Appendix B. Study Area Characterisation

B.1. Introduction

This report forms an appendix report (Appendix B) to the *Phase One Lead Consultant's Site and Corridor Identification Report* for a proposed 220/110 kV substation and associated transmission infrastructure near Millstreet, County Cork.

The following sections present a characterisation of the study area illustrated in Figure B.1 (*Millstreet Constraints Map*) below in terms of Land Use Zoning, Land Characteristics, Cultural Heritage, Ecology, Landscape and Visual, Soils, Geology and Hydrogeology and Water. A description of the legends used in the mapping which supports this report is included in Appendix C (*Description of Constraints Map Legend*).

B.2. Man-made Constraints

B.2.1. Land Use Zoning

The majority of the study area under consideration is located in County Cork, however, the south western section of the study area encompasses, and the proposed development is required to connect to, Garrow substation in County Kerry. In the context of a substation site and route selection constraints report, the relevant land use zoning for both County Cork and County Kerry are therefore considered hereunder.

County Cork

Zoning objectives and plans for settlements in County Cork are set out in the relevant Local Area Plans (LAP's) or Special LAP's, although Cork County Development Plan 2009 does include general land use zoning principles that should be followed in the LAPs including:

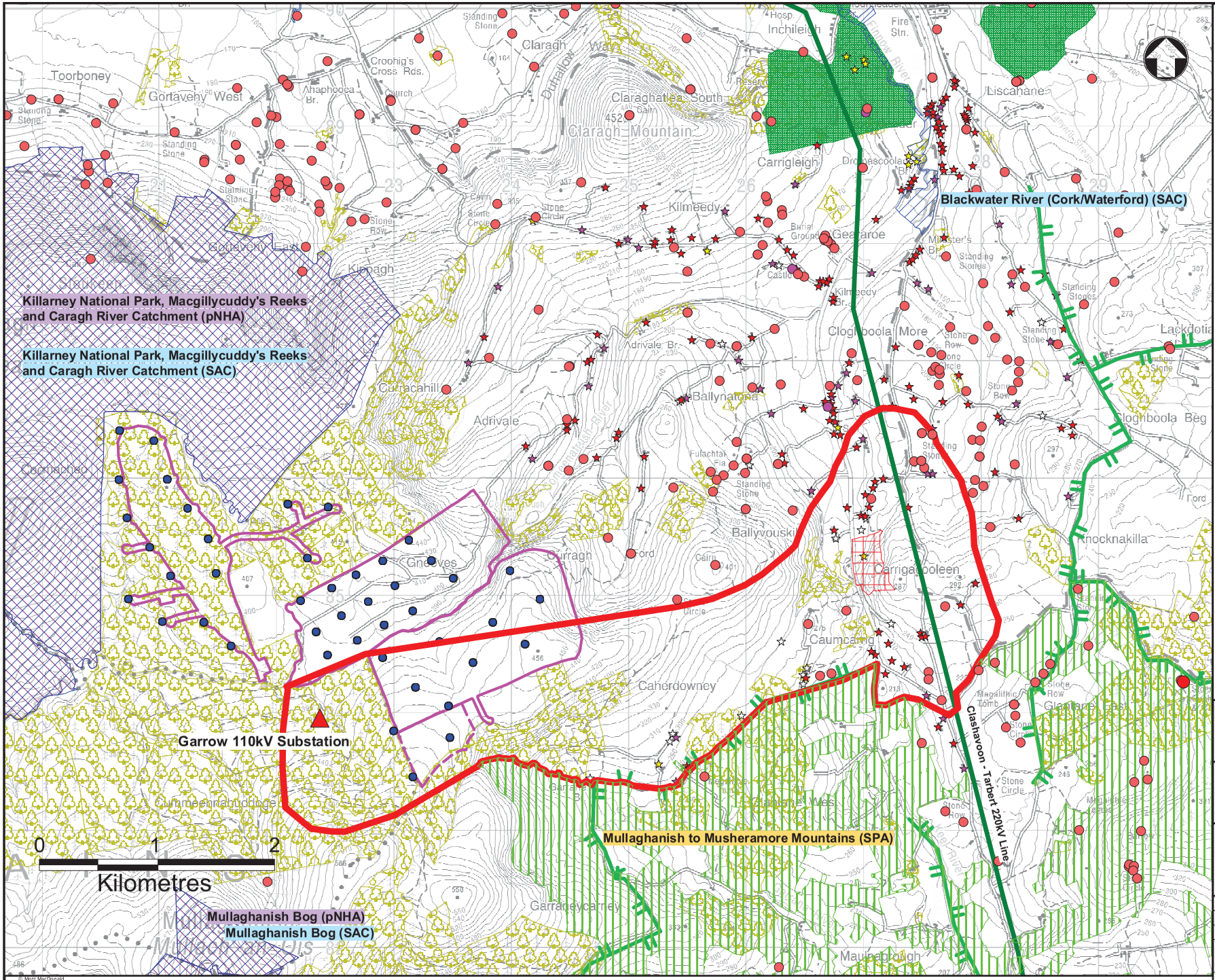
LAP 2-4 (Zoning Objectives for Other Lands): *Where lands have not been explicitly zoned, in either the adopted Local Area Plans or the adopted Special Local Area Plans, the specific zoning shall be deemed to be that of the existing use of the lands (if such a use is not an unauthorised use under the Planning Acts) or, if such a use is unauthorised, that of the most recent authorised use of the lands.*

LAP 3-1 (Primary Uses – Places Outside the Main Settlements): *Through the Local Area Plan's it is an objective, normally, to encourage development that supports in general the primary land use of the surrounding established area. Development that does not support, or threatens the vitality or integrity of, the primary use of these established areas will be resisted.*

The town of Millstreet, and the majority of the project area, are located within the Kanturk Electoral Area (EA) and Coomlogane Electoral Division (ED). In terms of development in rural areas and villages, the *Kanturk Electoral Area Local Area Plan Review: Outline Strategy 2010 – 2020* states "*Consideration will be given as to how best to develop the key villages and villages of the electoral area as local employment centres having regard to the specific attributes and strengths of each settlement. In this regard consideration would also need to be given to the level of existing employment opportunities in an area and the scale of development which would be appropriate in each case. Some of the key villages already have land zoned for industrial / commercial purposes and the need to zone land in the remaining key villages and villages will be considered."*

In terms of Land Uses in Established Areas, the *Kanturk Electoral Area Local Area Plan 2005* states "*Within all settlements throughout the Electoral Area, it is an objective, normally, to encourage development that supports the primary land use of the surrounding established area. Development that does not support, or threatens the vitality of, the primary use of these established areas will be resisted."*

The LAP also concurs with the Cork County Development Plan in terms of development where no explicit zoning has been ascribed stating "*Where lands have not been explicitly zoned, the specific zoning shall be*



LEGEND

- Study Area
- Garrow Substation
- Existing Clashavoon - Tarbert 220kV Transmission Line
- Designated Scenic Landscape
- Scenic Route
- Forestry

Cultural Heritage Sites

- National Monuments
- Record of Monuments & Places
- Record of Protected Structures

GeoDirectory Data

(Data Sourced from An Post)

- Residential
- Commercial
- Both
- Unknown
- Quarry
- Caherdowney Windfarm (Permitted)
- Curragh, Gneeves & Coomache Windfarms (Constructed)
- Wind Turbine

Environmental Designations

- NHA/pNHA
- SPA
- SAC

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Project

Millstreet Constraints Map

Figure B.1

Designed	-		Eng. Chk.	-	
Drawn	DG		Coordination	PK	
Drg. Chk.	DH		Approved	PK	
Scale at A3	1:30,000	Project	261715	Status	INF
		Mapinfo file	261715-N-018		
Drawing Number	MMD-261715-N-MI-018			Rev	P1

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deemed to be that of the existing use of the lands (if such a use is not an unauthorised use under the Planning Acts) or, if such a use is unauthorised, that of the most recent authorised use of the lands".

The study area is outside the Green Belt Zone for Millstreet and no specific zoning has been ascribed to the study area in either the Kanturk LAP or the Cork County Development Plan 2009.

County Kerry

The western section of the study area is located across the Kerry / Cork border within Clydagh ED, in Killarney EA. Neither the Tralee & Killarney Hub Settlements LAP nor the Tralee & Killarney Environs Plan reference the area around Garrow substation. However, the *Kerry County Development Plan 2009 – 2015* does highlight the area as being open for consideration as a Wind Deployment Zone.

Conclusion

Having reviewed the relevant planning documentation it is considered that all potential substation site location and transmission connection options are equivalent in the context of Land Use Zoning. Land Use zoning constraints are therefore not considered further in this report.

B.2.2. Land Characteristics

Land Use

The northern and western sections of the study area are characterised by elevated terrain and peat bogs predominantly surrounded by pasture land with peaks ranging from approximately 200 to 520 metres Above Ordnance Datum Malin Head (AOD). The main land use in the area is sheep grazing. A large commercial coniferous forest is located to the west and south of the study area. A number of small forests are also sited to the south and east.

The western section of the study area, in proximity to Garrow substation, is characterised by wind farm developments i.e. the existing Curragh and proposed, but yet to be constructed, Caherdowney wind farm. In addition, the existing Gneeves and Coomacheo wind farms are located immediately outside of the study area to the north of Garrow substation.

In March 2010, Kerry County Council refused planning permission to Airtricity Developments (Ireland) Limited (Reference No. 1075) for the development of a 20 turbine wind farm in the area of Clydaghroe / Cummeennabuddoge. Two of the proposed turbines are located within the study area, to the northeast and southwest of the existing Garrow substation respectively. The applicant lodged an appeal with An Bord Pleanála (Reference No. PL08.236593) on 21st April 2010. The appeal was refused permission by the Board on 10th November 2010.

A sandstone quarry, operated by Siac Construction Limited, is located to the east of the study area, immediately east of the Millstreet / Macroom (R582) Road. Michael Cronin (Readymix) Limited also operates an asphalt manufacturing facility at the site.

Mullaghanish Mountain, to the southwest of the study area, hosts a number of radio transmitter masts. Operators include RTE, Today FM and Radio Kerry.

Cloghboola National School is located immediately outside the northern boundary of the study area. No schools, churches or hospitals are located within the actual study area.

The Derrynasaggart Mountains are located to the southeast, Boggeragh Mountains are located to the east and Caherbarnagh Mountain is located to the west of the study area. These mountains and surrounding areas offer a broad range of recreational activities attracting hill walkers and birdwatchers alike.

Duhallow Way, a 29 kilometre walking route, follows a route from the north of the study area. The walkway traverses the study area running parallel to the existing 220 kV Clashavoon - Tarbert transmission line and the R582 Millstreet / Macroom road, before turning in an easterly direction at Carrigacooleen

Millstreet County Park is located in the Cloghboola Beg / Knocknakilla area approximately 1.5 kilometres east of the study area. The 500 acre park offers walking trails and tours of the surrounding lakes, waterfalls, streams, wetlands and archaeological sites.

The annual Millstreet International Horse Show is held at the Green Glens Equestrian Centre, in Millstreet town. Drishane Castle, a Town Park, a pitch and putt club and a museum are also located either within or in close proximity to Millstreet town.

Residential Amenity

The study area is sparsely populated with small clusters of residential properties located in proximity to the Millstreet / Macroom (R582) Road. The closest areas of settlement are located around Millstreet, approximately 4 kilometres north of the study area. Macroom is a larger town and is located at a greater distance to the south. According to information provided by the GeoDirectory (An Post), the study area includes 48 buildings. Of these 6 are listed as businesses, 2 are listed as combined business and residential, 28 are listed as residential and 12 are listed as unknown. No buildings are listed in the western half of the study area. However, it is known that this area includes Garrow substation and a number of wind farms and associated buildings.

Road Access

The study area is dissected by the Regional R582 road which connects Millstreet and Macroom. A local road (L5226), which provided access to the aforementioned wind farms during the construction phases, runs along the southern boundary of the study area connecting Caumcarrig and Coomnaclohy. A tertiary road (L5227) runs parallel to the R582 road connecting Millstreet and Carriganimmy, access to the R582 is also gained via another tertiary road within the study area, the L5249. The L5227 and L5249 are approximately 3 metres in width. The L5226 is approximately 5.5 metres wide.

A number of tertiary roads and tracks within the study area provide access to existing woodland and commercial forested areas as well as scattered residential dwellings. The N72 and the N22 national roads are located to the north and south of the study area respectively.

B.2.3. Cultural Heritage

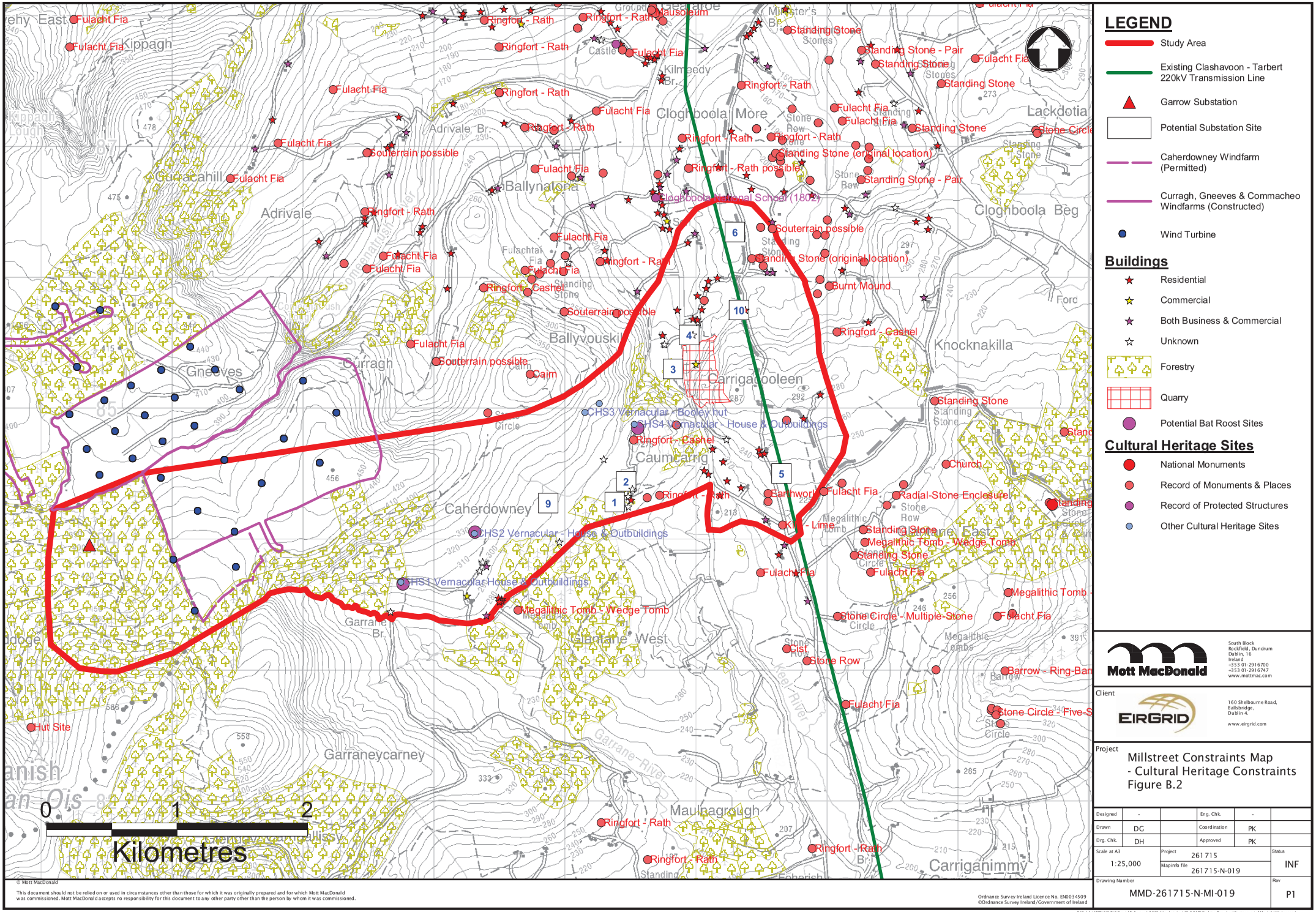
Archaeology

The following sections are based on a document search and paper study of all available archaeological, historical and cartographic sources.

Figure B.2 (*Millstreet Constraints Map – Cultural Heritage Constraints*) illustrates the cultural heritage sites within the study area.

Mesolithic Period

The Mesolithic (middle stone age) people were the first inhabitants of Ireland, arriving about 9000 years ago. They were a mobile society relying on wild resources for food, which was hunted and gathered using stone tools as well as boats, nets and traps. Settlement was in temporary and semi permanent groups of huts constructed of wood slung with hide, which may have operated as seasonal or hunting camps. There are a number of potential sites in County Cork. Most prominently, there have been a number of finds of flint artefacts from the Blackwater Valley, including microlith finds from Guileen and Dunpower Head on Cork's



LEGEND

- Study Area
- Existing Clashavoon - Tarbert 220kV Transmission Line
- Garrow Substation
- Potential Substation Site
- Caherdowney Windfarm (Permitted)
- Curragh, Gneeves & Commacheo Windfarms (Constructed)
- Wind Turbine

Buildings

- Residential
- Commercial
- Both Business & Commercial
- Unknown
- Forestry
- Quarry
- Potential Bat Roost Sites

Cultural Heritage Sites

- National Monuments
- Record of Monuments & Places
- Record of Protected Structures
- Other Cultural Heritage Sites

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Millstreet Constraints Map
- Cultural Heritage Constraints
Figure B.2

Designed	-		Eng. Chk.	-	
Drawn	DG		Coordination	PK	
Drg. Chk.	DH		Approved	PK	
Scale at A3	1:25,000	Project	261715	Status	INF
		MapInfo file	261715-N-019		
Drawing Number	MMD-261715-N-MI-019			Rev	P1

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east coast. At Guileen, an abundance of microliths, most of Later Mesolithic provenance, were discovered by field walking after ploughing had taken place in the area.

Neolithic Period

Farming was first adopted in the Middle East but spread gradually across Europe in succeeding centuries, arriving in Ireland about 4000 BC. The megalithic (from the Greek mega – large and lith – stone) monuments of the Neolithic people, built as communal tombs or for ceremonial purposes, are relatively common in the landscape. On a national scale, County Cork is under-represented in the archaeological record of the Neolithic. There is also a notable absence of both court tombs and passage tombs (the two principal megalithic monument types of the Neolithic) in the Cork area. However there is a high density of wedge tombs in west Cork.

Within the study area in the townland of Caherdowney, the Record of Monuments and Places (RMP) records a well preserved but deeply buried wedge tomb (CO048:086). This wedge tomb consists of a gallery 3.45 metres long, east – west, surrounded by a closely set outer wall.

The Bronze Age

The Bronze Age in Cork is unique in both its monumental record and its metal producing heritage. The earliest copper mines in Ireland (and indeed northeast Europe) are located in the southwest of Cork. A series of 9 mines span the west Cork peninsulas, the most famous of which is the Mount Gabriel complex near Schull. At Mount Gabriel, copper was mined from as early as 1800-1400 BC (O'Brien 2004:1) and would mark out the west of Cork as a focal point for metal mining throughout the Bronze Age.

While County Cork appears to have been a largely peripheral region in the megalithic tradition, during the later Bronze Age there appears to have been a population explosion (mirrored all over the country), indicated by a massive increase of metal production for prestige goods and the appearance of a more densely settled landscape, indicated both by increased domestic settlement and a varied sacred monumental landscape. The vast majority of recumbent stone circles from the Later Bronze Age found in Munster are located in Cork and Kerry (over 90 in total).

The area around Millstreet is characterised by a significant intensity of Bronze Age archaeological features. To the north of the study area, in the townland of Ballyvouskill, there is a recorded stone circle (CO048:056). This site consists of a large recumbent stone with a roughly flat top. There are four smaller stones alongside which give the appearance of having fallen over. The dimensions for the larger stone are 1.3 metres long and 0.6 metres thick. The dimensions for the smaller stones are 1.5 metres long, 0.3 metres thick and 0.8 metres wide. It is concluded that this monument appears to be the remains of a five stone circle, enclosed by a fosse and outer bank.

One of the most common prehistoric monuments in Ireland is the Fulacht Fiadh or burnt mound with over 2000 of these Fulachta Fiadh having been recorded in County Cork. The classic burnt mound is low and grass covered with a crescent or U-shaped plan. The general date range for this monument extends from about 1800 to 800 BC. The RMP for the surrounding townlands shows evidence of several Fulachta Fiadh. One of them, the recorded RMP CO048:054, is located within the perimeter of a nearby wind farm development. It is described as a semi circular area of low stones embedded in blanket bog. Outside one of the arms is a grass covered mound of burnt stone about 0.8m high. It is concluded that this monument is a Fulacht Fiadh which is partially levelled. The townland of Ballyvourney, just south of the Derrynasaggert Mountains had two burnt mounds which were the first to be scientifically excavated by M.J. O'Kelly in 1952.

The Iron Age/Early Historic Period

In late Bronze Age Ireland the use of the metal reached a high point with the production of high quality decorated weapons, ornaments and instruments, often discovered from hoards or ritual deposits. The Iron

Age however is known as a 'dark age' in Irish prehistory. The ringfort is the most numerous archaeological monument in the Irish landscape and they are generally believed to have been the defended farmsteads of a free farming class in the early Medieval period. They were primarily built and used during the Early Christian period, 500-1200 AD. They are differentiated from cashels in having enclosing banks composed of dumped earth and sometimes a mixture of earth and stone. Cashels were constructed at the same period and fulfilled the same functions as ringforts. Subterranean (or semi-subterranean) structures were built to allow access and usually associated with habitation and are common in ringforts and cashels of the Early Christian period c. 500-1200 A.D.

There are several ringforts, possible souterrains and cashels recorded in the vicinity of the study area and surrounding townlands. Two cashels (RMP CO048:068 and 69) are found in Caherdowney townland. Both sites are reasonably well preserved and make maximum use of their elevated locations with commanding views across the valley to the west and north.

From the Later Bronze Age the use of recumbent stone circles and single standing stones, used either to mark burials or places of sacred significance, became widely popular in the Cork and Kerry region. The vast majority of recumbent stone circles found in Munster are located in Cork and Kerry (over 90 in total).

Later Historic Period/Modern Era

Historically the study area is infamous for an ambush that took place near Kilmeedy castle during Donal Cam O'Sullivan Beara's epic march northwards from the Beara peninsula to O'Rourke's Leitrim in 1602/3.

Following a succession of unsuccessful revolts throughout the country in the 17th century Irish owned land was confiscated by the Crown and granted or sold to people who were thought loyal, most of whom were English and Protestant. So it was for the lands in the study area.

The town of Millstreet dates to the early 18th century and grew around a little mill. The town owes much of its development to the patronage of the Wallis family who were responsible for building much of its finer buildings including the parish church built in 1798.

Records of Monuments and Places

There are no National Monuments located within the study area. The nearest National Monument No. 420 (a Five-Stone Stone Circle, SMR Number CO048-095002-) is located in Knockilla approximately 2.5 kilometres to the east of the study area.

The following archaeological sites are located within the study area or within 250 metres of its boundary. Lists of the RMP, relevant to the study area, are included in Appendix G of this report.

Table B.1: Sites from the Record of Monuments & Places found within the study area

Legal Status	Reference	NGR_E	NGR_N	Townland	Classification
RMP	CO048-068----	126530	84754	Caherdowney	Ringfort - Cashel
RMP	CO048-069----	126856	84868	Caherdowney	Ringfort - Cashel
RMP	CO048-070----	127069	85821	Carrigacooleen	Fulacht Fia
RMP	CO048-071001-	127434	86141	Carrigacooleen	Standing Stone (original location)
RMP	CO048-071002-	127496	86144	Carrigacooleen	Ringfort - Rath
RMP	CO048-071003-	127520	86085	Carrigacooleen	Standing Stone (original location)
RMP	CO048-072001-	127501	86380	Cloghboola More	Ringfort - Rath
RMP	CO048-072002-	127501	86380	Cloghboola More	Souterrain possible
RMP	CO048-088----	127668	84104	Carrigacooleen	Kiln - Lime
RMP	CO048-087----	126729	84332	Caherdowney	Ringfort - Rath

Legal Status	Reference	NGR_E	NGR_N	Townland	Classification
RMP	CO048-103----	127699	84904	Carrigacooleen	Fulacht Fia possible
RMP	CO048-104----	127557	84283	Carrigacooleen	Enclosure
RMP	CO048-159----	127557	84344	Carrigacooleen	Earthwork
RMP	CO048-162----	127496	86144	Carrigacooleen	Souterrain possible
RMP	CO048-185----	126633	84313	Caherdowney	Boulder-Burial possible

Table B.2: Sites from the Record of Monuments & Places found within 250m of the boundary of the study area.

Legal Status	Reference	NGR_E	NGR_N	Townland	Classification
RMP	CO048-056----	125415	84962	Ballyvouskill	Stone Circle - Five-Stone
RMP	CO048-057----	125739	85257	Ballyvouskill	Cairn
RMP	CO048-067----	126399	85721	Ballyvouskill	Ringfort - Rath
RMP	CO048-073001-	127590	86370	Cloghboola More	Ringfort - Rath
RMP	CO048-073002-	127590	86370	Cloghboola More	Souterrain possible
RMP	CO048-075----	127930	86324	Knocknakilla	Fulacht Fia
RMP	CO048-076001-	127992	86181	Knocknakilla	Ringfort - Rath
RMP	CO048-076002-	127992	86181	Knocknakilla	Souterrain possible
RMP	CO048-077----	128084	85580	Knocknakilla	Ringfort - Cashel
RMP	CO048-086----	125646	83453	Caherdowney	Megalithic Tomb - Wedge Tomb
RMP	CO048-143----	128123	84424	Glantane East	Fulacht Fia
RMP	CO048-144----	127984	84360	Glantane East	Fulacht Fia
RMP	CO048-180----	127954	85981	Knocknakilla	Burnt Mound
RMP	CO048-181----	127935	85872	Knocknakilla	Burnt Mound
RMP	CO048-182----	128025	85930	Knocknakilla	Burnt Mound

Architecture

There are no sites listed in the Record of Protected Structures (RPS) or the National Inventory of Architectural Heritage (NIAH) for County Cork within the study area.

The nearest Protected Structures are to the north of the study area namely Cloghboola National School (dated 1802) and Kilmeedy castle, built in 1436 as a military stronghold to command the mountain pass between Cork and Kerry.

A field survey of the study area along the access ways revealed a further four unrecorded cultural heritage sites that may be impacted by the proposed development. These sites represent pre-famine homesteads consisting of vernacular dwellings with associated outbuildings. Three of these sites are located in Caherdowney townland, the remainder is in Ballyvouskill. All of these sites appear on the OS first edition map and all are presently extant with varying degrees of preservation. These sites are discussed in more detail in Chapter 5 (*Route Corridor Environmental Constraints*) and are presented in Figure B.2 (*Cultural Heritage Constraints*). Three of these sites correspond with the potential bat roost sites detailed in B.3.1 (*Ecology*) below.

Cultural Heritage

The general area is popular with walkers and the Duhallow way is located within the eastern boundary of the study area. Also in the vicinity is the Slí Beara-Breifne that interlinks a number of walking trails following in the footsteps of O' Sullivan Beara's epic trek from the Beara Penninsula to Leitrim.

B.3. Natural Constraints

B.3.1. Ecology

Flora

Figure B.3 (*Ecological Constraints*) illustrates the areas of ecological value within the study area. A Natura Impact Statement (Screening Stage) of the study area is included in Appendix I of this report.

A large commercial conifer plantation forms the western part of the study area. Commercial conifer plantations are also scattered along part of the southern site boundary. Most of the down slope central portion of the study area is managed for intensive sheep farming. The higher slopes of the centre of the study area (west of the R582 road) consist of moorland (bog and heath) which extends along the upper slope of a long ridge. This ridge area (moorland) is considered to be of moderate to high conservation interest.

The lower slopes of this central section consist of improved farmland with some conifer plantation and lines of conifers in the field boundaries. This area is largely of low conservation interest though patches of wet heath and dry-humid acid grassland occur that are considered to be of moderate conservation interest.

Further east other less extensive habitats include dry heath, gorse scrub and old stone wall enclosed field systems. The eastern down slope side of the study area, close to the R582 road, includes a mosaic of habitats including habitats of moderate to high local conservation interest. These are summarised as follows:

- Native Woodland (oak – birch – holly woodland - Annex 1 listed habitat)
- Native Woodland (oak ash hazel woodland)
- Poor fen and flush
- Mosaic of rocky heath type habitats and scrub

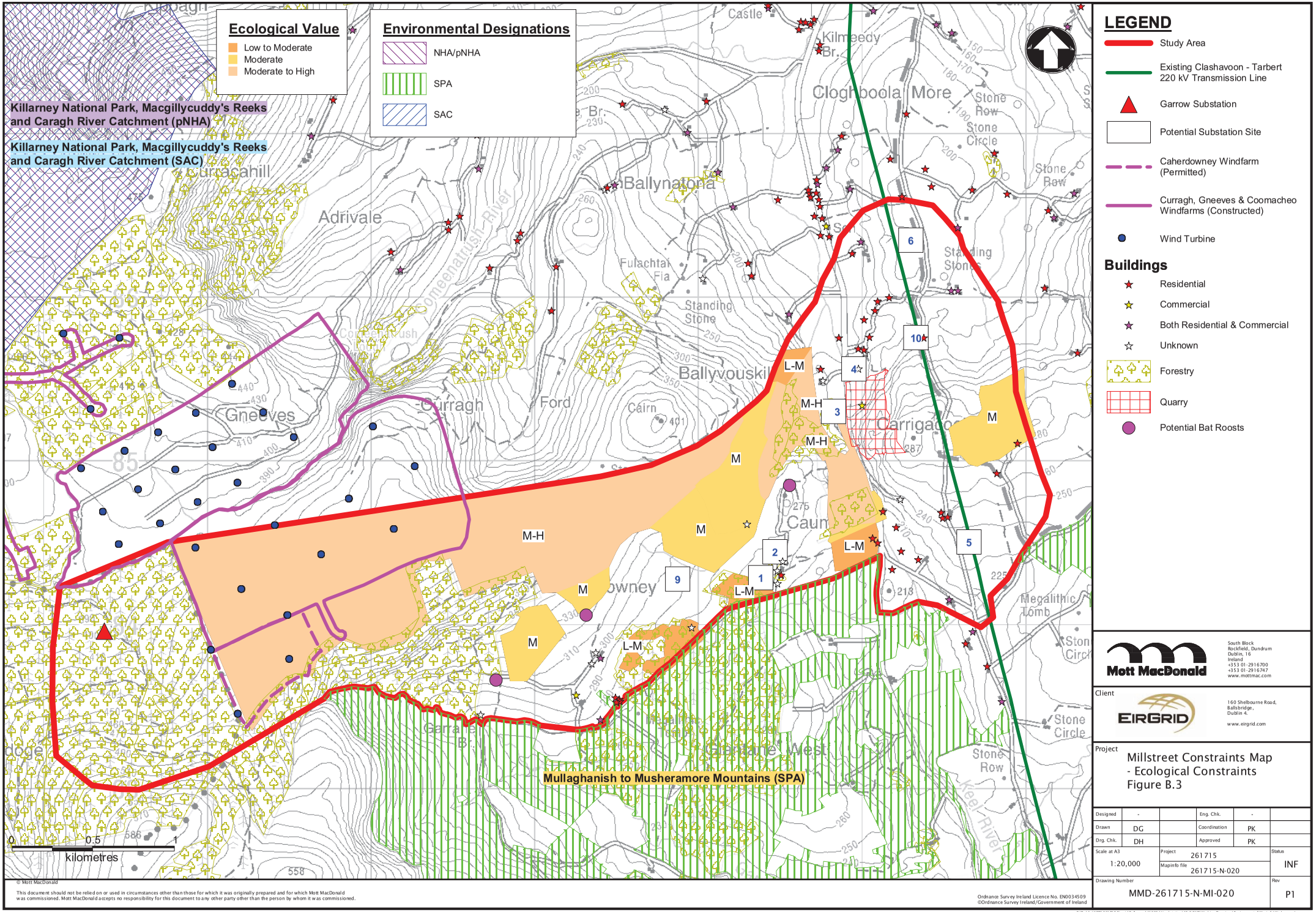
To the east of the R582 road is a quarry located in an area of rocky heath. The rest of the study area is managed for agriculture with hedgerow boundaries typical.

Much of the study area consists of habitats considered to be of low ecological value botanically including; *made or disturbed ground*; *fields improved for agriculture* and *managed plantation forestry*.

The Mullaghanish to Musheramore Mountains Special Protection Area (SPA) is the closest site designated for nature conservation and is located immediately south of the study area.

River Systems

Four rivers are present within the study area namely the Garrane River located to the south west, Keel River located to the south east, Finnow River to the east and Clydagh River located to the northwest of the study area. Two streams, which connect with the Finnow River to the north, are present within the study area. Water quality in these rivers has been recorded by the Environmental Protection Agency (EPA) as



LEGEND

- Study Area
- Existing Clashavoon - Tarbert 220 kV Transmission Line
- Garrow Substation
- Potential Substation Site
- Caherdowney Windfarm (Permitted)
- Curragh, Gneeves & Coomacheo Windfarms (Constructed)
- Wind Turbine

Buildings

- Residential
- Commercial
- Both Residential & Commercial
- Unknown
- Forestry
- Quarry
- Potential Bat Roosts

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Project

Millstreet Constraints Map
- Ecological Constraints
Figure B.3

Designed	-		Eng. Chk.	-	
Drawn	DG		Coordination	PK	
Drg. Chk.	DH		Approved	PK	
Scale at A3	1:20,000	Project	261715	Status	INF
		MapInfo file	261715-N-020		
Drawing Number	MMD-261715-N-MI-020			Rev	P1

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being of good quality / unpolluted status. Sensitive ecological receptors including Salmon (*Salmo* salar) and lamprey species occur.

Fauna

Initial bird surveys conducted do not point to any part of the study area as being utilised as a nest site by hen harrier and Merlin. These species are listed on Annex 1 of the EU Birds Directive and their conservation is an objective of the Mullaghanish to Musheramore Mountains SPA located to the south of the study area.

Initial studies highlight that the study area is used by foraging hen harrier. Foraging habitats for hen harrier within the study area include heath/bog, new/ second rotation forest and acid grasslands.

Several potential bat roost sites are detailed in Figure B.3 (*Millstreet Constraints Map – Ecological Constraints*), however it should be noted that no roosts were identified during the most recent assessments completed during the summer (2010).

No other fauna of note have been recorded to date. Further studies are ongoing.

B.3.2. Landscape and Visual

General Overview

The study area is located between the massive Derrynasaggart Mountains to the west and the Boggeragh Mountains to the east. The landscape between the mountain ranges is lower lying in a broad valley with two rivers and their associated tributaries, one flowing north to the Blackwater River catchment and the second a series of tributaries flowing south to the River Lee catchment.

This distinctive topography strongly defines the extent of views across the study area. North of the mountain ranges the landscape is gentler and the small town of Millstreet is located set within an undulating pastoral landscape that leads to the River Blackwater as it flows eastwards and broadly parallel to the N72 road. South of the mountain ranges the landscape is hillier but still consists of a low lying pastoral landscape that extends south towards Macroom. The R582 crosses the study area extending from Millstreet to Macroom between the mountains. Due to the mountainous nature of the majority of the topography there are very limited county roads. The N72 and the N22 are the only National Primary roads in the vicinity being located to the north and south respectively.

Landscape Character

The distinctiveness of the landscape character in the study area has resulted in the identification of two landscape character areas as detailed below and illustrated in Appendix H of this report:

Mountainous Rounded Open Moorland

The predominant landscape in the study area is the mountainous uplands of Derrynasaggart Mountains and Boggeragh Mountains. The upland areas dominate the lower ground to the north and south. The mountains have been smoothed by erosion and have a rounded appearance. The dominant vegetation cover is open grassland and heather but frequently large tracts of coniferous forestry are also found particularly on Derrynasaggart Mountain. A number of wind farms (Gneeves and Coomacheo) have been constructed on the eastern side of Derrynasaggart Mountain with more applications in planning. The wind turbines being such prominent features have altered this portion of the upland landscape to a Mountainous Rounded Open Moorland with wind turbines Landscape Character. Roads and dwellings are very infrequent in this landscape. Where winding narrow roads exist they offer panoramic views across this landscape to the adjacent lower lying ground.

This landscape has been assessed as part of this landscape and visual impact assessment as of "Very Attractive" Landscape Quality as it is of high value nationally and can be described as highly scenic.

This landscape character area has a high sensitivity to change.

Undulating Elevated Valley Landscape

There is a narrow elevated valley landscape located between the Derrynasaggart and Boggeragh Mountains that broadens out to the north towards Millstreet and to the south towards Macroom. This valley landscape contains better soils than the mountainous areas and has been historically developed by man for agricultural purposes. The field systems are small in size with well maintained hedgerows and frequent trees. Scattered visible farmsteads are common and appear to rise up the sides of the valley along narrow country lanes. Occasional woodland copses add extra tree cover and, when combined with trees that follow small streams, the landscape has an enclosed character.

This landscape has been assessed as part of this landscape and visual impact assessment as of "Good" Landscape Quality, as although generally attractive, it has more frequent common features.

This landscape character area has a medium sensitivity to change.

Landscape Designations

A review has taken place of the Cork County Development Plan 2009, the Kerry County Development Plan 2009 – 2015 and related documents to establish if there are any relevant landscape related designations that may influence the assessment within the study area.

The key relevant landscape issues identified in the Cork County Development Plan 2009 are summarised as follows;

- **Scenic Landscapes:** the Plan states that these are based on designations established by previous development plans (e.g. 2003) and that they are currently under review. The 2009 Development Plan sets out, in Volume 3, designated Scenic Landscapes. The nearest areas designated are to the north of the study area on high ground east and west of Millstreet.

- **Scenic Routes:** the Plan sets out, in Volume 2 (Chapter 4), a number of Scenic Routes. The routes relevant to the study area are; Plan ref S21 R582 Regional Road at Carriganima views of the Musherabeg Mountains and the rural landscape; Plan ref S22 Local road south east of Derrynasaggart Mountains from Caumcarrig to Bohill River views of Derrynasaggart Mountains and Plan ref S20 Local roads at Mushera in the Boggeragh Mountains and roads from Mushera to Ballynagree, Lachdotia and Rylane Cross. Views to and from the Boggeragh Mountains, views of the Knocknaggoun Mountains and remote rural landscape.

- **Landscape Character:** the Plan has established a set of 76 landscape characters reflecting the complexity and diversity of the county (Volume 3 of the Plan). The character areas have been amalgamated into a set of 16 generic landscape types based on similarities evident in the various areas. According to the Plan, the study area covers 2 landscape character areas (LCA) namely Carriganimmy LCA (Undulating Rugged and Forested Upland Valley) and Millstreet LCA (Composite Upper Valley). Both LCA are located within landscape type Ridged and Peaked Upland.

The key relevant landscape issues identified in the Kerry County Development Plan 2009 – 2015 are summarised as follows;

- **Rural Prime Special Amenity:** these are landscapes which are very sensitive and that have little capacity to accommodate new development. Maps 12.1a-12.1u in the Plan set out such zonings. There are no areas of Rural Prime Special Amenity in proximity to the study area.

- **Rural Secondary Special Amenity:** these are landscapes which are generally sensitive and new development must be designed to minimise the effect on landscape. Maps 12.1a-u in the Plan set out such zonings. The nearest area zoned is located immediately west of the study area on the north facing slopes of the summit of Mullaghanish Mountain.

- **Views and Prospects:** Maps 12.1a to 12.1u of the Plan set out protected views and prospects. There are no such designations in proximity to the study area with the nearest being where the N22 crosses the Derrynasaggart Mountains, approximately 9 kilometres to the west.

Visually Significant Vegetation

The vegetation cover within the study area is greatly influenced by elevation and soil type. On the higher ground the vegetation consists of predominantly open moorland of grass and heather with occasional blocks of forestry. On lower lying areas richer soils have been exploited for agricultural purposes and a patchwork of fields are found with occasionally strong hedgerows and trees. Frequently streams and rivers that flow off the mountains are lined by woodland and woodland copses are scattered throughout the lowlands usually associated with dwellings and farms.

B.3.3. Soils, Geology and Hydrogeology

Soils

The terrain within the study area consists of mostly upland areas with peaks ranging from approximately 200 to 520 metres AOD Malin Head.

Soil types in the study area include;

- **Acid Brown Earths/ Brown Podzolics** - Well drained productive mineral soils which are highly suitable to broadleaf and conifer production. Acid Brown Earths are one of the most prevalent soils in the study area occurring in the north, south and south eastern sections.

- **Blanket Peats** - Blanket peats accumulate under conditions of high rainfall and humidity. These conditions are prevalent in the upper parts of mountain ranges due to high altitudes and associated adverse climatic conditions. The peat profile varies from one to two metres in depth and it is usually characterised by a basal layer of fine matter overlain by a peat layer. Because of poor drainage, adverse physical conditions and their occurrence in areas of poor climate, the range of uses of blanket peat in agriculture is very limited. Blanket peats are prevalent in the western and northern sections of the study area.

- **Podzols (Peaty), Lithosols, Peat** - These are shallow, lithosolic-podzolic type soils potentially with peaty topsoil. They are predominantly shallow soils derived from non-calcareous rock or gravels. Podzols are generally poor soils usually formed in hill and mountain areas where mechanical means of reclamation and cultivation are not feasible. These soils are often devoted to forestry. Lithosols are stony soils, which usually overlay solid or shattered bedrock. They are often associated with podzols at higher elevations. Generally such soil areas have bare rock outcropping at frequent intervals and many also have steep slopes. These soil types occur intermittently in the western and eastern sections of the study area.

- **Lithosols** / **Regosols** - Lithosols are described above. Regosol soils texture can vary between sands and clays, depending on the material from which they are derived. Regolsols can have a

wide use range but as they are often subject to flooding, they are mostly used for grazing. These soils occur in the eastern section of the study area near Carrigacooleen and northeast of Ballyvouskill.

- **Peaty Gleys** - Gleys are soils in which the effects of drainage impedance dominate and which have developed under the influence of permanent or intermittent waterlogging. Peaty gleys have acid and poorly drained characteristics and exist intermittently in the western and northern sections of the study area.

- **Surface Water Gleys** / **Ground Water Gleys** - As stated above, gleys are soils in which the effects of drainage impedance dominate and which have developed under the influence of permanent or intermittent waterlogging. Where gley conditions are the result of a high water-table or of seepage or springs, the soil is referred to as a ground water gley. Where gleisation is due to a perched water-table, caused by the impervious nature of the soil, the soil is referred to a surface water gley. These soils are not very common in the study area but do occur in small sections in the north and south.

- **Mineral Alluvium** - A small area of mineral alluvium soils occurs in the north of the study area in proximity to the Clydagh River.

According to the GSI's *South Western RBD Subsoils Map*, subsoil's in the study area include till derived from Devonian sandstones, peat and bedrock outcrop and subcrop. Alluvium deposits are also evident to the north of the study area, north east of Ballyvouskill.

Geology

According to the *National Draft Generalised Bedrock Map* (GSI) the study area is underlain by Devonian Old Red Sandstones.

The GSI were consulted in order to determine if any geological heritage areas exist within the study area. The GSI confirmed (e-mail dated 29th March 2010) that there are no geological heritage sites within the study area. According to the GSI, the closest site of geological significance is located 4.5 kilometres north of the northern study area boundary (Rathmore Esker).

Quarries

A sandstone quarry is located to the east of the Millstreet / Macroom (R582) Road which is operated by Siac Construction Limited. Michael Cronin (Readymix) Limited also operates an asphalt manufacturing facility at the site.

Mining and Prospecting Activities

The Exploration and Mining Division of the Department of Communications, Energy and Natural Resources produces a twice yearly report outlining details of State Mining Licences, State Mining Leases and Prospecting Licences in Ireland. The most recent report was produced in December 2009, according to the report, there are no industries in the study area operating under a State Mining Licence or a State Mining Lease. There are also no Mineral Prospecting Licences granted within the study area.

Landslides

Landslides are a major geohazard and can be triggered by heavy rainfall, or by man-made activities. Landslides in peaty areas are a particular hazard at peat thickness of greater than 0.5 metres or where the peat slope is greater than 15 degrees. According to the GSI Irish Landslide Working Group publication *Landslides in Ireland* (2006), there are no known landslide events in the study area.

Radon

Radon gas is a naturally occurring radioactive gas originating from the decay of uranium on rocks and soils. Radon dissipates readily in open air and is not considered harmful. However, in enclosed spaces, such as a building, radon can accumulate to unacceptably high concentrations. When inhaled, radon particles result in a radiation dose that can cause damage to lungs and eventually lead to lung cancer.

Radon is measured in Becquerel's per cubic metre of air (Bq/m^3). A Becquerel is a unit of radioactivity and corresponds to one radioactive disintegration per second. A High Radon Area is one where more than 10% of houses are predicted to have radon levels in excess of 200 Bq/m^3.

According to the Radiological Protection Institute of Ireland Radon Maps, (www.rpii.ie, accessed on 29th September 2010) the study area is located within a low radon area where less than one per cent of the homes are estimated to have radon levels in excess of the reference level i.e. 200 Bq/m^3.

Hydrogeology

Groundwater is described as water that is stored in and moves through the pores and cracks in subsoils and bedrock. Aquifers are rocks that contain sufficient voids to store water and are permeable enough to allow water to flow through them in significant quantities. The bedrock underlying the study area has been classified as Devonian Old Red Sandstones.

The northern section of the study area is located within Glenville groundwater water body while the southern section is located within Ballinhassig_2 groundwater water body.

The Glenville water body extends over an area of 1,107 km^2, occupying the upland ridges between elongate east-west trending valleys in County Cork. Groundwater water quality in the Glenville water body has been categorised as overall **Good** Status.

The Ballinhassig_2 water body extends over an area of 1,762 km^2, occupying the uplands of the Lee catchment and its tributaries in County Cork. Groundwater water quality in the Ballinhassig_2 water body has been categorised as overall **Good** Status.

According to the GSI well data (www.gsi.ie, accessed on 29th September 2010), there are no groundwater wells within the study area.

Groundwater Protection Schemes

Groundwater Protection Schemes are county – based projects that are undertaken jointly between the GSI and the relevant Local Authority to preserve the quality of groundwater, particularly for drinking water purposes. A search conducted on the GSI website for Groundwater Protection Schemes revealed that there are currently no Groundwater Protection Schemes within the study area.

Source Protection Areas

Source Protection Areas are areas delineated by the GSI, where the groundwater resource requires protection by placing tighter controls on activities within all or part of the zone of contribution (ZOC) of the source. There are no Source Protection Areas within the study area.

Aquifer Classification

The study area has been classified by the GSI, on the draft bedrock aquifer map, as a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones. This type of aquifer has a limited and relatively poorly connected network of fractures, fissures and joints, giving a low fissure permeability

which tends to decrease further with depth. A shallow zone of higher permeability may exist within the top few metres of more fractured/weathered rock, and higher permeability may also occur along fault zones. These zones may be able to provide larger 'locally important' supplies of water. In general, the lack of connection between the limited fissures results in relatively poor aquifer storage and flow paths that may only extend a few hundred metres.

Due to the low permeability and poor storage capacity, the aquifer has a low 'recharge acceptance'. Some recharge in the upper, more fractured/weathered zone is likely to flow along the relatively short flow paths and rapidly discharge to streams, small springs and seeps.

Aquifer Vulnerability

The GSI uses a matrix comprising four groundwater vulnerability categories - extreme, high, moderate and low for mapping purposes and in the assessment of risk to groundwater. The categories are based on the thickness of cover (overburden), which provides some attenuation for contaminants migrating toward the groundwater table from the surface or near sub-surface. Where the overburden is less than 3 metres thick, the Matrix Vulnerability Rating of the aquifer is considered extreme (i.e. the potential for contamination to reach the aquifer is extremely high). Where the overburden is greater than 10 metres thick and has a low permeability the vulnerability is considered to be low.

The majority of the study area is classified as "extreme" aquifer vulnerability. Areas of Rock near Surface or Karst are also recorded to the south, north and east of the study area.

B.3.4. Water

River Catchments

The study area extends over three Hydrometric Areas; HA18 (Blackwater catchment), HA19 (Lee-Cork Harbour and Youghal Bay catchment) and HA22 (Laune-Maine-Dingle Bay catchment).

Hydrometric Area 18 (Blackwater (Munster)) is the surface catchment drained by the River Blackwater and all streams entering tidal water between East Point and Knockaverry, Youghal, County Cork. The Blackwater River flows through counties Kerry, Cork, and Waterford. It rises in the Mullaghareirk Mountains in County Kerry and then flows in an easterly direction through Mallow and Fermoy in County Cork. It then enters County Waterford where it flows through Lismore, before turning south at Cappoquin, and finally draining into the sea at Youghal Harbour.

Hydrometric Area 19 (Lee, Cork Harbour and Youghal Bay) is the surface catchment drained by the River Lee and all streams entering tidal water in Cork Harbour and Youghal Bay and between Knockaverry and Templebreedy Battery, County Cork. The River Lee rises in the Sheehy Mountains on the western border of County Cork and flows eastwards through Cork City before flowing into Cork Harbour.

Hydrometric Area 22 (Laune) is the surface catchment drained by the Rivers Laune and Maine and all streams entering tidal water between Glanearagh Head and Clogher Head, County Kerry. The River Laune flows west from Lough Leane, one of the lakes of Killarney (situated approximately 17 kilometres west of the study area), through the town of Killorgan and into Dingle Bay.

The main water bodies associated with the study area comprise:

- Keel River (Lee catchment);
- Garrane River (Lee catchment - tributary of the Foherish River);
- Finnow River (Blackwater catchment); and

- Clydagh River (Laune catchment - tributary of the River Flesk).

Water Quality

The EPA monitors biological water quality in the Keel River, Garrane River, the Finnow River and the River Flesk. There are also four Water Framework Directive (WFD) water body delineations within the study area; namely, the River Keel, Foherish River (An Fhothrais), the River Finnow and the River Clydagh. Publicly available water quality data for each of the above named rivers is provided below.

Keel River

The Keel River is a tributary of the Foherish River. There is one EPA biological monitoring station in the Keel River which is located approximately 2.5 kilometres south east of the study area at Keel Bridge. According to the EPA, water quality in the Keel River is classified as being continuously satisfactory with good quality recorded at the only location sampled on this tributary of the Foherish.

Garrane River

The Garrane River is a tributary of the Foherish River. There is one EPA biological monitoring station in the Garrane River which is located approximately 2.5 kilometres south of the study area at Garrane Bridge. According to the EPA, water quality in the Garrane River is classified as being continuously satisfactory with high status recorded at the only location sampled on this tributary of the Foherish.

Foherish River

Since 1990 the EPA has consistently recorded High Status at the monitoring points in the Foherish River both upstream and downstream of the confluence with the Garrane River.

Finnow River

The Finnow River is a tributary of the River Blackwater (Munster). There are six EPA biological monitoring stations in the Finnow River but none are located within the study area boundary. The closest monitoring station to the study area is Kilmeedy Bridge, which is located approximately 1 kilometre north of the study area boundary. According to the EPA, water quality in the Finnow River is classified as satisfactory, with good ecological quality, however, evidence of farmyard pollution in the stream entering the Finnow River immediately downstream of Kilmeedy Bridge has been recorded. Water quality at Kilmeedy Bridge has remained unpolluted since 1990.

Clydagh River

The EPA does not monitor biological water quality in the Clydagh River. Biological EPA monitoring data for the River Flesk, which the Clydagh River flows into, is available for a monitoring point located approximately 3 kilometres to the west of the study area. The EPA has noted that the quality of the Flesk River is satisfactory except for the final monitoring location (South of Killarney) where the quality has deteriorated. This location (South of Killarney) has a history of moderate or poor status due to intermittent sewage storm-overflow discharges. In the latest survey, in 2007, siltation and remnants of sewage material were recorded.

Designations

Salmonid Waters

There are no designated salmonid waters within the study area. However, the main channels of the River Blackwater (Munster), River Brown Flesk and the River Lee are designated as Salmonid Rivers under the

European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. 293 of 1988). Ireland is legally required to maintain and improve the water quality of rivers for Salmonid fisheries.

Sensitive Waters

In accordance with the *Urban Waste Water Treatment Regulations, 2001 (S.I. 254 of 2001)*, as amended, there are no sensitive waters classified within the study area. However; Lough Leane, the Lee Estuary and the River Blackwater (downstream of Mallow railway bridge to Ballyduff Bridge) are classified as sensitive waters.

Special Areas of Conservation

The Blackwater River (Site Code 002170) has been designated a candidate Special Area of Conservation (cSAC), which has the same level of protection as an SAC, however, it has not yet been formerly ratified by the Minister of the Environment. The designation boundary is located approximately 1.75 kilometres north of the study area at Geararoe. The Finnow River, which is within the study area, is a tributary of the River Blackwater (Munster).

Flooding

According to the Office of Public Works National Flood Hazard Mapping, there have been no recorded flood events within the study area. The nearest recorded flood events occur at Kilmeedy bridge, located approximately 1 kilometre north of the study area boundary and west of the R582, downstream of Adrivale Bridge, approximately 2 kilometres north of the study area. Both events are noted as being recurring.