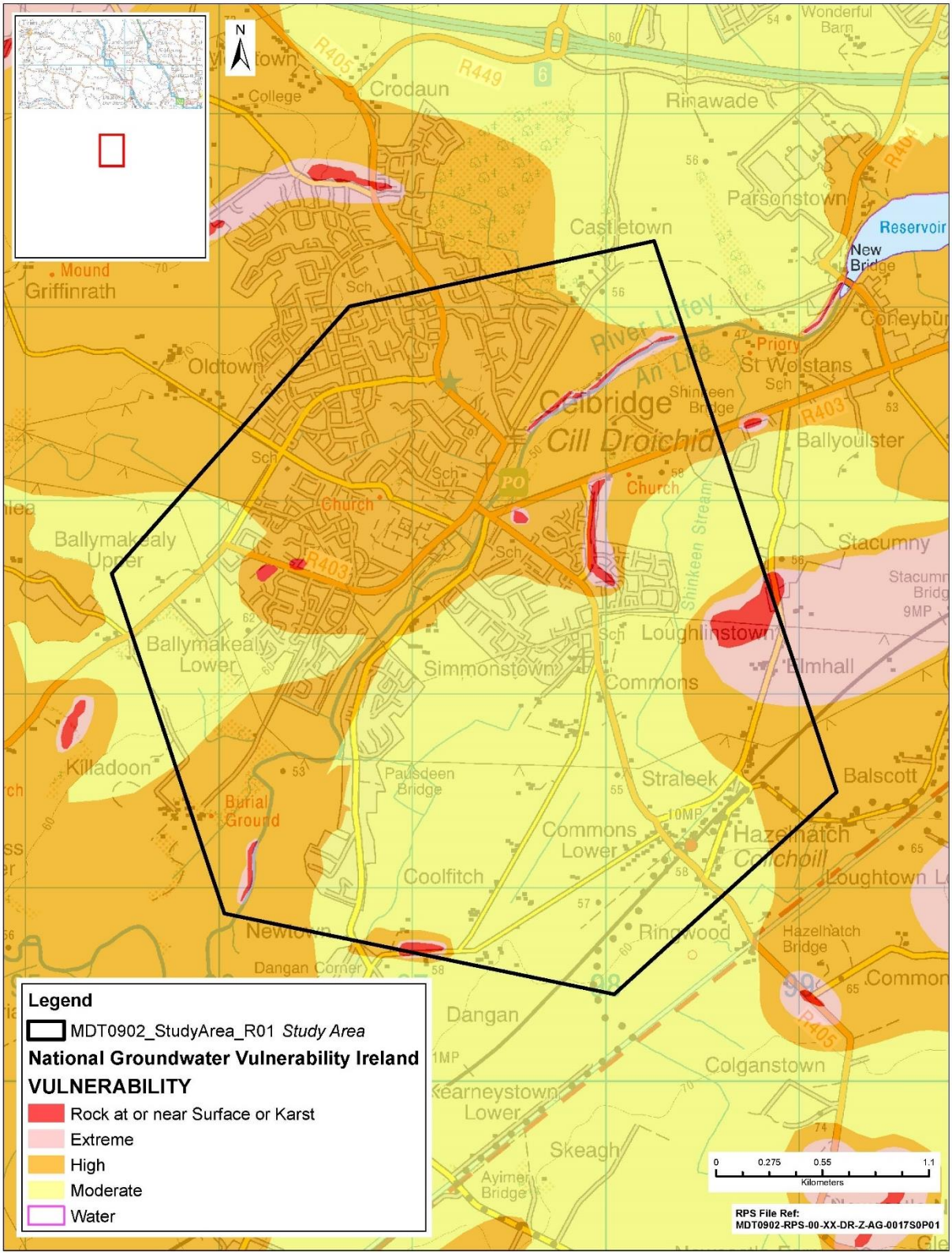


Figure 2-19: Groundwater Vulnerability

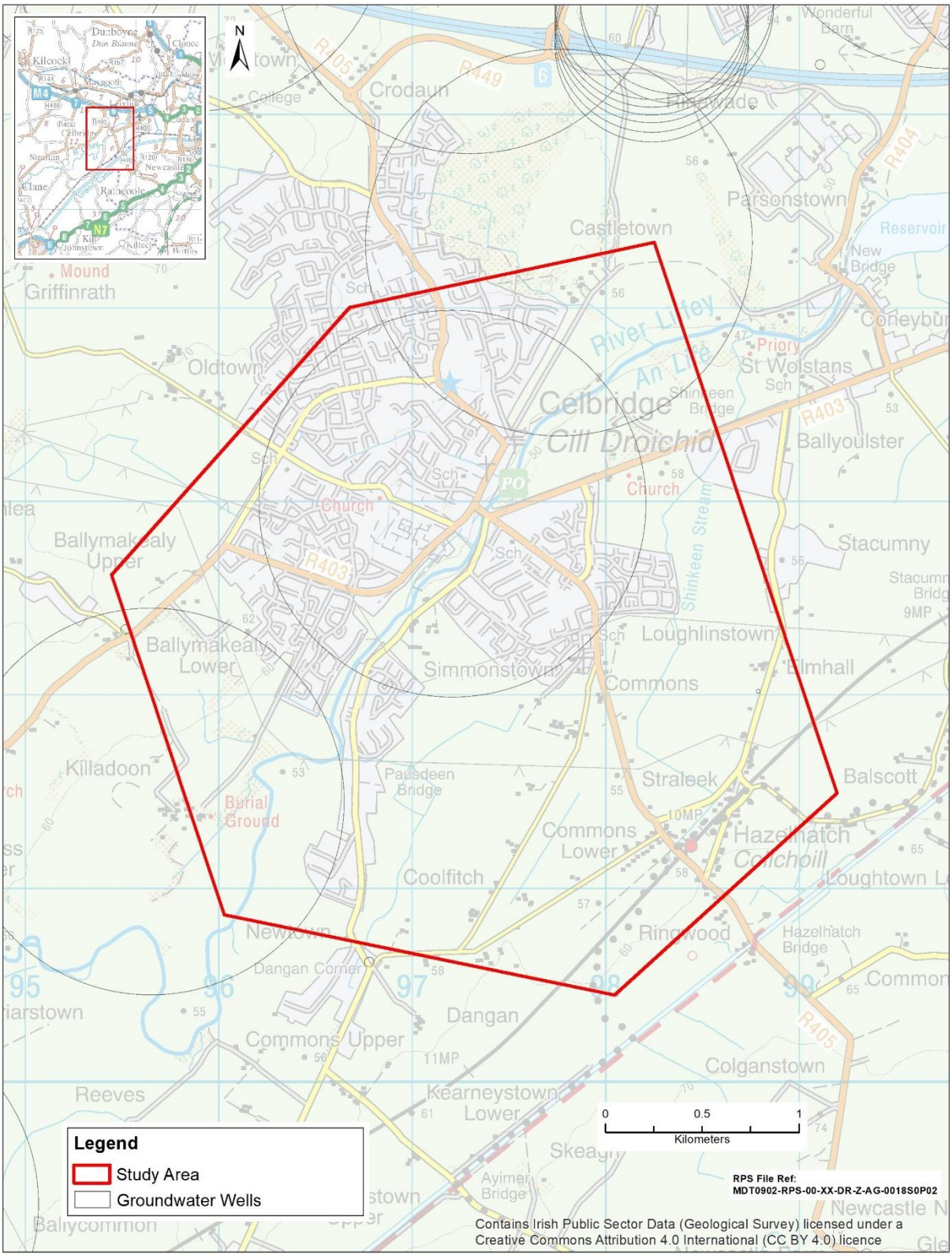


Figure 2-20: GSI Wells

2.9.4 Identified Constraints

The Water Framework Directive (WFD, 2000/60/EC) has directed water management in the EU. The WFD requires that all Member States implement the necessary measures to prevent deterioration of the status of all water bodies (surface waters including rivers, lakes, transitional and coastal, as well as groundwater) and to protect, enhance and restore all waters with the aim of achieving at least Good Status.

Given the Ecological Status (WFD reporting period 2013-2018) of the surface and groundwater bodies, discussed in **Section 2.9.3.1**, the objectives of the WFD requires no further deterioration of status. As such, the waterbodies are considered at risk.

Under the WFD Register of Protected Areas (RPA), the River Liffey WFD Catchment is classed as a nutrient sensitive catchment of interest (IERI_EA_1994_0004). The Liffey_140 and Liffey_150 river waterbodies are classed as rivers in nutrient sensitive areas and the River Liffey is a nutrient sensitive river and a nutrient sensitive area under the Urban Wastewater Treatment Directive.

Flooding can be exacerbated through development by accelerating and increasing surface water run-off, altering watercourses and removing floodplain storage. The constraints study area encompasses an area prone to fluvial flooding along the River Liffey and associated streams.

The area is underlain by a Locally Important bedrock aquifer with a Moderate to Extreme (E and X) vulnerability to pollution. There is potential for draw-down of groundwater where any road cuttings are required and there is a risk of impacts to groundwater abstraction where groundwater wells are present.

The following key constraints have been identified from the baseline environment appraisal that will need to be considered further at route selection stage:

- The study area is located within the Dublin Bay WFD Catchment;
- The study area consists of the Liffey_140, Liffey_150 and Castletown (Dublin-Kildare)_010 WFD River Sub Basins, these sub basins and associated streams flow into the River Liffey;
- The Liffey_140 and Liffey_150 rivers are currently Good WFD 2013-2018 Status and the Castletown (Dublin-Kildare)_010 and Leixlip Reservoir (lake) are currently unassigned;
- Hydrological connection (3km) from the study area to the Rye Water Valley/Carton Special Area of Conservation;
- Hydrological connection (20km) from the study area to north Dublin Bay SAC, South Dublin SAC, North Bull Island Special Protected Area (SPA) and South Dublin Bay and River Tolka SPA;
- The River Liffey, Liffey_140, Liffey_150 and Leixlip Reservoir are classified as nutrient sensitive areas/waterbodies;
- Flooding and recurring flood events are common in the study area;
- The study area lies within the Dublin GWB which has a Good WFD Status (2013-2018);
- The study area is underlain by a Locally Important bedrock aquifer which is moderately productive only in local zones (Ll);
- The groundwater vulnerability across the study area ranges from Moderate to Extreme where bedrock or sub-crop is at or close to the surface;
- GSI mapping of groundwater wells indicate that there are six wells located within the study area drilled between 1899 and 2002, the total depth of the wells range from 1.2mbgl to 25.9mbgl and are likely to produce Moderate yields;
- The bedrock is expected to be encountered between the surface and <10mbgl in some areas and groundwater is expected to be encountered between 0.90mbgl and 5mbgl (shallower groundwater expected adjacent to the River Liffey); and
- Consideration must be given to the high water table and soil sensitivity.

2.10 Landscape and Visual

2.10.1 Introduction

This section of the report presents the constraints pertaining to landscape and visual amenity that are relevant to the proposed Celbridge to Hazelhatch Link Road. The approach to the reporting of constraints was guided by the following:

- Landscape Institute and Institute of Environmental management and Assessment, Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, (2013);
- TII, Landscape character assessment (LCA) and landscape and visual impact assessment (LVIA) of proposed national roads: Standards Document, PE-ENV-01105, Draft January 2019; and
- TII, Landscape character assessment (LCA) and landscape and visual impact assessment (LVIA) for Specified Linear Infrastructure Projects: Overarching Technical Document, PE-ENV-01104, Draft January 2019.

The constraints study and comparative assessment was informed by the following data sources:

- Celbridge Local Area Plan (LAP) 2017-2023;
- Kildare County Development Plan 2017-2023;
- South Dublin County Development Plan (CDP) 2016-2022;
- Ordnance survey maps at varying scales; and
- OS Maps and Aerial photography.

2.10.2 Existing Environment

2.10.2.1 Study Area

A study area was identified for the purpose of identifying sensitive landscape and visual receptors that may be significantly affected by the proposed link road. This study area differs from the Project Study Area, as it is tailored to landscape and visual amenity. The study area includes the town of Celbridge, centred on the River Liffey and the surrounding landscape in Kildare County and South Dublin County. This is illustrated in **Figure 2-21**.

The historic town of Celbridge developed along the banks of The River Liffey which are lined with mature trees and woody vegetation and the surrounding area features important demesnes such as Castletown House, Celbridge Abbey, Oakley Park, Donaghcumper and St. Wolstan's.

Further south, the smaller settlement of Hazelhatch is located along the railway line and further south, the Grand canal follows a broadly north east to south west alignment.

The study area includes a range of designated areas and features along with designated Scenic Views and Scenic Routes.

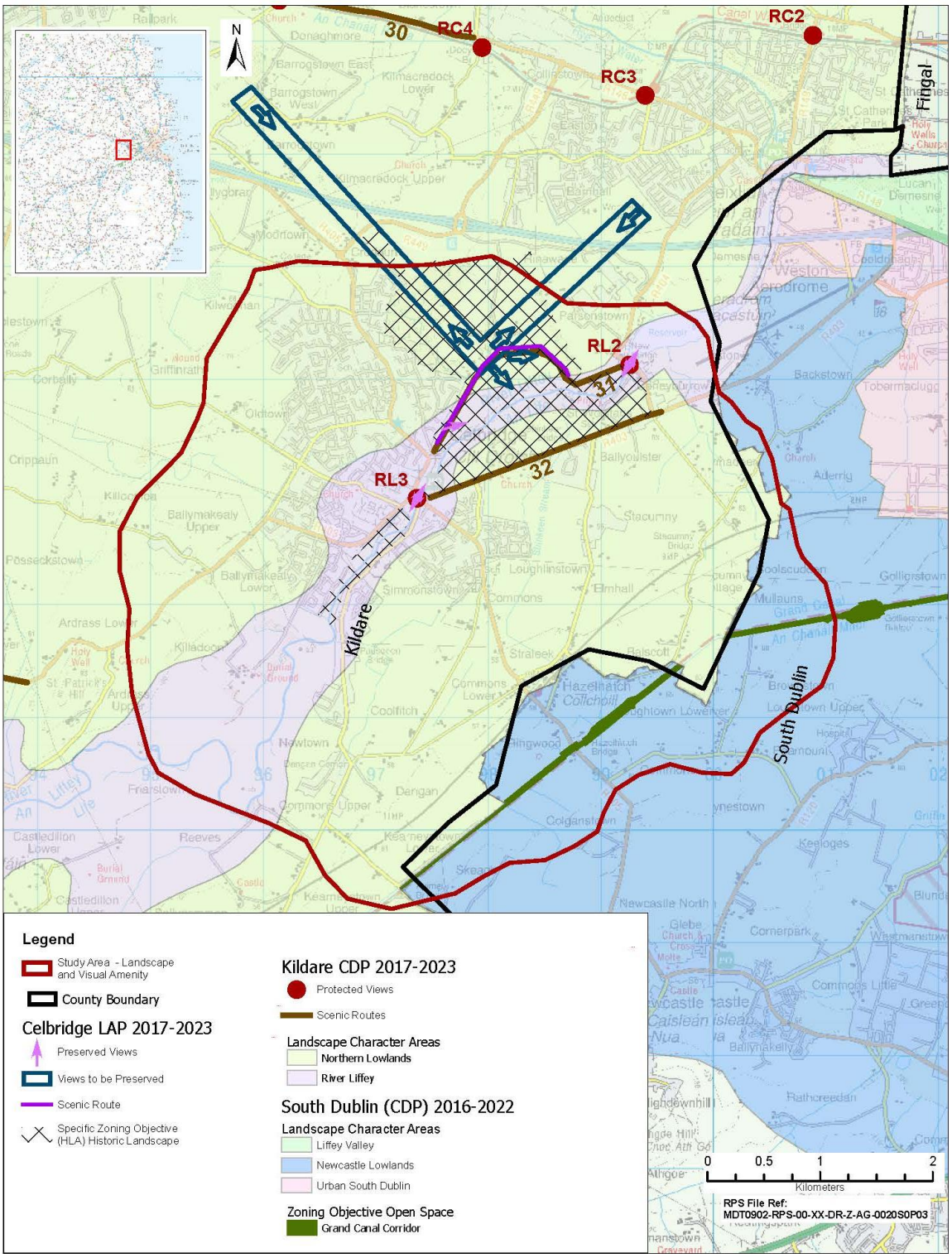


Figure 2-21: Constraints Landscape and Visual Amenity

2.10.3 Identified Key Constraints

The main constraints or sensitive receptors include designated landscapes such as the historic urban character of Celbridge and adjacent historic landscapes along with a number of Protected Views and Scenic Routes. These elements are recognised in the Kildare County Development Plan and the Celbridge Local Area Plan. The study area at Hazelhatch falls within the South Dublin County Development Plan 2016 – 2022 for which relevant sensitive landscape and visual data is documented below.

2.10.3.1 Kildare County Development Plan (LAP) 2017-2023

Landscape Character

Section 14 of the CDP refers to a Landscape Character Assessment for the County. The River Liffey is identified as a distinct Landscape Character Area (LCA) and is categorised as Class 4 – Special Sensitivity in a scoring system ranging from 1 - Low Sensitivity to 5 – Unique Sensitivity in Tables 14.1 and 14.2. Class 4 states *'Areas with low capacity to accommodate uses without significant adverse effects on the appearance or character of the landscape having regard to special sensitivity factors.'* The River Liffey is also a designated Area of High Amenity.

The landscape of the study area surrounding Celbridge occurs within the Northern Lowlands LCA and is categorised as Class 1 – Low Sensitivity. The CDP *states 'the following Areas with the capacity to generally accommodate a wide range of uses without significant adverse effects on the appearance or character of the area.'*

Scenic Routes

Scenic route no. 31 refers to Views within Castletown – Donaghcumper rural area; Views to the south and north from Castletown House, including axial view to the Obelisk and the Wonderful Barn. Location: Castletown, Barrogstown, Barnhall, Rinawade, Crodaun

Scenic Route no. 32 refers to Views of the River Liffey from the main avenue of Castletown House, Castletown.

Scenic Views

- Scenic View RL 2 – Views from New Bridge, Coneyburrow; and
- Scenic View RL 3 – Views from Celbridge Bridge, Celbridge.

2.10.3.2 Celbridge Local Area Plan (LAP) 2017-2023

Section 10 of the LAP refers to built and natural heritage including landscape. Paragraph 10.3.2 Architectural and Landscape Conservation states the following, *'The LAP area encompasses a composite landscape that is connected by the River Liffey. This landscape is made up of a number of character areas that respond to both their river setting and one another. The value of this landscape is much greater than the sum of its individual parts and warrants protection and preservation. The character areas can broadly be categorised as areas being of either architectural or landscape value.*

Architectural Conservation Area

The built up core of Celbridge is proposed for designation as an Architectural Conservation Area (ACA). In regard to ACAs, the LAP states *'An ACA is a place, area, group of structures or townscape that is of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest or value, or contributes to the appreciation of protected structures. It is considered appropriate to preserve the architectural value of the historic core through the designation of an ACA that encompasses Main Street, Celbridge Mill and surrounds, English Row, Tea Lane and Big Lane.'*

Historic Landscape Areas

The historic demesnes of Castletown, St. Wolstan's and Donaghcumper are connected to the River Liffey and Celbridge giving rise to a unified and composite landscape comprising town centre, river and historic landscape areas. In this regard, Policy HLA1 relates to Historic Landscapes Areas and states *'It is the policy of the Council to preserve the special landscape character of historic landscapes within Celbridge as set out on Map 13.1 Land Use Zoning.'*

Objective HLAO1.1 states *'To protect the special landscape character of historic landscape areas and ensure that new development enhances the special character and visual setting of the historic landscapes outlined on Map 13.17 and to prevent development that would have a negative impact on the character of the lands within the Historic Landscape Areas.*

Scenic Routes and Views

The Celbridge LAP refers to protected views and scenic routes in the County Development Plan and also views within the Celbridge LAP including important vistas in the Castletown designed landscape indicated in Figure 2-21 above.

Policy SRV1 relates to Scenic Routes and Views and states *'It is the policy of the Council to ensure that the proposed location, siting and design of buildings and structures and any mitigation measures identified in the LAP, protect the special character of the identified scenic routes and protected views.'*

The LAP outlines the following objectives.

'Objective SRVO1.1: To protect the visual amenity and character of scenic routes and views in Celbridge and Castletown as identified in the County Development Plan.

Objective SRVO1.2: To require a Visual Impact Assessment of proposals for development that may impact the special character and visual amenity of scenic routes and views as part of the planning application process.'

Protected view RL 3 View of the River Liffey from Celbridge Bridge, applies in both directions, both downstream and upstream.

2.10.3.3 South Dublin County Development Plan (CDP) 2016-2022

A number of designed landscapes occur within this LCA including Colganstown House, located immediately south of Hazelhatch.

The Grand Canal Corridor is an important recreational asset and features the promoted Grand Canal Way for recreational users on foot. The Grand Canal Corridor is Zoned under objective OS to preserve and provide for open space and recreational amenity.

Landscape Character

The landscape in the vicinity of Hazelhatch occurs within the Limestone Farmlands Landscape Character Type and locally known as the Newcastle Lowlands Landscape Character Area (LCA).

The county landscape character assessment categorises the Newcastle Lowlands LCA as being of medium sensitivity (combining medium landscape sensitivity and medium visual sensitivity). It is also categorised as a high value landscape.

In terms of capacity to accommodate change, this is considered to be low for the and the following is stated in the county landscape character assessment *'Key characteristics of the landscape are vulnerable to change. There may be limited opportunity to accommodate development without changing landscape character. Great care would be needed in locating development.'*

Policy in regard to landscape character is outlined below.

HCL Policy 7 states the following *'It is the policy of the Council to preserve and enhance the character of the County's landscapes particularly areas that have been deemed to have a medium to high Landscape Value or medium to high Landscape Sensitivity and to ensure that landscape considerations are an important factor in the management of development.'*

HCL7 Objective 1 states *'To protect and enhance the landscape character of the County by ensuring that development retains, protects and, where necessary, enhances the appearance and character of the landscape, taking full cognisance of the Landscape Character Assessment of South Dublin County (2015).*

HCL7 Objective 2 states *'To ensure that development is assessed against Landscape Character, Landscape Values and Landscape Sensitivity as identified in the Landscape Character Assessment for South Dublin County (2015) in accordance with Government guidance on Landscape Character Assessment and the National Landscape Strategy.'*

Scenic Routes and Views

There are no designated scenic routes or protected views in the study area within South Dublin County.

2.10.3.4 Visual Amenity

Viewers with the potential to be affected by the Celbridge to Hazelhatch Link Road include residents of dwellings within and around the Town of Celbridge along with residents of dwellings in the settlement of Hazelhatch further south.

Recreational visitors to the area with the potential together with recreational users of The Grand Canal Corridor along with visitors travelling by car in the area.

Viewers on transport routes include those travelling along the Dublin - Cork/Limerick railway line along with those travelling along regional roads R403 and R405 and the minor roads that cross the landscape generally.

2.11 Material Assets (Non-Agriculture)

2.11.1 Introduction

This section identifies the constraints aspects of the proposed scheme in relation to Material Assets with particular reference to transport infrastructure, utilities and non-agricultural land use.

Issues in relation to residential and commercial properties are dealt with in in **Section 2.3** on Population and Human Health and agricultural land use in **Section 2.7** on Land Use.

The following methods were used in assessing the potential material assets constraints for the Celbridge to Hazelhatch Link Road:

- Desktop study of available information including, but not limited to, was considered in this assessment:
  - OSi 1:50,000 mapping;
  - Aerial photography; and
  - Utilities datasets (ESB, GNI, Irish Water, and ComReg).
- Kildare County Development Plan and Celbridge Town Plan.

2.11.2 Existing Environment

The study area and the wider environment encompasses the majority of Celbridge Town as well as rural areas beyond the town's urban environs (refer to details on land cover and use and CORINE mapping in **Section 2.7**). For the purpose of this assessment, constraints were considered from a number of perspectives: 'agricultural' and 'other', which included the following;

- Transportation infrastructure; and
- Utilities including water and wastewater treatment.

2.11.2.1 Transport Infrastructure

The constraints study area contains a road network comprising of a number of regional and local roads including; R403, R405, L1022, and L1016.

No motorways traverse the study area. The nearest motorway is the M4, located c.1.5km north of the study area's northern boundary, and connects Dublin and the northwest of Ireland. This motorway is linked to Celbridge by the R449 and R405 Maynooth Road.

Celbridge Town is served by an intercity rail service, serving Hazelhatch and Celbridge Station. This railway line traverses the southern section of the constraints study area in a north east to south west direction. Several Bus Éireann and Dublin Bus routes operate in the study area and serve Celbridge Town.

2.11.2.2 Utilities

As part of the constraints gathering exercise, the major services (including ESB, Gas Networks Ireland and Irish Water infrastructure) have been identified and are mapped where data is available on **Figure 2-22**. The

exact locations of utility service infrastructure (such as for gas, electricity, telecoms, water mains and wastewater) will be identified as the project progresses.

Electricity Network

Celbridge and the study area is traversed by high voltage lines of the ESB Network, which pass through residential areas and recreational lands. There is an existing 110kV overhead electricity transmission line which traverses the central section of the study area in an east to north west direction, crossing the railway line and northern section of the Celbridge Elm Hall pitch and putt golf course, Loughlinstown Road, the R405 at The Square/The Close at Commons, Newtown Road (L1016), the River Liffey at Simmonstown, Clane Road (R403) at Abbey Green/St. Raphael's Ave, and Shackleton Road at Priory Square/Oakleypark.

An existing 220kV also traverses the lower section of the study area from east to north west, crossing the railway line and part of the southern area of the pitch and putt golf course, Loughlinstown Road, Hazelhatch Road (R405) c.220m south of Celbridge & District Tennis Club, the L1016 at Pausdeen/Celbridge Abbey, the River Liffey at Celbridge Abbey, Killadoon Lane, and Clane Road (R403) at Ballymakealy Lower.

Medium and low voltage lines are also present in Celbridge and within the study area. Two 38kV overhead distribution lines run parallel to each other and briefly traverse the north west of the study area at Oakleypark, where they then become underground distribution lines which traverse the study area at residential areas in the Oakleypark area and Celbridge Abbey, crossing under the River Liffey at the footbridge at Celbridge Abbey continuing underground along Newtown Road and turning east in to The Grove and Primrose Hill residential areas, where it appears to terminate at a *cul de sac* in Primrose Hill, adjacent to the R405.

A substation is located beyond the study area on the Oldtown Mill Road, c.450m north east of the study area boundary; the 110 kV and 38 kV lines identified connect to this station. The Celbridge LAP has mentioned that '*while the presence of the high voltage transmission lines enables north Kildare to be in a position to meet future electricity demands, such infrastructure has implications in terms of visual impact and land use compatibility*'.

Gas Network

Celbridge is connected to the natural gas network and is supplied via a high pressure spur off the Cork-Dublin high pressure gas transmission pipeline (Celbridge LAP 2012-2023). A network of Gas Networks Ireland (GNI) Medium Pressure (MP) distribution pipes are located within the study area along much of the streets and roads of residential and commercial areas within Celbridge Town, including the R403, R405 Shackleton Road, L1022, and L1016.

Sections of this MP network also run adjacent to the River Liffey on both sides along the Temple Mills Road (L1016), Clane Road/English Row (R403) and the River View/River Lawns estate, and cross the river in the vicinity of the existing Liffey Bridge. No High or Low pressure pipelines were identified within the study area. See **Figure 2-22**, which outlines the distribution of the GNI MP distribution pipe network within the extents of the study area and beyond.

Water Network

The Celbridge LAP states that Celbridge is connected to the water supply scheme servicing North Kildare and is serviced by the Ballygoran Reservoir, which can be supplied by both the Ballymore Eustace and Leixlip Water Treatment Plants. The LAP has mentioned that '*the capacity of the water supply and wastewater network will be a critical determinant for significant new development in Celbridge*'.

There are a number of water mains that exist within the constraints study area and these generally run adjacent to the local road network of Celbridge Town and its environs.

A higher concentration of water main infrastructure is present in the northern and central sections of the study area, serving residential and commercial properties in the town. A section of water main crosses the River Liffey at the existing Liffey Bridge. Water mains identified are mainly situated adjacent to residential streets and estates in the town. Some water mains are also present in the southern section of the study area, including along the R405 and L1016 roads. A section of water main line traverses the railway line at Hazelhatch station. Refer to **Figure 2-22** which outlines the water mains network within Celbridge Town and the wider study area.

There are a number of wastewater gravity mains that exist within the constraints study area and these generally run adjacent to the local road network of Celbridge town and its environs. A higher concentration of wastewater infrastructure is present in the northern and central sections of the study area, serving properties in the town.

A section of wastewater gravity main crosses the River Liffey at the existing Liffey Bridge, and at a second location c.680m south west of the Liffey Bridge. Wastewater infrastructure identified is mainly situated adjacent to residential streets and estates in the town. Some wastewater gravity main infrastructure is present in the south west section of the study area, including along the L1016 (Temple Mills Road). **Figure 2-23** illustrates the wastewater gravity mains network present within the study area.

Celbridge town falls within the Urban Wastewater Treatment (UWWT) agglomeration boundaries[22] set for wastewater treatment catchment areas in towns and cities with a population equivalent of over 500 and is part of the Lower Liffey Valley Regional Sewerage Scheme and serviced by the Leixlip Wastewater Treatment Plant (located c.5km north east of the town and outside of the study area). As per the EPA UWWT Plant Compliance dataset (accessed September 2020)[23] this plant is currently directive compliant.

Telecommunications Network

Telecommunications lines, and associated poles, run along the majority of roads in the constraints study area where housing is situated. The Celbridge LAP 2017-2023 confirms that broadband is readily available in Celbridge. According to the Eir service availability map, Eir currently provides broadband in the Celbridge town area, as well as a number of other telecoms providers which have network infrastructure serving the area, providing various types of connectivity from fixed-line to wireless and mobile broadband (Celbridge LAP 2017-2023).

The Department of Communications, Climate Action and Environment (DCCAE) Broadband Coverage Map also indicates that broadband operators are already delivering and/or have committed to delivering high speed broadband services to buildings in much of the study area for which residential and commercial buildings can expect significant improvements to services, as well as parts which are designated as being within 'National Broadband Plan (NBP) intervention areas' (mainly rural areas beyond the town), which are targeted areas for State intervention as part of the NBP.

There are approximately 17 mobile telecom masts located within the study area according to ComReg[24], of these, five masts are located in the eastern area of Celbridge town; one at 'The Duck' on English Row and four at the Applegreen Garage on the Dublin Road (R403). There are four located in the northern area of the town at Whitethorn Grove and four masts in the west of the town; one at Celbridge Manor and three at Springfield/Killadoon Park. A further four are located in the south of the study area at Hazelhatch Railway Station.

A further four masts are located c.350m beyond the northern study area boundary at Celbridge House/Henry Grattan's off Maynooth Road, and two are located at the substation located on Oldtown Mill Road, c.450m north west of the study area boundary.

Four ComReg monitoring sites were identified within the study area boundary, for which surveys of non-ionising radiation (NIR - broadband and narrowband) were carried out in 2008 (Dublin Road), 2010 (Willowbrook Road/Whitehorn Grove), 2011 (Hazelhatch Railway Station) and 2015 (Celbridge Manor Hotel).

It was reported for all locations that there are low levels of NIR in the area, with the mean and peak readings below the ICNIRP general public guideline limit for all frequencies.

Another ComReg monitoring site is located just beyond the study area boundary at Celbridge House on Maynooth Road for which surveys of non-ionising radiation (NIR - broadband and narrowband) were also carried out in 2011.

[22] https://data.gov.ie/dataset/urban-waste-water-treatment-agglomeration-boundaries

[23] https://gis.epa.ie/EPAMaps/SewageTreatment

[24] https://www.comreg.ie/industry/radio-spectrum/site-viewer/siteviewer

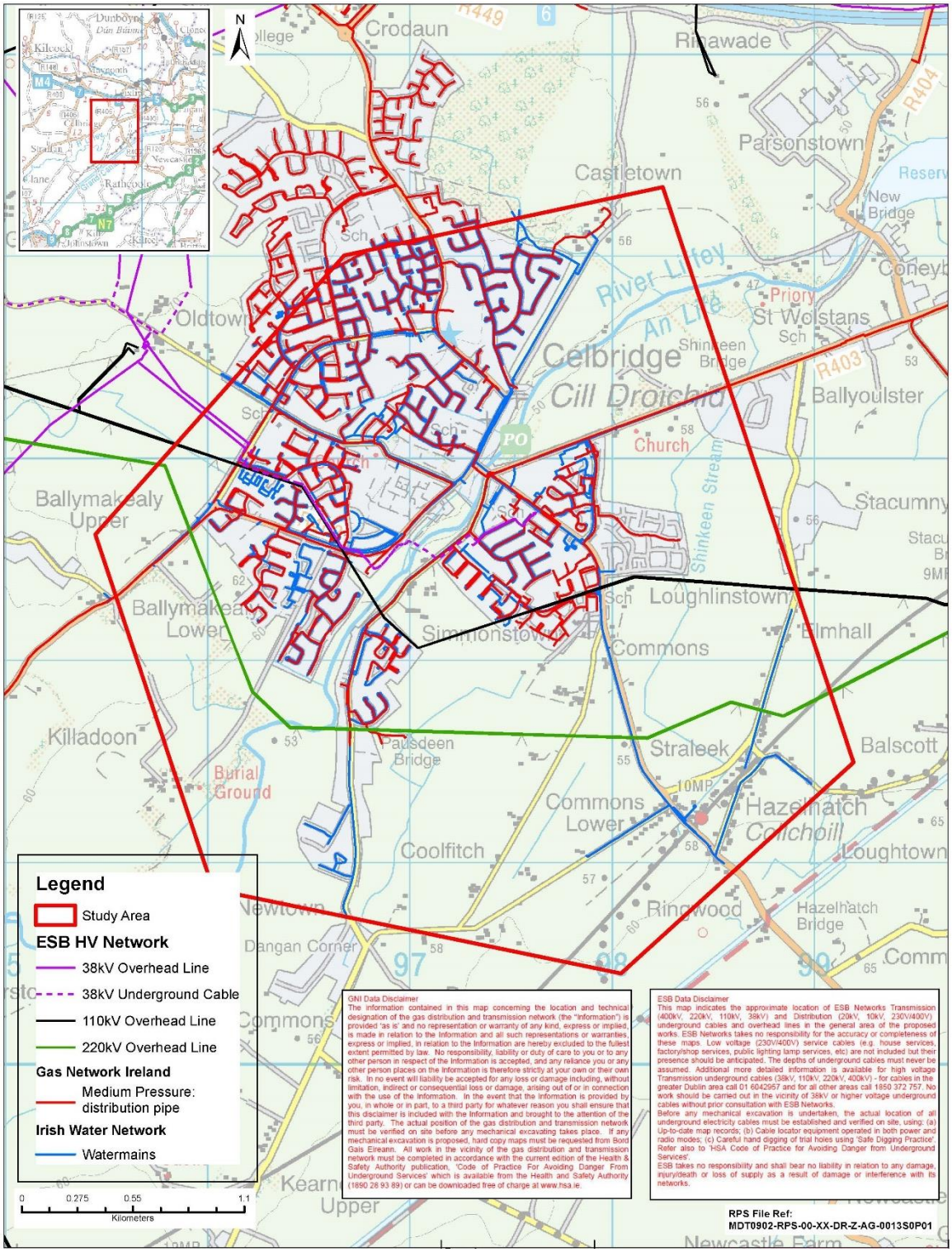


Figure 2-22: Utilities

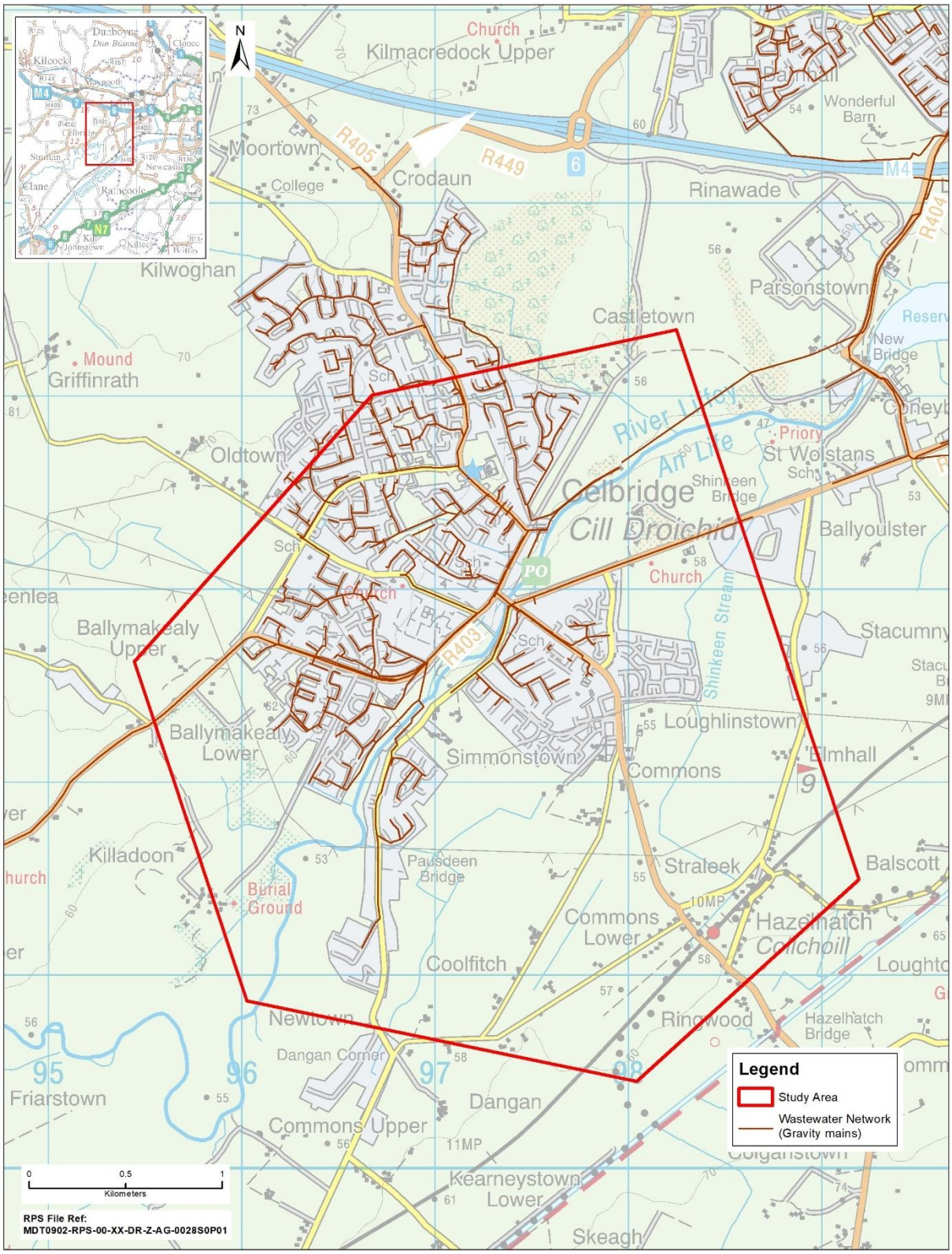


Figure 2-23: Wastewater Network (Gravity Mains)

Waste

In terms of solid waste, it is an objective of the Celbridge Local Area Plan 2017-2023 (LAP) *'to adequately maintain recycling facilities and to secure the provision of additional facilities, as required, including in conjunction with new development'* (Objective INFO4.1) and *'to provide a civic amenity site (recycling centre) in Celbridge on lands located south of the M4 Motorway and north of the R449 Regional Route to the west of Exit 6'* (Objective INFO4.2).

No known landfill sites, recycling plants, or civic amenity sites were identified within the constraints study area. Recycling facilities (bring banks) for materials including cans and glass are located at Tesco (Shackleton Road), SuperValu (R403) and Celbridge GAA Club.

The Celbridge LAP states that presently, Kildare County Council operates two civic amenity sites, both beyond the study area at Silliot Hill (c.20km south west) and Athy (c.50km south west). The LAP further states that, as per Objective INFO4.2 mentioned above, that a site has been identified north of Celbridge town for the provision of a recycling centre to serve North Kildare. The location of the identified site is south of the M4 Motorway, to the west of the R449 Regional Route and to the west of the M4 Exit 6, which is a central position within the cluster of Celbridge, Leixlip, Maynooth and Kilcock.

No licenced waste facilities were identified within the study area. The nearest licenced waste facilities identified are located in Maynooth c.4km north east of the study area, and Lucan, Dublin, c.5.5km east of the study area. However, the current licence status of both of these facilities is surrendered.

In terms of industrial licencing, no Industrial Emissions (IE) Licence holders were identified within the study area. Other IE facilities identified were beyond the study area. The nearest IE licence holder identified was HP Production Company Limited (P0195), located c.500m north east of the study area at Liffey Business Park.

There are two EPA Licenced sites in Celbridge; HDS Energy Limited (IPC P0286), located at Celbridge Industrial Estate, and General Paints Limited (P0229), located on Maynooth Road (R405).

Two 'Section 4' wastewater discharge licences were also identified in the area, one for St Patrick's National School (WP286/09), located within the study area on Hazelhatch Road, and the second at Elm Hall Nursing Home (WP232/06), located at immediately east of the study area boundary on Loughlinstown Road. Other light industry in the area include; a crash repairs service at Celbridge Industrial Estate, various garages, and a brewing company (Rye River Brewing) located within the east of the study area on the Dublin Road (R403).

2.11.3 Identified Key Constraints

The principal constraints in the area, from a material assets perspective, are the utilities and existing transport infrastructure. Utility service infrastructure and their exact locations will be identified as the project progresses.

Early consideration of how route options can integrate with the existing material assets in the area is essential and will require engagement with service providers to ensure that utilities can be avoided and/or modified to mitigate impact, particularly at the design stage.

The identified key constraints which will need to be considered at route selection stage include:

- The 38kV, 110kV, and 220kV overhead and underground distribution lines identified within the study area;
- The location of future Civic Amenity Facility in north Celbridge to serve North Kildare;
- The EPA Licensed Sites identified;
- Watermains along the existing road network;
- GNI MP distribution pipelines; and
- The cut fill/balance and the calculation of materials suitable for reuse for each option brought forward to route selection stage.

3 NEXT STEPS

Following the completion of an environmental appraisal of the study area, a number of constraints have been identified. The next phase of the project will be to identify suitable routes for the Celbridge to Hazelhatch Link Road Scheme. The subsequent study and the route options for the new road and river crossing will be determined and assessed against the framework of constraints outlined in this report.