APPENDIX A

STRUCTURE PHOTOGRAPHS

General view of the bridge surface, looking north

General view of the west parapet

General view of the east parapet

General view of the east elevation

General view of the south abutment

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General view of the arch barrel from the east

General view of the arch barrel from the east

General view of the west elevation

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Bridge No. 9 Inspection Report

Coillte CGA & SSE 110kV Grid Route at Gortyrahilly, Inchamore and Cummeennabuddoge (CMBG)

July 2020

Document Control

Document Number: 201-164-BIR-09

Revision	Date	Prepared	Checked	Approved
R0 (1st issue)	July 2020	K. O'Kelly	D. Walsh	A. O'Connell

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1.0 Introduction

PUNCH Consulting Engineers have been commissioned to undertake a Civil and Structural Due Diligence Report for the proposed cable routes at Gortyrahilly, Inchamore & Cummeennabuddoge (CMBG) , Millstreet, for Coillte Group.

The proposed cable routes include a number of watercourse crossings. These crossings have been visited and assessed by PUNCH as part of the due diligence study.

This report sets out the findings of a visual inspection of Bridge No. 9 (PUNCH project specific reference). The inspection was completed on 31/06/2020 by Kevin O'Kelly and Tadhg McEllistrem of PUNCH.

2.0 Location

The existing structure is located in Gortnascarty East to the south-west of Ballvourney village, Co. Cork. Refer to Figure.1. The bridge carries a local road over a tributary of the River Douglas.

ITM Grid reference E: 518757, N: 573841.

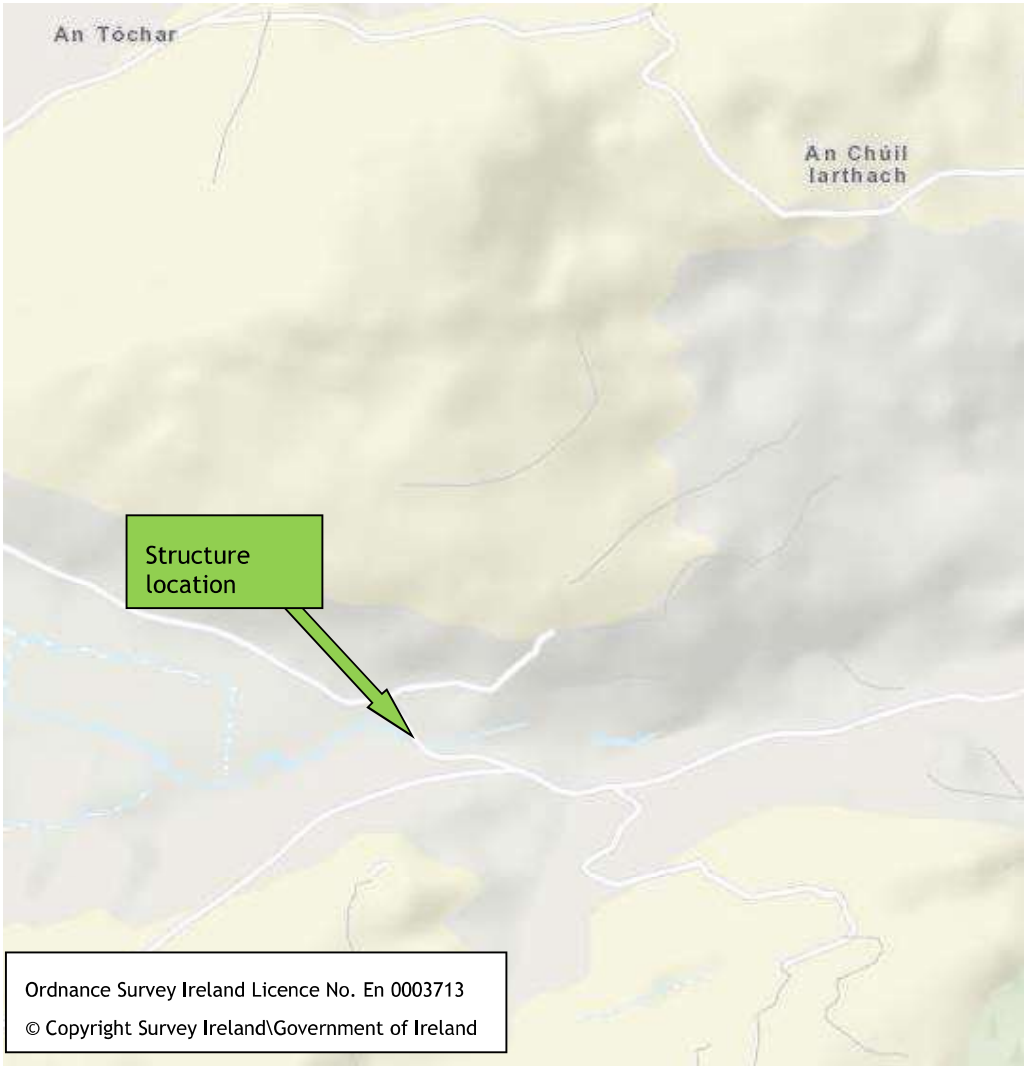


Figure 1 – Bridge Location

3.0 Bridge details

The bridge is a single span concrete deck structure with a span of 4.30m. The wing & parapet walls are both formed in concrete.

The bridge carries a local road, connecting to the R582, over the River Douglas.

The overall length of the bridge is 6.10m.

4.0 Principal Inspection - Eirspan

The inspection carried out is based on the Principal Inspection proforma of the TII's Eirspan bridge management system. The Principal Inspection system is a systematic visual-only check of all elements of the bridge structure. A total of fourteen components of the bridge are considered as part of the inspection with each component assigned a rating number depending on its condition. The bridge is then assigned an overall rating number.

The condition rating is based on the table below. There is no invasive investigation carried out as part of the inspection.

Rating	Comment on damage, repairs etc.
0	No or insignificant damage.
1	Minor damage but no need of repair.
2	Some damage, repair needed when convenient. Component is still functioning as originally designed. Observe the condition development.
3	Significant damage, repair needed very soon. i.e. within next financial year.
4	Damage is critical and it is necessary to execute repair works at once, or to carry out a detailed inspection to determine whether any rehabilitation works are required.
5	The component has failed or is in danger of total failure, possibly affecting the safety of traffic. It is necessary to implement emergency temporary repair work immediately or rehabilitation work without delay after the introduction of load limitation measures.

4.1 Bridge surface

The existing bridge surface consists of tar & chip wearing course and is in good order generally.

Eirspan Rating: 1

4.2 Expansion Joints

There are no expansion joints on the bridge.

Eirspan Rating: n\a

4.3 Footway \ Median \ Verges

There are no footpaths provided on the bridge. There are 800mm wide soft verges on either side of the carriageway.

Eirspan Rating: 1

4.4 Parapet \ Safety Barrier

There are no safety barriers in the vicinity of the bridge structure.

The existing parapets are of concrete construction and are between 850mm and 950mm high above the road surface. Both parapets are approximately 300mm.

Vegetation is present on both faces of the parapets, no significant defects are evident in the areas that could be viewed.

Eirspan Rating: 1

4.5 Embankment \ Revetments

There are no embankments or revetments associated with this structure.

Eirspan Rating: N/A

4.6 Wingwalls \ Spandrel Walls \ Retaining Walls

Minor vegetation is present on the wing walls. No significant structural defects were noted.

There are no retaining walls.

Eirspan Rating: 1

4.7 Abutments

The abutments are of concrete construction and appear to be in good condition generally.

Eirspan Rating: 1

4.8 Piers

There are no piers on the bridge.

Eirspan Rating: 0

4.9 Bearings

There are no bearings on this bridge

Eirspan Rating: N/A

4.10 Deck \ Slab \ Arch Barrel

The deck of the bridge consists of a 250mm deep concrete slab.

No information to the exact construction detail of the slab was available, but no significant structural defects were noted and the deck appears to be in good condition.

Some minor water ingress is evident locally at the junction between the slab and abutments.

Eirspan Rating: 1

4.11 Riverbed

A depth of approximately 1400mm from the soffit to the river bed was recorded. The bed is gravelly with larger loose stones. No significant defects were noted.

Eirspan rating: 1

4.12 Other Elements & Structure in General

Overall the structure is in good condition with few defects found.

The source of the water ingress between the concrete deck and abutments should be investigated.

Eirspan Rating: 1

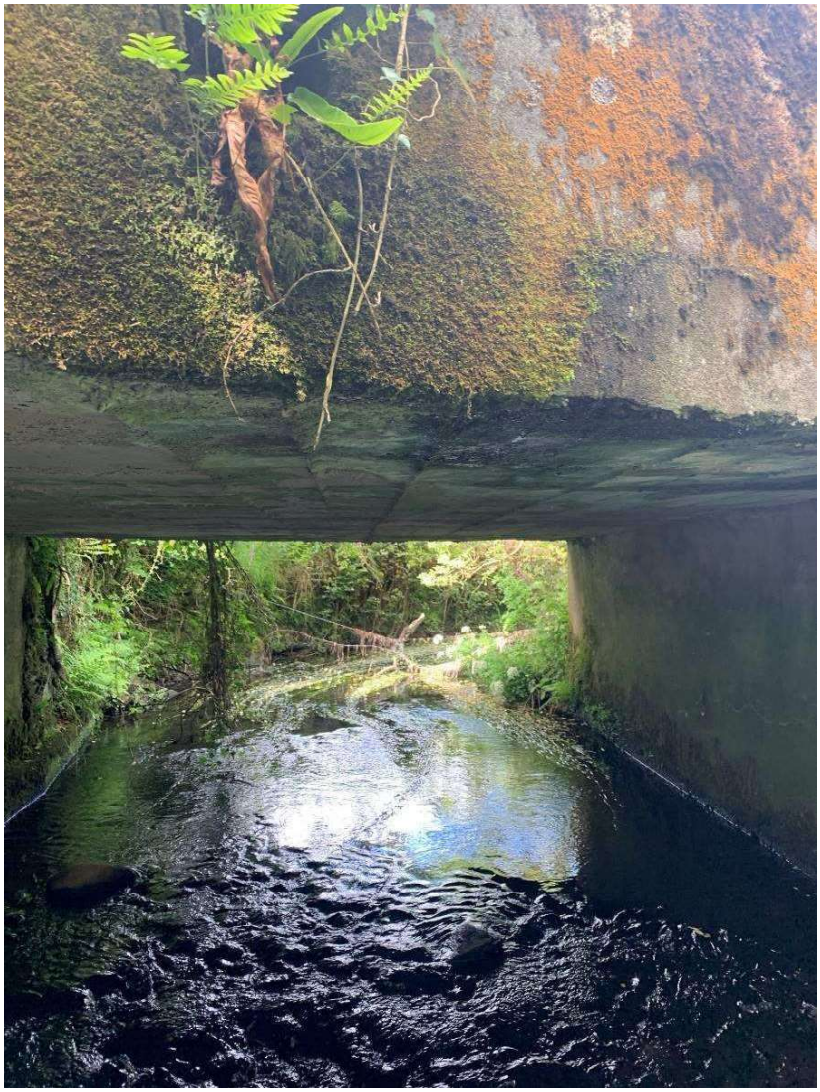
APPENDIX A

STRUCTURE PHOTOGRAPHS

General view of the bridge surface looking south

General view of the east parapet

General view of the bridge elevation



General view of the deck soffit

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Bridge No. 10 Inspection Report

Coillte CGA & SSE 110kV Grid Route at Gortyrahilly, Inchamore and Cummeennabuddoge (CMBG)

July 2020

Document Control

Document Number: 201-164-BIR-10

Revision	Date	Prepared	Checked	Approved
R0 (1st issue)	July 2020	K. O'Kelly	D. Walsh	A. O'Connell

Table of Contents

1.0 Introduction

PUNCH Consulting Engineers have been commissioned to undertake a Civil and Structural Due Diligence Report for the proposed cable routes at Gortyrahilly, Inchamore & Cummeennabuddoge (CMBG) , Millstreet, for Coillte Group.

The proposed cable routes include a number of watercourse crossings. These crossings have been visited and assessed by PUNCH as part of the due diligence study.

This report sets out the findings of a visual inspection of Bridge No. 10 (PUNCH project specific reference). The inspection was completed on 31/06/2020 by Kevin O'Kelly and Tadhg McEllistrem of PUNCH.

2.0 Location

The existing structure is located to the west of the village Coolea Co. Cork. Refer to Figure.1. The bridge carries a local road over a tributary of the River Sullane.

ITM Grid reference E: 514235, N: 575454.

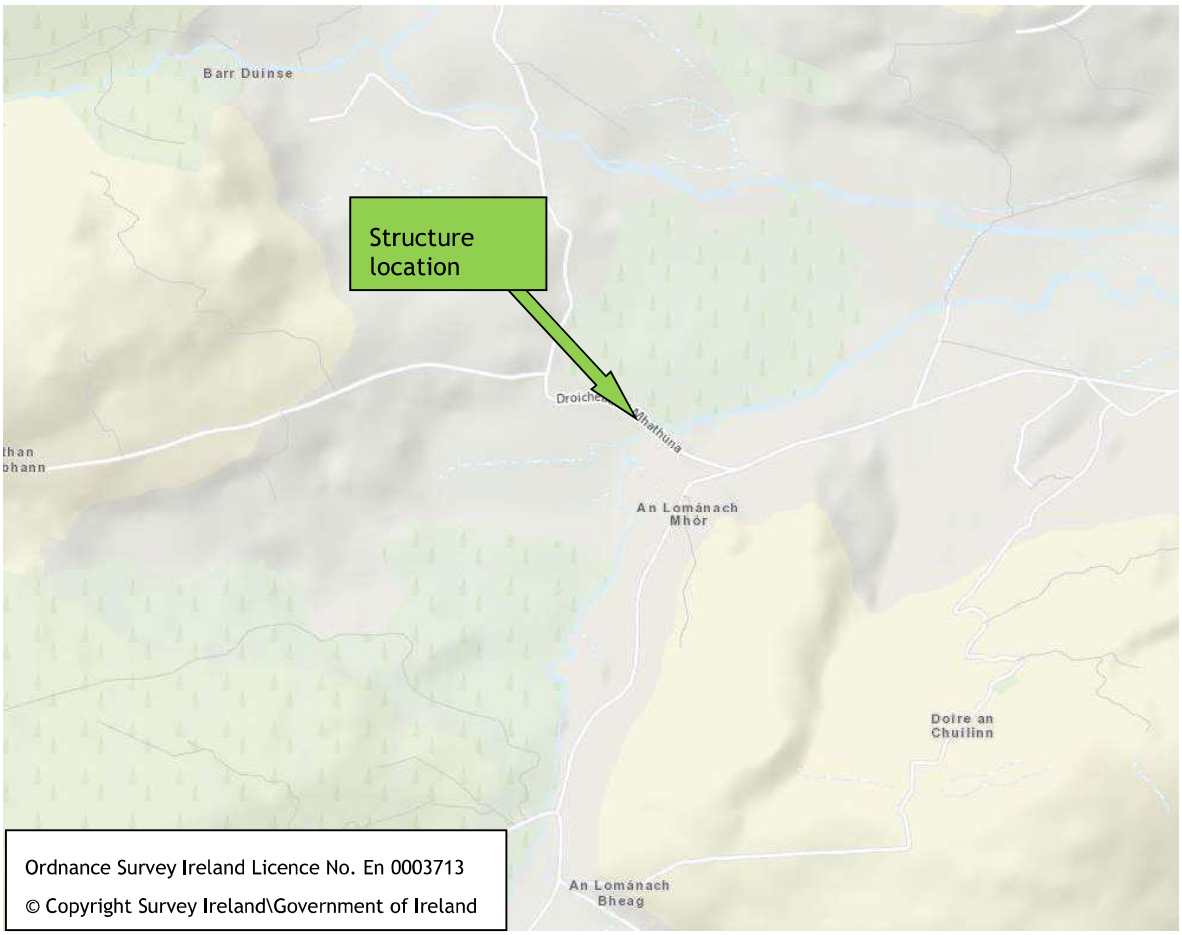

Figure 1 – Bridge Location

3.0 Bridge details

The bridge is a twin span masonry arch bridge. There are rectangular stone masonry flood relief culverts at both ends of the arch bridge.

The parapet walls are constructed in concrete and masonry on the approaches with an Armco barrier on concrete posts over the arches.

The bridge carries a local road, connecting to the N22, over the River Sullane.

The overall length of the bridge is 16.3m to end of the parapet on each side of the bridge.

4.0 Principal Inspection - Eirspan

The inspection carried out is based on the Principal Inspection proforma of the TII's Eirspan bridge management system. The Principal Inspection system is a systematic visual-only check of all elements of the bridge structure. A total of fourteen components of the bridge are considered as part of the inspection with each component assigned a rating number depending on its condition. The bridge is then assigned an overall rating number.

The condition rating is based on the table below. There is no invasive investigation carried out as part of the inspection.

Rating	Comment on damage, repairs etc.
0	No or insignificant damage.
1	Minor damage but no need of repair.
2	Some damage, repair needed when convenient. Component is still functioning as originally designed. Observe the condition development.
3	Significant damage, repair needed very soon. i.e. within next financial year.
4	Damage is critical and it is necessary to execute repair works at once, or to carry out a detailed inspection to determine whether any rehabilitation works are required.
5	The component has failed or is in danger of total failure, possibly affecting the safety of traffic. It is necessary to implement emergency temporary repair work immediately or rehabilitation work without delay after the introduction of load limitation measures.

4.1 Bridge surface

The existing bridge surface consists of tar & chip wearing course and is in good order generally.

Eirspan Rating: 1

4.2 Expansion Joints

There are no expansion joints on the bridge.

Eirspan Rating: N/A

4.3 Footway \ Median \ Verges

There are no footpaths provided on the bridge. There are 500mm wide soft verges on both sides of the carriageway.

Eirspan Rating: 2

4.4 Parapet \ Safety Barrier

There is a safety barrier supported on concrete posts across the length of the central arches on both sides of the bridge surface.

The existing parapets are constructed in stone masonry with a concrete capping and some concrete repairs. The parapets are between 800mm and 900mm high above the road surface and are approximately 450mm thick.

Vegetation is present on both external faces of the parapets. A loss of mortar was noted in the visible areas.

Eirspan Rating: 2

4.5 Embankment \ Revetments

There are no embankments or revetments associated with this structure.

Eirspan Rating: N/A

4.6 Wingwalls \ Spandrel Walls \ Retaining Walls

The spandrels over the masonry arches have been replaced with mass concrete construction and are in good condition.

There are masonry retaining walls on both approaches to the bridge. The retaining walls are overgrown with vegetation. A loss of pointing was noted in the visible areas.

There are no wing walls.

Eirspan Rating: 2

4.7 Abutments

The arch abutments are constructed in stone masonry. Some light vegetation and minor mortar loss was noted.

Eirspan Rating: 2

4.8 Piers

The pier is constructed in stone masonry. Some light vegetation and minor mortar loss was noted.

Eirspan Rating: 2

4.9 Bearings

There are no bearings on this bridge

Eirspan Rating: N/A

4.10 Deck \ Slab \ Arch Barrel

The arch barrels are generally in good condition. Full access to the culverts was not possible due to vegetation growth and dropped masonry, however, the areas that could be inspected appeared to be in poor condition with damaged and missing stones noted.

Eirspan Rating: 3

4.11 Riverbed

A depth of approximately 1360mm from the soffit to the river bed was recorded. The riverbed is paved with cobbles through both arches and no significant structural defects were noted.

Eirspan Rating: 1

4.12 Other Elements & Structure in General

The culverts are in poor condition and further investigation is required to confirm the full extent of the damage noted. This investigation should include removal of vegetation from the retaining walls.

General cleaning of vegetation and repointing of the masonry elements is required.

Eirspan Rating: 3

APPENDIX A

STRUCTURE PHOTOGRAPHS

General view of the bridge surface

Parapet with concrete coping and repairs, open joints in exposed masonry

General view of bridge elevation, relief culvert shown to the left

General view through arch barrel

General view through arch barrel

General view of bridge elevation

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Bridge No. 11 Inspection Report

Coillte CGA & SSE 110kV Grid Route at Gortyrahilly, Inchamore and Cummeennabuddoge (CMBG)

July 2020

Document Control

Document Number: 201-164-BIR-11

Revision	Date	Prepared	Checked	Approved
R0 (1st issue)	July 2020	K. O'Kelly	D. Walsh	A. O'Connell

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1.0 Introduction

PUNCH Consulting Engineers have been commissioned to undertake a Civil and Structural Due Diligence Report for the proposed cable routes at Gortyrahilly, Inchamore & Cummeennabuddoge (CMBG) , Millstreet, for Coillte Group.

The proposed cable routes include a number of watercourse crossings. These crossings have been visited and assessed by PUNCH as part of the due diligence study.

This report sets out the findings of a visual inspection of Bridge No. 11 (PUNCH project specific reference). The inspection was completed on 31/06/2020 by Kevin O'Kelly and Tadhg McEllistrem of PUNCH.

2.0 Location

The existing structure is located to the north-west of the village Coolea Co. Cork. Refer to Figure.1. The bridge carries a local road over the River Sullane.

ITM Grid reference E: 513210, N: 576134.

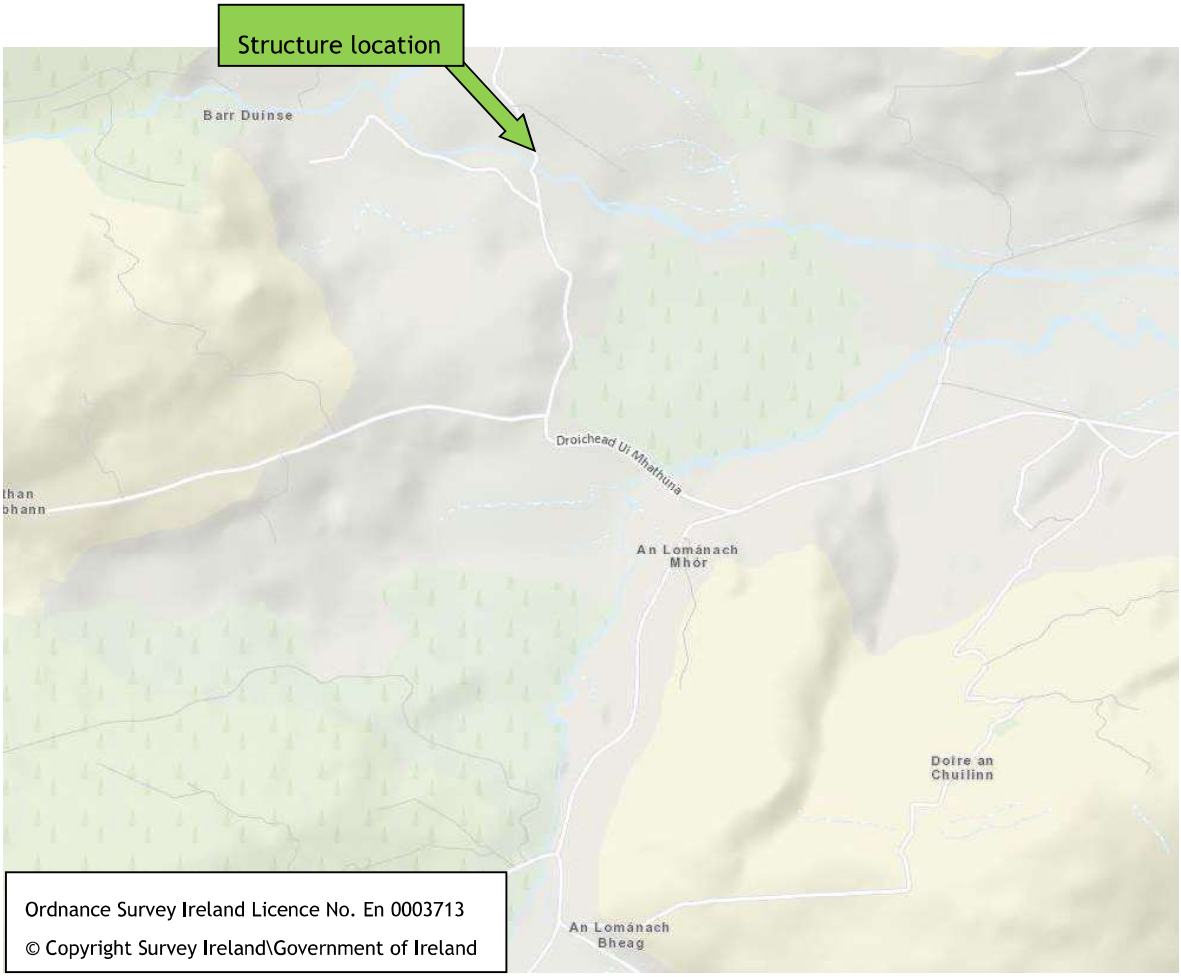

Figure 1 – Bridge Location

3.0 Bridge details

The bridge is a twin span concrete arch bridge. The parapet walls are formed in concrete.

The bridge carries a local road, connecting to the N22, over the River Sullane.

The overall length of the bridge is 16.5m to end of the parapet on each side of the bridge.

4.0 Principal Inspection - Eirspan

The inspection carried out is based on the Principal Inspection proforma of the TII's Eirspan bridge management system. The Principal Inspection system is a systematic visual-only check of all elements of the bridge structure. A total of fourteen components of the bridge are considered as part of the inspection with each component assigned a rating number depending on its condition. The bridge is then assigned an overall rating number.

The condition rating is based on the table below. There is no invasive investigation carried out as part of the inspection.

Rating	Comment on damage, repairs etc.
0	No or insignificant damage.
1	Minor damage but no need of repair.
2	Some damage, repair needed when convenient. Component is still functioning as originally designed. Observe the condition development.
3	Significant damage, repair needed very soon. i.e. within next financial year.
4	Damage is critical and it is necessary to execute repair works at once, or to carry out a detailed inspection to determine whether any rehabilitation works are required.
5	The component has failed or is in danger of total failure, possibly affecting the safety of traffic. It is necessary to implement emergency temporary repair work immediately or rehabilitation work without delay after the introduction of load limitation measures.

4.1 Bridge surface

The existing bridge surface consists of tar & chip wearing course and is in good order generally.

Eirspan Rating: 1

4.2 Expansion Joints

There are no expansion joints on the bridge.

Eirspan Rating: N/A

4.3 Footway \ Median \ Verges

There are no footpaths provided on the bridge. There are 500mm wide soft verges on both sides of the carriageway.

Eirspan Rating: 2

4.4 Parapet \ Safety Barrier

There are no safety barriers on the bridge.

The existing parapets are constructed in concrete. The parapets are between 800mm and 900mm high above the road surface and are approximately 350mm thick.

The parapets are generally in good condition. Local damage to the concrete capping was noted.

Eirspan Rating: 2

4.5 Embankment \ Revetments

There are no embankments or revetments associated with this structure.

Eirspan Rating: N/A

4.6 Wingwalls \ Spandrel Walls \ Retaining Walls

The spandrel walls are constructed in concrete and are in good condition.

Wing walls are overgrown with vegetation.

Eirspan Rating: 1

4.7 Abutments

The abutments are generally in good condition. Some minor washout of the concrete is evident towards the abutment footings; however, no undermining or significant loss of material has occurred.

Eirspan Rating: 2

4.8 Piers

The pier is generally in good condition. Some minor washout of the concrete is evident towards the pier footing; however, no undermining or significant loss of material has occurred.

Eirspan Rating: 2

4.9 Bearings

There are no bearings on this bridge

Eirspan Rating: n\a

4.10 Deck \ Slab \ Arch Barrel

Both arches are constructed in concrete. No significant structural defects were noted.

Eirspan Rating: 1

4.11 Riverbed

There is a bed of rubble though the south span. The north span was dry at the time of the inspection. No significant structural defects were noted.

Eirspan Rating: 1

4.12 Other Elements & Structure in General

Overall the structure is in good condition with few defects found. General maintenance works are required, including concrete repairs to the abutments, piers and parapets.

Eirspan Rating: 2

APPENDIX A

STRUCTURE PHOTOGRAPHS

General view of the bridge surface

General view of the bridge parapet

Close up of parapet showing concrete damage

General view of bridge elevation – viewed from downstream.

General view of bridge span showing typical condition of arch barrel and abutment

General view of bridge span showing typical condition of arch barrel and abutment

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Bridge No. 12 Inspection Report

Coillte CGA & SSE 110kV Grid Route at Gortyrahilly, Inchamore and Cummeennabuddoge (CMBG)

July 2020

Document Control

Document Number: 201-164-BIR-12

Revision	Date	Prepared	Checked	Approved
R0 (1st issue)	July 2020	K. O'Kelly	D. Walsh	A. O'Connell

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1.0 Introduction

PUNCH Consulting Engineers have been commissioned to undertake a Civil and Structural Due Diligence Report for the proposed cable routes at Gortyrahilly, Inchamore & Cummeennabuddoge (CMBG) , Millstreet, for Coillte Group.

The proposed cable routes include a number of watercourse crossings. These crossings have been visited and assessed by PUNCH as part of the due diligence study.

This report sets out the findings of a visual inspection of Bridge No. 12 (PUNCH project specific reference). The inspection was completed on 31/06/2020 by Kevin O'Kelly and Tadhg McEllistrem of PUNCH.

2.0 Location

The existing structure is located to the south-east of the village of Clonkeen Co. Cork. Refer to Figure.1. The bridge carries a local road over a tributary to the River Sullane.

ITM Grid reference E: 513612, N: 577815.

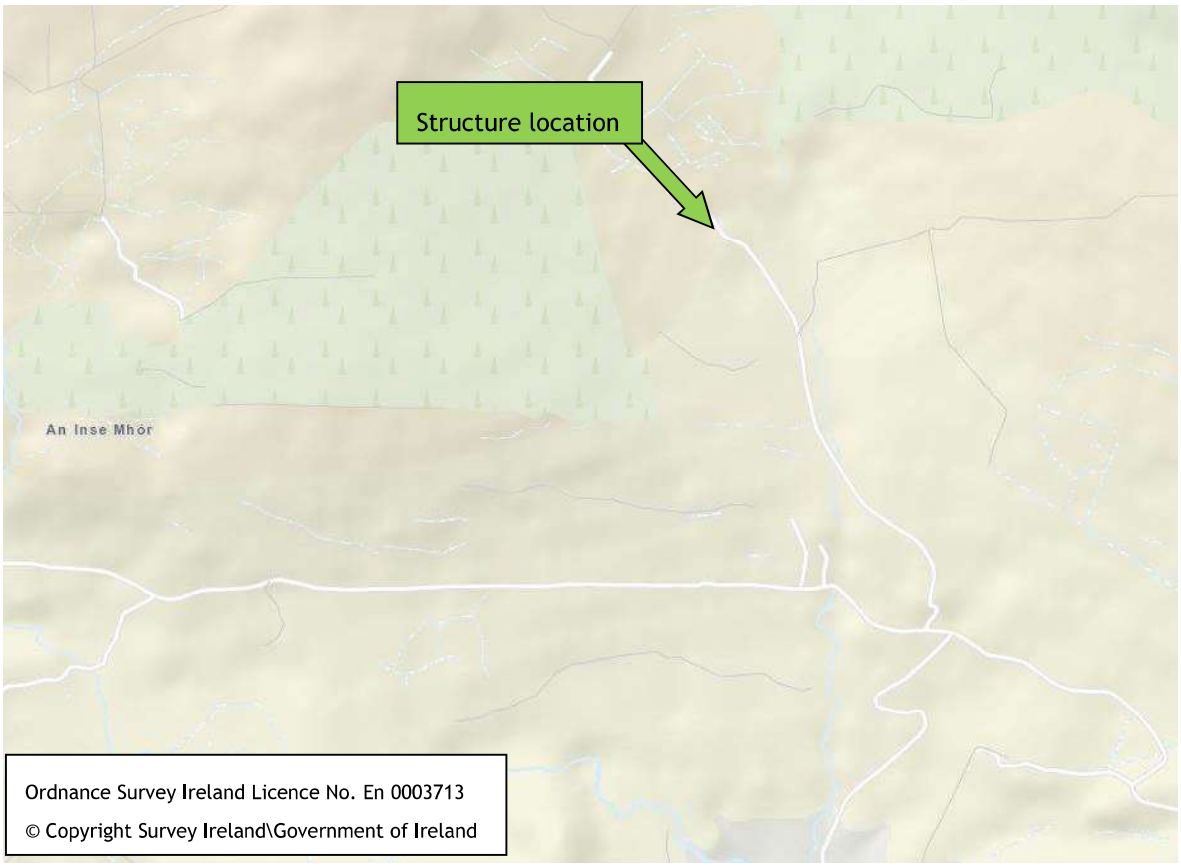


Figure 1 – Bridge Location

3.0 Bridge details

The bridge is a single span bridge made up of a concrete deck structure with a span of 3.0m. The wing & parapet walls are constructed in concrete.

The bridge carries a local road, connecting to the N22, over a tributary to the River Sullane.

The overall length of the bridge is 3.0m to end of the parapet on each side of the bridge.

4.0 Principal Inspection - Eirspan

The inspection carried out is based on the Principal Inspection proforma of the TII's Eirspan bridge management system. The Principal Inspection system is a systematic visual-only check of all elements of the bridge structure. A total of fourteen components of the bridge are considered as part of the inspection with each component assigned a rating number depending on its condition. The bridge is then assigned an overall rating number.

The condition rating is based on the table below. There is no invasive investigation carried out as part of the inspection.

Rating	Comment on damage, repairs etc.
0	No or insignificant damage.
1	Minor damage but no need of repair.
2	Some damage, repair needed when convenient. Component is still functioning as originally designed. Observe the condition development.
3	Significant damage, repair needed very soon. i.e. within next financial year.
4	Damage is critical and it is necessary to execute repair works at once, or to carry out a detailed inspection to determine whether any rehabilitation works are required.
5	The component has failed or is in danger of total failure, possibly affecting the safety of traffic. It is necessary to implement emergency temporary repair work immediately or rehabilitation work without delay after the introduction of load limitation measures.

4.1 Bridge surface

The existing bridge surface consists of mainly gravel and has not been maintained in some time.

Eirspan Rating: 2

4.2 Expansion Joints

There are no expansion joints on the bridge.

Eirspan Rating: N/A

4.3 Footway \ Median \ Verges

There are no footpaths provided on the bridge. There are 200mm wide soft verges on both sides of the road surface.

Eirspan Rating: 2

4.4 Parapet \ Safety Barrier

There are no safety barriers at the bridge.

The parapets are constructed in concrete 800mm high above the road surface and approximately 200mm thick.

Both parapets have been damaged with parts missing and structural cracking noted.

Eirspan Rating: 2

4.5 Embankment \ Revetments

There are no embankments or revetments associated with this structure.

Eirspan Rating: N/A

4.6 Wingwalls \ Spandrel Walls \ Retaining Walls

No significant structural defects were noted.

Eirspan Rating: 1

4.7 Abutments

The abutments are constructed in stone masonry. Concrete repairs are evident. Some washout of joints has occurred along the base of both abutments.

Eirspan Rating: 2

4.8 Piers

There are no piers on the bridge.

Eirspan Rating: N/A

4.9 Bearings

There are no bearings on the bridge

Eirspan Rating: N/A

4.10 Deck \ Slab \ Arch Barrel

The deck of the bridge consists of an approx. 300mm deep concrete slab.

No information to the exact construction of the deck slab was available. No significant structural details were noted. Water ingress and calculi staining was evident.

Eirspan Rating: 1

4.11 Riverbed

The riverbed is paved through the bridge and there are no signs of scouring.

Eirspan Rating: 1

4.12 Other Elements & Structure in General

Overall the structure is in fair condition with the defects mentioned above. Repairs to the parapets and abutments are required. The waterproofing of the bridge deck should be investigated with consideration to given to removing the soft verges to limit water ingress to the structure.

Eirspan Rating: 2

APPENDIX A

STRUCTURE PHOTOGRAPHS

General view of the bridge surface

Upstream parapet with knocked section and structural cracking

Knocked section of the downstream parapet

General view of the bridge elevation

General view through the bridge showing the deck and abutments

Report

Inchamore Wind Farm

Aviation Review Statement

Document Number:	001/IE/0323			
Author:	PT\DMG			
Approved for Release:	Rev 1.0	KH	**Date:**	29/03/2023

Document Filename: *Inchamore Wind Farm - Aviation Review Statement*

Executive Summary

Ai Bridges Ltd have been commissioned to review the possible impacts of the proposed wind farm on aviation systems in the vicinity of the proposed wind farm development at Inchamore. As part of the review, the following subjects were considered:

- Annex 14 - Obstacle Limitation Surfaces (OLS)
- Annex 15 – Aerodrome Surfaces
- Minimum Sector Altitudes (MSA)
- Instrument Flight Procedures
- Permitted Wind Farms in vicinity of Proposed Wind Farm
- Communications, Navigation and Radar Surveillance Systems Safeguarding
- Flight Inspection and Calibration
- Aeronautical Obstacle Warning Light Scheme
- Irish Air Corps / Department of Defence (DoD) Safeguarding

Annex 14 - Obstacles Limitation Surfaces (OLS)

A review shows that the proposed wind farm would be located outside the Outer Horizontal Surface of the Kerry and Cork Airport Runway Obstacles Limitation Surfaces, as defined in ICAO (International Civil Aviation Organization) Annex 14.

As the proposed wind farm is situated outside the Outer Horizontal Surfaces and there are no penetration of the take-off or approach surfaces, it is unlikely that there will be any impacts to the OLS surfaces for Kerry Airport or Cork Airport.

Annex 15 - Aerodrome Surfaces

Following a review of ”Terrain and obstacle requirements Area 1” as defined in ICAO Annex 15, wind turbines need to be registered if they are more than 100 meters above terrain. From the centre point (ARP – Airport Reference Point) of an Airport to the boundary of the Area 1 of the Annex 15 Aerodrome Surface is 45km. This area encloses the TMA area i.e. Total Maneuvering Area and this is used for circling and maneuvering by aircraft. Should the proposed wind farm be permitted, the turbines would be within 45km of the ARP at Kerry Airport and would be greater than 100m in height. Therefore the turbines would be required to be included in the IAA Electronic Air Navigation Obstacle Dataset.

Minimum Sector Altitudes (MSA)

The Minimum Sector Altitudes (MSA) is the lowest altitude which may be used that will provide a minimum obstacle clearance of 1000ft above all obstacles within a sector of 25 nautical miles (46km) from the NDB at Kerry Airport and the VOR/DME at Cork Airport. The proposed wind farm is 30km from the NDB at Kerry Airport; however, there is over 1000ft from the maximum height of the wind farm to the applicable MSA Sector altitude and therefore there would appear to be no impact on the published MSA altitudes for Kerry or Cork Airports.

Instrument Flight Procedures

There are 33 published Instrument Flight Procedures for flights to/from Kerry and Cork Airports. Due to the distance of the proposed wind farm from the airports, and as there are existing obstacles nearer to the airports than the proposed development, there should be no impacts to these flight procedures.

Communications, Navigation and Surveillance System Safeguarding

As the proposed wind farm is more than 25km from the Localizer and transmitting antenna at Kerry and Cork Airports, it is very unlikely that the proposed wind farm will have any impact on these ATS communications and radio navigational aids.

For Radar Surveillance Systems, EUROCONTROL Guidelines require a 16km safe distance from the surveillance radar system (SSR), for a "*Zone 4 - No Assessment*" condition. It has been highlighted in the analysis that the nearest of the proposed turbines would be located at a distance of 48 km from the radar station at Mount Gabriel and in Assessment Zone 4 of the EUROCONTROL Guidelines. As turbines at the proposed development would be located in Assessment Zone 4, a detailed impact assessment on Radar Surveillance Systems will not be required by the IAA.

Flight Inspection and Calibration

Flight checks are conducted annually to ensure that flight procedures and associated navigational aids are safe and accurate. These flight checks are carried out by an IAA approved Flight Inspection Service Provider. The checks are carried out during annual inspections consisting of radial and orbital test flights around Kerry and Cork Airports for calibration of instrument landing systems.

Flight Inspection Procedures will not be impacted as the proposed wind farm is sufficiently far from the airport runways and the flight inspection procedures should already account for the existing obstacles (e.g. terrain and existing wind farms).

Aeronautical Obstacle Warning Light Scheme

In the event of a grant of planning consent the IAA are likely to request lighting of the proposed wind turbines in the interest of aviation safe-guarding as the proposed development would be considered as an en-route obstacle.

Irish Air Corps / Department of Defence (DoD) Safeguarding

The Irish Air Corps position on wind farms / tall structures are outlined in the paper which was published in 2014: "*Air Corps Wind Farm/ Tall Structures Position Paper*". In the position paper the Irish Air Corps outlines restricted areas where they would object to the installation of wind turbines /tall structures. The areas defined by the Air Corps have been mapped and analysis shows that proposed wind farm site is located outside the restricted areas. As the proposed wind farm is not located in a restricted area it should have no impacts on the Irish Air Corps activities.

Sections

Appendices

1. Introduction

This section provides a brief summary of the proposed wind farm development at Inchamore and of the nearest significant aviation installations at Kerry Airport and Cork Airports.

1.1 Wind Farm Site Information

The proposed wind farm development is located in County Cork approximately 20 km northeast of Kenmare. Figure 1 shows the proposed wind farm site with respect to Kerry Airport and Cork Airport.

Figure 1. Location of proposed wind farm at Inchamore

1.2 Kerry Airport

Table 2 below shows the co-ordinates of Kerry Airport and the distance from the Airport reference Point (ARP) to the proposed wind farm site. Kerry Airport operates in Class C controlled airspace with Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) Flight rules.

Location	Installation	Description	Airport Ref. Point ARP	ARP Distance to Proposed Wind Farm
Farranfore, Co. Kerry.	International Airport	Single Asphalt Runway Airspace: Class C	52 10 51 N 09 31 26 W (Mid-point of Runway 08/26).	30 km

Table 1. Kerry Airport Details

The aeronautical navigation aids at the aerodrome include DME, NDB, ILS LOC and ILS GP.

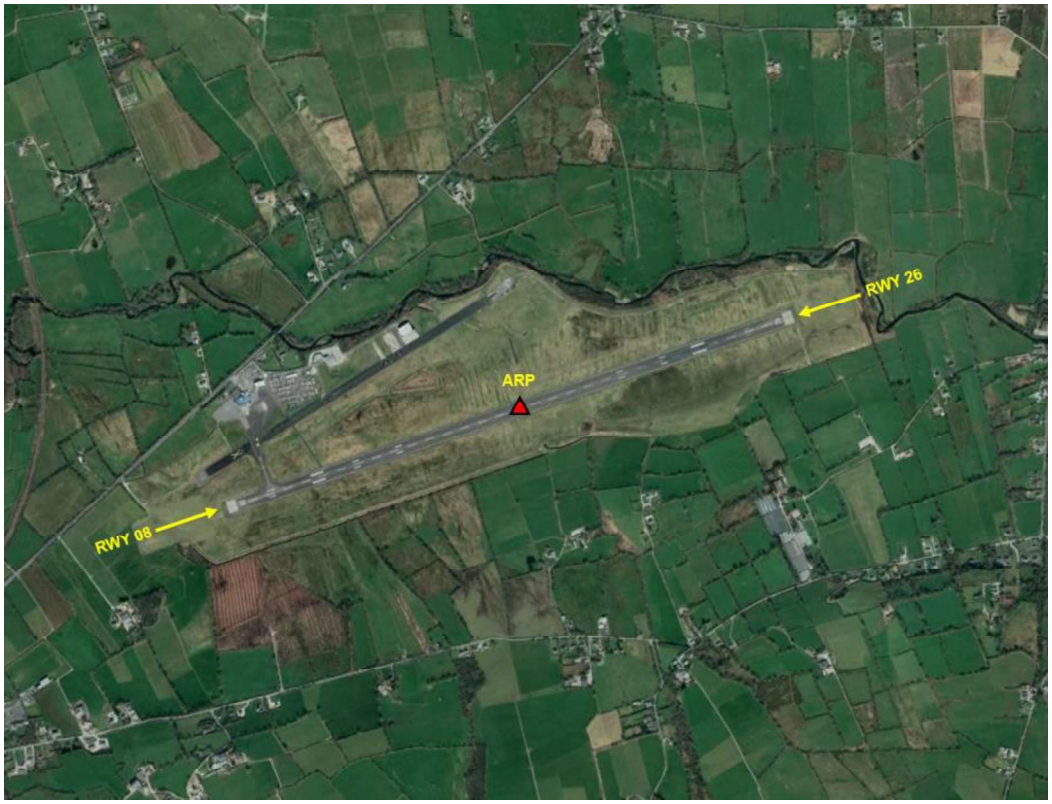


Figure 2. Kerry International Airport

1.3 Cork Airport

Table 2 below shows the co-ordinates of Cork Airport and the distance from the Airport reference Point (ARP) to the proposed wind farm site. Cork Airport operates in Class C controlled airspace with Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) Flight rules.

Location	Installation	Description	Airport Ref. Point ARP	ARP Distance to Proposed Wind Farm
Farmers Cross, Co Cork	International Airport	Two Asphalt Runways Airspace: Class C	51 50 29 N 08 29 28 W (Mid-point of Runway 16/34).	54 km

Table 2. Cork Airport Details

The aeronautical navigation aids at the aerodrome include DME, ILS LOC and ILS GP.

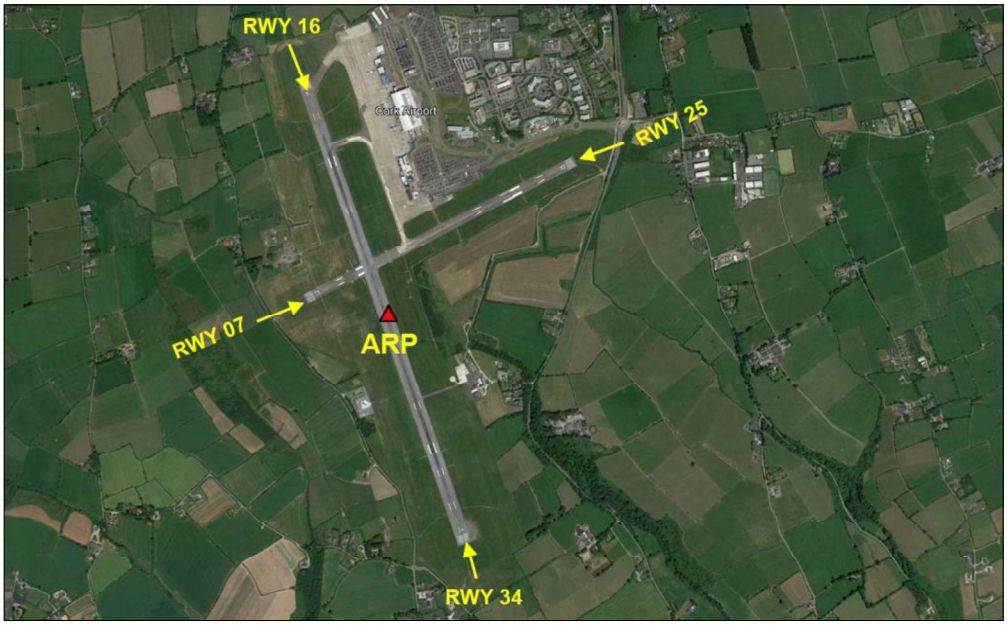


Figure 3. Cork International Airport

2. Aviation Review

In this section a review of the following a review of the following Aviation topics is provided.

- Annex 14 - Obstacle Limitation Surfaces (OLS)
- Annex 15 – Aerodrome Surfaces
- Minimum Sector Altitudes (MSA)
- Instrument Flight Procedures
- Permitted Wind Farms in vicinity of proposed Wind Farm
- Communications, Navigation and Radar Surveillance Systems Safeguarding
- Flight Inspection and Calibration
- Aeronautical Obstacle Warning Light Scheme
- Irish Air Corps / Department of Defence (DoD) Safeguarding

2.1 Annex 14 Obstacle Limitation Surfaces (OLS)

A review of the Annex 14 Obstacles Limitation Surfaces (OLS) was first was carried out by first plotting the proposed wind farm location and the airport obstacle surfaces. The obstacle limitation surfaces for aerodromes are plotted based on the following:

- Annex 14 to the Convention on International Civil Aviation Aerodromes Volume I - Aerodrome Design and Operations Seventh Edition July 2016"
- Certification Specifications and Guidance Material for Aerodromes Design CS-ADR-DSN Issue 4, 8th of December 2017

Figure 4 below shows the Kerry and Cork Airport OLS surfaces in relation to the proposed wind farm. The distance from the ARP at Kerry and Cork Airports to the nearest point of the proposed wind farm is greater than 25km. The analysis of the OLS plots indicates that turbines at the proposed wind farm would not penetrate the Outer Horizontal Surfaces for these Airports which extends to 15km from the Airport Reference Points (ARPs).

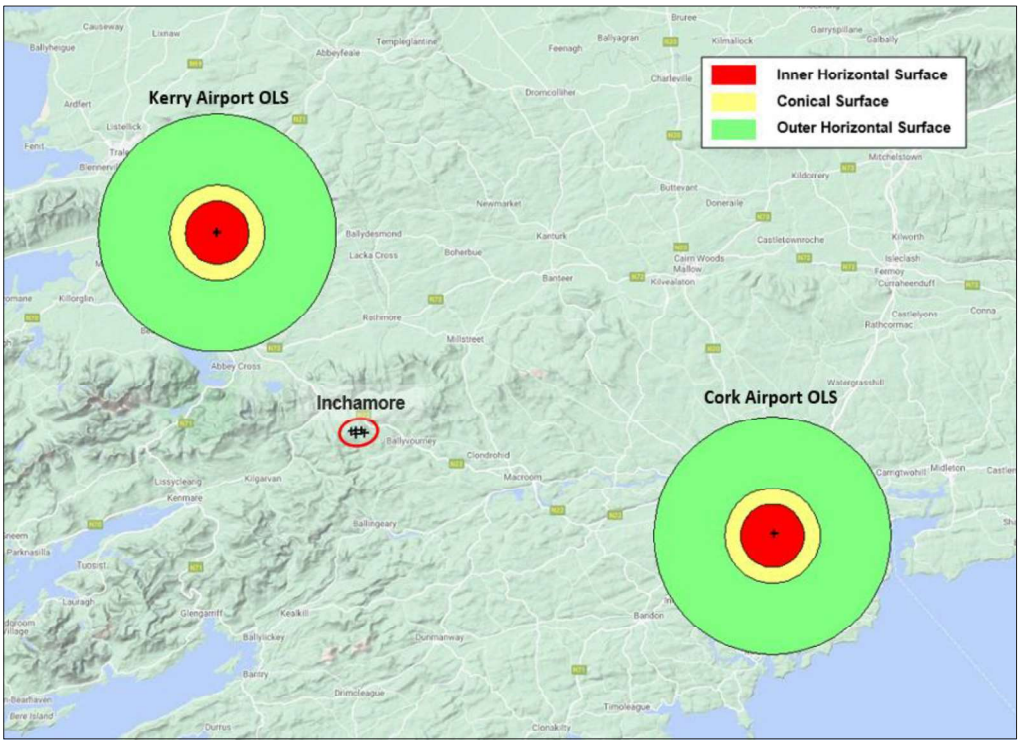


Figure 4. Inchamore Wind Farm in relation to Aerodrome OLS Surfaces.

Aerodrome	Runway Code	Outer Horizontal Surface Applicable	Clearance Distance to Aerodrome OLS Surface
Kerry Airport	Runway Code 4	Y	15 km
Cork Airport	Runway Code 4	Y	39 km

Table 3. Clearance Distances to Aerodrome OLS Surfaces

2.2 Annex 15 Aerodrome Surfaces

Turbines at the proposed wind farm would not penetrate the ICAO Annex 15 Aerodrome Surface as shown in Figure 4. The "Terrain and Obstacle Requirements Area" is defined in ICAO Annex 15 as an area of up to 45km from the Aerodrome ARP. (An illustration of ICAO Annex 15 Area 1 and Area 2 Surface is provided in Appendix A).

As the proposed wind farm site is 30km from the ARP at Kerry Airport, there is penetration of the Annex 15 surface for this Aerodrome. All obstacles, if they are more than 100 meters above terrain for a distance of up to 45km from the ARP, need to be registered in the IAA Air Navigation Obstacle Data Set. This area is known as the TMA area i.e. Terminal Maneuvering Area and is used for en-route circling and maneuvering and is shown in Figure 5.

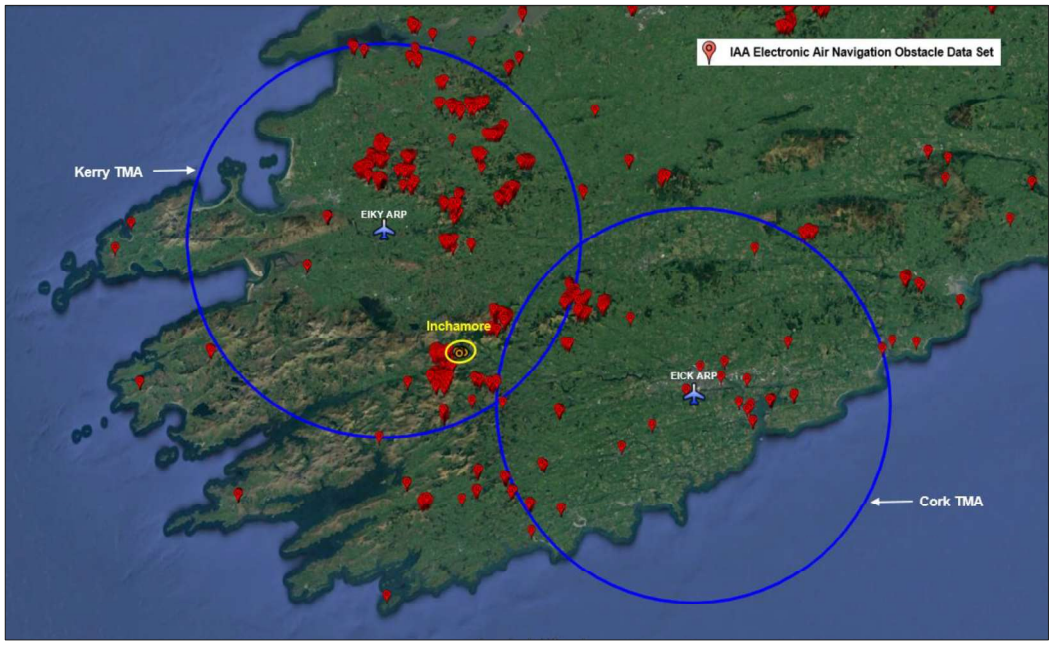


Figure 5. Annex 15 Aerodrome Surface and IAA Electronic Air Navigation Obstacle Data Set

It should also be noted that there are other existing tall structures (obstacles) nearer to the Kerry and Cork airports, e.g. the existing wind farms at Scartaglen, Coomacheo, Gneeves, Caherdowney, Curragh, Coomagearlaghy, Midas, Sillahertane, Everwind, etc.

These existing obstacles would shield any potential impacts from the proposed wind farm at Inchamore. The IAA Electronic Air Navigation Obstacle Data Set permitted obstacles are shown relative to the proposed wind farm in Figure 6.

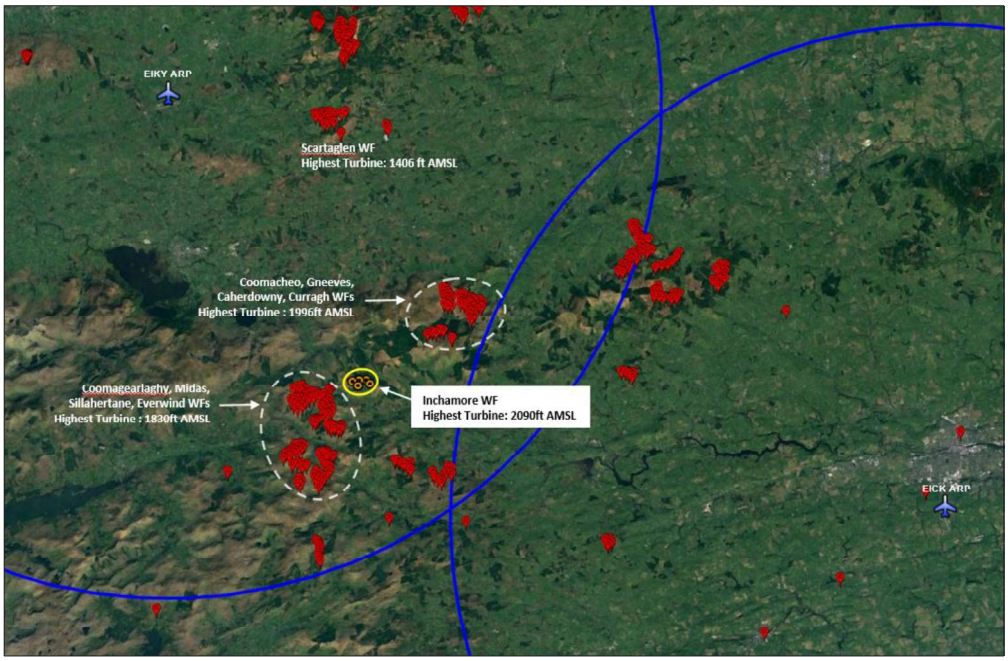


Figure 6. Permitted Obstacles in vicinity of Inchamore Wind Farm

Although there are other obstacles closer to the airport than the proposed wind farm, all new obstacles must be considered and assessed to see if they cause a "hazard to air navigation" and all Terrain Obstacle Data (including man-made obstacles) have to be considered by the relevant Aviation Authorities.

2.3 Minimum Sector Altitudes

A review of the Minimum Sector Altitudes (MSA) shows that the proposed wind farm site is located within 25 nautical miles from the NDB at Kerry Airport. The MSA provides a minimum obstacle clearance of 1000 ft above the highest obstacle within specified sectors. The proposed wind farm is located in the southeastern MSA Sector (MSA 3900 ft), as shown in Figure 7.

According to the wind farm location, the maximum construction height for the site would be 2900 ft/884m AMSL (3900 ft MVA minus 1000 ft).

The tip-height of the highest of the proposed turbines would be 637m (2090 ft) AMSL. This is below the 2900ft threshold, therefore the relevant MSA will not be affected and there will be no impact on the published MSA altitude figures.

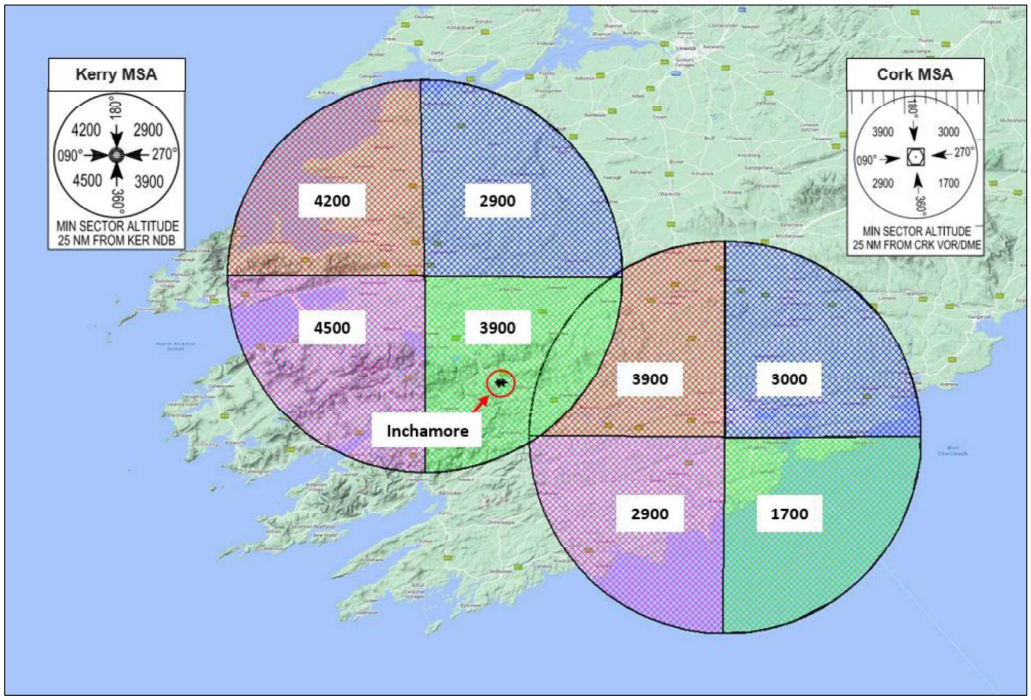


Figure 7. Minimum Sector Altitudes – Kerry and Cork Airports

2.4 Instrument Flight Procedures

There are 33 published Instrument and Visual Flight Procedures for arrivals to and departures from Kerry and Cork Airports.

Due to the distance of the proposed wind farm from Kerry and Cork Airports (and as there are existing obstacles adjacent to the proposed wind farm, it is unlikely that there will be any impacts on the Instrument Flight Procedures for flights to/from these Airports. Table 4 below lists the Instrument Flight Procedures for Kerry and Cork Airports.

Aerodrome	Aerodrome Procedure	Chart ID	Wind Farm Impacts
Kerry	Standard Departure Chart –Instrument RWY 26 CAT A, B - ICAO	EIKY AD 2.24-3	No Impacts.
Kerry	Standard Departure Chart –Instrument RWY 26 CAT C - ICAO	EIKY AD 2.24-4	No Impacts.
Kerry	Standard Departure Chart –Instrument RWY 08 CAT A, B- ICAO	EIKY AD 2.24-5	No Impacts.
Kerry	Standard Departure Chart –Instrument RWY 08 CAT C - ICAO	EIKY AD 2.24-6	No Impacts.
Kerry	Instrument Approach Chart RNP RWY 26 CAT A, B, C - ICAO	EIKY AD 2.24-7	No Impacts.
Kerry	Instrument Approach Chart ILS B OR LOC RWY 26 CAT A, B, C - ICAO	EIKY AD 2.24-8.1	No Impacts.
Kerry	Instrument Approach Chart NDB RWY 26 CAT A, B, C – ICAO	EIKY AD 2.24-9.1	No Impacts.
Kerry	Instrument Approach Chart RNP RWY 08 CAT A, B, C – ICAO	EIKY AD 2.24-10	No Impacts.
Kerry	Instrument Approach Chart NDB RWY 08 CAT A, B, C - ICAO	EIKY AD 2.24-11	No Impacts.
Kerry	Visual Approach Chart – ICAO	EIKY AD 2.24-13	No Impacts.
Cork	NAV (GNSS) Standard Departure Chart RWY 16 CAT A, B- ICAO	EICK AD 2.24-6	No Impacts.
Cork	RNAV (GNSS) Standard Departure Chart RWY 16 CAT C, D - ICAO	EICK AD 2.24-7	No Impacts.
Cork	RNAV (GNSS) Standard Departure Chart RWY 34 CAT A, B - ICAO	EICK AD 2.24-8	No Impacts.
Cork	RNAV (GNSS) Standard Departure Chart RWY 34 CAT C, D - ICAO	EICK AD 2.24-9	No Impacts.
Cork	RNAV (GNSS) Standard Departure Chart RWY 07 CAT A, B - ICAO	EICK AD 2.24-10	No Impacts.
Cork	RNAV (GNSS) Standard Departure Chart RWY 07 CAT C, D - ICAO	EICK AD 2.24-11	No Impacts.
Cork	RNAV (GNSS) Standard Departure Chart RWY 25 CAT A, B- ICAO	EICK AD 2.24-12	No Impacts.
Cork	RNAV (GNSS) Standard Departure Chart RWY 25 CAT C, D- ICAO	EICK AD 2.24-13	No Impacts.
Cork	RNAV (GNSS) Standard Arrival Chart RWY 16 - ICAO	EICK AD 2.24-14	No Impacts.
Cork	RNAV (GNSS) Standard Arrival Chart RWY 34 - ICAO	EICK AD 2.24-15	No Impacts.
Cork	RNAV (GNSS) Standard Arrival Chart RWY 07 CAT A, B - ICAO	EICK AD 2.24-16	No Impacts.
Cork	RNAV (GNSS) Standard Arrival Chart RWY 25 CAT A, B - ICAO	EICK AD 2.24-17	No Impacts.
Cork	Instrument Approach Chart RNP RWY16 - ICAO	EICK AD 2.24-18	No Impacts.
Cork	Instrument Approach Chart ILS Cat I & II or LOC RWY16 - ICAO	EICK AD 2.24-19.1	No Impacts.
Cork	Instrument Approach Chart VOR RWY16 - ICAO	EICK AD 2.24-20	No Impacts.

Cork	Instrument Approach Chart RNP RWY34 - ICAO	EICK AD 2.24-21	No Impacts.
Cork	Instrument Approach Chart ILS CAT I or LOC RWY34 - ICAO	EICK AD 2.24-22	No Impacts.
Cork	Instrument Approach Chart VOR RWY 34 - ICAO	EICK AD 2.24-23	No Impacts.
Cork	Instrument Approach Chart RNP RWY07 - ICAO	EICK AD 2.24-24	No Impacts.
Cork	Instrument Approach Chart VOR RWY 07 - ICAO	EICK AD 2.24-25	No Impacts.
Cork	Instrument Approach Chart RNP RWY25 (LNAV Only) - ICAO	EICK AD 2.24-26	No Impacts.
Cork	Instrument Approach Chart VOR RWY 25 - ICAO	EICK AD 2.24-27	No Impacts.
Cork	Visual Approach Chart - ICAO	EICK AD 2.24-28	No Impacts.

Table 4. Instrument and Visual Flight Procedures – Kerry and Cork Airports

2.5 Permitted Wind Farms in vicinity of Proposed Wind Farm

The Planning References for the permitted wind farms in the vicinity of the proposed wind farm are shown below in Table 5. None of these wind farms required a Full Assessment of Instrument Flight Procedures.

Wind Farm	Planning Reference	Description
Scartaglen	TBC	Operational Wind Farm
Coomacheo	TBC	Operational Wind Farm
Gneeves	TBC	Operational Wind Farm
Caherdowney	TBC	Operational Wind Farm
Curragh	TBC	Operational Wind Farm
Coomagearlaghy	TBC	Operational Wind Farm
Midas	TBC	Operational Wind Farm
Sillahertane	TBC	Operational Wind Farm
Everwind	TBC	Operational Wind Farm

Table 5. Permitted Wind Farms in vicinity of Proposed Wind Farm

2.6 Communication Navigation and Surveillance Systems

In this section the possible impact of the proposed wind farm on the Communication, Navigation and Radar Surveillance Systems for the aerodromes at Kerry and Cork are assessed.

2.6.1 Communications and Navigation Systems

The AIP documents EIKY AD 2-18/19 and EICK AD 2-18/19 provides the information for communication and navigation facilities for Kerry and Cork Airports respectively. The table below shows the channel frequencies for the ATS communications Facilities and the Radio Navigation and Landing Aids for each airport.

Aerodrome	ATS Communications Facilities Channel Frequency	Radio Navigation and Landing Aids Channel Frequency	Approximate Distance to Localizer and Transmitting antennas	Impacts of wind fam
Kerry	118 MHz –124 MHz	334 KHz – 330 MHz	30 km	No impacts
Cork	109 MHz – 121 MHz	109 MHz – 1575 MHz	54 km	No impacts

Table 6. Impacts on Communications and Navigation Systems

As the proposed wind farm is over 25km from the Localizers and transmitting antennas, it is very unlikely that turbines at the proposed wind farm will have any impact on these ATS communications and radio navigational aids. Typically, interference to VHF communications systems will only occur when obstacles are in close proximity to the VHF transmitter e.g. less than 500m.

2.6.2 Radar Surveillance Systems

The tables below show the Irish Aviation Authority Assessment Zone arrangement for the two types of aviation radar surveillance systems; Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR).

Zone	Description	Assessment Requirements
Zone 1	0 - 500m	Safeguarding
Zone 2	500m - 15km and in radar line of sight	Detailed Assessment
Zone 3	Further than 15km and in radar line of sight	Simple Assessment
Zone 4	Not in radar line of sight	No Assessment

Table 7. PSR Zone Arrangements

Zone	Description	Assessment Requirements
Zone 1	0 - 500m	Safeguarding
Zone 2	500m - 16km but within maximum instrumented range and in radar line of sight	Detailed Assessment
Zone 4	Further than 16km or not in radar line of sight	No Assessment

Table 8. SSR Zone Arrangements

The EUROCONTROL Guidelines require a 16km safe distance for a "Zone 4 - No Assessment" condition and detailed assessments are required for any proposed wind within 16km of a secondary surveillance radar.

It should be noted that in the UK, NATS (Air Traffic Control) safeguards SSR to a distance of 10km. The guidelines used by NATS (*CAP 764: Chapter 2: Impact of wind turbines on aviation*) state that:

> *"Wind turbine effects on SSR are traditionally less than those on PSRs but can be caused due to the physical blanking and diffracting effects of the turbine towers, depending on the size of the turbines and the wind farm. These effects are typically only a consideration when the turbines are located very close to the SSR i.e. less than 10 km."*

2.6.2.1 Irish Aviation Authority (IAA) Radar Surveillance Sensors

To determine which Assessment Zones are applicable to the proposed wind farm a desktop assessment was carried out. The nearest radar surveillance site to the proposed wind farm development is at Mount Gabriel, County Cork.

Figure 8. Radar Surveillance Site(s) relative to Inchamore Wind Farm.

2.6.2.1.1 Mt Gabriel Radar Assessment

The radar surveillance site at Mt Gabriel consists of two SSR installations. Figure 9. Shows one of the SSR installations. The SSR antennas are housed in the dome-shaped structure at the top of the tower.

Figure 9. Mt Gabriel Radar Station.

Table 9 below shows the (EuroControl & NATS) assessment zone applicable to the nearest point where a turbine could potentially be located. The applicable assessment zone has been based on distance from the Radar Station and whether a radar line-of-sight condition exists.

Wind Farm ID	Distance to PSR/SSR Radar Station	Radar LOS Assessment (EuroControl Guidelines)	Radar LOS Assessment (NATS Guidelines – UK)
Inchamore	48 km	Detailed Assessment Not Required	Detailed Assessment Not Required

Table 9. EuroControl / UK Safeguarding Guidelines – Mt Gabriel Radar Station

As the table above show, the proposed wind farm is within Assessment Zone 4 as specified by the EUROCONTROL guidelines, which would indicate that a detailed technical assessment would not be required for the impact on the radar station at Mt Gabriel.

2.7 Flight Inspection and Calibration

Flight checks are conducted annually to ensure that flight procedures and associated navigational aids are safe and accurate. These flight checks are carried out by an IAA approved Flight Inspection Service Provider. The checks are carried out during annual inspections consisting of radial and orbital test flights around Kerry and Cork Airports for calibration of instrument landing systems.

It is unlikely that the Flight Inspection Procedures will be impacted as the proposed wind farm is sufficiently far from the airport runways and the flight inspection procedures should already account for the existing obstacles (e.g. terrain and existing wind farms).

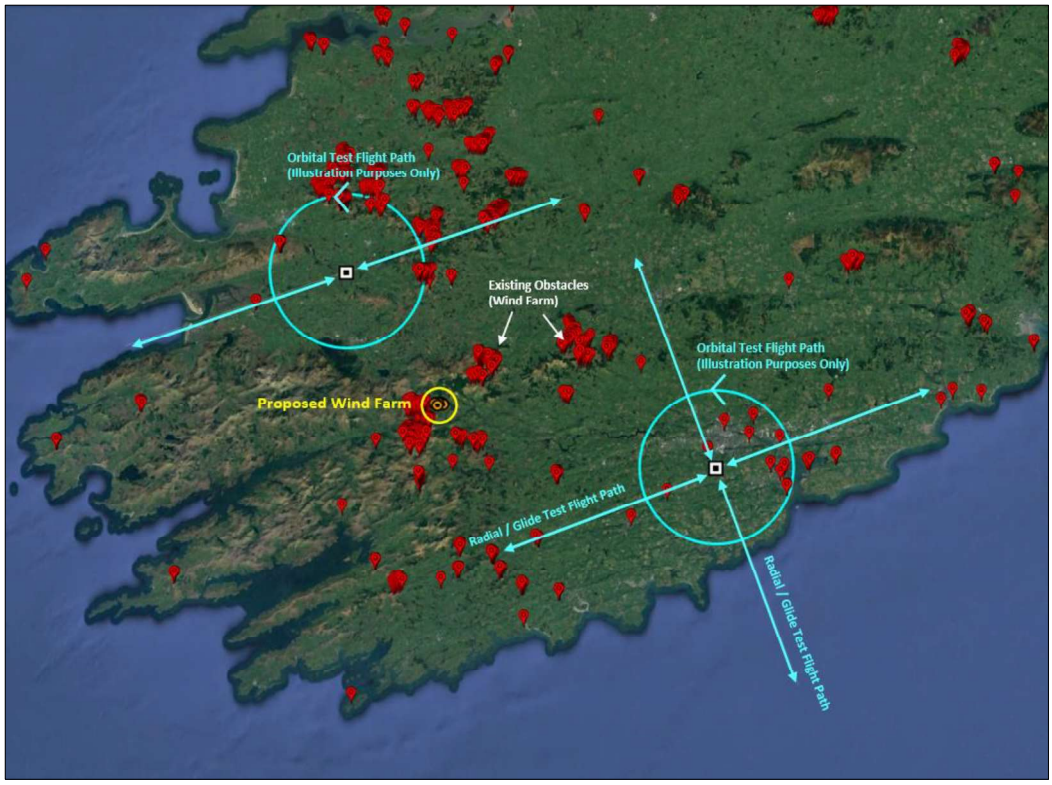


Figure 10. Flight Inspection and Calibration Test Procedures should account for existing obstacles (e.g. terrain and existing wind farms)

2.8 Aeronautical Obstacle Warning Light Scheme

In the event of a grant of planning consent the IAA-ANSP would require the lighting of the proposed wind turbines in the interest of aviation safe-guarding as the proposed development may be considered as an en-route obstacle. The developers of the proposed turbines would intend to implement an aeronautical obstacle warning light.

It is recommended that lighting requirements should be in accordance with Chapter Q – Visual Aids for denoting Obstacles; CS ADR.DSN.Q.851 and GM.ADR.DSN.Q.851 (Pages 729/730) of the EASA Easy Access Rules for Aerodromes (Reg (EU) No. 139/2014) where it states that

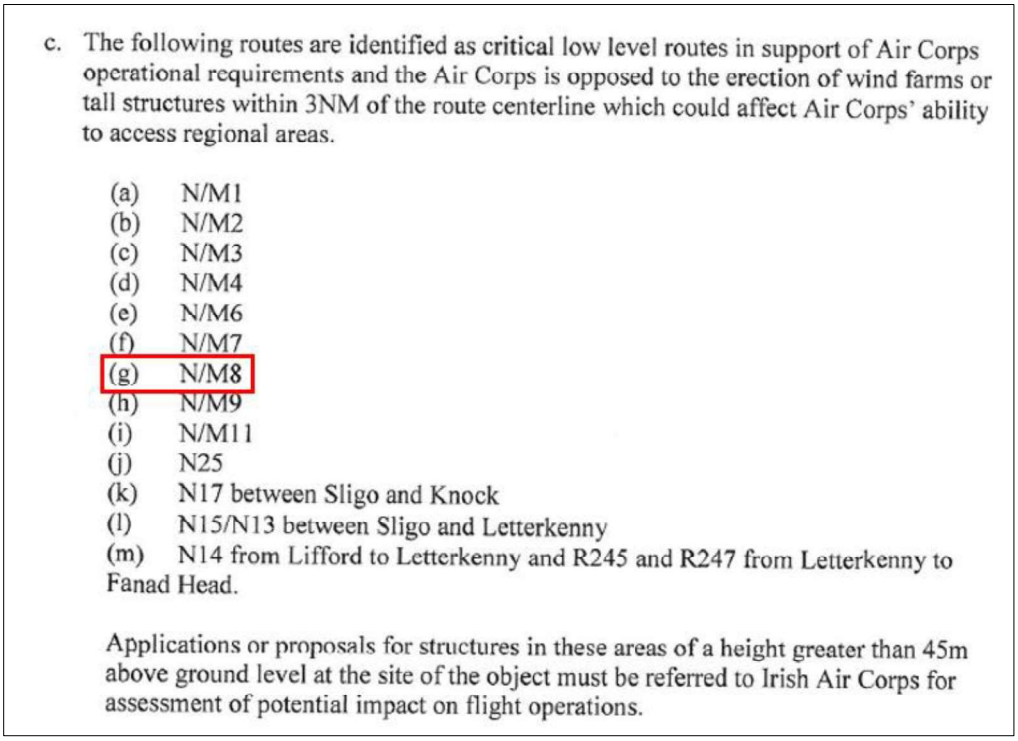
> *"Applicability: When considered as an obstacle a wind turbine should be marked and/or lighted."*

2.9 Irish Air Corps / DoD Safeguarding

The Irish Air Corps Position Paper "*Air Corps Wind Farm/ Tall Structures Position Paper*" published on 08th August 2014, states that the Air Corps are likely to oppose any wind farm / tall structure in the following restricted areas:

- Lands underlying military airspace for flying activity.
- Low Flying Area – LFTA WEST.
- A distance of 5NM or less from military installations.
- Critical low level flying routes in support of Air Corps operation requirements.

The nearest of the Air Corps restricted areas to the proposed wind farm is the low level flight route around the M8 motorway. The proposed wind farm site is 29 NM (54 km) from the M8 and is outside the 3 NM restricted area. As the proposed wind farm is located outside the restricted area, there should be no impacts on Irish Air Corps activities.



c. The following routes are identified as critical low level routes in support of Air Corps operational requirements and the Air Corps is opposed to the erection of wind farms or tall structures within 3NM of the route centerline which could affect Air Corps' ability to access regional areas.

(a) N/M1
(b) N/M2
(c) N/M3
(d) N/M4
(e) N/M6
(f) N/M7
(g) N/M8
(h) N/M9
(i) N/M11
(j) N25
(k) N17 between Sligo and Knock
(l) N15/N13 between Sligo and Letterkenny
(m) N14 from Lifford to Letterkenny and R245 and R247 from Letterkenny to Fanad Head.

Applications or proposals for structures in these areas of a height greater than 45m above ground level at the site of the object must be referred to Irish Air Corps for assessment of potential impact on flight operations.

Figure 11. Irish Air Corps – Critical Low Level Routes

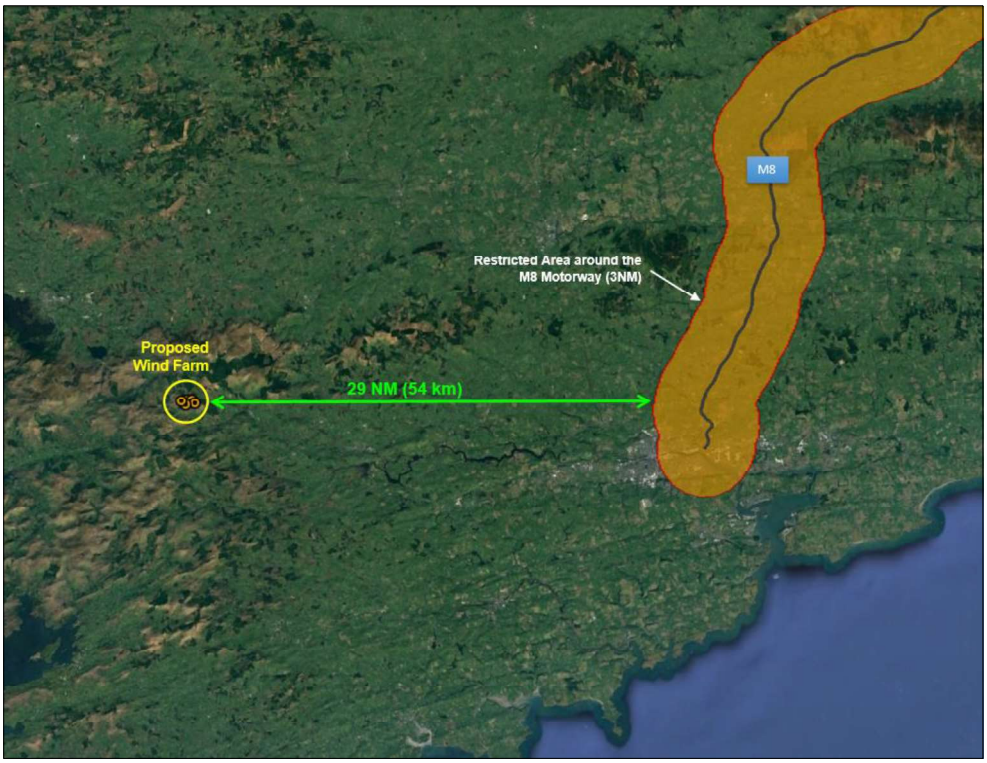


Figure 12. Proposed Wind Farm relative to Critical Low Level Flight Route (M8)

3. Summary

A summary of the aviation review for the proposed wind farm at Inchamore is provided in Table 10 below.

Item	Impact \ Observation	Summary
Annex 14 - Obstacle Limitation Surfaces (OLS)	None	Turbines at the proposed wind farm would be outside the Obstacle Limitation Surfaces for Kerry and Cork Airport.
Annex 15 - Aerodrome Surfaces	OBV	Observation : Turbines at the proposed wind farm would penetrate the ICAO Annex 15 Aerodrome Surface for Kerry Airport. All obstacles, if more than 100 meters above terrain for a distance of 45km from center point of Kerry Airport, need to be registered in the IAA Air Navigation Obstacle Data Set. The IAA may request that the turbines be included in the IAA Aeronautical Electronic Obstacle Data Sets. It should be noted that other existing tall structures nearer to Kerry Airport (e.g. the existing turbines at Scartaglen, Coomacheo, Gneeves, etc.) are also located within the ICAO Annex 15 Aerodrome Surface and are already listed in the IAA Aeronautical Electronic Obstacle Data Sets.
Minimum Sector Altitudes (MSA)	None	A review of the Minimum Sector Altitudes (MSA) shows that the proposed wind farm is within 25 nautical miles from the NDB at Kerry Airport. The maximum allowable structure in the applicable sector is 2900ft (AMSL). Turbines at the proposed wind farm would not exceed the 2900ft threshold, therefore the MSA of the relevant sector will not be affected and there will be no impact on the published MSA altitude figures.
Instrument Flight Procedures	None	A review shows that the proposed wind farm site is sufficiently far from Kerry and Cork Airports that the instrument flight procedures for approach and departure flights to/from the airports are unlikely to be impacted for precision aircraft
Communication and Navigation Systems	None	As the proposed wind farm is over 25 km from the Localizers and transmitting antennas at Kerry and Cork Airports, it is very unlikely that the proposed development will have any impact on these ATS communications and radio navigational aids.
Radar Surveillance Systems Safeguarding	None	The proposed wind turbines would be located in Assessment Zone 4 (EuroControl guidelines) for SSR and PSR instruments and a detailed Impact Assessment will not be required
Flight Inspection and Calibration	None	The annual Flight Inspection Procedures will not be impacted by the proposed wind farm as the proposed site is sufficiently far from the ARPs at Kerry and Cork Airports that there would be no impacts.
Aeronautical Obstacle Warning Light Scheme	OBV.	Observation : It is possible that the IAA may request that the wind farm, if permitted, would be fitted with Aeronautical Obstacle Warning Lights in accordance to industry standards. Subject to further consultation with the IAA.
Irish Air Corps / DoD Safeguarding	None	The proposed wind farm is located outside the Irish Air Corps Restricted Areas.

Table 10. Inchamore Wind Farm – Aviation Review Summary

APPENDIX A - ICAO Annex 15 Area 1 and Area 2 Surfaces.

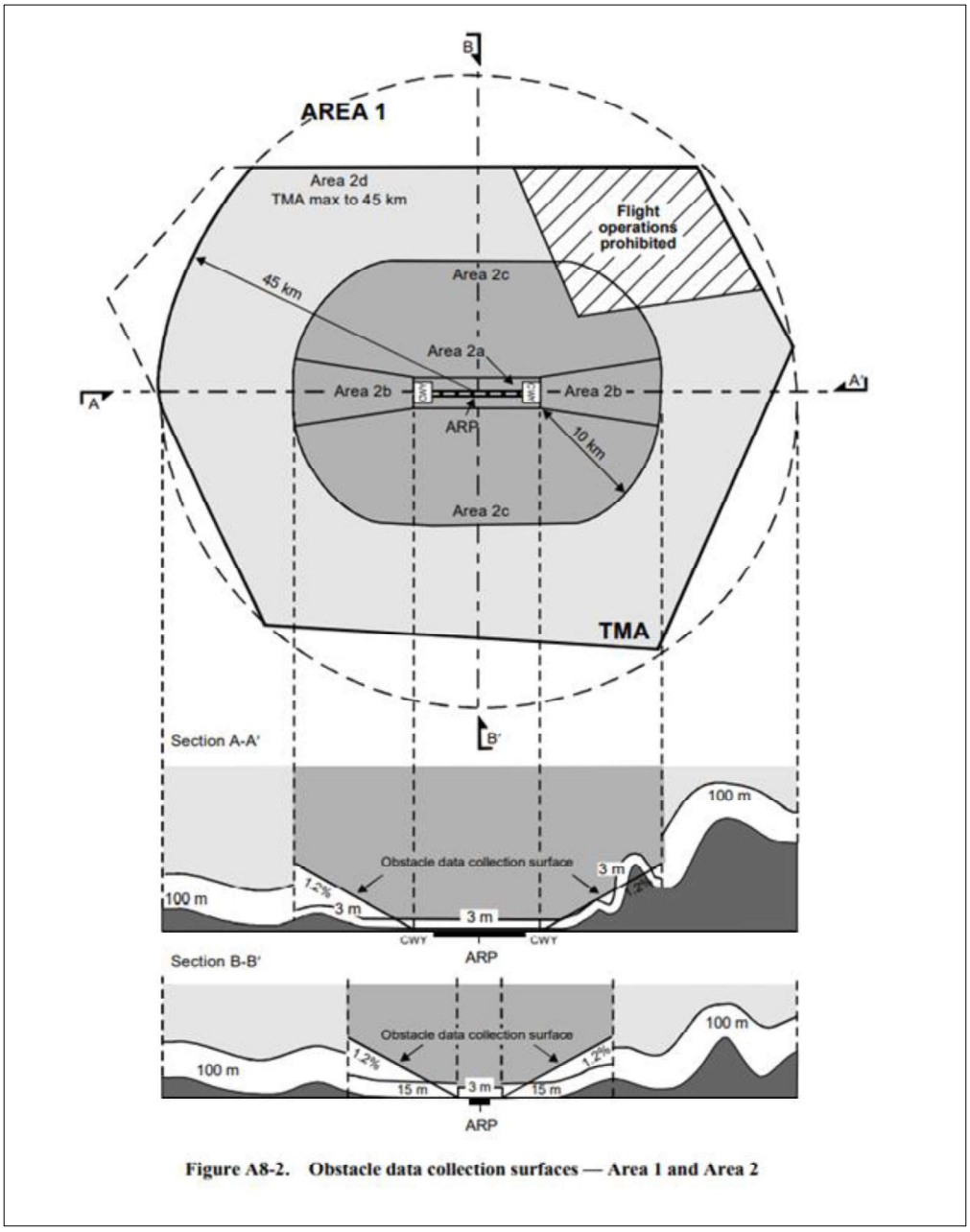


Figure A8-2. Obstacle data collection surfaces — Area 1 and Area 2

ICAO Annex 15 Area 1 and Area 2 Surfaces.