Appendix 14G

Bridge Condition Survey

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Structures Visual Inspection Report

Project Tynagh

EP Energy Developments Ltd. to address the RFI from Galway County Council

Project reference: Project Tynagh
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Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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1. Introduction

Galway County Council (GCC) have Requested Further Information (RFI) on a planning application (Ref. No. 21/2192) for an Open Cycle Gas Turbine power plant and associated infrastructure and buildings in Tynagh, Co. Galway. As part of the RFI response, AECOM have been tasked by the Applicant with carrying out a visual inspection and condition survey of two structures on the proposed haul route along the L4310 between the N65 and the site entrance. This report acts as a record of the structure conditions and highlights the findings of visual inspections carried out between 12pm and 4pm on the 8th of February 2022. The weather was cloudy with constant light rainfall. All structures were visually inspected without the use of special access equipment or the use of traffic management. Inspections were carried out from the footways, carriageways, embankments and riverbeds of each bridge. The following structures were inspected:

- ST01 - 3No. Portal Frames; and
- ST02 – Masonry Culvert.

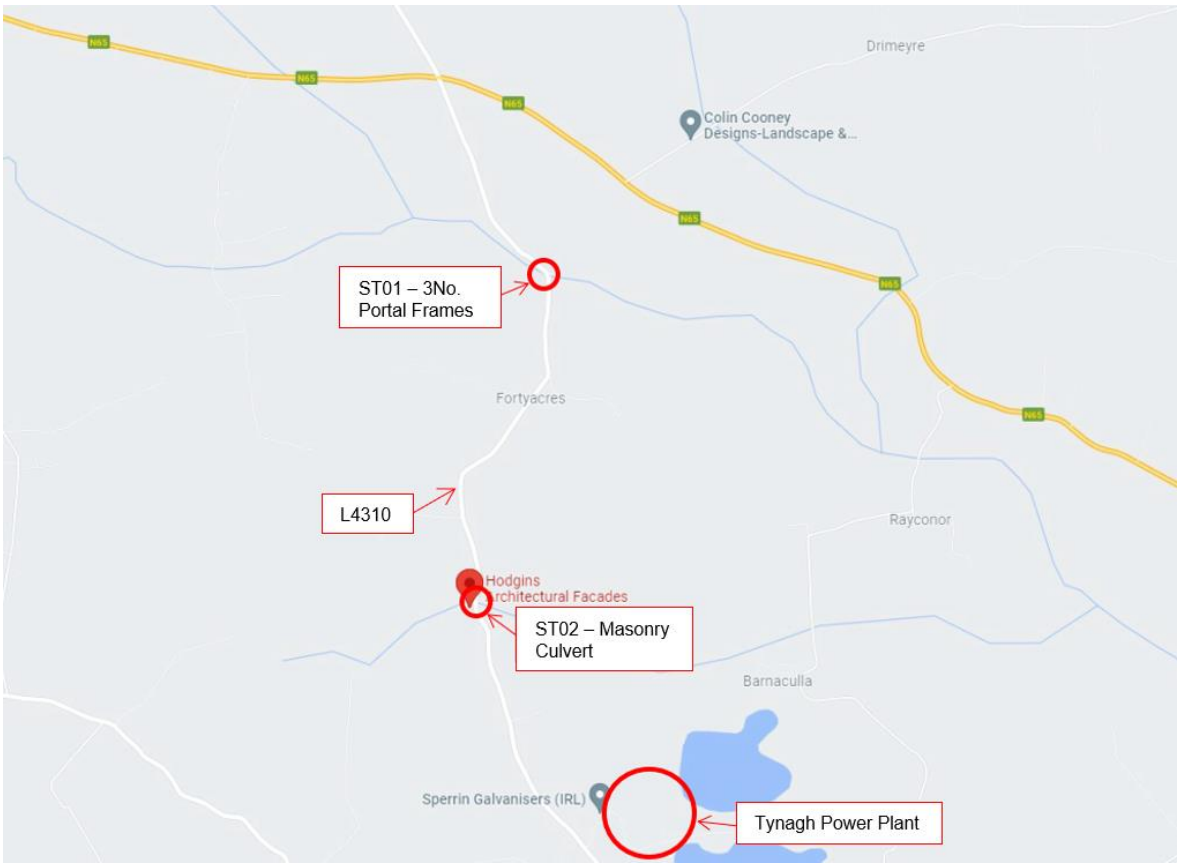

Figure 1 – Structures Location Map

2. Inspection Methodology

Visual Inspections of the structures have been carried out in accordance with best practice and the TII EIRSPAN Bridge Management System Principal Inspection Manual, AM-STR-06054. The element type, condition ratings, and defect type attributed to each element during the visual inspection are as defined within Figure 3.2, 3.8 & 3.11 of AM-STR-06054. For clarity of this report, these figures have been provided for reference below.

1	Bridge Surface
2	Expansion Joints
3	Footway/Median
4	Parapet/Safety Barrier
5	Embankments/Revetments
6	Wingwalls/Spandrel Walls/Retaining Walls
7	Abutments
8	Piers
9	Bearings
10	Deck/Slab
11	Beams/Girders/Transverse Beams
12	Riverbed
13	Other Elements
14	Structure in General

Figure 2 - EIRSPAN Components of a Structure given in AM-STR-06054 Figure 3.2

0	No or insignificant damage
1	Minor damage but no need for 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	Ultimate damage. The component has failed or is in danger of total failure, possibly affecting the safety of the road user. It is necessary to implement emergency temporary repair work immediately or rehabilitation work without delay after the introduction of load limitation measures.
?	Unknown
-	Does not exist

Figure 3 - EIRSPAN Structure Condition Ratings given in AM-STR-06054 Figure 3.8

10	Cracking of concrete
11	Corrosion of reinforcement
12	Spalling
13	Carbonation
14	Corrosion of structural steel
15	Cracking of steel
16	Loose connections
17	Structural damage
18	Permanent deformation
19	Wear and abrasion
20	Material deterioration
21	Abnormal vibration
22	Water seepage
23	Tilt/settlement
24	Erosion/scour
25	Ponding of water
26	Debris and vegetation
27	Blockage of drain
28	No pipe/inadequate pipe length
29	Vehicle impact
30	Potholes
31	Rutting
32	Cracking
33	Abnormal noise
34	Rupture
35	Material loss/disintegration
36	Silting of culvert
37	Inadequate size of component
38	Corrosion
39	Missing
40	Grass verge over structure
41	Damaged paving slab
42	No safety barrier
43	Inadequate parapet height
44	Damaged/missing mesh
45	Loss of masonry pointing
46	No parapet/barrier connection
47	Bulging
90	Other
91	Not applicable
92	Unknown
93	Not registered

Figure 4 - EIRSPAN Defect Codes given in AM-STR-06054 Figure 3.11

3. STR-01 3No. Portal Frames

Inspection Report						
Structure Information				**Structure Position (ITM)**		
Structure Name:	ST01 – 3No. Portal Frames			**Easting;**	573,951.000	
Structure Ref:	Unknown			**Northing:**	715,409.000	
Inspection Information						
Inspector Initials:	CM/RM			**Date:**	08/02/2022	
Weather:	Cloudy/Rain			**Temperature:**	10°C	
Structural Form						
Structure Geometric Information			**Number of Spans**	3 span		
			Total Span Length	Overall Span = 12.65m Portal Clear Skew Span = 3.52m Portal Clear Square Span = 2.7m		
			Structure Width	Skew Width = 12.4m Square Width = 8.05m		
Superstructure			**Type**	3no. Jointed Portal Frames		
			Material	Reinforced Concrete		
Substructure	**Abutment:**		**Type**	Portal Leg Abutment with Wingwalls		
			Material	Reinforced Concrete		
			Foundation	Unknown		
	Pier:		**Type**	2no. Portal Legs with Concrete Grouting between Adjacent Portals		
			Material	Concrete		
			Foundation	Unknown		

Recorded Structural Condition						
Component No.	**Component**	**Condition Rating**	**Maintenance Required**	**Defect Type**	**Photos**	**Comments**
1	**Bridge Surface**	0	Y	-	Y	Surfacing over bridge structure was found to be in good condition with no defects noted, see Figure 7 in Appendix A.
2	**Expansion joint**	N/A	N/A	N/A	N/A	Not applicable to this structure in Appendix A.
3	**Footway / Median**	0	Y	-	Y	No defects were noted to the concrete verges over the structure from inspection, see Figure 7 and Figure 8 in Appendix A.
4	**Parapet/safety Barrier**	2	Y	32 45	Y	Inspection of parapets was undertaken from the bridge deck and riverbed on east side of the bridge. Minor defects noticed including loss of masonry facing and cracking of the pointing. A number of stalactites with staining have formed on the parapet edge beam. See Figure 8, Figure 17, Figure 18 and Figure 19 in Appendix A.
5	**Embankments / Revetments**	2	Y	26	Y	Timber post and wire fencing has fallen on both the north and south embankments on the east side of the bridge. A large PVC pipe was lying on the south east embankment and extending into the river. See Figure 15, Figure 20 and Figure 21 in Appendix A.

Component No.	Component	Condition Rating	Maintenance Required	Defect Type	Photos	Comments
6	**Wingwalls / Spandrel Walls / Retaining Walls**	0	Y	-	Y	Wing walls to structure were found to be in good condition. See Figure 15 and Figure 16 in Appendix A.
7	**Abutments**	2	Y	12 17 20 23 35	Y	South Abutment had visible structural damage at the joint with the wingwall. In addition, loss of rubber filler has occurred at the horizontal joint in the portal leg. Minor spalling and structural damage noted on the north abutment leg, although no visible rebar. There is a noticeable difference in the south abutment leg between the eastern and western sides of the vertical joint. See Figure 22 to Figure 27 in Appendix A.
8	**Piers**	2	Y	10 13 23	Y	Minor vertical cracking is present on the extreme east end of the north pier. Some minor concrete loss on the south pier. Heavy leaching with rusting/carbonation indicators (red/brownish colour) were noted in a number of areas on the piers, concentrated around gaps in the rubber filler in the portal legs and at the vertical joints between the portal units. There is a noticeable difference in the north pier between the eastern and western sides of the vertical joint. See Figure 28 to Figure 31 in Appendix A.
9	**Bearings**	N/A	N/A	N/A	N/A	Not applicable to this structure.
10	**Deck/Slab**	1	Y	17 22	Y	No defects noted to the deck soffit of the structure. It was visible from the riverbed that water can seep through the deck at the main joint location, leaching onto the soffit causing staining. One very minor area of concrete loss was noted. See Figure 32 and Figure 33 in Appendix A.
11	**Beams / Girders / Transverse Beams**	N/A	N/A	N/A	N/A	Not applicable to this structure.
12	**Riverbed**	1	Y	26 36	Y	Riverbed was generally in good condition. Immediately upstream and downstream of the bridge, vegetation build-up is restricting the channel capacity. Silt build-up was noticed in the north and south spans. See Figure 5 and Figure 6 in Appendix A.
13	**Other Elements**	0	Y	12 35 38	Y	Vertical steel strips are visible in the end elevation of all portal legs which are now heavily rusted. Their purpose is unknown. Concrete cover of the steel strip on the north abutment has spalled from the surface. See Figure 11, Figure 12 and Figure 34 in Appendix A.
14	**Structure in General**	2	Y	-	-	Structure was found to be in good condition with some minor defects to elements noted. No major defects were noted to ancillary elements which would indicate that the primary elements of the structure were in distress. See Figure 5 to Figure 16 in Appendix A for general structure photographs.

Maintenance Actions
From inspection of the structure it is advised that the following maintenance actions are undertaken; - Repair rubber filler along horizontal joint in the portal legs; - Repair/replace the timber post and wired fencing along the crest of the river embankment; and - Removal of calcite build-up from parapets and joints.
Inspector's Comments
Inspection of the top surface of the bridge and the parapets was carried out from the bridge deck. Inspection of the substructure elements was carried out from the riverbed and embankments on the east side of the bridge. Due to high water levels, a heavy flow in the river and protective fencing, access to the embankments and riverbed on the west side of the bridge was not possible. From the limited visibility granted from the road level the condition at the west side of the bridge appeared similar to the east side. From inspection the structure appeared to be in good condition with no visible signs of significant distress to the structure or its primary elements.

4. STR-02 Masonry Culvert

Inspection Report						
Structure Information				**Structure Position (ITM)**		
Structure Name:	ST02 – Masonry Culvert			**Easting;**	573,635.000	
Structure Ref:	Unknown			**Northing:**	713,893.000	
Inspection Information						
Inspector Initials:	CM/RM			**Date:**	08/02/2022	
Weather:	Cloudy/Rain			**Temperature:**	10°C	
Structural Form						
Structure Geometric Information			**Number of Spans**	2 span		
			Total Span Length	2.43m (Internal Culvert Spans including Central Pier)		
			Structure Width	9.17m		
Superstructure			**Type**	Double Culvert		
			Material	Masonry Stone		
Substructure	**Abutment:**		**Type**	Abutment wall & wing walls		
			Material	Concrete and Masonry Stone		
			Foundation	Unknown		
	Pier:		**Type**	Central Pier		
			Material	Concrete		
			Foundation	Unknown		

Recorded Structural Condition						
Component No.	**Component**	**Condition Rating**	**Maintenance Required**	**Defect Type**	**Photos**	**Comments**
1	**Bridge Surface**	0	N	-	Y	Surfacing over structure was found to be in good condition with no defects noted, see Figure 36 and Figure 37 in Appendix B.
2	**Expansion joint**	N/A	N/A	N/A	N/A	Not applicable to this structure.
3	**Footway / Median**	N/A	N/A	N/A	N/A	Not applicable to this structure.

Component No.	Component	Condition Rating	Maintenance Required	Defect Type	Photos	Comments
4	**Parapet/safety Barrier**	0	N	26	Y	Inspection of parapets was undertaken from the bridge deck. Heavy vegetation was present over the northern portion of the east parapet. If left unmaintained could damage the masonry facing. No major defects were noted to the parapets over the structure, see Figure 38 and Figure 39 in Appendix B for general condition. However, the west parapet height (450mm) is too low for pedestrians and should be increased to 1.25m in accordance with DN-REQ-03034, The Design of Road Restraint Systems (Vehicle and Pedestrian) for Roads and Bridges.
5	**Embankments / Revetments**	0	N	26	N	No defects noted to the east or west embankment or revetments of the structure, however, access to the east embankment was limited due to the excessive vegetation.
6	**Wingwalls / Spandrel Walls / Retaining Walls**	2	N	26	Y	Wing walls of the structure were found to be in good condition with some vegetation growth, see Figure 40 and Figure 48 in Appendix B. Access to the wingwalls on the east was limited due to excessive vegetation.
7	**Abutments**	2	N	26	Y	Abutments to the structure were found to be in good condition with some vegetation growth, see Figure 40 and Figure 48 in Appendix B. Access to the abutments on the east was limited due to excessive vegetation.
8	**Piers**	0	N	-	Y	Central Pier was found to be in good condition with no defects noted, see Figure 41 in Appendix B.
9	**Bearings**	N/A	N/A	N/A	N/A	Not applicable to this structure.
10	**Deck/Slab**	0	N	-	N	No defects noted to the deck soffit of the structure. Due to the limited clearance within the structure, <1m, inspection of the soffit was not possible.
11	**Beams / Girders / Transverse Beams**	0	N	-	Y	Transverse capping stones and beams were found to be in good condition with no defects noted. See Figure 42 and Figure 44 in Appendix B.
12	**Riverbed**	2	Y	26 36	Y	Debris and silt build-up on the northeast of the structure. Otherwise, the riverbed is in good condition. See Figure 46 and Figure 49 in Appendix B.
13	**Other Elements**	0	N	-	Y	A service duct runs through the southern culvert. No defects were noted to this service duct. See Figure 47 in Appendix B.
14	**Structure in General**	0	Y	-	Y	Structure was found to be in good condition with some defects to elements noted. No defects were noted to ancillary elements which would indicate that the primary elements of the structure were in distress.

Maintenance Actions

From inspection of the structure, it is advised that the following maintenance actions are undertaken;
- Remove excess vegetation from the structure; and
- Remove debris from the riverbed.

Inspector's Comments
Due to limited safe access at on the east side of the structure, visual Inspection was carried out from the bridge deck and west side riverbed and embankments. From the view on the west side through the culvert, it appears that there may be a change in structural form on the east side. Due to limited access to the east side this could not be investigated further. Unidentified wire noted along the southwest revetment. It is recommended the height of the west parapet should be increased to 1.25m in accordance with DN-REQ-03034, The Design of Road Restraint Systems (Vehicle and Pedestrian) for Roads and Bridges. From inspection, the structure appeared to be in good condition with no visible signs of significant distress to the structure or its primary elements.

Appendix A ST01 – 3No. Portal Frames

A.1 General Photos

Figure 5 – East Elevation

Figure 6 - West Elevation

Figure 7 – Surfacing

Figure 8 - Parapet Arrangement

Figure 9 - South Span External

Figure 10 - South Span Internal

Figure 11 - South Pier

Figure 12 - North Span, Central Span and South Pier

Figure 13 - Central Span Internal

Figure 14 - North Span Internal

Figure 15 - North East Wingwall and Embankment

Figure 16 - South East Wingwall and Parapet Edge Beam

A.2 Defect Photos

Figure 17 - Loss of Masonry Facing

Figure 18 - Cracking of Masonry Pointing

Figure 19 - Stalactites and Staining on Parapet Edge Beam

Figure 20 - Fallen Timber Post and Mesh Fence

Figure 21 - Pipe on River Embankment Downstream of ST01 (Masonry Arch Bridge visible here is parallel to ST01 and not included in this inspection)

Figure 22 - Damage and Concrete Loss to South Abutment

Figure 23 - South Abutment Joint Filler Loss

Figure 24 - South Abutment Additional Joint Filler Loss

Figure 25 - Spalling of Concrete on North Abutment

Figure 26 - Damage and Concrete Loss to North Abutment

Figure 27 - Position Difference in South Abutment at Vertical Joint

Figure 28 - Cracking in North Pier

Figure 29 - Damage and Concrete Loss to South Pier

Figure 30 - Heavy Leaching and Material Build-up on North Pier

Figure 31 - Position Difference in North Pier at Vertical Joint

Figure 32 - Leaching and Water Seepage on Soffit of South Span

Figure 33 - Damage and Concrete Loss to Soffit of North Span

Figure 34 - Concrete Spalling around Corroded Steel Strips

Appendix B ST02 – Masonry Culvert

B.1 General Photos

Figure 35 – West Elevation

Figure 36 – Surfacing looking North

Figure 37 – Surfacing looking South

Figure 38 – West Parapet

Figure 39 – East Parapet

Figure 40 – Southwest Wingwall and Abutment

Figure 41 – Central Pier

Figure 42 – Transverse Capping Stone on Southern Culvert

Figure 43 – Southern Culvert

Figure 44 – Transverse Capping Stone on Northern Culvert

Figure 45 – Northern Culvert

Figure 46 – Riverbed

Figure 47 – Service Duct

B.2 Defect Photos

Figure 48 – Northwest Wingwall and Abutment with Vegetation Growth

Figure 49 – Debris and Silt Build-up in Riverbed

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