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Project Ireland
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N19 SHANNON AIRPORT ACCESS ROAD IMPROVEMENT SCHEME

Constraints Report



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An Roinn Iompair,
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport



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1 INTRODUCTION

Clare County Council in partnership with Transport Infrastructure Ireland (TII) proposes to carry out the planning and design for the N19 Shannon Airport Access Road Improvement Scheme. The Project shall provide a high-quality road improvement scheme on the N19 National Primary Road between Drumgeely Roundabout and Knockbeagh Point Roundabout on approach to Shannon International Airport.

Clare County Council appointed Fehily Timoney and Company Ltd. / Clandillon Civil Consulting Ltd. Joint Venture (FTC) on the 14/October/2019 to provide Technical Consultancy Services which will provide the Engineering, Environmental, Economic and Appraisal services required to successfully deliver the project through the planning and design phases (TII Project Management Guidelines Phases 1 to 4 inclusive).

Following the identification of an appropriate study area and its approval at the Sponsoring Agency Management Group Meeting on the 18/03/2020, constraints within this area have been identified. This will facilitate a systematic assessment of the potential impacts associated with route options.

Constraints comprise of natural constraints such as landscape, biodiversity etc. and artificial constraints such as built structures or utilities and external parameters such as design standards and policies.

Constraints considered in this assessment include:

- Engineering
- Traffic
- Material Assets – Non-Agriculture
- Land Use and Planning
- Soils, Geology and Hydrogeology
- Biodiversity
- Hydrology and Water Quality
- Air and Climate
- Noise and Vibration
- Landscape and Visual
- Archaeology, Architectural and Cultural Heritage
- Population and Human Health
- External Parameters

This assessment assesses natural and built constraints within the study area and its environs which have the potential to affect the design of the project, the location of the project or which could have programming or cost implications. The mapped constraints will facilitate the development of feasible route options which avoid constraints, where possible.

This constraints assessment has been prepared in accordance with the TII Project Manager's Manual for Major National Road Projects (PE-PMG-02042, 2019).

2 NEED FOR THE SCHEME AND OBJECTIVES

2.1 Project Need

The existing road is approximately 2.2 kilometres in length and comprises primarily of single carriageway cross section. Figure 2.1 illustrates the location of the scheme. The existing surface comprises a combination of bituminous and concrete surfaces and much of the pavement has exceeded its design life. Dedicated off-road cycle facilities are not provided and facilities for pedestrians require significant improvement to meet current design standards. Gaps in street lighting are evident on approach to the Airport presenting significant safety concerns for vulnerable road users. All these deficiencies require vital improvement works to address non-compliance with design standards.

Shannon International Airport has raised safety concerns regarding the last segment of the existing N19 route as the only public access/egress into Shannon Airport being of single carriageway and believe there is a requirement for a dual carriageway cross section to facilitate emergency responses.

This section of the N19 National Road connects Shannon International Airport to all parts of the country and plays a significant role in international connectivity, which in turn increases prosperity to the Mid-West region, particularly tourism and exports.

This scheme also provides connectivity to Shannon Free Zone (Gateway West Access) which is currently under extensive regeneration. Shannon Free Zone is a prime area for indigenous and international investment and should be supported by a good quality road transport network.

There are clear indications that this section of the N19 does not provide the required level of service necessary to cater for existing and future growth at Shannon International Airport and Shannon Free Zone. Good transportation links are essential to supporting existing and future expansion within these key economic centres and to maintaining and promoting economic growth and investment at national and international levels. Shannon Airport have raised concerns that the current N19 route provides a poor appearance on approach to an international airport.

The issues to be addressed by the scheme include:

- Potential conflict between airport traffic and Shannon Free Zone traffic in the form of localised congestion at peak times
- The perception of quality of access, which forms a constraint on inward investment as traffic levels rise over time
- Reliability of access, both in day-to-day variation and resilience to incidents
- Existing safety issues, including poor quality pavement, lack of lighting and inconsistency of road standard
- Poor quality of provision for pedestrians and cyclists to enable and promote healthier travel options

The current extent of the N19 National Primary Road was established by S.I. No. 131/2016, under the Roads Act 1993 and extends from M18 Junction 9 to Knockbeagh Point Roundabout, approximately 5km. Previously, the section between Knockbeagh Point and Gateway West was a local road.

The route provides access to Shannon International Airport and the Shannon Free Zone industrial area, and a northern access to Shannon Town.

The Section from the M18 Junction 9 to Drumgeely Roundabout was upgraded in 2003 and is a good-quality dual carriageway. The remaining section South-west from Drumgeely Roundabout to Knockbeagh Point Roundabout relevant to the proposed scheme comprises primarily single carriageway with a couple of stretches that are divided on the approach to roundabouts. Some sections are in poor condition, reflecting its history as a local road.

This section suffers from deficiencies including poor quality pavement, poor signing & lining, sub-standard public lighting, poor drainage, high volume of accesses, poor junction layouts and sub-standard pedestrian facilities.

The road pavement surface consists of three different material types over five distinct sections comprising hot rolled asphalt, stone mastic asphalt and concrete. There are clear indications of surface failure/distress on several sections of the existing route. Poor ground conditions have contributed to sever cracking of both concrete and bituminous surfaces.

Gaps in street lighting are evident on approach to the Airport, presenting significant safety and security concerns for vulnerable road users.

A disused Security Station is located within the carriageway just southwest of the Gateway West roundabout. The layout of this building – shown in Plate 2.1, contributes to the slow movement of traffic on the N19 at this location.

These various deficiencies together with the existing road not complying with current design standards in terms of geometric parameters and facilities for vulnerable road users contribute to a poor level of service on this strategic route and the need for the scheme.



Plate 2-1: Security Station



- Roundabout
- - - 2.2km Proposed Improvement Scheme

TITLE:	
Site Location	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO:	
2.1	
CLIENT:	
Clare County Council	
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2.2 Project Objectives

2.2.1 Economy

To support the economy of the Mid-West region by removing transport-related constraints on the growth of employment in the Shannon Free Zone.

The attractiveness of the Free Zone to inward investment is strongly dependent on ease of access to a qualified labour force.

To support the growth of freight and passenger throughput at Shannon International Airport – a key driver of the regional economy - by improving the quality, efficiency and reliability of ground transport to and from the airport.

The attractiveness of Shannon International Airport depends on groundside access to a hinterland which covers a significant part of the West of Ireland. The M18 motorway and the Galway to Limerick railway provide good onward connections to centres of population, but parts of the current N19 – the “last mile” – are of lower quality.

To achieve value for money from investment in the project.

This reflects a key objective of government transport policy.

2.2.2 Safety

The scheme objectives relate to two aspects of transport safety:

To improve access to Shannon International Airport by emergency response vehicles in the event of an incident.

Shannon is the nearest airport for emergency landings or flight diversions for a large swathe of Atlantic airspace – one of the busiest air travel corridors in the world. In the event of an airside incident, priority access by emergency vehicles to the airport (and by ambulance from the airport to the nearest hospital) is potentially a critical factor.

To reduce the frequency of transport collisions within the N19 corridor.

This objective is included, not because the existing collision rate is particularly high, but because all transport investment should have maintaining and improving safety as an objective.

2.2.3 Physical Activity

Increased levels of physical activity have been shown to lead to significant health benefits. The scheme objective is:

To improve opportunities for walking and cycling between Shannon town, Shannon International Airport, and Shannon Free Zone.

2.2.4 Environment

There are many aspects of environment. The study aims to consider all significant aspects but focuses particularly on the aspect which has been identified as a potential risk, which is the risk of impact of water pollution from the N19 on the designated SACs in the Shannon estuary. The scheme objective is:

To take all reasonably practical measures to avoid, minimise and mitigate impact on the natural environment.

2.2.5 Social Inclusion

The scheme objective is:

To improve access for non-car-available people to social, employment and education opportunities in the N19 corridor.

2.2.6 Integration

There are many aspects of integration, which addresses consistency with wider government policy. Three aspects have been identified as particularly significant. One is to do with government policy on airports; this has largely been picked up in objective 2) above and is not considered further so as to avoid duplication. The other scheme objectives are:

To support the European-level TEN-T policy by providing high-quality connectivity between Shannon International Airport and the Comprehensive TEN-T network.

To improve wider integration between transport and land-use planning by being consistent with the forthcoming Limerick & Shannon Metropolitan Area Transport Strategy (L-MATS).

3 DEVELOPMENT OF CONSTRAINTS AREA

3.1 Project Appraisal Plan – Phase 0 Indicative Study Area

Figure 3.1 below illustrates the Indicative Study Area Boundary (delineated using a red boundary line) as outlined in the 'N19 Project Appraisal Plan, Rev.01' – Document Reference – 0137_02_00001.

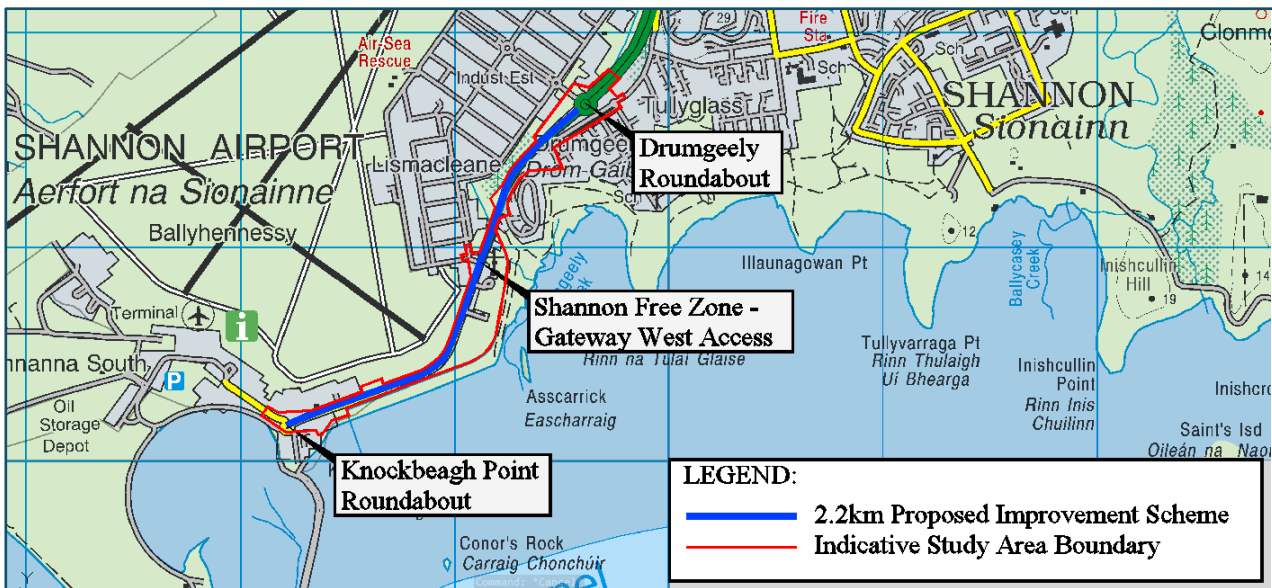


Figure 3-1: Indicative Study Area – Source PAP, May 2018

The basis for this Phase 0 Indicative Study Area Boundary, was to allow for the upgrade of the existing N19 route, such as online widening with upgrades to the existing walkways and the incorporation of a cycle route.

3.2 Phase 1 - Study Area

Transport Infrastructure Ireland - Project Appraisal Guidelines Unit 4.0: Consideration of Alternatives and Options provides guidance on the process for identifying alternatives and options once the need for intervention has been established.

To facilitate the assessment of alternatives and options the Phase 0 Study Area was reviewed at Workshop 1 in the light of the list of potential alternatives and options that were drawn up that might meet the objectives of the scheme.

The study area was expanded for Phase 1 to cover the area encompassed by the list of alternatives and options identified. See Figure 3.2 below. Table 3.1 lists the possible measures identified.

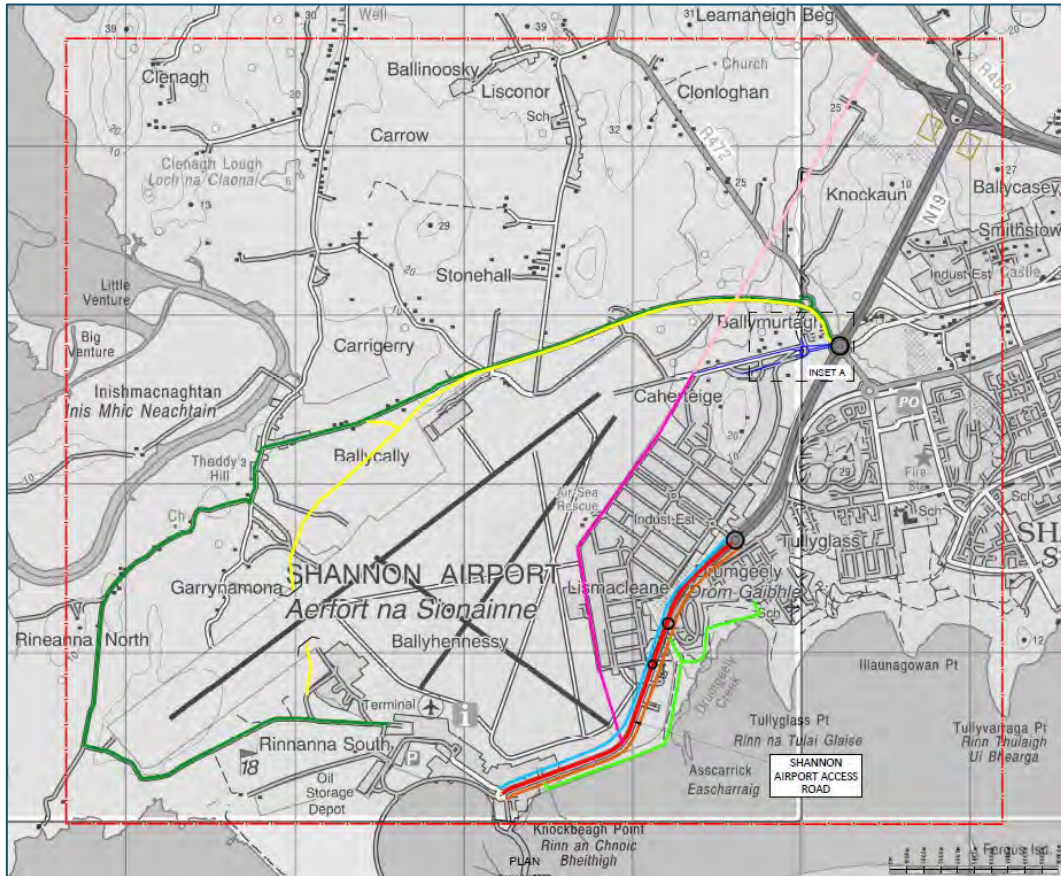


Figure 3-2: Workshop 1 Study Area and Alternatives and Options

Table 3-1: Wide Range of Measures Considered

No.	Infrastructure Options in Alternative Corridors:	
1	New public road for access to Shannon International Airport from the West	
2	Emergency vehicle access onto Airport property at the north side of the airport	
3	New route running broadly along the line of the existing boundary fence east of the airport and west of the Free Zone	
4	Tunnel under the airport	
5	Upgraded access to the Free Zone from the north, so as to reduce traffic using the existing Drumgeely and West Gateway roundabouts	
Alternative Modes:		
6	Heavy rail route to airport	
7a	Park-and-ride site near M18/N19 junction, with onward service to the airport by:	Light Rail
7b		Bus
7c		A pool of autonomous vehicles
8	Improve footpath and cycleway to airport	

No.	Infrastructure Options in Alternative Corridors:	
9	Package of bus, cycleway & footpath improvements to Shannon Free Zone West to reduce demand for car travel	
Demand Management Alternatives:		
10	Package of improved bus service to the airport & increased parking charges at the airport, so as to reduce car traffic on N19	
11	Tolling of airport access road to encourage mode-switching	
Road Options to Improve Existing Corridor:		
12	Upgrade road to design standards broadly along the line of the existing N19.	
13a	Improvements to junctions along the existing N19	Including grade separation
13b		At-grade junctions only

3.3 Phase 1 Sifting of Alternatives and Options

The Phase 1 Project Brief undertook a high-level sifting of this set of possible measures down to a list of alternatives and options to be appraised in more detail in the Phase 2 of TII’s Project Management Guidelines.

The set of options recommended to be taken forward to detailed appraisal comprises combinations of:

- A road improvement within the existing corridor (a package involving one or more of option 12, 13)
- A set of measures to improve non-car journeys (a package of footway/cycleway measures and bus infrastructure that draws on options 8 and 9).

3.4 Phase 2 Constraints Study Area

At the start of Phase 2, a Study Area review was undertaken to include sufficient land so that all potential options recommended to be taken forward, as detailed in 3.3 above, could be assessed. The Study Area Review report was submitted to Clare County Council with a recommendation for a revised study area. This was approved at the Sponsoring Agency Management Group Meeting on the 18/03/20

The approved study area brought forward for constraints identification is illustrated in Figure 3.3.

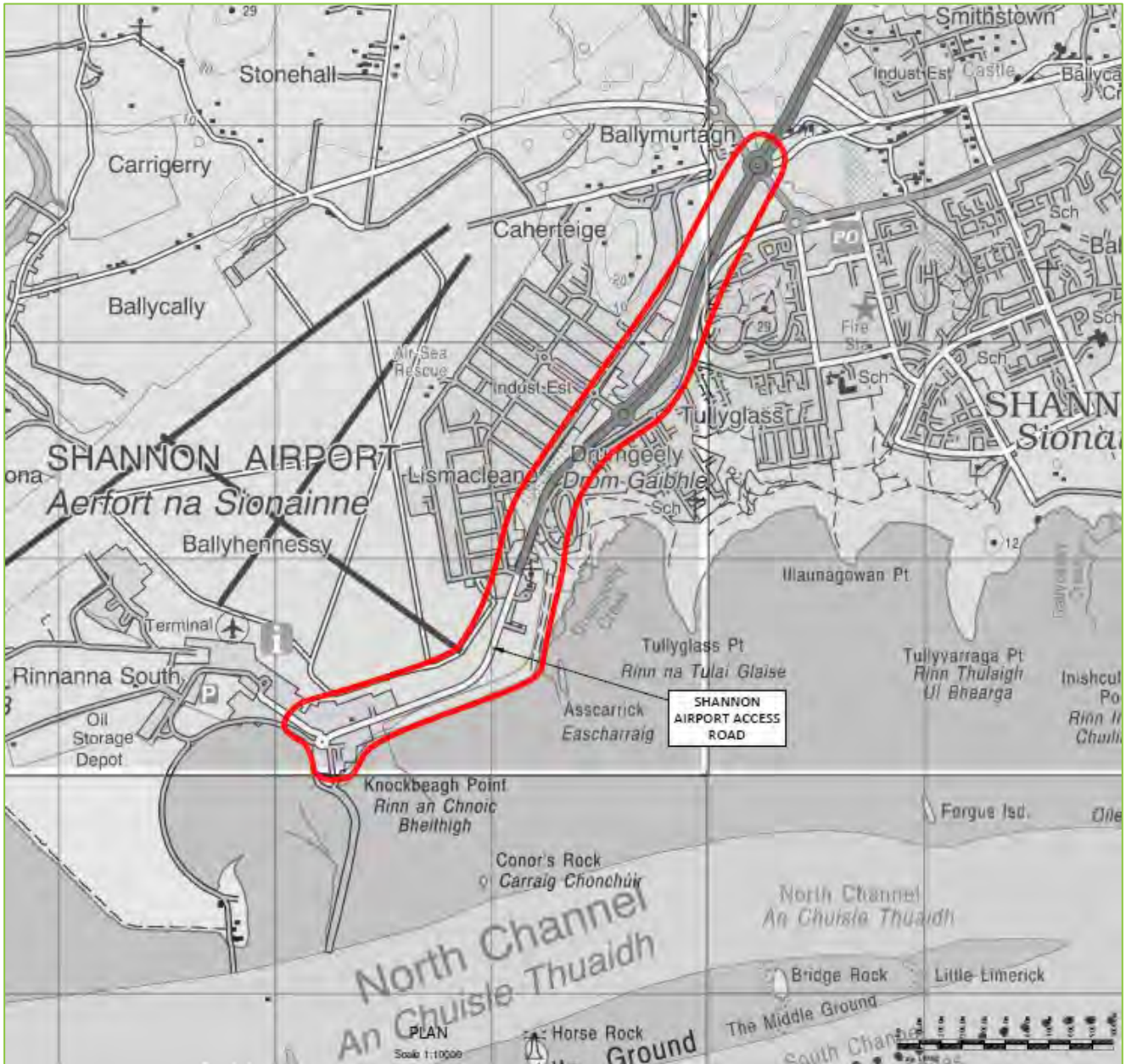


Figure 3-3: Phase 2 Study Area - Constraints Area

4 CONSULTATION

4.1 Statutory Consultation

Consultation was initiated with statutory bodies and key stakeholders during Phase 1. Emails with project information were issued in January 2020 to the following consultees:

- The Arts Council
- An Taisce
- Commission for Regulation of Utilities, Water and Energy
- Department of Agriculture, Food and Marine
- Department of Communications, Climate Action and Environment
- Department of Culture, Heritage and the Gaeltacht - Development Applications Unit
 - National Monuments
 - National Parks and Wildlife Service
- Department of Defence
- Department of Housing, Planning, Community and Local Government
- Department of Transport, Tourism and Sport
- Southern Regional Assembly
- Fáilte Ireland
- Health Service Executive - Environmental Health Department
- Inland Fisheries Ireland
- Irish Aviation Authority
- The Heritage Council
- Irish Rail
- Bat Conversation Ireland
- Birdwatch Ireland
- Vincent Wildlife Trust
- Geological Survey of Ireland
- National Transport Authority
- Teagasc

Consultation was also conducted with TII, OPW and Irish Water with regard to the proposed development and details are provided in Section 4.2.

Detailed responses were received from the Department of Communications, Climate Action and Environment/Geological Survey of Ireland. GSI outlined the datasets available and outlined elements in relation to geoheritage, groundwater, geohazards, geothermal energy and natural resources. GSI also sought information into the timing of the 4 phases of the project and a response was issued to GSI.

The Irish Aviation Authority replied and said that there were no issues in relation to air safety. IAA were also contacted in relation to the use of cranes and drones.

IAA responded with the details that would be needed for operating cranes. In relation to drones, provided the drones are operated by a company holding a Specific Operating Permission, this can be facilitated within certain ATC conditions.

The Health Service Executive responded with regard to emergency management and highlighted that unimpeded access would need to be maintained to Shannon Airport via the N19 for emergency vehicles responding to emergency 999 calls and that unimpeded access would be required to be maintained to the Shannon Free Zone via the N19 for emergency vehicles responding to emergency 999 calls. The HSE also outlined the requirements under the EIA Directive with regard to human health and that surface water, groundwater, air, noise, vibration and dust should be included in the EIAR. Other areas to be considered in the EIAR include staff welfare facilities, public consultation, potential for future health gain from the provision of walkways and cycle paths. Requirements for the Construction Environmental Management Plan were also detailed.

Fáilte Ireland responded with their guidelines on tourism in the EIAR - EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects.

The Department of Culture, Heritage and the Gaeltacht responded with respect to Nature Conservation. The response noted the presence of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. A full and detailed description of the project including all associated and ancillary works, including temporary works, should be assessed. Direction is also given with regard to Appropriate Assessment. DCHG noted the following in particular:

- Water quality and run off to European Sites
- Disturbance to qualifying species
- Lighting effects
- Survey for Opposite-leaved Pondweed in suitable habitat

Other existing, permitted and proposed developments and change ins land use locally to be taken into account and also the Shannon Airport Embankments Refurbishment, Clare County Development Plan and the Shannon Estuary Strategic Integrated Framework Plan.

4.2 Meetings / Workshops / Consultations

In addition, meetings/workshops and consultations were held with the following:

TII: Transport Infrastructure Ireland attend the Sponsoring Agency Management Group meetings and so are involved throughout the project.

Irish Water: In consultation Irish Water noted that information, as previously sent, is current but indicative only and that the existing foul rising main is not on drawing. It is noted that Irish Water policy is not to provide CAD data. Also noted that no major works or alterations proposed immediately but existing services are old (circa 1970) and a DAP has been commenced which will eventually determine necessary works.

Noted in terms of the study area that the only critical services are the existing N19 road crossings, the pump station and the rising main. Rest of services are in estates and unlikely to be impacted by road scheme.

Also noted that the existing foul sewer is asbestos concrete. No guarantees to location so service should be mapped with where necessary by undertaking slit trenches to proof location.

Fáilte Ireland: current plans being developed were discussed, the most important being Clare County Council's Tourism Strategy. Others to be considered include National Plans, Wild Atlantic Way and Regional Strategies. Fáilte Ireland regard Shannon Airport as a critical international gateway to the region and to the Wild Atlantic Way and therefore any improvement to its access/egress would support further growth. Fáilte Ireland will provide current growth figures during further consultation as the project progresses.

Shannon International Airport (SIA): noted that the channel drains are not species rich. On airport lands there have been observations of waders such as curlew, oystercatcher as well as pheasant and foxes. The airport manages the landscaping and has a bird and wildlife control policy. Shannon International Airport although they have no specific written Construction Procedures, requested that:

- Areas to be scanned in advance in the case of the ground investigation works,
- Suitable bird deterrent measures such as humming tape to be put in place in the case of excavations,
- Traffic management plan to be implemented if required should access road be impacted,
- Equipment not to be left unattended at any time in the interest of Airport security.

SIA noted that the NPWS' main concern is the lagoon and horseshoe bay. There is a discharge licence in place for the discharge from the airport into the estuary. They also noted that the airport is a Gateway to Ireland, the Region and Limerick Shannon Metropolitan Area for both tourists and business people and as such the current access is below the standard expected and gives a very poor first impression. Noted current infrastructure is old (circa 1940's) and in major need of upgrade and improvement and is the access for all employees, deliveries, public transport (buses and taxis) and customers and the poor surface, poor public lighting and lack of properly designed pedestrian and cyclist infrastructure is a major concern. SIA noted that as well as having to deal with any local emergencies/incidents the airport is the centre for all flight emergencies over the Atlantic and therefore access is required at all times in case of a major emergency/ incident. The current road is a single access point and in its current format (single carriageway) and condition is a single point of failure. They also noted that the airport is seeking to expand on the international hanger industry, but as well as hanger availability good road access is essential. The current road is therefore seen as a disincentive to the development of this business.

On other issues SIA noted that a 3 m clearance is required from existing fence line to driven or stationary vehicles, that IAA have regulations/policies and procedures re notification relating to use of cranes and drones – area of influence is 13 km around airport, that the Airport has a 'safeguarding role' re above. GPS corridor with working heights below 25m okay. Most critical service is the fibre-optic as it has no redundancy Power has a ring main and as such can be feed in both directions.

Clare County Council (Environment and Planning): CCC noted that prescribed bodies are to be consulted. CCC noted the sensitivity of the area and in particular the estuary. Environmental information is available from the Shannon Estuary Strategic Integrated Framework Plan. CCC have a green infrastructure policy. CCC advised that due to the sensitivity of the area that it is likely that a Natura Impact Statement will be required and an EIAR. CCC highlighted that cumulative effects need to be considered in terms of projects such as the Flood Relief Scheme and plans, such as CCC's Noise Action Plan, Climate Action Plan and Rail Policy. The management of construction waste is a critical factor.

With regard to the SEA of the County Development Plan, CCC noted that the mitigation measures must tie into the project. There is a need to protect the rail corridor as set out in the CDP. The RSES came into effect on 31st January 2020 and CCC's Tourist Plan should be consulted.

Clare County Council (Shannon Area Office): CCC noted note as this area has now been included into the MMarC area it is no longer directly under Shannon Area Office for maintenance. Area was only recently added to Shannon Area and designated as a National Road and therefore, little to no historical maintenance knowledge available. CCC noted that the Pedestrian Traffic Light crossings are still with County Council. CCC also noted that there is no major interventions planned – as now with MMarC but aware of the existing problems – poor pavement – mostly concrete slabs which are lifting, joint sealing required, ponding along drainage channel, signage confusing, poor public lighting, pedestrian and cycling facilities not up to standard, drainage culverts old no condition survey information and channels overgrown. CCC also noted that all drainage flows to channels behind embankment, that the road is a single access to the airport and is as such a single point of failure and that there are multiple accesses to Shannon Free Zone and that the apartments area has also got an alternative access.

Clare County Council (Roads) (Resident Engineering Staff from previous adjacent Scheme): CCC noted that the project section of the N19 was taken in charge in 2014 and provided drawing and CAD file outlining road and area taken-in -charge and that statutory notice SI-131-2016 declared the section as a National Road. On adjacent section of N19 CCC noted construction completed 2003 with an internal design team but with piling section designed and constructed by Kellers. The piling section which immediate adjoins the study section consists of a 700m section piled using mix of stone columns and vibro-concrete columns. The road was constructed in 4 sections of 450m using vibro-concrete in the Alluvium sections and stone columns in the Peat Sections. Depths ranged between 6 – 8 m using 350 diameter columns in a 2.75 triangle grid spacing. Load transfer platform is 900mm in depth and consisted of one layer of woven geotextile and 3 layers of geogrid – with 250mm of stone in layers. Full width piling was conducted, the concern was lateral stability and potential damage to existing properties. The Pedestrian Bridge was piled one side using precast concrete piles and founded on rock on other. The remaining section of the N19 north back to N18 was constructed by excavate and replace. The constructed pavement consists of 600mm capping, 300 Cl804 subbase, 200mm DBM, 60mm Basecourse and 45mm HRA. Drainage flows into existing flood control system. The section of road has Public Lighting and accurate details are available but there are a number of issues that need to be dealt with.

CFRAMS (Shannon Flood Relief Scheme): CCC Project Staff noted that the Flood Scheme's background comes from CFRAMs Study which was undertaken at a high level. Concern that high-level proposals need to be reviewed at detail level for adequacy. The current scheme is an amalgamation of schemes – Shannon Town, Embankments and Shannon Airport – comprising new flood maps, environmental studies, upgrade embankments/pumps. Currently the scheme is at tender for consultants to progress and programme is to be at construction in approximately three years. The scheme consists of three pumped sections – two in OPW/Council control and one with Shannon Airport. New road drainage will naturally flow to Shannon Airport pump station. Noted existing open channels are concrete lined.

Shannon Commercial Properties: noted that the airport is a Gateway to Ireland, the Region and Limerick Shannon Metropolitan Area for both tourists and business people and as such the current access is below the standard expected and gives a very poor first impression, that the existing road is also the access for all employees, deliveries, public transport (buses and taxis) and customers and the poor surface, poor public lighting and lack of properly designed pedestrian and cyclist infrastructure is a major concern and that although they have 4 accesses the ones included within the schemes study area are problematic. With continuous growth there is a concern with regard to capacity and safety of the smaller out of standard junction/entrance which they would like to see improved. Shannon Commercial Properties also noted that their past and future phased development plans in Shannon Free Zone (SFZ) West will have a significant impact on traffic.

The SFZ West phased development plan is as follows:

- Phase 1 Development (2014 – 2018) = 650,000 sq. ft. commercial / industrial buildings (Completed),
- Phase 2 Development (2019 – 2023) = 650,000 sq. ft. commercial / industrial buildings (Commenced),
- Phase 3 Development (2024 – 2028) = 700,000 sq. ft. commercial / industrial buildings.

Utility Providers (ESB, EIR, GNI, IW)

Consultation was undertaken with the four impacted Utility Companies – Irish Water, Gas Networks Ireland, the ESB and Eir and the results of the consultation is detailed in Chapter 16.

MMaRC

The TII appointed MMaRC contractor Colas-Roadbridge JV: noted that the area of the study was only recently added to the previous area being maintained by them and that the maintenance includes pavement, drainage, public lighting and some verge but does not include the two pedestrian crossings. The new contract started 1st of October 2019 – for 6 years. They also noted that the extended area is new to CRJV and they are aware it's not in great condition, but current knowledge of section limited. Condition surveys being undertaken and noted that currently no major interventions are currently planned – so initially routine maintenance. They also noted that as this is a CRJV site health and safety coordination is required and survey/investigations and works are to be notified to them for their approval and to book necessary road space.

Jaguar Land Rover Consultation: Consultation was around connected and autonomous vehicles (CAVs). Noted current Government and TII policy re CAVs and the project requirement to be future proofed with regard to CAVs. Discussion around potential systems and requirements – international levels of autonomous vehicles and current space Ireland is looking at – Level 3 (on motorways/GIS) initially later look to Level 4 (home to work) which test track in SFZ will allow testing of.

5 ENGINEERING

5.1 Topography and Landscape

Generally, the landform is flat and gently falling towards the River Shannon. The eastern and southern perimeter of the Study Area is dominated by the River Shannon Estuary with a pronounced hill to the south-east of Drumgeely Roundabout. The western perimeter consists predominately of built environment including Shannon Airport and the Shannon Free Zone. The landscape is generally managed grassland and some ornamental planting at Shannon Free Zone and the apartment blocks – see Plate 5.1.



Plate 5-1: Apartment Blocks

5.2 Rivers and the coastal domain

The River Shannon estuary provides the eastern and southern perimeter of the study area. The study area is reclaimed swamp land circa 1940-50s and is enclosed by an embankment with drainage collected in two channels with culverts under the existing road, one of which flows to a pump house and the other to a sluice gate.

Initially the two drainage channels flow in a broadly north west to south east direction as they cross under the N19 as they travel towards the River Shannon.

The northern channel continues in the same direction and discharges directly to the River Shannon through a sluice gate non-return valve, whilst the southern channel turns approximately 90 degrees and travels parallel to the existing road and discharges through a pump station maintained by Shannon Airport into the Lagoon.



Plate 5-2: Southerly Open Channel before crossing under road

5.3 Flooding

The OPW, working in partnership with Clare County Council (CCC) and other Local Authorities, commissioned and have completed the Shannon Catchment Flood Risk Assessment and Management (CFRAM) Study.

The objectives of the CFRAM Study were to:

- Identify and map the existing and potential future flood hazard within the CFRAM Study Area,
- Assess and map the existing and potential future flood risk within the CFRAM Study Area,
- Identify viable structural and non-structural options and measures for the effective and sustainable management of flood risk in the Areas for Further Assessment (AFAs) and within the CFRAM Study Area as a whole,
- Prepare a set of Flood Risk Management Plans (FRMPs) for the CFRAM Study Area, and associated Strategic Environmental and, as necessary, Habitats Directive (Appropriate) Assessment, that sets out the policies, strategies, measures and actions that should be pursued by the relevant bodies, including the OPW, Local Authorities and other Stakeholders, to achieve the most cost-effective and sustainable management of existing and potential future flood risk within the Study Area, taking account of environmental plans, objectives and legislative requirements and other statutory plans and requirements.

The Shannon CFRAM Study Area included Shannon Town & Shannon Airport as an AFA and IRR (Individual Risk Receptor) respectively and concluded that a flood relief scheme would be viable and effective for the community.

The option for Shannon Town, as identified at the CFRAM level of assessment, included the construction of new walls and embankments, a flow diversion, online storage areas, the replacement of two culverts crossing under the existing N19, and the maintenance of the coastal embankments. The CFRAM Study option did not address the risk of wave overtopping of the coastal embankments.

In addition to the CFRAM Study, Clare County Council, Shannon Airport Authority & OPW commissioned a further study and survey of the coastal embankments, with the outcomes of that study described in the report entitled “Shannon Town and Airport Embankments – Survey and Assessment” (Malachy Walsh, 2018). This report concluded that the embankments were constructed in part from locally sourced weak silt/clay materials, giving rise to concerns regarding their ability to provide an appropriate standard of protection to Shannon Town and the airport, and recommended extensive remediation works of the embankments.

Accordingly, the Shannon Town and Environs Flood Relief Scheme Consultancy Design Services tender was advertised on the 25th of November 2019. Tender Assessment was completed in February and Final Assessment Report and Recommendations issued to OPW for approval. RPS have been appointed to the scheme and the project is expected to go to construction subject to receiving all approvals in Summer 2023.

This project will be developed in around the same timeline as the proposed N19 Shannon Airport Access Road Improvement Scheme. Therefore, ongoing coordination will be required and the potential for in combination effects will need to be assessed.

The objective of the Shannon Town and Environs Flood Relief Scheme Consultancy Design Services project is the identification, design and submission (for planning consent) of a Flood Relief Scheme, that is technically, socially, environmentally and economically acceptable, to alleviate the risk of flooding to the Community of **Shannon Town & Environs** to a determined Standard of Protection, and to procure, manage and oversee the construction of that Scheme.

The appointed Consultant is to produce and deliver a set of flood maps that are based on:

- A full and detailed hydrological assessment, that has been developed in a manner that addresses the lack of calibration & validation data and takes account of the significant proportions of paved/developed areas, and
- Hydraulic conditions that accurately reflect the existing hydraulic arrangements and baseline conditions, including the presence of the existing pumps and flow control structures, and,
- Updated coastal tide, surge and wave data from the Irish Coast Wave & Water Level Study 2018 (ICWWS, 2018).

The Consultant is also to assess, develop and design a Flood Relief Scheme that:

- Achieves effective protection from the estuary through the upgrade, replacement, realignment and extension of the existing embankments, and,
- Includes the optimisation of the operation of the existing pumps within the smaller catchments, and any additional pumping requirements identified, and,
- Addresses any residual flooding within those smaller catchments following that optimisation of the pumps.

A smaller interim Shannon Airport Embankments Scheme – PA Ref: 19/1006 has been submitted for Planning Approval the objective of which is to undertake necessary urgent upgrades to the Shannon Airport Embankments to provide protection from erosion and overtopping.



Plate 5-3: Location of Flood Protection Embankments

5.4 Roads, railways, public transport, ports, airports etc.

The primary constraints detailed in this section are illustrated in Figure 5.1.

5.4.1 Roads

The Study Area is bisected by the existing N19 National Primary road and contains a number of junctions and local accesses. This section suffers from deficiencies including poor quality pavement, poor signing & lining, sub-standard public lighting, poor drainage, high volume of accesses, poor junction layouts and sub-standard pedestrian facilities. These deficiencies contribute to a poor level of service on this strategic route.

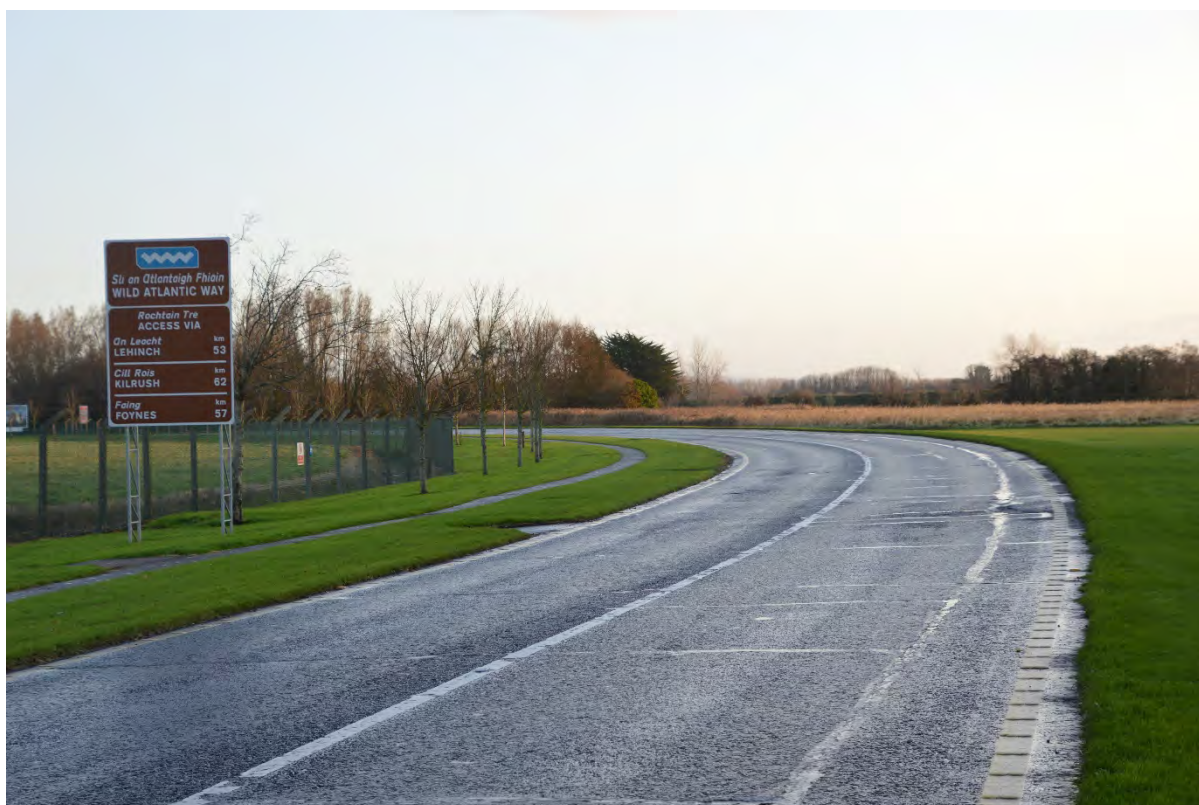


Plate 5-4: Section of Existing N19

This section of the N19 National Primary Road is the only public access serving Shannon International Airport and has posted Speed Limits which vary from 40km/h, 50km/h and 60km/h over various sections and overtaking opportunities in both directions are infrequent and short in length. The carriageway cross section varies in width and does not provide the recommended edge treatment from Table 6 of TII DN-GEO-03031. Travelling west from Drumgeely Roundabout the road cross section begins to narrow from dual to single carriageway and remains single carriageway for the remainder of its length as far as Knockbeagh Point Roundabout. Some of the existing pedestrian facilities are not in accordance with standards and do not incorporate the required facilities for the safe crossing of pedestrians. Footpath widths are as low as 0.9 meters at some locations. The traffic lights, required to facilitate pedestrian crossings, located east of Shannon Free Zone are not operational. Existing street lighting is showing signs of deterioration and requires upgrading to comply with current lighting standards.

No street lighting is in place for approximately 0.5 km south of the security station on approach to the airport. This presents a significant safety risk for pedestrians using the adjacent footpaths. Much of the Road Signage and Road Markings are showing signs of deterioration and require upgrading to comply with current design standards.

Within the study area the N19 has three main junctions:

- Two roundabouts giving access to Shannon Free Zone (West), at Drumgeely and Gateway West.
- One roundabout at Knockbeagh Point providing access to Shannon Airport



Plate 5-5: Drumgeely Roundabout






Plate 5-6: Gateway West Roundabout



Plate 5-7: Knockbeagh Point Roundabout



-  Infrastructure Constraints
-  2.2km Proposed Improvement Scheme
-  Constraints Area

TITLE:	
Infrastructure Constraints	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO:	
5.1	
CLIENT:	
Clare County Council	
SCALE:	REVISION:
1:12,403	0
DATE:	PAGE SIZE:
22/05/2020	A3



There are many access points along this section of the N19, particularly along the later section of the scheme just east of Knockbeagh Point Roundabout. All of these accesses contribute to reduced safety along the route. Local accesses include those to the apartment blocks, various businesses and car park areas.



Plate 5-8: Typical Local Accesses

5.4.2 Railway

There are no existing railways in the study area, but a Shannon Rail Link Feasibility Study was undertaken by MVA Consultancy for Iarnród Éireann in 2007. The conclusion of the report is that the provision of a rail link with its initial high capital cost is at best a long-term objective as the then low cost-benefit ratio would be a very poor return on the expenditure. A proposed route was identified and described in the report. The report did not involve any detailed engineering assessment.

Clare County Council in ensuring they plan for the long term have included in the current County Development Plan 2017-2023 Objective CDP8.15 - It is an objective of the Development Plan: To safeguard the route of the proposed Shannon Rail Link and permit development where it is demonstrated it will not inhibit the future development of the selected route as a rail link and objective LAP 4.4 of the Shannon Town and Environs Local Area Plan 2012-2018 Objective LAP 4.4 - To reserve a corridor that will facilitate the future provision of a rail link to serve Shannon Airport. Refer to Section 7 for further information.

The proposed corridor is a constraint that requires to be considered in developing the proposed scheme and is illustrated in Plate 5-8 below.



Plate 5-9: County Development Plan – Proposed Rail Corridor (from CAD file provided by CCC)

5.4.3 Shannon International Airport

The existing N19 National Primary Route is the only public access serving Shannon International Airport. Shannon International Airport serves a catchment area which extends northwards to Galway and beyond and southwards to Cork and Kerry. Shannon is the closest long-haul airport for 40% of the State's population and is the principal gateway for the Wild Atlantic Way.

The airports operations and infrastructure consisting of terminal buildings, runways, hangers, parking facilities and services are constraints that need to be considered in developing the scheme.



Plate 5-10: Airport Boundary Fence

5.4.4 Public Transport

Bus Services

Three scheduled bus services operate to and from Shannon Airport – the 51, X51 and 343 (all operated by Bus Éireann). The 51 and X51 are Expressway services, and only stop at one point in the vicinity, Shannon Airport itself. Both services travel along the N19, the most direct route back to the N18/M18.

The 343 is a local route, which serves the Airport but also serves stops in the adjacent Shannon Business Parks and Shannon Town. There is one bus stop for this route on the N19 just east of Knockbeagh Roundabout.

No other services are currently planned by the National Transport Authority for this area. The National Transport Authority recommended that further discussion regarding any potential for future bus service changes, corresponding to development objectives within the Shannon area are communicated during the design phase of any potential scheme.



Plate 5-11: Existing Bus Stop

Taxis

There is a taxi rank at the airport and the operators of same must use the existing N19 National Primary Route as the only public access serving the airport.

Private Buses

The airport is very reliant on coach operators for the collection and return of passengers serving European and Transatlantic flight operators.

5.4.5 Non-motorised Transport

Pedestrians

There are existing footpaths along the N19 in places, but they are not compliant with standards and are in a poor condition. In addition, they do not provide proper control at junctions and accesses to cater for safe crossing of pedestrians



Plate 5-12: Section of existing footpaths

Cyclists

There are no dedicated cycle facilities on the route. This forces cyclists to use the existing N19 carriageway.

5.4.6 Safety Implications of Project Development

There were only two recorded collisions on the study area section of the N19 Shannon Airport Access Road, the single carriageway section between Drumgeely roundabout and Knockbeagh Point roundabout, for the five years 2012 – 2016. The injury collisions were minor which reflects the type of road and the lower speeds. The collision rate, in injury collisions per 100 million km travel per year over the five years from 2012 to 2016 is 8.5, which is low.

The main safety implication in the project development is in terms of safeguarding vulnerable road users. Cycle facilities are currently not provided, pedestrian facilities are narrow and lack suitable safety control at junctions and street lighting is absent for 0.5 kilometres of the existing route.

5.4.7 Waste

There are no licensed waste management facilities in the environs of the study area. As the project progresses through route selection and EIAR, waste management will be assessed. TII have published 'Management of Waste from National Road Construction Projects', which sets out the legal framework in relation to the management of waste and sets out good practice to ensure that effective waste management is a priority through the design and construction stages of national roads projects.

The aim is to minimize environmental impacts related to construction waste from road schemes and to reduce the volume of waste. These guidelines facilitate compliance with the provisions of the Waste Management Act 1996, as amended.

5.5 Conclusions

Based on the review of the proposed study area, constraints have been identified above in relation to engineering both existing and proposed that will need to be considered in the development of the scheme.

6 TRAFFIC

6.1 Existing Traffic Volumes

There is a permanent traffic counter on the N19, with data available from February 2019 onwards. As shown in Figure 6.1, this records traffic levels on the section between the Shannon Town and Drumgeely roundabouts. TII's published estimate of 2019 AADT flow at this site is 12,680 vehicles per day, with 3.1% heavy vehicles.

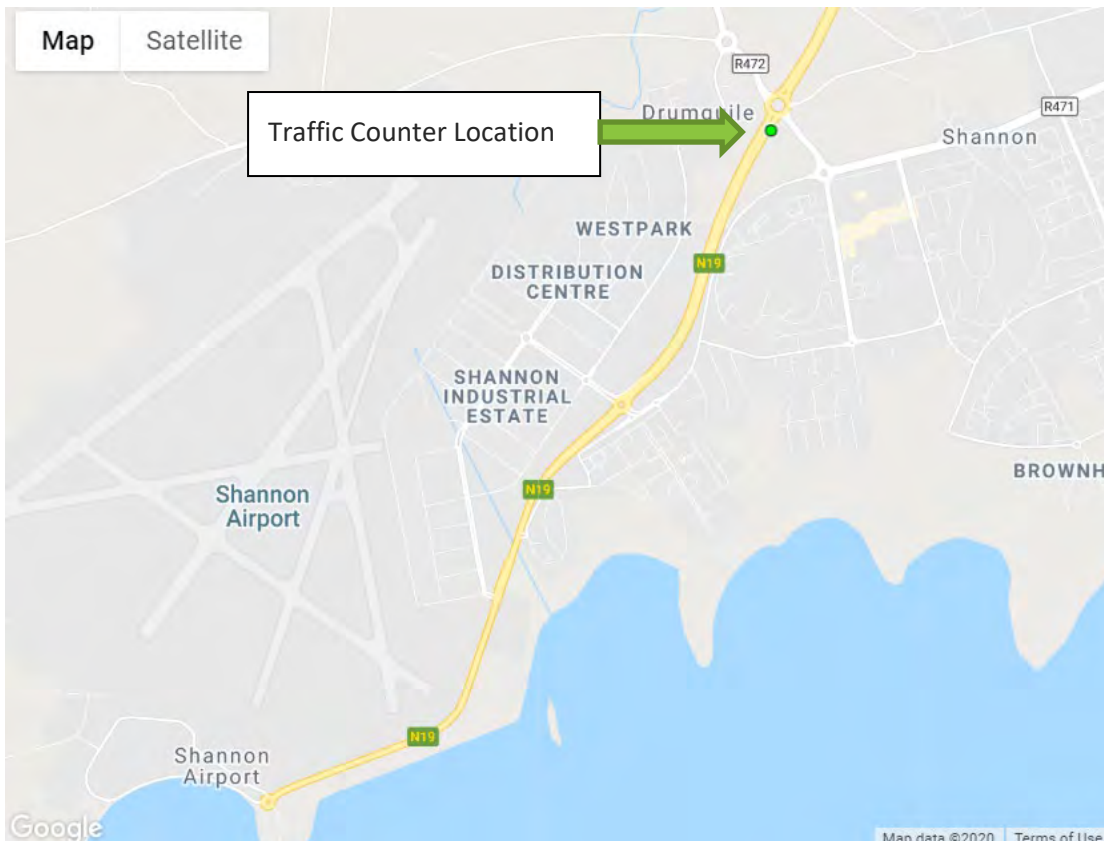


Figure 6-1: Location of permanent counter

Traffic counts were carried out on the section between the Drumgeely Roundabout and the Gateway West roundabout over 14 days in November/December 2017. These show an average daily flow of approximately 8279 vehicles per day AADT, with 6% heavy vehicles.

A similar count on the section between the Knockbeagh Point roundabout and the Gateway West roundabout gives an estimated 4243 vehicles per day AADT.

These figures will be updated as the study progresses.

It is noted that airport passenger-related trips are seasonal. Shannon International Airport have confirmed that the busiest period of their year is in late August. November would be a relatively quiet month.

Traffic to and from the airport also tends to be concentrated into short periods of the day, before and after the arrival and departure of large passenger aircraft, and before and after changes of shift. So that the intensity of use of the N19 is higher than if traffic were evenly spread across the day, as would be the case on many routes.

6.2 Traffic Speeds

Journey time surveys were undertaken in November 2017, using the “moving observer” method. The average journey time recorded was 3 minutes 11 seconds for the 2.15 km journey between Knockbeagh roundabout and Drumgeely roundabout, an average speed of 40.5 kph.

6.3 Traffic Growth

Existing issues within the N19 corridor need to be viewed in the light of projected traffic growth rates.

Both the growth in employment-related trips to and from SFZ (West) and the growth in airport-related trips to and from Shannon International Airport have the potential to be significantly higher than rates of background traffic growth.

Quantifying the likely range of outcomes in travel demand for these two key destinations will be a key element of the traffic studies being carried out as part of the current project.

6.4 Road Safety Issues

Data on reported collisions causing personal injury is published by the Road Safety Authority. The results show a number of low-speed collisions on the N19 causing minor injury, and these tend to be clustered at the roundabouts.

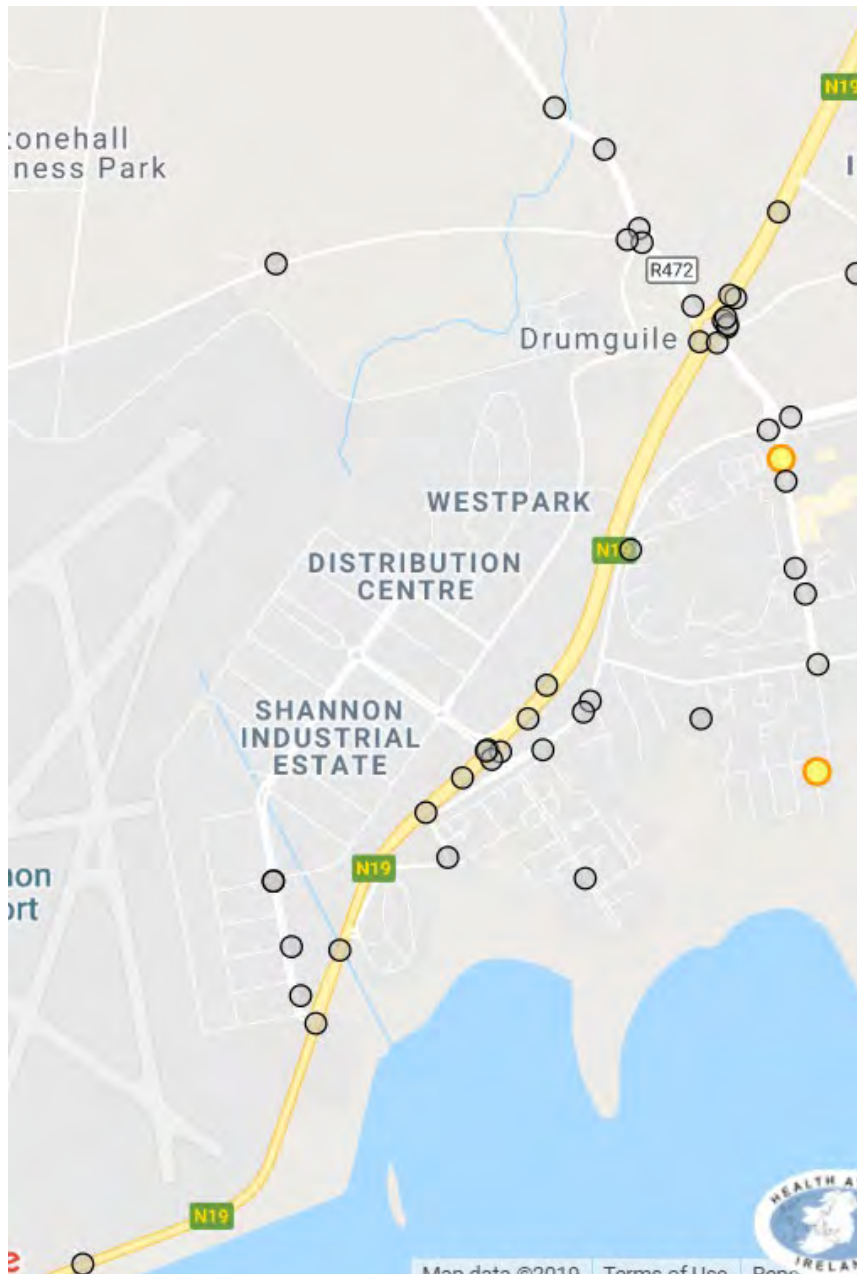


Figure 6-2: Published Data on Injury Collisions 2005 – 2016 (source: RSA)

The safety issues of the existing road relate to poor-quality pavement, sub-standard cycling and pedestrian facilities, lack of lighting and inconsistency of road standard.

As part of the Phase 1 work, a Road Safety Impact Assessment Audit was undertaken. This indicated that the main road safety concern on the N19 is the number of rear-end and cyclist collisions. Therefore, any scheme option that addresses these issues will be positive from a road safety point of view.

6.5 Traffic Summary and Conclusions

Traffic counts have been conducted between Drumgeely and Gateway West roundabouts and show an average daily flow of ca. 8279 vehicles per day AADT with 6% heavy vehicles. Between Knockbeagh Point roundabout and the Gateway West roundabout, the count showed a flow of 4243 vehicles per day AADT. Traffic flows to and from the airport tend to be concentrated into short periods of the day, before and after the arrival and departure of large passenger aircraft and before and after changes of shift. Passenger-related trips are also seasonal, with later August being the busiest period.

7 PLANNING AND LANDUSE

7.1 Planning Policy

Planning policy as set out below is divided into 3 no. sections in line with the Irish Planning Hierarchy, 1) National Policy, 2) Regional Policy and 3) Local Policy. National Policy is discussed in relation to the National Planning Framework and National Development Plan. At a regional level, the N19 study area is located within the regional jurisdiction of the Southern Regional Spatial & Economic Strategy which sets out strategic policy objectives for the Southern Region. At local level, the area falls within the Clare County Development Plan 2017 – 2023 (as varied) and the Shannon Town and Environs Local Area Plan 2012 - 2018 (As Amended).

7.2 National Policy Context

The National Development Plan (NDP) was published in 2018 and sets out a 10-year investment plan for national infrastructure. A strategic goal included in the NDP is for the enhancement of regional accessibility and places the National Road Network as a Strategic Investment Priority. In order to encourage balanced regional development, a particular priority is delivering the Atlantic Corridor, a high-quality road network linking Cork, Limerick, Galway and Sligo. Furthermore, the NDP supports Shannon Airport as a key tourism and business gateway for the region, in line with the National Aviation Policy (2015).

The NDP is supported by the National Planning Framework (NPF) which is the Government's high-level strategic plan for shaping the future growth and development of the country. The NPF shares the strategic outcomes as listed in the NDP, including the enhancement of regional accessibility and maintaining the strategic capacity and safety of the national roads network including planning for future capacity enhancements. With respect to the Southern Region, the NPF recognises Shannon Airport as having an established role as a key travel and enterprise hub for the region, with potential for further growth.

7.3 Regional Policy Context

7.3.1 Southern Regional Spatial and Economic Strategy

The Southern Regional Spatial and Economic Strategy (RSES) is a 12-year strategic regional development framework to guide change for the Southern Region. It establishes a broad framework for the way in which society, environment, economy and the use of land should evolve. It is an Objective of the RSES to sustainably maintain, support and enhance the Region's International Connectivity Transport Network including the Trans European Transport Network (TEN-T) which seeks the development of a Europe-wide network of railway lines, roads, inland waterways, maritime shipping routes, ports, airports and railroad terminals (RPO 140).

The RSES sets out the priorities for the forthcoming Limerick-Shannon Metropolitan Area Transport Strategy and details transport investment objectives for the region, including the maintenance and enhancement of the national roads network, catering for transport demand within the Limerick-Shannon Metropolitan Area, for improved inter-urban, inter-regional connectivity, reduced journey times and for improved access to international gateways, including Shannon International Airport.

7.3.2 Limerick-Shannon Metropolitan Area Strategic Plan

The RSES details the Draft Limerick Shannon Metropolitan Area Strategic Plan (MASP). With respect to strategic road infrastructure, Objective 8 of the MASP aims to maintain and deliver the sustainable development of strategic road infrastructure, including the upgrade of the N19 road access to Shannon International Airport. The MASP supports the ambition to create a rail link between Limerick City and Shannon International Airport as detailed in Policy Objective 7.

7.4 Local Policy Context

7.4.1 Clare County Development Plan 2017 – 2023 (as varied)

Clare County Development Plan (CDP) sets out an overall strategy for the proper planning and sustainable development of the functional area of Clare County Council. With respect to the economic development of Shannon Airport, the CDP sets out objectives relevant to the project, including:

- To support the future sustainable development and expansion of Shannon International Airport and its continued role as a key driver of economic growth in the region (CDP6.4 A);
- To facilitate the improvement/upgrade (as necessary) of key infrastructural resources within the airport, the airport lands and the N19 providing access to the area (CDP6.4 C);
- To safeguard current and future operational, safety, technical and development requirements of Shannon International Airport; (CDP8.9 B)

Table 8.2 of the CDP intensifies proposed projects for future development which includes the upgrade/extension of the N19 to Shannon Airport. It is an objective of Clare County Council to provide and/or facilitate the projects identified in Table 8.2 where necessary, and to ensure that such road infrastructure is designed and constructed to fulfil its intended purpose.

Section 8.2.5 of the CDP states the following: “Connectivity to/from Shannon International Airport is essential to ensure that it can continue to grow and make a significant contribution to the local, regional and national economy in the future. Road connectivity to the airport is currently provided via the N19, which provides a link to the national motorway network. The Council will support the upgrade of the N19 during the lifetime of this Plan (see Objective CDP6.4(c)).”

The Infrastructure, Environment and Flood Risk Zones map of the CDP (Map Reference I11 of the CDP) identifies the N19 route as an “Infrastructure Safeguard (rail)”. It is intended that land zoned ‘infrastructure safeguard’ will be reserved for the existing and future provision of key infrastructural services and the upgrading of existing services and infrastructure relating to road, rail, air, electricity, telecommunications, gas, water and wastewater treatment services. The map identifies the area as Flood Zone A, however, the flood risk assessment of the existing Shannon Flood Defences eliminates potential flooding at the N19 study area.

7.4.2 Shannon Town and Environs Local Area Plan 2012 - 2018 (as amended)

The Shannon Town and Environs Local Area Plan (LAP) sets out the land use plan for the proper planning and sustainable development of the settlement of Shannon and its environs. The Land Use Zoning Map of the LAP identifies the lands of the N19 as 'Airport' and white lands (unzoned existing road corridor).

Appendix 1 of the LAP details the definitions of Land Use Zonings. Airport is not defined in Appendix 1 of the LAP. However, chapter 4 of the LAP details objectives and policies for Shannon International Airport which states that the airport area is designated as a Strategic Development Area (SDA). SDAs are defined in Appendix 1 of the LAP as follows:

Strategic Development Areas

'Strategic Development Areas' are areas identified within the plan area where specific planning and development objectives, land use policies and or master development plans have been identified for the future development of such designated area.

Objective 4.1 of the LAP aims to facilitate the development and expansion of Shannon International Airport within the designated Strategic Development Area, subject to the requirements of Habitats Directive Assessment, to include:

- Airport operational activities and uses complementary to the operation of the airport,
- Aircraft maintenance/cargo handling facilities related to airport activities,
- Business park use, primarily related to airport servicing, management and maintenance activities,
- Long-term aircraft maintenance, air-freight cargo handling facilities,
- Future runway / taxiway(s),
- Innovative initiatives, such as a residential flight school, global logistics centre for humanitarian aid, unmanned aerospace systems (UAS), centre for space collaboration and research.

Objective 4.2 of the LAP aims to safeguard and facilitate the improvement/upgrade of (as necessary), the key infrastructural resources within the Airport lands, including the wastewater treatment plant, airport lands water supply, storm water network and fuel depot, subject to the requirements of a Habitats Directive Assessment.

LAP Objective 4.4 and 12.2 set out an aim to reserve a corridor to facilitate a future rail link to serve Shannon airport. Furthermore, the Infrastructure zoning map identifies the N19 route as Proposed Shannon Airport Rail Link (IS3) and Proposed Fibre Duct. The rail link corridor appears to run alongside the N19, crossing the existing road at a point at the east of the study area. An extract of the Infrastructure Map relevant to the N19 upgrade project is illustrated in Figure 7-1. Land Use Zones as defined in Appendix 1 of the LAP state the following with respect to IS3 – Shannon Rail Corridor:

"The Council will retain and protect the indicative rail corridor (infrastructural safeguard) for Shannon identified on the map B accompanying this plan. A rail link to Shannon Airport and Shannon town is considered to be critical for the growth of the Limerick-Shannon-Ennis area. A route has been identified for such a rail link, and this Local Area Plan makes provision for either a heavy rail or light rail link into Shannon town."

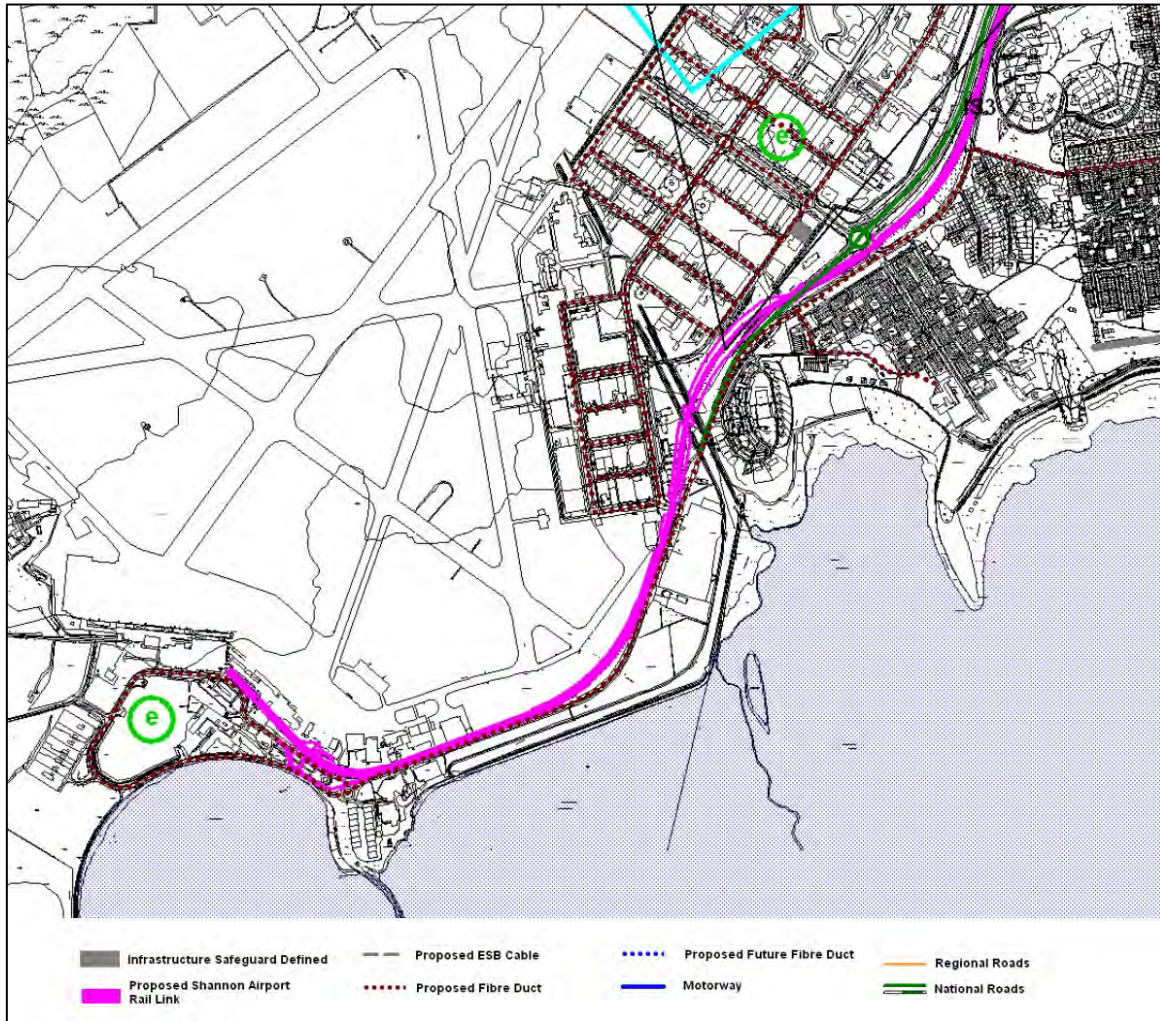


Figure 7-1: Infrastructure Map from Shannon Town and Environs LAP

Detailed design of the Shannon Rail Link project has not yet been undertaken and the route as illustrated in figure 7-1 is therefore indicative. However, the proposed upgrade project should take cognisance of the policy to provide a rail link.

7.5 Planning Policy Summary and Conclusions

The upgrade/extension of the N19 to Shannon Airport is identified as a project priority in the Clare County Development Plan 2017 – 2023, as varied, and its inclusion in the Southern Regional Spatial and Economic Strategy and the LSMATS reinforces this local policy priority. While the Shannon Town and Environs Local Area Plan 2012 – 2018 does not include any reference to the proposed upgrade of the N19, it is eight years (extended to 2022) since it was made and is considered subservient to the County Development Plan.

The Shannon Airport Rail Link Corridor, as contained in the Clare County Development Plan 2017-2023, is identified as a route to be safeguarded from development or other activities that would compromise its future development. This proposed Shannon Rail Link was taken from the Shannon Rail Link Feasibility Study, 2007 and a detailed engineering assessment has yet to be completed.

In this context, the recently published Southern Regional Spatial and Economic Strategy supports the ambition to further investigate a rail link between Limerick City and Shannon International Airport.

In the interests of the proper planning and development of Shannon, it is important that during the planning and design stages of the proposed upgrade of the N19 that the County Development Plan's Rail Link corridor objective is protected. It is probable that the proposed upgrade of the N19 will significantly impact on the safeguarded rail route as illustrated in Map Ref I11 of the County Development Plan. With regard to the above, engagement between the N19 Project Team and Clare County Council Planning Department will be required to inform any inputs/revisions to the development plans for the purposes of progressing the required variations through the statutory processes. Any alteration to the rail line infrastructure safeguard route will be subject to an amendment to the Shannon Town and Environs LAP 2012- 2018 and a variation to the Clare County Development Plan 2017- 2023, or any future version of either of these documents.

7.6 Land Use

The N19 study area includes a range of land use zonings as detailed in Appendix 1 of the Shannon Town and Environs Local Area Plan (as amended). An extract of the Land Use Zoning Map is illustrated in Figure 7-2. A large section to the west of the study area is zoned as 'Airport' with no specific land use definition detailed in Appendix 1 of the LAP. The lands of the study area located outside of the 'Airport' designation and road corridor area include zonings for Enterprise (E1 & E4), Community (C1 & C17), Light Industry, Open Space (OS6) and Existing Residential.

These various zoning designations are defined as follows:

Enterprise Development

Lands zoned for 'enterprise development' shall be taken to include the use and development of lands for light industrial, high-end research and development, science and technology based industry, financial services, call centres, incubator and small/medium manufacturing purposes, corporate offices excluding general retail, retail park outlets, motor sales and heavy industrial undertakings.

Enterprise Development (E1) Shannon Free Zone West

The plan provides for the redevelopment and regeneration of Shannon Free Zone West.

Enterprise Development (E4) Airport Enterprise Site

This site occupies a prominent gateway position on the approach to Shannon International Airport and has convenient road access. The site has potential to accommodate business park use.

Community

The development of lands for Community uses shall be taken to include the use of land for community, public or educational uses, including the provision of schools, community halls, health care institutions, utilities, libraries and the development of other community uses. Ancillary facilities such as dedicated open space and sports facilities will also be facilitated within this type of zoned land.

Community (C1) Mary Immaculate Church

No specific LAP objective.

Community (C17) Community Site

Community Site C17 has the potential to accommodate support structures for community activity. However, the site or part thereof, shall if required, be considered for airport security.

Light Industry

The use of land for 'Light Industry' shall be taken to include the use of land for industry/manufacturing, distribution, open storage, transport operating centres and the treatment and recovery of waste materials. A mix of uses such as 'office-based development' and or 'retail development' is not considered appropriate in areas zoned for 'Light Industry'.

Open Space

The use of land as 'Open Space' shall be taken to include the use of land for afforestation, playgrounds, housing estate open spaces, landscaped areas and parks. Developments incidental to the enjoyment of open space including sports centres, outdoor recreation centres and landscapes areas, play equipment, dressing rooms and similar facilities are open for consideration. There may be limitations to what 'Open Space' can allow, particularly in relation to sensitive ecological sites.

It should be noted that lands zoned as Open Space are not necessarily in public ownership and members of the public should not automatically assume that access to the lands is permitted.

Open Space (OS6) Drumgeely Hill

This site, which is surrounded by the existing residential development on Drumgeely Hill, shall be retained as an open space amenity area for the local community.

Existing Residential

The use of land for existing residential development and uses that enhance existing residential communities.

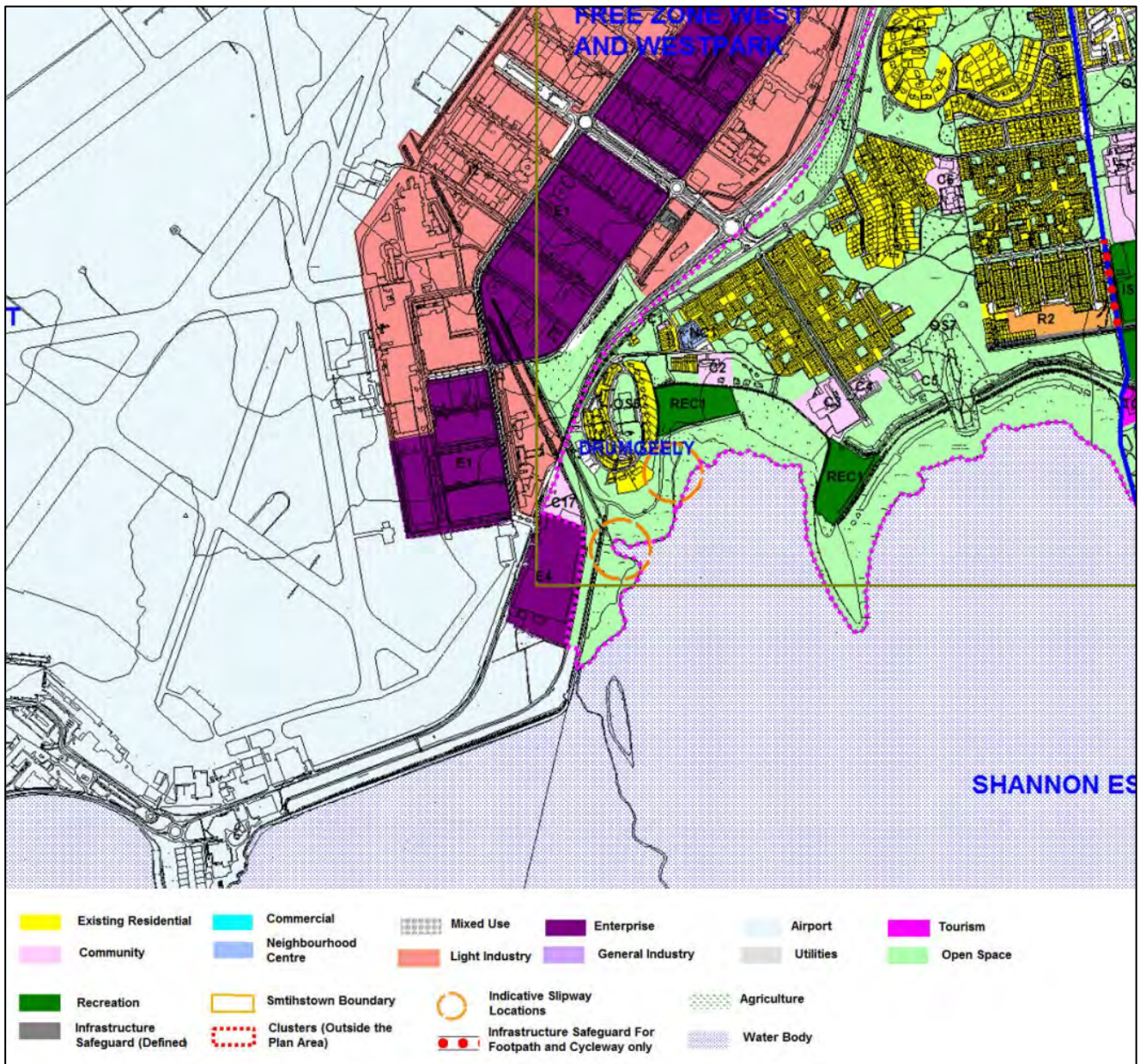


Figure 7-2: Land Use Zoning Map from Shannon Town and Environs LAP

The N19 study area is located adjacent a range of land uses as identified by the land use zoning objectives detailed above. Furthermore, the existing road provides access to Shannon International Airport and airport related services at the western extent of the study area, Shannon Free Zone Business Park to the north of the N19 and residential lands including small business and schools to the south of the N19.

Shannon International Airport is one of three state airports of the Republic of Ireland. Shannon Airport retains a critical role as a gateway to Ireland’s primary tourist locations and a driver for County and regional economic development. The Airport has both scheduled and chartered flights to a range of destinations and has 30 aircraft stands. The Airport operates 24 hours per day, 365 days per year. Total passengers in 2019 totalled approximately 1.6 million with over 13,000 passenger flights (CSO, 2020). The airport has car parking capacity of over 4,000 spaces. Within the airport area there are various ancillary services including fuel storage, car rental, taxi services hotel and golf club. The N19 is the core access route for the Airport and ancillary services.

The Shannon Free Zone is an international business park located adjacent the airport, to the north of the N19 study area. It is managed by Shannon Commercial Properties, a commercial semi-state company. Currently there are over 150 companies and more than 9,000 people employed at Shannon Free Zone in a diverse range of activities.

The business park consists of advanced manufacturing, distribution, warehousing, storage and logistics businesses, with complementary small-scale business such as cafes. A large part of this business park is made up of low density 'northlight' factory units. The business park is accessed from the N19 at the Drumgeely Roundabout and Gateway West Roundabout, both of which are within the scope of works for the N19 upgrade.

An area of vacant land is located south of the Shannon Free Zone Business Park. Currently there is a large hardstanding area adjacent an area of greenspace. These lands are zoned E4 – Airport Enterprise and C17 – Community Site.

On the opposite side of the N19 to the Shannon Free Zone Business Park, to the east of the N19 study area, there is a significant residential area consisting of terraced and semi-detached houses and a number of apartment blocks. Included in this area are neighbourhood services, schools and recreation areas. Access to these residential areas can be made from the N19 at Drumgeely Roundabout and a separate junction at Drumgeely Hill. Alternative road access is available from the Drumgeely Road.

To the south and east of the existing N19 the study area is bounded by an existing flood protection embankment which is currently the subject of a Flood Protection Improvement Scheme which will likely consist of raising the existing embankments and hence increasing its footprint as well as provision of coastal protection works in the form of rock armour.

There are 3 no. Seveso sites within Shannon settlement and environs. These include the following:

- Shannon Airport Authority's aviation fuel farm (consultation distance of 700m) located ca. 1.2km west of the study area.
- Avara Shannon Pharmaceutical Services (consultation distance of 1000m) located ca. 600m north west of the study area.
- Enva Ireland (consultation distance of 1000m) located ca. 2km north east of the study area.

In line with the requirements laid down by Directive 96/82/EC, as implemented by the European Communities (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2000, SI No 476 of 2000. The National Authority for Occupational Safety and Health, as the Central Competent Authority, is obliged to provide technical advice to the Planning Authority in case of relevant decisions taken relating to specified development within the vicinity of existing Seveso site areas. As the N19 upgrade scheme is within 1000m of the Avara Pharmaceutical plant, the planning application will be referred to the HSA. It is unlikely that the presence of the Seveso site will impact on the N19 upgrade scheme.

In relation to future development and future plans and projects in the area, the National Development Plan sets out details of investment by the Shannon Group. The Shannon Group's Capital Program aims to invest over €150 million. This includes €100 million for the development of the property portfolio which is designed to deliver high quality advanced manufacturing, warehousing and office space solutions. Also included in this capital programme, is the construction of a wide body paint hangar at Shannon Airport.

Between 2019 and 2028, phased development of additional commercial and industrial floor space will be completed in support of economic development in the Shannon Free Zone.

This will provide a significant number of new jobs, increasing the numbers employed in the Shannon Free Zone, therefore increasing traffic flow on the N19.

Due to the N19 scheme, it is likely that access constraints will occur at the Shannon Free Zone West for both employees and construction workers associated with the proposed future developments. This impact will be temporary in nature.

7.7 Land Use Summary and Conclusions

In conclusion, potential conflict may arise to the various land uses due to access constraints during the construction of the N19 upgrades. The core land uses which rely on the N19 route for access are the airport and ancillary uses located in and around the airport terminal area, and the Shannon Free Zone Business Park where two of the primary access points are located on the N19. Residential access will be impacted however, an alternative route is available. Once delivered, the project will benefit these land uses, improving accessibility, capacity and safety.

Existing land use zonings will not be significantly impacted by the project, however, Airport Enterprise Site E4 and Community Site C17, both located between the N19 and the Shannon Estuary, may become segregated if appropriate access is not provided in the design of the project.

8 SOILS, GEOLOGY AND HYDROGEOLOGY

8.1 Soils & Geology

8.1.1 Introduction

This chapter outlines the geology, hydrology and hydrogeology of the Study Area for the proposed scheme. This includes the bedrock and soil types and details of soft or unstable ground, which may affect the route of the proposed Scheme.

8.1.2 Methodology

The study has been carried out in accordance with National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, NRA, 2009.

An initial desktop study of the soils and bedrock conditions was undertaken with information published by Geological Survey of Ireland, and other referenced sources of information, as appropriate. In addition, borehole information was available for several sites in and around the Study Area, giving general information on depth to bedrock and bedrock type. A Geophysical Survey undertaken in 2018 along the existing airport access road was also used.

8.1.3 Sources of Information

Research for the constraints study was undertaken as a desktop exercise. The following sources were consulted in order to identify soils and geological constraints:

- Aerial imagery from Google and Bing accessed in 2020
- Current and historical (6 inch and 25 inch) Ordnance Survey maps
- Mapping data of the area produced by the Geological Survey of Ireland (GSI)
 - Quaternary geology
 - Bedrock Geology
 - Karst features
 - Geological Heritage features
 - Aggregate potential
 - Landslide susceptibility
- Sleeman, A.G. and Pracht, M. (1999) Geology of the Shannon Estuary, Sheet 17, Shannon Estuary
- Datasets from the EPA
- Ground investigation reports held by the GSI for the area
- Ground Investigation reports from adjacent schemes
- Geophysical Survey (Minerex, 2018) along the existing airport access road.

8.1.4 Geomorphology

The GSI have carried out detailed mapping nationwide of Quaternary geology, including Teagasc subsoil mapping, subsoils, permeability mapping, depth to bedrock mapping and geomorphology mapping.

The geomorphology of the area around Shannon Airport has been affected by the last two glaciation events. The main geomorphological features are a series of drumlins typically running NNE-SSW, present mainly to the north and east of the study area. The majority of the area around the airport comprises flat to gently undulating sediments, part of a coastal plain. This is characterised by the presence of alluvial and estuarine sediments.

Due to the overall low-lying, flat to gently sloping topography over the entire study area, landslide geohazards are not expected to be a major constraint. No landslide scars have been noted from the reviewed aerial photographs.

Unconsolidated, soft alluvial sediments, present throughout the study area, are likely to impose settlement problems on earthworks.

8.1.5 Solid Geology

The study area is underlain by the Ballysteen Formation, which is described as a fossiliferous dark-grey muddy Limestone and the Walsortian Limestone, a pale grey fossiliferous micritic Limestone. To the northeast of Shannon Airport three other formations are present: the Ballymartin Formation, a Limestone and dark grey calcareous Shale, the Lower Limestone Shale, which comprises Sandstone, mudstone and thin limestone and the Old Red Sandstone, a red conglomerate, sandstone and mudstone which comprises red mudstones, siltstones and sandstones, and poorly sorted, polymict pebble conglomerates and breccias.

From the available ground investigation data, depth to bedrock ranges from 5 to 15m bgl.

Ballysteen Formation

The Ballysteen Formation is a Lower Carboniferous limestone comprising dark grey bioclastic wackestone, packstone and grainstone and shale-parted limestones, roughly divided into a lower and upper unit. The lower unit is generally an argillaceous wackestone. The upper unit is typically more argillaceous with the presence of black calcareous mudstones.

Walsortian Limestone

The Walsortian Limestone is typically described as a massive, unbedded, pale to dark grey calcilutites and biomicritic wackestones, with crinoid fragments, frequently with sparry cavities.

8.1.6 Subsoils & Soils Deposits

8.1.6.1 *Soils (Teagasc Classification)*

The majority of the scheme is underlain by Made Ground, with an area of marine/estuarine sediments to the east of the existing N19.

8.1.6.2 Superficial Deposits

The superficial deposits within the scheme area include estuarine and alluvial deposits, glacial till derived from limestone and Made Ground. The Made Ground is characterised as both 'Urban' and 'Airport' with no further information provided.

During the Pleistocene epoch of the Quaternary two glaciations covered the Shannon region, however most of the sediments present are from the most recent glaciation period. The glacial till in the area was formed during this period. Following the end of the glaciation, deposition of alluvium has occurred along major rivers, such as the Shannon, along with the deposition of estuarine muds.

Made Ground

Made Ground is present within the study area as a result of housing, commercial and industrial developments related to Shannon Town, Shannon Airport and the Shannon Free Zone.

Glacial Till

Glacial deposits are typically sandy gravelly Clay based on GSI data and information from adjacent sites. These deposits are usually firm to stiff, however due to their low plasticity, they are susceptible to softening and deterioration in wet weather, especially if heavily trafficked. When the clayey tills are kept dry, they present relatively little difficulty to road construction.

Estuarine Silts and Clays

Marine estuarine sediments have been deposited at various locations along existing and former estuarine grounds close to the River Shannon. A deposit of estuarine silt and clay is present across much of the area around Shannon Airport. This material typically described as a very soft to soft sandy Silt.

Alluvium

Alluvial deposits are associated with the River Shannon, its tributaries and streams. These deposits are typically high plasticity silts and clays and may have an amount of organic content. They typically consist of normally or slightly over consolidated silt and clays or fluvial sands and gravels. Descriptions of alluvial deposits present along the existing River Shannon flood embankments indicate the presence of a very soft to soft grey sandy Silt. This deposit is likely to underly a significant proportion of the study area.

Soft ground presents a minor environmental constraint for any potential options within the scheme study area. Where these soft or 'unconsolidated' soils are present, they can pose geotechnical engineering challenges to construction solutions and engineering designs.

8.1.7 Contaminated Land

Sources of contamination within the scheme study area have been investigated and identified into the following four categories:

- Landfills (licensed and historical);
- Pits, quarries and mines (active and historical);

- Industrial facilities (licensed and historical); and
- Historical land use contamination.

Land contamination is highly related to site history and previous land use which can leave contaminants in the ground depending on historic site activities. The OSI historic maps were assessed to determine land uses within the scheme study such as factories, railway works, etc. that may provide a potential source of historic contamination. Most of the development around the airport has occurred in the past 60 years.

In 1996 the EPA began licensing certain activities in the waste sector. These include landfills, transfer stations, hazardous waste disposal and other significant waste disposal and recovery activities.

These are potential geological constraints as they may act as areas of contamination. There is however no EPA licensed waste facility recorded within the study area.

No definite areas of contaminated land are currently known, although the likelihood of such cases in proximity to a town is historically very high. Existing industrial sites may be the source of locally contaminated land due to site activities. However, these sites operate within the EPA Integrated Pollution Control (IPC) licence framework and due to the regulated nature of their activities, the risk of contamination is low.

Sites which have been granted a wastewater discharge licence may be a source of contamination. However, there are no wastewater discharge licensed sites within the study area.

8.1.8 Economic Geology

The economic geological features within the scheme study area are divided into the following:

- Granular aggregate potential
- Active mines and quarries
- Mineral resource locations

There are no recorded active pits, mines or quarries within the study area. The nearest quarry is located between Shannon and Bunratty and is described as an active limestone quarry.

There are two historic pits recorded to the north and west of the study area, however there is no further information about either of these locations. A historic gravel pit is also recorded to the west of the study area.

An area of very low granular aggregate potential is located to the west of Shannon Airport, and an area of moderate potential is present in the north of the study area. Both areas are localised.

Two mineral resource locations have been identified by the GSI to the southwest of the Airport. These are described as:

- An area of potential brick clay in the townland of Rineanna
- A red marble quarry referenced as being shown on an old GSI 6-inch map, but not shown on OSI mapping

These appear to be historic in nature, and neither of these two areas appear to have been significantly worked.

8.1.9 Geological Heritage

A single geological heritage site is noted at Rineanna Point, located approximately 3km to the west of the study area. This is described as an exposure of the base of the Carboniferous Waulsortian limestone along strike on a shore section on the southern shore of Rineanna Point, comparable to the Deel River section on the opposite side of the Shannon in Limerick.

8.1.10 Landslides

There are no records of landslides within the study area. The nearest recorded landslide is at Ayleacotty, 8km to the north of Shannon Airport, and is described as the collapse of a steep railway bank which occurred in 2009. The area around Shannon Airport is described as having low landslide susceptibility.

8.1.11 Inventory of Geological Constraints

The geological constraints affecting the study area include the following:

- Soft ground including alluvium and estuarine deposits
- Made Ground and Contaminated Land

8.1.12 Soils and Geology Summary and Conclusions

Based on a desktop review of the Soils and Geology within proposed study area, the main constraint is the presence of soft alluvial soils across the study area. The presence of these soils will require suitable engineering solutions to be developed as part of the design process.

8.1.13 Sources of Information & References

The following sources of information were used:

- Geological Survey of Ireland, Digital Mapping, 2020 (<https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx>);
- Environmental Protection Agency, Digital Mapping, 2020 (<https://gis.epa.ie/EPAMaps>);
- Geological Survey of Ireland, Directory of active quarries, pits and mines in Ireland, 2001;
- Ordnance Survey of Ireland. (2020) GeoHive. OSI Online Mapping. Available from: (<http://map.geohive.ie/mapviewer.html>).
- Sleeman, A.G. & Pracht, M., 1999, Geology of The Shannon Estuary, A geological description to accompany the Bedrock Geology 1:100,000 Map Sheet 17, Geological Survey of Ireland;
- NRA, 2008, Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;

8.2 Hydrogeology

8.2.1 Introduction

This section identifies the hydrogeological constraints identified within the study area.

8.2.2 Methodology

This assessment was prepared taking cognisance of the requirements of the NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, NRA 2009'.

The assessment is based on a review of the results of a desk study and available ground investigation results. The desk study included a review of the information sources listed in the Soils & Geology section to identify the constraints associated with hydrogeology within the study area.

In compiling the hydrogeology constraints consideration has been given to data acquired by other disciplines in particular the Soils and Geology, Ecology and Hydrology constraint studies.

The assessment considers the features identified under the following hydrogeological headings:

- Aquifer type and classification
- Aquifer vulnerability
- Karst
- Groundwater Resources; and
- Ecology

8.2.3 Aquifer Types & Classification

The Geological Survey of Ireland (GSI) has devised a system for classifying the aquifers in Ireland based on the hydrogeological characteristics, size and productivity of the groundwater resource. The three main classifications are Regionally Important Aquifers (RI), Locally Important Aquifers (LI) and Poor Aquifers (P). Each of these types of aquifer is further subdivided and has a specific range of criteria such as the transmissivity (m^2/day), productivity, yield and potential for springs associated with it. The GSI also provides a delineation of the extents for groundwater bodies within each aquifer.

The bedrock in the study area is classified as a Dinantian Pure Unbedded Limestones (Walsortian Limestone) and Dinantian Lower Impure Limestones (Ballysteen Formation). These rock units are classified as Locally Important aquifers, that are moderately productive in local zones.

The GSI has not identified any gravel aquifers within or in the vicinity of the study area. The GSI only designates a sand and gravel aquifer as being locally important if the area of aerial extent is greater than 1 km^2 and the saturated thickness is greater than 5m (or if the saturated thickness is unknown a full thickness of $<10\text{m}$).

8.2.4 Aquifer Vulnerability

Vulnerability of a groundwater body is the term used to describe the intrinsic geological and hydrogeological characteristics which determine the ease with which a groundwater body may be contaminated by human activities.

The vulnerability is determined by the permeability and thickness of the overlying deposits. For example, bedrock with a thick, low permeability overburden is less vulnerable than bedrock with a thin high permeability, gravel overburden.

The GSI has produced a vulnerability map for the Shannon region. The Study Area includes areas of variable vulnerability from extreme (rock near surface) to low vulnerability.

The most vulnerable sections of underlying aquifers are identified to the west of Shannon Airport where shallow bedrock is present.

8.2.5 Karst

No karst features are noted within the study area. The nearest known karst features are found in Ennis, approximately 16km to the north. However, the Ballysteen Formation is known to be karstified in areas, and as such the presence of unidentified karst features cannot be excluded.

8.2.6 Groundwater Resources

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

Source Protection Zones (SPZ) reports have been produced by the GSI and the EPA. The reports aim to guide development planning and regulation to provide protection from pollution to groundwater sources. To date no SPZ reports have been produced for locations within the study area.

Boreholes and springs (identified from GSI records) within the study area and in the surrounding lands are summarised in Table 8.1.

Table 8-1: Boreholes and Spring Abstractions within the scheme study area

ID	Source	Abstraction Type	Townland	Yield (m ³ /day)	Abstraction use
1115NEW005	GSI	Borehole	Rineanna North	35.4	Agri & Domestic Use
1115NEW006	GSI	Borehole	Rineanna	220	Agri & Domestic Use
1115NEW004	GSI	Borehole	Ballycally	10.9	Agri & Domestic Use
1115NEW016	GSI	Borehole	Lismaclean	54.5	Other
1115NEW025	GSI	Borehole	Carrigerry	110	Other

ID	Source	Abstraction Type	Townland	Yield (m ³ /day)	Abstraction use
1115NEW016	GSI	Borehole	Lismaclean	54.5	Other
1115NWW062	GSI	Borehole	Tullyglass	15.3	Agri & Domestic Use

8.2.7 Ecology

Groundwater dependent habitats may be impacted by any potential option through accidental contamination, localised flooding or the alteration of base-flow supplies to wetlands causing the area to dry out. A more comprehensive assessment of the impacts on ecology is presented in Section 9 Biodiversity. This section presents habitats that are present in the scheme study area and assesses if they are reliant on groundwater.

Sites of ecological importance recorded on the EPA mapping database close to the scheme study area are listed in Table 8.2.

Table 8-2: Ecological features close to the scheme study area

Site name	Site Code	Designation	Characteristics
Lower River Shannon SAC	002165	SAC	Estuary habitat
River Shannon and River Fergus SPA	004077	SPA	Intertidal flats. SPA under the EU Birds Directive.
Fergus Estuary and Inner Shannon, North Shore	002048	pNHA	Intertidal Flats

8.2.8 Hydrogeological Summary and Conclusions

The nature and potential of the groundwater environment has been assessed. The main hydraulic unit for groundwater flow across the entire Study Area is the bedrock, which is classified as locally important and moderately productive in local zones. No sand or gravel aquifers have been identified within or in the vicinity of the Study Area.

Aquifer vulnerability of the Study Area ranges from extreme (rock near surface) to low.

No karst features are noted within the Study Area. The nearest known karst features are found in Ennis, approximately 16km to the north. However, the Ballysteen Formation is known to be karstified in areas, and as such the presence of unidentified karst features cannot be excluded.

No SPZ reports have been produced for locations within the Study Area, boreholes and springs have been identified. Where the water table would be lowered as a result of excavation, the potential effects on local wells should be assessed. The lowering of the water table could reduce or eliminate the well yield.

A number of sites of ecological importance are located in the vicinity of the Study Area and are assessed in greater detail in Section 9 Biodiversity.

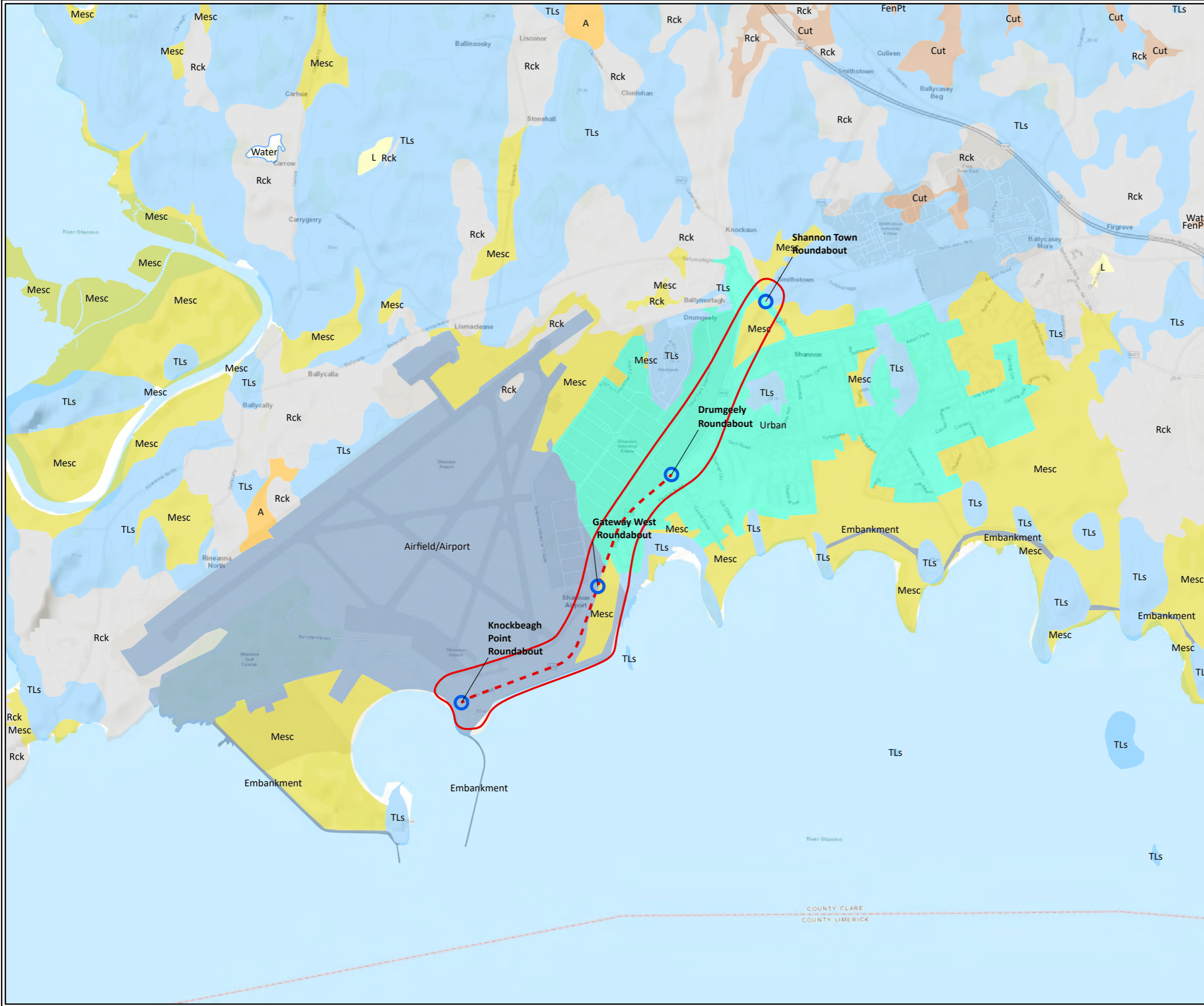
The hydrogeological constraints affecting the study area include the following:

- Boreholes and springs close to the Study Area
- Potential for unidentified karstic features in the bedrock
- The presence of the SAC/SPA/pNHA to the south of the Study Area

8.2.9 Sources of information & References

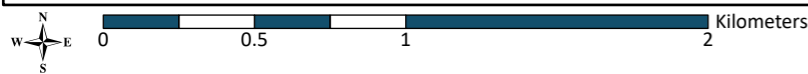
The following sources of information were used:

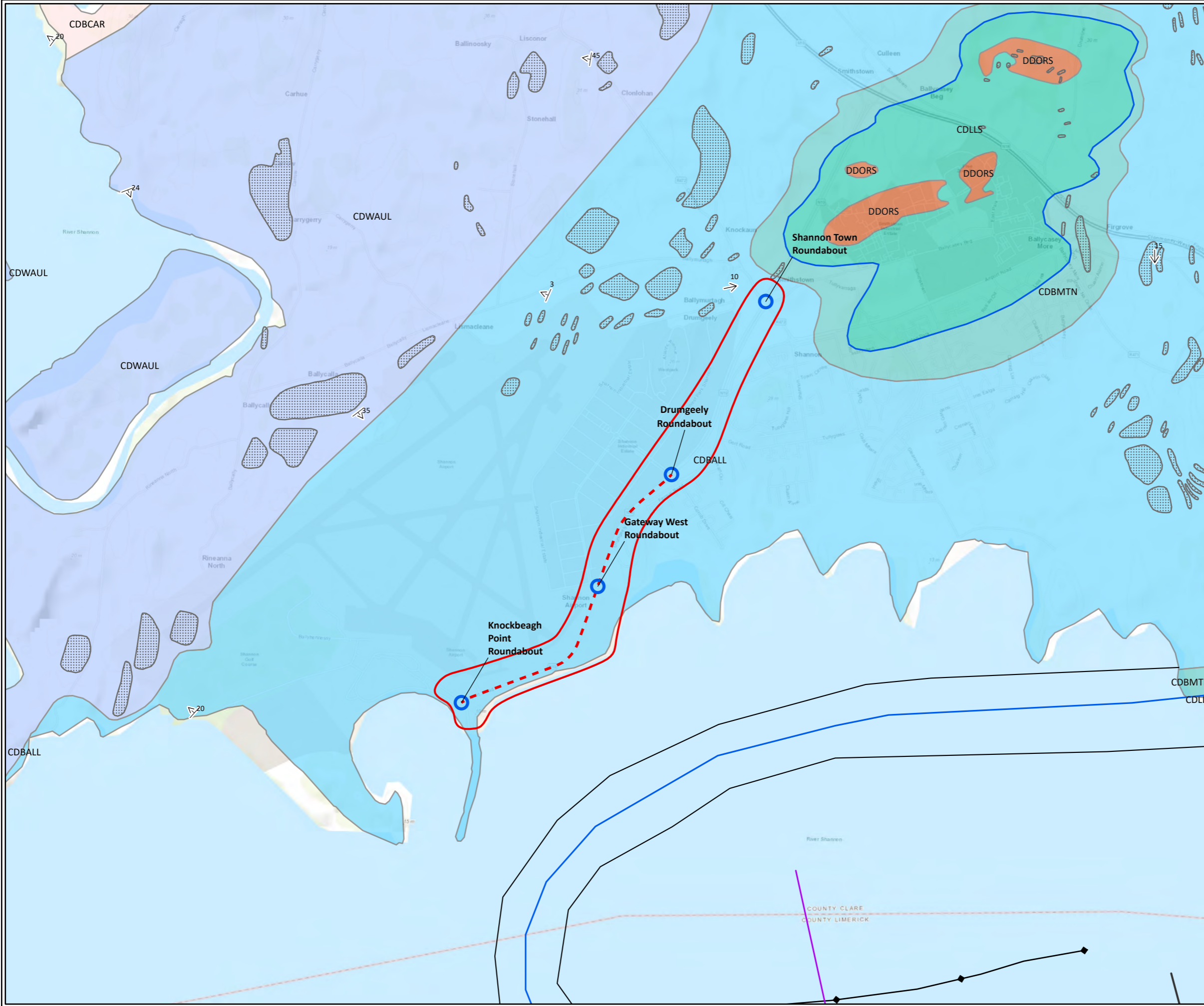
- Geological Survey of Ireland, Digital Mapping, 2020 (<https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx>);
- Environmental Protection Agency, Digital Mapping, 2020 (<https://gis.epa.ie/EPAMaps/>);
- Geological Survey of Ireland, Directory of active quarries, pits and mines in Ireland, 2001;
- Ordnance Survey of Ireland. (2020) GeoHive. OSI Online Mapping. Available from: (<http://map.geohive.ie/mapviewer.html>).
- Sleeman, A.G. & Pracht, M., 1999, Geology of The Shannon Estuary, A geological description to accompany the Bedrock Geology 1:100,000 Map Sheet 17, Geological Survey of Ireland;
- NRA, 2008, Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;



- - - 2.2km Proposed Improvement Scheme
- Roundabout
- Constraints Area
- Quaternary Sediments**
- A, Alluvium
- Airfield/Airport
- Cut, Cut over raised peat
- Embankment
- FenPt, Fen Peat
- L, Lacustrine sediments
- Mesc, Estuarine silts and clays
- Rck, Bedrock outcrop or subcrop
- TLs, Till derived from limestones
- Urban
- Water

TITLE:	Quaternary Geology		
PROJECT:	N19 Shannon Airport Road Improvement Scheme		
FIGURE NO:	8.1		
CLIENT:	Clare County Council		
SCALE:	1:25,000	REVISION:	0
DATE:	23/03/2020	PAGE SIZE:	A3





--- 2.2km Proposed Improvement Scheme

○ Roundabout

▭ Constraints Area

▨ Bedrock Outcrop

Bedrock Structural Symbols

↑ Dip of bedding or main foliation, old GSI data

↖ Strike and dip of bedding, right way up

Stratigraphic and Structural Linework

◆ Anticlinal Axis

— Fault

— Lithological boundary offshore

— Thin stratigraphical unit, diagrammatic

— X-Section

Bedrock Geology

■ Ballysteen Formation

■ Ballycar Formation

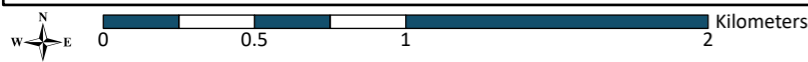
■ Ballymartin Formation

■ Lower Limestone Shale

■ Waulsortian Limestones

■ Old Red Sandstone (undifferentiated)

TITLE:	
Bedrock Geology	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO:	
8.2	
CLIENT:	
Clare County Council	
SCALE:	REVISION:
1:25,000	0
DATE:	PAGE SIZE:
23/03/2020	A3



9 BIODIVERSITY

9.1 Introduction

This section identifies the biodiversity constraints of the constraints area for the proposed scheme and includes watercourses, designated nature conservation sites (both national and European), any additional nature conservation sites, protected flora and fauna and the responses from consultation with statutory bodies.

9.2 Methodology

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the site's natural environment. Records available on the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC) and Environmental Protection Agency (EPA) websites including datasets and map viewers were reviewed. Geological Survey of Ireland (GSI) webviewer was also used to attain geological data. Aerial photography from the aforementioned map viewers as well as Google Maps (2020) was also used to assess existing vegetation links within the study area.

Cognisance has been paid to National Roads Authority's (NRA) guidelines and include '*Guidelines for Assessment of Ecological Impacts of National Road Schemes*' (2009a), and '*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (2008a) and '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*' (2008).

Documentation and guidance available from Clare County Council (CCC) such as 'Clare County Development Plan 2017-2023' and 'Clare Biodiversity Action Plan 2017-2023' have also been reviewed. In Clare County Development Plan 2017-2023, cognisance has been paid to the associated Strategic Environmental Assessment (SEA) environmental report and Natura Impact Report (NIR).

Designated Nature Conservation Sites

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) which are nationally designated sites have been identified within 10 km of this project. Candidate Special Areas of Conservation (cSACs)/Special Areas of Conservation and Special Protection Areas for birds (SPAs) are European designated sites and these have been identified within 15km of the proposed development. All sites were identified using the Map Viewer at www.npws.ie and www.epa.ie.

NHAs are protected under the Wildlife Act (as amended) whilst pNHAs are non-statutory sites but are provided protection under County Development Plans and are assessed as the same ecological importance as NHAs.

SACs are designated and protected under the EU Habitats Directive, transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended. At present many SACs in Ireland are currently 'candidate' SACs and referred to as cSACs. The relevant Statutory Instruments for the SACs in Ireland have not yet all been made, however, these "candidate" sites must still be afforded the same level of protection as if they were SACs in accordance with the Habitats Directive.

Ireland is required under the terms of the EU Birds Directive (2009/147/EC) to designate Special Protection Areas (SPAs) for the protection of endangered species of wild birds. Protection of SPAs is also undertaken through EU Habitats Directive, transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended.

Designated nature sites also form part of Strategic Environmental Objectives B2 and B3 of the SEA for Clare County Council Development Plan 2017-2023:

- B2: “To achieve the conservation objectives of European Sites (SACs and SPAs) and other sites of nature conservation.”
- B3: “B3 - Conserve and protect other sites of nature conservation including NHAs, pNHAs, National Parks, Nature Reserves, Wildfowl Sanctuaries as well as protected species outside these areas as covered by the Wildlife Act.”

Impacts that could potentially affect sensitive species from European designated sites were specifically addressed in the NIR report for Clare County Council Development Plan 2017-2023. Mitigation measures included:

- Ensure that any development application is accompanied by a full bat survey, particularly in relation to Lesser Horseshoe bats’ usage of the site, and a full light-spill modelling study to demonstrate that the chosen lighting design would not create any increase in ambient light levels beyond the perimeter of the development footprint. Development applications must not propose removal of woody vegetation around the perimeter of the site and must address how linkages across the landscape can be maintained.
- Any development applications should include an assessment by a suitably qualified Ecologist as to the potential for the site to support SPA SCI bird species. If the site is deemed suitable, detailed bird surveys should be undertaken on the site to accompany the development application. These assessments and/or surveys should inform an Appropriate Assessment Screening Report and/or Natura Impact Statement, dependent on the outcome of the site survey. If the site is deemed suitable, a full lightspill modelling study should accompany all development applications and demonstrate that the chosen lighting design would not create any increase in ambient light levels beyond the perimeter of the development applications and demonstrate that the chosen lighting design would not create any increase in ambient light levels beyond the perimeter of the development footprint in relation to SCI birds.

Impacts of invasive species that could potentially affect European designated sites were specifically addressed in the NIR report for Clare County Council Development Plan 2017-2023. Mitigation measures included:

- Any development application should address the potential for introduction and spread of invasive species via water-craft/equipment movement into the area and/or out of the area to other European sites.

Impacts on water quality and groundwater that could potentially affect European designated sites were specifically addressed in the NI report for Clare County Council Development Plan 2017-2023. Mitigation measures included:

- Ensure any further development application is connected to a WWTP with adequate capacity for foul water during operation, or that it is serviced by an on-site treatment system that will ensure no impact to water quality in the area.

- Ensure a Construction Environmental Management Plan (CEMP) is produced as part of any planning application for development detailing how surface water run-off, especially in relation to release of silt and other pollutants, will be controlled during construction.
- Ensure that surface water run-off during operation is treated via a combination of appropriate SUDS (i.e. green roofs, permeable paving, petrol interceptor, silt trap) prior to discharge to any surface water features.
- Ensure any development application is accompanied by a hydrogeological assessment and concludes that the development will not interfere with groundwater movement to the groundwater dependent Qualifying Interest of the European site.

Flora and Fauna

The NBDC mapviewer was used to identify all flora and fauna records within the 10km and 2km grid square in which the constraints area is located (R36 and R36V respectively). Records were examined for species protected under the Flora Protection Order 2015 (plants only), European Union (Birds and Natural Habitats)(Sea-Fisheries)(Amendment) Regulations (as amended), Annex listed within the EU Directive on the Conservation of Habitats and Fauna (the Habitats Directive) and/or threatened species listed in Irish Red Lists (see below for referencing) were included within the study.

With regards to Fauna (not including birds), only species legally protected under the Wildlife Act (as amended), European Union (Birds and Natural Habitats)(Sea-Fisheries) Regulations (as amended) and Annex listed (II, IV and V) within the Habitats Directive and/or threatened species listed in Irish Red Lists (see below) were included.

With regards to birds, only Annex I listed species within the EU Birds Directive or birds listed as a bird of conservation concern (as per Colhoun and Cummins (2013)) were included.

Irish Red Lists:

- Colhoun K. & Cummins, S. 2013 Birds of Conservation Concern in Ireland 2014-19. Irish Birds 9:523-544
- King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- Marnell, F., Kingston, N. and Looney, D., (2009). *Ireland Red List No. 3, Terrestrial Mammals*. National parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin
- Red List No. 10: Vascular Plants (Wyse et al. 2016).
- Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Flora and fauna also form part of Strategic Environmental Objectives B1 and B5 of the SEA for Clare County Council Development Plan 2017-2023:

- B1: "Protect, conserve, enhance where possible and avoid loss of diversity and integrity of the broad range of habitats, species and wildlife corridors"
- B5: "To minimise and, where possible, eliminate threats to biodiversity including invasive species."

Waterbodies

The EPA mapviewer was used to identify hydrological connections between the constraints area and surrounding waterbodies as well as potential connections to any national or European sites. Waterbodies are protected under the EU Water Framework Directive (2000/60/EC). Water Framework Directive (WFD) water quality data has also been reviewed.

Waterbodies also form part of Strategic Environmental Objectives B4 and B6 of the SEA for Clare County Council Development Plan 2017-2023:

- B4: “Meet the requirements of the Water Framework Directive and the Shannon River Basin Management Plan/National River Basin Management Plan”
- B6: “Promote green infrastructure networks, including riparian zones and wildlife corridors.”

9.2.1 Consultation

Consultation was initiated with the following biodiversity related statutory bodies and key stakeholders during Phase 1. Emails with project information were issued in January 2020 to the following consultees:

- An Taisce,
- Department of Agriculture, Food and Marine,
- Department of Communications, Climate Action and Environment,
- Department of Culture, Heritage and the Gaeltacht - Development Applications Unit/National Parks and Wildlife Service (NPWS),
- Inland Fisheries Ireland,
- The Heritage Council,
- Bat Conversation Ireland,
- Birdwatch Ireland,
- Vincent Wildlife Trust.

A response was received from the Development Applications Unit. The Department of Culture, Heritage and the Gaeltacht (DCHG) responded with respect to Nature Conservation. The response noted the presence of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. A full and detailed description of the project including all associated and ancillary works, including temporary works, should be assessed. Direction is also given with regard to Appropriate Assessment. DCHG noted the following in particular:

- Water quality and run off to European Sites,
- Disturbance to qualifying species,
- Lighting effects,
- Survey for Opposite-leaved Pondweed in suitable habitat.

Other existing, permitted and proposed developments and change ins land use locally to be taken into account and also the Shannon Airport Embankments Refurbishment, Clare County Development Plan (which is cognisant of associated SEA and NIR reports) and the Shannon Estuary Strategic Integrated Framework Plan.

9.3 Existing Environment

The section of the N19 National Road under consideration extends from Drumgeely Roundabout to Knockbeagh Point Roundabout and is comprised of the N19 road and its margins. The existing road is approximately 2.2 kilometres in length and currently comprises primarily single carriageway. The existing surface of the road comprises a combination of bituminous and concrete surfaces. Geological Survey of Ireland (GSI) data indicates that the area is underlain by the Ballysteen Formation, which is described as a fossiliferous dark-grey muddy Limestone. Soil is described as alluvium which is generally underlain by gravelly Clay and angular cobbles.

Corine 2018 land cover¹ data indicates that the site is located within airports (124), industrial and commercial units (121) and discontinuous urban fabric (112). The greater area is comprised of same with the addition of pastures (231), intertidal flats (423) and land principally occupied by agriculture with significant areas of natural vegetation (243), mixed forests (313) and estuaries (522). Shannon Estuary is located to the south, south east and east of the constraints area; approximately 0m from the estuary at its closest point (western edge of the constraints area). Shannon Estuary is designated as River Shannon and River Fergus SPA (site code: 004077), Lower River Shannon cSAC (site code: 002165) and Fergus Estuary and Inner Shannon, North Shore pNHA (site code: 002048).

It is clear from aerial mapping that the marginal land of the lower Shannon Airport half of the N19 is comprised of managed improved grassland with a young sparse treeline and path to the airport side (west) and mostly managed improved grassland accompanied by native semi mature treelines along the estuary side (east) which screen the road; as well as buildings and parking areas where access to the estuary can be gained. Areas of reedbed and rough grass habitat are visible along the estuary side of the N19 where there are breaks in treeline screening.

The marginal land of the upper Shannon Town half of the N19 is mostly comprised of conifer woodland with native deciduous scrub and rough grassland along the road edge with a path present at the lower part of the road along the Shannon Industrial Estate side (west side). The road margin of the Shannon Town side (closest side to the estuary) is comprised of managed improved grassland accompanied by native young treelines and hedgerow and path which block views of the town.

Access to Shannon estuary as well as Shannon Airport Lagoon (both designated) is attainable along the N19 on the approach to Shannon Airport and at multiple locations at the edge of Shannon Town (northeast and east of the constraints area).

A footpath runs along the edge of the estuary from the Shannon Airport area east, along the southern edge of Shannon Town and on to Shannon Wastewater Treatment Plant, where the path stops. A dirt path then continues along the edge of the estuary east where Shannon Town ends and there are agricultural fields.

The N19 (section of the constraints area) crosses two streams via existing culverts. The N19 is located within the Shannon Estuary North (catchment ID: 27²) catchment and both streams feed into Shannon Estuary. See Section below for more information.

¹ Corine 2018 data: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 21/02/20.

² WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

9.3.1 Waterbodies

The constraints area is located within the Shannon Estuary North catchment and is located 0m at its closest point to the Shannon Estuary. The constraints area is hydrologically linked to the Shannon Estuary via two second order watercourses which feed into the Shannon Estuary; Urlan_Beg stream and Clonloghan stream³ (for more information see Table 9-1). The existing N19 crosses both of the streams via culverts and are located at the more northern/eastern half of the constraints area. Both streams in aerial mapping in the vicinity of the constraints area appear unnatural and canalised. Urlan_Beg stream is located 315m at its closest point from where the N19 crosses it to where the stream feeds into Shannon Estuary. Clonloghan stream is located 353m at its closest point from where the N19 crosses it to where the stream feeds into Shannon Estuary. The 2013-2018 WFD status for the streams was not available and their risk projection is under review by the EPA. However Upper Shannon Estuary (location of the receiving waters) water quality status is unpolluted⁴ whilst it is projected to be at risk⁵. The constraints area is located within Tull-Newmarket on Fergus⁶ ground waterbody and its 2013-2018 WFD status is 'Good' or Q4.

Table 9-1: Hydrological links Between the constraints area and the Shannon Estuary

Catchment ⁷	Sub Catchment ⁸	Sub Basin ⁹	River	Watercourse ¹⁰	N19 Crossing Location
Shannon Estuary North (ID: 27)	Ballygireen_SC_010	Urlan Beg_010		Urlan_Beg	52.698292, -8.900242
				Clonloghan	52.701551, -8.897065

9.3.2 Designated Conservation Site – European Designated Sites

There are 13 European sites within the zone of influence (15 km) of the constraints area. Of these, 12 are SACs and one is a SPA. Figure 9-1 indicate the locations of European sites whilst Table 9-2 lists the European sites and includes their qualifying interests, conservation objectives and known threats to these sites (according to information provided by the NPWS (www.npws.ie)). The thirteen sites are as follows:

- Lower River Shannon cSAC (002165)
- River Shannon and River Fergus Estuaries SPA (004077)
- Lough Gash Turlough cSAC (000051)
- Askeaton Fen Complex SAC (002279)

³ EPA name, River Network; EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

⁴ Transitional Water Quality 2010-2012: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

⁵ Transitional Waterbodies Risk: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

⁶ 2013-2018 WFD Ground waterbodies Risk: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

⁷ WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

⁸ WFD Sub Catchment: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

⁹ WFD Sub River Basin: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

¹⁰ WFD Catchments: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 19/03/20.

- Curraghchase Woods cSAC (000174)
- Ratty River Cave SAC (002316)
- Barrigone cSAC (000432)
- Poulmagordon Cave (Quin) SAC (000064)
- Newhall and Edenvale Complex SAC (002091)
- Knockanira House SAC (002318)
- Kilkishen House SAC (002319)
- Old Domestic Building (Keevagh) SAC (002010)
- Danes Hole Poulnalecka SAC (000064)

River Shannon and River Fergus SPA (004077)

River Shannon and River Fergus SPA is located immediately adjacent to the south of the constraints area and overlaps with Lower River Shannon cSAC. The constraints area is connected to the SPA via two streams. The site is designated for Wetland and Waterbirds [A999] as well as 21 wetland wintering birds species. At the closest point to the constraints area the marine communities are comprised of intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex¹¹. According to conservation objecting supporting documents¹², 15 of the SPAs special conservation interests have been recorded during 2010/11 winter surveys foraging (F), roosting/other activities (R/O) in the areas closest to the constraints area. These species are comprised of: Dunlin (F), Black-tailed Godwit (F, R/A), Curlew (F, R/O), Greenshank (F), Redshank (F), Shoveler (F, R/O), Black headed gull (F, R/O), Shelduck (F), Wigeon (F, R/O), Teal (F, R/O), Wigeon (F, R/O), Cormorant (F, R/O), Golden Plover (F, R/O), Lapwing (F, R/O) and Knot (F).

Lower River Shannon cSAC (site code: 002165)

Lower River Shannon cSAC is located immediately adjacent to the south of the site. The constraints area is connected to the cSAC via two streams. The site is designated for 21 qualifying interests (QIs). Of these 21 QI, 6 are coastal habitats and two are purely freshwater based (e.g. freshwater pearl mussel).

According to the cSAC's supporting documents, the area of the cSAC directly south/southeast of the constraints area support Shannon Airport Lagoon (code: IL032), mudflats and sandflats not covered by sea water at low tide [1140] and estuaries [1130]¹³. Transient QI *Lutra lutra* (Otter) [1355] is likely to frequent the area whilst *Petromyzon marinus* (Sea Lamprey) [1095], *Lampetra planeri* (Brook Lamprey) [1096], *Lampetra fluviatilis* (River Lamprey) [1099], *Salmo salar* (Salmon) [1106] are unlikely to travel into the streams which connect the constraints area to the Shannon Estuary as aerial photography indicates that they are second order streams that they have been modified in the past and appear more like drainage ditches.

Lough Gash Turlough cSAC (site code: 000051)

Lough Gash Turlough cSAC is located 4.3km north of the constraints area.

¹¹ NPWS (2012) Lower River Shannon SAC (0002165) Conservation Objectives Supporting Documents – marine habitats [version 1].

¹² NPWS (2012), River Shannon and River Fergus Estuaries SPA (004077) Conservation objectives supporting document [Version 1]

¹³ NPWS (2012) Lower River Shannon SAC (0002165) Conservation Objectives Supporting Documents – lagoon habitats [version 1].

The cSAC is designated for Annex I habitats turloughs [3180] and rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation [3270]. The cSAC is designated for aquatic dependent habitats which are sensitive to changes in hydrological regimes and the ingress of nutrients

Lough Gash cSAC is located within the same subcatchment as the location of the constraints area. However the cSAC is not connected directly or indirectly via stream or river. Also the cSAC is located within GWDTE-Lough Gash Turlough (SAC000051) ground waterbody a separate ground waterbody to the Constraints area. The cSAC does feed into Shannon Estuary (via Boherraroan waterbody¹⁴) the cSAC is located 3km upstream of the Shannon Estuary. From where the connecting stream feeds into the Shannon Estuary there is another ca. 11km from that point to where any discharge from the constraints area would enter the Shannon Estuary.

Askeaton Fen Complex SAC (site code: 002279)

Whilst Askeaton Fen Complex SAC is located 6.2km from the constraints area and is designated for calcareous fen and alkaline fen. The SAC has a remote indirect hydrological connection to the Shannon Estuary through a number of streams which feed into the estuary. At its closest hydrological connection (Dromlohan 24¹⁵), Askeaton Fen Complex SAC is located 4km upstream of the Shannon Estuary on the opposite side of the estuary (southern bank as opposed to northern bank) to where the constraints area is located. At the nearest point where the connecting stream (Dromlohan 24) discharges into the estuary (southern bank), there is another 3.4km from where potential discharge would enter the Shannon Estuary (northern bank).

Curraghchase Woods cSAC (site code: 000174)

Curraghchase Woods cSAC (site code: 000174) is located 8 km from the constraints area and is designated for woodland habitats and the lesser horsehoe bat. The cSAC is located within a separate catchment and has no hydrological link to the Shannon Estuary.

Ratty River Cave SAC (002316)

Ratty River Cave SAC (002316) is located 8.9km from the constraints area and is designated for Lesser Horseshoe bat and cave habitat. This SAC is located within the same catchment as the constraints area and is located 6km (direct distance) upstream of the Shannon Estuary and another 8km (direct distance) east from where the Owenogarney stream enters the Shannon Estuary and where any potential discharge from works would enter the estuary.

Barrigone cSAC (000432)

Barrigone cSAC (000432) is located 12km from the constraints area and is designated for four qualifying interests; *Juniperus communis* formations on heaths or calcareous grasslands, semi-natural dry grasslands and scrubland important for orchid, limestone pavement and Marsh Fritillary butterfly. This SAC is located on in a separate catchment to the constraints area and has no hydrological link to Shannon Estuary.

Poulnagordon Cave (Quin) SAC (000064)

Poulnagordon Cave (Quin) SAC (000064) is located 11.1km from the constraints area and is designated for Lesser Horseshoe bat and cave habitat. This cSAC is located within the same catchment as the constraints area but does not have a direct hydrological connection to the constraints area or the Shannon Estuary.

¹⁴ EPA name, River Network: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 05/03/20.

¹⁵ EPA name, River Network: EPA Maps (mapviewer); <https://gis.epa.ie/EPAMaps/> viewed 05/03/20.

Newhall and Edenvale Complex SAC (002091)

Newhall and Edenvale Complex SAC (002091) is located 12.3km from the constraints area and is designated for Lesser Horseshoe bat and cave habitat. This cSAC is located within the same catchment as the constraints area but does not have a direct hydrological connection to the constraints area and has no hydrological connection to the Shannon Estuary.

Knockanira House SAC (002318)

Knockanira House SAC (002318) is located 13.5km from the constraints area and is designated for a single qualifying interest; Lesser Horseshoe bat. This SAC is located within the same catchment as the constraints area but does not have a direct hydrological connection to the constraints area and has no hydrological connection to the Shannon Estuary.

Kilkishen House SAC (002319)

Kilkishen House SAC (002319) is located 12.7km from the constraints area and is designated for a single qualifying interest; Lesser Horseshoe bat. This SAC is located within the same catchment as the constraints area but does not have a direct hydrological connection to the constraints area and has no hydrological connection to the Shannon Estuary.

Old Domestic Building (Keevagh) SAC (002010)

Old Domestic Building (Keevagh) SAC (002010) is located 13km from the constraints area and is designated for a single qualifying interest; Lesser Horseshoe bat. This SAC is located within the same catchment as the constraints area but does not have a direct hydrological connection to the constraints area and has no hydrological connection to the Shannon Estuary.

Danes Hole Poulnalecka SAC (000064)

Danes Hole Poulnalecka SAC (000064) is located 14.8km from the constraints area and is designated for three qualifying interests; Lesser Horseshoe bat, caves and Oak woodland. This SAC is located within the same catchment as the constraints area and is located 5.8km (direct distance) upstream of Ratty River Cave SAC (002316) and 12.5km upstream of the Shannon Estuary; connected by the Owenogarney stream. There is a further 8km (direct distance) from the point where the Owenogarney stream feeds into the Shannon Estuary and where any potential discharge from works would enter the estuary.

Table 9-2: Site of European Importance within 15km of the constraints area

Designated Site (Site Code)	Qualifying Interests	Threats and Pressures
Lower River Shannon cSAC (002165)	<ul style="list-style-type: none"> • Sandbanks which are slightly covered by sea water all the time [1110] (M) • Estuaries [1130] (M) • Mudflats and sandflats not covered by seawater at low tide [1140] (M) • Coastal lagoons [1150] (R) • Large shallow inlets and bays [1160] (M) • Reefs [1170] (M) • Perennial vegetation of stony banks [1220] (M) • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] (M) • <i>Salicornia</i> and other annuals colonising mud and sand [1310] (M) • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] (R) • Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] (R) • Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260] (M) • Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] (M) • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] (R) • <i>Margaritifera</i> (Freshwater Pearl Mussel) [1029] (R) 	<p><u>High level impacts:</u></p> <ul style="list-style-type: none"> • I01 - invasive non-native species (inside site) • D01.01 - paths, tracks, cycling tracks (inside site) • G01.01 - nautical sports (inside site) • B - silviculture, forestry (inside site) • F01 - marine and freshwater aquaculture (inside site) • F03.01 - hunting (inside site) • C01.01.02 - removal of beach materials (inside site) • C01.03.01 - hand cutting of peat (inside site) • J02.12.01 - sea defense or coast protection works, tidal barrages (inside site) • J02.10 - management of aquatic and bank vegetation for drainage purposes (inside site) <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> • A08 - fertilisation (outside site) • E01 - urbanised areas, human habitation (outside site) • H04 - air pollution, air-borne pollutants (outside site) • A08 - fertilisation (inside site) • E03 - discharges (outside site) • K02.03 - eutrophication (natural) (outside site) • E03 - discharges (inside site) • A04 - grazing (inside site) • J02.01.01 - polderisation (inside site) • J02.01.02 - reclamation of land from sea, estuary or marsh (outside site)

Designated Site (Site Code)	Qualifying Interests	Threats and Pressures
	<ul style="list-style-type: none"> • <i>Petromyzon marinus</i> (Sea Lamprey) [1095] (R) • <i>Lampetra planeri</i> (Brook Lamprey) [1096] (M) • <i>Lampetra fluviatilis</i> (River Lamprey) [1099] • <i>Salmo salar</i> (Salmon) [1106] (R) • <i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349] (M) • <i>Lutra</i> (Otter) [1355] (R) 	<p><u>Low level impacts:</u></p> <ul style="list-style-type: none"> • I01 - invasive non-native species (inside site) • D01.01 - paths, tracks, cycling tracks (inside site) • G01.01 - nautical sports (inside site) • B - silviculture, forestry (inside site) • F01 - marine and freshwater aquaculture (inside site) • F03.01 - hunting (inside site) • C01.01.02 - removal of beach materials (inside site) • C01.03.01 - hand cutting of peat (inside site) • J02.12.01 - sea defense or coast protection works, tidal barrages (inside site) • J02.10 - management of aquatic and bank vegetation for drainage purposes (inside site)
<p>River Shannon and River Fergus Estuaries SPA (004077)</p>	<ul style="list-style-type: none"> • Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Wigeon (<i>Anas penelope</i>) [A050] • Teal (<i>Anas crecca</i>) [A052] • Pintail (<i>Anas acuta</i>) [A054] • Shoveler (<i>Anas clypeata</i>) [A056] • Scaup (<i>Aythya marila</i>) [A062] • Ringed Plover (<i>Charadrius hiaticula</i>) [A137] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Lapwing (<i>Vanellus vanellus</i>) [A142] 	<p><u>High level impacts:</u></p> <ul style="list-style-type: none"> • E02 - industrial or commercial areas (outside site) • E03 - discharges (inside site) • A08 - fertilisation (outside site) • E01 - urbanised areas, human habitation (outside site) <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> • G01.01 - nautical sports (inside site) • D03.02 - shipping lanes (inside site) • F01 - marine and freshwater aquaculture (inside site) <p><u>Low level impacts:</u></p> <p>n/a</p>

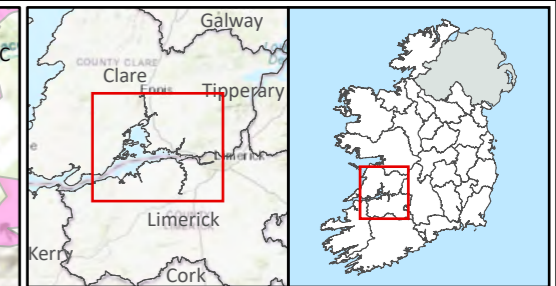
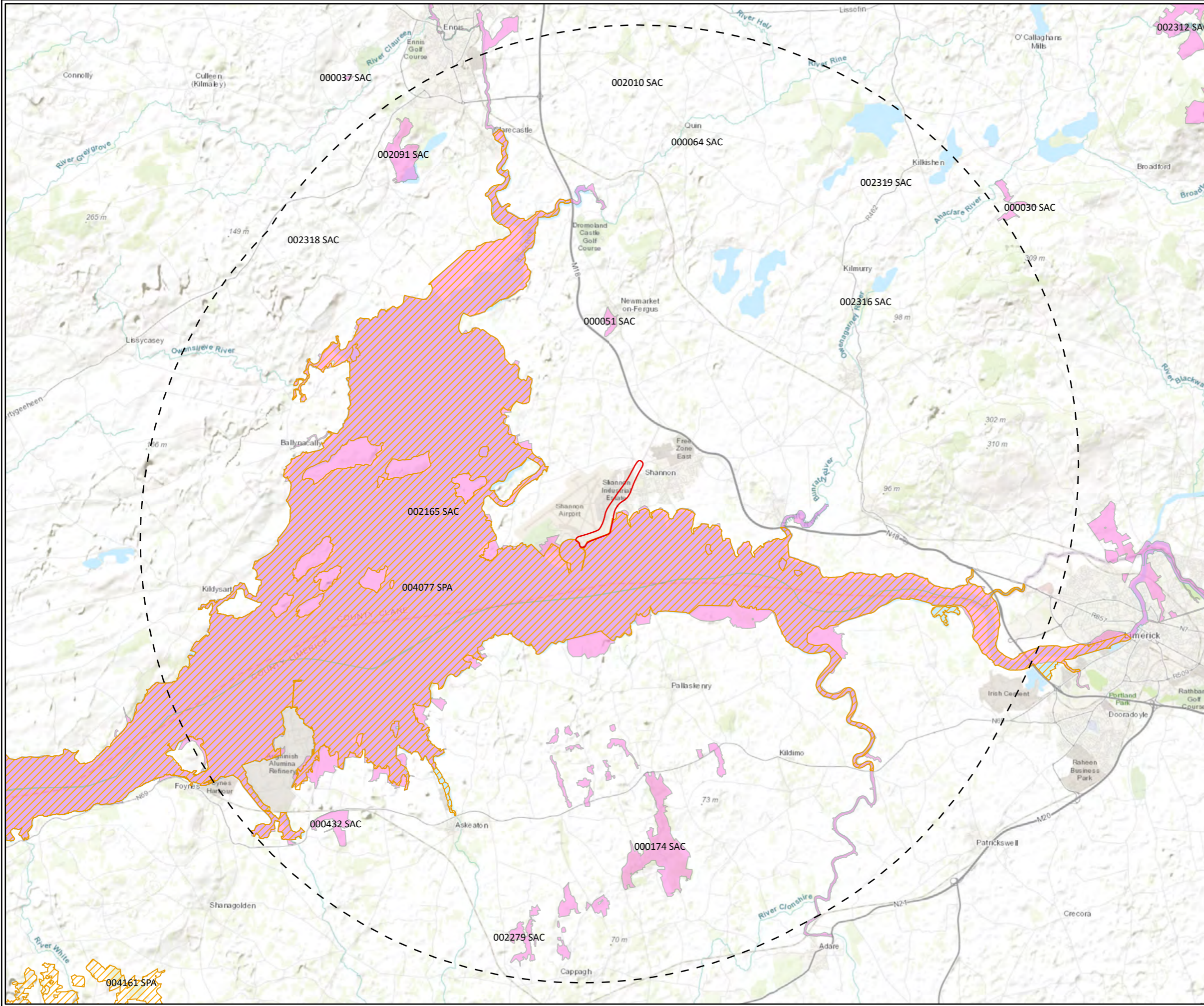
Designated Site (Site Code)	Qualifying Interests	Threats and Pressures
	<ul style="list-style-type: none"> • Knot (<i>Calidris canutus</i>) [A143] • Dunlin (<i>Calidris alpina</i>) [A149] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Curlew (<i>Numenius arquata</i>) [A160] • Redshank (<i>Tringa totanus</i>) [A162] • Greenshank (<i>Tringa nebularia</i>) [A164] • Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] • Wetland and Waterbirds [A999] 	
Lough Gash Turlough cSAC (000051)	<ul style="list-style-type: none"> • Turloughs [3180] • Rivers with muddy banks with <i>Chenopodium rubri p.p.</i> and <i>Bidention p.p.</i> vegetation [3270] 	<p><u>High level impacts:</u></p> <ul style="list-style-type: none"> • H01.08- diffuse pollution to surface waters due to household sewage and waste waters (inside site) <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> • E01 - urbanised areas, human habitation (outside site) <p><u>Low level impacts:</u></p> <ul style="list-style-type: none"> • A08 - fertilisation (outside site) • D01.02 - roads, motorways (outside site) • A04 - grazing (inside site) • F03.01 - hunting (inside site) • A10.01 - Removal of hedges and copses or scrub (inside site)
Askeaton Fen Complex SAC (002279)	<ul style="list-style-type: none"> • Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210] • Alkaline fens [7230] 	<p><u>High level impacts:</u></p> <ul style="list-style-type: none"> • J01 - fire and fire suppression (inside site) • J02.01.02 - reclamation of land from sea, estuary or marsh (inside site)

Designated Site (Site Code)	Qualifying Interests	Threats and Pressures
		<p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> A10.01 - removal of hedges and copses or scrub (inside site) H02 - pollution to groundwater (point sources and diffuse sources) (outside site) E01.03 - dispersed habitation (inside site) A08 - fertilisation (inside site) <p><u>Low level impacts:</u> n/a</p>
Curraghchase Woods cSAC (000174)	<ul style="list-style-type: none"> Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] <i>Taxus baccata</i> woods of the British Isles [91J0] <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] 	<p><u>High level impacts:</u></p> <ul style="list-style-type: none"> J02.02.01 - dredging/ removal of limnic sediments (inside site) <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> G05.04 - vandalism (inside site) B02 - forest and Plantation management & use (inside site) <p><u>Low level impacts:</u></p> <ul style="list-style-type: none"> G01 - outdoor sports and leisure activities, recreational activities (inside site)
Ratty River Cave SAC (002316)	<ul style="list-style-type: none"> Caves not open to the public [8310] <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] 	<p><u>High level impacts:</u></p> <p>E06.01 - Demolishment of buildings & human structures (inside site)</p> <p>A10.01 - Removal of hedges and copses or scrub (inside site) (outside site)</p> <p><u>Medium level impacts:</u> n/a</p> <p><u>Low level impacts:</u></p> <p>A10.01 - Removal of hedges and copses or scrub (inside site)</p>
Barrigone cSAC (000432)	<ul style="list-style-type: none"> <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] (R) 	<p><u>High level impacts:</u></p>

Designated Site (Site Code)	Qualifying Interests	Threats and Pressures
	<ul style="list-style-type: none"> Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] (R) Limestone pavements [8240] (M) <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065] (M) 	<ul style="list-style-type: none"> K02.01 (inside site) A04.03- species composition change (succession) - abandonment of pastoral systems, lack of grazing (inside site) <p><u>Medium level impacts:</u> (n/a)</p> <p><u>Low level impacts:</u> (n/a)</p>
Poulnagordon Cave (Quin) SAC (000064)	<ul style="list-style-type: none"> Caves not open to the public [8310] (M) <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] (M) 	<p><u>High level impacts:</u> A10.01 - Removal of hedges and copses or scrub (inside site) (outside site)</p> <p><u>Medium level impacts:</u> E01- urbanised areas, human habitation (outside site)</p> <p><u>Low level impacts:</u> G05.04 - vandalism (inside site) G01.04.03 - Recreational cave visits (inside site)</p>
Newhall and Edenvale Complex SAC (002091)	<ul style="list-style-type: none"> Caves not open to the public [8310] <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] 	<p><u>High level impacts:</u> Not applicable (n/a)</p> <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> A04 – grazing (outside site) <p><u>Low level impacts:</u></p> <ul style="list-style-type: none"> G05.04 - vandalism (inside site) A04 – grazing (inside site)

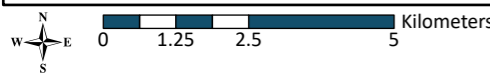
Designated Site (Site Code)	Qualifying Interests	Threats and Pressures
Knockanira House SAC (002318,)	<ul style="list-style-type: none"> <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] 	<p><u>High level impacts:</u> n/a</p> <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> A04 – grazing (outside site) <p><u>Low level impacts:</u> n/a</p>
Kilkishen House SAC (002319)	<ul style="list-style-type: none"> <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] 	<p><u>High level impacts:</u></p> <ul style="list-style-type: none"> E06.01 - Demolishment of buildings & human structures (inside site) <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> A10.01 - Removal of hedges and copses or scrub (inside site) A10.01 - Removal of hedges and copses or scrub (outside site) <p><u>Low level impacts:</u> n/a</p>
Old Domestic Building (Keevagh) SAC (002010)	<ul style="list-style-type: none"> <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] 	<p><u>High level impacts:</u> n/a</p> <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none"> A04 – grazing (outside site) <p><u>Low level impacts:</u></p> <ul style="list-style-type: none"> n/a

Designated Site (Site Code)	Qualifying Interests	Threats and Pressures
Danes Hole Poulnalecka SAC (000064)	<ul style="list-style-type: none">• Caves not open to the public [8310]• Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]• <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303]	<p><u>High level impacts:</u></p> <ul style="list-style-type: none">• A10.01 - Removal of hedges and copses or scrub (inside site)• D05 - Improved access to site (inside site)• M02.03 Decline or extinction of species (inside site) <p><u>Medium level impacts:</u></p> <ul style="list-style-type: none">• B06 Grazing in forests/ woodland (inside site) <p><u>Low level impacts:</u></p> <p>n/a</p>



- Constraints Area
 - 15km Buffer of Constraints Area
 - Special Protection Area (SPA)
- Site Code, Site Name, Distance(m)
- 004077, River Shannon and River Fergus Estuaries SPA, 0
- Special Area of Conservation (SAC)
- Site Code, Site Name, Distance(m)
- 000030, Danes Hole, Poulnalecka SAC, 14810
 - 000051, Lough Gash Turlough SAC, 4416
 - 000064, Poulmagordon Cave (Quin) SAC, 11142
 - 000174, Curraghchase Woods SAC, 8052
 - 000432, Barrigone SAC, 12092
 - 002010, Old Domestic Building (Keevagh) SAC, 13007
 - 002091, Newhall and Edenvale Complex SAC, 12347
 - 002165, Lower River Shannon SAC, 0
 - 002279, Askeaton Fen Complex SAC, 6166
 - 002316, Ratty River Cave SAC, 8924
 - 002318, Knockanira House SAC, 13518
 - 002319, Kilkishen House SAC, 12727

TITLE:	
Designated European Sites within 15km of the Proposed Development	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO: 9.1	
CLIENT: Clare County Council	
SCALE: 1:130,000	REVISION: 0
DATE: 23/03/2020	PAGE SIZE: A3



9.3.3 Designated Conservation Site – National Importance

There are no NHAs and 12 pNHAs within 10km of the constraints area:

- Fergus Estuary and Inner Shannon, North Shore pNHA (site code: 002048)
- Inner Shannon Estuary – South Shore pNHA (site code 000435)
- Lough Gash Turlough pNHA (site code: 000051)
- Ballycar Lough pNHA (site code: 000015)
- Fin Lough(Clare) pNHA (site code: 001010)
- Rosroe Lough pNHA (site code: 002054)
- Dramore Beach and Loughs pNHA (site code: 001030)
- Dromoland Lough pNHA (site code: 001008)
- Carragchase Woods pNHA (site code: 000174)
- Garrannon Wood pNHA (site code: 001012)
- Fort Fergus (Ballynacally) pNHA (site code: 000035)
- Castle Lake pNHA (site code: 000239)

Fergus Estuary and Inner Shannon, North Shore pNHA (site code: 002048), Inner Shannon Estuary – South Shore pNHA (site code 000435), Lough Gash Turlough pNHA (site code: 000051) and Carragchase Woods pNHA (site code: 000174) all overlap with European sites and these sites are discussed further in the previous section.

Of these national sites only Fergus Estuary and Inner Shannon, North Shore pNHA (site code: 002048) and Inner Shannon Estuary – South Shore pNHA (site code 000435) are located within close proximity (0m) and are hydrologically linked to the constraints area.

Castle Lake pNHA (site code: 000239) is located 295m upstream of Ratty River Cave SAC (002316); connected via the Owenagarney stream which feeds into the Shannon Estuary.

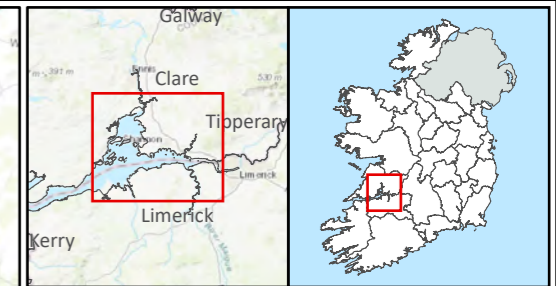
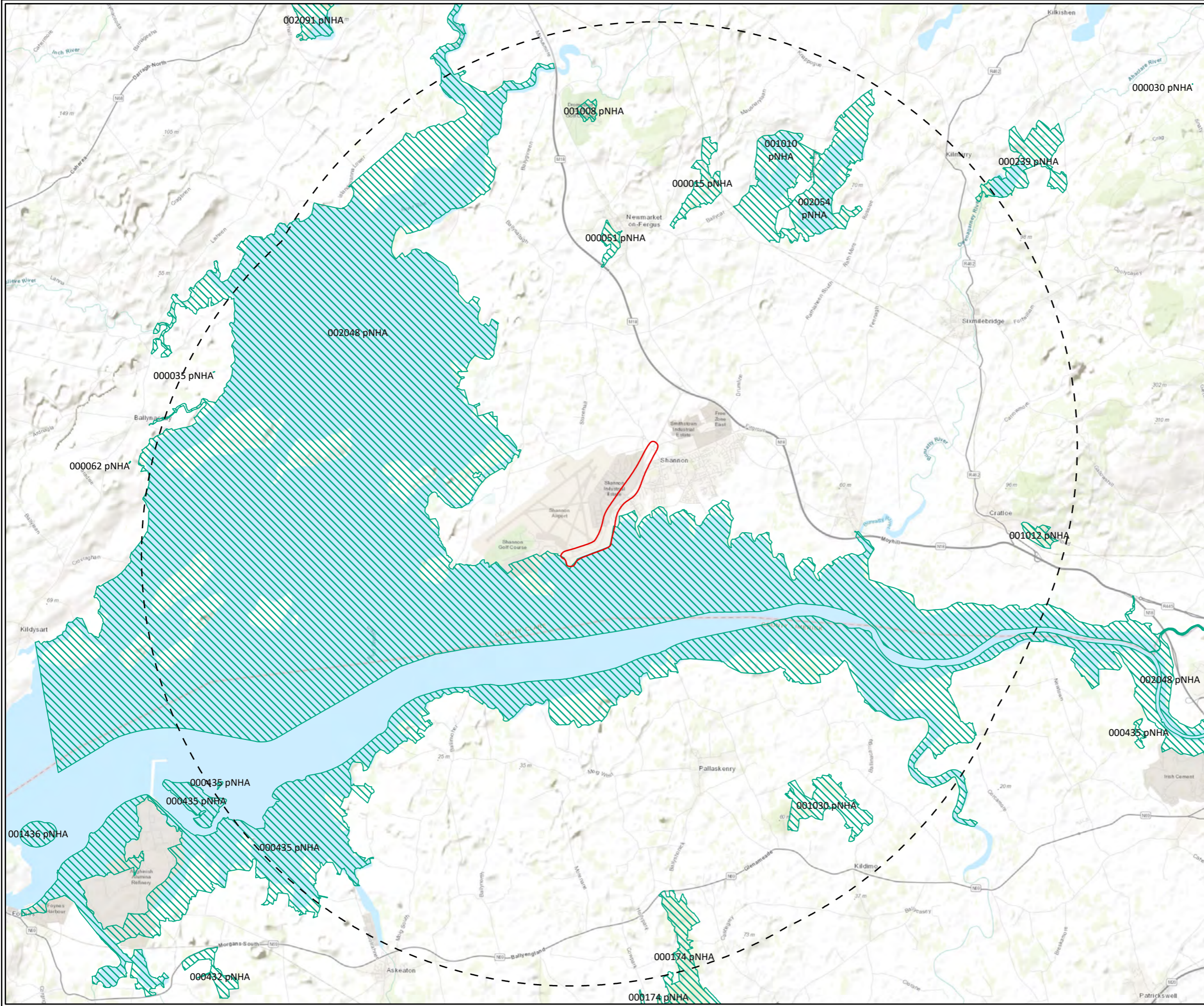
The location of national sites are indicated within Figure 9-2 and Table 9.3 provides details of their ecological distances and distance from site.

Table 9-3: Sites of National Importance within 10km of the constraints area¹⁶

Site Name	Ecological Feature	Distance from site
Fergus Estuary and Inner Shannon, North Shore pNHA (site code: 002048)	<ul style="list-style-type: none"> - Overlaps with the River Shannon and River Fergus SPA and Lower River Shannon cSAC. - Extensive area of intertidal mudflats with fringing reedbeds, swamps, salt marsh and wet marsh habitats. - Provides a rich source of nutrients for huge numbers of waters and wildfowl. - The number of birds it supports are greater than any other site and it seems to act as a refuge from the south-Clare lakes during the autumn and winter - Very rare Triangular Clubrush (<i>Scirpus triqueter</i>) - Less common species include a salt marsh grass (<i>Fuccinellia</i> sp) for which the Fergus Estuary 	0m
Inner Shannon Estuary – South Shore pNHA (site code 000435)	<ul style="list-style-type: none"> - Overlaps with the River Shannon and River Fergus SPA and Lower River Shannon cSAC. - large tidal system with intertidal mudflats, fringing reedbeds, swamps, polders, salt marsh and wet marsh habitats. - On a national scale it is perhaps more important for waders than for wildfowl. - The rare triangular rush (<i>Scirpus triqueter</i>) - The rare summer snowflake (<i>Leucojuin pestirum</i>): 	2.6km
Lough Gash Turlough pNHA (site code: 000051)	<ul style="list-style-type: none"> - Overlaps with Lough Gash Turlough Csac - Turlough - rare Northern Yellow - protected Orange Foxtail Supports wildfowl 	4.3km
Ballycar Lough pNHA (site code: 000015)	<ul style="list-style-type: none"> - Range of reed, fen and marsh communities - An interesting range of calcareous communities - Lake supports a large number of waterfowl populations. - Transitional fen 	5km
Fin Lough(Clare) pNHA (site code: 001010)	<ul style="list-style-type: none"> - Medium sized calcareous lake - Good examples of fen habitat, - Good examples of raised bog habitat - Good examples of heath habitat - Good examples of scrub habitats habitat - A beetle, <i>Panagaeus crux-major</i> - The lake is a popular waterfowl site 	5.5km

¹⁶ All pNHA site synopsis were downloaded from the NPWS website: <https://www.npws.ie/protected-sites/nha>

Site Name	Ecological Feature	Distance from site
Rosroe Lough pNHA (site code: 002054)	<ul style="list-style-type: none"> - Several small lakes - Raised bog - Wet grassland to scrubby dry grassland - healthy bird presence (Coot, Dabchicks and a pair of Great Crested Grebe) - Holly-dominated scrub and associated grassland - Bird refuge 	5.7km
Dramore Beach and Loughs pNHA (site code: 001030)	<ul style="list-style-type: none"> - Open water lakes - Fen; ranging from wet fen to transitional fen/raised bog - Rich scrub habitat - Possibly an example of fen developing a transitional phase to raised bog formation 	7km SE
Dromoland Lough pNHA (site code: 001008)	<ul style="list-style-type: none"> - Lake and marsh with diverse flora 	7.8km N
Curraghchase Woods pNHA (site code: 000174)	<ul style="list-style-type: none"> - Overlaps with Curraghchase Woods cSAC - Lesser Horseshoe bat hibernacula - Alluvia forest - Yew wood - Small lakes, fen and wet grassland 	8km S
Garrannon Wood pNHA (site code: 001012)	<ul style="list-style-type: none"> - Good example of mature oak woodland 	8.9km E
Fort Fergus (Ballynacally) pNHA (site code: 000035)	<ul style="list-style-type: none"> - Lesser Horseshoe bats roost (four small lofts in a block of farm buildings attached to Fort Fergus House) 	9.3km
Castle Lake pNHA (site code: 000239)	<ul style="list-style-type: none"> - Main habitat is open water (Castle Lake and Ballymulcashel) - Two secondary habitats comprised of hazel scrub and Ask/Oak woodland - Also, a number of wet grassland, marsh and mixed woodland. 	9.6km



	Constraints Area
	10km Buffer of Constraints Boundary
	Proposed Natural Heritage Area (pNHA)
Site Code, Site Name, Distance(m)	
000015	Ballycar Lough, 5096
000035	Fort Fergus (Ballynacally), 9339
000051	Lough Gash Turlough, 4320
000174	Curraghchase Woods, 8044
000239	Castle Lake, 9585
000435	Inner Shannon Estuary - South Shore, 2596
001008	Dromoland Lough, 7756
001010	Fin Lough (Clare), 5494
001012	Garrannon Wood, 8857
001030	Dromore & Bleach Loughs, 7071
002048	Fergus Estuary And Inner Shannon, North Shore, 0
002054	Rosroe Lough, 5709

TITLE:	Designated National Sites within 10km of the Proposed Development		
PROJECT:	N19 Shannon Airport Road Improvement Scheme		
FIGURE NO.:	9.2		
CLIENT:	Clare County Council		
SCALE:	1:90,000	REVISION:	0
DATE:	20/03/2020	PAGE SIZE:	A3



9.3.4 Additional Sites

The closest nature reserve is Dramore Wood Nature Reserve which is located 24.4km north of the constraints area. The nature reserve covers approximately one thousand acres and includes, rivers, lakes, turlough, callows, limestone pavement, fen peat, reed and rush beds as well as species rich woodland. The site is also known to support pine marten, red squirrel, badger stoat and hares as well as numerous bird species.¹⁷

9.3.5 Flora

NBDC Records indicate that within 10km of the constraints area Meadow Barley (*Hordeum secalinum*) is present. Meadow Barley is protected under the Flora (Protection) Order, 2015 and rated. Bee Orchid (*Ophrys apifera*) which is rated as Near Threatened has been recorded within 2km of the constraints area. According to the Shannon Airport Embankments Refurbishment Natura Impact Statement¹⁸, Opposite-leaved Pondweed (*Groenlandia densa*) which is a Flora Protection Order species, is located within a drainage channel within the Shannon Airport Lagoon.

Three species of invasive species have been recorded within 10km of the constraints area. See Table 9-4 for more information. Whilst all three invasive species have not been recorded within 2km of the constraints area.

Table 9-4: Invasive Species within 10km of the constraints area (NBDC 10km grid square: R36)

Common Name	Botanical Name	Impact	Legislation	Not within 2km (R36V) of site
Himalayan Knotweed	<i>Persicaria wallichii</i>	Medium	Regulation S.I. 477; Reg 49 and 50	X
Japanese Knotweed	<i>Fallopia japonica</i>	High	Regulation S.I. 477; Reg 49 and 50	X
Red-osier Dogwood	<i>Cornus sericea</i>	Amber List: Uncertain risk		X

9.3.6 Fauna

9.3.6.1 Birds

A total of 24 species of Annex I (of the Birds directive), red listed and/or amber listed species birds have been recorded within 2km of the constraints area. The majority of species recorded are wetland birds and many are likely to forage and roost along the margins of the Shannon Estuary. Fewer passerine species have also been recorded than wetland birds. Passerines are likely to forage along the terrestrial habitats and breed within hedgerows and tree lines of the road margins of the constraints area.

¹⁷ Information attained from Burren National Park website: <https://www.burrennationalpark.ie/dromore-wood/> visited 21/02/20

¹⁸ Malacky Walsh and Partners (2019). Natura Impact Statement; Shannon Airport Embankments Refurbishment, Shannon, Co. Clare, Revision a, September 2019. Clare County Council Planning Reference: 191006, available from www.eplanning.ie/ClareCC/searchexact.

Four birds are Annex I listed and have been found within the 2km grid square within which the constraints area is located; Common Tern, European Golden Plover, Little Egret and Sandwich Tern. Six species recorded within the 2km grid square are red listed; Black-headed Gull, Dunlin, Eurasian Curlew, Herring Gull, Meadow Pipit, Northern Lapwing. Whilst 14 are amber listed; Barn Swallow, Common Redshank, Common Sandpiper, Common Shelduck, Common Snipe, Common Starling, Common Swift, Eurasian Oystercatcher, European Robin, House Sparrow, Lesser Black-backed Gull, Mew Gull, Red Knot and Sky Lark. For more information see Table 9-5 below.

Table 9-5: Birds recorded within 2km of the constraints area(NBDC 2km grid square: R36V)

Common Name	Scientific Name	Protection/Designation	Date of last record
Barn Swallow	<i>Hirundo rustica</i>	Wildlife Acts Amber List	14/04/2016
Black-headed Gull	<i>Larus ridibundus</i>	Wildlife Acts Red List	14/11/2012
Common Redshank	<i>Tringa totanus</i>	Wildlife Acts Amber List	31/12/2011
Common Sandpiper	<i>Actitis hypoleucos</i>	Wildlife Acts Amber List	08/08/2006
Common Shelduck	<i>Tadorna tadorna</i>	Wildlife Acts Amber List	31/12/2011
Common Snipe	<i>Gallinago gallinago</i>	Wildlife Acts Amber List	31/12/2011
Common Starling	<i>Sturnus vulgaris</i>	Wildlife Acts Amber List	14/11/2012
Common Swift	<i>Apus apus</i>	Wildlife Acts Amber List	31/12/2011
Common Tern	<i>Sterna hirundo</i>	EU Birds Directive Annex I Wildlife Acts Amber List	31/07/1991
Dunlin	<i>Calidris alpina</i>	Wildlife Acts Red List	31/12/2011
Eurasian Curlew	<i>Numenius arquata</i>	Wildlife Acts Red List	31/12/2011
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	Wildlife Acts Amber List	14/11/2012
European Golden Plover	<i>Pluvialis apricaria</i>	EU Birds Directive Annex I Wildlife Acts Red List	31/12/2011
European Robin	<i>Erithacus rubecula</i>	Wildlife Acts Amber List	14/11/2012

Common Name	Scientific Name	Protection/Designation	Date of last record
Herring Gull	<i>Larus argentatus</i>	Wildlife Acts Red List	31/12/2011
House Sparrow	<i>Passer domesticus</i>	Wildlife Acts Amber List	31/12/2011
Lesser Black-backed Gull	<i>Larus fuscus</i>	Wildlife Acts Amber List	31/12/2011
Little Egret	<i>Egretta garzetta</i>	EU Birds Directive Annex I Wildlife Acts Green List	16/11/2016
Meadow Pipit	<i>Anthus pratensis</i>	Wildlife Acts Red List	31/12/2011
Mew Gull	<i>Larus canus</i>	Wildlife Acts Amber List	31/12/2011
Northern Lapwing	<i>Vanellus vanellus</i>	Wildlife Acts Red List	31/12/2011
Red Knot	<i>Calidris canutus</i>	Wildlife Acts Amber List	31/12/2011
Sandwich Tern	<i>Sterna sandvicensis</i>	EU Birds Directive Annex I Wildlife Acts Amber List	31/07/1991
Sky Lark	<i>Alauda arvensis</i>	Wildlife Acts Amber List	31/12/2011

As part of the Shannon Integrated Framework Plan (SIFP), bird usage surveys were undertaken along the Shannon Estuary. All bird species which are listed as Special Conservation Interests of the SPA were recorded at Shannon Estuary across the entire 2017-2018 survey period. The three subsites closest to Shannon Airport are 0H511, 0H512 and 0H508. SCI species recorded at these subsites included: black-headed gull, black-tailed godwit, cormorant, curlew, dunlin, golden plover, grey plover, lapwing, knot, redshank, shelduck, teal and wigeon. Nationally important populations of dunlin and redshank were recorded at subsite 0H512 and a nationally important population of golden plover was recorded at subsite 0H508.

Shannon Airport Lagoon represents a key constraint, owing to the proximity of this site to the constraints area and that it may represent important habitat for special conservation interest (SCI) bird species from River Shannon and River Fergus Estuaries SPA (004077).

Noise, vibration and overall disturbance will need to be fully considered in relation to any mobile bird species that might use habitats within or nearby to the constraints area (especially Shannon Airport Lagoon).

Finally, some SCI bird species are winter migrants and thus, a strong constraint is that works take place outside of the winter season (October to March) to avoid disturbance.

9.3.6.2 Terrestrial Mammals

A total of 7 terrestrial mammals have been recorded within 10km of the constraints area. All are protected under the Wildlife Act with Otter, Irish Hare and Pine Marten are afforded further protection under the EU Habitats Directive. Of these 7 species only Hare and Hedgehog have been recorded within 2km of the constraints area. Due to the lack of woodland and built up area in the vicinity of the constraints area, species such as Irish Stoat and Red Deer are unlikely to frequent the areas close to the constraints area. Otter, however, is a qualifying interest of the Lower River Shannon cSAC and is likely to frequent the Shannon Estuary in the area adjacent to the constraints area and also streams which feed into the Estuary.

Table 9-6: Mammal records 10km from site (NBDC 10km grid square R36V)

Common Name	Species name	Protection/Designation	Date of last record	Not within 2km (R36V) of site
Eurasian Badger	<i>Meles meles</i>	Wildlife Acts Least Concern	08/03/2017	X
European Otter	<i>Lutra lutra</i>	EU Habitats Directive Annex II & IV Wildlife Acts Least Concern	01/12/2018	X
Irish Hare	<i>Lepus timidus subsp. Hibernicus</i>	EU Habitats Directive Annex IV Wildlife Acts	05/07/2018	
Irish Stoat	<i>Mustela erminea subsp. Hibernica</i>	Wildlife Acts Least Concern	31/05/2011	X
Pine Marten	<i>Martes martes</i>	EU Habitats Directive Annex V Wildlife Acts Least Concern	31/12/2012	X
Red Deer	<i>Cervus elaphus</i>	Wildlife Acts Least Concern	31/12/2008	X
West European Hedgehog	<i>Erinaceus europaeus</i>	Wildlife Acts Least Concern	15/04/2012	

Within 10km of the constraints area three invasive mammal species have been recorded; none have been recorded within 2km of the constraints area. For more information see Table 9-7:

Table 9-7: Invasive Mammal Species within 10km of the constraints area (NBDC 10km grid square R36V)

Common Name	Species name	Impact	Legislation	Date of last record
American Mink	<i>Mustela vison</i>	High	Regulation S.I. 477	15/04/2010
European Rabbit	<i>Oryctolagus cuniculus</i>	Medium		02/11/2014
Fallow Deer	<i>Dama dama</i>	High	Regulation S.I. 477 Wildlife Acts	31/12/2008

9.3.6.3 Bats

Within 10km of the constraints area 6 species of bat have been recorded. All bats are protected under both the Wildlife Act and EU Habitats Directive Annex IV , with the Lesser Horseshoe bat provided extra protection under Annex II of the EU Habitats Directive. It must be noted that no bat species have been recorded within 2km of the constraints area. However, according to the National Biodiversity Data Centre’s Bat Landscapes (Biodiversity Maps), the area of the constraints area and its surrounds provide the highest suitability for all the species recorded within 10km, except the Lesser Horseshoe bat. For Lesser Horseshoe bat, the area is categorized as medium habitat suitability for the species. For more information see Table 9-8 below.

Table 9-8: Bats Recorded within 10km of the constraints area (NBDC 10km grid square R36V)

Common Name	Species name	Protection/Designation	Date of last record
Brown Long-eared Bat	<i>Plecotus auritus</i>	EU Habitats Directive Annex IV Wildlife Acts Least Concern	10/05/2000
Daubenton's Bat	<i>Myotis daubentonii</i>	EU Habitats Directive Annex IV Wildlife Acts Least Concern	09/09/2009
Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	EU Habitats Directive Annex II & IV Wildlife Acts Least Concern	10/06/2009
Lesser Noctule	<i>Nyctalus leisleri</i>	EU Habitats Directive Annex IV Wildlife Acts	09/09/2009
Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	EU Habitats Directive Annex IV Wildlife Acts Least Concern	29/04/2001
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	EU Habitats Directive Annex IV Wildlife Acts Least Concern	09/09/2009

9.3.6.4 Other Taxa

Three species of other taxa which are legally protected under the Wildlife Act were recorded within 10km of the constraints area; Frog, Smooth Newt and Lizard. Frog is afforded further protection as it is Annex V listed in the EU Habitats Directive. It is also noted that only Smooth Newt has been recorded within 2km of the constraints area. All three species may forage and breed within the area of the constraints area. See Table 9-9 for more information.

Table 9-9: Other Taxa Recorded within 10km of the constraints area (NBDC 10km grid square R36V)

Common Name	Species name	Protection/Designation	Date of last record	Not within 2km (R36V) of site
Common Frog	<i>Rana temporaria</i>	EU Habitats Directive Annex V Wildlife Acts Least Concern	31/12/1979	X
Smooth Newt	<i>Lissotriton vulgaris</i>	Wildlife Acts Least Concern	30/04/2012	
Common Lizard	<i>Zootoca vivipara</i>	Wildlife Acts Least Concern	04/09/1972	X

9.4 Summary and Conclusions

The following are a list of the biodiversity constraints associated with the constraints area:

- Nearby designated sites:
 - The constraints area is 0km to the River Shannon and River Fergus SPA (004077), Lower River Shannon cSAC (site code: 002165) and North Shore pNHA. Shannon Airport Lagoon represents a key constraint, owing to the proximity of this site to the constraints area and that it may represent important habitat for special conservation interest (SCI) bird species from River Shannon and River Fergus Estuaries SPA (004077).
- Hydrological links:
 - Two existing culvert water crossings hydrologically link the N19 to the Shannon Estuary designated as River Shannon and River Fergus SPA (004077), Lower River Shannon cSAC (site code: 002165) and Fergus Estuary and Inner Shannon, North Shore pNHA.
- Appropriate Assessment:
 - Due to hydrological links and proximity (0km) to River Shannon and River Fergus SPA (004077) and Lower River Shannon cSAC (site code: 002165), a Natura Impact Statement is likely to be required.
- Flora:
 - Meadow Barley (*Hordeum secalinum*) which is protected under the Flora (Protection) Order, 2015 and rated as Vulnerable as been recorded within 10km of the constraints area.
 - Bee Orchid (*Ophrys apifera*) which is rated as Near Threatened has been recorded within 2km of the constraints area.

- Opposite-leaved Pondweed (*Groenlandia densa*) (Flora Protection Order species) has been recorded in a canal connected to Shannon Airport Lagoon.
- Invasive Flora:
 - Himalayan Knotweed (*Persicaria wallichii*), a Medium Impact invasive species regulated under Regulation S.I. 477; Reg 49 and 50, recorded within 10km of the constraints area.
 - Japanese Knotweed (*Fallopia japonica*), a High Impact invasive species regulated under Regulation S.I. 477; Reg 49 and 50, recorded within 10km of the constraints area.
 - Red-osier Dogwood (*Cornus sericea*), Amber List/Uncertain Risk species, recorded within 10km of the constraints area.
- Birds:
 - Four Annex I (Birds Directive) species and protected under the Wildlife Acts have been recorded within 2km of the constraints area; Common Tern, European Golden Plover, Little Egret and Sandwich Tern.
 - Six red listed species (and protected under the Wildlife Acts) were recorded within 2km of the constraints area; Black-headed Gull, Dunlin, Eurasian Curlew, Herring Gull, Meadow Pipit, Northern Lapwing.
 - Fourteen amber listed species (and protected under the Wildlife Acts) recorded within 2km of the constraints area; Barn Swallow, Common Redshank, Common Sandpiper, Common Shelduck, Common Snipe, Common Starling, Common Swift, Eurasian Oystercatcher, European Robin, House Sparrow, Lesser Black-backed Gull, Mew Gull, Red Knot and Sky Lark.
 - Noise, vibration and overall disturbance will need to be fully considered in relation to any mobile bird species that might use habitats within or nearby to the constraints area (especially Shannon Airport Lagoon).
 - Some SCI bird species are winter migrants and thus, a strong constraint is that works take place outside of the winter season (October to March) to avoid disturbance.
- Terrestrial Mammals:
 - European Otter (*Lutra lutra*), protected under the Wildlife Acts and Annex II and IV listed of the Habitats Directive, has been recorded within 10km of the constraints area and is a qualifying interest of the Lower River Shannon cSAC (site code: 002165).
 - Irish Hare (*Lepus timidus subsp. Hibernicus*), protected under the Wildlife Acts and Annex IV listed (Habitats Directive), has been recorded within 2km of the constraints area.
 - Pine Marten (*Martes martes*), protected under the Wildlife Acts and Annex V listed (Habitats Directive) has been recorded within 10km of the constraints area.
 - Three mammals solely protected under the wildlife act and of Least Concern have been recorded within 10km of the constraints area; Eurasian Badger (*Meles meles*), Irish Stoat (*Mustela erminea subsp. Hibernica*) and Red Deer (*Erinaceus europaeus*).
 - Hedgehog (*Erinaceus europaeus*) solely protected under the Wildlife Acts and of Least Concern has been recorded within 2km of the constraints area.
- Bats:
 - Six species of bat protected under Annex IV of the Habitats Directive and Wildlife Acts and of Least Concern have been recorded within 10km of the constraints area; Brown Long-eared Bat (*Plecotus auritus*), Daubenton's Bat (*Myotis daubentonii*), Lesser Noctule (*Nyctalus leisleri*), Pipistrelle (*Pipistrellus pipistrellus sensu lato*), Soprano Pipistrelle (*Pipistrellus pygmaeus*) and Lesser Horseshoe Bat (*Rhinolophus hipposideros*). The Lesser Horseshoe Bat is also protected under Annex II of the Habitats Directive.

- Other Taxa:

- Common Frog (*Rana temporaria*), protected under Annex V of the Habitats Directive and the Wildlife Acts, is of Least Concern and was recorded within 10km of the constraints area
- Smooth Newt (*Lissotriton vulgaris*) protected under the Wildlife Acts, is of Least Concern and was recorded within 2km of the constraints area
- Common Lizard (*Zootoca vivipara*) protected under the Wildlife Acts, is of Least Concern and was recorded within 10km of the constraints area

10 HYDROLOGY AND WATER QUALITY

10.1 Introduction

The section considers the hydrology and water quality constraints within the study area. It describes surface water hydrology and water quality within the catchment, and the potential for flooding within the study area.

The study area is located within hydrometric area 27 (Shannon Estuary North) and it is situated along the Shannon Estuary. The study area is traversed by the Clonloghan Stream and Urlan Beg Stream.

10.2 Methodology

The Hydrology and Water Quality assessment was carried out in accordance with the NRA Guidelines on *Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* and legislation listed in Section 10.2.1.

The Hydrology and Water Quality assessment comprised a desk study of all available hydrological and water quality information on the study area.

A desk study will address the following categories:

- Description of catchment and receiving waters
- Flooding/tidal influences and historic flooding
- Water quality
- Water supply

To assist in addressing constraints related to hydrology and water quality, consultations with relevant organisations have been undertaken. This is further addressed in Section 4.

10.2.1 Relevant Legislation

Water Framework Directive (WFD)

The WFD established a new system for the protection and improvement of water quality and water dependent ecosystems. It has influenced the management of water resources and has affected conservation, fisheries, flood defence, planning and development. It has endeavoured to ensure that all impacts on water resources – physical modification, diffuse and point source pollution, abstraction or otherwise – are controlled.

The overriding purpose of the WFD is to achieve at least ‘good status’ in all European waters and to ensure that no further deterioration occurs in these waters. European waters are classified as ground waters, rivers, lakes, transitional and coastal waters. The WFD has been implemented in Ireland by dividing the island of Ireland into eight river basin districts. These districts are natural geographical areas that occur in the landscape. For the 2nd Cycle (2016-2021), the Eastern, South Eastern, South Western, Western and Shannon River Basin Districts were merged to form one national River Basin District.

The WFD has been transposed into Irish law following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003)¹⁹
- European Union (Water Policy) Regulations 2014 (S.I. No. 350 of 2014)
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009)²⁰
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010)²¹
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2010 (S.I. No. 610 of 2010)²²
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011)

Water Framework Directive - Waterbody Status

The European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009), give effect to the criteria and standards used for classifying surface waters in accordance with the WFD. There are five categories of surface water status: ‘High’, ‘Good’, ‘Moderate’, ‘Poor’ and ‘Bad’.

A surface waterbody must achieve both good ecological status and good chemical status before it can be considered to be of good status. The chemical status of a waterbody is assessed based on certain chemical pollutants. The ecological status is assessed based on Biotic Indices or Quality (Q) Values. The EPA Biological Quality Rating System for Rivers (Q Rating System) and its relationship with the WFD Status is shown in Table 10-1.

Table 10-1: EPA Q Rating System and WFD Status

Q-Value	Water Quality	WFD Status
Q5	Pristine	High
Q4-5	Very good	
Q4	Good	Good
Q3-4	Slightly Polluted	Moderate
Q3	Moderately Polluted	Poor
Q2-3	Moderate to Poor	
Q2	Poor	Bad
Q1-2	Poor to bad	
Q1	Bad	

¹⁹ Amended in 2005 (S.I. No 413/2005), 2008 (S.I. No. 219/2008) and 2010 (S.I. No. 93/2010)

²⁰ Amended in 2012 (S.I. No. 327/2012) and 2015 (S.I. No. 386/2015)

²¹ Amended in 2011 (S.I. No 389/2011), 2012 (S.I. No 149/2012) and 2016 (S.I. No 366/2016)

²² Amended in 2014 (S.I. 31/2014)

In accordance with the Surface Water Regulations, water classified as ‘High’ or ‘Good’ must not be allowed to deteriorate. Water classified as less than good must be restored. The Surface Water Regulations also state that, for the purpose of classification, a status of less than good is assigned in the case of a waterbody where the environmental objectives are not met.

10.3 Desk Study

The following sources of information were considered to identify constraints related to hydrology and water quality:

- Surface Water Features (<https://gis.epa.ie/EPAMaps/>)
- Catchments (<https://www.catchments.ie/>, River Basin Management Plan for Ireland 2018-2021)
- River Flows (www.opw.ie)
- Flooding (<http://www.floodinfo.ie/>)
- Water Quality (<https://www.epa.ie/>)
- Public Water Supply (Local Authorities)

Having collected the available baseline data, the Constraints Study Report is prepared for each topic where available data is briefly discussed.

10.4 Detailed Description

10.4.1 Surface Water Features and Catchments

For the purpose of hydrological activities and by agreement between the various hydrological agencies in Northern Ireland and the Republic of Ireland. Ireland was divided into 40 hydrometric areas; each consists of a single river catchment or a number of smaller ones. The study area is located within Hydrometric Area No. HA 27, Shannon Estuary North, of the Irish River Network System.

The study area is within Urlan Beg_010 sub-basin which drains a total area of 39.6 km². Urlan Beg_010 sub-basin is not identified as an Area for action. The areas for action are areas where action will be carried out as part of the River Basin Management Plan for Ireland 2018-2021 (second cycle).

The national road N19 within the study area is traversed by the Urlan Beg Stream and Clonloghan Stream which drain into the Upper Shannon Estuary. The Urlan Beg Stream flows along the west side of the Shannon Free Zone. The Clonloghan Stream flows between the Shannon Free Zone and the national road N19.

The Urlan Beg Stream has two tributaries, the Leamaneigh More Stream and Lisconor Steam. The Leamaneigh More Stream joins the Urlan Beg Stream approximately 850m northwest of the junction of motorway road M18 and national road N19.

In tidal waters there are two water body types, transitional and coastal. The Upper Shannon Estuary is classified as a transitional water body. The Upper Shannon Estuary is a designated area, the Lower River Shannon SAC (002165) and the River Shannon and River Fergus Estuaries SPA (004077).

Within the southern part of the study area an unnamed artificial waterbody is located. It runs at the landward side of and parallel to the East Embankment for approximately 1.1 km until it meets the Urlan Beg Stream. From there it runs to the north west, in parallel with the Urlan Beg Stream. This channel is connected to the Shannon Estuary via a sluice gate located near the western limit of the East Embankment. The East and West Embankments are further addressed in Section 10.4.2.

Annual precipitation within the Shannon Estuary North varies with topography with rainfall varying between 1250 mm per annum in the upland areas to 960 mm per annum in the low-lying areas.

The study area is not within a shellfish area. The closest shellfish area is approximately 4.9km southwest of the study area. The receiving waters within the study area are not bathing nor drinking water. No lake waterbodies are present within the study area.

10.4.2 Flooding/Tidal Influence and Historic Flooding

The Office of Public Works compiles Flood Hazard Maps for the entire country. Flood Hazard Maps are tools used to assist with the management of development in floodplains and other areas at risk from tidal, fluvial or surface water flooding. A flood is defined as the occurrences of recorded flooding at a given location on a given date or on a recurring basis.

The OPW has produced indicative flood mapping based on findings from preliminary flood risk assessment (PFRA). The PFRA mapping was prepared as part of the high-level screening exercise to identify areas for further assessment under the Catchment Flood Risk Assessment and Management (CFRAM) Programme. These areas are referred to as Areas for Further Assessments (AFAs). 300 AFAs were designated, of which 90 are coastal communities.

The study area is within Shannon Area for Further Assessment (AFA) and Shannon Airport Individual Risk Receptor (IRR)²³ which is one of the three most significant airports in Ireland. These areas are addressed in the Flood Risk Management Plan for the Shannon Estuary North and Mal Bay River Basin (UOM 27-28).

According to the CFRAM mapping, the study area is within both fluvial and coastal Flood Zone A. There is no coastal flood risk to any properties within the Shannon Airport IRR in the 0.5% AEP event and therefore no assessment of measures has been carried out within CFRAM Programme.

To the south and south-west of the study area, the East and West Coastal Embankments are located. These embankments are essential to the protection of the Shannon airport. The East and West Embankments are approximately 1.3 km and 1.6 km in length, respectively. These embankments are likely to be refurbished following the storm damage of the winter of 2013/2014.

The national flood hazard mapping indicates that the north part of study area is within benefiting lands as shown on Figure 10.1²⁴. These lands have benefit from Shannon Embankment North Embankment Schemes – Bunratty Rineanna.

²³ Individual Risk Receptor

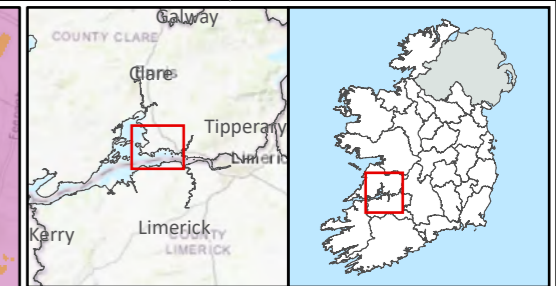
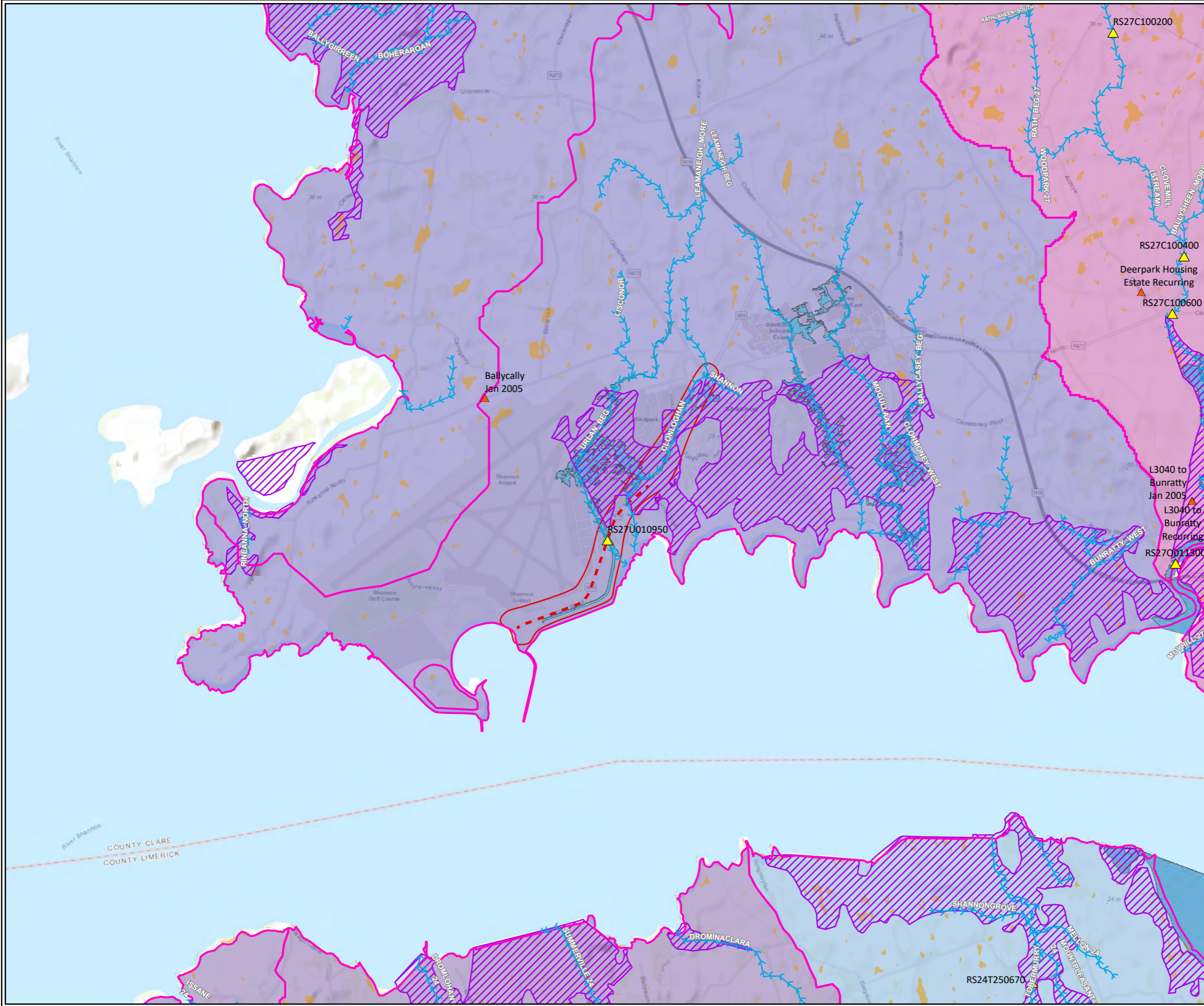
²⁴ Benefiting lands are areas of land subject to flooding or poor drainage that might benefit from the implementation of Arterial Drainage Schemes. Drainage schemes cover approximately 20% of the country.

The national flood hazard mapping does not indicate any record of historic flooding within the study area and in the buffer zone of 1750 m. The nearest flood incident has been recorded under the name Ballycally Jan 2005, approximately 1.75 km north west of the study area. The nearest recurring flooding is Shannon Carrigerry Clare located approximately 2.5 km north west of the study area.

Clare County Council issued Climate Change Adoption Strategy 2019-2024 where they identified 6 themes. Theme 4 (Drainage and Flood Management) is discussed herein.

Theme 4 (Drainage and Flood Management) outlines the following objectives:

- To manage the risk of flooding through a variety of responses.
- To ensure that areas that are at risk of Flooding are clearly identified and to ensure that inappropriate development does not take place within areas that are at risk of flooding.
- To mitigate the risk and impact of flooding
- To undertake measures to reduce coastal flooding and to proactively react to incidences of coastal flooding in County Clare.



- ▲ Water Quality Monitoring Locations
- ▲ OPW Historic Flood Points
- - - 2.2km Proposed Improvement Scheme
- Constraints Area
- — — Rivers
- WFD River Sub Basins
- Benefiting Lands
- PFRA/CFRAMS 1% AEP Pluvial Flood Extent
- River Flood Extents - Medium Probability
- WFD Sub Catchments**
- BALLYGIRREEN_SC_010
- Deel[Newcastlewest]_SC_050
- Greanagh_SC_010
- Owenagarney_SC_020

TITLE:	
Hydrological Constraints	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO: 10.1	
CLIENT: Clare County Council	
SCALE: 1:40,000	REVISION: 0
DATE: 20/03/2020	PAGE SIZE: A3



10.4.3 Water Quality

The receiving waters within study area are not classified as per WFD. The river water quality status for the periods of 2007 to 2018 is unassigned. According to the *Interim Classification of Coastal and Transitional Waters for the purpose of the WFD, November 2008* water bodies were classified as 'high', 'good' or 'moderate' status. In most cases there was insufficient confidence to classify below 'moderate'. In water bodies where data confidence was very low status was set as 'unassigned', even where the conservation status was considered to be favourable. The river waterbodies risk is under Review.

Transitional waterbody status of Upper Shannon Estuary is classified as 'Poor', likely due to agricultural, urban and industrial discharges.

At the northeast part of the study area a Section 4 discharge is located, Ballymurthagh Traveller Accommodation. Section 4 licences are LA licensed industries that discharge trade effluent into waters. Trade effluent is any liquid waste (other than domestic wastewater and storm water) that is discharged from a business premises to the public sewers.

10.5 Hydrology and Water Quality Summary and Conclusions

All watercourses within the study area are considered to be constraints due to the requirements to cross the river channel by means of a bridge or culvert crossings. Aside from the engineering constraints involved with a river crossing, full consideration needs to be given to the sensitivity of the receiving water in terms of the conservation importance and the current water quality of a river. According to the EPA database, there are no recorded water quality parameters of the Urlan Beg Stream and Clonloghan Stream.

With regards to the WFD Transitional Waterbody identified as the 'Upper Shannon Estuary' into which both watercourses flow this has been assigned a WFD Status (2013-2018) of 'Poor' and a Risk category of 'at risk'. This is most likely due to agricultural, urban and industrial discharges further north and east of the study area.

The study area is within Shannon AFA and Shannon Airport IRR as defined in the CFRAM Programme. Wall and embankments are proposed as potentially viable flood relief measures for these zones.

According to the Clare County Council Climate Change Adoption Strategy 2019-2024 the proposed development shall ensure that area at risk of flooding are clearly identified and shall ensure that inappropriate development does not take place within areas that are at risk of flooding. The proposed development shall mitigate the risk and impact of flooding.

The time of reconstruction of the West and East Embankments might overlap with the proposed N19 Shannon Airport Access Road Improvement Scheme with potential for in combination effects.

11 AIR AND CLIMATE

11.1 Introduction

This section describes the air quality and climate constraints identified within the scheme study area for the N19 National Primary Road between the Shannon Town Roundabout and Knockbeagh Point Roundabout on approach to Shannon International Airport. The specific objectives of the air quality and climate constraints study is to determine the prevailing ambient air quality, the main existing sources of air pollution and greenhouse gases, and the most sensitive receptor locations within the study area.

The TII guidelines (2011) specifically define what types of receptors can be deemed sensitive with respect to air quality impacts “Sensitive receptor locations include: 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.” In addition, the impact of air quality on ecologically sensitive receptors must also be considered. As stated within the TII guidelines “Designated habitats are also potentially sensitive receptors. Such sites include, Natural Heritage Areas (NHA), Special Areas of Conservation (SAC), Special Protection Areas (SPA), National Parks, Nature Reserves, Refuges for Fauna, Refuges for Flora, Wildfowl Sanctuaries, Ramsar Sites, Biogenetic Reserves and UNESCO Biosphere Reserves.”

The air quality objectives for proposed road project relate to avoidance, where necessary, of new routes through built up areas with a large density of air sensitive receptors or through areas that are ecologically sensitive to air quality impacts.

11.2 Methodology

The air quality and climate constraints study has been prepared in accordance with the following guidelines:

- TII *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011).

The constraints assessment was carried out by means of a desktop review of available information on the proposed study area and a review of existing air quality and climate data from the EPA. The following information was consulted as part of this study:

- OS Mapping;
- Satellite Mapping (Google Earth, Bing Maps);
- EPA Air Quality Monitoring Data (EPA 2020a, 2019a);
- EPA Maps of Licenced Facilities (EPA 2020b);
- Recent reports on Greenhouse Gas Emissions and Projections in Ireland (EPA 2019b, 2019c).

11.3 Identified Constraints

11.3.1 Sensitive Receptors

The existing environment of the study area is a mixture of rural and industry in nature. The land use is predominately residential to the north east boundary of the scheme. These residential receptors are within the most northern 2km the constraints area, to the east of the current alignment. Industrial facilities associated with Shannon Airport are located to the north western end of the scheme, to the south west the land is associated with the runway of Shannon Airport. To the south east of the scheme the alignment runs parallel with the Shannon Estuary, which is a SAC due to sensitive ecological receptors.

The proposed N19 scheme will provide a higher quality road connection on the N19 National Primary Road between Drumgeely Roundabout and Knockbeagh Point Roundabout on approach to Shannon International Airport which will lead to improved safety. The existing surface has exceeded its design life, dedicated off-road cycle facilities are not provided and facilities for pedestrians require significant improvement.

The N19 scheme is listed in the TII list of Projects & Improvements. A degraded road surface leads to inefficiencies in fuel consumption and therefore results in greater air and climate pollutant emissions. Receptor locations in the remainder of the study area currently experience rural background levels of pollutants. A small number of these receptors may be impacted, positively or negatively, by the proposed N19 improvements, once selected, but the magnitude of impact is not expected to be significant given the narrow constraints area.

The constraints area bounds the Shannon Estuary SAC, which would be considered a highly sensitive ecological receptor with respect to construction phase dust and operational phase air pollutant impacts.

11.3.2 Review of EPA Air Monitoring Data

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes. In terms of air monitoring, the study area is categorised as Zone D (rural areas and towns with a population of less than 15,000).

Air quality monitoring programs have been undertaken throughout Ireland in recent years by the EPA and Local Authorities. The most recent EPA annual report on air quality monitoring undertaken throughout Ireland is entitled "*Air Quality in Ireland 2018*" (EPA, 2019a). *The TII Guidelines* (2011) state that the local air quality assessment should focus on NO₂ and PM₁₀, as these are the pollutants of greatest concern with respect to road traffic conditions. A review of data from representative Zone D locations in Ireland can be used to provide an indication of the prevailing air quality conditions within the study area.

Historical data is available for Shannon town however the monitoring site was shut in 2012 and therefore the data is out of date. This monitoring was in line with other urban zone D monitoring stations. NO₂ monitoring was carried out at two rural (Emo and Kilkitt) and one urban (Castlebar) Zone D locations in recent years (EPA, 2019a). The NO₂ annual average in 2018 was 3µg/m³ at both rural sites. Annual average concentrations at the Castlebar station were 8µg/m³ in 2018. Hence long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m³. The maximum 1-hour limit value of 200µg/m³ (measured as a 99.8th percentile i.e. 18 exceedances are allowed per year) was not exceeded in any year for any of the Zone D locations. The average results at rural Zone D locations over the last five years suggests a maximum of 9 µg/m³ as a background concentration. Based on the above information, a conservative estimate of the current background NO₂ concentration for the region of the development is 8µg/m³.

Long-term PM₁₀ measurements carried out at the rural Zone D location in Kilkitt in 2018 gave an average level of 9µg/m³ (EPA, 2019a). Concentrations for the urban Zone D location of Castlebar averaged at 11µg/m³ for 2018. Results are also available for Castlebar to observe the trend in concentrations over the last five years. The average result at Castlebar over the last five years is 12µg/m³. Based on the above information a conservative estimate of the current background PM₁₀ concentration for the region of the development is 12µg/m³.

There is no monitoring of PM in Castlebar, therefore another station must be reviewed. The results of PM_{2.5} monitoring at the rural Claremorris in 2018 indicated an average PM_{2.5}/PM₁₀ ratio of 0.50. Results are also available for Claremorris to observe the trend in PM_{2.5}/PM₁₀ ratios over the last five years. The average result at Claremorris over the last five years is 0.54µg/m³. Based on this information, a conservative ratio of 0.6 was used to generate a background PM_{2.5} concentration for the region of the development of 6µg/m³.

11.3.3 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM₁₀ (particulate matter less than 10 microns), the situation is more complex due to the range of sources of this pollutant, and thus measured levels of PM₁₀ can be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Shannon Airport meteorological station. This station is located at the boundary of the existing N19. Wind roses for the most recent 5 years of data collected (2015 – 2019) show that the prevailing wind is westerly to south-westerly in direction.

11.3.4 Air Pollution Sources

The major source of air pollution within the study area is from road and airport traffic. Air quality is variable and subject to significant spatial variation, with concentrations generally falling significantly with distance from major road sources. The highest levels of air pollution are experienced within 50m of the existing national roads in the study area with the remainder of the study area generally experiencing rural background concentrations of pollutants.

A review of IPPC / IED licences issued by the EPA for the region show that there are eight licenced facilities within a 1km radius of the proposed road scheme. Two of these licenced facilities have NO_x emissions and five have emissions of particulates. Emissions from each of these facilities will have to comply with ambient air quality limit values as part of their licence criteria. Due to the limited size of the constraints area there are no options to increase distance from the licenced facilities.

- Badgers Blinds Ltd. (IE) - No relevant emissions;
- Eirchem Pharma Services Limited (IED) – NO_x and particulate emissions;
- ITW Ireland Unlimited Company (IED) – No relevant emissions;
- Molex Ireland Limited (IED) – No relevant emissions;
- Heraeus Metal Processing Limited - NO_x and particulate emissions;

- Element Six Limited (IED) - Particulate emissions;
- International Aerospace Coatings Limited (IED) - Particulate emissions;
- Lufthansa Technik Shannon Ltd (IED) - Particulate emissions.

11.4 Air and Climate Summary and Conclusions

The Clare County Council Climate Change Adaption Strategy 2019 recommends that infrastructure plans should support sustainable modes of transport such as walking and cycling through promotional strategies and the provision of infrastructure where required. Currently there are no dedicated off-road cycle facilities and facilities for pedestrians require significant improvement to meet current design standards.

Based on the review of the proposed study area and the existing ambient air quality environment, no significant constraints have been identified in relation to air quality and climate.

11.5 References

EPA (2019a) *Air Quality in Ireland 2018* - (& previous annual reports)

EPA (2020a) <http://www.epa.ie/whatwedo/monitoring/air>

EPA (2020b) <https://gis.epa.ie/EPAMaps/> (Accessed 26/02/2020)

Transport Infrastructure Ireland / National Roads Authority (2011) *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*.

12 NOISE AND VIBRATION

12.1 Introduction

This section describes the noise and vibration constraints within the study area. The assessment identifies noise sensitive locations within the study area that have the potential to constrain the location of the proposed route corridor.

12.2 Methodology

The noise and vibration constraints study was undertaken in accordance with Transport Infrastructure Ireland's (formally National Roads Authority, NRA) document "*Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, 2014*", "*Guidelines for the Treatment of Noise and Vibration in National Road Schemes, 2004*" and "*Noise Action Plan 2018, Clare County Council*".

The purpose of the constraints study phase is to:

- Identify any receptors that may be deemed to be particularly sensitive to noise and/or vibration.
- Identify the ambient noise climate and any significant existing noise sources in the study area.
- Describe existing noise environment.
- Identify possible mitigation options that might be considered.

12.3 Noise Sensitive Receptors

Noise sensitive receptors have been identified using aerial imagery and Eircode data within 300m of the proposed scheme. The main noise sensitive residential locations are located within the housing estate to the east and south of the existing N19. To the south of the N19, these extend from Drumgeely Hill, Drumgeely at the western end to Dernish Lawn, Tullyvarraga to the east. There is also one dwelling just east of the N19 and R472 roundabout, in addition to the Ballymurtagh halting site just north west of this roundabout. Approximately 660 residential locations have been identified from Eircode data and these include dwellings on the roads listed above. The height of dwellings is important as it can determine the effectiveness of noise mitigation or screening. Generally, most dwellings are two storey housing. There are apartment blocks, ranging from three to five storeys, towards the centre of the scheme at Drumgeely Hill. There are also two floors of apartments above ground floor commercial units on Fergus drive. Drumgeely Avenue includes three storey houses.

Other noise sensitive receptors within the residential estate include:

- St Johns Primary School, Drumgeely Avenue, approximately 180 m from existing road within the housing estate
- Mercy Sisters Convent, Fergus Drive.
- Ground floor commercial units within the housing estate.
- Lidl supermarket within Shannon Town Centre at eastern extent of scheme.

In addition to residential receptors, commercial buildings within 300m of the proposed scheme were identified. At the western end of the scheme, there is a small industrial estate to the south of the existing N19 at Knockbeg Point comprising of warehousing and industrial buildings. There are also industrial buildings contained within the boundary of Shannon airport.

Between the Shannon Estuary and the proposed N19, opposite the Airport Avenue, is a disused park and ride along with a disused Oil Station, and therefore are not noise sensitive buildings. North of this location are industrial buildings, off Airport Avenue. These include industrial buildings within Shannon Airport and within the Shannon Free Zone West Industrial Estate. To the east of this is an industrial area, Shannon Industrial Estate and Western Business Park. The industrial facilities described include industries related to the aviation industry and Shannon Airport, financial services and manufacturing industry. While these are not likely to be noise sensitive given the proximity to Shannon Airport, it is possible that there may be manufacturing processes that may have vibration sensitive equipment, such as microelectronic manufacturing equipment. This might be an issue during construction operations (piling works) and may necessitate the selection of low vibration plant during construction. Figure 12.1 shows a map of the nearest commercial and residential receptors within 300m of the route that will be investigated further for potential effects during the construction phase.

12.4 Existing Noise Environment

The existing noise within the study area comprises noise from flight movements and ground operations at Shannon Airport. Road traffic noise is also a major noise source including noise from the N19 and local road traffic noise within the housing and industrial estates.

Within the housing estates, the noise level reduces with distance from the N19.

Existing vibration sources are due to vibration from traffic on the N19. The vibration level is not anticipated to be at a level that would cause disturbance to residents or structural damage.

12.5 Potential Impacts of the Development

Potential impact depends on final alignment and the distance to noise sensitive locations. The levels of noise from the proposed scheme will depend on the traffic volumes and speed. Requirements for mitigation will be assessed using the criteria outlined in the TIIs “Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, 2014”. The TII guidelines propose a design goal of 60dB(A) Lden (free field residential facade criterion) for new national road schemes.

The TII guidelines outline criteria to determine the requirement for mitigation measures at noise sensitive locations. The TII guidelines state.... *‘Mitigation measures are deemed necessary when whenever all of the following three conditions are satisfied:*

- (a) the combined expected maximum traffic noise level, i.e. the relevant noise level, from the proposed road scheme together with other traffic in the vicinity is greater than the design goal;*
- (b) the relevant noise level is at least 1dB more than the expected traffic noise level without the proposed road scheme in place;*
- (c) the contribution to the increase in the relevant noise level from the proposed road scheme is at least 1dB.’*

12.6 Potential Mitigation Measures

Mitigation measures will generally consist of one or more of the following:

- Locate road as far from residential dwellings as possible. At the eastern end of the scheme, at the N19/R472 roundabout, there are residential locations both to the north and south and therefore the alignment cannot be moved away from both residential locations.
- Have the road in a cutting, were practicable, to provide more acoustic screening.
- Install berms/noise barriers as screening between the N19 and the residential area to south.
- Use low noise road surface (LNRS) instead of hot rolled asphalt (HRA). Using LNRS rather than HRA can result in a reduction in traffic noise levels of the order of 3 to 4 dB.

12.7 Noise and Vibration Summary and Conclusions

The existing noise environment is comprised ground operation and aircraft noise from Shannon Airport, noise from traffic on the existing N19 and local road traffic noise within the housing and industrial estates.

Most noise sensitive locations are located in the housing estate south of the existing N19. Locating the proposed route as far north as possible, away from the existing residential locations is recommended. At the most eastern end of the scheme, at the N19/R742 roundabout, there are residential properties both to the north and south so there is no benefit in moving the alignment northwards at this location.

There are limited options in terms of alternative route alignments and applying appropriate mitigation measures will minimise the impact on noise sensitive locations and in some instance may reduce the impact below current levels.

The area north of the proposed route is very industrial and some manufacturing processes may have vibration sensitive equipment that could be an issue during construction.

13 LANDSCAPE AND VISUAL

13.1 Introduction

This section identifies and examines potential landscape and visual (including light) constraints within the study area. The landscape is the visible environment in its entirety, comprised of both natural and built elements including topography, water bodies, vegetation, wildlife habitats, open spaces, buildings and structures. Landscape and visual sensitivities considered include statutory and non-statutory landscape designations, natural features, landscape character areas of notable deciduous trees of woodland, amenities and historic landscapes.

The purpose of this chapter is to examine the existing environment and highlight any potential landscape and visual impacts of the proposed scheme at an early stage. Any Very High Landscapes²⁵ or highly sensitive visual receptors will be highlighted. (Note: the term 'sensitivity' is applied here in relation to how it is used in the Guidelines for Landscape and Visual Impact Assessment,²⁶ which may or may not align with how the term is used in the wider arena of landscape planning, such as by local authorities in their County Development Plans or Landscape Character Assessments²⁷). Landscape and visual constraints are examined as two discreet topics:

- Landscape - is concerned with alteration to the physical landscape and features which contribute to the formation of its character; and
- Visual - is concerned with changes that may arise in the overall visual amenity.

13.2 Methodology and Sources of Information

The methodology for Landscape and Visual involved a desk study of the relevant County Development Plans (CDPs) and Local Area Plans (LAPs) to ascertain the most valuable and sensitive landscapes and, along with a variety of other sources, to identify locations from where notable visual amenity is likely to be afforded. This desk study was based on a review of the following sources:

- Clare County Development Plan 2017 - 2023 (As Varied)²⁸
- Shannon Town and Environs Local Area Plan 2012 - 2018 (As Amended)²⁹

²⁵ 'Very High Landscapes' are determined with reference to TII guidelines - Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis (PE-PAG-02031-01 October 2016).

²⁶ Landscape Institute and the Institute of Environmental Management and Assessment (eds.) (2013) Guidelines for Landscape and Visual Impact Assessment. Routledge, Oxon.

²⁷ In accordance with the Landscape and Visual Impact Assessment (p88), landscape sensitivity is a function of the susceptibility of the landscape to the type of change proposed and the value placed on that landscape. Landscape value and sensitivity are determined while establishing the baseline conditions as part of an impact assessment through consideration of a number of factors highlighted in the guidelines.

²⁸ Clare County Council (2017) Clare Development Plan 2017 – 2023. Available from: <https://www.clarecoco.ie/services/planning/ccdp2017-2023/>

²⁹ Clare County Council (2017) Shannon Town and Environs Local Area Plan 2012-2018 (as amended). Available from: <https://www.clarecoco.ie/services/planning/local-area-plans/shannon-town-and-environs-local-area-plan%202012-2018/>

- Shannon Town Green Infrastructure Plan 2013³⁰
- A Guide to Landscape Treatments for National Road Schemes in Ireland (2006)³¹;
- Guidelines on the Implementation of Landscape Treatments on National Road Schemes in Ireland (2011)³²;
- National Parks and Wildlife Service³³;
- The Heritage Council – HeritageMaps.ie³⁴;
- Ordnance Survey maps;
- Historical mapping³⁵;
- National Inventory of Architectural Heritage³⁶;
- [Sport Ireland Trails](http://www.sportirelandtrails.ie)³⁷; and
- Google Maps³⁸.

13.3 Existing Environment

13.3.1 General Description

The study area is situated in south County Clare on the north shore of the River Shannon flanked by Shannon International Airport with associated industrial and business areas to the west, and the settlement of Shannon to the east. The study area runs from Knockbeagh Point in the south to the junction of the N19 Shannon access Road and the R472 regional road in the north and passes through portions of the townlands of Rineanna South, Drumgeely, Tullyglass, Ballymurtagh, Tullyvarraga and Knockaun.

13.3.2 Landform and Drainage

Topography in the study area is low lying and largely flat, ranging 0m to no greater than 30m Above Ordnance Datum (AOD). The most elevated locations are Tullyglass Hill 28m AOD, Drumgeely Hill 13m AOD, and Westpark Business Campus 26m AOD.

³⁰ Clare County Council (2013) Shannon Town Green Infrastructure Plan.

³¹ National Road Authority (NRA) publication 'A Guide to Landscape Treatments for National Road Schemes in Ireland' (2006)

³² National Road Authority (NRA) publication 'Guidelines on the Implementation of Landscape Treatments on National Road Schemes in Ireland' (2011)

³³ National Parks and Wildlife Service (2020) Map viewer. Available from: <http://webgis.npws.ie/npwsviewer/> [Accessed: 16 March 2020]

³⁴ The Heritage Council (2020) Map Viewer. Available from <http://www.heritagemaps.ie/> [Accessed: 16 March 2020]

³⁵ Ordnance Survey Ireland (various) Map viewer. Available from <https://geohive.ie/> [Accessed: 16 March 2020]

³⁶ National Inventory of Architectural Heritage (2020) Map viewer. Available from: <https://www.buildingsofireland.ie/> [Accessed: 16 March 2020]

³⁷ Sport Ireland (2020) Sport Ireland Trails. Available from: www.irishtrails.ie [Accessed: 16 March 2020]

³⁸ Google Maps (2020) Map view and aerial view. Available from: www.google.ie/maps [Accessed: 16 March 2020]

The Clonloghan watercourse has been canalised and flows through the study area from north to south before entering the River Shannon while a short section of the canalised Urlan Beg watercourse flows through the southern portion of the study area (Both of these watercourses are associated with the Special Protection Area - River Shannon and River Fergus Estuaries SPA, the Special Area of Conservation – Lower River Shannon SAC and proposed Natural Heritage Area - Fergus Estuary and Inner Shannon, North Shore pNHA). The coastal area to the south of Tullyglass at Drumgeely Creek and the area to the west of Knockbeagh Point are Saltmarsh wetlands.

13.3.3 Vegetation and Land Use

The northern end of the study area contains agricultural areas but the remainder is largely comprised of artificial surfaces including a combination of discontinuous urban fabric, industrial, commercial and transport units interspersed by a number of Open Spaces. Open Spaces are not necessarily publicly accessible and some currently contain coniferous planting.

13.4 Landscape Considerations

13.4.1 Clare County Development Plan 2017 - 2023 (As Varied)

13.4.1.1 *Clare Landscape Character Assessment*

A Landscape Character Assessment has been prepared for County Clare and this is incorporated into the current Clare County Development Plan 2017 – 2023 (Clare County Council 2017)³⁹. This identifies 26 separate Landscape Character Types (LCT). As Illustrated in Figure 13.1, the proposed Project passes through the LCT 1: ‘Built-up Areas’ (URBAN) and LCT 10: ‘Flat Estuarine Farmland and Islands’ (FEF). The LCTs are then amalgamated into 21 Landscape Character Areas (LCA) and the majority of the proposed Project occurs within LCA 10: ‘Sixmilebridge Farmland’ while the south western extents fall within LCA 14: ‘Fergus Estuary’ (Figure 13.2).

LCT 1 - Built-up Areas is described as:

‘Urban settlement with denser population levels that provides a hub of commercial, industrial and cultural activity that impacts on surrounding rural areas. Major communication routes radiate from centres including road and rail services. A variety of urban style buildings and often a number of historical features as found within Ennis; alternatively, planned urban centre of Shannon reflects more homogenous urban styles. Linear expansion along the roads a frequent element, resulting in ‘urban sprawl’.’

LCA 10 - Sixmilebridge Farmland, according to the Landscape Character Assessment, the key characteristics of this LCA are as follows:

- *An undulating, well maintained landscape, with the principal river of Owengarney draining from Doon Lough in the north.*

³⁹ <https://www.clarecoco.ie/planning/clare-county-development-plan-2017-2023/>

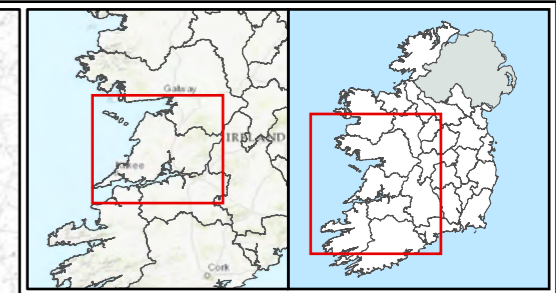
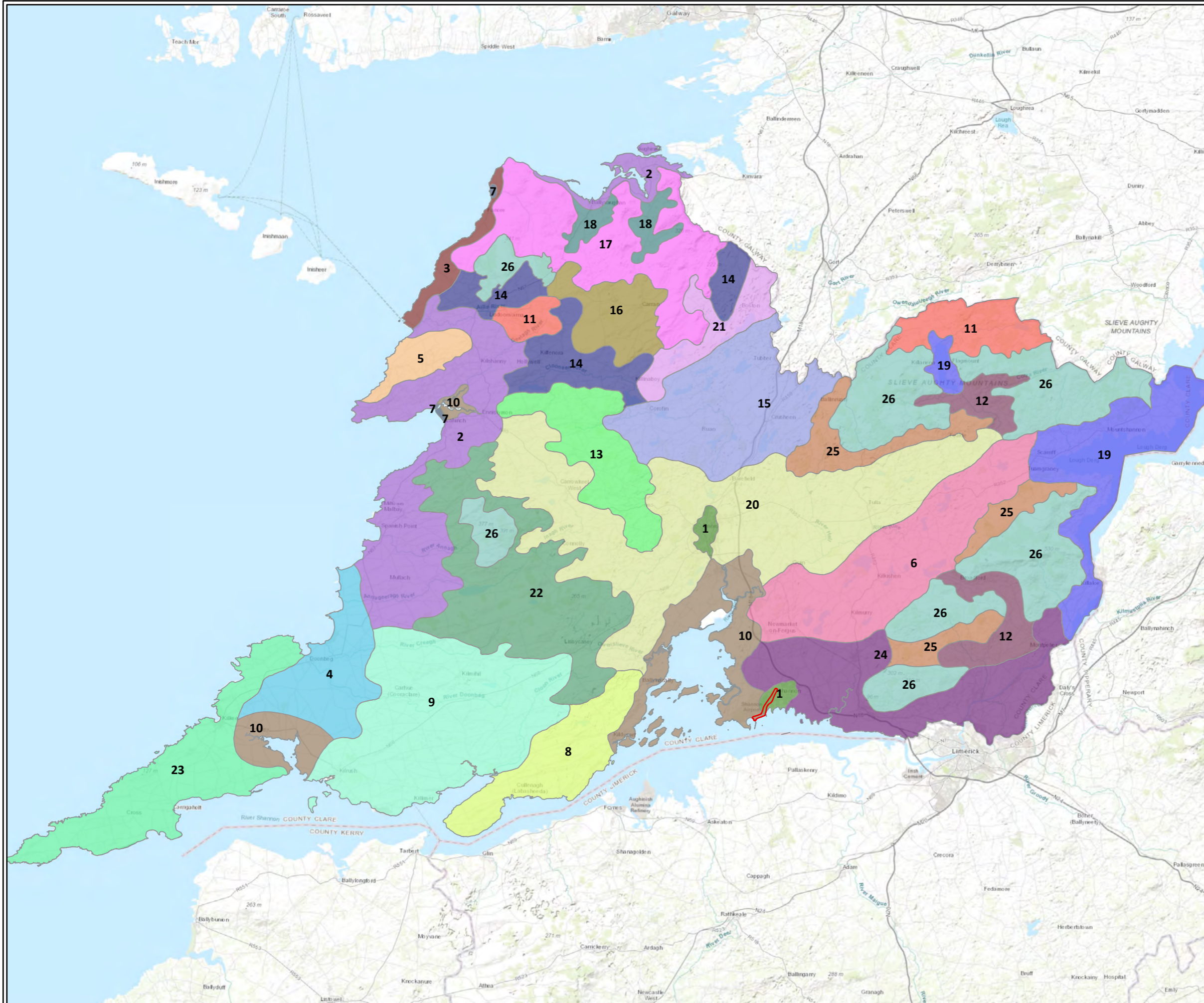
- *An area of considerable archaeological and historical interest testifying to its strategic location and good land resources.*
- *Principal roads cross through this area such as the N18 and there is a significant urban and commercial centre at Shannon, as well as the smaller settlement of Sixmilebridge.*

LCT 10 - Flat Estuarine Farmland and Islands is described as:

'Distinctively flat farmland adjacent to estuaries, which are inundated daily by the tide. Contained by sea defences which limit views, beyond which are extensive mudflats exposed at low tide and fringed by salt marshes. Rich bird life reflects the importance of mudflats for feeding birds. Land cover is pasture combined with estuarine elements such as mudflats and salt marsh with little tree cover. Fields are enclosed largely by ditches (reflecting the poorly drained characteristic), with occasional banks or hedgerows and post and wire fences. Limited roads are often located on elevated causeways through the wetter areas. Settlement is quite limited, confined to areas of higher ground and the low hills which are found occasionally through these areas'

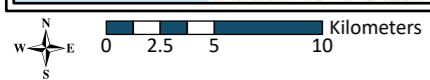
LCA 14 - Fergus Estuary, according to the Landscape Character Assessment, the key characteristics of this LCA are as follows:

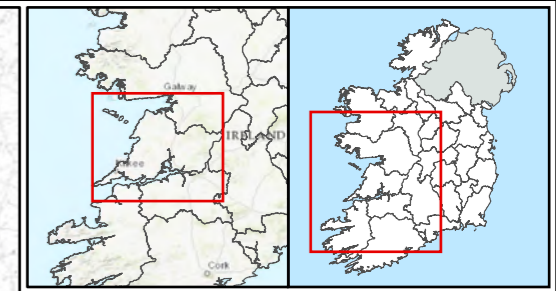
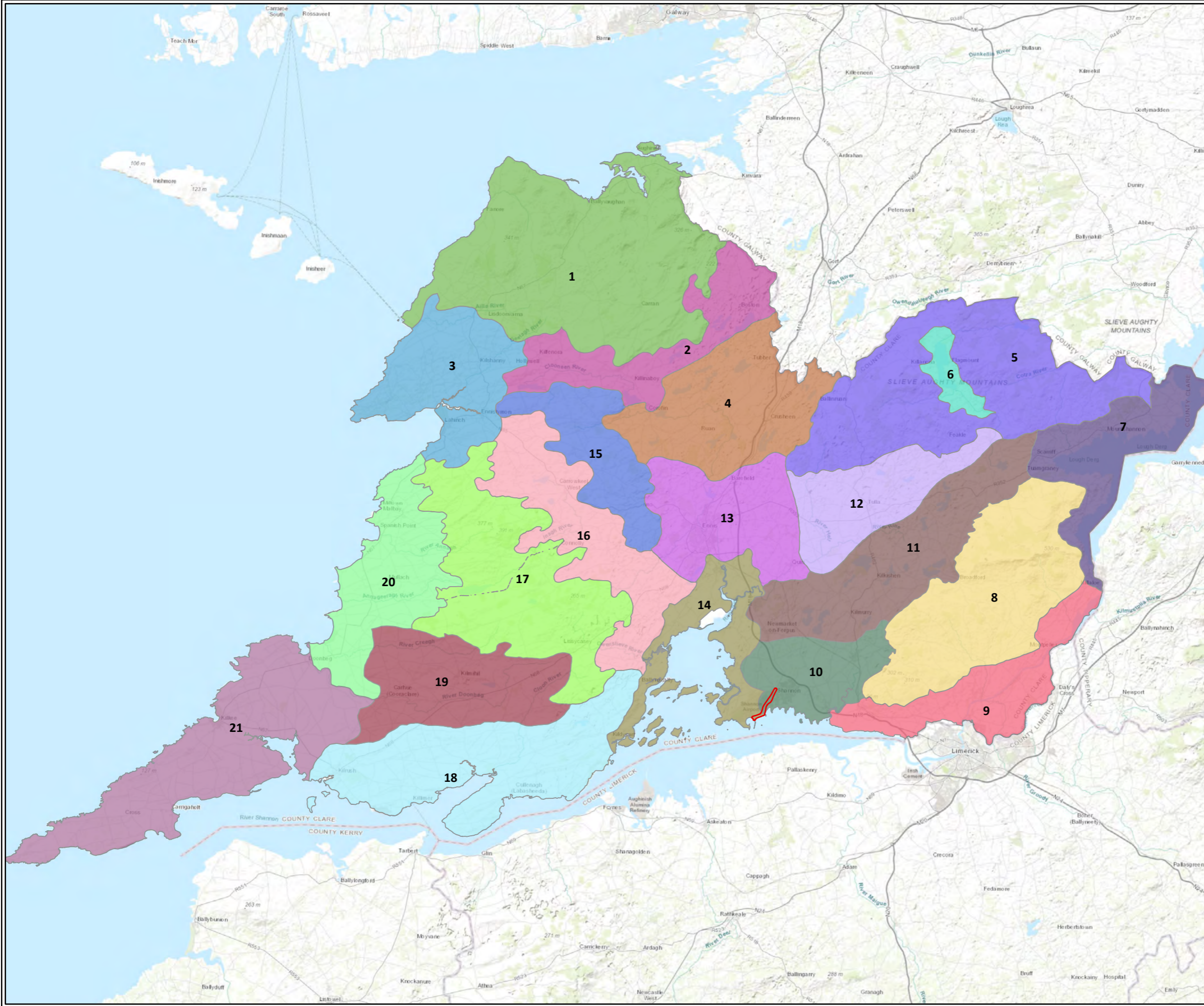
- *Flat estuarine farmland divided by drainage ditches, post and wire fences and degraded thorny hedgerows.*
- *Open expansive views are afforded across the estuary to the River Shannon, though these are limited in places due to flood defence embankments.*
- *Settlement is sparse reflecting the areas past tendency to flood, some settlement on higher ground. On eastern boundary, increased settlement due to proximity to Shannon Airport and town.*
- *Scattered holy wells with a number of graveyards and standing stones.*



- Constraints Area
- Map ID, Landscape Character Type
- 1, Built-up Areas
 - 2, Coastal Farmland and Islands
 - 3, Coastal Limestone Slopes
 - 4, Coastal Plain and Dunes
 - 5, Coastal Plateau
 - 6, Drumlin Farmland with Loughs
 - 7, Dunes
 - 8, Farmed Lowland Ridges
 - 9, Farmed Rolling Hills
 - 10, Flat Estuarine Farmland and Islands
 - 11, Forrested Upland Valley
 - 12, Glacial Valley
 - 13, High Drumlin Farmland
 - 14, Limestone Farmland
 - 15, Limestone Farmland with Loughs
 - 16, Limestone Plateau
 - 17, Limestone Uplands
 - 18, Limestone Valley
 - 19, Lough Fringe Farmland
 - 20, Low Drumlin Farmland
 - 21, Lowland Limestone Pavement
 - 22, Moorland Hills
 - 23, Peninsular Farmland
 - 24, River Valley Farmland
 - 25, Upland Fringe
 - 26, Upland Hills

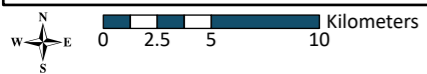
TITLE:	Landscape Character Types		
PROJECT:	N19 Shannon Airport Road Improvement Scheme		
FIGURE NO.:	13.1		
CLIENT:	Clare County Council		
SCALE:	1:350,000	REVISION:	0
DATE:	25/03/2020	PAGE SIZE:	A3





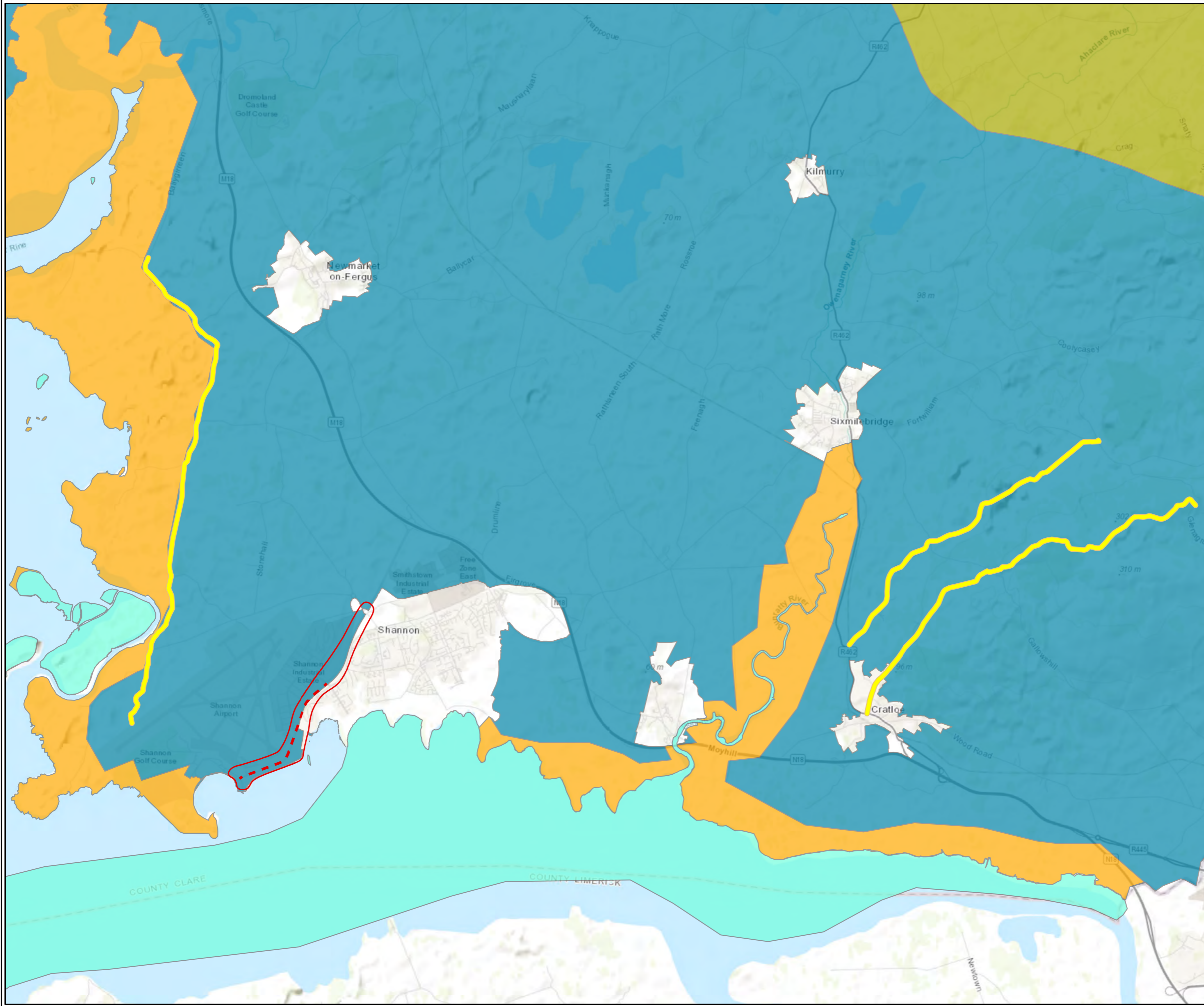
- Constraints Area
- Map ID, Landscape Character Areas
- 1, Burren Uplands
 - 2, Low Burren
 - 3, Cliffs of Moher and Lahinch
 - 4, Fergus Loughlands
 - 5, Slieve Aughty Uplands
 - 6, Lough Graney
 - 7, Lough Derg Basin
 - 8, Slieve Bernagh Uplands
 - 9, River Shannon Farmland
 - 10, Sixmilebridge Farmland
 - 11, East Clare Loughlands
 - 12, Tulla Drumlin Farmland
 - 13, Ennis Drumlin Farmland
 - 14, Fergus Estuary
 - 15, Kilmanona High Drumlin Farmland
 - 16, Cullenagh River Farmlands
 - 17, Slieve Callan Upland
 - 18, Shannon Estuary Farmland
 - 19, Kilrush Farmland
 - 20, Malbay Coastal Farmland
 - 21, Loop Head

TITLE:	
Landscape Character Areas	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO.: 13.2	
CLIENT: Clare County Council	
SCALE: 1:350,000	REVISION: 0
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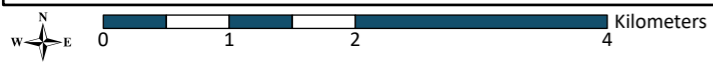
13.4.1.2 Other Clare Landscape Designations

Using the LCAs from the Landscape Character Assessment as a basis, Clare County Council has identified three types of landscape for the purposes of developing and implementing landscape policy. These include ‘Settled Landscapes’, ‘Working Landscapes’ and ‘Heritage Landscapes’. Map 13a of the Clare CDP of the Clare County Development Plan 2017 – 2023 (Clare County Council 2017) and Map C in Volume 2 of same, identifies where these various landscape occur. Figure 13.3 indicates that the study area occurs predominantly within the Working Landscape, but also includes a sliver of Heritage Landscape situated along the coast. The Working Landscapes are divided in to the ‘Western Corridor Working Landscape’ and the ‘Shannon Estuary Working Landscape’ with the latter being the one relevant to the proposed Project.



- - - 2.2km Proposed Improvement Scheme
- Constraints Area
- Scenic Routes
- Heritage Landscape
- Seascapes Region
- Shannon Estuary Working Landscape
- Western Corridor Working Landscape
- Settled Landscape

TITLE:	
Landscape and Scenic Designations	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO:	13.3
CLIENT:	Clare County Council
SCALE: 1:60,000	REVISION: 0
DATE: 26/03/2020	PAGE SIZE: A3



The objective 'CPD13.3' of the Clare County Development Plan 2017-2023 (Clare County Council 2017) relates specifically to the Shannon Estuary Working Landscape and includes the following aims:

- A) *'To permit development in these areas that will sustain economic activity, and enhance social well-being and quality of life - subject to conformity with all other relevant provisions of the Plan and the availability and protection of resources;*
- B) *'That selection of appropriate sites in the first instance within this landscape, together with consideration of the details of siting and design, are directed towards minimising visual impact;*
- C) *'That particular regard should be given to avoiding intrusions on scenic routes and on ridges or shorelines. Developments in these areas will be required to demonstrate:*
 - i. *'That the site has been selected to avoid visually prominent locations;*
 - ii. *'That site layouts avail of existing topography and vegetation to reduce visibility from scenic routes, walking trails, public amenities and roads;*
 - iii. *'That design for buildings and structures reduce visual impact through careful choice of form, finishes and colours and that any site works seek to reduce visual impact of the development.'*

The objective 'CPD13.5' of the Clare County Development Plan 2017-2023 (Clare County Council 2017) relates to Heritage Landscapes and includes the following aims:

'To require that all proposed developments in Heritage Landscapes demonstrate that every effort has been made to reduce visual impact. This must be demonstrated for all aspects of the proposal – from site selection through to details of siting and design. All other relevant provisions of the Development Plan must be complied with.

- *All proposed developments in these areas will be required to demonstrate:*
 - *That sites have been selected to avoid visually prominent locations;*
 - *That site layouts avail of existing topography and vegetation to minimise visibility from scenic routes, walking trails, public amenities and roads;*
 - *That design for buildings and structures minimise height and visual contrast through careful choice of forms, finishes and colour and that any site works seek to reduce the visual impact of the development.'*

13.4.1.3 Seascape Character

A Seascape Character Assessment of County Clare was carried out as part of the aforementioned Landscape Character Assessment. The Seascape Character Assessment identified 12 individual Character Areas in County Clare. The southern edge of the study area adjoins the coast along the Seascape Character Area 12 - Fergus Estuary.

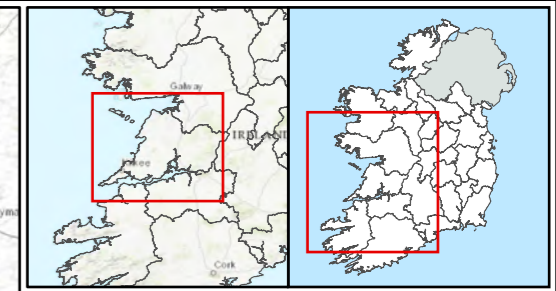
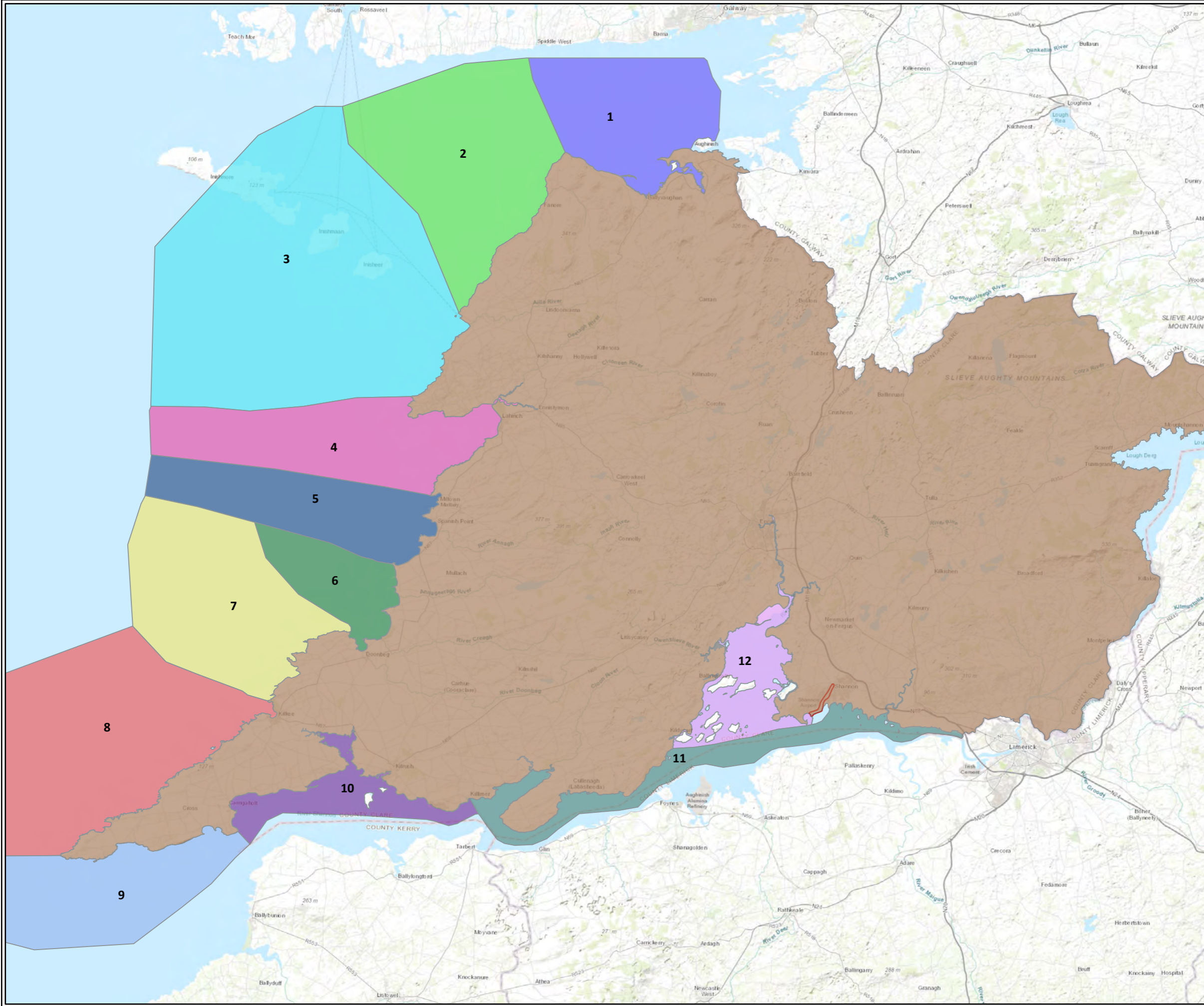
The objective 'CPD13.6' of the Clare County Development Plan 2017-2023 (Clare County Council 2017) relates to Seascape Character Areas and includes the following objectives:

A) *'To require all proposed developments within Seascape Character Areas to demonstrate that every effort has been made to reduce the visual impact of the development.'*

This must be demonstrated by assessing the proposal in relation to:

- *Views from land to sea;*
- *Views from sea to land;*
- *Views along the coastline.*

B) *'To ensure that appropriate standards of location, siting, design, finishing and landscaping are achieved.'*



- Constraints Area**
- Map ID, Seascape Character Areas**
- Mainland County Clare
 - 1, Blackhead Bay
 - 2, Burren
 - 3, Cliffs of Moher
 - 4, Liscannor Bay
 - 5, Malbay
 - 6, Mutton Island and White Strand
 - 7, Ballard Bay and Donegal Point
 - 8, North Loop Head Peninsula
 - 9, South Loop Head and Shannon Mouth
 - 10, Placemork
 - 11, River Shannon
 - 12, Fergus Estuary

TITLE:	
Seascape Character Areas	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO.:	13.4
CLIENT:	Clare County Council
SCALE:	1:350,000
REVISION:	0
DATE:	26/03/2020
PAGE SIZE:	A3

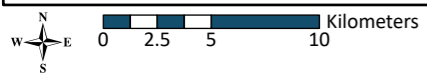


Table 13-1: Landscape / Seascape Character Schedule

Area	Name	Sensitivity	Importance
Landscape Character Area	LCA10 - Sixmilebridge Farmland	Low	Regional
Landscape Character Area	LCA14 - Fergus Estuary	High	Regional
Heritage Landscape	Heritage Landscape	High	Regional
Working Landscape	Shannon Estuary Working Landscape	Low	Regional
Seascape Character Area	12 - Fergus Estuary	High	Regional

13.4.2 Shannon Town and Environs Local Area Plan 2012 - 2018 (as amended)

Development Plan Objective - Compliance with Zoning CDP19.3 in the Clare County Development Plan 2017-2023 (Clare County Council 2017) states that it is an objective of Clare County Council:

“To require development proposals to comply with the zoning of the subject site in the settlement plans and local area plans.”

Map C in Volume 1 of the Shannon Town and Environs Local Area Plan 2012 - 2018 (as amended) indicates Open Green Space zones adjoining the existing N19 Shannon Airport Access Road (Figure 13.5 refers). The landscape value these areas provide is by functioning to maintain a buffer between the settlement of Shannon and the industrial area of Free Zone West and Westpark.

A Green Infrastructure Framework for Shannon is detailed in Chapter 11 of the Shannon Town and Environs Local Area Plan 2012 - 2018 (as amended). Section 11.4 details several ‘Important Green / Amenity areas.’ Important Green / Amenity area OS6 – Drumgeely Hill occurs within the study area, surrounded by the existing residential development on Drumgeely Hill and represents a locally sensitive landscape so is considered to be a constraint.

There are a number of relevant Local Area Plan Objectives:

- LAP11.3 – ‘To connect the component elements of the town through the delivery of an integrated Green Infrastructure network, i.e. the town centre with the residential areas, the Industrial Zone, the Airport, and the Estuary.
- LAP11.4 - ‘To increase the amenity value of key recreational areas / corridors through the enhancement with, and protection of, biodiversity.’
- LAP11.5 - ‘To identify areas for additional tree planting / species enhancement in order to improve connectivity and linkages between existing corridors, open spaces and wooded areas.’

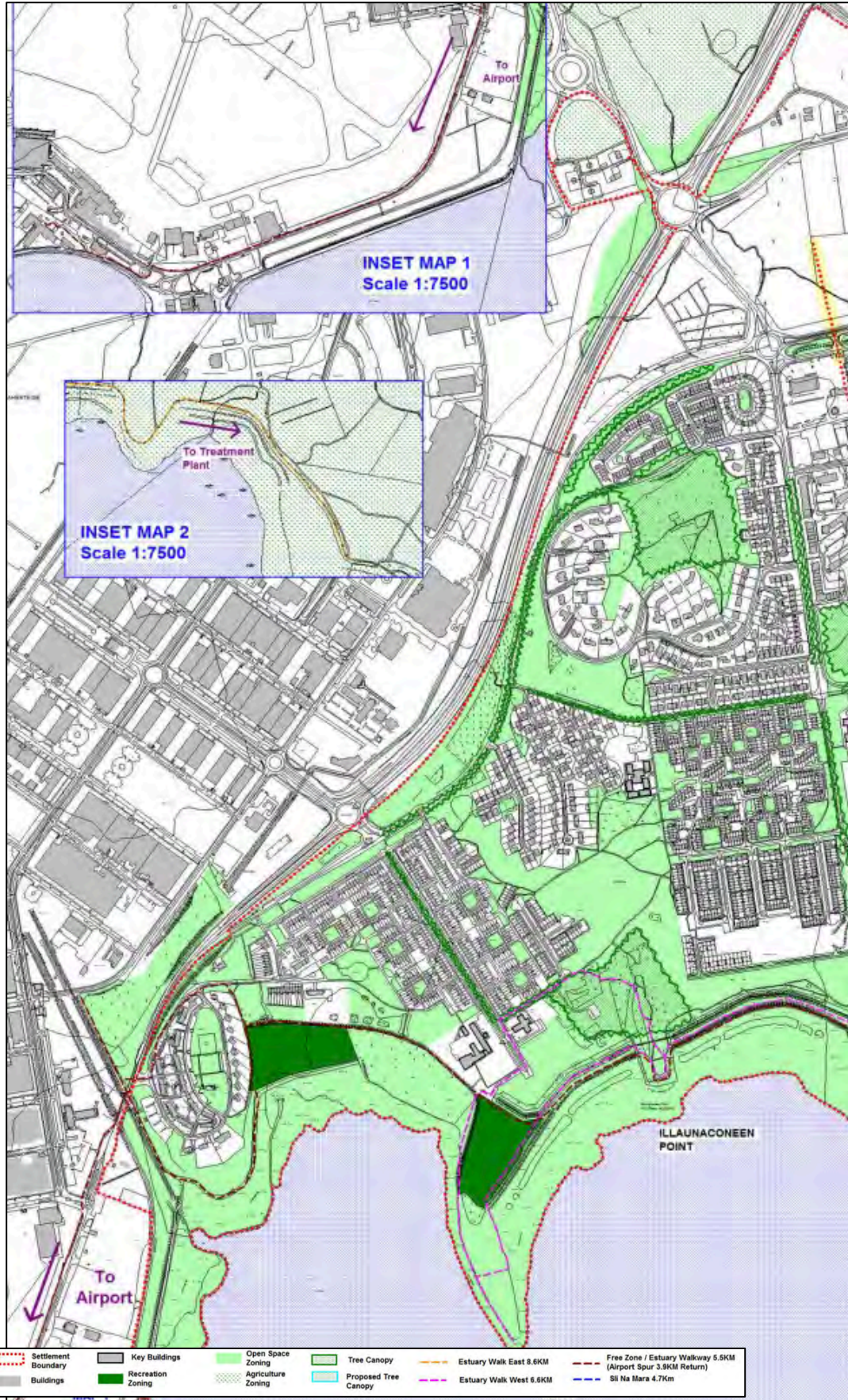


Figure 13-5: Excerpt from Map C of the Shannon Town and Environs Local Area Plan 2012 - 2018 which illustrates the Green Infrastructure and walking routes.

13.4.3 Ecological and Conservation Interests

There are a number of conservation areas within or adjoining the study area which provide natural amenity for the public and contribute to the make-up of the landscape character. (A detailed assessment of ecological designations within the study areas is discussed in the Biodiversity section of this Constraints Report – Section 9.) All these designations relate to the River Shannon and largely overlap:

- Lower River Shannon SAC (002165)
- River Shannon and River Fergus Estuaries SPA (004077)
- Fergus Estuary And Inner Shannon, North Shore pNHA (00204)

13.4.4 Highly Sensitive Landscapes

‘Very High Landscapes’ are determined with reference to TII guidelines - Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis (PE-PAG-02031-01 October 2016) and broadly align with the Guidelines for Landscape and Visual Impact Assessments (GLVIA). Table 7.1.1 in the former states:

“A landscape or townscape protected by an international or national designation (Special Area Amenity Order (SAAO), candidate Special Area of Conservation (cSAC), proposed Natural Heritage Area (pNHA), etc.). A landscape widely acknowledged for its distinctive features and the quality and value of its elements and edge condition. A landscape with distinctive character and low capacity to accommodate change. Absence of negative elements, e.g. traffic, noise, dereliction, unmanaged areas, etc. Landscape types to include but not limited to: - Historical townscapes and urban set pieces; - Nationally important open spaces and parkland.”

The Heritage landscape character designation assigned to the coastal areas along the southern border of the study area and the multiple overlapping conservation interests on the River Shannon estuary, indicate higher degree of landscape sensitivity in this area. It is noted that this particular section of coastline has already been physically modified, both historically, by means of drainage systems, and also more recently in terms of flood defences / flood management. Shannon Free Zone, Shannon Airport and the settlement of Shannon contribute to a landscape character that is peri-urban / industrial and less naturalistic than other parts of the Shannon estuary and consequently is less sensitive to the form of development of the proposed Project. For these reasons it is considered that the study area is near to but does not contain a highly sensitive / Very High Landscape. Due to the low-lying, flat character, development on the estuary shore could be more likely to be visible and should be carefully managed where it interfaces with the River Shannon.

13.5 Visual Considerations

No international, national, regional or local scenic designations were identified within the study area. Any scenic designations situated outside of the study area would not be significantly adversely affected due to the intervening distances because existing features, such as building, trees and hedgerows, in this low-lying receiving landscape will screen views.

Other non-designated views such as from residences, outdoor public amenities and recreational facilities are considered to have a heightened level of sensitivity.

Residences on Tullyglass Hill are slightly elevated and some dwellings are afforded long distance views to the west and will be sensitive to changes to the view, particularly if there is a loss of existing vegetation that screens the existing N19 Shannon Airport Access Road. Residences at Drumgeely Hill, Fergus Road and Fergus Drive are in close proximity to the existing N19 Shannon Airport Access Road and intervening vegetative screening is variable so some dwellings are largely enclosed while others have more open views.

13.5.1 Shannon Town and Environs Local Area Plan 2012 - 2018 (as amended)

Recreational walking routes are indicated on Map C Volume 1 of the Shannon Town and Environs Local Area Plan 2012 - 2018 (as amended) (Figure 13.5 refers). The 'Free Zone / Estuary Walkway Shannon' Recreational Route passes within the study area. Sections of this Recreational Route, just outside of the eastern side of the study area, are also referred to as the Shannon Town River Walk. Although this section is outside of the study area, if clear views are afforded into the study area, further assessment will need to be undertaken. Users of these routes are considered to have a heightened sensitivity to changes to the natural environment around them.

There are a number of relevant Local Area Plan Objectives:

- LAP10.2 - *'To promote, formalise and enhance the existing network of riverside walks and to market the Shannon Estuary as an important natural, high amenity resource.'*
- LAP10.3 - *'To formalise, enhance and promote looped walks around Shannon, encompassing the Shannon Estuary riverside network and the Sli Na Mara Way.'*
- LAP10.3 - *'To promote the existing abundance of recreational activities, including sports clubs, walking trails and Shannon Golf Club.'*

Map C 'Green Infrastructure' in Volume 1 of the Shannon Town and Environs Local Area Plan 2012 - 2018 (as amended) indicates tree canopies / treelines between the residences in the west of the settlement of Shannon and the existing N19 Shannon Airport Access Road (Figure 13.5 refers). Although not subject to any known tree preservation / tree protection orders, it is likely that in some locations these trees provide a degree of visual screening for the residents.

There are a number of relevant Local Area Plan Objectives:

- LAP9.3a - *'To facilitate the carrying out of a full survey of the trees in Shannon, recording location, species and condition, which shall inform future developments and works to the townscape and proposals for replanting.'*
- LAP9.3b - *'To promote the planting of tree species which are suited to the Shannon landscape as part of any public landscaping projects, or planting associated with developments.'*
- LAP9.4 - *'To require development proposals to take cognisance of the surrounding wildlife corridors when considering boundary treatment, landscaping schemes and planting as part of the development, and where possible to extend the network of wildlife areas within Shannon.'*
- LAP11.3 - *'To connect the component elements of the town through the delivery of an integrated Green Infrastructure network, i.e. the town centre with the residential areas, the Industrial Zone, the Airport, and the Estuary.'*

13.5.2 Shannon Town Green Infrastructure Plan – 2013

The Shannon Town Green Infrastructure Plan (Clare County Council 2013) was prepared for Clare County Council in 2013. Page 10 of this document contains a map showing two potential future continuous cycle / footpath loop routes. A section of the potential future Shannon Loop Yellow Route on the western side of the town would pass within the study area and has three main links to adjoining areas (at Shannon Free Zone). This section of the route passes along public roads / footpaths which are likely to currently be utilised by walkers and cyclists. For this reason, and because they are likely to be formalised in future, for the purposes of this assessment, the roads and footpaths that form the Shannon Loop Yellow Route and Main Links will be considered potential visual constraints.

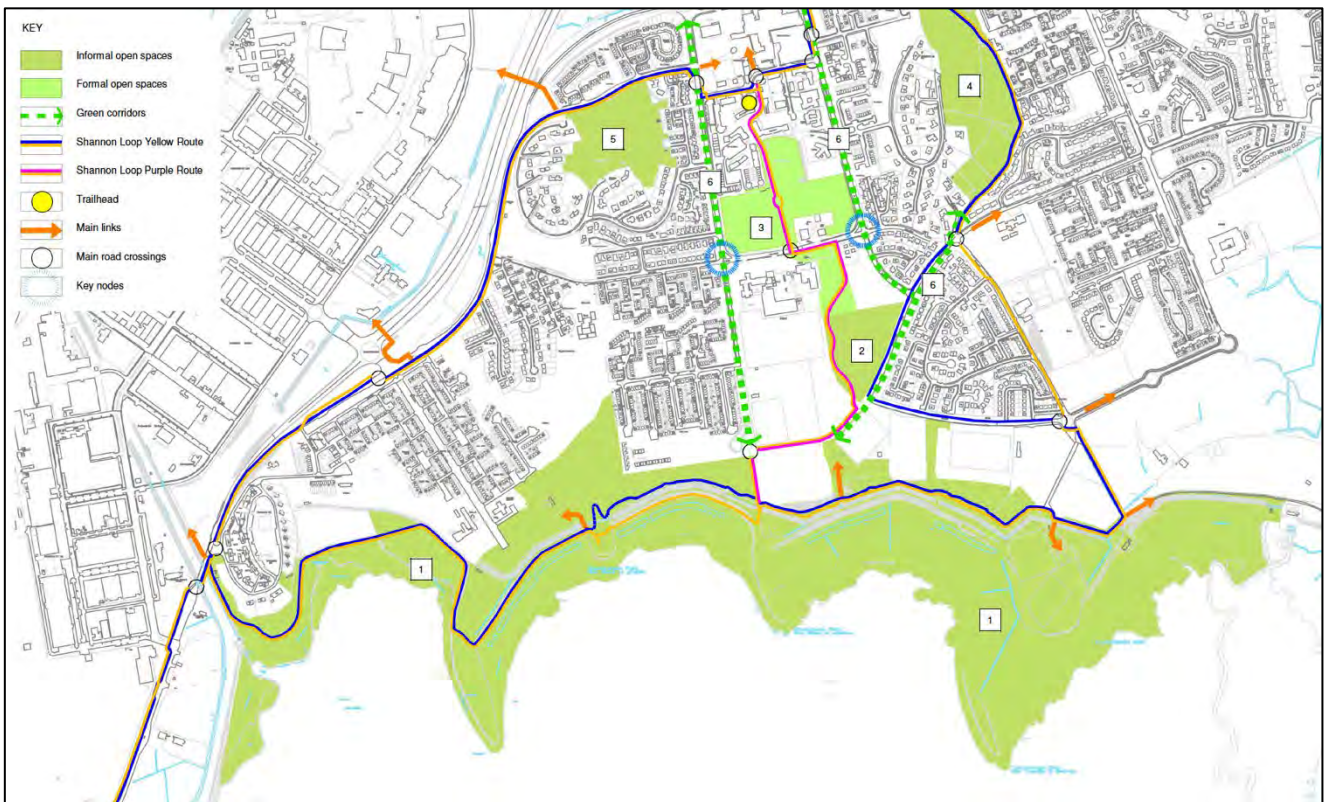


Figure 13-6: Excerpt from map on page 10 of the Shannon Town Green Infrastructure Plan which illustrates the alignment of the potential future Shannon Loop Yellow Route and Main Links.

13.6 Landscape and Visual Summary and Conclusions

The desktop review of landscape and visual constraints within the study area for the N19 Shannon Airport Access Road has identified a number potential constraints. These are summarised in Table 13-2: . In terms of Landscape, the Heritage Landscape (regional level) designation, which occurs along the coastline at the southern end of the study area, and the Important Green / Amenity Area OS6 – Drumgeely Hill (local level) designation are both landscape constraints. Additionally, nearby residential dwellings and recreational walking routes are potential visual constraints. Furthermore, the roads and footpaths that constitute the potential future Shannon Loop Yellow Route are also considered potential visual constraints. Throughout the planning and development of the proposed Project, cognisance will have to be had of the landscape designations and the requirements of the landscape and visual related policies.

Table 13-2: Constraints Schedule

Topic	Name	Description	Importance
Landscape	Heritage Landscape	County level designation applied along shoreline of River Shannon	Regional
Landscape	Seascape Character Area 12 - Fergus Estuary	Identified in the Clare Seascape Character Assessment	Regional
Landscape	Important Green / Amenity Area OS6 – Drumgeely Hill	Amenity green area identified in the Local Area Plan set amongst residential dwellings on Drumgeely Hill	Local
Visual	Recreational Route	Free Zone / Estuary Walkway identified in the Local Area Plan	Local
Visual	Shannon Loop Yellow Route	Route for cycling or walking likely to be formalised	Local

14 ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

14.1 Introduction

This chapter by Rubicon Heritage Services Ltd details the archaeological, architectural and cultural heritage constraints for the proposed N19 Shannon Airport Access Road Improvement Scheme within the defined Constraints Study Area (see Section 3).

This report has been undertaken in accordance with the provisions of the following legislative procedures which are further detailed in Appendix 14-4:

- National Monuments Acts 1930-2004
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999
- Local Government (Planning and Development) Acts 2000-2001

It has also been undertaken in accordance with the policies set out in Chapter 19 of the Clare County Development Plan 2017–2023 (as amended) and Chapter 9 of the Shannon Town and Environs Local Area Plan 2012–2018 (as amended).

14.1.1 Site location

The study area centres on the existing route of the N19 Access Road to Shannon Airport. It includes seven townlands (Table 14.1) in the barony of Bunratty Lower.

14.1.2 Toponymy

A townland name may preserve information relating to its archaeology, history, folklore, ownership, topography or land use. Most place names were anglicised by the time the Ordnance Survey began in the 1830's. Despite some inaccuracies in translation, the Gaelic, Viking, Anglo-Norman and English origins of place names are generally recognisable. The Constraints Study Area extends through seven townlands that are included in Table 14.1.

Table 14-1: Townlands within study area

Townland (place name)	Irish origin	Glossary
Ballymurtagh	<i>Baile Uí Mhuirheartaigh</i>	<i>baile</i> : townland, town, homestead
Drumgeely	<i>Dhrom Gaibhle</i>	<i>droim (also: drom)</i> : ridge <i>gabhal</i> : fork
Knockaun	<i>An Cnocán</i>	<i>cnocán</i> : hillock
Lismaclean	<i>Lios Mhic Léinn</i>	<i>Lios</i> : ring-fort, enclosure

Townland (place name)	Irish origin	Glossary
Rineanna South	<i>Rinn Eanaigh Theas</i>	<i>eanach</i> : marsh <i>rinn</i> : point, headland
Tullyglass	<i>An Tulaigh Ghlais</i>	<i>glas</i> green, grey <i>tulach</i> (also: <i>tulaigh</i>): hillock
Tullyvarraga	<i>Tulaigh Uí Bhearga</i>	<i>tulach</i> (also: <i>tulaigh</i>): hillock

14.2 Objectives and Methodology

14.2.1 Objectives

The objective for the Archaeological, Architectural and Cultural Heritage Constraints Chapter includes the identification of all recorded archaeological monuments within the study area including the legal status, if any, of these features. All protected structures are also identified as are other features or cultural heritage significance.

The scope and methodology for the study has been devised with reference to the following guidelines:

- National Roads Authority (2005) 'Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes'
- National Roads Authority (2005) 'Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes'
- EirGrid (2015) 'Cultural Heritage Guidelines for Electricity Transmission Projects. A stand approach to archaeological, architectural and cultural heritage impact assessment of high voltage transmission projects.'
- Environmental Protection Agency (2002) 'Guidelines on the information to be contained in Environmental Impact Statements'
- Environmental Protection Agency (2003) 'Advice notes on current practice (in the preparation of Environmental Impact Statements)'
- Environmental Protection Agency (Draft, 2015) 'Advice notes on preparing Environmental Impact Statements'
- Environmental Protection Agency (Draft, 2017) 'Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)'
- Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI) (1999) 'Frameworks and Principles for the Protection of the Archaeological Heritage'
- Department of the Environment, Heritage and Local Government (2004) 'Architectural Heritage Guidelines'

14.2.2 Desktop Study Methodology

The identification of the archaeological, architectural and cultural heritage constraints within the study area is based on a desktop study of a number of documentary and cartographic sources. The desktop study was further augmented by an examination of aerial photography and publicly available LiDAR data. The main sources consulted in completing the desktop study are listed here:

- Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Clare
- Various editions of the Ordnance Survey of Ireland maps
- National Inventory of Architectural Heritage
- Excavation Bulletins Database (www.excavations.ie)
- Clare County Development Plan (2017–2023)
- Shannon Town and Environs Local Area Plan (2012–2018)
- Various published sources for local history
- Ordnance Survey Name books and Letters
- Aerial Photographs
- Cartographic Sources

14.3 Archaeological and Historical Background

14.3.1 Prehistoric Period

Though there is abundant evidence for prehistoric settlement elsewhere in Co. Clare, there are few indications of it within the immediate environs of the Constraints Study Area. A wedge tomb (RMP CL051-119----) is located in the townland of Ballycally to the north of Shannon Airport. Wedge tombs are burial monuments that date to the early bronze age. Three burnt mounds or *fulachta fiadh* were identified in the townland of Knockaun during investigations in advance of the Dromoland to Ballycasey Road Improvement Scheme. All three sites were scientifically dated with radiocarbon dates ranging from the late Neolithic/early Bronze Age transition through to the Later Bronze Age.

Fulachta fiadh are the most numerous prehistoric sites in Ireland and often survive as low mounds, usually horse-shoe shaped, of charcoal-enriched soil packed with fragments of heat-shattered stones (termed 'burnt mound'); when levelled, they are often noticeable as black spreads in ploughed fields. They were usually situated close to a water source, like a stream, or in wet marshy areas. It is generally accepted that they were probably used as cooking places (Ó Drisceóil 1988). Water was boiled in a regular pit (lined with wooden planks or stone slabs to form a trough) by the addition of hot stones from a fire close by. O'Kelly (1954, 105–55) showed by experiment that the large quantities of water can be boiled in this way in about twenty minutes. He also demonstrated that meat, wrapped in straw and immersed in the boiling water, cooked at a rate of twenty minutes per pound weight. When the cooking was over the remnants of heat-shattered stones in the trough were discarded to one side. Eventually, after many episodes of use, these would form a mound curving round three sides of the trough, hence the horse-shape mound. It is not certain whether *fulachta fiadh* were elements of temporary hunting camps or of permanent settlements. The majority of radiocarbon dates place these monuments in the Bronze Age (Brindley and Lanting 1990, 55–6). A review of the use of the term '*fulacht*' in early Irish literature and of references to 'activities that may have taken place at such sites', suggest associations with 'the cooking and eating of food, washing and bathing, music and sex' (Ó Drisceóil 1990, 157– 64).

The word *'fulacht'* means a pit used for cooking. The second element can be interpreted as either *'fiadh'* meaning 'of the deer' or 'of the wild' or *'fian'* meaning 'of a roving band of hunters or warriors' or 'of Fianna or Fionn Mac Cumhail' (Ó Drisceóil 1988, 671–80).

A fourth site excavated in the townland of Knockaun (Appendix 14-2)—comprising a series of burnt spreads—is likely to be of prehistoric date. The mounds located in Ballycally (RMP CL051-115----) and in Caherteige (RMP CL051-130----) may also be prehistoric in date, though their exact date and function remains uncertain.

14.3.2 Medieval period (AD 400–1540)

The early medieval period (AD 400 – c. 1169) was a time of rapid expansion of agriculture. Throughout this period Ireland was a predominantly rural society characterised by dispersed settlement. The economy was based on mixed agriculture though the rearing of cattle was seen as very important. Ringforts and enclosures are indicative of settlement at this time. There is extensive evidence for sites of these types located generally to the north of Shannon Airport. Examples of ringforts are recorded in Rineanna North (RMP CL061-001----; CL061-003002-), Ballycally (RMP CL061-005001-; CL051-120----) and Knockaun (RMP CL051-139----) and enclosures are recorded in Ballycally (RMP CL061-006----; CL051-114----; CL051-117----), Stonehall (RMP CL051-126001-), Caherteige (RMP CL051-126002-; CL051-181----; CL051-131----; CL051-132----; CL051-134----; CL051-136----) and Ballymurtagh (RMP CL051-137----; CL051-138----).

Ringforts are undoubtedly the most widespread and characteristic archaeological field monument in the Irish countryside. They are usually known by the names *ráth* or *lios*, forming some of the most common place name elements in the countryside. The ringfort is basically a circular or roughly circular area enclosed by an earthen bank formed of material thrown up from concentric fosse (ditch) on its outside. Generally, the diameter of the enclosure is between 25 m and 50 m. A single bank and fosse (univallate) is the most usual form; double rings (bivallate) or triple rings (trivallate) are rarer. The number of rings of defence are thought to reflect on the status of the site, rather than the strengthening of its defences. These sites have endured centuries of erosion, reuse and sometimes deliberate destruction and it is not always possible to distinguish original features; the overgrown nature of many sites compound the problem of field recording. However, entrances may be detected where a clear break in the bank is in line with an uncut causeway over the fosse. Souterrains are often found in association with ringforts.

Archaeological excavation has shown that the majority of ringforts were enclosed farmsteads, built in the early medieval period. Though not forts in the military sense, the earthworks acted as a defence against natural predators like wolves, as well as human predators. Local warfare and cattle raiding were commonplace at this time. The construction of so many throughout the country, in a relatively short period (400–500 years), reflects on the stability and wealth of society at the time, and also its homogeneity. As well as farming-related activities like corn-grinding and animal husbandry, the ringfort was home to a wide variety of craft industries, including spinning, weaving, metal- and glass-working.

The church and graveyard at Rineanna North (RMP CL061-002001-; CL061-002002-) located to the north of Shannon Airport may also originate in the early medieval period.

The arrival of the Anglo-Normans at the end of the 12th century introduced a new dynamic. This is reflected in the presence of a castle site (RMP CL051-078----) to the north in the townland of Clonloghan. A further later medieval castle—a tower house (RMP CL051-124001-) in Stonehall—was destroyed in the 1950s to facilitate the development of Shannon airport.

14.3.3 Post-medieval (AD 1540–1700) & early modern period (AD 1700–1850)

A 17th century house (RMP CL051-124----) is located in the townland of Stonehall and its proximity to the site of the demolished tower-house (RMP CL051-124001-) suggests that it was replacement for this. Buildings and building clusters identified on historic mapping within the Constraints Study Area reflect settlement in the post-medieval to early modern period. In particular clusters such as CH012, CH015 and CH017 demonstrate continuity from the late 18th/early 19th century into the 20th century. Analysis of historic mapping also show the development of an extensive network of coastal flood defence features during this period (e.g. CH013, CH014, CH018 and CH019).

14.4 Constraints

The management and protection of cultural heritage in Ireland is achieved through a framework of international conventions and national laws and policies (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the ‘European Convention on the Protection of the Archaeological Heritage’ (the Valletta Convention) and ‘European Convention on the Protection of Architectural Heritage’ (Grenada Convention). Cultural heritage can be divided loosely into the archaeological resource covering sites and monuments from the prehistoric period until the post-medieval period and the built heritage resource, encompassing standing structures and sites of cultural importance dating from the post-medieval and modern period. In addition, local place-names, folklore and traditions are considered part of our cultural heritage.

14.4.1 Designated archaeological sites

14.4.1.1 *Record of Monuments and Places (RMPs)*

Section 12 (1) of the National Monuments Act 1994 made provision the establishment and maintenance of a Record of Monuments & Places (RMP). Under this Act, each site recorded in the Record of Monuments and Places is granted statutory protection. When the owner or occupier of a property, or any other person proposes to carry out, or to cause, or to permit the carrying out of any work at or in relation to a recorded archaeological monument they are required to give notice in writing to the Minister for Culture, Heritage and the Gaeltacht two months before commencing that work.

There are no RMPs incorporated by the Constraints Study Area.

14.4.1.2 *National Monuments*

National Monuments are broken into two categories; National Monuments in the ownership or guardianship of the state and National Monuments in the ownership or guardianship of a local authority. Section 8 of the National Monuments (Amendment) Act 1954 provides for the publication of a list of monuments, the preservation, of which, are considered to be of national importance. Two months’ notice must be given to the Minister for Culture, Heritage and the Gaeltacht where work is proposed to be carried out at or in relation to any National Monument.

There are no National Monuments sites incorporated by the Constraints Study Area.

14.4.1.3 Sites with Preservation Orders

The National Monuments Act 1930-2004 provide for the making of Preservation Orders and Temporary Preservation Orders in respect of National Monuments. Under Section 8 of the National Monument Act 1930 (as amended) the Minister for Culture, Heritage and the Gaeltacht, can place a Preservation Order on a monument if, in the Ministers' opinion, it is a National Monument in danger of being or is actually being destroyed, injured or removed or is falling into decay through neglect. The Preservation Order ensures that the monument shall be safeguarded from destruction, alteration, injury, or removal, by any person or persons without the written consent of the Minister.

There are no sites with preservation orders incorporated by the Constraints Study Area.

14.4.2 Designated architectural heritage sites

In 1997 Ireland ratified the Granada Convention on architectural heritage. This provided the basis for a national commitment to the protection of the architectural heritage throughout the country. The Local Government (Planning and Development) Act 2000, and the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999, made the legislative changes necessary to provide for a strengthening of the protection of architectural heritage.

14.4.2.1 *Record of Protected Structures*

The Clare County Development Plan (2017 – 2023) was consulted for schedules of Protected Structures. These are buildings that a planning authority considers to be of special interest from an architectural, historical, archaeological, artistic, cultural, scientific, social, and/or technical point of view. Protected Structures receive statutory protection from injury or demolition under Section 57 (1) of the Local Government (Planning and Development) Act 2000. Protected structure status does not exclude development or alteration but requires the developer to consult with the relevant planning authority to ensure that elements which make the structure significant are not lost during development.

There are no Protected Structures located within the Constraints Study Area.

14.4.2.2 *Architectural Conservation Areas*

The Clare County Development Plan (2017–2023) was consulted for records relating to Architectural Conservation Areas (hereinafter 'ACAs'). The stated objective of ACAs is to conserve and enhance the special character of the area, including traditional building stock and material finishes, spaces, streetscapes, landscape and setting.

There are no ACAs within the Constraints Study Area.

14.4.2.3 *National Inventory of Architectural Heritage (NIAH)*

The National Inventory of Architectural Heritage (hereinafter the 'NIAH') is a state initiative under the administration of the DoCHG and was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999.

Its purpose is to identify, record and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently, as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Culture, Heritage and the Gaeltacht to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

There are no NIAH sites incorporated by the Constraints Study Area.

14.4.3 Undesignated cultural heritage sites within the proposed development site

This section deals with sites that are considered to be of cultural heritage value but which do not fall within the above categories as they are not registered. Such sites may include lime kilns, dwellings/outhouses, trackways or townland boundaries etc. identifiable on the First Edition 6/25-inch OS maps or aerial photography.

14.4.3.1 *Sites identifiable on cartographic sources*

The cartographic record for the Constraints Study Area was examined for the purposes of this report to see if there were any additional monuments or potential sites which may be impacted upon and that are no longer visible. The maps that were consulted were the 1st edition 6-inch map (1833-46) (Figure 14-3) and 25-inch of 1897-1913 (Figure 14-4) and the Cassini 6-inch series (1936) (Figure 14-5).

The Constraints Study Area for the scheme intersects a total of ten townland boundaries:

- CH001—Townland boundary between Knockaun and Tullyvarraga
- CH002—Townland boundary between Knockaun and Ballymurtagh
- CH003—Townland boundary between Tullyvarraga and Ballymurtagh
- CH004—Townland boundary between Tullyvarraga and Tullyglass
- CH005—Townland boundary between Ballymurtagh and Tullyglass
- CH006—Townland boundary between Ballymurtagh and Drumgeely
- CH007—Townland boundary between Tullyglass and Drumgeely
- CH008—Townland boundary between Drumgeely and Lismaclean
- CH009—Townland boundary between Drumgeely and Rineanna South
- CH010—Townland boundary between Lismaclean and Rineanna South

There are five locations within the Constraints Study Area where historic mapping indicates the presence of a vernacular building or cluster of buildings:

- CH011—Single building shown on OS Historic 25-inch series map only in the townland of Knockaun
- CH012—Building cluster (2 no) shown on 1st edition 6-inch, historic 25-inch and Cassini 6-inch series maps in the townland of Tullyglass.
- CH017—Building cluster (3-4 no.) shown on 1st edition 6-inch, historic 25-inch and Cassini 6-inch series maps; historic 25-inch series also notes a pump just NW of cluster in the townland of Drumgeely.

- CH015—Building cluster (4 no.) shown on 1st edition 6-inch, historic 25-inch and Cassini 6-inch series maps; historic 25-inch series also notes a well within the cluster in the townland of Drumgeely.
- CH021—Building: A rectangular building orientated west southwest/east/northeast as marked on OS First Edition 6" Map; replaced by building cluster (3 no) on historic 25-inch series map and Cassini 6-inch series map in the townland of Rineanna South.

There is evidence for historic coastal flood defences at four locations within the Constraints Study Area:

- CH013—Curvilinear embankment shown on historic 25-inch series and Cassini 6-inch series map. Possibly relating to flood defences in the townland of Tullyglass.
- CH019—Embankment extending along the shoreline of c. 1.2 km shown on 1st edition 6-inch, historic 25-inch and Cassini 6-inch series maps. Probably part of coastal flood defences in the townland of Rineanna South
- CH014—Embankment following line of field system shown on 1st edition 6-inch series, historic 25 inch series and Cassini 6-inch series maps. Probably relating to flood defences in the townland of Drumgeely.
- CH018—Embankment, generally following alignment of townland boundary (but located NW of it) shown on 1st edition 6-inch series and historic 25-inch series map in the townland of Lismaclean. Only vestige of the eastern end is shown on Cassini 6-inch series map.

These are generally characterised by hatchures to indicate an embankment following the general alignment of the foreshore, field boundaries or townland boundaries.

Two wells are shown in Drumgeely and Rineanna South townlands (CH016; CH020) and the site of a former navigation beacon is shown on Knockbeagh Point (CH022).

14.4.3.2 Sites identifiable on aerial photography and satellite imagery

Ortho-rectified aerial photography available from the Ordnance Survey of Ireland was inspected in order to identify possible features of cultural and heritage significance. Aerial photography from the 1995, 2000, and 2005 fly-overs was inspected, as well as the latest OSI images, Google Earth and Bing Maps satellite imagery.

No additional undesignated cultural heritage sites were identified on aerial photography and satellite imagery within the Constraints Study Area.

14.4.4 Recent excavations

on-line at www.excavations.ie and includes excavations from 1985 to 2019. This database was consulted as part of the desktop research for this report to establish if any archaeological investigations had been carried out within the seven townlands of the study area. The database produced eight results (see Appendix 14-2).

Only the four investigations carried out in the townland of Knockaun in advance of the construction of the Dromoland to Ballycasey Road Improvement Scheme provided evidence for archaeological activity. All appear to be prehistoric in date. Three of the sites comprised fulachta fiadh, which were all scientifically dated to the Bronze Age. No scientific date is noted for the fourth site—comprising a series of charcoal spreads—but its character would suggest a broadly similar date.

It should also be noted that a series of sites in the townlands of Ballycally, Garrynamona, Rineanna North and Rineanna South were removed during construction of a new run-way and landing strip at Shannon Airport in 1959 with only limited archaeological investigation (Rynne 1962–4). These sites comprised a multivallate ringfort in Ballycally, a single vallate ringfort in Garrynamona, two single vallate ringforts in Rineanna North and a trackway along the townland boundary between Rineanna North and South. There are also accounts of two burials associated with the trackway route (Rynne 1962–4, 267–8).

14.5 Summary and Conclusions

This study has identified a total of 22 site of archaeological, architectural or cultural heritage significance within the Constraints Study Area. None of these sites are National Monuments or Sites Subject to a Preservation Order, Recorded Monuments (RMPs), Protected Structures (PS) or sites included in the NIAH. The identified sites comprise 10 townland boundaries and 12 unregistered cultural heritage sites. The unregistered cultural heritage sites include five vernacular buildings or building clusters, four embankments related to historic coastal defences, two wells and the site of a former navigation beacon for the Shannon Estuary.

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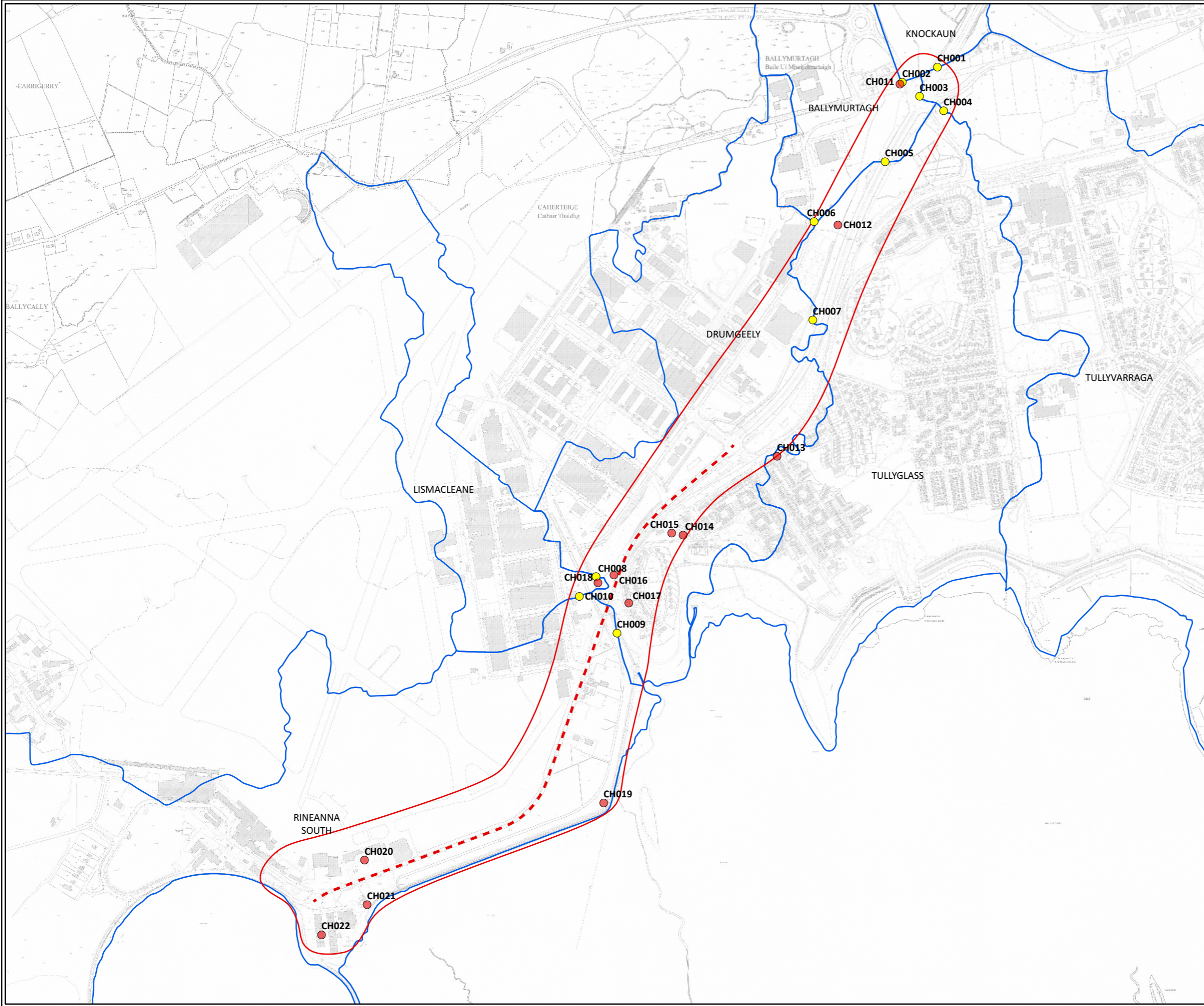
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- - - 2.2km Proposed Improvement Scheme
- Constraints Area
- Townlands
- Cultural Heritage Sites**
- Townland Boundary
- Unregistered Cultural Heritage

TITLE: Architectural, Archaeological and Cultural Heritage Sites	
PROJECT: N19 Shannon Airport Road Improvement Scheme	
FIGURE NO: 14.1	
CLIENT: Clare County Council	
SCALE: 1:12,500	REVISION: 0
DATE: 24/03/2020	PAGE SIZE: A3

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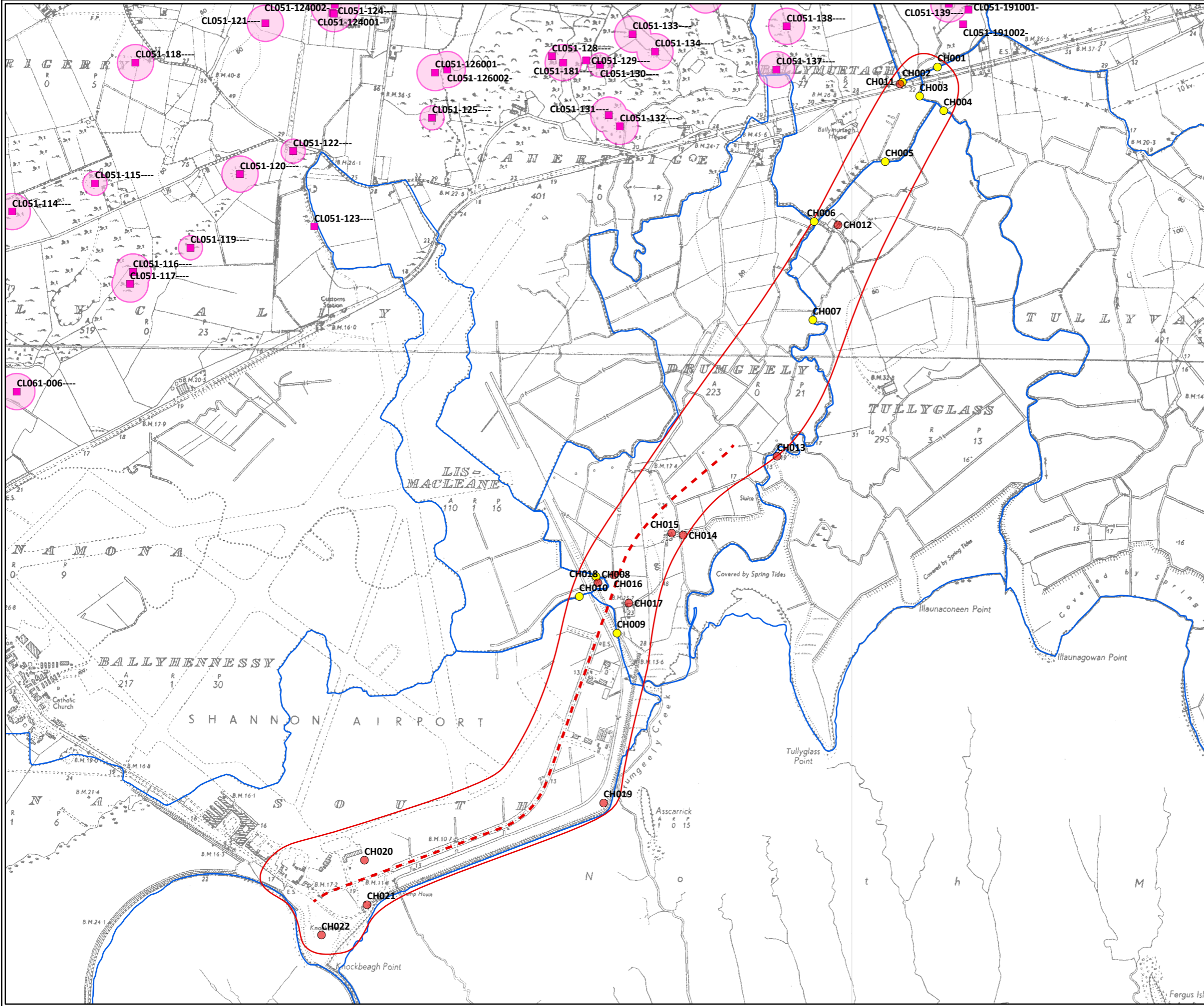
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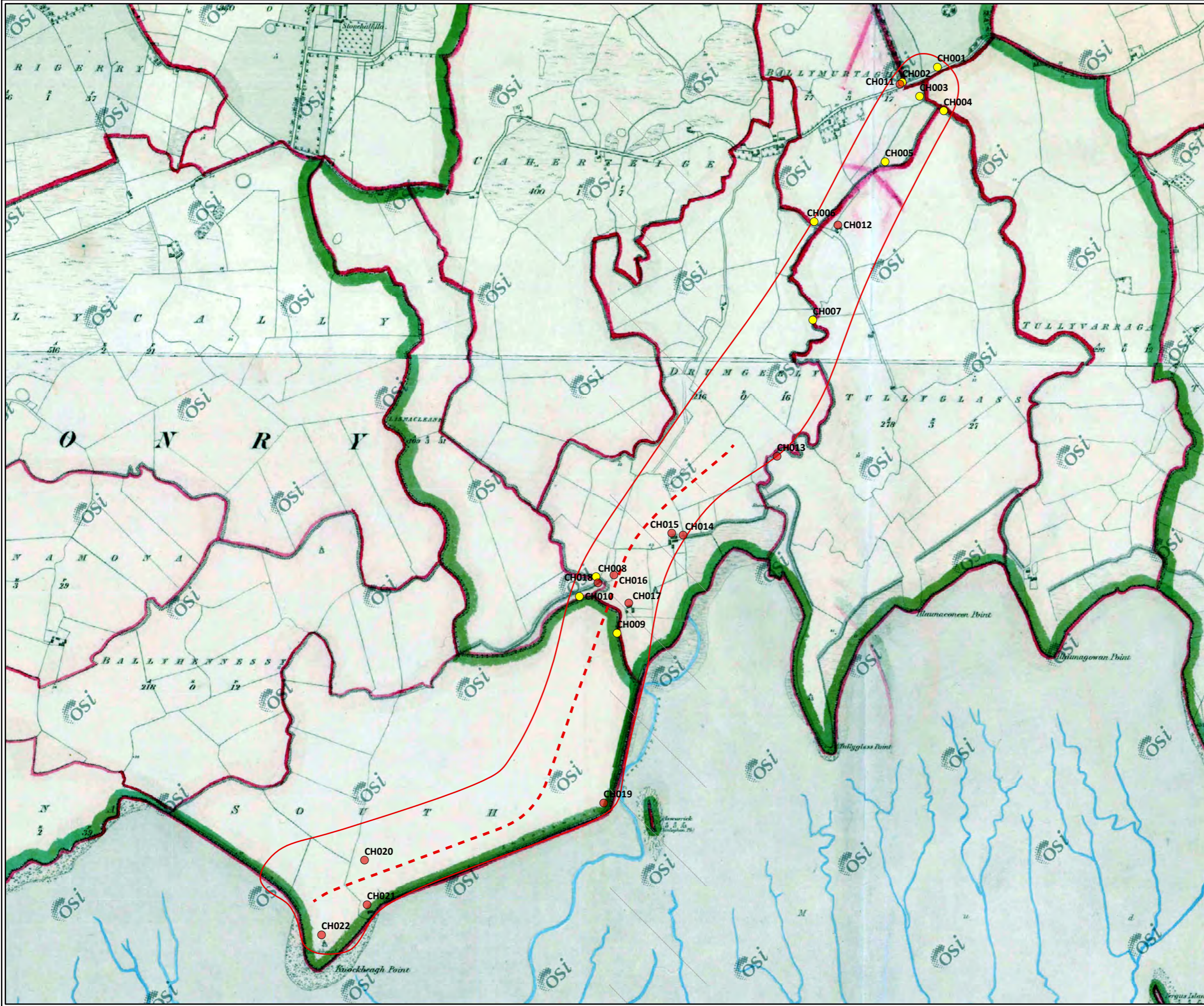
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- Constraints Area
- Townlands
- National Monuments Service
- National Monuments Service - Zones of Notification
- Cultural Heritage Sites**
- Townland Boundary
- Unregistered Cultural Heritage

TITLE:	
Record of Monuments and Places	
PROJECT:	
N19 Shannon Airport Road Improvement Scheme	
FIGURE NO: 14.2	
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SCALE: 1:12,500	REVISION: 0
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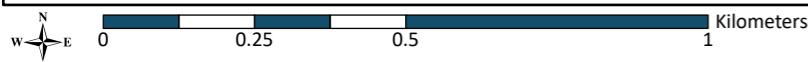
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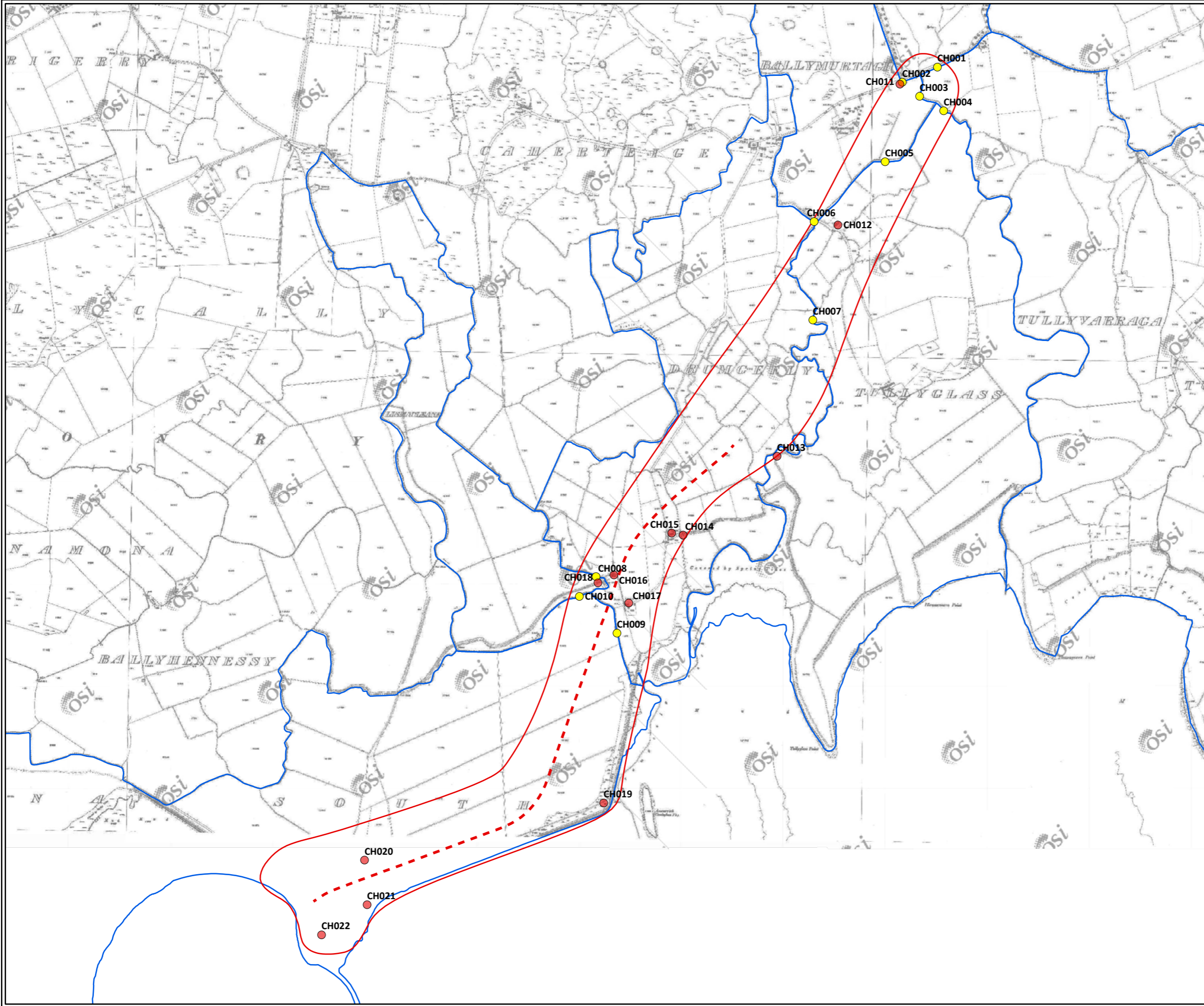
- - - 2.2km Proposed Improvement Scheme
- Constraints Area
- Cultural Heritage Sites**
- Townland Boundary
- Unregistered Cultural Heritage

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CLIENT: Clare County Council	
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- - - 2.2km Proposed Improvement Scheme
- Constraints Area
- Townlands
- Townland Boundary
- Unregistered Cultural Heritage



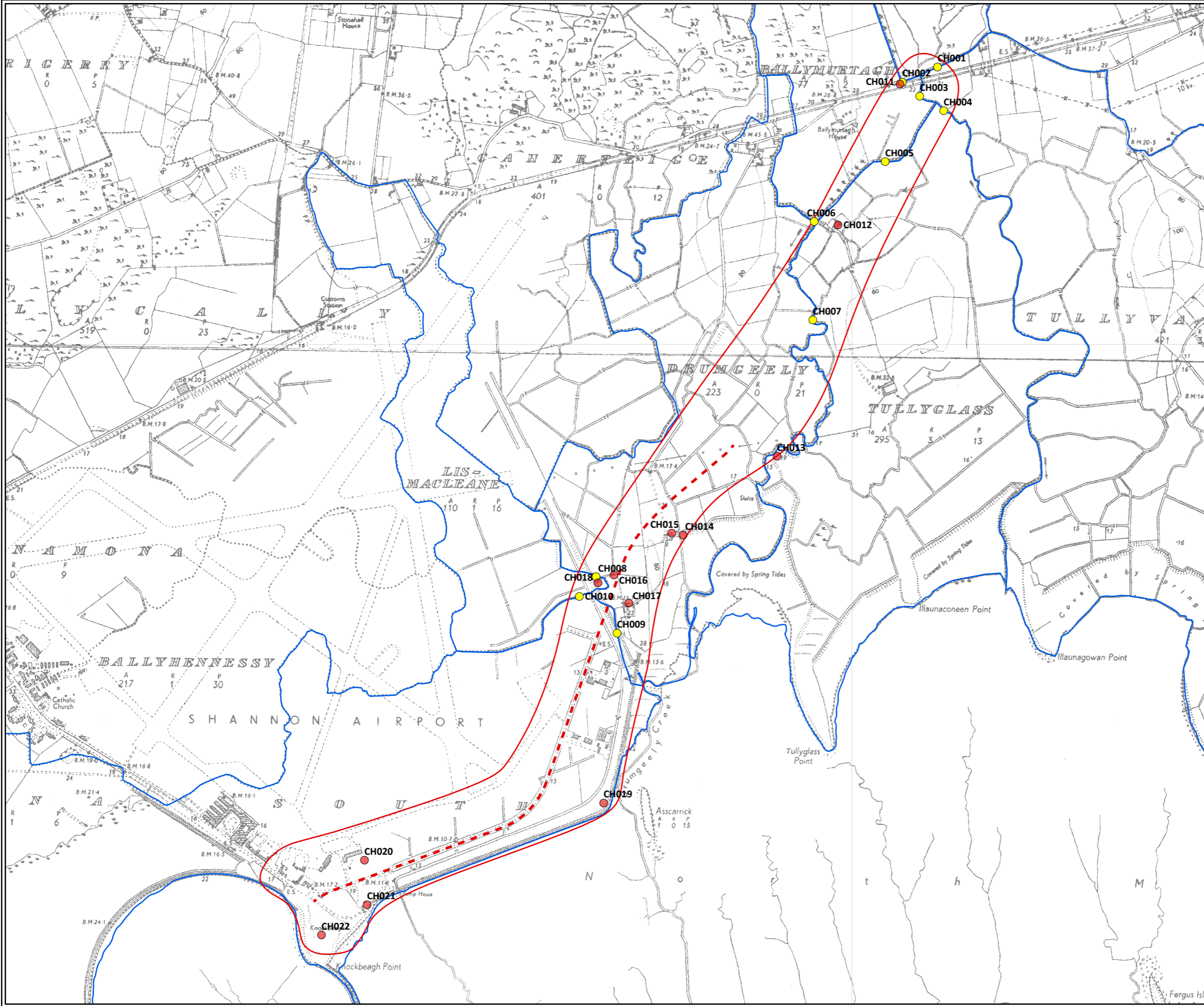
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SCALE: 1:12,500	REVISION: 0
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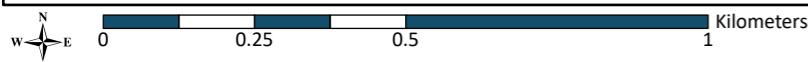


- - - 2.2km Proposed Improvement Scheme
- Constraints Area
- Townlands
- Townland Boundary
- Unregistered Cultural Heritage

TITLE: Architectural, Archaeological and Cultural Heritage Sites - Cassini 6 Inch Mapping	
PROJECT: N19 Shannon Airport Road Improvement Scheme	
FIGURE NO.: 14.5	
CLIENT: Clare County Council	
SCALE: 1:12,500	REVISION: 0
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- - - 2.2km Proposed Improvement Scheme
 - Constraints Area
 - Townlands
- Cultural Heritage Sites
- Townland Boundary
 - Unregistered Cultural Heritage

TITLE: Architectural, Archaeological and Cultural Heritage Sites - Aerial Imagery	
PROJECT: N19 Shannon Airport Road Improvement Scheme	
FIGURE NO:	14.6
CLIENT:	Clare County Council
SCALE: 1:12,500	REVISION: 0
DATE: 24/03/2020	PAGE SIZE: A3



15 POPULATION AND HUMAN HEALTH

15.1 Population

For the purpose of population statistical analysis, the town of Shannon will be examined, as this settlement includes the study area. The settlement is approximately 6.4 square kilometres and has a population of 9,729 persons (Census 2016). There are 3,678 households in the settlement with an average household size of 2.64.

Table 15-1: Population Numbers

Population	2006 Census	2011 Census	2016 Census	Av. Household Size 2016
Shannon	9,222	9,673	9,729	2.64
Co. Clare	110,950	117,196	118,817	2.73
The State	4,239,848	4,588,252	4,761,865	2.75

Table 15-2: Population Change

% Population Change	2006 - 2011	2011 - 2016	2006 - 2016
Shannon	+4.9%	+0.6%	+5.5%
Co. Clare	+5.6%	+1.4%	+7.1%
The State	+8.2%	+3.8%	+10.9%

The population of Shannon increased 507 persons or 5.5% between 2006 and 2016 indicating a slower population growth rate compared to County Clare (7.1%) and the state (10.9%). The household size recorded in Shannon in 2016 was 2.6%, slightly lower than the state average and County Clare average which are both approximately 2.7%. Overall, the population trends of Shannon Town indicate a slower average rate of population growth.

Figure 15-1 illustrates the N19 upgrade area with respect to residential receptors (Eircode data). As indicated in the figure, there are 1,350 dwellings within 1km of the project. These are entirely located to the east of the study area. The most proximate dwellings are located at Drumgeely Hill and are located ca. 25m to the existing N19 corridor. Other dwellings in proximity to the proposed scheme are located on Fergus Road and are between 90m and 60m from the N19 corridor.

Lands zoned for new residential development are not located within proximity to the study area. Furthermore, the proposed works will not require the demolition of existing residential properties. Therefore, it is unlikely that the N19 upgrade project will negatively impact on population trends in the settlement of Shannon.

15.2 Socio-Economic

The main economic activities located in the N19 study area includes enterprise, business and light industry associated with the Shannon Free Zone, located north of the study area, and airport related activity located west of the study area.

The Shannon Free Zone is one of Ireland's leading international business parks and is considered a significant employment centre for the region. It is home to a range of manufacturing, distribution and office-based business consisting of over 150 companies and providing for approximately 9,000 jobs. The Shannon Free Zone is home to the largest agglomeration of American companies in Ireland outside of Dublin.

Shannon Airport is the key driver for economic activity in the Shannon area. The airport operates 365 days a year and is the third busiest in Ireland. The airport is strategically placed to cater for transatlantic flights and has the longest runway in Ireland, able to accommodate the largest commercial jets. In 2019 the airport handled approximately 1.6 million passengers. The routes are mostly Transatlantic, Great Britain and European services.

Figure 15-1 illustrates the commercial receptors located within 1km of the N19 upgrade works (Eircode data). The figure demonstrates the significant amount of commercial business located within the Shannon Free Zone, north of the study area. A significant number of businesses are also located to the west of the study area at Knockbeg Point. A small area of local commercial units is located east of the study area at Drumgeely Neighbourhood Centre.

Shannon is a significant airport for tourism as it is located on the Wild Atlantic Way. Major tourism attractions in proximity to Shannon include:

- Bunratty Castle
- Dromore Castle
- Craggaunowen
- Atlantic Air Adventures Aviation Museum
- Shannon Golf Club

The N19 upgrade project has potential to impact on economic activity at the Shannon Free Zone and Shannon Airport as a result of potential restricted access during the construction phase of the project. It will be necessary to maintain access to the business park as a core economic driver of the region and maintain convenient access to Shannon Airport as the core gateway to the region for business and tourism.

15.3 Community Facilities, Amenities and Healthcare

The settlement of Shannon has a range of community, social, cultural and recreational facilities supporting residential amenity throughout the town. Town centre facilities are located east of the N19 upgrade project; however, many existing community facilities are located in proximity to the study area at the western extent of the residential area of the town, focused around the Drumgeely neighbourhood centre. These facilities are identified in the Land Use Zoning Map of the Shannon Town and Environs Local Area Plan.

Facilities include:

- Convent/Chapel (C1),
- St. John’s National School (C2),
- St. Senan’s National School (C3),
- Mary Immaculate Church (C4),
- Handball Alley (C5)
- St. Tolas National School (C6),
- Shannon Town United FC (REC1),
- Shannon Airport Community Tourism Office.

Disruption to the existing facilities is unlikely as a result of the N19 upgrade works. Potential nuisance as a result of construction works may occur, including noise, dust and traffic management restrictions, however, these potential impacts will be temporary and will not significantly affect the amenity or use of the facilities. There are no healthcare facilities located in proximity to the study area.

15.4 Human Health & Safety

In the context of existing human health, The Department of Health (2016) has published a report entitled ‘Health in Ireland, Key Trends 2016’ which provides statistics relating to human health in Ireland over the last 10 years. Generally speaking, Ireland has a high level of health as demonstrated in self-evaluation statistics included in Census data, as detailed in table 15-3.

The settlement of Shannon has similar health trends to the County Clare and The State. The majority of the population have ‘Very Good’ general health with a very small percentage (2%) having general health classed as ‘Bad’ or ‘Very Bad’. From these health statistics it can be concluded that the settlement of Shannon is not an ‘at risk community’ and is unlikely to be significantly impacted by the N19 upgrade project.

Table 15-3: Population by General Health (Census 2016)

General Health	Shannon 2016	Clare County 2016	State 2016
Very good	56%	57.5%	59%
Good	31%	29%	28%
Fair	9%	8%	8%
Bad	1%	1.5%	1%
Very bad	1%	1%	0%
Not stated	2%	3%	3%

In relation to health and safety, there are 3 no. Seveso sites within the Shannon town and environs area. The Shannon Airport Authority's aviation fuel farm (former Tedcastle Oil), an upper tier Seveso site, is located ca. 1.2km west of the study area, adjacent the Shannon Golf Club.

2 no. lower tier Seveso sites are located within the settlement, Avara Shannon Pharmaceutical Services, located within the Shannon Free Zone, ca. 600m north west of the study area. Enva Ireland is located in the Smithstown Industrial Estate, ca. 2km north east of the study area. It is unlikely that the presence of these sites will impact on the N19 upgrade works, however, the planning application for the N19 project will be referred to the Health and Safety Authority.

15.5 Population and Human Health Summary and Conclusion

According to CSO statistics, Shannon Town has a lower than average population growth rate in comparison to average figures of County Clare and The State. The population of the town is wholly located to the east of the N19. Lands zoned for future residential development are not located in proximity to the N19 study area.

Economic activity in the study area is focused on Shannon Airport and Shannon Free Zone West, located adjacent to the N19. This area is considered a significant employment centre for the region. Shannon Airport is also a key driver for tourism in the region. The N19 upgrade project has potential to impact on economic activity at the Shannon Free Zone and Shannon Airport as a result of potential restricted access during the construction phase of the project. It will be necessary to provide adequate access to the airport and business park during the construction stage to maintain economic activity.

The settlement of Shannon has a range of community, social, cultural and recreational facilities supporting residential amenity throughout the town. Drumgeely neighbourhood centre is located in proximity to the N19 scheme, however, disruption to the existing facilities is unlikely as a result of the N19 upgrade works.

In relation to human health, the population of Shannon Town has generally good or very good health as indicated by CSO statistics, and therefore is therefore not considered an 'at risk community'. In relation to health and safety, there are 3 no. Seveso sites within 2km of the study area. It is unlikely that these Seveso sites will impact upon the project, however the planning application for the N19 project will be referred to the Health and Safety Authority.

In conclusion, the N19 project is unlikely to cause a significant impact on population and human health in the study area or Shannon town and its environs.



- - - 2.2km Proposed Improvement Scheme
- ▭ Constraints Area

TITLE:	Constraints Area		
PROJECT:	N19 Shannon Airport Road Improvement Scheme		
FIGURE NO:	15.1		
CLIENT:	Clare County Council		
SCALE:	1:15,000	REVISION:	0
DATE:	08/05/2020	PAGE SIZE:	A3



16 MATERIAL ASSETS – NON-AGRICULTURE

16.1 Existing Services

Electricity Supply – Electricity Supply Board (stations, substations and underground cables)

In consultation the ESB noted that the information as previously sent is correct – there have been no upgrades but as project progresses contact should be made with ESB at dig@esb.ie to request latest maps. Currently there are no major works or alterations proposed by ESB and all future changes will be driven by connections/development. The existing service is deemed significant as it feeds the airport and control tower as well as Shannon Free Zone. The service is underground mainly on LHS going towards airport. It is an old single 185 copper cable (type no longer in use) and if replaced/diverted it would have to now be a 400-type cable. The existing cable has ~ 600mm cover over boarding but has no marker tape. There are no guarantees to location so service should be mapped with Cat and Jenny and where necessary slit trenches may be required to proof location. Other major infrastructure includes 2 number 38kv and one number 110kv stations as well as a number of sub-stations of which two are of particular concern – Shell (potential pinch point) and East Hanger. ESB also noted that distances between sub-stations are critical.

Gas Distribution – Gas Networks Ireland (underground distribution network)

In consultation GNI noted information as previously sent is correct for mainline only and alterations consist of service connections but as project progresses contact should be made with GNI to request latest maps. No major works or alterations proposed, and any future changes will be driven by connections. GNI noted that the service is a deemed a significant main as it serves the airport and the Shannon Free Zone and is a 180mm diameter main likely an old type PE 80 (TBC) at approximately 600mm depth in grass verge running mainly on RHS approaching airport parallel to fence. There are no guarantees to location so slit trenches will be required to proof location and details.

Telecom – Eir (cabinets, underground cables and fibre-optic cables)

In Consultation Eir noted information as previously sent is current but there is no guarantee to accuracy so service should be mapped with Cat and Jenny and where necessary slit trenches may be required to proof location. Noted that no major works or alterations proposed by EIR. Noted service is deemed critical as feeds airport and control tower as well as Shannon Free Zone. Noted that existing service varies in locations:

- 4 no. concrete ducts and 4 no 100mm waving from Flats to Roundabout
- In grass verge on LHS up to roundabout then crosses road and on RHS up to airport.
- Note 3 or 4 Fibreoptic services – copper cable with nominal 2ft 6inch cover.

Other major infrastructure includes numerous cabinets.

Water Supply and Wastewater Disposal – Irish Water

In consultation Irish Water noted that information as previously sent is current but indicative only and that the existing foul rising main is not on drawing. Noted that Irish Water policy is not to provide CAD data. Also noted that no major works or alterations proposed immediately but existing services are old (circa 1970) and a DAP has been commenced which will eventually determine necessary works. Noted in terms of the study area that the only critical services are the existing N19 road crossings, the pump station and the rising main. Rest of services are in estates and unlikely to be impacted by road scheme.

Also noted that the existing foul sewer is asbestos concrete. No guarantees to location so service should be mapped with where necessary by undertaking slit trenches to proof location.

Water Supply, Wastewater Disposal and Surface Water Runoff – Shannon International Airport

Shannon International Airport noted it has its own package treatment plant and water supply contained within the airport lands. Also noted that the runway runoff is collected in various drainage pipes which cross the existing road and connect to the open drainage channel.

The corridor constraints identified are the existing air fibre optic cables, electricity supply, gas transmission and water, waste-water and surface water infrastructure. The locations of services are shown on Figures in Appendix 1. These will need to be considered in developing the scheme.

16.2 Mining and Mineral Extractions

There are no mining and mineral extraction identified in the Study Area.

16.3 Built environment constraints

Adjoining the study area, the built environment constraints consist of the following:

16.3.1 Shannon International Airport

Shannon International Airport is located to the south and west of the N19. The airport infrastructure includes Terminal Buildings, hangars, parking facilities, runways, fuel farm, internal services and utility connections. There is a requirement to ensure 3m clearance from the existing boundary fence line to driven or stationary vehicles.



Plate 16-1: Shannon International Airport

16.3.2 Shannon Free Zone

Shannon Free Zone is a Business Park located to the west of the N19. Shannon Free Zone is a world-renowned business park at the edge of Shannon Airport. Located on 600 acres, over 200 buildings house more than 150 companies, making it one of Ireland's largest multi-sectoral business parks and home to the largest concentration of American companies in Ireland outside of Dublin.

Shannon Commercial Properties past and future phased development plans in Shannon Free Zone (SFZ) West will have a significant impact on traffic. The SFZ West phased development plan is as follows:

- Phase 1 Development (2014 – 2018) = 650,000 sq. ft. commercial / industrial buildings (Completed)
- Phase 2 Development (2019 – 2023) = 650,000 sq. ft. commercial / industrial buildings (Commenced)
- Phase 3 Development (2024 – 2028) = 700,000 sq. ft. commercial / industrial buildings



Plate 16-2: Shannon Free Zone

16.3.3 The apartment blocks at Drumgeely Hill

There are a series of apartment blocks located to the east of the N19 at Drumgeely Hill at a higher elevation to the existing road with a steep local access out on to the N19 and an alternative access through Shannon Town.



Plate 16-3: Apartment Blocks

16.3.4 Direct Accesses for Business

There are various individual businesses with direct access off the existing N19 particularly along the later section of the scheme just east of Knockbeagh Point Roundabout. All of these accesses contribute to reduced safety and reduced service level along the route.



Plate 16-4: Individual businesses with direct access off the existing N19

16.3.5 The existing security hut.

There is a security hut located on the N19 in the centre of the existing road. This is used by the Gardai when required and will need relocating in agreement with them.



Plate 16-5: Existing Security Hut

16.4 Engineering Summary and Conclusions

Based on the review of these material assets within and adjoining the study area, constraints have been identified above in relation to existing utilities and the built environment both existing and proposed that will need to be considered in the development of the scheme.

17 EXTERNAL PARAMETERS

17.1 Funding & Scope.

TII Project Appraisal Guidance, reflecting the Public Spending Code requirements, sets out the required level of appraisal based on the expected level of capital expenditure.

The Feasibility Working Cost is still under consideration by TII as part of Project Management procedures and once confirmed will determine under which TII PAG Unit procedures the scheme be appraised in the next stage.

17.2 European Requirements/Standards

Ireland's transport infrastructure contributes to one Trans-European Transport Network (TEN-T) Corridor. The North Sea - Mediterranean Corridor includes infrastructure on the island of Ireland, with particular focus on port and airports and the road and rail connections to them, in support of the EU policy aim of improved transport connectivity across Europe.

There are two levels of TEN-T network – Core and Comprehensive. Shannon International Airport is designated as part of the Comprehensive network, as are the road and rail links between Limerick and Galway.

17.2.1 Extract from DECISION No. 1692/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 July 1996 on Community guidelines for the development of the trans-European transport network:

2. The network must:

- (a) Ensure the sustainable mobility of persons and goods within an area without internal frontiers under the best possible social and safety conditions, while helping to achieve the Community's objectives, particularly in regard to the environment and competition, and contribute to strengthening economic and social cohesion;
- (b) Offer users high-quality infrastructure on acceptable economic terms;
- (c) Include all modes of transport, taking account of their comparative advantages;
- (d) Allow the optimal use of existing capacities;
- (e) Be, insofar as possible, interoperable within modes of transport and encourage intramodality between the different modes of transport;
- (f) Be, insofar as possible, economically viable;
- (g) Cover the whole territory of the Member States of the Community so as to facilitate access in general, link island, landlocked and peripheral regions to the central regions and interlink without bottlenecks the major conurbations and regions of the Community.

Article 9 Characteristics

1. The trans-European road network shall comprise motorways and high-quality roads, whether existing, new or to be adapted, which:
 - play an important role in long-distance traffic, or
 - bypass the main urban centres on the routes identified by the network, or
 - provide interconnection with other modes of transport.

17.2.2 Extract from Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network, Article 10

1. In the development of the comprehensive network, general priority shall be given to measures that are necessary for:
 - a) Ensuring enhanced accessibility and connectivity for all regions of the Union while taking into consideration the specific case of islands, isolated networks and sparsely populated, remote and outermost regions;
 - b) Ensuring optimal integration of the transport modes and interoperability within transport modes;
 - c) Bridging missing links and removing bottlenecks, particularly in cross-border sections;
 - d) Promoting the efficient and sustainable use of the infrastructure and, where necessary, increasing capacity;
 - e) Improving or maintaining the quality of infrastructure in terms of safety, security, efficiency, climate and, where appropriate, disaster resilience, environmental performance, social conditions, accessibility for all users, including elderly people, persons with reduced mobility and disabled passengers, and the quality of services and continuity of traffic flows;

17.2.3 Interpretation

The interpretation of the above is that:

- the whole of the N19, as the short connection between Shannon International Airport that is part of the Comprehensive network and the N18/M18 which is part of the Comprehensive network, should be considered part of the Comprehensive network
- it is therefore EU policy that the N19 should be high-quality infrastructure
- in developing the Comprehensive network within Ireland, the Irish government has a duty under EU law to consider a range of issues including disaster resilience, safety, accessibility for all users and quality of service.

17.3 TII Requirements/Standards

In order to meet the TII Requirements / Standards for a new or upgraded National Road the road should, as a minimum, have the following characteristics:

- The road should be designed to TII Publications (Standards) to provide as a minimum an average inter-urban speed of at least 80km/h which relates to a Level of Service (LOS) of D during peak traffic flows in the Design Year of the project (15 years after the opening of the road). The USA Highway Capacity Manual defines six levels of service ranging between A (free flow) and F (forced or breakdown flow) with LOS of D relating to stable flow conditions.
- Continuous or generous opportunities for overtaking.
- The road should aim to limit or remove all direct access other than at junctions with other roads.
- DN-GEO-03036 notes that facilities for cyclists and pedestrians should be provided as standard for all national road schemes built to Type 2 or Type 3 Single Carriageway or Type 2 or Type 3 Dual Carriageway standard. Where options for provision may include:
 - A Cycleway remote from the road (designed in accordance with DN-GEO-03047)
 - Within the maintenance strip or verge of the national road
 - Using a suitable existing alternative route incorporating appropriate signage.

17.4 Construction Phasing.

Access to Shannon International Airport, the Shannon Free Zone and other businesses and premises must be maintained at all times during the construction of the project. This will necessitate extensive traffic management and phased construction.

There are critical utilities those service cannot be disrupted, particularly the fibre-optic cable to the Control Tower, this may necessitate an early works contract for diversion of affected services.

17.5 Procedural & Legal Requirements

The scheme will have to be developed within the constraints of the existing roads, procurement and environmental legislation and of the documents produced in conformity with this body of legislation. The Roads Act 1993 and the Roads Regulations 1994 indicate that a formal Environmental Impact Assessment Report for the scheme is necessary. The road authority is required to advise the Minister in accordance with the Roads Act 1993.

The Environmental Impact Assessment Report and the Compulsory Purchase Orders (if deemed necessary) will require to be assessed by An Bord Pleanála.

17.6 External Parameters Summary and Conclusions

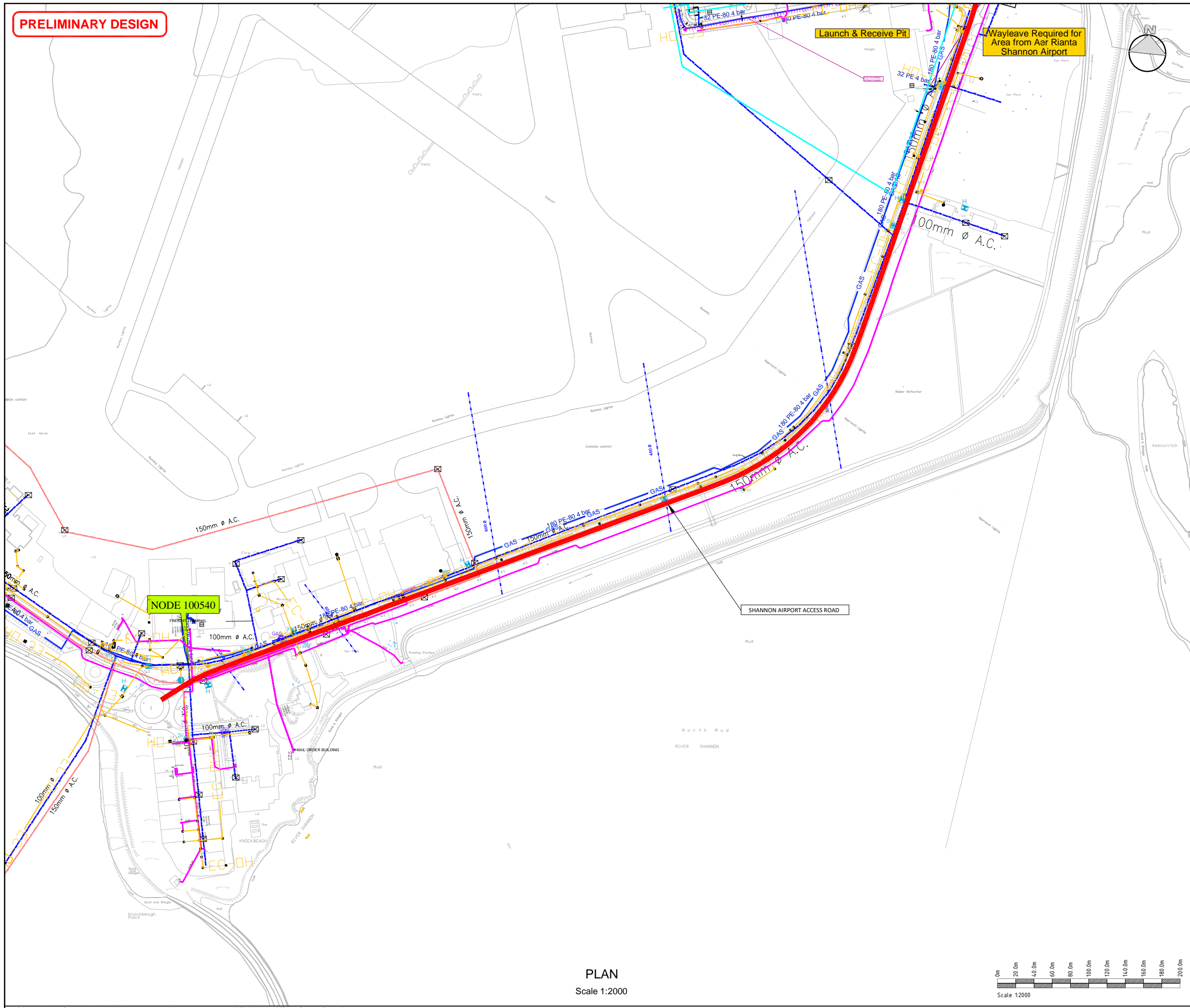
Based on the review of the proposed study area significant external parameters have been identified above which will need to be considered in the development of the scheme.



APPENDIX 5

Services Drawings

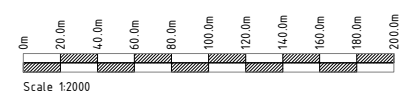
PRELIMINARY DESIGN



- NOTES**
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- LEGEND**
- 2.2 km PROPOSED IMPROVEMENT SCHEME
 - EC-DH EIRCOM LINE
 - ICEI EIRCOM INSPECTION COVER
 - GAS LOW PRESSURE PIPE
 - GAS MEDIUM PRESSURE PIPE
 - AURORA TELECOM DUCT
 - AURORA TELECOM FIBRE OPTIC CABLE
 - GAS GAS VALVE
 - LV-DH LV (400V/230V) OVERHEAD LINES
 - 38kV-UG 38KV & HIGHER VOLTAGE UNDERGROUND CABLE
 - MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE
 - SV STOP VALVE
 - H HYDRANT
 - OVE VALVE
 - PIPE LINE 1
 - PIPE LINE 2
 - UNKNOWN SIZE PIPE EXTENTS UNKNOWN
 - ASBESTOS PIPE LINE EXTENTS UNKNOWN
 - SHANNON AIRPORT DRAINAGE PIPES

PLAN
Scale 1:2000



P00	09/11/2019	PRELIMINARY DESIGN	KK	AP	SC
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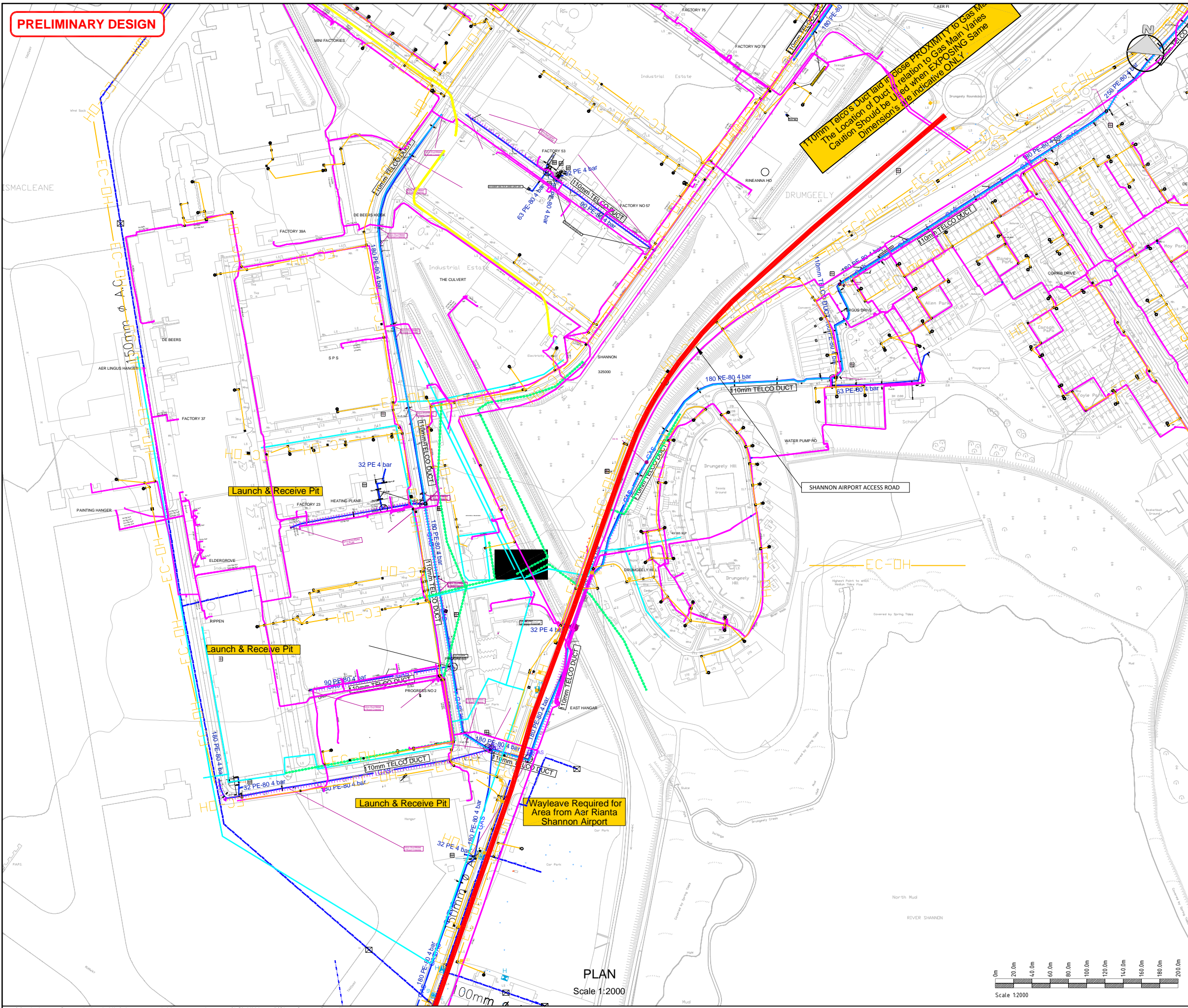
PROJECT
N19 SHANNON AIRPORT
ACCESS ROAD IMPROVEMENT SCHEME

DRAWING TITLE
COMBINED UTILITIES
SHEET 1 OF 3

DESIGNED AP	DRAWN KK	CHECKED/APPROVED SC
DATE 09/09/2019	SCALE 1:2,000	SHEET SIZE A1
DRAWING NUMBER N19-SAAR-DR-UT-0101		REVISED P00

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PRELIMINARY DESIGN



10mm TELCO DUCT
 The Location of Duct in relation to Gas Main Varies
 Caution should be used when EXPOSING Same
 Dimensions are Indicative ONLY

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LEGEND

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- GAS LOW PRESSURE PIPE
- GAS MEDIUM PRESSURE PIPE
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- AURORA TELECOM FIBRE OPTIC CABLE
- ⊙ GAS VALVE
- LV-DH LV (400V/230V) OVERHEAD LINES
- 38kV-UG 38KV & HIGHER VOLTAGE UNDERGROUND CABLE
- MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE
- ⊙ SV STOP VALVE
- ⊕ H HYDRANT
- ⊙ OVE VALVE
- PIPE LINE 1
- PIPE LINE 2
- UNKNOWN SIZE PIPE EXTENTS UNKNOWN
- ASBESTOS PIPE LINE EXTENTS UNKNOWN
- - - SHANNON AIRPORT DRAINAGE PIPES

P00	09/11/2019	PRELIMINARY DESIGN	KK	AP	SC
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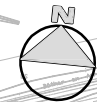


N19 SHANNON AIRPORT ACCESS ROAD IMPROVEMENT SCHEME

COMBINED UTILITIES SHEET 2 OF 3

DESIGNED AP	DRAWN KK	CHECKED/APPROVED SC
DATE 09/09/2019	SCALE 1:2,000	SHEET NO. A1
PROJECT NUMBER N19-SAR-DR-UT-0102		REVISED P00

PRELIMINARY DESIGN

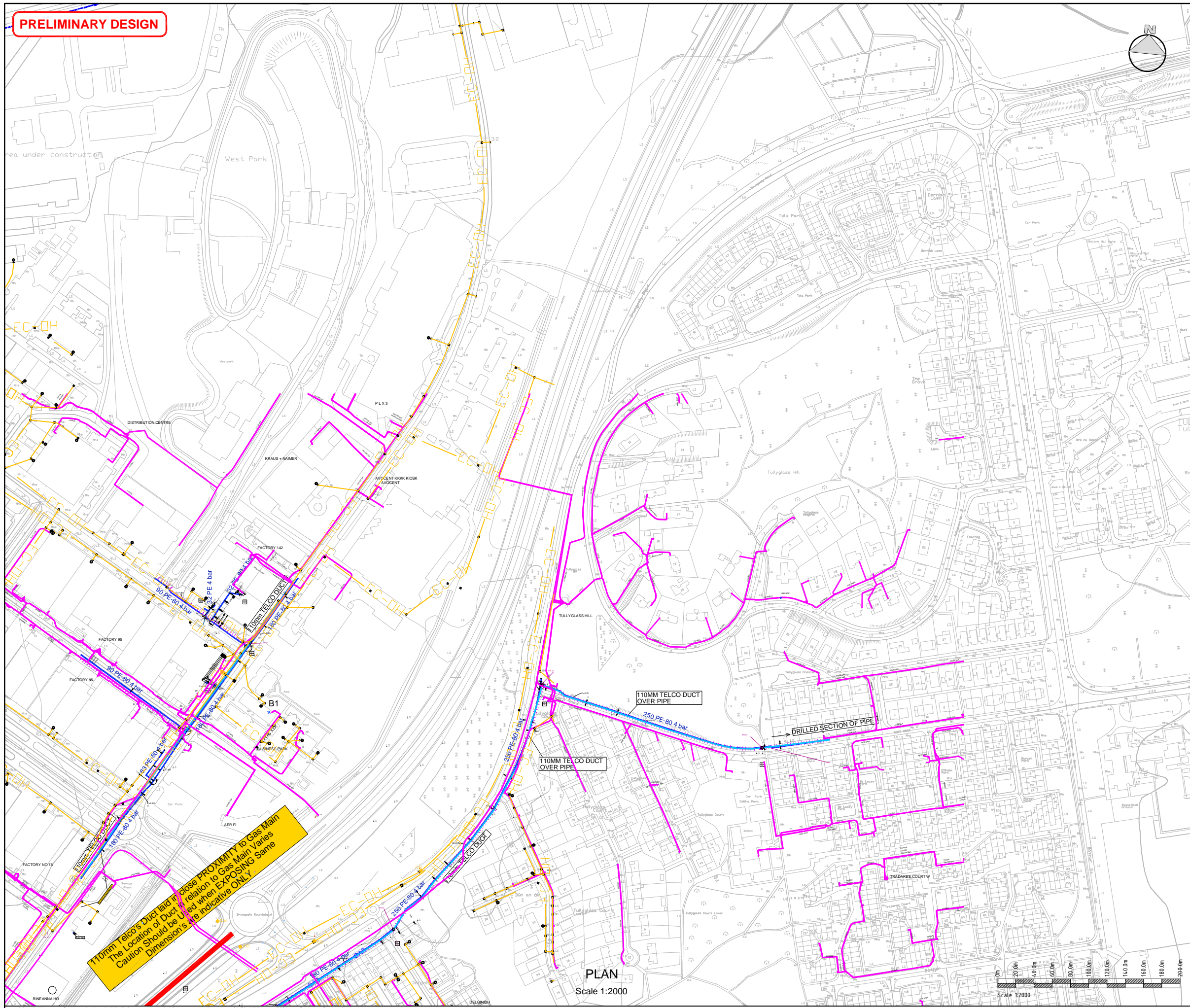


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LEGEND

- 2.2 km PROPOSED IMPROVEMENT SCHEME
- EC-DH EIRCOM LINE
- ICEI EIRCOM INSPECTION COVER
- GAS LOW PRESSURE PIPE
- GAS MEDIUM PRESSURE PIPE
- AURORA TELECOM DUCT
- AURORA TELECOM FIBRE OPTIC CABLE
- ⊙ GAS VALVE
- LV (400V/230V) OVERHEAD LINES
- 38kV-UG 38KV & HIGHER VOLTAGE UNDERGROUND CABLE
- MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE
- ⊙ SV STOP VALVE
- ⊕ H HYDRANT
- ⊙ OVE VALVE
- PIPE LINE 1
- PIPE LINE 2
- - - UNKNOWN SIZE PIPE EXTENTS UNKNOWN
- - - ASBESTOS PIPE LINE EXTENTS UNKNOWN
- - - SHANNON AIRPORT DRAINAGE PIPES



110mm Telco's Duct laid in close PROXIMITY to Gas Main
 The Location of Duct is related to Gas Main varies
 Caution Should be Used when EXPOSING Same
 Dimensions are indicative ONLY

PLAN
 Scale 1:2000



P00	09/11/2019	PRELIMINARY DESIGN	KK	AP	SC
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**N19 SHANNON AIRPORT
 ACCESS ROAD IMPROVEMENT SCHEME**

**COMBINED UTILITIES
 SHEET 3 OF 3**

DESIGNED AP	DRAWN KK	CHECKED/APPROVED SC
DATE 09/09/2019	SCALE 1:2,000	SHEET NO. A1
PROJECT NUMBER N19-SAAR-DR-UT-0103		REVISED P00



APPENDIX 14

Archaeology, Architectural
and Cultural Heritage



APPENDIX 14

ARCHAEOLOGY,
ARCHITECTURAL AND
CULTURAL HERITAGE

1 INVENTORY OF IDENTIFIED SITES OF ARCHAEOLOGICAL, ARCHITECTURAL OR CULTURAL HERITAGE SIGNIFICANCE AND/OR POTENTIAL WITHIN STUDY AREA

CH No.	Category	Legal status	Type	Description	Townland	ITM_E	ITM_N
CH001	TB	N/A	Townland Boundary	Townland boundary between Knockaun and Tullyvarraga	Knockaun/ Tullyvarraga	540247	662961
CH002	TB	N/A	Townland Boundary	Townland boundary between Knockaun and Ballymurtagh	Knockaun/ Ballymurtagh	540131	662911
CH003	TB	N/A	Townland Boundary	Townland boundary between Tullyvarraga and Ballymurtagh	Tullyvarraga/ Ballymurtagh	540188	662865
CH004	TB	N/A	Townland Boundary	Townland boundary between Tullyvarraga and Tullyglass	Tullyvarraga/ Tullyglass	540268	662817
CH005	TB	N/A	Townland Boundary	Townland boundary between Ballymurtagh and Tullyglass	Ballymurtagh/ Tullyglass	540074	662648
CH006	TB	N/A	Townland Boundary	Townland boundary between Ballymurtagh and Drumgeely	Ballymurtagh/ Drumgeely	539839	662450
CH007	TB	N/A	Townland Boundary	Townland boundary between Tullyglass and Drumgeely	Tullyglass/ Drumgeely	539834	662124
CH008	TB	N/A	Townland Boundary	Townland boundary between Drumgeely and Lismaclean	Drumgeely/ Lismaclean	539117	661275
CH009	TB	N/A	Townland Boundary	Townland boundary between Drumgeely and Rineanna South	Drumgeely/ Rineanna South	539186	661087
CH010	TB	N/A	Townland Boundary	Townland boundary between Lismaclean and Rineanna South	Lismaclean and Rineanna South	539061	661209
CH011	UCH	N/A	Vernacular Building(s)	Single building shown on OS Historic 25-inch series map only	Knockaun	540123	662905

CH No.	Category	Legal status	Type	Description	Townland	ITM_E	ITM_N
CH012	UCH	N/A	Vernacular Building(s)	Building cluster (2 no) shown on 1st edition 6-inch, historic 25-inch and Cassini 6-inch series maps	Tullyglass	539918	662439
CH013	UCH	N/A	Historic Coastal Flood Defences	Curvilinear embankment shown on historic 25-inch series and Cassini 6-inch series map. Possibly relating to flood defences	Tullyglass	539716	661673
CH014	UCH	N/A	Historic Coastal Flood Defences	Embankment following line of field system shown on 1st edition 6-inch series, historic 25 inch series and Cassini 6-inch series maps. Probably relating to flood defences	Drumgeely	539405	661412
CH015	UCH	N/A	Vernacular Building(s)	Building cluster (4 no.) shown on 1st edition 6-inch, historic 25-inch and Cassini 6-inch series maps; historic 25-inch series also notes a well within the cluster.	Drumgeely	539367	661419
CH016	UCH	N/A	Well	Well shown on historic 25-inch series map only	Drumgeely	539176	661280
CH017	UCH	N/A	Vernacular Building(s)	Building cluster (3-4 no.) shown on 1st edition 6-inch, historic 25-inch and Cassini 6-inch series maps; historic 25-inch series also notes a pump just NW of cluster.	Drumgeely	539225	661187
CH018	UCH	N/A	Historic Coastal Flood Defences	Embankment, generally following alignment of townland boundary (but located NW of it) shown on 1st edition 6-inch series and historic 25-inch series map. Only vestige of eastern end shown on Cassini 6-inch series map. Possibly relating to flood defences	Lismaclean	539123	661254
CH019	UCH	N/A	Historic Coastal Flood Defences	Embankment extending along the shoreline of c. 1.2 km shown on 1st edition 6-inch, historic 25-inch and Cassini 6-inch series maps. Probably part of coastal flood defences	Rineanna South	539142	660525
CH020	UCH	N/A	Well	Well shown on historic 25-inch series map only	Rineanna South	538350	660336
CH021	UCH	N/A	Vernacular Building(s)	Building: A rectangular building oriented west southwest/east/northeast as marked on OS First Edition 6"	Rineanna South	538359	660188

CH No.	Category	Legal status	Type	Description	Townland	ITM_E	ITM_N
				Map; replaced by building cluster (3 no) on historic 25-inch series map and Cassini 6-inch series map			
CH022	UCH	N/A	Navigation Marker	Beacon/Navigation Signal for Knockbeagh Point: Marked on OS First Edition 6" Map as the location of beacon, probably associated with maritime navigation along the River Shannon Estuary.	Rineanna South	538208	660088

Note: The abbreviations that have been used for the 'Category' section are as follows:

RMP: Recorded archaeological monument
 PS: Protected Structure
 NIAH: Site recorded in NIAH
 ACA: Architectural Conservation Area
 UBH: Unregistered built heritage site
 UCH: Unregistered cultural heritage site
 TB: Townland boundary
 AAP: Area/feature of archaeological potential

2 PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

An examination of previous excavations carried out within and around the area proposed for development provides a useful framework for assessment of the study area in terms of its archaeological significance as well as its archaeological potential. The Archaeological Excavations Bulletin is an annual fieldwork gazetteer for Irish Archaeology; it was checked for a record of any licensed archaeological investigations carried out in the vicinity of the development area between 1970 and 2019.

Site name: Tullyvarraga, Shannon

Sites and Monuments Record No.: N/A **Licence number:** 18E0731

Author: Alan Hawkes (For Maurice F. Hurley) 'Melrose' 5 Palmbury, Togher, Cork

Site type: Testing

ITM: E 541634m, N 661574m

In December 2018, test-trenching was carried in advance of new social housing scheme in the townland of Tullyvarraga, near Shannon town, Co. Clare. The layout of some of the trenches was informed by a previous geophysical survey (18R0216) that was restricted to a small area at the centre of the site due to the poor ground conditions.

Eight trenches were excavated across three areas within the proposed development site and were positioned between areas of dense vegetation and mature trees. The majority of the features identified were lines of dark silty soil within the natural orange subsoil. Partial excavation of some of the lines suggests they are likely related to early modern ridge and furrow cultivation. The furrows were consistently shallow and barely penetrated to the depth of the subsoil. Other linear features relate to drains and levelled field boundaries that are depicted on the early historic mapping of the site. These agricultural features are not considered to be of archaeological significance.

Two large iron objects were recovered from Trenches 2 and 3. One comprised a possible bucket handle, while the other appeared to be the corroded remains of a large knife complete with tang. These are likely to be early modern in date and both were recovered from topsoil. The remaining objects were recovered from Trench 5. These included five sherds of white creamware, a possible iron nail and a small fragment of clay pipe stem.

No features of any archaeological significance were found and all the objects recovered were of early modern date.

Site name: Drumgilla/Drumgeely, Caherteige and Ballymurtagh

Sites and Monuments Record No.: N/A **Licence number:** 05E0227

Author: John O'Connor, Ballingoola, Grange, Co. Limerick.

Site type: No archaeological significance

ITM: E 539668m, N 663026m

Monitoring of groundworks at Westpark, Shannon, Co. Clare, were carried out intermittently from January 2005 to April 2007. The site is located between Shannon Airport and Shannon town.

The development involves the construction of seven three-storey over lower ground-floor-level buildings as well as a five-storey carpark and surface parking.

The monitoring of topsoil-stripping associated with the construction of Buildings 2, 3, 4 and 7, as well as access roads, was undertaken during this time. Nothing of archaeological significance was discovered as a result of this phase of the works.

Site name: DRUMGEELY

Sites and Monuments Record No.: N/A **Licence number:** 05E0227

Author: John O'Connor, ADS Ltd, Windsor House, 11 Fairview Strand, Dublin 3.

Site type: Monitoring

ITM: E 539229m, N 661466m

Monitoring of groundworks associated with the construction of an e-campus/business park at Shannon was carried out intermittently from 14 February to 28 May 2005. There are no known archaeological sites on the development area, but there is a concentration of sites directly to the north of the townland of Drumgeely. A total of thirteen raths, enclosures and mounds are recorded in the adjacent townlands of Ballymurtagh and Caherteige.

Topsoil-stripping was done initially by a machine with a toothless bucket and later with a bulldozer. Nothing of archaeological significance was revealed during this phase of the works. Works are scheduled to restart in 2006.

Site name: Illaunamanagh Point, Tullyvarraga

Sites and Monuments Record No.: N/A **Licence number:** 01E0011

Author: Paul Stevens, for Margaret Gowen & Co. Ltd, 2 Killiney View, Albert Road Lower, Glenageary, Co. Dublin.

Site type: No archaeological significance

ITM: E 540600m, N 662293m

Monitoring took place in March 2001 of a development at Illaunamanagh Point, Tullyvarraga, Shannon, Co. Clare. The development site was a new municipal cemetery and burial-ground, covering a roughly oval area of 6.45ha with an adjoining triangular area, both linked by a farm road. The site is close to a number of known archaeological monuments and borders the River Shannon. Monitoring was carried out of all groundworks, which consisted of the removal of topsoil from the burial-ground area and adjacent link road, widening of an existing lane from the road to the burial-ground, and the construction of a temporary carpark in front of the site.

Monitoring revealed nothing of archaeological significance within the development area.

Site name: SITE AR31, KNOCKAUN

Sites and Monuments Record No.: N/A **Licence number:** 00E0415

Author: Ken Hanley, 44 Eaton, Heights, Cobh, Co. Cork, on behalf of Valerie J. Keeley Ltd.

Site type: Charcoal-flecked spreads

ITM: E 540288m, N 664729m

Site AR31 consisted of three prominent mounds in the north-west corner of a field in the townland of Knockaun, Co. Clare.

It was identified as a site of archaeological potential during an environmental impact assessment, in advance of the N18/N19 Road Improvement Scheme, from Ballycasey to Dromoland.

The site lies within the take of the proposed road, and further archaeological investigation was warranted. Testing was carried out on 15 and 16 June 2000.

The site comprised two adjoining prominent mounds (12.3–16.8m OD and 12.3–15.9m OD), with a third, lower (12.5–13.4m OD) mound c. 60m to the south-east. Three test-trenches were manually inserted. Test-trench 1 measured 10m east–west x 1.5m and ran up the western slope of the most eastern of the two main mounds. Topsoil consisted of mid-/dark brown, stony clay, with frequent spreads of orange and black ash, the result of recent removal of gorse. Beneath this was c. 0.05–0.15m of grey, silty sand (C4). This covered most of the trench and rested on yellow/brown, silty, sandy natural subsoil. Two localised and shallow (c. 30mm) spreads of grey clay (C5 and C6), with very occasional flecks of charcoal, were identified. These features were potentially archaeological, but testing proved inconclusive. A possible cut feature (0.23m east–west x 0.15m x c. 0.16m deep) was identified next to C6. It was filled by sterile, mid-/dark orange/brown, sandy clay, which was similar to natural subsoil.

Site name: Knockaun

Sites and Monuments Record No.: N/A **Licence number:** 01E0521

Author: Deirdre Murphy, Archaeological Consultancy Services Ltd, 15 Trinity Street, Drogheda, Co. Louth.

Site type: Fulacht fiadh

ITM: E 540288m, N 664729m

This site was discovered during monitoring of topsoil-stripping during the Dromoland to Ballycasey Road Improvement Scheme Phase II. The site, AR31A, was subsequently excavated, as it was apparent that the construction of the road would destroy any underlying archaeology.

The topsoil consisted of dark brown loam that extended to a depth of 0.2m. The removal of the topsoil exposed a fulacht spread, subcircular in shape with an irregular extension to the south. It consisted of loose sandy loam containing 60% heat-shattered sandstone, 5% charcoal and moderate inclusions of decayed stone. It measured 4.3m by 6.3m and had a maximum depth of 0.15–0.2m. A rock outcrop was evident along its south-eastern edge.

A trough was exposed beneath the fulacht spread. This was roughly oval in shape and its fill consisted of loose sandy loam containing 60% heat-shattered sandstone, 5% charcoal and moderate amounts of decayed stone. The upper 0.1m of the fill contained peat. The cut was U-shaped, measuring 2.1m by 1.26m. The trough was cut into natural and reached a depth of 0.31m (OD 11.54m). The sides of the cut were gentle and gradual, with the break of slope at 0.2–0.3m. Two stones rested in the base of the trough. A post-hole was cut through the base. Its fill consisted of compact sandy brown loam. The cut for this feature was shallow and circular with straight-cut vertical sides and a flat base. The diameter of the post-hole was 0.12m and it reached a depth of 0.06m. There were no finds from this context and there were no other accompanying post-holes. This post-hole may have supported a post for suspension of an object above the trough. Analysis of a charcoal sample from the trough produced a date of 2580–2210 BC, placing this feature within the late Neolithic–early Bronze Age transitional period.

Site name: Knockaun

Sites and Monuments Record No.: N/A **Licence number:** 01E0689

Author: Deirdre Murphy, Archaeological Consultancy Services Ltd, 15 Trinity Street, Drogheda, Co. Louth.

Site type: Fulacht fiadh

ITM: E 540361m, N 663138m

The N18/N19 road improvement scheme involves the construction of a new dual carriageway from Ballycasey northwards to Latoon South. At construction phase topsoil-stripping was monitored along the proposed road route, and a fulacht site (AR45A) was identified along the proposed N19, south of a ringfort (SMR 51:139). It was in undulating land and the site spread over a large area, occupying almost the entire width of the proposed road.

The removal of the topsoil revealed two fulacht spreads of heat-shattered sandstone and charcoal with associated features and numerous agricultural furrows. The terrain consisted of swampy marshland with rock outcrops with thin soil cover. The furrows were cut into the boulder clay on a north-east-sloping outcrop as this was the only area suitable for ploughing in this marginal ground. The fulacht spread in the eastern area of the site was almost ploughed out, having been disturbed by the furrows, and it sealed a gully and an underlying pit. It was concentrated in three spreads measuring 11.6m by 3m, 7.2m by 5.6m and 2.6m by 3m. A whetstone was recovered from the fill of the pit. A radiocarbon date of 3900–3480 BP (1950–1530 BC) was obtained from a charcoal sample from the fulacht spread, indicating that the site was middle Bronze Age in date.

The second fulacht spread, towards the south-western edge of the site (F026), was also ploughed out (dimensions of 3.9m by 2.8m), but it sealed an almost intact timber plank trough (dimensions 2m by 1.5m). A whetstone and two rim sherds of unidentifiable prehistoric pottery were recovered from the spread, and a second whetstone was recovered from the topsoil. A radiocarbon date of 3250–2880 BP (1300–930 BC) was obtained from a wood sample from the trough, indicating that this site was late Bronze Age in date. The radiocarbon dates provided evidence that while the two fulacht sites were in close proximity they were not contemporary.

Further stripping in the adjacent area failed to identify any other archaeological features.

Site name: Knockaun

Sites and Monuments Record No.: N/A **Licence number:** 01E0739

Author: Deirdre Murphy, Archaeological Consultancy Services Ltd, 15 Trinity Street, Drogheda, Co. Louth.

Site type: Fulacht fiadh

ITM: E 540551m, N 664428m

At the construction phase of the Dromoland to Ballycasey Road Improvement Scheme Phase II, topsoil-stripping was monitored along the proposed road route and a fulacht site (AR32A) was identified on the western side of the proposed N18, south-east of a cairn (AR32).

The removal of the topsoil revealed a fulacht spread of heat-shattered sandstone and charcoal and numerous furrows and pits.

Six east–west-orientated furrows and three pits of post-medieval date were identified in the northern area of the site. A furrow cut the northern edge of the fulacht spread, which had maximum dimensions of 7.5m by 8.4m. Excavation identified a trough just beyond the south-eastern edge of the fulacht.

This trough was rectangular in shape and the sides had dense concentrations of charcoal, suggesting that it was originally timber-lined. An oval pit was also exposed beneath the fulacht spread, cut into the natural boulder clay. No finds were recovered from the fill but it is presumably contemporary with the fulacht spread.

A radiocarbon date (2120–2100 BC) was obtained from a charcoal sample from the fulacht spread and this indicated that the site was early Bronze Age in date.

Further stripping in the adjacent area failed to identify any other archaeological features.

3 NATIONAL MUSEUM OF IRELAND (NMI) TOPOGRAPHICAL FILES

The topographical files of the National Museum of Ireland (NMI) contain a record of stray artefacts found in Ireland. Each artefact has an individual file where it gives locational information, description of the artefact and relevant references.

Townland	NMI Ref No	Description
Rinneanna South	1941:318-320	3 Quernstones

4 LEGISLATIVE FRAMEWORK

4.1 EIA Legislation

EIA Directive 85/337/EEC as amended by 97/11/EC, 2003/35/EC and 2009/31/EC requires that certain developments be assessed for likely environmental effects before planning permission can be granted. This original directive and its amendments were consolidated informally in EIA Directive 2011/92/EU and further amended 2014/52/EU.

Directive 2014/52/EU that among other factors, information is to be provided on:

‘cultural heritage, including architectural and archaeological aspects’ (Annex IV, Section 3)

Each of these assets is addressed within this assessment report.

4.2 Cultural Heritage Legislation

Archaeological Monuments/Sites

Archaeological heritage is protected primarily under the National Monuments Acts 1930-2004. Section 2 of the 1930 National Monuments Act defines the word ‘monument’ as including:

‘any artificial or partly artificial building, structure, or erection whether above or below the surface of the ground and whether affixed or not affixed to the ground and any cave, stone, or other natural product whether forming part of or attached to or not attached to the ground which has been artificially carved, sculptured or worked upon or which (where it does not form part of the ground) appears to have been purposely put or arranged in position and any prehistoric or ancient tomb, grave or burial deposit, but does not include any building which is for the time being habitually used for ecclesiastical purposes’

Under the 1994 Act, provision was made for a Record of Monuments & Places (RMP). The RMP is a revised set of SMR (Sites and Monuments Record) maps, on which newly-discovered sites have been added and locations which proved not to be of antiquity have been de-listed by the National Monuments Service.

In effect, the National Monuments Acts 1930-2004 provide a statutory basis for:

- Protection of sites and monuments (RMPs),
- Sites with Preservation Orders,
- Ownership and Guardianship of National Monuments,
- Register of Historic Monuments (pre-dating 1700AD),
- Licensing of archaeological excavations,

- Licensing of Detection Devices,
- Protection of archaeological objects,
- Protection of wrecks and underwater heritage (more than 100 years old).

In relation to proposed works at or in the vicinity of a recorded archaeological monument, Section 12 (3) of the National Monuments (Amendment) Act 1994 states:

‘When the owner or occupier (not being the Commissioners) of a monument or place which has been recorded [in the Record of Monuments and Places] or any person proposes to carry out, or to cause or permit the carrying out of any work at or in relation to such monument or place, he shall give notice in writing of his proposal to carry out the work to the Commissioners and shall not, except in the case of urgent necessity and with the consent of the Commissioners, commence the work for a period of two months after having given the notice.’

Archaeological artefacts

Section 2 of the 1930 National Monuments Act (amended) defines an archaeological object as (in summary) any chattel in a manufactured or partly manufactured state or an unmanufactured state but with an archaeological or historical association. This includes ancient human, animal or plant remains.

Section 9 (1) of the National Monuments (Amendment) Act 1994 states that any such artefact recovered during archaeological investigations should be taken into possession by the licensed archaeological director and held on behalf of the state until such a time as they are deposited accordingly subsequent to consultation with the National Museum of Ireland.

Architectural Sites

In 1997 Ireland ratified the Granada Convention on architectural heritage. This provided the basis for a national commitment to the protection of the architectural heritage throughout the country. The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 and Local Government (Planning and Development) Act 2000 made the legislative changes necessary to provide for a strengthening of the protection of architectural heritage. The former Act has helped to provide for a forum for the strengthening of architectural heritage protection as it called for the creation of a National Inventory of Architectural Heritage which is used by local authorities for compiling the Record of Protected Structures (RPS). The Record of Protected Structures (RPS) is set out in each respective county’s Development Plan and provides statutory protection for these monuments.

Section 1 (1) of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 states:

‘architectural heritage means all—

- (a) structures and buildings together with their settings and attendant grounds, fixtures and fittings,
- (b) groups of such structures and buildings, and
- (c) sites, which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest”

The 1999 Act was replaced by the Local Government (Planning and Development) Act 2000 where the conditions relating to the protection of architectural heritage are set out in Part IV of the Act. Section 57 (1) of the 2000 Act states that:

‘...the carrying out of works to a protected structure, or a proposed protected structure, shall be exempted development only if those works would not materially affect the character of –

- (a) the structure, or
- (b) any element of the structure which contributes to its special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest’

4.3 Policy Framework

Clare County Development Plan 2017–2023 (as amended)

- CDP15.1 Development Plan Objective: Architectural Heritage
 - a. To ensure the protection of the architectural heritage of County Clare through the identification of Protected Structures, the designation of Architectural Conservation Areas, the safeguarding of historic gardens, and the recognition of structures and elements that contribute positively to the vernacular and industrial heritage of the County;
 - b. To ensure that the architectural heritage of the County is not damaged either through direct destruction or by unsympathetic developments nearby.
- CDP15.2 Development Plan Objective: Protected Structures
 - a. To protect, as set out in the Record of Protected Structures, all structures and their settings, which are of special architectural, historical, archaeological, artistic, cultural, scientific, social, or technical interest;
 - b. To review the Record of Protected Structures periodically and add structures of special interest as appropriate, including significant elements of industrial, maritime or vernacular heritage and any twentieth century structures of merit.
- CDP15.3 Development Plan Objective: Industrial Heritage

To protect and preserve buildings and features of industrial heritage such as mills, bridges, lighthouses, harbours, etc. Proposals for refurbishment works to, or redevelopment/conversion of, these sites will be subject to a full architectural and archaeological assessment.
- CDP15.4 Development Plan Objective: Vernacular Heritage
 - a. To seek the retention, appreciation and appropriate revitalisation of the vernacular heritage of County Clare, in both towns and rural areas, by deterring the replacement of good quality vernacular buildings with modern structures and by protecting (through the use of ACAs and the RPS and in the normal course of Development Management) vernacular buildings where they contribute to the character of an area or town and/or where they are rare examples of a structure type;
 - b. To support proposals to refurbish vernacular structures that are in a run-down or derelict condition, provided that:
 - Appropriate traditional building materials and methods are used to carry out repairs to the historic fabric;

- Proposals for extensions to vernacular structures are reflective and proportionate to the existing building and do not erode the setting and design qualities of the original structure which make it attractive;
- CDP15.5 Development Plan Objective: Architectural Conservation Areas (ACAs)
 - a. To ensure that new developments within or adjacent to an ACA respect the context of the area and contribute positively to the ACA in terms of design, scale, setting and material finishes;
 - b. To protect existing buildings, structures, groups of structures, sites, landscapes and features such as street furniture and paving, which are considered to be intrinsic elements of the special character of the ACA, from demolition or removal and non-sympathetic alterations;
 - c. To ensure that all new signage, lighting, advertising and utilities to buildings within an ACA are designed, constructed and located in a manner that is complementary to the character of the ACA;
 - d. To ensure that external colour schemes in ACAs enhance the character and amenities of the area and reflect traditional colour schemes
- CDP15.8 Development Plan Objective: Sites, Features and Objects of Archaeological Interest
 - a. To safeguard sites, features and objects of archaeological interest generally;
 - b. To secure the preservation (i.e. preservation in situ or in exceptional cases preservation by record) of all archaeological monuments included in the Record of Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act, 1994, and of sites, features and objects of archaeological and historical interest generally (in securing such preservation, the Council will have regard to the advice and recommendations of the Department of the Arts, Heritage, Regional, Rural and Gaeltacht Affairs);
 - c. To permit development only where the Planning Authority is satisfied that the proposals will not interfere with:
 - items of archaeological or historical importance;
 - the areas in the vicinity of archaeological sites;
 - the appreciation or the study of such items.
 - d. To have regard to the government publication 'Framework and Principles for the Protection of the Archaeological Heritage 1999' in relation to protecting sites, features and objects of archaeological interest;
 - e. To advocate for greater financial assistance for the maintenance and improvement of features of archaeological interests in County Clare.
- CDP15.9 Development Plan Objective: Newly Discovered Archaeological Sites
To protect and preserve archaeological sites discovered since the publication of the Record of Monuments and Places.
- CDP15.10 Development Plan Objective: Zones of Archaeological Potential
To protect the Zones of Archaeological Potential located within both urban and rural areas as identified in the Record of Monuments and Places.
- CDP15.11 Development Plan Objective: Archaeology and Infrastructure Schemes
To have regard to archaeological concerns when considering proposed service schemes (including electricity, sewerage, telecommunications and water supply) and proposed roadworks (both realignments and new roads) located in close proximity to Recorded Monuments and Places and Zones of Archaeological Potential.
- CDP15.14 Development Plan Objective: Cultural Development
To conserve cultural identity and enhance access to both culturally-distinct areas and facilities for cultural experiences.

