

IN THE MATTER OF AN APPLICATION TO
AN BORD PLEANÁLA

FOR APPROVAL OF THE FOYNES TO LIMERICK ROAD (INCLUDING
ADARE BYPASS) COMPRISING:

- (I) FOYNES TO RATHKEALE PROTECTED ROAD SCHEME,
2019;
- (II) RATHKEALE TO ATTYFLIN MOTORWAY SCHEME, 2019;
- (III) FOYNES SERVICE AREA SCHEME, 2019.

ABP Ref. ABP-306146-19 and ABP-306199-19

ORAL HEARING

Brief of Evidence

Soils and Geology

By Fintan Buggy B Sc., M Sc., MICE, MIEI.

February 2021

1. QUALIFICATIONS AND EXPERIENCE

- 1.1 My name is Fintan Buggy, I am a civil engineer with 40 years professional experience in the specialist area of geotechnics. I am a Technical Director employed by Roughan & O'Donovan (ROD) in Sandyford, Dublin who were engaged by Limerick County Council from 2014 to present in respect of the Foynes to Limerick Road (including Adare Bypass) Project. I obtained a B Sc. Degree in Civil Engineering from Loughborough University, Leicestershire, U.K. and subsequently a M Sc. Degree in Soil Mechanics from Imperial College, London. I have lived and worked in the United Kingdom, USA and Ireland over my career with the last 16 years employed by Roughan & O'Donovan in Ireland. I am a Chartered Engineer and a Registered Ground Engineering Adviser in both the UK and Ireland.
- 1.2 I currently manage the geotechnical group within ROD and have been involved in the Foynes to Limerick Road (including Adare Bypass) project since 2015. I have served as an expert witness in the area of soils and geology for other road projects, notably the N59 Oughterard to Clifden project in Galway. I have been involved in the ground investigations, preparation of relevant chapters of EIARs and the detailed geotechnical design and construction of several major road projects in Ireland including the N5 Ballaghaderreen to Scramogue, Roscommon; Limerick Tunnel; M7 / M8 Portlaoise Motorway; N21 Castleisland to Abbeyfeale. I served as Chairman and Secretary of the Geotechnical Society of Ireland in addition to currently serving on technical committees of the International Society of Soil Mechanics and Geotechnical Engineering and National Standards Authority of Ireland.

2. ROLE IN PROPOSED ROAD DEVELOPMENT

- 2.1 My role in the Foynes to Limerick Road (including Adare Bypass) Project involved responsibility for the ground investigations along the proposed route plus the soils and geology appraisal in respect of the proposed road development. My responsibilities include:
- Managing the geotechnical / geology team to ensure that potential impacts to soils and geology resources and receptors are appropriately assessed in the EIAR;
 - Working with other specialists (specifically Hydrology / Hydrogeology, Biodiversity and Engineering Design) to ensure that potential soils and geology interactions are appropriately considered.
 - Preparation of Chapter 8 Soils and Geology of the EIAR for the proposed road development and the associated Appendices.
- 2.2 The evidence I am presenting covers impacts of the proposed road development on Soils and Geology, as it relates to the loss or use of natural soils and rock resources (e.g. quarries); treatment of waste which may result from soft ground or contaminated soils; risks of ground instability related to landslides, erosion or karst features such as sinkholes and caves; geologic heritage features.

- 2.3 Full details of the above assessments are presented in the relevant sections of the EIAR reports and the response to the Request for Further Information (RFI) from An Bord Pleanála as follows:
- Soils and Geology impact assessment of the proposed road development, Chapter 8 of the EIAR;
 - Response to the RFI, Items 1 – 5 and 7 -9 relating to soils and geology issues.

3. EXECUTIVE SUMMARY

- 3.1 The following summary of EIAR Chapter 8 and of the relevant responses to the RFI, focusses on the key aspects of the baseline conditions; assessed impacts and proposed mitigations in respect of Soils and Geology.
- 3.2 Soft ground (including peat, soft glacial, alluvium, estuarine and lacustrine soils) is present along the route especially in proximity to rivers, streams, lakes and low lying ground. These soils represent 320,000 m³ of excavation and replacement (a relatively modest total quantity in the context of a 35km long major road development) and has been included in the Earthworks Volumes reported in Table 4.20 and described in Chapter 4, Section 4.11 of the EIAR. This volume excludes a topsoil volume of 415,000 m³, which is suitable for landscaping and will be stripped, stored and reused within the project. Whilst not expressly stated in the EIAR, I should confirm that the volume of peat soils are modest at around 35,000 m³ or 11% of total soft ground. These highly organic soils are not suitable for landscaping and will be stored within borrow areas available within the project CPO limits. A number of locations have been identified for storage of peat and other soft ground within borrow pits including at the base of widened rock cuttings as described in Chapter 8, Section 8.4.1.9 of the EIAR. There is sufficient capacity to store all such excavated soft ground if required within the project CPO limits. Additionally, significant reductions in total volumes of excavated soft ground by means of ground improvement using lime modification, vertical drains or surcharge are feasible and could be used. For the sake of completeness, I confirm that, whilst lime modification is not explicitly mentioned in EIAR, it is an example of a feasible method of “ground improvement”, which is mentioned in EIAR Ch 4.11.2. In order to ensure a robust assessment of impacts on soils and geology, whilst it is anticipated that there will be a reduction in volumes of excavated soft ground which have been predicted in the EIAR, no account has been taken of potential reductions in these volumes of excavated soil in assessing the potential impacts of the proposed road development. In other words, the maximum excavated soft ground volumes and impacts have been predicted and fully assessed in the EIAR.
- 3.3 An earthworks balance deficit of 1.3 million m³ is expected from the construction of the proposed road development. A portion of this volume – up to 500,000 m³ – could be sourced from borrow pits within the alignment of the compulsory acquisition in relation to the proposed road development and the remainder will be obtained from local licensed quarry sources. The loss of reserves to existing quarries in the region is assessed as a moderate adverse impact. The main areas of deficit for earthworks materials occur at the southern 3km of Section C from Graigeen to Rathkeale requiring

850,000m³ of fill, and 3.5km to the east of the River Maigue in Section D requiring 240,000m³. The sources of imported materials will be licensed commercial quarries in proximity to the project as described in Chapter 4 Section 4.16.8 of the EIAR and shown below. Transport routes / entry points into the project for earthwork fill will be restricted to 7 locations off national and regional roads with the most heavily utilised routes for importing earthworks materials being at N21 Rathkeale, R518 at Graigeen and N21 proposed Adare Junction at Gortaganniff. The traffic impacts of imported material transportation for the project are fully addressed in Chapter 4, Section 4.16.9 of the EIAR and permitted haulage routes and access points are shown in Figures 4.71 (Rev A) and 4.71a as outlined by Seamus Mac Gearailt in his Brief of Evidence presented on Monday and illustrated below.

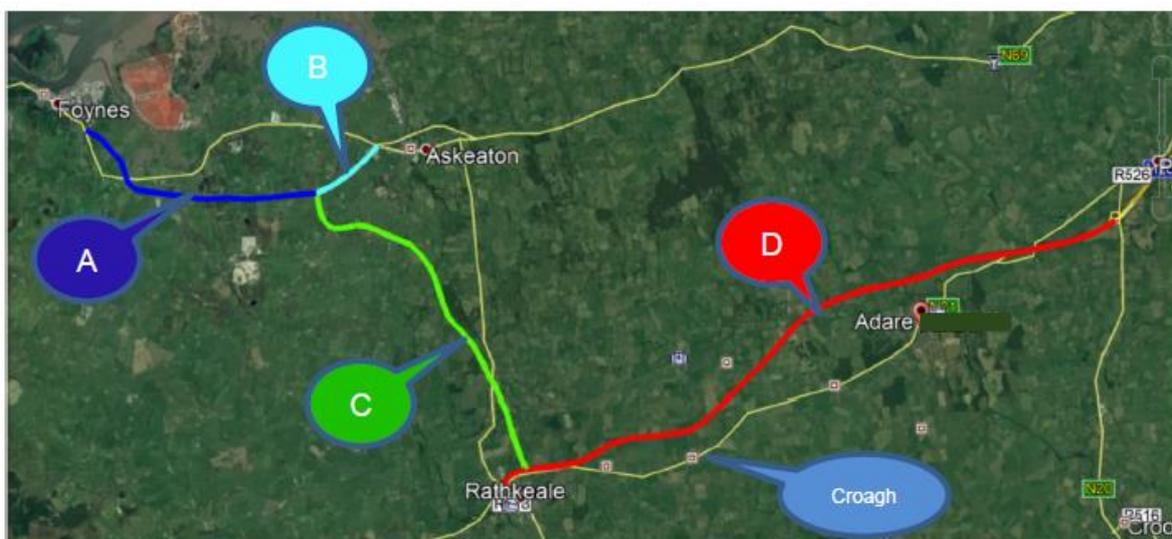


Plate 4.2 Sections of the Proposed Road Development (Source: Google Earth)

Table 4.20 Earthworks Volumes

1	2	3	4	5	5	6	7	8	9	10
		Cut (m ³)			Fill (m ³)			Balance (m ³)	Other (m ³)	
Chainage	Unsuitable Material (Part of 2 +)	Suitable Soil	Rock	Total suitable Material (3+4)	Embankments	Fill to replace soft ground	Total General Fill (6+7)	Suitable Cut minus Fill (5-7)	Capping (m ³)	Topsoil Strip & Reuse (m ³)
Section A Ch. 1+000 – Ch. 7+320	80,000	300,000	1,300,000	1,600,000	530,000	10,000	540,000	1,060,000	20,000	95,000
Section B Ch. 10+000 – Ch. 11+940	-	-	-	-	220,000	-	220,000	- 220,000	-	20,000
Section C Ch. 20+000 - Ch. 29+260	50,000	0	0	0	1,700,000	50,000	1,750,000	- 1,750,000	30,000	100,000
Section D Ch. 50+000 – Ch. 65+550	190,000	500,000	600,000	1,100,000	1,250,000	90,000	1,340,000	- 240,000	100,000	200,000
TOTAL (rounded)	320,000	800,000	1,900,000	2,700,000	3,700,000	150,000	3,850,000	-1,150,000	150,000	415,000
Net (m³)	12%	2,700,000						-1,300,000		



Map of Active Quarries

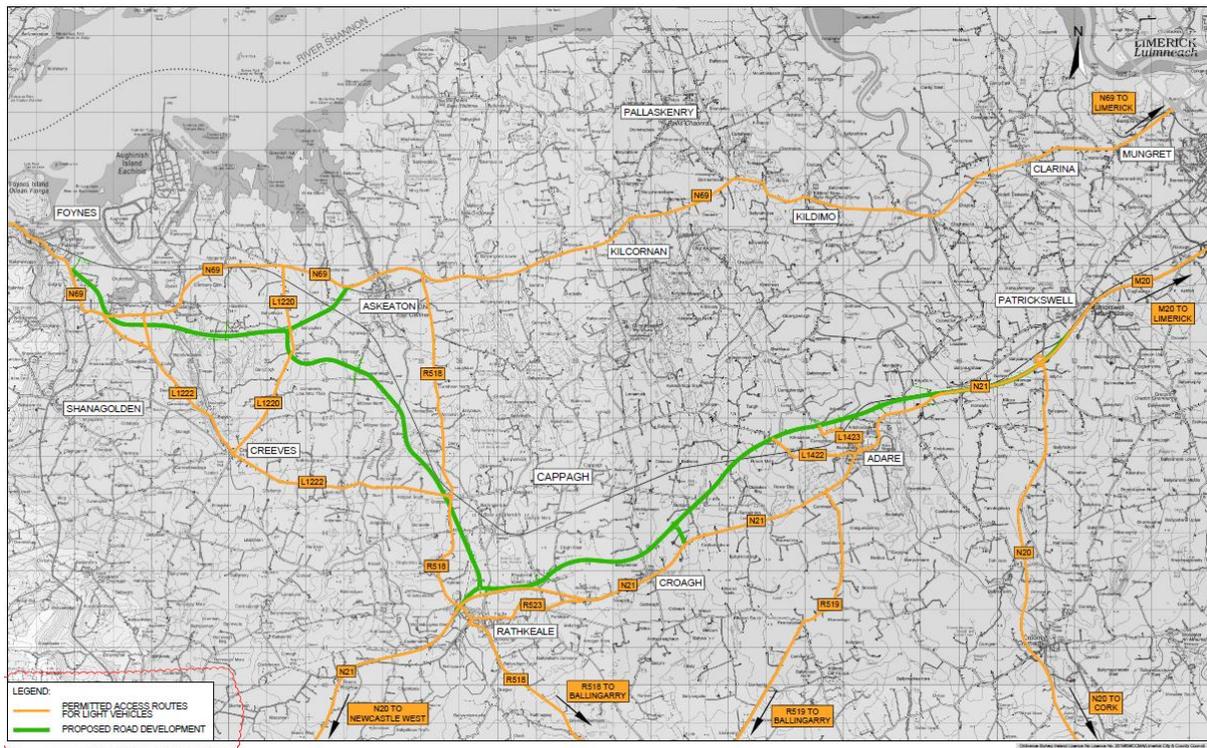


Figure 4.71 of Volume 3 of the EIAR – Permitted Haulage Routes for Light Vehicles (Rev A)

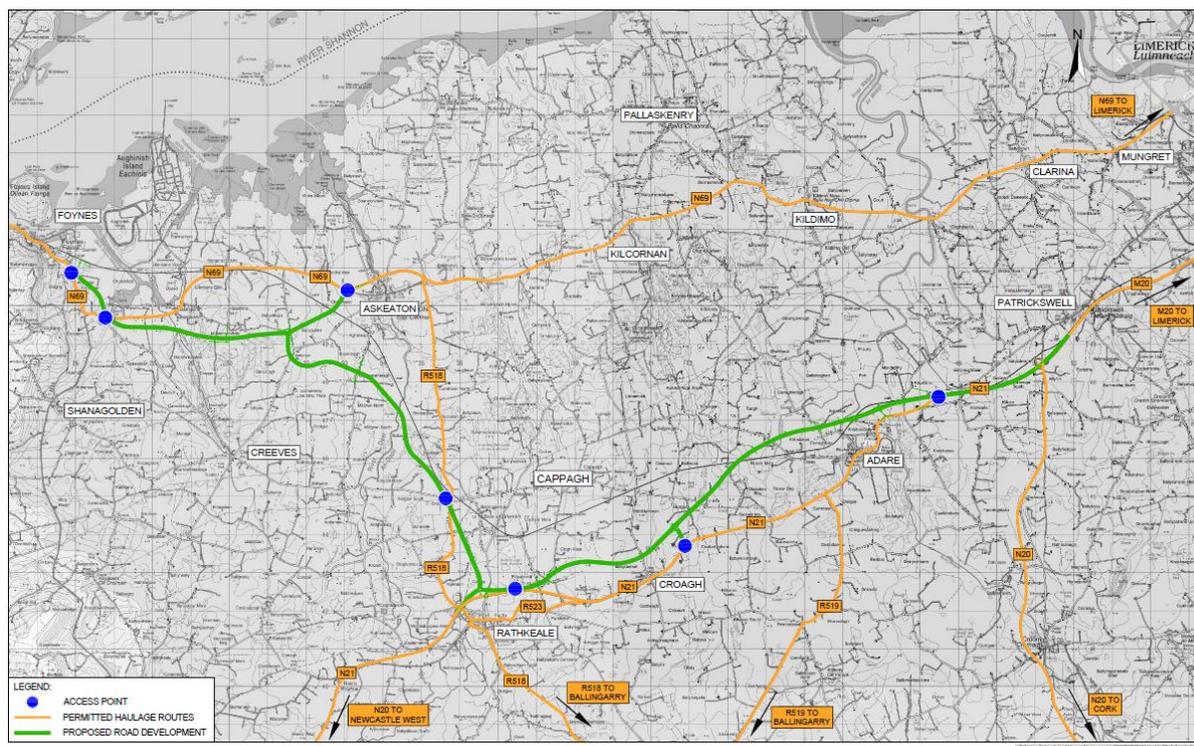
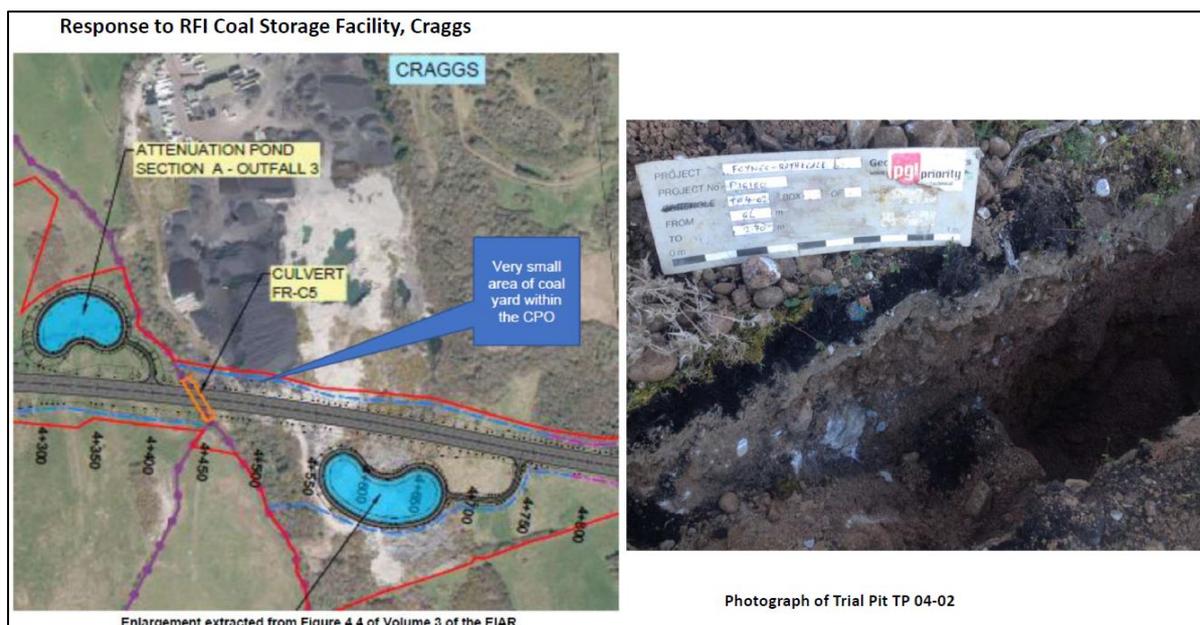


Figure 4.71a Permitted Haulage Routes

3.4 Waste materials which cannot be safely disposed, such as waste expected at the southern edge of a fuel storage / coal depot facility in Craggs in Section A (near Ch. 4+500), will be disposed of at appropriate licensed facilities. This is described in further detail in the response to the RFI, Item 8. The area potentially containing coal waste is roughly triangular shaped with dimensions 60m x 40m based on aerial photography and proven by ground investigations and the observed depth of contaminated material is 0.3m. A total volume of contaminated waste is estimated at 360m³. All excavated waste soils will be tested on site and transported to a licensed landfill facility. There are no local landfill facilities suitable for this small volume of coal waste which is likely to be transported to a licensed facility such as Integrated Material Solutions Ireland in Co. Dublin. Inert soil materials will be separated and as already explained, there is sufficient capacity to store all such excavated materials within the project CPO limits.



3.5 Karst features which have potential to be unstable e.g., depressions, sinkholes, caves etc. have been identified by a combination of site reconnaissance, desk top review of existing GSI databases and aerial photography, geophysics surveys and intrusive boreholes. Further intrusive investigation of geophysics anomalies, possibly related to karst features was performed, and no such features were found as discussed in the response to the RFI, Items 4 and 5. Some minor features including small voids and clay infill at depth within the bedrock were identified in boreholes at the Mulderricksfield cutting and proposed mitigations include filling and sealing with concrete as described in Chapter 8 of the EIAR, Section 8.4.1.5. Karst features such as springs and turloughs which may have hydrogeologic or ecologic significance are separately addressed in the EIAR Chapter 7 Biodiversity and 9 Hydrogeology by the relevant specialist experts. I confirm that no significant adverse impacts to Soils and Geology receptors are expected from karst and sufficient investigations have been performed to substantiate this conclusion.

3.6 The removal of relatively small volumes of organic soils from the project footprint has previously been addressed in section 3.2 of this Brief of Evidence and is expected to have a slight adverse impact on soils and geology in the context of a loss of organic soils.

4. RESPONSES TO SUBMISSIONS / OBJECTIONS ON SOILS AND GEOLOGY

4.1 Three submissions / objections were received arising from the response to the Further Information Response document furnished to An Bord Pleanála in September 2020 in respect of Soils and Geology.

Issues raised in submissions / objections

4.2 Submission FI-2 has expressed concerns about the volumes of rock blasting and associated adverse impacts to nearby residents and property.

Response

- 4.3 As addressed in Chapter 8 of the EIAR, section 8.4.1.4, the extent of rock excavation by blasting is only expected at two locations: the cutting at Mulderricksfield chainage 5+150 to 6+400; and over approximately 65% of the cutting length, (typically in the lower 3 to 4m of the cutting depth) at Ballycannon, chainage 52+400 to 56+000. However, all four rock cuttings on the project have been assessed for noise and vibration impacts. The rock excavation assessment is based upon the measured rock strength determined by laboratory testing of relevant rock core and the nature of discontinuities (fractures and joints) present in the rock mass observed in rock cores obtained during the ground investigations. These measured rock properties are correlated to excavation methods including blasting using a well-recognised methodology developed by Pettifer and Fookes (1994). Noise and vibration impacts from potential blasting are assessed by Jennifer Harmon in Chapter 12 Noise and Vibration of the EIAR, Section 12.4.1.4 and mitigation measures are described in Section 12.5.2. See also section 4.5 of Jennifer Harmon's Brief of Evidence which further responds to submissions regarding blasting.

Location of Major Cuttings Likely to Require Blasting



Issues raised in submissions / objections

- 4.4 Submission FI-2 expressed concerns about impacts of ground investigations undertaken on lands adjacent to Lismakeery stream (specifically RC10-09) due to pollution from grout and mitigation methods to be adopted during construction to prevent pollution of watercourses.

Response

- 4.5 The borehole in question RC10-09 was constructed during 24th to 26th April 2017. While I note the concern raised, there is no field record documenting that pollution occurred or that the matter was raised with supervisory field staff at that time.
- 4.6 As set out in the Hydrology/Hydrogeology Brief of Evidence, measures are proposed in Chapter 9 (Section 9.5) and Chapter 10 (Section 10.5) of the EIAR for the protection of surface waters and groundwater during both construction and operation stages. Adherence to good construction practices, as fully outlined in the Environmental Operating Plan (EOP) (Appendix 4.1 of the EIAR), will ensure protection of water quality in all drainage catchments and watercourses traversed by the proposed road development.

Issues raised in submissions / objections

- 4.7 Submission FI-2 and Submission FI-4 raise concerns that records of site visits in the response to the RFI were unsatisfactory. It is claimed that no walkovers were performed on the stakeholders land and quality control checks should have been done by Geotechnical engineer during ground investigations.

Response

- 4.8 The records of general site reconnaissance visits are described in the response to the RFI - Item 1, which included photographic records and notes of features of interest. The ground investigation works were supervised and monitored by designers engineering staff and this was recorded in weekly progress meetings held on site. In addition, visits by geotechnical engineering staff occurred intermittently during the field investigation phase to confirm the quality of works being performed.

Issues raised in submissions / objections

- 4.9 Submission FI-3 requests the local authority to consult directly with their respective Regional Waste Management Planning Office regarding development of the final plans in respect of waste.

Response

- 4.10 Limerick City and County Council will consult with the Regional Waste Management Planning Office prior to the construction phase, in order to confirm the manner in which the relevant mitigation measures identified will be implemented. This has been added to the Schedule of Commitments.

5. CONCLUSION

The submissions received have been considered and it is confirmed that the assessment undertaken in Chapter 8 Soils and Geology, the mitigation measures proposed and the conclusion stated remain valid and unchanged.

Appendix 1

The following submissions have been responded to in this Brief of Evidence:

Submissions Responded to in this Brief of Evidence	
ENV-	None
SCH-	None
FI-	2,3,4