Appendix to Chapter 15: Material Assets (Roads)

Appendix 15.1: Traffic and Transportation Assessment Report

The data and descriptions in this appendix have informed the cumulative evaluations in the EIA Main Report.

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A15.1.1 EXECUTIVE SUMMARY – (NON-TECHNICAL)

This Traffic & Transport Assessment Report assesses the cumulative impact of the subject development UWF Grid Connection, in addition to all other elements of the whole Upperchurch Windfarm Project.

The Whole UWF Project consists of a series of related supporting projects associated with the consented Upperchurch Windfarm (identified herein within Section A15.1.5). The whole project, when built, will involve the export of the renewable electricity generated at the permitted Upperchurch Windfarm to the national grid.

This report has been prepared in accordance with Transport Infrastructure Ireland's Traffic & Transportation Assessment Guidelines and addresses the worst case vehicular traffic impact of the Whole UWF Project, for both the construction and operational phases. The adequacy of the road network to safely and appropriately accommodate the worst-case Transportation demands of the development are addressed.

A comprehensive classified traffic survey (counts) of the road network in the vicinity of the projects was undertaken and this information, together with observation of the performance of the road network, forms the basis for this assessment. Traffic Data was collected using temporary Automatic Traffic Counters known as 'ATC tube counters', and these allowed full vehicle classification and traffic speeds to be measured and recorded.

The assessment included a photographic condition survey of the existing roads and associated affected structures. For UWF Grid Connection a Pavement Condition Survey was commissioned in order to determine the condition of the road. It is proposed to undertake another pavement condition survey following the works in order to confirm that no adverse impact has occurred. For UWF Related Works, Falling Weight Deflectometer (FWD) testing was carried out in order to determine the strength of the affected local roads.

The construction programme and plans prepared for the Whole UWF Project allowed the associated daily traffic volumes to be calculated. The worst case daily traffic associated with each element of the works was assigned to the roads in accordance with industry guidelines for an assumed commencement year of 2021. The impact of the traffic has been assessed and quantified.

The Report sets out the temporary and permanent traffic management measures which are to be put in place at the construction and operational access points in order to ensure the continued operation of the roads in a safe manner and without any impact upon capacity in order to ameliorate and minimise impact upon road users.

Based on our studies, we believe that, with some checks and balances in place in the form of temporary Traffic Management and road condition surveys, there will be no adverse traffic/transportation capacity or road safety issues associated with the construction or operation of the Whole UWF Project.

A15.1.2 INTRODUCTION TO THE TRAFFIC & TRANSPORTATION ASSESSMENT

This Traffic and Transportation Assessment has been has been written by David Tarrant, Ruairí Geary and Daithí Barrett with TLI Group. This Traffic and Transportation Assessment addresses the Traffic/Transportation and Construction/Operational Access issues arising from the development of the Whole UWF Project.

Evaluations contained within this Transportation Assessment are based upon site visits, observations of operational performance of the existing road network, a comprehensive classified interval movement and speed survey, a comprehensive Falling Weight Deflectometer (FWD) Test, a comprehensive Pavement Condition Survey and our experience in assessing and designing for developments of this nature.

The Report has been prepared following consultation with Tipperary County Council Roads Department and Transport Infrastructure Ireland. Further details on these consultations are included in Appendix 3.3 in Volume C4 of the EIA Report.

The Report has been prepared broadly in accordance the following information and industry accepted practices:

- Transport Infrastructure Ireland's (TII) Traffic and Transport Assessment Guidelines (2014)
- TII Design Manual for Roads and Bridges
- The Department for Transport Traffic Signs Manual (2010),
- TII Specification for the Reinstatement of Openings in National Roads (2013).
- Department of Transport, Tourism and Sport Guidelines for Managing Openings in Public Roads

A15.1.3 EXISTING CONDITIONS

The existing roads environment consists of a section of the Regional Road R503, along with a mix of local roads which are generally rural in nature and lightly trafficked and used for local residential access, forestry access and farming access purposes.

A15.1.3.1 ROADS

The affected roads include those subject to road works associated with cable laying or temporary road widening; roads with temporary or permanent site access points, and roads along the concentrated haulage routes.

All of these roads are 2-way roads, with the except of 3 local roads, with the trafficked pavement varying in width from 2.5 to 8.3m, with narrow verges, and are generally bounded by low level earthen embankments or hedgerows along either side.

The roads relevant to the UWF Grid Connection and the UWF Related Works elements of the Whole UWF Project are listed in Table 1, and identified on Figure GC 15.2 and Figure RW 15.2. The subject development figure is at Tab 15 of Volume C3: EIA Report Figures. The other element figures, i.e Figure RW 15.2, is in Volume F: Reference Documents to the Planning Application. These figures are also available on **www.upperchurchwindfarmgridconnection.ie**.

Any roads marked with an asterisk appear on both lists. It should also be noted that the roads associated with the UWF Related Works will also be used for access to the Consented Upperchurch Windfarm. The UWF Replacement Forestry entrance is located off the L2264-34, (also indicated on Figure RW 15.2, Reference Documents Volume F1).

Table 1: Roads affected by UWF Grid Connection and UWF Related Works

UWF Grid Connection	UWF Related Works
R503*	R503*
L2166-10	L4139-0
L6013-0	L4138-12
L2156-0	L4139-16
L2157-0	L6188-0*
L6009-0	L61881-0
L2264-50*	L2264-50*
L6188-0*	L6185-13
	L2264-34

A15.1.3.1.1 Road Pavements

The road pavements consist of traditional surface-dressed flexible pavement ('tar and chippings'), with narrow verges and road surface water drained to open drains, generally running along each of the roadsides.

Pavement Condition Survey: A Pavement Condition Survey typically comprises forward view Digital Video, IRI and PCI, or a combination of these. The ride quality (IRI) and digital video of a road network is assessed using a Video/Roughness survey vehicle. The ride quality of the road pavement is expressed in terms of IRI (International Roughness Index). The Video/Roughness vehicle takes a forward view video of the road surface using a broadcast quality high-definition video camera, and measures the ride quality of the road using two bump integrators located on the vehicle axle, for each 100 metres of roadway. The video and ride quality data are recorded using both chainage and GPS referenced coordinate systems by an on-board computer in the cab of the survey vehicle. The video record will show the condition of the road surface by chainage and can be viewed in digital format. The video recorded in the field for each road section can be post-processed in the office to produce the video Pavement Condition Index (VPCI). The PCI survey consists of identifying the type, severity and quantity of pavement distress for each 100 metre length of pavement from the video recorded. These distresses include defects such as bleeding, ravelling, patching, rutting, depressions, alligator cracking, potholes, edge break-up and road disintegration. The PCI rating, and the structural index and surface index based on distress type, are calculated for each 100 metres from the distress data collected. The Pavement Condition Survey for the UWF Grid Connection is included as Appendix 15.2.

Falling Weight Deflectometer (FWD) Testing: In order to accurately determine the load bearing capacity of the affected UWF Related Works local roads, a comprehensive FWD Test of the affected local road network was undertaken by specialist supplier, Milestone Pavement Technologies Ltd. The FWD is a non-destructive test which determines the load bearing capacity of a pavement structure. The FWD drops a known mass from a pre-defined height onto a loading plate. The load pulse generated is similar to the dynamic load pulse generated by a moving wheel of a heavy goods vehicle travelling at normal traffic speed. Measurements of the pavement deflection in response to the load provides information on the overall bearing capacity of the pavement. The extent of the testing and the results are included as Appendix 15.4.

In summary, the FWD testing shows that there is stiff to moderate subgrade support under the roads, and while the local road surfaces were observed during site investigations to be generally in good condition with few potholes, the FWD testing indicates that the pavements themselves are weak.

A15.1.3.1.2 Buried Structures

There are 65 No. buried structures located on the route of the 110kV UGC, 15 bridges and 50 concrete/stone culverts. 1 No. buried structure under the 2166-10 (1 culvert, W4), 2 No. buried structures (1 bridge and 1

culvert, W5 – W6) under the L6013-0, 1 No. buried structure (1 bridge, W7) under the L2156-0, 2 No. buried structures (2 bridges, W8 – W9) under the L6009-0, 52 No. buried structures (11 Bridge and 41 culvert, W10 – W61) under the R503, 3 No. buried structures (3 culverts, W62 – W64) under the L2264-50, 2 No. buried structures (2 culverts, W65 – W66) under the L6188-0 and 2 No. buried structures (2 culverts, W67 – W68) under the private paved road at Knockcurraghbola Commons. These structures were visually inspected by TLI Group (civil engineer) during site investigations. Photographs of these structures are included in Appendix 15.3.

At UWF Related Works locations, there are 3 No. buried structures under affected roads; concrete culverts routing storm water under the L6188-0 at WW31 and under the L4139-0 at WW12 and a square masonry culvert routing a small stream under the L6185-13 road at WW32. All three structures have been inspected by Wind Prospect Ireland (civil engineer) who found that the structures are in good condition and are not subject to vehicular weight restrictions, therefore it is considered that these structures will not be affected by either the 1m extension to the two concrete culverts or the additional construction traffic associated with the UWF Related Works and the Consented Upperchurch Windfarm.

A15.1.3.1.3 Current Weight Restrictions

There are no vehicle weight restrictions in place along any of the roads affected by the works. This provides a useful guide to the acceptability of the roads and buried structures and their adequacy to facilitate the movement of HGV vehicle types, subject to the normal legally allowable axle loading on Irish Roads.

A15.1.3.1.4 Road Boundaries

Road boundaries consist of a mix of hedgerows and simple mounded embankments, which are aligned beyond drainage channels that occur in many roadside verges.

A15.1.3.2 TRAFFIC

A15.1.3.2.1 Existing Traffic Volumes

7-day classified 'ATC Tube Counts' surveys were carried out at on each of the affected roads in order to establish background traffic conditions, in terms of volume and ambient speed. All vehicles recorded during the traffic survey are expressed in terms of “Passenger Car Units” (PCUs), sometimes referred to as “Car Equivalents”. This is the methodology which has been employed here (with for example specific industry standard conversion factors to convert HGVs, Skip Lorries, Cars/Trailers and Bin Lorries to PCUs). The conversion factors used are in accordance with industry-standard recommendations.

The existing traffic conditions of the affected roads, as recorded during the surveys, are presented in Table 2 and Table 3. The Electoral Districts in which each of the affected roads are located, are also identified in the Table, for ease of reference to the CSO data in Table 4. In summary, it is clear from Tables 2 to 6, that the roads in the area are generally very lightly trafficked, reflecting the rural nature of the study area.

Table 2: Summary of Existing Traffic Conditions for the UWF Grid Connection

Traffic Count Locations	Road ID	Electoral District	24Hr 2-Way AADT (PCUs)	% HGVs	AM Peak Hr 2-Way Flow (PCUS)	PM Peak Hr 2-Way Flow (PCUS)
T1	L-2166-10	Kilcomenty	721	0.5%	94	66
T2	L6013-0	Kilcomenty	301	0.4%	35	27
T3	L2156-0	Kilnarath	1016	0.3%	97	108
T4	L2157-0	Kilnarath	967	0.7%	85	95
T5	L6009 at Castlewaller	Kilnarath	217	0.2%	31	21
T6	L6009 at Cooldrisla	Newport	407	0.7%	38	37
T7	R503 at Derryleigh	Newport	2046	0.9%	176	229
T8	R503 at Rear Cross	Abington	950	1.6%	80	110
T9	R503 at Knockmaroe	Foilnaman	709	1.9%	66	87
T10	L2264-50	Foilnaman	183	0.8%	19	23
T11	L6188-0	Foilnaman	76	0.6%	7	7

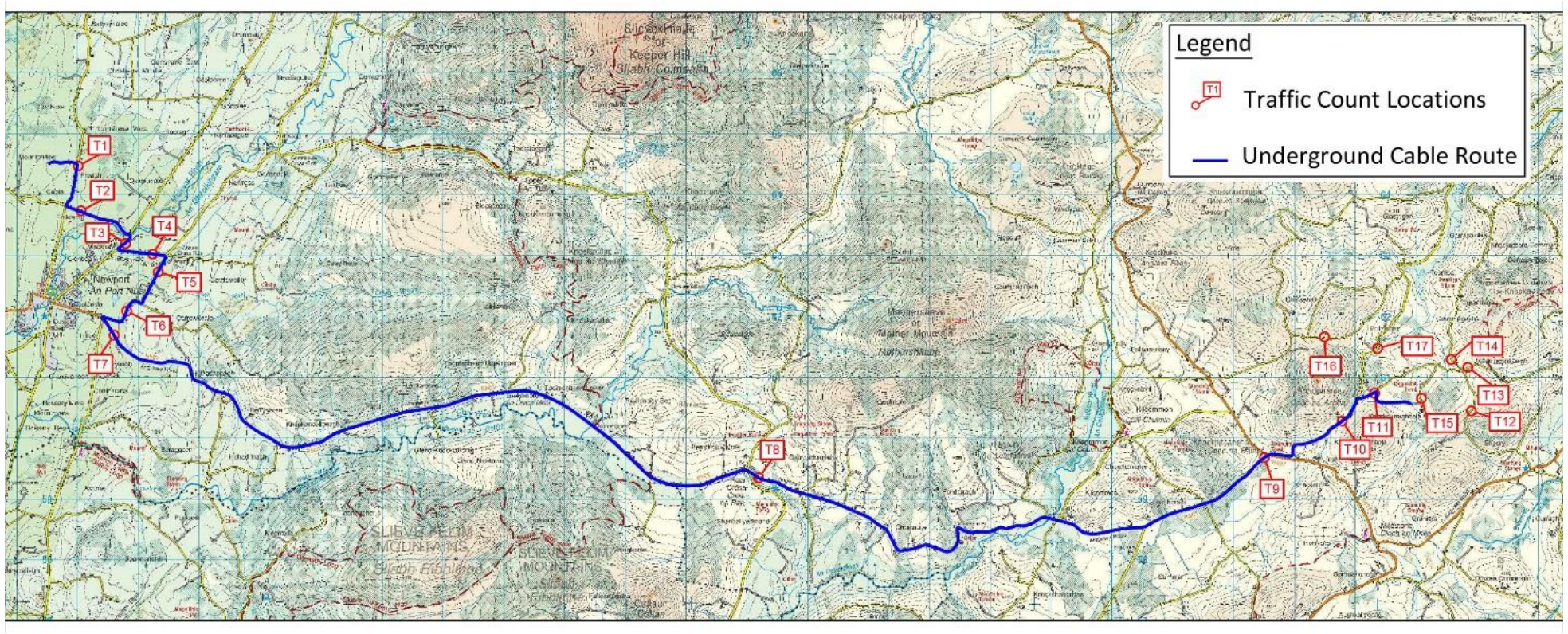
Table 3: Summary of Existing Traffic Conditions for the UWF Related Works

Traffic Count Locations	Road ID	Electoral District	24Hr 2-Way AADT (PCUs)	% HGVs	AM Peak Hr 2-Way Flow (PCUS)	PM Peak Hr 2-Way Flow (PCUS)
T9	R503 at Knockmaroe	Foilnaman	709	1.9%	66	87
T10	L2264-50	Foilnaman	183	0.8%	19	23
T11	L6188-0	Foilnaman	76	0.6%	7	7
T12	L4139-0	Foilnaman / Upperchurch	31	0.0%	5	2
T13	L4138-12	Foilnaman	92	0.0%	5	9
T14	L4139-16	Foilnaman	42	0.0%	4	2
T15	L61881-0	Foilnaman	17	0.0%	3	0
T16	L6185-13	Foilnaman	13	0.0%	0	1
T17	L2264-34	Foilnaman	147	0.7%	4	12

Survey results indicate that for UWF Related Works roads, on average 98.2% of traffic counted comprised cars or vans, 0.4% comprises heavy vehicles which would include buses, articulated and rigid trucks, and 1.4% comprises bicycles or motorcycles. Survey results indicate that for UWF Grid Connection roads, on average 98.6% of traffic counted comprised cars or vans, 0.9% comprises heavy vehicles which would include buses, articulated and rigid trucks, and 0.5% comprises bicycles or motorcycles.

The traffic count survey, in addition to observations during site investigations, confirms that the affected roads have low traffic volumes and are not congested roads.

Figure 1: Mapping showing Traffic Count Locations



A15.1.3.2.2 CSO Data

The POWSCAR 2016 Census, outlined in Table 4 and Table 5, shows a high usage of cars and a very low usage of bicycles and walking as modes of transport in the Electoral Districts associated with the UWF Related Works (Foilnaman and Upperchurch) and the UWF Grid Connection (Kilcomenty, Newport, Kilnarath, Killoscully, Abington, Foilnaman).

Table 4: Extract from CSO 2016 POWSCAR data – for both UWF Grid Connection and UWF Related Works.

POWSCAR 2016 - Theme 11 Commuting	Kilcomenty	Newport	Killoscully	Kilnarath	Abington	Foilnaman (Related Works)	Upperchurch (Related Works)
Commuting to Work							
On foot - Work	3	39	1	1	2	2	4
Bicycle - Work	0	7	0	0	0	0	0
Bus, minibus or coach - Work	2	11	2	0	4	0	0
Train, DART or LUAS - Work	0	1	1	0	1	1	1
Motorcycle or scooter - Work	0	2	0	1	0	1	0
Car driver - Work	232	868	158	113	158	88	86
Car passenger - Work	7	61	5	1	4	4	0
Van - Work	30	86	16	17	26	16	10
Other (incl. lorry) - Work	3	7	0	2	7	4	1
Work mainly at or from home - Work	22	42	19	12	26	21	27
Not stated - Work	5	30	8	6	6	4	11
Total – Commuting to Work	**304**	**1154**	**210**	**153**	**234**	**141**	**140**
Commuting to School or College							
On foot - School or college	15	189	0	2	14	5	4
Bicycle - School or college	0	3	0	1	0	0	0
Bus, minibus or coach - School or college	19	36	57	23	47	31	33
Train, DART or LUAS - School or college	1	0	0	0	0	0	2
Motorcycle or scooter - School or college	0	0	0	0	0	0	0
Car driver - School or college	14	39	7	5	9	2	4
Car passenger - School or college	150	473	53	41	61	39	21
Van - School or college	2	3	0	1	0	0	0
Other (incl. lorry) - School or college	0	0	0	0	0	0	0
Work mainly at or from home - School or college	4	0	0	0	0	0	0
Not stated - School or college	3	22	4	4	4	3	3
Total – Commuting to School or College	**208**	**765**	**121**	**77**	**135**	**80**	**67**
Total per Mode of Transport							

POWSCAR 2016 - Theme 11 Commuting	Kilcomenty	Newport	Killoscully	Kilnarath	Abington	Foilnaman (Related Works)	Upperchurch (Related Works)
On foot - Total	18	228	1	3	16	7	8
Bicycle - Total	0	10	0	1	0	0	0
Bus, minibus or coach - Total	21	47	59	23	51	31	33
Train, DART or LUAS - Total	1	1	1	0	1	1	3
Motorcycle or scooter - Total	0	2	0	1	0	1	0
Car driver - Total	246	907	165	118	167	90	90
Car passenger - Total	157	534	58	42	65	43	21
Van - Total	32	89	16	18	26	16	10
Other (incl. lorry) - Total	3	7	0	2	7	4	1
Work mainly at or from home - Total	26	42	19	12	26	21	27
Not stated - Total	8	52	12	10	10	7	14
Total per ED	**512**	**1919**	**331**	**230**	**369**	**221**	**207**

A15.1.3.2.3 Tourist/Walking/Cycling Routes

Both the R497 and the R503 are designated scenic routes in Tipperary North County Development Plan. The waymarked walking routes that exist in the area consist of the Slievefelim Way, Eamon a Chnoic Loop, Multeen Way, Kilcommon Pilgrim Walk and the Ormond Way walking route, (this walk is currently being developed). There is also a waymarked cycle route, the Ormond Way Cycle, part of which is routed along the L2264-50 and L2264-34 (locally called the Borrisoleigh Road) through Knockmaroe and Foilnaman. These walks and cycle route are identified on Figure GC 6.2 in Tab 6 of Volume C3 EIA Report Figures

All of these trails include public road sections to some degree; the Slievefelim Way is routed along the R503 for c. 1.3km just outside Rearcross village; part of the Ormond Way walking route (currently being developed) is along the L4139-0; and all of the Ormond Way Cycle route is along public roads, starting in Milestone and ending in Portumna.

Both the CSO data and the traffic count surveys show a very low usage of the road network by cyclists. A very low usage of the local roads by cyclists was recorded during 2017 traffic count surveys, with no cyclists recorded on half of the roads, and one or two trips on the vast majority of the remaining roads. The exception to this low usage was on the R503 in Newport where 54 cycle trips were recorded at one location and 36 cycle trips were recorded at a second location over separate 1 week periods in January 2019, which would correspond to the CSO data. There were also 2 groups of 4 cyclists, recorded on the L2264-34 and the eastern extent of the R503 in the study area during July 2017, the use of the L2264-34 road corresponds with it being a waymarked cycle route (Ormond Way Cycle). This road was surveyed again, for a one week period in November 2017, only one cyclist was recorded.

A15.1.3.3 Road Safety

A15.1.3.3.1 Recorded Traffic Speeds

The traffic data collected confirmed that the traffic speeds are generally maintained within the posted speed limits (i.e. less than 80kph which is generally the speed limit on the affected roads) – See Table 5 and Table 6.

Table 5: Summary of 85th percentile speeds at points along the UWF Grid Connection

Traffic Count Locations	Road ID	Entrance ID	85% ile Traffic Design Speed Km/Hr
T1	L-2166-10	UWF Grid Connection Site Entrance 1	84
T2	L6013-0	None	58.9
T3	L2156-0	None	59.6
T4	L2157-0	None	72.5
T5	L6009 at Castlewaller	None	67.5
T6	L6009 at Cooldrisla	None	52.4
T7	R503 at Derryleigh	None	83.4
T8	R503 at Rear Cross	None	69.5
T9	R503 at Knockmaroe	None	61.7
T10	L2264-50	None	70.4
T11	L6188-0	Entrance onto private paved road	54

Table 6: Summary of 85th percentile speeds at Permanent and Temporary Site Entrances for UWF Related Works

Traffic Count Locations	Road ID	Entrance ID	85% ile Traffic Design Speed Km/Hr
T9	R503 at Knockmaroe	EW18	61.7
T10	L2264-50	EW19, EW20 & EW21	70.4
T11	L6188-0	EW5, EW6, EW16, EW17 & EW22	54
T12	L4139-0	EW1	49
T13	L4138-12	EW2	58
T14	L4139-16	EW3 & EW4	50
T15	L61881-0	EW7, EW8, EW9 & EW10	48
T16	L6185-13	EW11 & EW12	46
T17	L2264-34	EW13, EW14 & EW15	53

A15.1.3.3.2 RSA Online Collision Database

A review of the Road Safety Authority (RSA) online collision database, between 2005-2015 inclusive, indicates that there were two serious collisions along the route of the 110kV on the R503 in 2006 and 2007, but no other record of any significant collision in the last 12 years., (save for some mostly single vehicle accidents which are classified as 'minor' on the database).

The RSA collision statistics demonstrate that the local and regional roads in the study area do not have a significant history of accidents.

The Data from the RSA on-line tool is reproduced below as *Plate 1* to Plate 5 below.

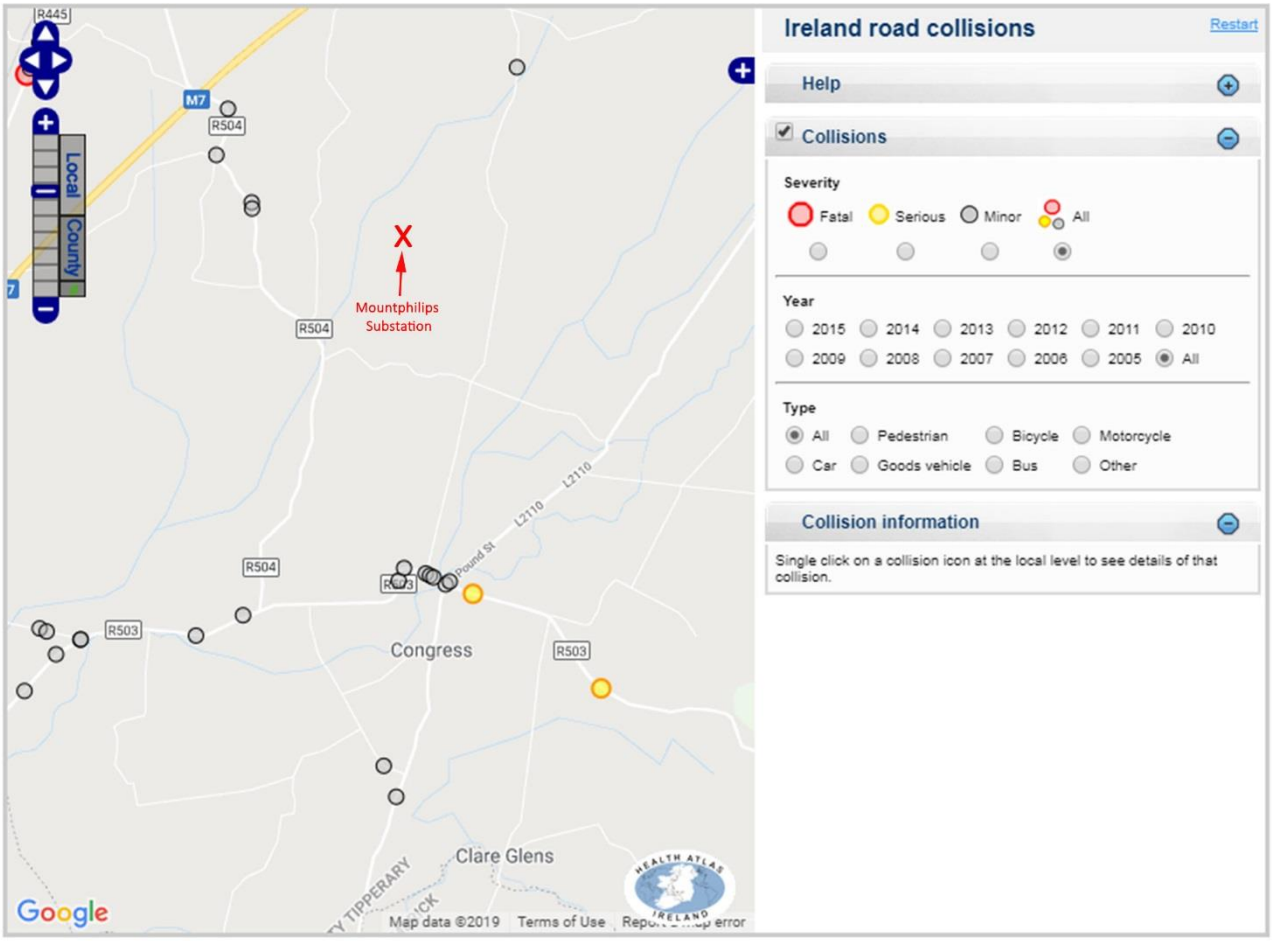


Plate 1: RSA Database Accident Statistics Extract - Map 1

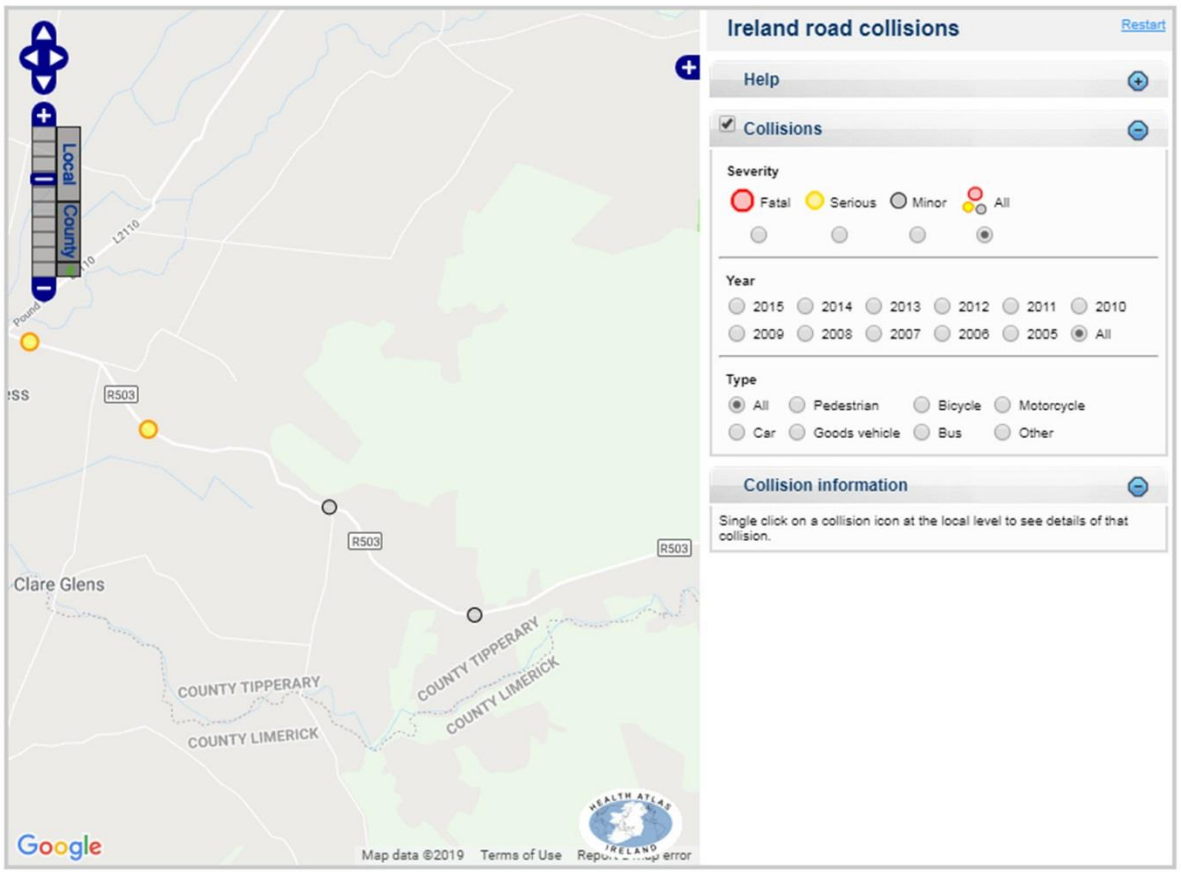


Plate 2: RSA Database Accident Statistics Extract - Map 2

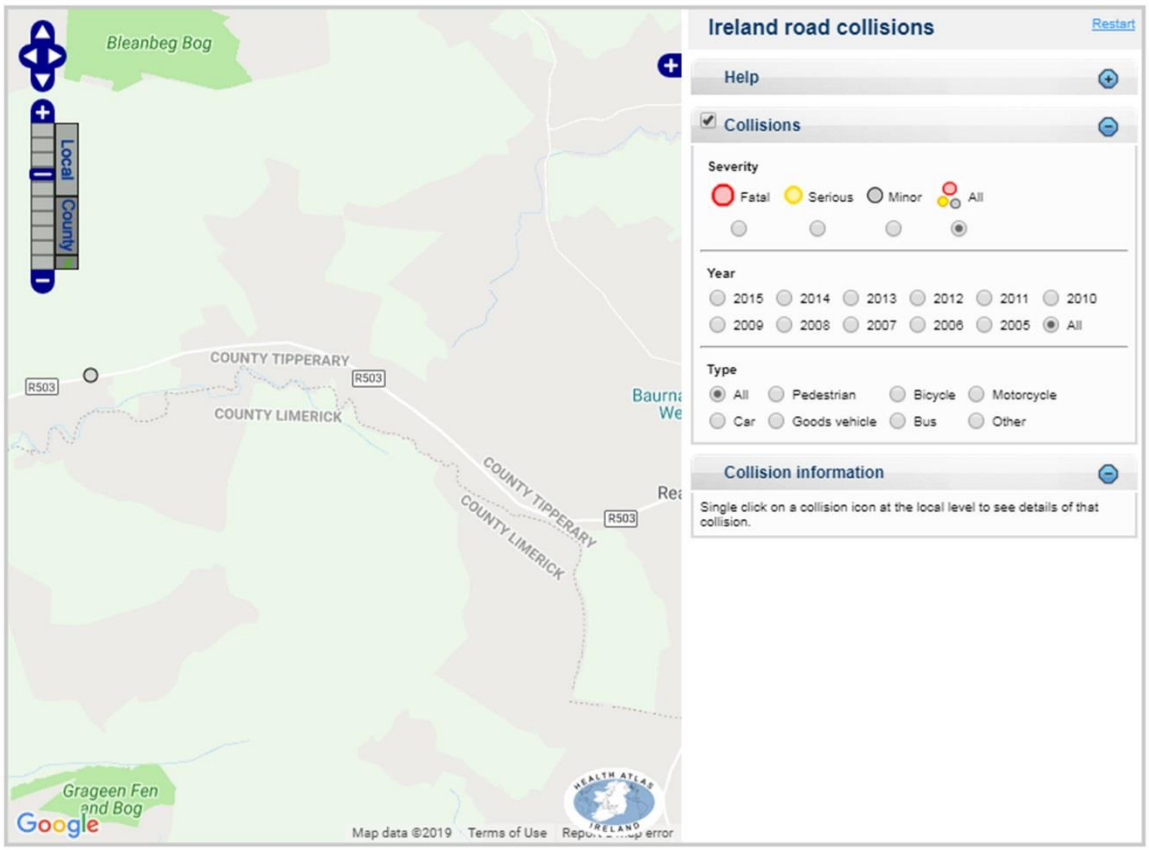


Plate 3: RSA Database Accident Statistics Extract - Map 3

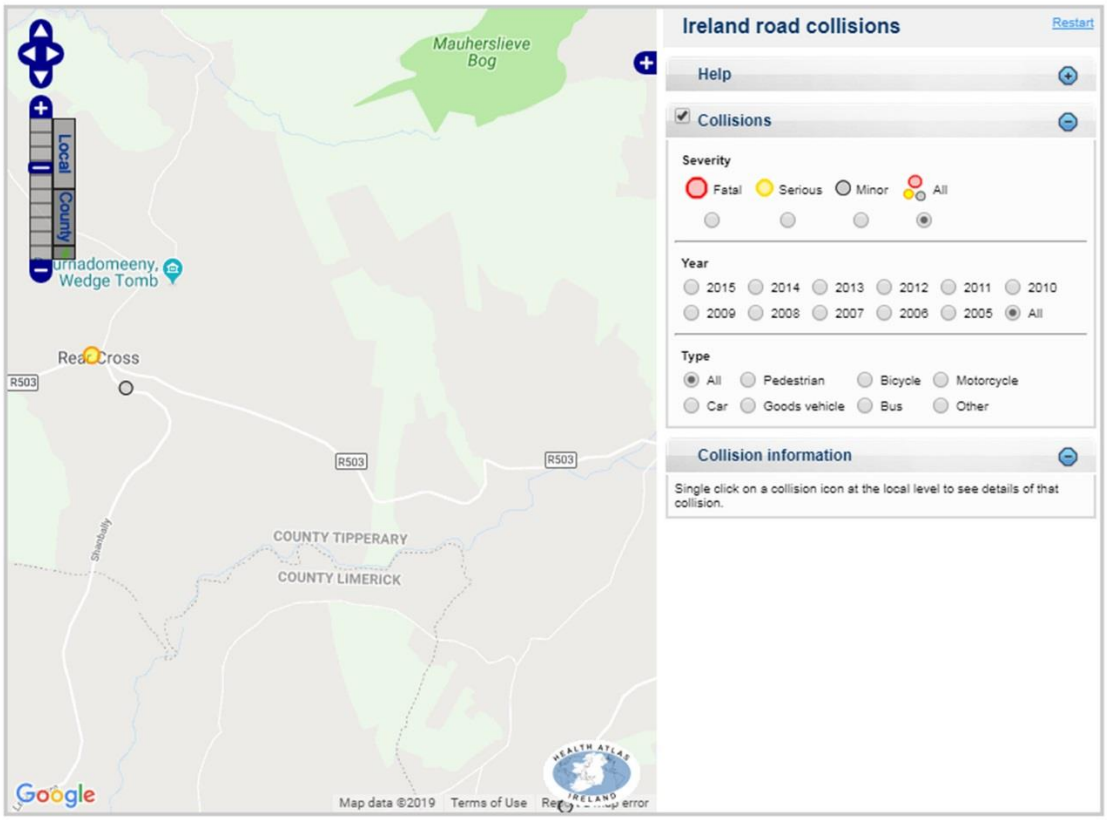


Plate 4: RSA Database Accident Statistics Extract - Map 4

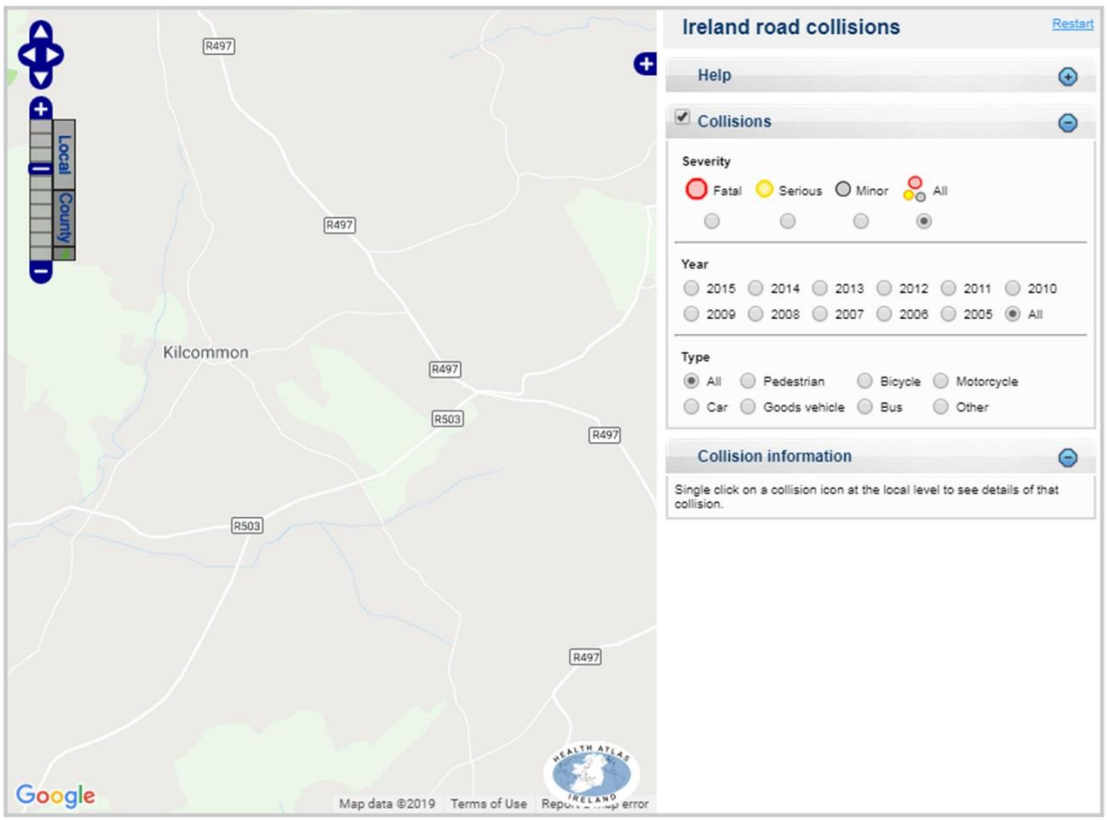


Plate 5: RSA Database Accident Statistics Extract - Map 5

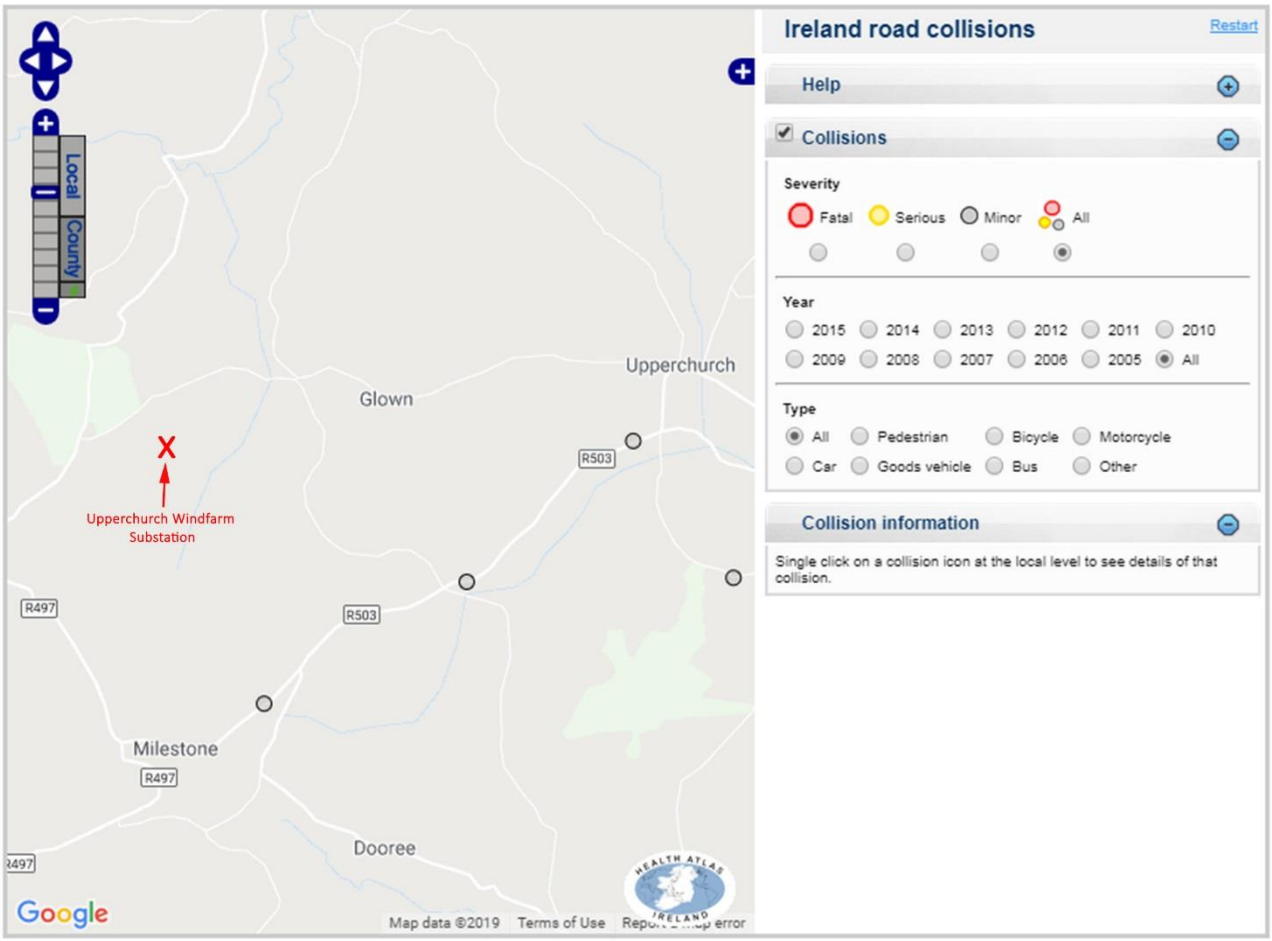


Plate 6: RSA Database Accident Statistics Extract - Map 6

A15.1.4 TRAFFIC FORECASTING

Construction traffic volumes were assigned to the various affected roads, based on the reasonable and industry standard assumption that the trip patterns associated with the construction stage will naturally gravitate to and from the temporary construction compound and works locations.

Construction is expected to commence in 2020/2021. In order to evaluated the worst case traffic volumes on the affected roads during construction works, an opening year of 2021 was selected for the purposes of this assessment.

Traffic growth factors for 2021 were calculated from data obtained in the TII PE-PAG-02017 Project Appraisal Guidelines for National Roads Unit 5.3 (Travel Demand Projections October 2016, Table 5.3.2: Link-Based Growth Rates: Annual Growth Factors) which provides the recommended method of predicting future year traffic growth on public roads.

Calculations of the relevant growth factors are included in Table 7.

Table 7: Tii Traffic Growth Rates

Traffic Growth		
From Year	To Year	NRA Link Based Growth Rate (1.014 per year)
2018/2019	2021	1.028

It should be noted that any requirement to use different or higher growth factors will have no implications for the conclusions of the study, as the available road capacity on the affected roads is very high (average 98%).

A15.1.5 DESCRIPTION OF THE INDIVIDUAL PROJECT ELEMENTS

The UWF Grid Connection, UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities are collectively referred to as the Whole UWF Project.

The purpose of the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities elements is to facilitate the construction and operation of the already consented Upperchurch Windfarm (UWF). Upperchurch Windfarm when operational, will produce renewable electricity from the wind to supply the National Grid.

Table 8: Overview of the Individual Elements of the Whole UWF Project

	Element of the whole UWF project	Composition of each Element	Planning Status and Competent Authority for each Element
1	UWF Grid Connection (GC)	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Grid Connection Ancillary Works	Planning application to An Bord Pleanála
2	UWF Related Works (RW)	Internal Windfarm Cabling Realigned Windfarm Roads Haul Route Works Telecom Relay Pole RW Ancillary Works	Planning application to Tipperary County Council, current appeal to An Bord Pleanála
3	UWF Replacement Forestry (RF)	Replacement Forestry at Foilnaman	Already approved
4	Upperchurch Windfarm (UWF)	Consented UWF Turbines Consented UWF Substation Consented UWF Roads UWF Ancillary Works	Already consented under Planning Reference: Tipperary Co.Co. 13/51/0003, ABP PL 22.243040
5	UWF Other Activities (OA)	Haul Route Activities Upperchurch Hen Harrier Scheme Monitoring Activities Overhead Line Activities	No planning permission required

Three separate Environmental Impact Assessment Reports (EIA Report also called EIAR) have been prepared, one each for the UWF Grid Connection, the UWF Related Works and the UWF Replacement Forestry. The individual EIA Reports accompany the application to the relevant Competent Authorities, for example the UWF Grid Connection EIA Report accompanies the SID application to An Bord Pleanála.

The EIA Reports are included with the applications as Volume C. A description of the location, layout, size and design, the construction stage, operational stage, and changes to the project, along with a description of the use of natural resources, emissions and wastes, and the vulnerability of the element to natural disasters and events is provided in Chapter 5 of the relevant EIA Report Main Report (Volume C2).

This information is also available on the following website: www.upperchurchwindfarmgridconnection.ie, where the full UWF Grid Connection EIA Report is available. A description of UWF Grid Connection is included in Chapter 5: Description of Development (UWF Grid Connection). A description of the Other Elements of the Whole UWF Project are included as Appendices 5.3, 5.4, 5.5 and 5.6 of the UWF Grid Connection EIA Report (EIAR Volume C4).

A15.1.5.1 Project Design Environmental Protection Measures

The design of the UWF Grid Connection includes the Project Design Environmental Protection Measures listed on Table 7, which were devised to avoid, prevent or reduce likely or potentially significant effects to public roads or road users. UWF Related Works includes similar project design measures.

Table 9: Project Design Environmental Protection Measures

Project Design Environmental Protection Measure	
PD04	All construction works will be carried out during daylight hours.
PD06	Construction works will not be carried out within 150m of Rearcross National School or Lackamore National School, during school hours. In addition, the project Community Liaison Officer will keep each school informed of construction timetables and scheduling.
PD07	110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads.
PD10	Flag-men will be used at 110kV UGC works locations on the public roads subject to one lane closures. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the public road network in a in a safe and efficient manner. The works will be carried out according to the Traffic Management Plan for UWF Grid Connection. The Traffic Management Plan forms part of the Environmental Management Plan.
PD11	Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m.
PD12	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.
PD13	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the Promoter will fund the costs of Tipperary County Council engaging a chartered Civil Engineer to oversee quality control and compliance with drawings, specifications and road opening conditions for the duration of the works

A15.1.6 TRIP GENERATION, ASSIGNMENT & DISTRIBUTION

The trips associated with the construction stage only have been modelled. Operational stage trip generation will be negligible and does not require or warrant further evaluation.

Similar to the operational stage, **the trips associated with the UWF Replacement Forestry and the UWF Other Activities will be very low and will have no effect on traffic or transport**. Consequently, the very low number of trips generated by these two elements are not included in the model.

The construction traffic associated with the UWF Grid Connection and the UWF Related Works have been quantified and are included in the model. Furthermore, the cumulative volumes associated with both of these developments along with the already Upperchurch Windfarm have been calculated in order to evaluate the whole project impact on any local roads which are affected by more than one element of the whole project.

The modelling of trip generation, assignment and distribution to the road network has been based on information[1] in Chapter 5 of the relevant EIA Report Main Report (Volume C2).

In order to quantify the impact on traffic and transport, the construction traffic volumes and movements to and from the site compound and to and from quarries and the various construction works areas was calculated, and the daily and peak hour construction traffic movements associated with each site entrance or road works location was then calculated for the relevant local road.

This was undertaken for a typical 24 Hour Annual Average Daily Traffic volume, and for the traditional weekday AM and PM peak hours.

[1] This information is also available on the following website: www.upperchurchwindfarmgridconnection.ie, where the full UWF Grid Connection EIA Report is available. A description of UWF Grid Connection is included in Chapter 5: Description of Development (UWF Grid Connection). A description of the Other Elements of the Whole UWF Project are included as Appendices 5.3, 5.4, 5.5 and 5.6 of the UWF Grid Connection EIA Report (EIAR Volume C4).

A15.1.7 IMPACT ASSESSMENT

A15.1.7.1 Introduction

TII's Traffic and Transportation Assessment Guidelines (2014), recommends that a threshold assessment & analysis is undertaken to determine the increases in traffic associated with any particular development, and whether this might be considered as significant. The threshold levels are outlined in Table *10*.

Table 10: Tii Threshold Analysis

Traffic Management Guidelines Thresholds for Transport Assessments	**Criteria met? Yes/No?**
Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road.	Yes, due to the extremely low existing traffic volumes on some of the local roads in the study area.
Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive	No, There are no roads are classed as 'congested' (A junction or link is considered to be congested when traffic flows are at 85% of the estimated capacity of the junction or link)
Residential development in excess of 200 dwellings.	No Not applicable
Retail and leisure development in excess of 1,000m^2.	No Not applicable
Office, education and hospital development in excess of 2,500m^2.	No Not applicable
Industrial development in excess of 5,000m2.	No Not applicable
Distribution and warehousing in excess of 10,000m2	No Not applicable

As the construction related traffic on some of the local roads associated with the UWF Grid Connection and the UWF Related Works will meet the first listed threshold in Table 10 above, this Traffic and Transport Assessment has been prepared and the Annual Average Daily Traffic volumes in PCUs without the works, for each of the affected roads has been measured through traffic counts, which were carried out on each affected road.

The transport impact of the additional construction traffic has been evaluated against the existing volumes and the future volumes, together with the quantified road link capacity based on the existing pavement width and conditions, using industry standard methods *(TD76/99 Link Capacity Assessment*) of link capacity assessment traffic volumes and link capacity details for each affected road.

The distribution of traffic to the local road network for each separate site entrance or road works location associated with the UWF Grid Connection, UWF Related Works and cumulatively with the Upperchurch Windfarm are included on Table 11 & Table 12. The resultant increase in projected 2020/2021 traffic levels is provided in Table 13. It should be noted that some percentage changes in traffic conditions due to the addition of the cumulative construction traffic appear large because the existing traffic levels are so low.

The results of the transport modelling are presented below.

A15.1.7.2 Traffic and Transportation Modelling

Table 11: Construction Traffic Distribution in relation to the UWF Grid Connection

		UWF Grid Connection		
Road Label	**Road 2-Way Capacity Based on conditions (PCUs/Hr 2-way)**	**24Hr 2-Way AADT (PCUs)**	**AM Peak Hr 2-Way Flow (PCUS)**	**PM Peak Hr 2-Way Flow (PCUS)**
L-2166-10	2000	135	31	31
L6013-0	1460	16	2	2
L2156-0	1760	16	2	2
L2157-0	1830	16	2	2
L6009 at Castlewaller	1530	16	2	2
L6009 at Cooldrisla	1460	16	2	2
R503 at Derryleigh	2000	75	8	8
R503 at Rear Cross	2000	58	6	6
R503 at Knockmaroe	2000	42	4	4
L2264-50	1555	16	2	2
L6188-0	1533	16	2	2

Table 12: Construction Traffic Distribution in relation to the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm and combined cumulative traffic

		Projected Construction Related Development Traffic									*Total Combined Works Traffic (Cumulative)*		
		UWF Grid Connection			*UWF Related Works*			*-Upperchurch Windfarm*					
Road Label	**Road 2-Way Capacity Based on conditions (PCUs/Hr 2-way)**	**24Hr 2-Way AADT (PCUs)**	**AM Peak Hr 2-Way Flow (PCUS)**	**PM Peak Hr 2-Way Flow (PCUS)**	**24Hr 2-Way AADT (PCUs)**	**AM Peak Hr 2-Way Flow (PCUS)**	**PM Peak Hr 2-Way Flow (PCUS)**	**24Hr 2-Way AADT (PCUs)**	**AM Peak Hr 2-Way Flow (PCUS)**	**PM Peak Hr 2-Way Flow (PCUS)**	**24Hr 2-Way AADT (PCUs)**	**AM Peak Hr 2-Way Flow (PCUS)**	**PM Peak Hr 2-Way Flow (PCUS)**
L-2166-10	2000	135	31	31							135	31	31
L6013-0	1460	16	2	2							16	2	2
L2156-0	1760	16	2	2							16	2	2
L2157-0	1830	16	2	2							16	2	2
L6009 at Castlewaller	1530	16	2	2							16	2	2
L6009 at Cooldrisla	1460	16	2	2							16	2	2
R503 at Derryleigh	2000	75	8	8							75	8	8
R503 at Rear Cross	2000	58	6	6							58	6	6
R503 at Knockmaroe	2000	42	4	4	9	1	1	8	8	8	59	13	13
L2264-50	1555	16	2	2	21	3	3	22	4	4	59	9	9
L6188-0	1533	16	2	2	12	2	2	22	4	4	50	8	8
L4139-0	1310				12	2	2	22	4	4	34	6	6
L4138-12	1425				12	2	2	22	4	4	34	6	6
L4139-16	1325				3	1	1	0	0	0	3	1	1
L61881-0	1325				3	1	1	0	0	0	3	1	1
L6185-13	1310				3	1	1	22	4	4	25	5	5
L2264-34	1555				3	1	1	0	0	0	3	1	1

Table 13: Projected Increase in Traffic Volumes on Affected Roads during the Construction Stage

		Existing Conditions Traffic Without Development			*Projected Opening Year 2020/2021 using Tii Annual Growth Rates Without Development Traffic*			*Total Combined Works Traffic (Cumulative)*			*2020/2021 Projected Traffic + Cumulative Works Traffic*			*Percentage Change in Conditions Associated with Cumulative Works*			*% Road Capacity Used With addition of Cumulative Works Traffic*	
Road Label	Road 2-Way Capacity Based on conditions (Daily)	24Hr 2-Way AADT (PCUs)	AM Peak Hr 2-Way Flow (PCUS)	PM Peak Hr 2-Way Flow (PCUS)	24Hr 2-Way AADT (PCUs)	AM Peak Hr 2-Way Flow (PCUS)	PM Peak Hr 2-Way Flow (PCUS)	24Hr 2-Way AADT (PCUs)	AM Peak Hr 2-Way Flow (PCUS)	PM Peak Hr 2-Way Flow (PCUS)	24Hr 2-Way AADT (PCUs)	AM Peak Hr 2-Way Flow (PCUS)	PM Peak Hr 2-Way Flow (PCUS)	24Hr 2-Way AADT (PCUs)	AM Peak Hr 2-Way Flow (PCUS)	PM Peak Hr 2-Way Flow (PCUS)	*24Hr Road Capacity Used (with Development)*	*Reserve Road Capacity Remaining*
L-2166-10	48000	721	94	66	741	97	68	135	31	31	876	128	99	18.2%	32.1%	45.7%	1.8%	98.2%
L6013-0	35040	301	35	27	309	36	28	16	2	2	325	38	30	5.2%	5.6%	7.2%	0.9%	99.1%
L2156-0	42240	1016	97	108	1044	100	111	16	2	2	1060	102	113	1.5%	2.0%	1.8%	2.5%	97.5%
L2157-0	43920	967	85	95	994	87	98	16	2	2	1010	89	100	1.6%	2.3%	2.0%	2.3%	97.7%
L6009 at Castlewaller	36720	217	31	21	223	32	22	16	2	2	239	34	24	7.2%	6.3%	9.3%	0.7%	99.3%
L6009 at Cooldrisla	35040	407	38	37	418	39	38	16	2	2	434	41	40	3.8%	5.1%	5.3%	1.2%	98.8%
R503 at Derryleigh	48000	2046	176	229	2103	181	235	75	8	8	2178	189	243	3.6%	4.4%	3.4%	4.5%	95.5%
R503 at Rear Cross	48000	950	80	110	977	82	113	58	6	6	1035	88	119	5.9%	7.3%	5.3%	2.2%	97.8%
R503 at Knockmaroe	48000	709	66	87	729	68	89	59	13	13	788	81	102	8.1%	19.2%	14.5%	1.6%	98.4%
L2264-50	37320	183	19	23	188	20	24	59	9	9	247	29	33	31.4%	46.1%	38.1%	0.7%	99.3%
L6188-0	36792	76	7	7	78	7	7	50	8	8	128	15	15	64.0%	111.2%	111.2%	0.3%	99.7%
L4139-0	31440	31	5	2	33	5	2	34	6	6	67	11	8	103.8%	113.6%	283.9%	0.2%	99.8%
L4138-12	34200	92	5	9	97	5	10	34	6	6	131	11	16	35.0%	113.6%	63.1%	0.4%	99.6%
L4139-16	31800	42	4	2	44	4	2	3	1	1	47	5	3	6.8%	23.7%	47.3%	0.1%	99.9%
L61881-0	31800	17	3	0	18	3	1	3	1	1	21	4	2	16.7%	31.5%	100.0%	0.1%	99.9%
L6185-13	31440	13	0	1	14	1	1	25	5	5	39	6	6	182.0%	500.0%	473.1%	0.1%	99.9%
L2264-34	37320	147	4	12	155	4	13	3	1	1	158	5	14	1.9%	23.7%	7.9%	0.4%	99.6%

A15.1.7.3 Evaluation of Traffic and Transport Modelling Results

A15.1.7.3.1 Road Capacity Impact:

Table 13 serves to demonstrate that the existing affected road network has more than adequate capacity to accommodate the worst case cumulative traffic associated with the development. It confirms that the existing volumes of traffic together with the cumulative works traffic will in all cases leave in excess of c.98% of the traffic carrying reserve capacity available for each of the roads.

The increase in traffic associated with the Whole UWF Project will therefore have an imperceptible impact upon network capacity and operation, subject to adherence to traffic management measures at the works locations, which are included in the Traffic Management Plan, see Volume D: Environmental Management Plan, Tab7- Traffic Management Plan.

A15.1.7.3.2 Road pavements impact

The pavements along haulage routes are not expected to be adversely impacted by construction traffic associated with the works. In any case Pavement Condition Surveys will be carried out both before and after the construction period, and any pavements which are inadvertently damaged by construction traffic will be repaired to the satisfaction of Tipperary County Council.

The pavements at road work locations, particularly at trenching locations will be impacted during road works, and as agreed with Tipperary County Council Roads Department, all sections of roads subject to trenching works in the road pavement will be reinstated. This reinstatement of trenching locations within road pavements is in accordance with the Department of Transport, Tourism and Sport Guidelines for Managing Openings in Public Roads. This road reinstatement will ameliorate any impacts to road pavements, and therefore it is considered that no impacts to road pavements are likely to occur.

A15.1.7.3.3 Buried structures impact

It is considered that these road structures are currently in good condition and will be capable of supporting all works and the small increased traffic loading associated with the construction works.

Along the UWF Grid Connection, where the culvert is old and in bad repair (13 No. instances), the culvert will be replaced.

Along the UWF Related Works, 2 No. culverts at the UWF Related Works Haul Route Works locations will require works, these are 1m extension works and will be carried out without affecting the integrity of these two structures. All structures will be monitored during the construction stage, and inspected following completion of the works to ensure integrity is maintained.

A15.1.7.3.4 Traffic impact

The effect on road users has been comprehensively and cumulatively assessed and there is expected to be an imperceptible effect on journey times or use of the road by road users due to the small increase in traffic loading and the available capacity on the roads (c.98%).

At road work locations, local road users will be accommodated through minimising the amount of road closures required by using stop-go systems, steel plating and through the use of appropriately sized machines to ensure the continued use of one lane of the road.

For road closures, detour road signs will be erected on the closed road and along the detour route. Access for local residents will be in place during the duration of the works. In the event of emergency and should the need arise for the road to be fully opened, steel plates will be put in place across the excavation to all traffic to flow on both sides of the road.

A15.1.7.3.5 Road Safety impact

The predicted small increases in traffic associated with the works, the provision of adequate sightlines at the permanent site entrance and the use of advance warning signage for entrances and road works will ensure the continued safe use of the road and it is expected that there will be no impact upon traffic safety.

A15.1.7.3.6 Pedestrians and cyclists impact

The presence of road works and increases in traffic volumes due to construction traffic is expected to have an imperceptible effect upon the continued safe progression and passage of pedestrians and cyclists on the affected roads, due to the very low usage of the roads by walkers and cyclists (CSO data, observations during site visits, traffic count survey results), the small increase in traffic volumes due to the works, the available capacity on the affected roads, and the imposition of speed limits on all vehicles delivering construction materials to works areas along the local road network.

A15.1.8 REQUIREMENT FOR MITIGATION MEASURES

There is no requirement for mitigation measures as no significant adverse effects are expected to the affected roads in the study area.

Project Design measures, described in Section A15.1.5.1 and the traffic management measures and best practice measures, described in the dedicated **Traffic Management Plan** in the UWF Grid Connection Environmental Management Plan which accompanies the EIA Report as Volume D.

The adherence to the Plan will be audited weekly by the Environmental Clerk of Works, and a Community Liaison Officer will inform local residences of upcoming construction schedules, in particular those relating to road works in their area.