

Appendices

Appendix I – Consultation Submissions



Registered Post

3rd December 2018

Our Ref: QY12-28

**Kilcarrig Quarries Ltd,
 C/o Patrick O'Donnell,
 Earth Science Partnership (IRE) Ltd.,
 Consulting Engineers, Geologists & Environmental Scientists,
 Tonranny,
 Westport,
 Co. Mayo.
 F28XH29**

Re: Request for comments on EIA Screening and Scoping Document for a Section 261(A) Substitute Consent application and a Section 37L application for further development, in respect of a quarry at Roscat, Adristan, Tullow, Co. Carlow. In relation to Section 261(A) and Section 37L, the provisions of the Planning and Development Act 2000 (as amended) refers.

File Ref: Planning Authority Quarry File Ref. QY12-28.

Dear Mr. O'Donnell,

I refer to your correspondence dated the 26th October 2018 and the Screening and Scoping Document attached.

Following a review of the content of the scoping document, and having regard to the observations received from the Council's internal department, the comments of Carlow County Council are outlined below:

National Policy & Guidance Context

Following the implementation of Directive 2014/52/EU and its recent transposition into planning law, there have been changes to legislation and statutory guidance which you are advised to have regard to in the preparation of the applications to An Bord Pleanála, specifically in respect of the content of EIARs. Relevant legislation, statutory guidance, and related information includes (inter alia):

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018), which came into effect on 8th October 2018.

DIRECT LINES: CODE 059

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|-----------------------------|---------|------------------------|---------|---------------------------------|---------|
| Carlow MD Area Engineer | 9136272 | Information Technology | 9136215 | Fire Service & Building Control | 9131144 |
| Planning | 9170346 | Housing | 9136296 | County Museum | 9131554 |
| Human Resources | 9170314 | Waste & Environment | 9136231 | Rent Payments | 9172497 |
| Muinebheag MD Area Engineer | 9172415 | Rates | 9172489 | Recreation & Amenity | 9170377 |
| Local Enterprise Office | 9129783 | County Library | 9129705 | Arts | 9136203 |
| Register of Electors | 9170313 | Community | 9136204 | Motor Taxation | 9170342 |
| Roads / Transportation | 9170379 | Loan Payments | 9172491 | | |



- Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018).
- EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft August 2017).
- DoHPCLG Circular Letters PL 1/2017, PL 05/2018, and PL 07/2018

The information to be provided by a developer in an EIAR is set out in Article 5(1)(a) to (e) of the 2014 Directive, and in Article 63 and Schedule 6 of the 2018 Regulations. This includes new requirements in relation to (inter alia) a description of the reasonable alternatives studied and the main reasons for the option chosen, the requirement for the EIAR to be prepared by competent experts, and the broadening of the environmental factors to be considered i.e. population and human health, climate change, and disaster prevention.

Schedule 7 of the 2018 Regulations sets out the criteria for determining whether development listed in Part 2 of Schedule 5 should be subject to an Environmental Impact Assessment, and Schedule 7A lists the information to be provided by an applicant or developer for the purposes of screening sub-threshold development for environmental impact assessment.

In addition to the above, you are referred to:

- the DoEHLG Quarries and Ancillary Activities Guidelines for Planning Authorities (2004). The guidelines set out best practice approaches and mitigation measures in relation to the environmental implications of quarries i.e. for noise/vibration, dust/air quality, water supplies and groundwater, natural and cultural heritage, landscape, traffic impacts, and waste management.
- The DoEHLG document entitled 'Wildlife, Habitats and the Extractive Industry, Guidelines for the Protection of Biodiversity within the Extractive Industry'.
- EPA Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (2006).

On the matter of Appropriate Assessment, you are referred to:

- DOEHLG Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities (2009).
- A recent decision by the Court of Justice of the European Union *People Over Wind and Sweetman v Coillte Teoranta (C-323/17)*. The decision addressed the consideration of measures at "screening stage" that are intended to avoid or reduce the harmful effects of a proposed project on a European site. Specifically, whether such measures (mitigation) can be taken into account by competent authorities at the Habitat Regulations Assessment "screening stage", when judging whether a proposed plan or project is likely to have a significant effect on the integrity of a European designated site.

County Planning Policy

The Carlow County Development Plan 2012-2018 includes policies and related provisions and requirements for aggregate resources and the extractive industry in the county. Section 3.5.7 of the Plan recognises the importance of sand and gravel extractions in the economic life of the county and its importance as a valuable source of employment, and also the need for a balance between the needs of the building industry and the need to protect the environment. The suitability of any extraction enterprise is assessed on the basis of the sensitivity of the local environment to such impacts, the scale of the development proposed and the capacity of the road network in the area to accommodate associated traffic.

E.D. Policy 13 in the Plan seeks to:

- *Provide for quarry and extractive development where it can be demonstrated that the development would not result in a reduction of the visual amenity of designated scenic area, to residential amenities or give rise to potential damage to areas of scientific, geological, botanical, zoological and other natural significance including all designated European Sites*
- *Ensure compliance with the overall objectives of the Water Framework Directive in the context of quarries, mining and extractive development.*

Trans – Policy 5 in the Plan seeks to:

- *“ensure access to the highest possible category of the road network hierarchy when considering applications for quarries”.*

Section 11.16 of the Plan requires the following to be taken into account in the assessment of development (whether for a new quarry or an extension to an existing quarry), the need for the development, the extent of existing authorised quarry or mining supplies available and the impact of the development on the local environment, together with the following:

- *Developments, including associated processes, which would have a negative impact on existing / established rights of ways, walking routes or tourist, natural or recreational amenities will not be looked upon favourably*
- *Nature and quantity of aggregate(s) to be extracted, including total and annual tonnage of excavated aggregate(s)*
- *Location – relative to dwellings or other developments, aquifers and groundwater*
- *Environmentally sensitive areas, protected structures, special amenity areas and areas of archaeological potential*
- *Impact on the environment, agriculture, tourism, recreational activities in the area, landscape and residential amenities*
- *Noise generation and control*
- *Dust generation and control*
- *Impact on water table: minimisation of disturbance to the existing surface and subsurface hydrological regime shall be ensured on site and in proximity to the quarry*
- *Ecology; due consideration shall also be given to sites of ecological value and designated species which lie outside designated sites*

- *Transportation arrangements for products and road network in the area*
- *Effects on amenity of the area and in particular residential, visual amenity*
- *Natural and proposed screening of site*
- *Restoration and aftercare with particular emphasis on protecting and facilitating bio-diversity*

In respect of the duration of quarrying activities, section 11.16.1 of the Plan states that “*In evaluating applications for permission for new quarries, consideration may be given to limited duration permissions, to allow for the re-evaluation of the development in light of unforeseen environmental implications and in light of changes in environmental standards and technology*”.

Landscape and Visual Impact Assessment

The assessment of landscape impacts should take account of Carlow County Landscape Character Assessment and Schedule of Protected Views, included as Appendix 6 to the Carlow County Development Plan 2015-2021. On the basis of the landscape character assessment and associated mapping, the site is located where the Central Lowlands character area transitions to the Blackstairs and Mount Leinster Upland character area. The landscape type in which the site is located is identified as Farmed Ridges, where higher levels of visibility can occur, and for which a landscape sensitivity of 4 (from 1 to 5) is listed.

Landscaping proposals should clearly identify existing tree and hedgerow planting to be retained and maintained, incorporate the use of berming as appropriate, and should include buffer zones between hedgerows, site boundaries and dwellings.

Visual impact assessment should be informed by a comprehensive photographic survey of the site.

Natural Heritage

The assessment of the existing and proposed development, in respect of the content of both EIA and Appropriate Assessment, needs to consider the following:

- The southwest end of the existing pit area is located in the Ardistan Fen Potential Natural Heritage Area (site code 000788). Ardistan Fen is a water dependant natural feature, and therefore the potential for negative impacts on the fen from existing and proposed quarrying activities needs to be examined in detail i.e. potential impacts on the existing drainage and water regime. Proposals including a groundwater monitoring programme and aquifer protection plan should be considered.
- There is watercourse c. 515m to the southwest of the existing pit area which drains into the Burren River. The Burren River drains into the River Barrow at Carlow Town, which forms part of the River Barrow and River Nore SAC (Site Code 002162). On the basis of OSI mapping, there also appears to be a number of open water channels in the fen, which may have hydrogeological linkages with the watercourse referred to and with the existing pit. The source-pathway-receptor model needs to be assessed in this regard.

- The Slaney River Valley SAC (Site Code 000781) is c. 1.5km east of the site.
- Field studies should be carried out at optimal survey times and be supported by an Ecological Report.
- Fields studies should examine the potential for biodiversity within the existing gravel pit, taking account of the DoEHLG document entitled 'Wildlife, Habitats and the Extractive Industry, Guidelines for the Protection of Biodiversity within the Extractive Industry'.
- The level of the water table in the area relative to existing and proposed pit floor levels/depths of extraction. The scoping document identifies that all production for the proposed development will be a dry process, therefore extraction depths should be maintained above the level of the water table in the area.

In relation to the Appropriate Assessment Process set out in Section 8.1 of the Scoping Document, you are advised that the AASR, NIS and rNIS should have regard to the following:

- Must clearly identify the European Sites potentially impacted by the proposed development and explain the basis on which these have been identified in a way that makes it clear that there is no scientific doubt that there could be adverse effects on the integrity of any other European sites (ecological or hydrological corridors).
- Must clearly explain why each of the identified European sites have been designated.
- Must clearly identify the conservation objectives for each European site (by reference to NPWS published data).
- Must clearly set out all relevant and available data in relation to each qualifying interest including all documentary sources available.
- Must set out all investigations and examinations that have been carried out.
- Must be apparent that regard has been had to the best scientific knowledge.
- Must contain a detailed analysis and evaluation of all available data with no lacunae or gaps.
- Must identify and analyse, in the light of the best scientific knowledge in the field, all aspects of the proposed development which can, by itself or in combination with

other projects or plans, affect the European Sites in the light of its conservation objectives. That analysis should distinguish between temporary and permanent impacts and has to address the impacts on the flora, fauna and habitats for which the site was designated and the impacts on the conservation objectives for the site.

- Must identify mitigation measures which will reduce impacts on the European Site and specify precisely how they will be implemented and why they will be effective. There cannot be any scientific doubt about the effectiveness of the mitigation measures and it will not be acceptable to say that these will be developed post-consent.
- Must contain clear, precise and definitive findings as to what the residual impacts will be on the European Site.

Noise, Vibration and Dust

Suitably scaled mapping should be provided which accurately identifies existing and proposed noise and dust monitoring stations relative to sensitive receptors.

Flora and Fauna

The existing site and proposed site should be surveyed for invasive species and recommendations for control measures made as part of EIAR/rEIAR, and in an invasive species management plan.

Water Quality

Geological Survey mapping identifies the groundwater vulnerability in the area as high and shows the existing gravel pit as being next to the Burren Basin Gravel Aquifer. These issues should be examined in detail in relation to potential impacts on groundwater.

Details of bunded fuel and oil storage facilities should be outlined and appropriate measures stated to protect groundwater from potential contamination.

Residential Amenity

The proposed development will bring quarrying activities in closer proximity to dwelling houses in the area. This will need to be assessed.

Traffic and Transportation

The assessment of traffic and transportation issues should set out details in relation to:

- Proposed haul routes should be clearly identified on suitably scaled maps. Haul routes should seek to predominantly utilise main roads, and therefore minimise the use of and impacts on county and local level roads. Potential traffic impacts from HGVs negotiating Tullow Town and Ballon should be considered, as well as the feasibility of avoiding routing HGV traffic through these location.
- Vehicle washing facilities should be provided within the site so as to prevent deposition of mud and debris on the public roads.

- Road sweeping equipment should be available on the site in the event material is transported and deposited on public roads.
- Details of measures for the prevention of dust from entering onto the public roads should be submitted.
- Details of the anticipated traffic types and volumes for the development should be provided and assessed, and broken down in daily, weekly and monthly figures. clearly correlated with proposed extraction figures. Details should also include expected peak site traffic, day to day operating hours and duration.
- Full design details for the entrance to the site should be provided to demonstrate adequate turning movements and sightlines.
- A condition survey of the local road (L-6026) from which the site is accessed should be carried out.

Restoration Plan

A progressive restoration plan using overburden on the site should be proposed in accordance with the DoEHLG Quarries and Ancillary Activities Guidelines for Planning Authorities (2004).

Cumulative Impacts

The cumulative impact of the existing and proposed development is required on a range of receptors. These include landscape and visual amenity, cumulative effects on species and habitats etc.


The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft August 2017), advises that *“assessors need to be vigilant for pathways – direct and indirect – that can magnify effects through the interaction or accumulation of effects – for instance the potential for cumulative significant effects to arise from multiple non-significant effects”*.

Cumulative impacts should consider the existing quarries c. 1.2km to the south of the site in the townland of Knocknacree. A current application (reg. ref. 18/220) at this location relates to a proposal to import inert waste consisting of soil and stone material to improve land for agricultural use.

Cumulative impacts must not only be examined in relation to the interactions between different existing or approved projects, but also in relation to the interactions between the various potential impacts that can arise in a single project. For example, the potential for cumulative impacts from the carrying out of restoration works alongside extraction activities should be considered.

If you have any further queries in relation to this matter, please contact me at 059-9136229 or planningdevman@carlowcoco.ie.

Yours Sincerely,


Alison Scanlon
Administrative Officer

Patrick O'Donnell
Earth Science Partnership
Consulting Engineers
Tonranny
Westport
Co. Mayo

19 November 2018

**EIA Screening & Scoping document for substitute consent & planning
in respect of a quarry at Roscat, Ardristan, Tullow, Co. Carlow.**

Dear Mr. O'Donnell,

The site of this facility is in close proximity to a tributary of the Burren River which is in turn a tributary of the River Barrow. The Barrow River is an important Spring Salmon & sea trout fishery. The Barrow system supports several species listed in Annex II of the Directive including Salmon, River Lamprey, Brook Lamprey, Sea Lamprey, Freshwater Pearl Mussel and Otter. Much of the main channel of the Barrow River is a candidate Special Area for Conservation (SAC) under the European Habitats Directive.

An examination of the old 6 and 25 inch maps for this site highlight that the south-western boundary of the site, borders a very wet area with a number of springs rising from there.

An examination of more recent aerial photos of the site highlight that there was significant production of concrete blocks and other concrete products on-site in the recent past.

The following are our concerns:

1. IFI request clarification if the applicant proposes to use the site for production of concrete blocks and other concrete products. Uncured concrete can kill fish and macro-invertebrates by altering the pH of the water. Given the proximity of the watercourse and the ground conditions on-site, we have concerns that there may be potential for contamination of the nearby watercourse from on-site operations. We would also point out that passage through silt ponds does not represent adequate treatment of waters which have come in contact with uncured concrete and have an pH.
2. One of the potential impacts of projects such as this, is the discharge of silt-laden waters to fisheries streams from sites at which earth moving and excavation works are ongoing. Silt can clog salmonid spawning beds, and juvenile salmonids are particularly sensitive to siltation of gill structures. Similarly plant and macro-invertebrate communities can literally be blanketed over, and this can lead to loss or degradation of valuable habitat.
3. Systems should be put in place to ensure that there shall be no discharge of suspended solids or other deleterious matter to watercourses during any phase of works at this site.

4. It is our understanding that no sand washing is carried out on-site and that there are no future plans to wash sand at this facility.
5. It is our understanding from the information submitted that there is no pumping from the quarry site to the surface waters.
6. It is our understanding that all sand extraction is carried out above groundwater level.
7. The design and sizing of the surface water drainage system must ensure that no suspended solids enter the neighbouring watercourse, even during periods of prolonged heavy rainfall.
8. All surface waters from the site and access roads should be channelled through adequately sized petrol/oil interceptors prior and be subject to attenuation prior to discharge to surface waters.
9. Given the proximity of surface waters draining to the Barrow the pollution threat from concrete and concrete/cement washings is significant. Good housekeeping is of the utmost importance while using concrete or cement, near watercourses.
10. Refuelling of machinery must be carried out in bunded areas.
11. Fuels, oils, greases and hydraulic fluids must be stored in bunded compounds.
12. All waste oil, empty oil containers and other hazardous wastes are disposed of in conjunction with the requirements of the Waste Management Act 1996.
13. The activities proposed for this site are likely to result in significant lorry traffic to and from the site, with potential for the generation of significant suspended solids pollution in the associated road run-off. It is imperative that the potential for suspended solids pollution from road run-off associated with vehicles entering and leaving this site is addressed.
14. We note that the applicant proposes to provide a wheel wash to prevent soils/clays being deposited on the public road. Our experience is that wheel-washes, if not designed/managed properly can represent a significant source of suspended solids pollution to surface waters. The maintenance of this wheel-wash should be addressed & wash water from any wheel wash must be directed to a suitable treatment facility.
15. Discharges to surface waters from wheel-washes and silt settlement ponds should be subject to S4 Discharge Licences.
16. It is important that the access/haul road, which is 1.1km in length is adequate to cope with the quantity and the type of traffic that this proposal will entail. Of concern to IFI is the fact that the 1.1km haul road between the proposed quarry and the N81 has not been included in the site layout plan.
17. The dirty waters generated from this 1.1km haul road, during times of high rainfall and also from waters used for dust suppression during the Summer months should be addressed.
18. IFI ask if the 1.1km haul road is a paved road or is a hard-core/clay road.
19. We request that all practical steps be taken to minimise dust being generated on this access road.

Yours faithfully



Donnachadh Byrne
Senior Fisheries Environmental Officer

Please note that any further correspondence regarding this matter should be addressed to Mr. Donnachadh Byrne, Senior Fisheries Environmental Officer, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24



Earth Science Partnership Ltd.,
Tonranny,
Westport,
Co Mayo.
F28 XH29

14 December, 2018.

Re: EIA Screening and Scoping Document for Planning Application in respect of a quarry at Roscat, Ardristan, Tullow, Co Carlow.

Your Ref: EI061

Our Ref: 18/138

A chara,

With reference to your email on 05 November, 2018, concerning the proposed extraction of sand and gravel at Roscat Quarry, Geological Survey Ireland (a division of Department of Communications, Climate Action and Environment) would like to make the following comments.

The Screening and Scoping Document has stated under Section 7.1.5 Land and Soils that it will assess the impacts to the soils and the geology of the affected area. In addition, Section 7.1.6 Water, there will be an assessment of the hydrogeological impacts. Data available for Geological Survey Ireland would be of use in further developing this section of the EIAR. Geological Survey Ireland provides information on all aspects of the geology of Ireland on our Map Viewer available on the GSI website www.gsi.ie. There are multiple layers of data available including Geology, Groundwater, Quaternary, Landslides, and Geological Heritage. Our newest map is the Physiographic Units map and this is especially designed to give information on land use. We would encourage the use of our [Map Viewer](#) when preparing the EIAR.

Geoheritage

Geological Survey Ireland (GSI) is in partnership with the National Parks and Wildlife Service (NPWS, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs) to identify and select important geological and geomorphological sites throughout the country for designation as geological NHAs (Natural Heritage Areas). This is addressed by the Irish Geoheritage Programme (IGH) of GSI, under 16 different geological themes, in which the minimum number of scientifically significant sites that best represent the theme are rigorously selected by a panel of theme experts.

County Geological Sites (CGS), as adopted under the National Heritage Plan, include additional sites that may also be of national importance but which were not selected as the very best examples for NHA designation. All geological heritage sites identified by GSI are categorised as CGS pending any further NHA designation by NPWS. CGS are now routinely included in County Development Plans and in the GIS of planning departments, to ensure the recognition and appropriate protection of geological heritage within the planning system.

County Geological Sites in audited and unaudited counties can now be viewed online under the Geological Heritage tab on the Geological Survey Public Data Online Viewer at: [Geological Survey's Online Viewer](#) or via a direct link at: [Geoheritage Online Viewer](#).

Our records show that there are no CGSs in the vicinity of the site. The County Audit for Carlow was completed in 2004. With the current plans, there is no envisaged impact on the integrity of County Geological Sites by the proposed developments. However, if the proposed development plan is altered, please contact Siobhán Power at Siobhan.Power@gsi.ie for further information and possible mitigation measures if applicable.



Groundwater

It should be noted that according to the Groundwater layer on our Map Viewer, the site is located within an area with High Groundwater Vulnerability. This should be taken into account when undertaking planning.

Recommendations

Should development go ahead, all other factors considered, Geological Survey Ireland would much appreciate a copy of reports detailing any site investigations carried out. Should any significant bedrock cuttings be created, we would ask that they will be designed to remain visible as rock exposure rather than covered with soil and vegetated, in accordance with safety guidelines and engineering constraints. In areas where natural exposures are few, or deeply weathered, this measure would permit on-going improvement of geological knowledge of the subsurface and could be included as additional sites of the geoheritage dataset, if appropriate. Alternatively, we ask that a digital photographic record of significant new excavations could be provided. Potential visits from Geological Survey Ireland to personally document exposures could also be arranged.

The data would be added to GSI's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector. Data can be sent to Beatriz Mozo, Land Mapping Unit, at Beatriz.Mozo@gsi.ie, 01-678 2795.

Other Comments

Geological Survey Ireland is the national earth science agency and has datasets on Bedrock Geology, Quaternary Geology, Geological Heritage Sites, Mineral deposits, Groundwater Resources and the Irish Seabed. These comprise maps, reports and extensive databases that include mineral occurrences, bedrock/mineral exploration groundwater/site investigation boreholes, karst features, wells and springs. Please see our [website](#) for data availability.

I hope that these comments are of assistance, and if we can be of any further help, please do not hesitate to contact me, or one of my colleagues in the Geoheritage Programme (Sarah Gatley at Sarah.Gatley@gsi.ie or Siobhán Power at Siobhan.Power@gsi.ie).

Le meas,

Dylan Potter
Contract Geologist
Geoheritage Programme
Geological Survey Ireland

Mr. Patrick O'Donnell
Earth Science Partnership (Ire) Ltd.
Tonranny
Westport
Co. Mayo
F28 XH29

Dáta | Date
16 November 2018

Ár dTag | Our Ref.
TII18-103670

Bhur dTag | Your Ref.

RE: EIAR Scoping Request for S261 A (Substitute Consent) and S37L (concurrent application) for quarrying at Roscat, Tullow, Co. Carlow, for Kilcarrig Quarries Ltd.

Dear Mr. O'Donnell,

Thank you for your letter and enclosures of 26 October 2018 regarding the above. Transport Infrastructure Ireland's (TII) position is outlined as follows.

The issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid application referred. The approach to be adopted by TII in making such submissions or comments will seek to uphold official policy and guidance as outlined in the Spatial Planning and National Roads Guidelines for Planning Authorities (2012). Regard should also be had to other relevant guidance available at www.TII.ie.

In this instance it appears that no record of total site area, quarry depth or proposed extraction rates are provided. An application area map and site history is submitted that indicates an area of somewhere less than 3 ha. for the previously quarried area and about 4 ha. for the greenfield area to be quarried. The subject lands are accessed via a local road that accesses the N81.

With respect to EIAR Scoping issues, the recommendations indicated below provide only general guidance for the preparation of EIAR, which may affect the National Roads Network. The developer should have regard, *inter alia*, to the following:

1. As outlined in the DoECLG Spatial Planning and National Roads Guidelines (2012), it is in the public interest that, in so far as is reasonably practicable, that the national road network continues to serve its intended strategic purpose. The EIAR should identify the methods/techniques proposed for any works traversing/in proximity to the national road network in order to demonstrate that the development can proceed complementary to safeguarding the capacity, safety and operational efficiency of that network.
2. Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to locations of existing and future national road schemes.

Próiseálann BIÉ sonraí pearsanta a sholáthraítear dó i gcomhréir lena Fhógra ar Chosaint Sonraí atá ar fáil ag www.tii.ie.
TII processes personal data in accordance with its Data Protection Notice available at www.tii.ie.

3. Clearly identify haul routes proposed and fully assess the network to be traversed. Separate structure approvals/permits and other licences may be required in connection with the proposed haul route and all structures on the haul route should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal load proposed.
4. Where appropriate and subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. TII's Traffic and Transport Assessment Guidelines (2014) should be referred to in relation to proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the TII TTA Guidelines which addresses requirements for sub-threshold TTA.
5. TII Standards should be consulted to determine the requirement for Road Safety Audit (RSA) and Road Safety Impact Assessment (RSIA).
6. Assessments and design and construction and maintenance standards and guidance are available at [TII Publications](#) that replaced the NRA Design Manual for Roads and Bridges (DMRB) and the NRA Manual of Contract Documents for Road Works (MCDRW).
7. The developer, in conducting Environmental Impact Assessment, should have regard to TII Environment Guidelines that deal with assessment and mitigation measures for varied environmental factors and occurrences. In particular, evidenced assessment of the protection of the strategic function of the national road in relation to the following matters is required;
 - a. TII's Environmental Assessment and Construction Guidelines, including the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (National Roads Authority, 2006);
 - b. The EIAR should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (1st Rev., National Roads Authority, 2004)).
8. The Environmental Assessment should have regard to previous Environmental Assessment Statements/Reports and conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area.

The developer is advised that any additional works/structures required as a result of the Assessment should be funded by the developer.

I trust that the above comments are of assistance in your EIAR preparation.

Yours sincerely,


Michael McCormack
Senior Land Use Planner

Irish Aviation Authority
The Times Building
11-12 D'Olier Street
Dublin 2, D02 T449,
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Date 05th November 2018

Mr Patrick O Donnell
Earth Science Partnership Ltd
Tonranny
West Port
Co Mayo

Development: Kilcarrig Quarries Ltd. proposes to submit a planning application to Carlow County Council for permission to extract material from a sand and gravel pit at Roscat Quarry, Roscat, Ardristan, Tullow Co. Carlow. Although two individual planning applications are required for this site (a Section 261A (Substitute Consent) and a Section 37L), all proposed works will remain identical to the historical works undertaken onsite. Thus, for the purposes of clarity and the avoidance of repetition, it is deemed appropriate to present the details of both applications to the relevant stakeholders within a single Screening and Scoping document, as enclosed at Roscat Quarry, Roscat, Ardristan, Tullow Co. Carlow.

Dear Sir / Madam

I refer to the request for planning permission for the above development, details of which were received by the Irish Aviation Authority from the Council.

I wish to advise that we have no observations on this application.

Yours sincerely

Deirdre Forrest
Corporate Affairs

Bord Stiúirthóirí/Board of Directors
Michael McGrail (Cathaoirleach/Chairman),
Peter Kearney (Príonihídehneannach/Chief Executive)
Marie Bradley, Ernie Donnelly, Michael Norton

Oifig Chláraithe:
Foirgneamh na hAmanna, 11-12 Sráid D'Olier
Baile Átha Cliath 2, D02 T449, Éire
Uimhir Chláraithe: 211082. Áit Chláraithe: Éire
Cuideachta Dlíteanais Theoranta

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Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

400611001
ENVIRONMENTAL HEALTH DEPARTMENT,
St. Dymphna's Hospital,
Athy Road,
Carlow,
Ireland.
Telephone 059 9136574
Fax 059 9136508

Patrick O'Donnell
Earth Science Partnership (Irl) Ltd.,
Tonranney,
Westport,
Co. Mayo.

26/11/2018

HSE EIS SUBMISSION REPORT
Environmental Health Service Consultation Report

(as a Statutory Consultee under the Planning and Development Acts 2000 (as amended) & Regulations made thereunder)

Type of consultation: Scoping Screening (constraints)
EHIS Reference number: 0837
Applicant: Kilcarrig Quarries Ltd

Proposed Development: Re: EIA Screening and Scoping Document for a Section 261A (Substitute Consent) and a Section 37L planning application in respect of a quarry located at Roscat, Ardristan, Tullow, Co. Carlow.

Dear Mr. O'Donnell,

The Environmental Health Service (EHS) notes the contents of the screening and scoping document received regarding the above proposed development and note the commitments made in this report regarding the completion of an Environmental Impact Assessment Report. **When considering the final Environmental Impact Assessment Report (EIAR), the EHS will pay particular attention to the following:-**

That the non-technical summary summarises the EIAR in a clear and non-technical way and identifies the significant impacts and the residual impacts of the proposed development.

That the assessment methodologies used and the criteria used for assessing the significance of any impacts are clearly identified.

That any mitigation proposed is clearly identified and the residual impact is clearly stated.

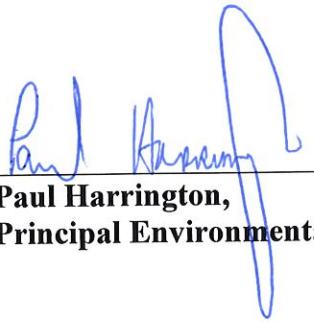
That the impact of the proposed development on the local population is assessed, the significance of any impact evaluated and any mitigation required is identified.

That the impact of noise/vibration from the proposed development is assessed, the significance of any impacts on the local environment is evaluated and any mitigation factors

are identified. This should include a measurement of the base line noise level and the predicted change in the noise environment as a result of the proposed development. All noise sensitive locations should be identified as part of the assessment.

That the impact of dust/particulate matter from the proposed development is assessed, the significance of any impact on the local environment is evaluated and any mitigation factors are identified.

If you have any queries, I can be contacted at the above address/phone number.



**Paul Harrington,
Principal Environmental Health Officer.**

*** All correspondence or any queries with regard to this report including acknowledgement of this report should be forwarded to Paul Harrington, Principal Environmental Health Officer, Environmental Health Section, St. Dymphna's Hospital, Athy Road, Carlow Town.**



An Foirgneamh Cathrach, Sráid James Joyce, Baile Átha Cliath 1, D01 K0Y8 Eire
The Metropolitan Building, James Joyce Street, Dublin 1, D01 K0Y8 Ireland
T: 1890 289 389 W: www.hsa.ie

06/11/2018

Patrick O'Donnell
Earth Science Partnership
Tonranny
Westport
Mayo

Ref ID: 134436

Dear Mr. O'Donnell

I hereby acknowledge receipt of your query, which has been recorded and assigned the reference number ID: 134436

Please ensure you have your reference number available or quote it in any correspondence to assist the Workplace Contact Unit to deal with your request efficiently.

Should you have any queries regarding the above or require any information in relation to a safety, health and welfare at work matter, please phone our workplace contact unit on 1890 289 389 anytime between 9:00am and 12:30pm, Monday to Friday, or email wcu@hsa.ie. Our staff will assist you in any way they can.

Yours sincerely

Michael Neville

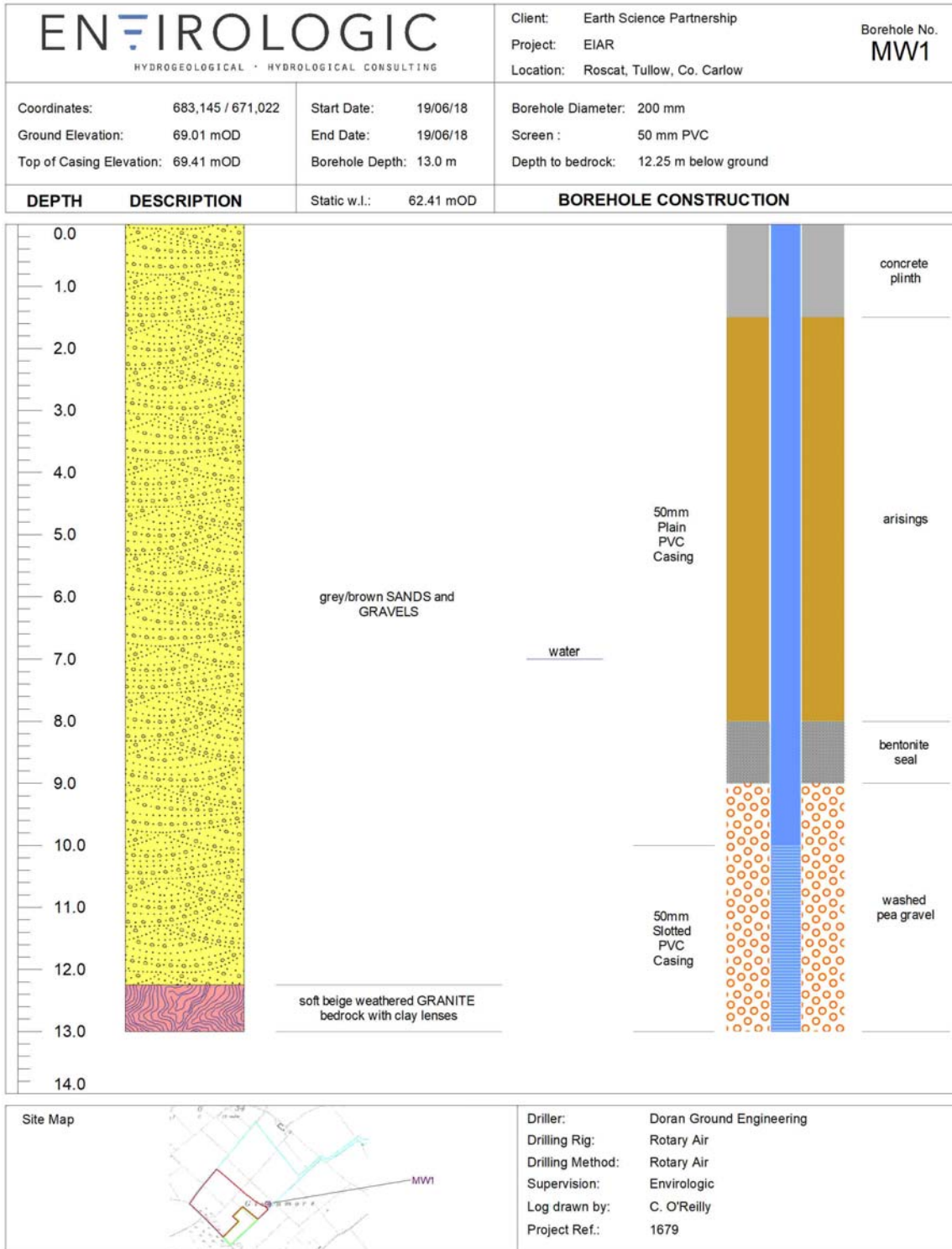
Michael Neville

On behalf of the Workplace Contact Unit

Please Note: This correspondence is not, and is not intended to be, a legal interpretation of the Regulations or Act and does not constitute legal advice. The Health and Safety Authority accepts no liability with regard to how this information may be interpreted or used.

Appendix II – Borehole logs & Impact Assessment Criteria

Monitoring Well Logs



Site Map



Driller: Doran Ground Engineering
 Drilling Rig: Rotary Air
 Drilling Method: Rotary Air
 Supervision: Envirologic
 Log drawn by: C. O'Reilly
 Project Ref.: 1679

ENVIROLOGIC

HYDROGEOLOGICAL · HYDROLOGICAL CONSULTING

Client: Earth Science Partnership
 Project: EIAR
 Location: Roscat, Tullow, Co. Carlow

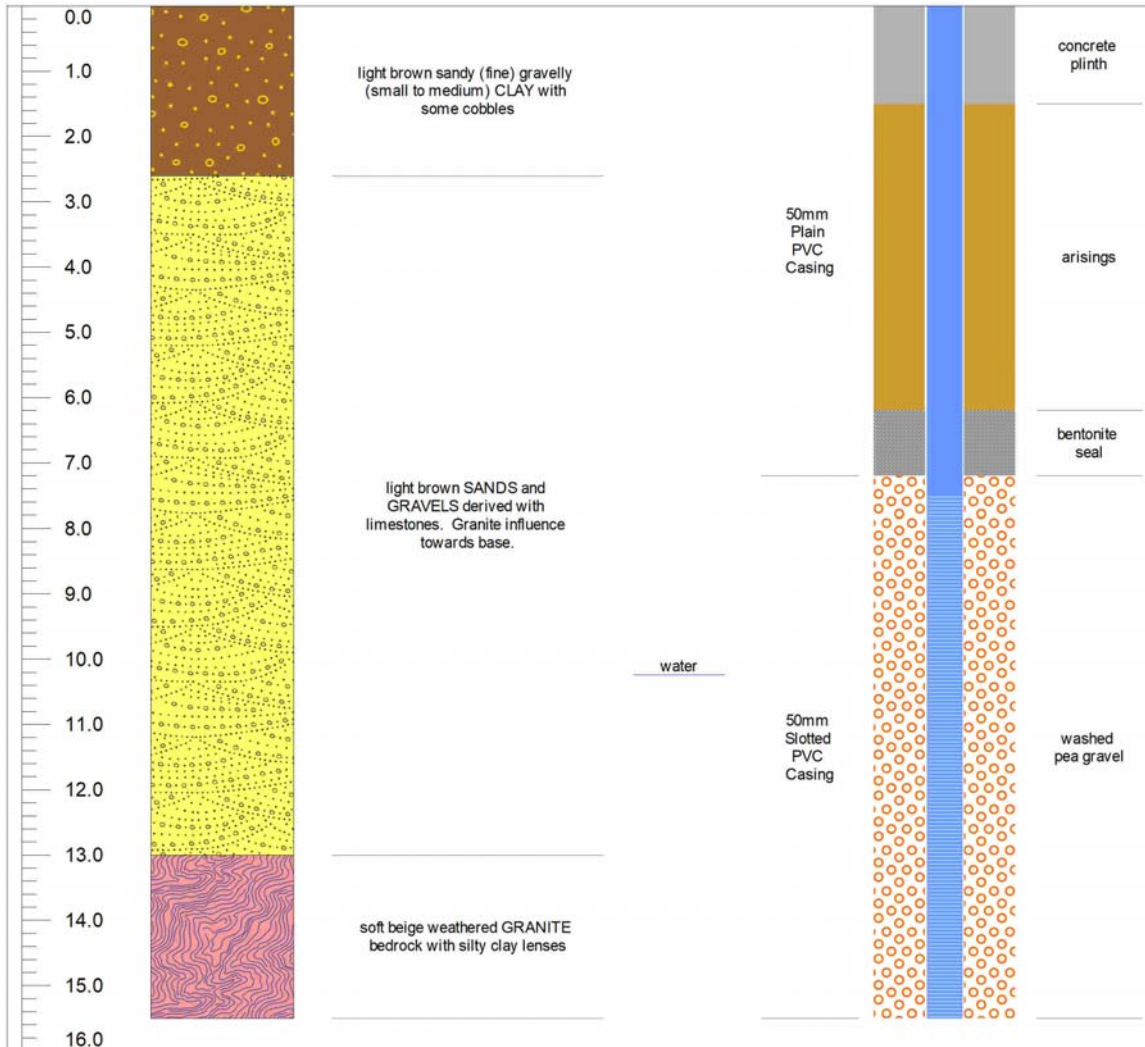
Borehole No.
MW2

Coordinates: 683,192 / 671,311
 Ground Elevation: 73.22 mOD
 Top of Casing Elevation: 73.63 mOD

Start Date: 19/06/18
 End Date: 20/06/18
 Borehole Depth: 15.5 m

Borehole Diameter: 200 mm
 Screen : 50 mm PVC
 Depth to bedrock: 13.0 m below ground

| DEPTH | DESCRIPTION | Static w.l.: | 94.81 mOD | BOREHOLE CONSTRUCTION |
|-------|-------------|--------------|-----------|-----------------------|
|-------|-------------|--------------|-----------|-----------------------|



Site Map



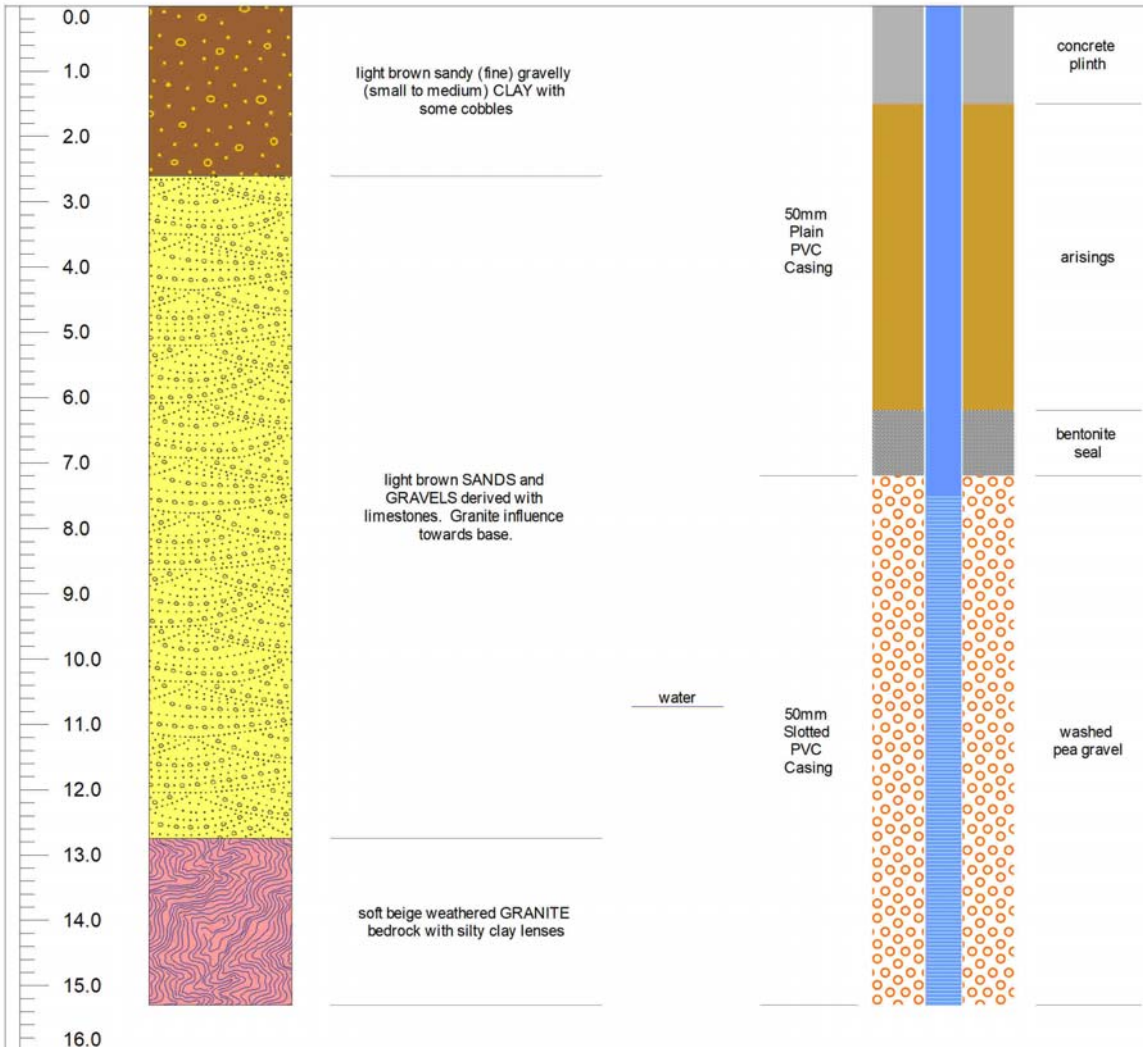
Driller: Doran Ground Engineering
 Drilling Rig: Rotary Air
 Drilling Method: Rotary Air
 Supervision: Envirologic
 Log drawn by: C. O'Reilly
 Project Ref.: 1679

Coordinates: 682,913 / 671,218
 Ground Elevation: 72.65 mOD
 Top of Casing Elevation: 73.13 mOD

Start Date: 20/06/18
 End Date: 20/06/18
 Borehole Depth: 15.3 m

Borehole Diameter: 200 mm
 Screen : 50 mm PVC
 Depth to bedrock: 12.75 m below ground

| DEPTH | DESCRIPTION | Static w.l.: | BOREHOLE CONSTRUCTION |
|-------|-------------|--------------|-----------------------|
|-------|-------------|--------------|-----------------------|



Driller: Doran Ground Engineering
 Drilling Rig: Rotary Air
 Drilling Method: Rotary Air
 Supervision: Envirologic
 Log drawn by: C. O'Reilly
 Project Ref.: 1679

Impact Definitions

The following impact defining tables were taken in part from NRA Guidelines (2009) and EIAR Draft Guidelines (2017).

Criteria for assessing importance of site attribute

Table 7.B.1 – Estimation of importance of sensitive geological attributes

| Importance of attribute | Criteria | Example |
|-------------------------|---|---|
| Very High | Attribute has a high quality, significance or value on a regional or national scale | Large quarry or designated area |
| High | Attribute has a high quality, significance or value on a local scale | High value soils, county geological site, heavily contaminated soil on brownfield site |
| Medium | Attribute has a medium quality, significance or value on a local scale | Small existing quarry, moderately drained soils, small landfill site, lightly contaminated soil |
| Low | Attribute has a low quality, significance or value on a local scale | Site for C & D waste, uneconomically extractable mineral resource, poor quality soils |

Criteria for assessing magnitude of impact

Table 7.B.2 – Estimation of the magnitude of a potential impact on an attribute

| Impact type | Magnitude of impact | Example |
|-------------|---------------------|---|
| Adverse | Negligible | No measurable changes in attributes |
| | Small | <ul style="list-style-type: none"> - Loss of small proportion of future quarry or pit reserves - Removal of small part of geological heritage feature - Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils - Requirement to excavate/remediate small proportion of waste site - Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment |
| | Moderate | <ul style="list-style-type: none"> - Loss of moderate proportion of future quarry or pit reserves - Removal of part of geological heritage feature - Irreversible loss of moderate proportion of local high fertility soils - Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment |
| | Large | <ul style="list-style-type: none"> - Loss of high proportion of future quarry or pit reserves - Irreversible loss of high proportion of local high fertility soils - Removal of entirety of geological heritage feature - Requirement to excavate/remediate entire waste site - Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment |
| Beneficial | Minor | Minor enhancement of geological heritage feature |
| | Moderate | Moderate enhancement of geological heritage feature |
| | Major | Major enhancement of geological heritage feature |

Criteria for rating site attributes

Table 7.B.3 – Estimation of the significance of a potential impact on an attribute

| Importance of attribute | Magnitude of impact | | | |
|-------------------------|---------------------|----------------------|----------------------|--------------------|
| | Negligible | Small | Moderate | Large |
| Extremely High | Imperceptible | Significant | Profound | Profound |
| Very High | Imperceptible | Significant/moderate | Profound/significant | Profound |
| High | Imperceptible | Moderate/slight | Significant/moderate | Severe/significant |
| Medium | Imperceptible | Slight | Moderate | Significant |
| Low | Imperceptible | Imperceptible | Slight | Slight/moderate |

Appendix III – Laboratory Certificates of Analysis & Impact Assessment Criteria



Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Envirologic Ltd
78 St Peters Terrace
Howth
Co Dublin
Ireland

Tel: +44 (0) 1244 833780

Fax: +44 (0) 1244 833781



Attention : Pat Breheny
Date : 11th July, 2018
Your reference :
Our reference : Test Report 18/10148 Batch 1
Location :
Date samples received : 28th June, 2018
Status : Final report
Issue : 1

Five samples were received for analysis on 28th June, 2018 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Lucas Halliwell
Project Co-ordinator

Mr Breheny
Envirologic
Envirologic Ltd.
78 St Peters Terrace
Howth
Dublin D13 H008
South Dublin

ALS Environmental Ltd
Torrington Avenue
Coventry
CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575
www.alsenvironmental.co.uk

29 June 2018

Test Report: COV/1570619/2018

Dear Mr Breheny

Analysis of your sample(s) submitted on 27 June 2018 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using ALS Environmental Ltd and we look forward to receiving your next samples.

Yours Sincerely,

Signed:



Name:

H. Nolan

Title:

Microbiology Senior Analyst



Report Summary

ANALYSED BY

Mr Patrick Breheny
Envirologic
Envirologic Ltd.
78 St Peters Terrace
Howth
Dublin
South Dublin
D13 H008



Date of Issue: **29 June 2018**

Report Number: **COV/1570619/2018**

Issue **1**

This issue replaces
all previous issues

Job Description: Micro analysis

Number of Samples
included in this report **5**

Job Received: **27 June 2018**

Number of Test Results
included in this report **15**

Analysis Commenced: **28 June 2018**

Signed:

Name: **H. Nolan**

Date: **29 June 2018**

Title: **Microbiology Senior Analyst**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated.

Information on the methods of analysis and performance characteristics are available on request.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.

Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No. 02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

(c) ALS Environmental Ltd 2018. All rights reserved. We, ALS Environmental Ltd, are the owner of all copyright in this report. You must not copy, reproduce, amend or adapt this report, its contents or any format in which it is delivered without our prior written agreement. If you copy, reproduce, amend, or adapt this report in any way without our agreement you will be liable for any damage or loss to us. In the event of a dispute the copy of the report held by us shall be the reference copy.

Certificate of Analysis

ANALYSED BY



Report Number: **COV/1570619/2018**
Laboratory Number: **17248351**
Sample Source: **Envirologic**
Sample Point Description:
Sample Description: **MW01**
Sample Matrix: **Surface Water**
Sample Date/Time: **27 June 2018**
Sample Received: **27 June 2018**
Analysis Complete: **29 June 2018**

Issue **1**
Sample **1** of **5**

| Test Description | Result | Units | Analysis Date | Accreditation | Method |
|-----------------------------|--------|-----------|---------------|---------------|--------|
| Total Coliforms (Colilert) | 23 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| E Coli (Colilert) | 0 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| Faecal Coliforms (Colilert) | 0 | mpn/100ml | 28/06/2018 | N S | SUBCON |

Analyst Comments for 17248351: No Analyst Comment

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), CTD = Coatbridge(ML5 4FR), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2SW), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **H. Nolan**

Date: **29 June 2018**

Title: **Microbiology Senior Analyst**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

ANALYSED BY



Report Number: **COV/1570619/2018**
Laboratory Number: **17248352**
Sample Source: **Envirologic**
Sample Point Description:
Sample Description: **MW02**
Sample Matrix: **Surface Water**
Sample Date/Time: **27 June 2018**
Sample Received: **27 June 2018**
Analysis Complete: **29 June 2018**

Issue **1**
Sample **2** of **5**

| Test Description | Result | Units | Analysis Date | Accreditation | Method |
|-----------------------------|--------|-----------|---------------|---------------|--------|
| Total Coliforms (Colilert) | 135 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| E Coli (Colilert) | 4 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| Faecal Coliforms (Colilert) | 4 | mpn/100ml | 28/06/2018 | N S | SUBCON |

Analyst Comments for 17248352:

No Analyst Comment

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), CTD = Coatbridge(ML5 4FR), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2SW), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **H. Nolan**

Date: **29 June 2018**

Title: **Microbiology Senior Analyst**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

ANALYSED BY



Report Number: **COV/1570619/2018**
Laboratory Number: **17248353**
Sample Source: **Envirologic**
Sample Point Description:
Sample Description: **TP01**
Sample Matrix: **Surface Water**
Sample Date/Time: **27 June 2018**
Sample Received: **27 June 2018**
Analysis Complete: **29 June 2018**

Issue **1**
Sample **3** of **5**

| Test Description | Result | Units | Analysis Date | Accreditation | Method |
|-----------------------------|--------|-----------|---------------|---------------|--------|
| Total Coliforms (Colilert) | 1986 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| E Coli (Colilert) | 228 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| Faecal Coliforms (Colilert) | 361 | mpn/100ml | 28/06/2018 | N S | SUBCON |

Analyst Comments for 17248353:

No Analyst Comment

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), CTD = Coatbridge(ML5 4FR), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2SW), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **H. Nolan**

Date: **29 June 2018**

Title: **Microbiology Senior Analyst**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

ANALYSED BY



Report Number: **COV/1570619/2018**
Laboratory Number: **17248354**
Sample Source: **Envirologic**
Sample Point Description:
Sample Description: **TP03**
Sample Matrix: **Surface Water**
Sample Date/Time: **27 June 2018**
Sample Received: **27 June 2018**
Analysis Complete: **29 June 2018**

Issue **1**
Sample **4** of **5**

| Test Description | Result | Units | Analysis Date | Accreditation | Method |
|-----------------------------|--------|-----------|---------------|---------------|--------|
| Total Coliforms (Colilert) | >2420 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| E Coli (Colilert) | 1046 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| Faecal Coliforms (Colilert) | >2420 | mpn/100ml | 28/06/2018 | N S | SUBCON |

Analyst Comments for 17248354:

No Analyst Comment

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), CTD = Coatbridge(ML5 4FR), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2SW), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **H. Nolan**

Date: **29 June 2018**

Title: **Microbiology Senior Analyst**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Certificate of Analysis

ANALYSED BY



Report Number: **COV/1570619/2018**
Laboratory Number: **17248355**
Sample Source: **Envirologic**
Sample Point Description:
Sample Description: **Fen SW**
Sample Matrix: **Surface Water**
Sample Date/Time: **27 June 2018**
Sample Received: **27 June 2018**
Analysis Complete: **29 June 2018**

Issue **1**
Sample **5** of **5**

| Test Description | Result | Units | Analysis Date | Accreditation | Method |
|-----------------------------|--------|-----------|---------------|---------------|--------|
| Total Coliforms (Colilert) | 185 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| E Coli (Colilert) | 39 | mpn/100ml | 28/06/2018 | N S | SUBCON |
| Faecal Coliforms (Colilert) | 121 | mpn/100ml | 28/06/2018 | N S | SUBCON |

Analyst Comments for 17248355:

No Analyst Comment

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), CTD = Coatbridge(ML5 4FR), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2SW), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **H. Nolan**

Date: **29 June 2018**

Title: **Microbiology Senior Analyst**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Impact Definitions

The following impact defining tables are taken in part from NRA Guidelines (2009) and they are included in the publication 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' published by the Institute of Geologists Ireland.

Criteria for assessing importance of site attribute

Table 8.B.1 – Estimation of importance of sensitive hydrogeological attributes

| Importance of attribute | Criteria | Example |
|-------------------------|---|--|
| Extremely High | Attribute has a high quality or value on an international scale | Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation, e.g. SAC or SPA status |
| Very High | Attribute has a high quality, significance or value on a regional or national scale | Regionally important aquifer with multiple wellfields Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source |
| High | Attribute has a high quality, significance or value on a local scale | Regionally important aquifer Groundwater provides large proportion of base flow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source |
| Medium | Attribute has a medium quality, significance or value on a local scale | Locally important aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source |
| Low | Attribute has a low quality, significance or value on a local scale | Poor bedrock aquifer Potable water source supplying < 50 homes |

Criteria for assessing magnitude of impact

Table 8.B.2 – Estimation of the magnitude of a potential impact on an attribute

| Impact type | Magnitude of impact | Example |
|-------------|---------------------|--|
| Adverse | Negligible | No measurable changes in attributes Calculated risk of serious pollution incident <0.5% annually |
| | Small | Removal of small proportion of aquifer Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually. |
| | Moderate | Removal of moderate proportion of aquifer Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems Potential medium risk of pollution to groundwater from routine runoff Calculated risk of serious pollution incident >1% annually |
| | Large | Removal of large proportion of aquifer Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems Potential high risk of pollution to groundwater from routine runoff Calculated risk of serious pollution incident >2% annually |
| Beneficial | Minor | Minor enhancement of aquifer |
| | Moderate | Moderate enhancement of aquifer |
| | Major | Major enhancement of aquifer |

Criteria for rating site attributes

Table 8.B.3 – Estimation of the significance of a potential impact on an attribute

| Importance of attribute | Magnitude of impact | | | |
|-------------------------|---------------------|--------------------------|--------------------------|------------------------|
| | Negligible | Small | Moderate | Large |
| Extremely High | Imperceptible | Significant | Profound | Profound |
| Very High | Imperceptible | Significant/ moderate | Profound/ significant | Profound |
| High | Imperceptible | Moderate/ slight | Significant/ moderate | Severe/ significant |
| Medium | Imperceptible | Slight | Moderate | Significant |
| Low | Imperceptible | Imperceptible | Slight | Slight/ moderate |

Appendix IV – Ambient Air Quality Standards, Emission Factors & Dust Monitoring Results

Client: Kilcarrig Quarries Ltd

Kilcarrig
Bagnelstown
Co. Carlow

BHP Ref. No: 18/11/0964-0966
Quote Ref: QC003001
Order No: N/A
Sales Order: 50871
Date Received: 10/11/2018
Date Sampled: 10/11/2018
Date Completed: 13/11/2018
Sample Type: Environmental Dust
Sampling Period: 15/10/2018 - 10/11/2018



Testing
Analysing
Consulting



BHP Laboratories
 New Road
 Thomondgate
 Limerick
 Tel: +353 61 455399
 Fax: +353 61 455261
 Email: colettehannan@bhp.ie

FTAO: Robert Reddy
Site: Roscat Quarry
BHP Ref: Monthly_ Environmental Dust

| TestName | ClientRef | Units | Results | DateAnalysed | Method |
|---------------------|-----------|------------------------|---------|--------------|------------|
| Dust Deposition Acc | D1 | mg/m ² /day | 25 | 13/11/2018 | BHP AC 017 |
| Dust Deposition Acc | D2 | mg/m ² /day | 68 | 13/11/2018 | BHP AC 017 |
| Dust Deposition Acc | D3 | mg/m ² /day | 191 | 13/11/2018 | BHP AC 017 |

Authorised by:
Dervla Purcell**Date Authorised:** 16/11/2018**Laboratory Manager****Additional Information:**(Opinions, where stated, are not covered by accreditation)**Acc.:** INAB Accredited**Notes:** All sample locations were inside the EPA limit of 350 mg/m²/day.

Total dust residues were ashed at 600°C for 1 hour to determine inorganic dust deposition.

Organic deposition was determined by subtracting the inorganic dust deposition from the total dust deposition.

Sample Conditions: All samples in acceptable condition.

AMBIENT AIR QUALITY STANDARDS

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC) (see Table 10.1). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time. In response to the problem of acid rain, sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent years the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002), and has set limit values which came into operation on 17th June 2002. Council Directive 1999/30/EC, as relating to limit values for sulphur dioxide, nitrogen dioxide, lead and particulate matter. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM₁₀, 40% for the hourly and annual limit value for NO₂ and 26% for hourly SO₂ limit values. The margin of tolerance commenced from June 2002. It started to reduce from 1 January 2003, continuing every 12 months thereafter by equal annual percentages to reach 0% by the respective attainment date for each pollutant. A second daughter directive, EU Council Directive 2000/69/EC, limit values for both carbon monoxide and benzene in ambient air is also included in the Air Quality Standards Regulations 2002. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. This has also been passed into Irish Law under the Air Quality Standards Regulations 2011 (S.I. 180 of 2011) (see Table 10.1). Provisions were also made for the inclusion of new ambient limit values relating to PM_{2.5}. The margin of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regards to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for PM_{2.5} are included in Directive 2008/50/EC. The approach for PM_{2.5} is to establish a target value of 25 µg/m³, as an annual average (to be attained everywhere by 2010) and a limit value of 25 µg/m³, as an annual average (to be attained everywhere by 2012), coupled with a target to reduce human exposure generally to PM_{2.5} between 2010 and 2020. This exposure reduction target will range

from 0% (for PM_{2.5} concentrations of less than 8.5 µg/m³ to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 µg/m³. Where the AEI is currently greater than 22 µg/m³ all appropriate measures should be employed to reduce this level to 18 µg/m³ by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008-2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 µg/m³ has been set which was to be complied with by 2012 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as “a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 96/62/EC”. These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).

The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 23 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other factors, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation. The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

APPENDIX - EMISSION FACTORS

Emission Factors Used In Dust Emission Calculations (USEPA, 1986 & subsequent updates):

Road Haulage (Unpaved)

$$E = [281.9 * k * (s/12)^a * (W/3)^b * ((365-P)/365)] \text{ g/veh km}$$

Where:

s = surface silt content (9.2%)

k = 4.9 (Total Dust), 1.8 (PM₁₀), 0.15 (PM_{2.5})

W = mean vehicle weight (30 tonnes)

a = 0.9 (PM₁₀/PM_{2.5}), 0.7 (Total Dust)

b = 0.45

P = 192 wet days

Road Haulage (Paved)

$$E = [k * (sL)^{0.91} * (W)^{1.02}] * (1-P)/4N \text{ g/veh km}$$

Where:

sL = surface silt loading (0.6 g/m²)

k = 24 (Total Dust), 4.6 (PM₁₀), 0.66 (PM_{2.5})

W = mean vehicle weight (30 tonnes)

P = 192 wet days

N = 365 days

Material Loading

$$E = k * (0.0016) * (U/2.2)^{1.3} / (M/2)^{1.4} * ((365-P)/365) \text{ kg/Mg}$$

Where:

k = 0.74 (Total Dust), 0.35 (PM₁₀), 0.053 (PM_{2.5})

M = moisture content (2.1%)

U = mean wind speed (3.5 m/s)

P = 192 wet days

| Operation | Total Dust Emission Rate | PM ₁₀ Emission Rate | PM _{2.5} Emission Rate |
|--|--------------------------|--------------------------------|---------------------------------|
| Conveyor Transfer (g/s/m ²) | 4.53E-08 | 1.66E-08 | 4.23E-09 |
| Screening (g/s/m ²) | 3.77E-07 | 1.30E-07 | 8.45E-09 |
| Stockpiling (g/s/m ²) | 2.11E-06 | 1.05E-06 | 4.21E-07 |
| Paved Roads (g/s) per source every 10 m | 3.14E-04 | 6.02E-05 | 1.46E-05 |
| Unpaved Roads (g/s) per source every 10 m | 2.12E-03 | 6.16E-04 | 6.16E-05 |

Appendix V – Noise Data

Appendix



Location N3: Noise monitor in-situ



Location N1: Noise monitor in-situ



Location N2: Noise monitor in-situ

receiving position in relation to the source and the barrier are required. Calculations may be made in octave bands instead of "A" weighting to provide a more accurate barrier attenuation; if the octave band sound levels (see Tables C.1 to C.11) and the positions of the sources, receiver and barrier are known. The barrier attenuation can be calculated from Figure F.3. The final results of this analysis then needs to be logarithmically summed and weighted to provide an "A" weighted level.

In the absence of spectral data, as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver. High topographical features and specifically designed and positioned noise barriers could provide greater attenuation. Subtract the attenuation from the value of L_{Aeq} calculated at the point of interest. Where the point of interest is 1 m from the façade of a building, make an allowance for reflection by adding 3 dB to the calculated (free field) levels.

- d) Stage 4. Repeat stages 1 to 3 for each activity.
- e) Stage 5. Estimate the percentage of the assessment period for which each activity takes place. Then use one of the methods outlined in F.2.6 to predict the assessment period L_{Aeq} from the individual activity L_{Aeq} values obtained in stage 3, which might be on a shorter time-base.

Figure F.2 Distance adjustment K for activity L_{Aeq} method

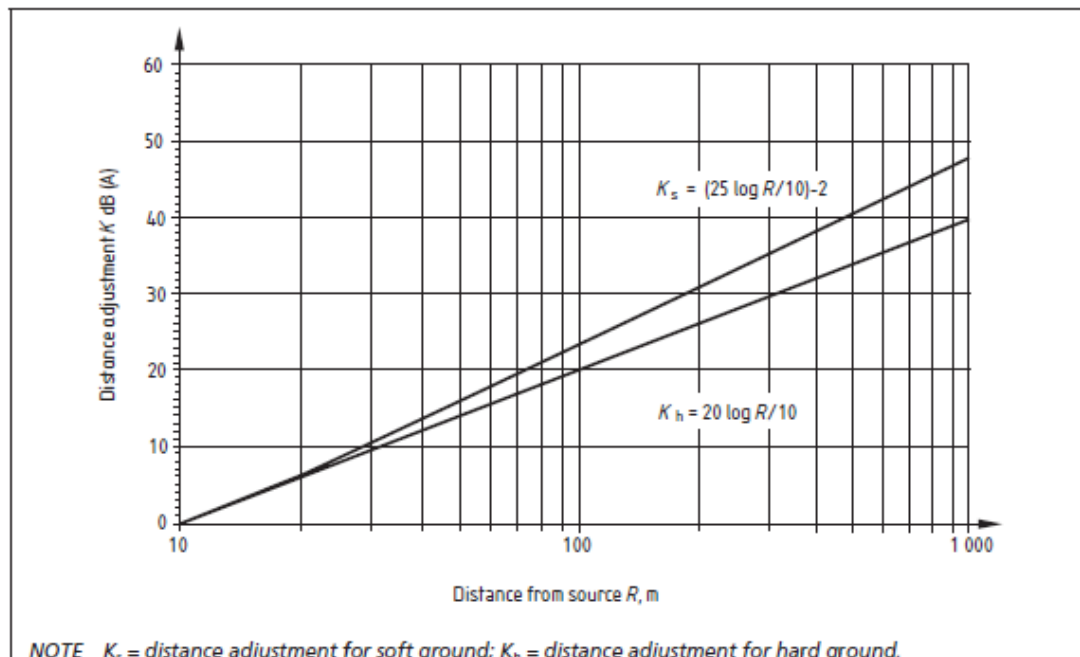
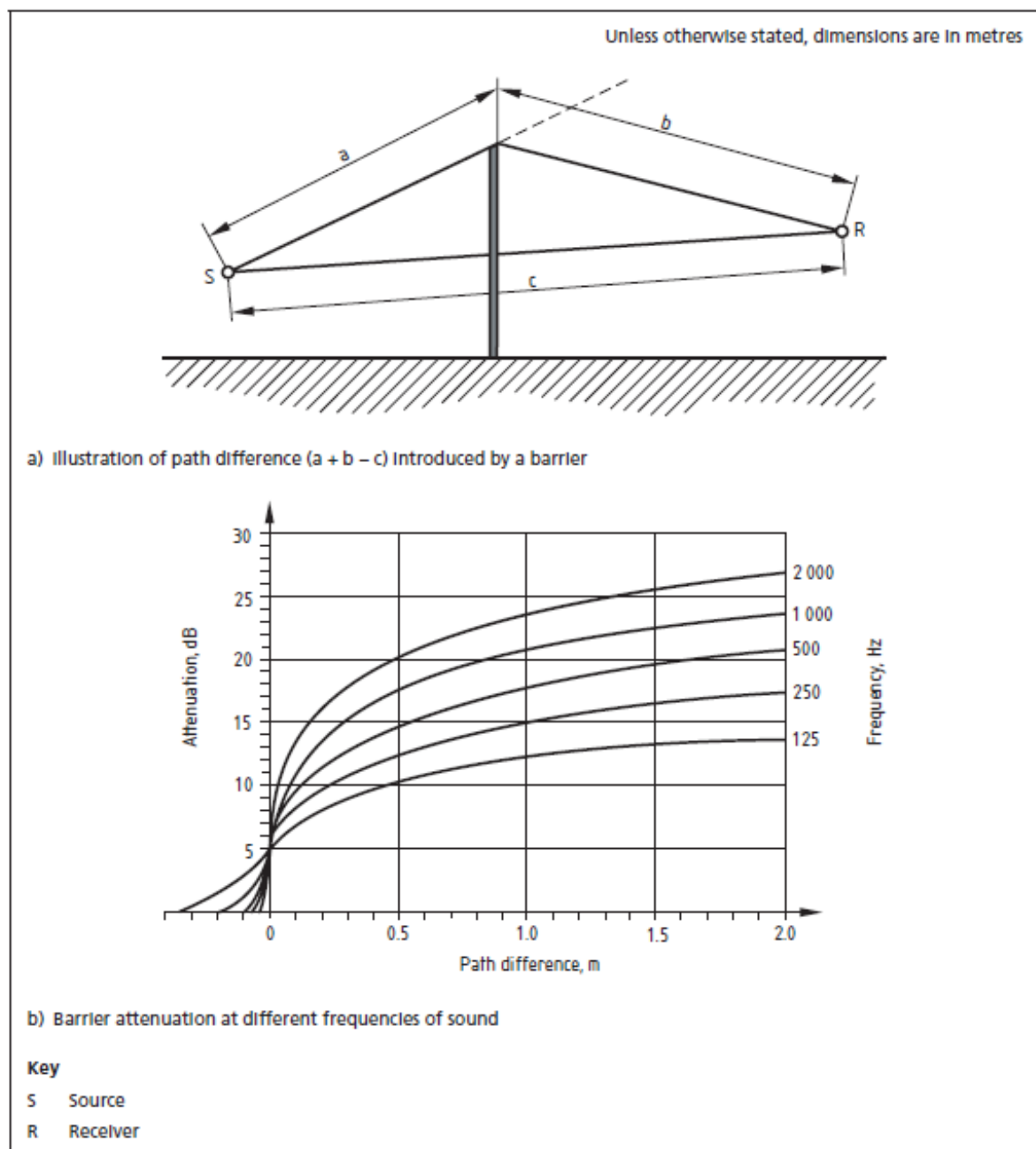


Figure F.3 Screening effect of barriers



F.2.2.2.2 Distance adjustment

For propagation over hard ground, $K = K_h$. For propagation over 100% soft ground, $K = K_s$, providing that the source is operating at ground level and the receiver is no more than 2.5 m above the ground. If either the source or receiver is more than 2.5 m above the ground, the additional attenuation offered by soft ground needs to be reduced until at 15 m its value is the same as that at hard ground.

Table 1

| Date | Time | Duration | Leq dBA | Lmin dBA | Lmax dBA | Location N1 | | | |
|-----------|----------|----------|------------|-------------|-------------|-------------|------------|------------|------------|
| | | | | | | L5 dBA | L10 dBA | L50 dBA | L90 dBA |
| 04Oct2018 | 13:23:47 | 06:12.9 | 54.5 | 34.3 | 85 | 56.2 | 53.1 | 43.5 | 37.3 |
| 04Oct2018 | 13:30:00 | 30:00.0 | 47.8 | 31.8 | 60.7 | 53.8 | 52.1 | 43.7 | 36.5 |
| 04Oct2018 | 14:00:00 | 30:00.0 | 49.7 | 34.2 | 66.4 | 55.3 | 53.6 | 45.8 | 38.3 |
| 04Oct2018 | 14:30:00 | 30:00.0 | 49.6 | 31.8 | 64.9 | 55.6 | 53.5 | 45.7 | 36.6 |
| 04Oct2018 | 15:00:00 | 30:00.0 | 51.1 | 31.1 | 70.2 | 56.8 | 54.6 | 44.8 | 35.2 |
| 04Oct2018 | 15:30:00 | 30:00.0 | 49.5 | 30 | 61.7 | 55.8 | 54.1 | 45 | 35.2 |
| 04Oct2018 | 16:00:00 | 30:00.0 | 49.7 | 29.6 | 62.3 | 55.2 | 53.7 | 47.2 | 37.6 |
| 04Oct2018 | 16:30:00 | 30:00.0 | 51.1 | 34.1 | 61.8 | 56.2 | 54.8 | 49.2 | 39.6 |
| 04Oct2018 | 17:00:00 | 30:00.0 | 50.7 | 34.3 | 61.2 | 56 | 54.7 | 48.3 | 40.3 |
| 04Oct2018 | 17:30:00 | 30:00.0 | 51.5 | 34.2 | 62.5 | 56.3 | 55.2 | 49.7 | 41 |
| 04Oct2018 | 18:00:00 | 30:00.0 | 51.3 | 30.1 | 65.5 | 56.6 | 55.3 | 48.3 | 38 |
| 04Oct2018 | 18:30:00 | 30:00.0 | 50.6 | 30 | 67.2 | 56.2 | 54.6 | 47 | 37.1 |
| 04Oct2018 | 19:00:00 | 30:00.0 | 49.1 | 28.3 | 61.3 | 55 | 53.7 | 45.3 | 35.7 |
| 04Oct2018 | 19:30:00 | 30:00.0 | 48.7 | 25.6 | 63.1 | 55.2 | 53.2 | 43.2 | 31.8 |
| 04Oct2018 | 20:00:00 | 30:00.0 | 47.2 | 24 | 61.1 | 53.8 | 52.1 | 40.1 | 30.1 |
| 04Oct2018 | 20:30:00 | 30:00.0 | 47.1 | 24.1 | 59.7 | 54.3 | 52.6 | 36.3 | 28.3 |
| 04Oct2018 | 21:00:00 | 30:00.0 | 47 | 25.1 | 61.8 | 53.6 | 51.2 | 39.2 | 29.5 |
| 04Oct2018 | 21:30:00 | 30:00.0 | 44.7 | 23.8 | 62.6 | 51.8 | 49.2 | 35.6 | 27.3 |
| 04Oct2018 | 22:00:00 | 30:00.0 | 43.8 | 21.1 | 59.1 | 51.2 | 48.8 | 35 | 25 |
| 04Oct2018 | 22:30:00 | 30:00.0 | 44 | 27.3 | 64.7 | 51.2 | 47.7 | 33.7 | 30.3 |
| 04Oct2018 | 23:00:00 | 30:00.0 | 39.6 | 29.3 | 60.3 | 45.2 | 37.7 | 32.2 | 30.5 |
| 04Oct2018 | 23:30:00 | 30:00.0 | 41.1 | 28.3 | 59.8 | 47.5 | 42 | 32.2 | 30.1 |
| 05Oct2018 | 00:00:00 | 30:00.0 | 39.1 | 28.5 | 63.6 | 42.2 | 36.6 | 32.8 | 30.6 |
| 05Oct2018 | 00:30:00 | 30:00.0 | 39.1 | 25.3 | 64.5 | 42.8 | 37.2 | 29.8 | 27.3 |
| 05Oct2018 | 01:00:00 | 30:00.0 | 39.2 | 21.6 | 59.6 | 45.7 | 40.6 | 27.3 | 24.1 |
| 05Oct2018 | 01:30:00 | 30:00.0 | 38.1 | 20.6 | 62.1 | 41.2 | 32.2 | 24.8 | 22.3 |
| 05Oct2018 | 02:00:00 | 30:00.0 | 23.8 | 20.3 | 38.7 | 27.5 | 26 | 22.8 | 21.3 |
| 05Oct2018 | 02:30:00 | 30:00.0 | 34.1 | 20.3 | 58.2 | 30.8 | 28 | 23.8 | 21.3 |
| 05Oct2018 | 03:00:00 | 30:00.0 | 33.3 | 21.8 | 57.1 | 37.2 | 34.8 | 28.8 | 23.8 |
| 05Oct2018 | 03:30:00 | 30:00.0 | 42.3 | 27.3 | 64 | 48.5 | 45.3 | 36.2 | 31.1 |
| 05Oct2018 | 04:00:00 | 30:00.0 | 40 | 26.6 | 61.7 | 41.6 | 39.5 | 34.7 | 30.8 |
| 05Oct2018 | 04:30:00 | 30:00.0 | 39.3 | 23.3 | 63.1 | 41.3 | 37.3 | 30.8 | 27.3 |
| 05Oct2018 | 05:00:00 | 30:00.0 | 43.5 | 24 | 65.5 | 50.2 | 43.2 | 29.3 | 26.3 |
| 05Oct2018 | 05:30:00 | 30:00.0 | 46.2 | 25.5 | 64.5 | 53.5 | 50.7 | 32 | 28.3 |
| 05Oct2018 | 06:00:00 | 30:00.0 | 47.7 | 26.6 | 66.2 | 54.7 | 52 | 36.8 | 30.3 |
| 05Oct2018 | 06:30:00 | 30:00.0 | 51.6 | 29.1 | 68.4 | 57.6 | 55.7 | 45.7 | 36.1 |
| 05Oct2018 | 07:00:00 | 30:00.0 | 52 | 31 | 72.2 | 58.7 | 56.2 | 43.2 | 34.5 |
| 05Oct2018 | 07:30:00 | 30:00.0 | 53 | 32.7 | 68.7 | 59.2 | 57.2 | 48 | 37.8 |
| 05Oct2018 | 08:00:00 | 30:00.0 | 54.1 | 34.2 | 69.7 | 59.7 | 58.1 | 51.1 | 38.7 |
| 05Oct2018 | 08:30:00 | 30:00.0 | 54.6 | 35.7 | 70 | 60.2 | 58.6 | 51.3 | 41.7 |
| 05Oct2018 | 09:00:00 | 30:00.0 | 54.2 | 35 | 71 | 60.5 | 58.5 | 49.8 | 40.1 |
| 05Oct2018 | 09:30:00 | 30:00.0 | 54.3 | 34.2 | 69.7 | 60.2 | 58.6 | 50.5 | 39.8 |
| 05Oct2018 | 10:00:00 | 30:00.0 | 53.6 | 33 | 74.7 | 59.7 | 57.6 | 48.6 | 38.5 |
| 05Oct2018 | 10:30:00 | 30:00.0 | 52.7 | 32.8 | 69.4 | 58.7 | 56.8 | 48.3 | 38.2 |
| 05Oct2018 | 11:00:00 | 30:00.0 | 54.1 | 33.7 | 68.5 | 60 | 58.2 | 50.5 | 39.3 |
| 05Oct2018 | 11:30:00 | 30:00.0 | 53.1 | 32.2 | 67 | 59.2 | 57.2 | 48.2 | 37.3 |
| 05Oct2018 | 12:00:00 | 30:00.0 | 53.2 | 32.1 | 66.7 | 59.6 | 57.7 | 48.5 | 37.1 |

| | | | | | | | | | |
|-----------|----------|---------|------|------|------|------|------|------|------|
| 05Oct2018 | 12:30:00 | 10:00.0 | 52.7 | 30.8 | 68.9 | 58.6 | 56.7 | 49.1 | 39.1 |
| 05Oct2018 | 13:00:00 | 30:00.0 | 53.2 | 33.1 | 66.7 | 59.2 | 57.6 | 49.8 | 40.1 |
| 05Oct2018 | 13:30:00 | 30:00.0 | 53.1 | 32.7 | 69 | 59.2 | 57.1 | 48.2 | 37.8 |
| 05Oct2018 | 14:00:00 | 30:00.0 | 53.7 | 34.3 | 68.5 | 59.7 | 58.1 | 49.3 | 39.3 |
| 05Oct2018 | 14:30:00 | 30:00.0 | 53 | 31.8 | 65.9 | 59.2 | 57.2 | 49 | 39.2 |
| 05Oct2018 | 15:00:00 | 30:00.0 | 53.2 | 31.3 | 67.4 | 59.1 | 57.3 | 50 | 40.7 |
| 05Oct2018 | 15:30:00 | 30:00.0 | 53.1 | 33.8 | 66 | 58.2 | 56.8 | 51 | 42.6 |
| 05Oct2018 | 16:00:00 | 30:00.0 | 53.7 | 34.2 | 70.4 | 58.8 | 57.5 | 51.2 | 42.6 |
| 05Oct2018 | 16:30:00 | 30:00.0 | 53.2 | 33.2 | 66.9 | 58.8 | 57.2 | 50 | 40.1 |
| 05Oct2018 | 17:00:00 | 30:00.0 | 53.7 | 32.7 | 67.2 | 59.2 | 57.7 | 51.1 | 40.7 |
| 05Oct2018 | 17:30:00 | 30:00.0 | 53.6 | 32.2 | 66.5 | 59.5 | 57.8 | 50.1 | 38.8 |
| 05Oct2018 | 18:00:00 | 30:00.0 | 53 | 32.1 | 67.9 | 58.7 | 57.2 | 49.2 | 39 |
| 05Oct2018 | 18:30:00 | 30:00.0 | 51.7 | 30.8 | 67.4 | 57.7 | 55.7 | 47.7 | 38.6 |
| 05Oct2018 | 19:00:00 | 30:00.0 | 50.7 | 32.1 | 65.5 | 56.7 | 54.8 | 46 | 36.7 |
| 05Oct2018 | 19:30:00 | 30:00.0 | 50.2 | 31.6 | 69 | 56.1 | 54.5 | 46.1 | 36.2 |
| 05Oct2018 | 20:00:00 | 30:00.0 | 49 | 29.6 | 65.7 | 55.1 | 53 | 43.5 | 34.2 |
| 05Oct2018 | 20:30:00 | 30:00.0 | 50.5 | 28.3 | 67.5 | 57.1 | 54.2 | 40.7 | 33.2 |
| 05Oct2018 | 21:00:00 | 30:00.0 | 47.6 | 28.6 | 64.7 | 54.7 | 51.7 | 39 | 32.8 |
| 05Oct2018 | 21:30:00 | 30:00.0 | 47.8 | 25.3 | 67.2 | 54.8 | 51.7 | 36.3 | 30.1 |
| 05Oct2018 | 22:00:00 | 30:00.0 | 46.7 | 24.8 | 70.4 | 53.1 | 50.2 | 32.3 | 28.1 |
| 05Oct2018 | 22:30:00 | 30:00.0 | 46.3 | 25.8 | 62.6 | 53.5 | 50.7 | 33.8 | 29 |
| 05Oct2018 | 23:00:00 | 30:00.0 | 45.2 | 24.6 | 64 | 52.1 | 49 | 31.8 | 27.6 |
| 05Oct2018 | 23:30:00 | 30:00.0 | 41.2 | 23.1 | 60.7 | 48.1 | 43.1 | 29.3 | 25.8 |
| 06Oct2018 | 00:00:00 | 30:00.0 | 37.1 | 22 | 59.7 | 41.6 | 36.2 | 26.5 | 24 |
| 06Oct2018 | 00:30:00 | 30:00.0 | 38.2 | 21.8 | 60.2 | 43 | 34.2 | 26.3 | 23.3 |
| 06Oct2018 | 01:00:00 | 30:00.0 | 41.7 | 21.8 | 64.4 | 47.7 | 41 | 28.1 | 23.8 |
| 06Oct2018 | 01:30:00 | 30:00.0 | 38.7 | 20.8 | 66.4 | 33.8 | 31.1 | 24.8 | 22.5 |
| 06Oct2018 | 02:00:00 | 30:00.0 | 38.5 | 21.6 | 59.1 | 44.3 | 36.6 | 26.8 | 23.1 |
| 06Oct2018 | 02:30:00 | 30:00.0 | 24.3 | 20.8 | 40.6 | 27.1 | 25.8 | 23.3 | 22.1 |
| 06Oct2018 | 03:00:00 | 30:00.0 | 33.7 | 20.6 | 63.7 | 29.3 | 27.6 | 23.3 | 21.8 |
| 06Oct2018 | 03:30:00 | 30:00.0 | 34.6 | 20.8 | 58.7 | 31.6 | 29 | 23.8 | 22.1 |
| 06Oct2018 | 04:00:00 | 30:00.0 | 35.3 | 20.3 | 63.8 | 30.3 | 27.8 | 22.8 | 21.1 |
| 06Oct2018 | 04:30:00 | 30:00.0 | 36.3 | 20.8 | 59.7 | 40.5 | 33 | 26.1 | 23 |
| 06Oct2018 | 05:00:00 | 30:00.0 | 40.2 | 21.6 | 63.7 | 42 | 32 | 26.3 | 23.3 |
| 06Oct2018 | 05:30:00 | 30:00.0 | 38.8 | 22.3 | 60.3 | 44.1 | 39.2 | 28.8 | 25.6 |
| 06Oct2018 | 06:00:00 | 30:00.0 | 44.3 | 22.3 | 64.7 | 51.7 | 47.6 | 29.8 | 26 |
| 06Oct2018 | 06:30:00 | 30:00.0 | 47 | 26.3 | 65 | 54.1 | 51.2 | 36.2 | 31.3 |
| 06Oct2018 | 07:00:00 | 30:00.0 | 46.8 | 28.3 | 66.2 | 53.3 | 51.1 | 37.1 | 31.3 |
| 06Oct2018 | 07:30:00 | 30:00.0 | 48.3 | 31.3 | 66.2 | 55.1 | 52.6 | 40.5 | 34.6 |
| 06Oct2018 | 08:00:00 | 30:00.0 | 50.2 | 32.1 | 70.7 | 57 | 54.1 | 43 | 36.3 |
| 06Oct2018 | 08:30:00 | 30:00.0 | 51.6 | 33.5 | 71 | 57.8 | 55.7 | 46.3 | 37.8 |
| 06Oct2018 | 09:00:00 | 30:00.0 | 52.7 | 34.7 | 69.4 | 58.7 | 56.7 | 48.2 | 38.5 |
| 06Oct2018 | 09:30:00 | 30:00.0 | 51.5 | 34.5 | 66.9 | 57.8 | 55.6 | 46.7 | 38.2 |
| 06Oct2018 | 10:00:00 | 30:00.0 | 51.6 | 34.1 | 65.2 | 58 | 55.7 | 46.7 | 38.2 |
| 06Oct2018 | 10:30:00 | 30:00.0 | 53.1 | 34.7 | 68.2 | 59.2 | 57.2 | 48.3 | 39.8 |
| 06Oct2018 | 11:00:00 | 30:00.0 | 52.3 | 35.7 | 67.2 | 58.3 | 56.2 | 48.2 | 40.3 |
| 06Oct2018 | 11:30:00 | 30:00.0 | 53.5 | 32.7 | 68.2 | 59 | 57.2 | 50.3 | 41.6 |
| 06Oct2018 | 12:00:00 | 30:00.0 | 54 | 35.1 | 68.7 | 59.7 | 57.6 | 50.6 | 43 |
| 06Oct2018 | 12:30:00 | 30:00.0 | 53.7 | 35.5 | 69.9 | 59.6 | 57.7 | 50.1 | 41.2 |
| 06Oct2018 | 13:00:00 | 30:00.0 | 54.2 | 35.5 | 66.2 | 60 | 58.5 | 51.1 | 42 |

| | | | | | | | | | |
|-----------|----------|---------|------|------|------|------|------|------|------|
| 06Oct2018 | 13:30:00 | 30:00.0 | 53.7 | 34.3 | 70.5 | 59.7 | 57.8 | 49.6 | 40.2 |
| 06Oct2018 | 14:00:00 | 22:15.0 | 53.8 | 35.2 | 68.2 | 59.6 | 58 | 50.3 | 42.3 |

Table 2

| | | | Location N2 | | | | | | | |
|-----------|----------|----------|--------------------|-------------|-------------|-----------|-----------|------------|------------|------------|
| Date | Time | Duration | Leq dBA | Lmin dBA | Lmax dBA | L1 dBA | L5 dBA | L10 dBA | L50 dBA | L90 dBA |
| 04Oct2018 | 12:48:30 | 11:29.8 | 55.7 | 42.1 | 80.2 | 65.2 | 59.2 | 57.7 | 54.1 | 44.8 |
| 04Oct2018 | 13:00:00 | 30:00.0 | 53.5 | 29.6 | 78.4 | 62 | 55.7 | 52.2 | 39.5 | 34.1 |
| 04Oct2018 | 13:30:00 | 30:00.0 | 41.1 | 30.5 | 66.9 | 47 | 44.1 | 43.1 | 40.2 | 36.3 |
| 04Oct2018 | 14:00:00 | 30:00.0 | 46.8 | 34.5 | 68 | 57.1 | 52.8 | 49.2 | 41.1 | 37.7 |
| 04Oct2018 | 14:30:00 | 30:00.0 | 56.3 | 33.2 | 81.2 | 67.7 | 60.5 | 57.3 | 42 | 36.7 |
| 04Oct2018 | 15:00:00 | 30:00.0 | 48.3 | 33 | 69 | 61.7 | 55.3 | 47.5 | 38.7 | 36.1 |
| 04Oct2018 | 15:30:00 | 30:00.0 | 57.2 | 33.2 | 77.2 | 68.2 | 61.8 | 60 | 51.2 | 38.5 |
| 04Oct2018 | 16:00:00 | 30:00.0 | 57.6 | 39.6 | 81 | 64.5 | 61.8 | 60.7 | 55.5 | 47.3 |
| 04Oct2018 | 16:30:00 | 30:00.0 | 60.2 | 38.5 | 86.4 | 68.4 | 60.5 | 54.7 | 48.3 | 43.8 |
| 04Oct2018 | 17:00:00 | 30:00.0 | 59.7 | 39.8 | 84.9 | 69.2 | 61.8 | 59 | 47 | 43.1 |
| 04Oct2018 | 17:30:00 | 30:00.0 | 50.2 | 37.5 | 62.8 | 57.7 | 55.3 | 53.5 | 48.2 | 44.1 |
| 04Oct2018 | 18:00:00 | 30:00.0 | 42 | 33.6 | 55.1 | 49.7 | 45.8 | 44.5 | 40.5 | 37.5 |
| 04Oct2018 | 18:30:00 | 30:00.0 | 44.5 | 31.6 | 68.7 | 53.7 | 46 | 44.2 | 39.5 | 35.6 |
| 04Oct2018 | 19:00:00 | 30:00.0 | 55.6 | 32.7 | 84.2 | 63.7 | 55.2 | 46.1 | 41.6 | 37.8 |
| 04Oct2018 | 19:30:00 | 30:00.0 | 54.7 | 34.5 | 80.7 | 63.5 | 51.2 | 45.2 | 42.2 | 38.2 |
| 04Oct2018 | 20:00:00 | 30:00.0 | 42.6 | 33 | 69.9 | 47.2 | 44.5 | 43.7 | 41.2 | 38.3 |
| 04Oct2018 | 20:30:00 | 30:00.0 | 43.8 | 32.5 | 69.4 | 49.2 | 46.3 | 45.2 | 42.7 | 40.2 |
| 04Oct2018 | 21:00:00 | 30:00.0 | 42.2 | 30.8 | 64.7 | 45.7 | 44.6 | 43.8 | 41.8 | 39.1 |
| 04Oct2018 | 21:30:00 | 30:00.0 | 42.5 | 31 | 53.2 | 45.5 | 44.6 | 44 | 42.3 | 40.2 |
| 04Oct2018 | 22:00:00 | 30:00.0 | 42.2 | 32.7 | 73 | 45.2 | 43.7 | 43 | 41.2 | 39.1 |
| 04Oct2018 | 22:30:00 | 30:00.0 | 44.1 | 36.7 | 70.7 | 48.1 | 45.6 | 44.8 | 43 | 41.5 |
| 04Oct2018 | 23:00:00 | 30:00.0 | 40.1 | 33.6 | 59 | 43.7 | 42.6 | 41.8 | 39.7 | 37.8 |
| 04Oct2018 | 23:30:00 | 30:00.0 | 39.7 | 34.2 | 57.5 | 44.2 | 42.6 | 41.7 | 38.7 | 37 |
| 05Oct2018 | 00:00:00 | 30:00.0 | 40.5 | 33.8 | 53.7 | 45 | 43.8 | 43.1 | 39.5 | 37.1 |
| 05Oct2018 | 00:30:00 | 30:00.0 | 39.3 | 31.3 | 48.2 | 44.2 | 42.7 | 41.7 | 38.7 | 36.1 |
| 05Oct2018 | 01:00:00 | 30:00.0 | 37.2 | 28.6 | 64.7 | 42.2 | 40.2 | 39.2 | 36.2 | 33.8 |
| 05Oct2018 | 01:30:00 | 30:00.0 | 35.5 | 28.1 | 48.8 | 42.3 | 38.7 | 37.3 | 34.5 | 32 |
| 05Oct2018 | 02:00:00 | 30:00.0 | 35.3 | 26.6 | 53.5 | 41.7 | 38.1 | 37.1 | 34.5 | 31.8 |
| 05Oct2018 | 02:30:00 | 30:00.0 | 34.1 | 26.3 | 56.2 | 39.2 | 37.2 | 36.2 | 33.2 | 30.3 |
| 05Oct2018 | 03:00:00 | 30:00.0 | 33.2 | 26.1 | 49.1 | 38.3 | 36.1 | 35.2 | 32.6 | 29.8 |
| 05Oct2018 | 03:30:00 | 30:00.0 | 36.7 | 28.6 | 50.2 | 41.8 | 40.3 | 39.5 | 36 | 32.2 |
| 05Oct2018 | 04:00:00 | 30:00.0 | 37 | 30.1 | 46.8 | 43.1 | 40.7 | 39.6 | 36 | 32.8 |
| 05Oct2018 | 04:30:00 | 30:00.0 | 39 | 30.1 | 47.5 | 44 | 42.6 | 41.7 | 38.2 | 34 |
| 05Oct2018 | 05:00:00 | 30:00.0 | 38.3 | 29.1 | 50.2 | 44 | 42.7 | 41.7 | 36.8 | 33.1 |
| 05Oct2018 | 05:30:00 | 30:00.0 | 35.8 | 28.6 | 53.2 | 44.2 | 40 | 38.3 | 34 | 31.3 |
| 05Oct2018 | 06:00:00 | 30:00.0 | 42 | 31.1 | 69.4 | 45.7 | 43.8 | 43.2 | 39.5 | 35.7 |
| 05Oct2018 | 06:30:00 | 30:00.0 | 42.5 | 34.6 | 56.7 | 50 | 45.6 | 44.3 | 41.5 | 39.1 |
| 05Oct2018 | 07:00:00 | 30:00.0 | 41.7 | 34.5 | 66.2 | 46.6 | 44.2 | 43.5 | 40.8 | 38.7 |
| 05Oct2018 | 07:30:00 | 30:00.0 | 47.1 | 34.6 | 75.4 | 59.2 | 50 | 46.7 | 40.7 | 38.2 |
| 05Oct2018 | 08:00:00 | 30:00.0 | 45.2 | 35.5 | 67.9 | 54.6 | 49.7 | 47 | 41.8 | 38.7 |
| 05Oct2018 | 08:30:00 | 30:00.0 | 45.5 | 37 | 66.9 | 53 | 48.1 | 47.1 | 43.8 | 40.7 |
| 05Oct2018 | 09:00:00 | 30:00.0 | 58.2 | 38.2 | 90.4 | 69.7 | 57.3 | 49.6 | 45.2 | 41.7 |
| 05Oct2018 | 09:30:00 | 30:00.0 | 52.5 | 36.2 | 84.5 | 62.7 | 52.1 | 48.3 | 42.7 | 39.7 |
| 05Oct2018 | 10:00:00 | 30:00.0 | 50.7 | 36.6 | 70.2 | 62.8 | 57 | 53.2 | 45.1 | 42.2 |
| 05Oct2018 | 10:30:00 | 30:00.0 | 48.7 | 37.3 | 77.7 | 53.1 | 48 | 46.6 | 42.6 | 40.3 |
| 05Oct2018 | 11:00:00 | 30:00.0 | 45.7 | 36.7 | 67 | 53.5 | 49.6 | 47.8 | 44.1 | 41.1 |
| 05Oct2018 | 11:30:00 | 30:00.0 | 45 | 36.2 | 69.9 | 50 | 46.6 | 45.2 | 41.7 | 39.7 |

| | | | | | | | | | | |
|-----------|----------|---------|------|------|------|------|------|------|------|------|
| 05Oct2018 | 12:00:00 | 30:00.0 | 47.5 | 37.1 | 67.4 | 56.6 | 50.7 | 48.6 | 45.7 | 43 |
| 05Oct2018 | 12:30:00 | 30:00.0 | 50.1 | 41.2 | 74.7 | 59.2 | 53.2 | 51 | 46.8 | 45.2 |
| 05Oct2018 | 13:00:00 | 30:00.0 | 48.3 | 41.2 | 70.7 | 56.7 | 51.6 | 49.8 | 46.6 | 44.2 |
| 05Oct2018 | 13:30:00 | 30:00.0 | 51.7 | 40.2 | 77.2 | 58.3 | 52.6 | 49.2 | 46.2 | 44.3 |
| 05Oct2018 | 14:00:00 | 30:00.0 | 58.2 | 41.7 | 78.2 | 71.4 | 65 | 59.2 | 47.8 | 45.1 |
| 05Oct2018 | 14:30:00 | 30:00.0 | 62.8 | 39.8 | 82.7 | 75.5 | 70.7 | 65.7 | 47.8 | 43.5 |
| 05Oct2018 | 15:00:00 | 30:00.0 | 65.7 | 45.2 | 89.7 | 77.5 | 73.7 | 68.9 | 54.5 | 49.1 |
| 05Oct2018 | 15:30:00 | 30:00.0 | 45.6 | 36.2 | 68.2 | 55 | 48.5 | 46.1 | 42.6 | 40.2 |
| 05Oct2018 | 16:00:00 | 30:00.0 | 53.3 | 34.7 | 78.9 | 62.2 | 50.8 | 47.7 | 42.8 | 38.3 |
| 05Oct2018 | 16:30:00 | 30:00.0 | 49.2 | 35.1 | 74.4 | 59.7 | 52.5 | 49.2 | 41.1 | 38.2 |
| 05Oct2018 | 17:00:00 | 30:00.0 | 59.1 | 34.7 | 85.9 | 65 | 51.7 | 50.1 | 40.3 | 38.1 |
| 05Oct2018 | 17:30:00 | 30:00.0 | 53.2 | 36.6 | 84 | 63.3 | 54.5 | 50.7 | 42.2 | 39.3 |
| 05Oct2018 | 18:00:00 | 30:00.0 | 44.6 | 34.7 | 64.9 | 54.3 | 49.2 | 46.5 | 40.6 | 37.7 |
| 05Oct2018 | 18:30:00 | 30:00.0 | 44.2 | 33.5 | 61.7 | 55.1 | 48.5 | 46.3 | 40.3 | 37 |
| 05Oct2018 | 19:00:00 | 30:00.0 | 51.7 | 34.6 | 80.2 | 59.2 | 51 | 47.8 | 42.3 | 39.1 |
| 05Oct2018 | 19:30:00 | 30:00.0 | 39 | 32.7 | 56.8 | 45.7 | 42.5 | 41.2 | 37.8 | 35.6 |
| 05Oct2018 | 20:00:00 | 30:00.0 | 50.2 | 32 | 78.5 | 56.5 | 46.8 | 44.3 | 38.7 | 35.3 |
| 05Oct2018 | 20:30:00 | 30:00.0 | 39.3 | 31.6 | 64.5 | 47.8 | 43.6 | 41.7 | 37.2 | 34.6 |
| 05Oct2018 | 21:00:00 | 30:00.0 | 38.5 | 30.8 | 54.6 | 45 | 42.6 | 41.2 | 37.2 | 34 |
| 05Oct2018 | 21:30:00 | 30:00.0 | 39.7 | 31.1 | 66.7 | 45.7 | 40.8 | 39.6 | 36.1 | 33.6 |
| 05Oct2018 | 22:00:00 | 30:00.0 | 35.5 | 29.8 | 45.5 | 40.6 | 38.5 | 37.6 | 34.7 | 32.7 |
| 05Oct2018 | 22:30:00 | 30:00.0 | 36.2 | 30.3 | 48.1 | 41.7 | 39.6 | 38.6 | 35.5 | 33 |
| 05Oct2018 | 23:00:00 | 30:00.0 | 34.7 | 28.6 | 56.5 | 41.2 | 38.3 | 37 | 33.3 | 31 |
| 05Oct2018 | 23:30:00 | 30:00.0 | 34 | 27.6 | 55.8 | 40.5 | 37.7 | 36.3 | 32.7 | 30.3 |
| 06Oct2018 | 00:00:00 | 30:00.0 | 34.3 | 25.8 | 57.6 | 41.8 | 39.2 | 37.3 | 31.8 | 28.6 |
| 06Oct2018 | 00:30:00 | 30:00.0 | 35.7 | 26.3 | 62.7 | 42.3 | 39.7 | 38.3 | 33 | 29.3 |
| 06Oct2018 | 01:00:00 | 30:00.0 | 34.2 | 26.5 | 51.3 | 40.7 | 38.6 | 37.2 | 32.7 | 29.3 |
| 06Oct2018 | 01:30:00 | 30:00.0 | 33.8 | 25.8 | 45.2 | 41 | 38.6 | 37 | 32.2 | 29.3 |
| 06Oct2018 | 02:00:00 | 30:00.0 | 35.6 | 25.8 | 68.7 | 45.1 | 38.3 | 36.3 | 31.6 | 28.8 |
| 06Oct2018 | 02:30:00 | 30:00.0 | 32.7 | 25.3 | 45 | 40.1 | 37.6 | 36 | 30.8 | 28 |
| 06Oct2018 | 03:00:00 | 30:00.0 | 31 | 23.8 | 46.7 | 38 | 34.7 | 33.6 | 29.8 | 26.6 |
| 06Oct2018 | 03:30:00 | 30:00.0 | 30.3 | 24.3 | 45.2 | 38.6 | 34.5 | 32.5 | 28.6 | 26.6 |
| 06Oct2018 | 04:00:00 | 30:00.0 | 32 | 24.5 | 44.7 | 38.8 | 36.3 | 35 | 30.5 | 27.1 |
| 06Oct2018 | 04:30:00 | 30:00.0 | 33.2 | 25.6 | 48.6 | 39.2 | 37.2 | 36.2 | 32.1 | 28.5 |
| 06Oct2018 | 05:00:00 | 30:00.0 | 33.2 | 24.8 | 47.5 | 39.1 | 37.1 | 36 | 32.2 | 28.6 |
| 06Oct2018 | 05:30:00 | 30:00.0 | 34.5 | 27 | 48.5 | 42 | 38.6 | 37.5 | 32.7 | 29.6 |
| 06Oct2018 | 06:00:00 | 30:00.0 | 43.2 | 25.8 | 75.5 | 46.1 | 40.2 | 37.3 | 31.8 | 28.8 |
| 06Oct2018 | 06:30:00 | 30:00.0 | 52.7 | 29.6 | 78 | 63.7 | 52.6 | 50.2 | 37.7 | 33.3 |
| 06Oct2018 | 07:00:00 | 30:00.0 | 38.2 | 30.3 | 54.3 | 44.7 | 41.8 | 40.7 | 37 | 33.5 |
| 06Oct2018 | 07:30:00 | 30:00.0 | 43.6 | 33.8 | 62 | 55 | 48.8 | 45.5 | 39.3 | 36.6 |
| 06Oct2018 | 08:00:00 | 30:00.0 | 44.5 | 35.2 | 68 | 55.7 | 48.7 | 45.5 | 39.6 | 37.3 |
| 06Oct2018 | 08:30:00 | 30:00.0 | 53.5 | 34.6 | 78.9 | 64.2 | 53.2 | 49.6 | 40.3 | 37.1 |
| 06Oct2018 | 09:00:00 | 30:00.0 | 48.2 | 37.1 | 71.5 | 56.6 | 50.6 | 48.5 | 44.1 | 41.7 |
| 06Oct2018 | 09:30:00 | 30:00.0 | 46.8 | 37.7 | 66.7 | 54.5 | 51.7 | 50.2 | 44.3 | 40.6 |
| 06Oct2018 | 10:00:00 | 30:00.0 | 49.6 | 40.3 | 66.5 | 58.6 | 54.6 | 52.3 | 47.3 | 43.5 |
| 06Oct2018 | 10:30:00 | 30:00.0 | 51.2 | 38.8 | 77 | 59.8 | 53.2 | 51.5 | 46.5 | 42.7 |
| 06Oct2018 | 11:00:00 | 30:00.0 | 47.8 | 38.1 | 65.2 | 56 | 52.2 | 50.6 | 45.7 | 42.2 |
| 06Oct2018 | 11:30:00 | 30:00.0 | 52.3 | 41.2 | 78 | 61.5 | 55.2 | 52.8 | 47.5 | 44.3 |
| 06Oct2018 | 12:00:00 | 30:00.0 | 56.1 | 37.7 | 82.5 | 66.7 | 55.8 | 51.3 | 45.2 | 41.8 |
| 06Oct2018 | 12:30:00 | 30:00.0 | 55 | 38.2 | 79.2 | 64 | 54.7 | 52.2 | 47 | 42 |

| | | | | | | | | | | |
|-----------|----------|---------|------|------|------|------|------|------|------|------|
| 06Oct2018 | 13:00:00 | 30:00.0 | 51.3 | 38.2 | 78 | 59.7 | 52 | 49.6 | 44.8 | 41.5 |
| 06Oct2018 | 13:30:00 | 30:00.0 | 47 | 38.7 | 60.7 | 53.6 | 51.3 | 50 | 45.2 | 41.8 |
| 06Oct2018 | 14:00:00 | 13:53.4 | 53.3 | 38 | 75 | 63.3 | 55.2 | 53 | 46.8 | 42 |

Table 3

| Date | Time | Duration | Location N3 | | | | | | | |
|------------|----------|------------|-------------|--------|--------|------|-------|-------|-------|-------|
| | | | LAeq | LAFmin | LAFmax | LAF5 | LAF10 | LAF50 | LAF66 | LAF90 |
| 2018-10-04 | 13:10:14 | 00:19:45.5 | 48.3 | 35.8 | 82.8 | 50.8 | 49.6 | 44.8 | 43.1 | 40.2 |
| 2018-10-04 | 13:30:00 | 00:30:00.0 | 45.4 | 33.7 | 59.5 | 49.8 | 48.4 | 43.8 | 42.3 | 39.6 |
| 2018-10-04 | 14:00:00 | 00:30:00.0 | 46.9 | 36.7 | 60.9 | 51.0 | 49.9 | 45.8 | 44.1 | 40.8 |
| 2018-10-04 | 14:30:00 | 00:30:00.0 | 54.8 | 34.5 | 94.3 | 52.3 | 50.4 | 44.5 | 42.6 | 39.3 |
| 2018-10-04 | 15:00:00 | 00:30:00.0 | 46.0 | 31.5 | 62.9 | 50.8 | 49.3 | 43.7 | 41.7 | 39.0 |
| 2018-10-04 | 15:30:00 | 00:30:00.0 | 45.9 | 32.2 | 65.3 | 50.8 | 49.5 | 43.6 | 41.5 | 37.6 |
| 2018-10-04 | 16:00:00 | 00:30:00.0 | 46.9 | 34.8 | 59.6 | 51.5 | 50.1 | 45.3 | 43.7 | 40.2 |
| 2018-10-04 | 16:30:00 | 00:30:00.0 | 48.1 | 34.2 | 69.8 | 52.3 | 51.2 | 46.8 | 44.9 | 39.9 |
| 2018-10-04 | 17:00:00 | 00:30:00.0 | 48.7 | 36.0 | 71.1 | 52.8 | 51.6 | 47.4 | 45.3 | 41.7 |
| 2018-10-04 | 17:30:00 | 00:30:00.0 | 48.1 | 34.1 | 60.3 | 52.5 | 51.3 | 46.7 | 44.6 | 40.0 |
| 2018-10-04 | 18:00:00 | 00:30:00.0 | 47.0 | 30.8 | 60.6 | 52.0 | 50.7 | 44.7 | 42.1 | 36.6 |
| 2018-10-04 | 18:30:00 | 00:30:00.0 | 47.3 | 30.4 | 64.0 | 52.9 | 51.2 | 43.9 | 41.2 | 36.6 |
| 2018-10-04 | 19:00:00 | 00:30:00.0 | 46.3 | 28.4 | 62.0 | 52.0 | 50.4 | 42.7 | 39.5 | 34.6 |
| 2018-10-04 | 19:30:00 | 00:30:00.0 | 45.4 | 25.8 | 62.0 | 51.2 | 49.4 | 41.4 | 37.4 | 32.3 |
| 2018-10-04 | 20:00:00 | 00:30:00.0 | 44.1 | 24.2 | 59.7 | 50.2 | 48.4 | 39.4 | 35.2 | 29.8 |
| 2018-10-04 | 20:30:00 | 00:30:00.0 | 44.1 | 23.5 | 63.0 | 50.5 | 48.8 | 35.5 | 31.5 | 27.6 |
| 2018-10-04 | 21:00:00 | 00:30:00.0 | 43.7 | 24.1 | 59.3 | 49.9 | 47.9 | 37.5 | 33.5 | 29.1 |
| 2018-10-04 | 21:30:00 | 00:30:00.0 | 40.7 | 23.7 | 54.3 | 47.1 | 44.9 | 34.7 | 31.5 | 27.6 |
| 2018-10-04 | 22:00:00 | 00:30:00.0 | 38.6 | 20.0 | 55.1 | 44.9 | 43.2 | 30.5 | 27.8 | 23.0 |
| 2018-10-04 | 22:30:00 | 00:30:00.0 | 38.2 | 25.2 | 50.8 | 42.6 | 40.5 | 37.0 | 35.7 | 33.3 |
| 2018-10-04 | 23:00:00 | 00:30:00.0 | 37.8 | 33.3 | 49.3 | 40.4 | 39.0 | 37.0 | 36.5 | 35.6 |
| 2018-10-04 | 23:30:00 | 00:30:00.0 | 39.5 | 32.8 | 53.2 | 44.6 | 42.5 | 37.4 | 36.5 | 35.1 |
| 2018-10-05 | 00:00:00 | 00:30:00.0 | 38.0 | 33.3 | 49.3 | 40.9 | 39.8 | 37.3 | 36.8 | 35.8 |
| 2018-10-05 | 00:30:00 | 00:30:00.0 | 36.0 | 29.8 | 50.5 | 39.3 | 37.4 | 34.9 | 33.9 | 32.5 |
| 2018-10-05 | 01:00:00 | 00:30:00.0 | 34.0 | 25.7 | 49.7 | 37.9 | 35.6 | 32.3 | 30.9 | 29.2 |
| 2018-10-05 | 01:30:00 | 00:30:00.0 | 31.8 | 22.3 | 48.1 | 36.2 | 33.2 | 28.5 | 27.6 | 25.7 |
| 2018-10-05 | 02:00:00 | 00:30:00.0 | 25.6 | 19.6 | 43.7 | 28.9 | 27.7 | 24.5 | 23.7 | 22.4 |
| 2018-10-05 | 02:30:00 | 00:30:00.0 | 28.9 | 18.4 | 47.4 | 33.0 | 31.1 | 25.5 | 23.6 | 21.3 |
| 2018-10-05 | 03:00:00 | 00:30:00.0 | 31.3 | 23.6 | 45.2 | 35.5 | 33.8 | 29.4 | 28.2 | 26.4 |
| 2018-10-05 | 03:30:00 | 00:30:00.0 | 42.4 | 26.5 | 56.6 | 49.2 | 42.9 | 36.2 | 34.7 | 32.6 |
| 2018-10-05 | 04:00:00 | 00:30:00.0 | 36.7 | 28.3 | 55.1 | 41.0 | 39.1 | 34.8 | 33.5 | 31.9 |
| 2018-10-05 | 04:30:00 | 00:30:00.0 | 33.4 | 23.4 | 49.3 | 37.2 | 35.6 | 30.9 | 29.6 | 27.3 |
| 2018-10-05 | 05:00:00 | 00:30:00.0 | 34.2 | 22.3 | 51.7 | 40.8 | 36.6 | 27.8 | 26.5 | 24.8 |
| 2018-10-05 | 05:30:00 | 00:30:00.0 | 36.4 | 23.3 | 52.9 | 43.7 | 40.3 | 29.7 | 28.2 | 26.3 |
| 2018-10-05 | 06:00:00 | 00:30:00.0 | 37.9 | 24.0 | 56.3 | 44.0 | 42.0 | 33.8 | 31.2 | 27.8 |
| 2018-10-05 | 06:30:00 | 00:30:00.0 | 41.7 | 28.3 | 54.5 | 46.7 | 45.0 | 39.3 | 37.6 | 33.5 |
| 2018-10-05 | 07:00:00 | 00:30:00.0 | 42.1 | 27.8 | 60.1 | 47.4 | 45.4 | 37.8 | 35.9 | 33.0 |
| 2018-10-05 | 07:30:00 | 00:30:00.0 | 56.0 | 29.8 | 77.0 | 59.8 | 49.1 | 40.4 | 38.4 | 35.4 |
| 2018-10-05 | 08:00:00 | 00:30:00.0 | 54.6 | 31.9 | 77.7 | 57.7 | 51.7 | 42.8 | 40.3 | 36.5 |
| 2018-10-05 | 08:30:00 | 00:30:00.0 | 47.6 | 32.5 | 74.6 | 50.2 | 47.9 | 42.5 | 40.6 | 37.4 |
| 2018-10-05 | 09:00:00 | 00:30:00.0 | 46.0 | 34.2 | 75.2 | 49.5 | 47.7 | 42.1 | 40.4 | 37.9 |
| 2018-10-05 | 09:30:00 | 00:30:00.0 | 46.2 | 32.9 | 75.3 | 49.5 | 47.5 | 41.8 | 39.9 | 37.2 |
| 2018-10-05 | 10:00:00 | 00:30:00.0 | 44.6 | 30.4 | 74.4 | 48.2 | 46.5 | 40.5 | 38.5 | 35.3 |
| 2018-10-05 | 10:30:00 | 00:30:00.0 | 43.3 | 32.5 | 58.3 | 48.3 | 46.5 | 40.6 | 39.0 | 35.9 |
| 2018-10-05 | 11:00:00 | 00:30:00.0 | 46.3 | 31.4 | 74.1 | 49.5 | 48.0 | 42.3 | 40.2 | 36.4 |
| 2018-10-05 | 11:30:00 | 00:30:00.0 | 46.2 | 30.8 | 76.3 | 49.0 | 47.2 | 41.0 | 38.7 | 35.5 |
| 2018-10-05 | 12:00:00 | 00:30:00.0 | 44.6 | 29.4 | 73.1 | 48.7 | 47.1 | 41.1 | 39.0 | 35.5 |
| 2018-10-05 | 12:30:00 | 00:30:00.0 | 49.5 | 27.7 | 78.7 | 51.6 | 50.2 | 43.0 | 40.7 | 36.6 |
| 2018-10-05 | 13:00:00 | 00:30:00.0 | 46.8 | 30.8 | 77.2 | 48.6 | 47.1 | 40.9 | 38.9 | 35.2 |

| | | | | | | | | | | |
|------------|----------|------------|------|------|------|------|------|------|------|------|
| 2018-10-05 | 13:30:00 | 00:30:00.0 | 42.9 | 30.9 | 61.2 | 47.9 | 46.2 | 39.7 | 37.8 | 34.8 |
| 2018-10-05 | 14:00:00 | 00:30:00.0 | 43.1 | 30.7 | 60.8 | 47.8 | 46.3 | 41.0 | 39.4 | 36.6 |
| 2018-10-05 | 14:30:00 | 00:30:00.0 | 53.4 | 31.2 | 80.9 | 50.0 | 47.8 | 41.2 | 39.6 | 36.8 |
| 2018-10-05 | 15:00:00 | 00:30:00.0 | 49.8 | 31.7 | 80.4 | 48.9 | 46.9 | 41.3 | 39.2 | 35.9 |
| 2018-10-05 | 15:30:00 | 00:30:00.0 | 44.2 | 28.4 | 66.4 | 48.6 | 47.2 | 41.6 | 39.0 | 34.2 |
| 2018-10-05 | 16:00:00 | 00:30:00.0 | 45.2 | 29.7 | 66.6 | 50.7 | 48.5 | 42.3 | 39.9 | 36.1 |
| 2018-10-05 | 16:30:00 | 00:30:00.0 | 43.2 | 29.8 | 62.3 | 47.9 | 46.5 | 40.6 | 38.5 | 34.9 |
| 2018-10-05 | 17:00:00 | 00:30:00.0 | 46.9 | 29.4 | 65.9 | 50.9 | 48.8 | 42.0 | 39.7 | 34.8 |
| 2018-10-05 | 17:30:00 | 00:30:00.0 | 44.7 | 31.3 | 65.0 | 50.6 | 48.4 | 41.9 | 39.3 | 35.3 |
| 2018-10-05 | 18:00:00 | 00:30:00.0 | 43.7 | 29.3 | 61.5 | 49.0 | 47.2 | 40.7 | 38.1 | 34.3 |
| 2018-10-05 | 18:30:00 | 00:30:00.0 | 42.0 | 27.9 | 62.5 | 46.9 | 45.5 | 38.9 | 36.9 | 34.3 |
| 2018-10-05 | 19:00:00 | 00:30:00.0 | 49.1 | 30.3 | 76.2 | 47.1 | 45.3 | 38.6 | 36.9 | 34.4 |
| 2018-10-05 | 19:30:00 | 00:30:00.0 | 41.5 | 27.9 | 63.3 | 46.7 | 45.3 | 37.6 | 35.5 | 32.3 |
| 2018-10-05 | 20:00:00 | 00:30:00.0 | 39.7 | 26.2 | 52.5 | 45.0 | 43.5 | 36.7 | 34.9 | 30.9 |
| 2018-10-05 | 20:30:00 | 00:30:00.0 | 42.4 | 26.4 | 72.0 | 45.7 | 43.3 | 35.4 | 33.6 | 30.6 |
| 2018-10-05 | 21:00:00 | 00:30:00.0 | 38.0 | 26.6 | 54.6 | 43.8 | 41.6 | 34.5 | 32.7 | 29.9 |
| 2018-10-05 | 21:30:00 | 00:30:00.0 | 37.1 | 22.8 | 49.8 | 43.7 | 41.4 | 32.5 | 30.6 | 27.3 |
| 2018-10-05 | 22:00:00 | 00:30:00.0 | 36.2 | 21.2 | 53.3 | 43.0 | 40.6 | 29.8 | 27.8 | 25.0 |
| 2018-10-05 | 22:30:00 | 00:30:00.0 | 36.2 | 22.2 | 50.2 | 43.3 | 41.0 | 29.3 | 27.5 | 25.6 |
| 2018-10-05 | 23:00:00 | 00:30:00.0 | 35.3 | 21.0 | 51.2 | 42.7 | 39.2 | 27.7 | 26.1 | 24.3 |
| 2018-10-05 | 23:30:00 | 00:30:00.0 | 32.6 | 19.2 | 49.4 | 39.7 | 34.6 | 25.9 | 24.3 | 22.1 |
| 2018-10-06 | 00:00:00 | 00:30:00.0 | 28.8 | 18.3 | 48.2 | 34.5 | 29.7 | 22.4 | 21.3 | 20.2 |
| 2018-10-06 | 00:30:00 | 00:30:00.0 | 33.0 | 17.6 | 59.8 | 37.9 | 32.7 | 22.5 | 21.2 | 19.4 |
| 2018-10-06 | 01:00:00 | 00:30:00.0 | 32.5 | 17.8 | 50.3 | 38.5 | 34.1 | 25.1 | 23.0 | 20.3 |
| 2018-10-06 | 01:30:00 | 00:30:00.0 | 30.5 | 17.4 | 53.1 | 31.9 | 28.7 | 20.8 | 19.8 | 18.7 |
| 2018-10-06 | 02:00:00 | 00:30:00.0 | 30.0 | 17.8 | 51.7 | 35.0 | 31.2 | 23.5 | 21.3 | 19.5 |
| 2018-10-06 | 02:30:00 | 00:30:00.0 | 21.6 | 17.3 | 37.1 | 25.4 | 23.6 | 19.8 | 19.2 | 18.4 |
| 2018-10-06 | 03:00:00 | 00:30:00.0 | 25.8 | 17.3 | 50.1 | 27.4 | 24.7 | 19.7 | 19.0 | 18.2 |
| 2018-10-06 | 03:30:00 | 00:30:00.0 | 27.5 | 17.2 | 51.3 | 28.6 | 25.1 | 19.9 | 19.3 | 18.3 |
| 2018-10-06 | 04:00:00 | 00:30:00.0 | 23.8 | 16.8 | 45.6 | 26.9 | 24.7 | 19.2 | 18.4 | 17.6 |
| 2018-10-06 | 04:30:00 | 00:30:00.0 | 30.5 | 17.9 | 52.0 | 33.8 | 30.9 | 22.8 | 21.5 | 19.5 |
| 2018-10-06 | 05:00:00 | 00:30:00.0 | 31.7 | 18.6 | 56.5 | 32.3 | 29.3 | 24.1 | 22.8 | 20.5 |
| 2018-10-06 | 05:30:00 | 00:30:00.0 | 31.6 | 19.3 | 48.4 | 38.2 | 33.7 | 25.8 | 24.5 | 22.1 |
| 2018-10-06 | 06:00:00 | 00:30:00.0 | 34.2 | 19.1 | 51.0 | 41.6 | 36.6 | 26.4 | 24.8 | 22.3 |
| 2018-10-06 | 06:30:00 | 00:30:00.0 | 37.6 | 23.8 | 52.1 | 44.2 | 41.4 | 32.6 | 30.9 | 28.6 |
| 2018-10-06 | 07:00:00 | 00:30:00.0 | 44.2 | 26.6 | 73.0 | 45.5 | 43.3 | 34.2 | 32.1 | 29.3 |
| 2018-10-06 | 07:30:00 | 00:30:00.0 | 42.4 | 27.7 | 67.4 | 46.8 | 44.2 | 35.6 | 33.8 | 31.1 |
| 2018-10-06 | 08:00:00 | 00:30:00.0 | 41.7 | 29.1 | 63.1 | 46.3 | 44.3 | 37.1 | 35.8 | 33.8 |
| 2018-10-06 | 08:30:00 | 00:30:00.0 | 57.2 | 30.3 | 77.6 | 63.5 | 52.6 | 39.6 | 37.4 | 34.9 |
| 2018-10-06 | 09:00:00 | 00:30:00.0 | 56.6 | 33.0 | 76.8 | 61.9 | 52.5 | 41.7 | 39.4 | 36.6 |
| 2018-10-06 | 09:30:00 | 00:30:00.0 | 54.7 | 31.3 | 77.7 | 51.1 | 46.9 | 40.1 | 38.5 | 35.5 |
| 2018-10-06 | 10:00:00 | 00:30:00.0 | 44.1 | 32.4 | 68.6 | 48.2 | 46.3 | 40.7 | 39.0 | 36.6 |
| 2018-10-06 | 10:30:00 | 00:30:00.0 | 53.5 | 33.1 | 78.1 | 52.2 | 48.4 | 42.0 | 40.2 | 37.1 |
| 2018-10-06 | 11:00:00 | 00:30:00.0 | 43.6 | 33.8 | 59.4 | 47.7 | 46.4 | 41.9 | 40.6 | 38.2 |
| 2018-10-06 | 11:30:00 | 00:30:00.0 | 50.7 | 31.5 | 76.7 | 49.9 | 47.9 | 42.9 | 41.4 | 38.4 |
| 2018-10-06 | 12:00:00 | 00:30:00.0 | 45.0 | 34.5 | 64.3 | 48.7 | 47.4 | 43.5 | 42.1 | 39.5 |
| 2018-10-06 | 12:30:00 | 00:30:00.0 | 46.2 | 33.7 | 67.9 | 50.2 | 48.4 | 43.4 | 41.8 | 39.0 |
| 2018-10-06 | 13:00:00 | 00:30:00.0 | 45.1 | 33.2 | 64.3 | 49.5 | 48.3 | 43.1 | 41.2 | 37.8 |
| 2018-10-06 | 13:30:00 | 00:30:00.0 | 44.6 | 33.2 | 56.6 | 49.2 | 47.9 | 43.2 | 41.5 | 37.6 |
| 2018-10-06 | 14:00:00 | 00:30:00.0 | 44.3 | 34.4 | 54.5 | 48.2 | 47.1 | 43.2 | 42.0 | 39.7 |
| 2018-10-06 | 14:30:00 | 00:11:49.8 | 45.5 | 38.4 | 63.8 | 49.4 | 48.3 | 44.2 | 43.2 | 41.2 |

Appendix VI – Traffic Assessment Plates

Plate 12.1 N81 / L6026 junction – looking north along N81



Plate 12.2 N81 / L6026 junction – looking south along N81



Plate 12.3 N81 / L6026 junction – looking east towards the N81



Plate 12.4 L6026 / local road junction – looking west along L6026



Plate 12.5 L6026 / local road junction – looking east along L6026



Plate 12.6 L6026 / local road junction – looking north towards L6026



Plate 12.7 Access junction on local road – looking north along local road



Plate 12.8 Access junction on local road – looking south along local road



Plate 12.9 Access junction on local road

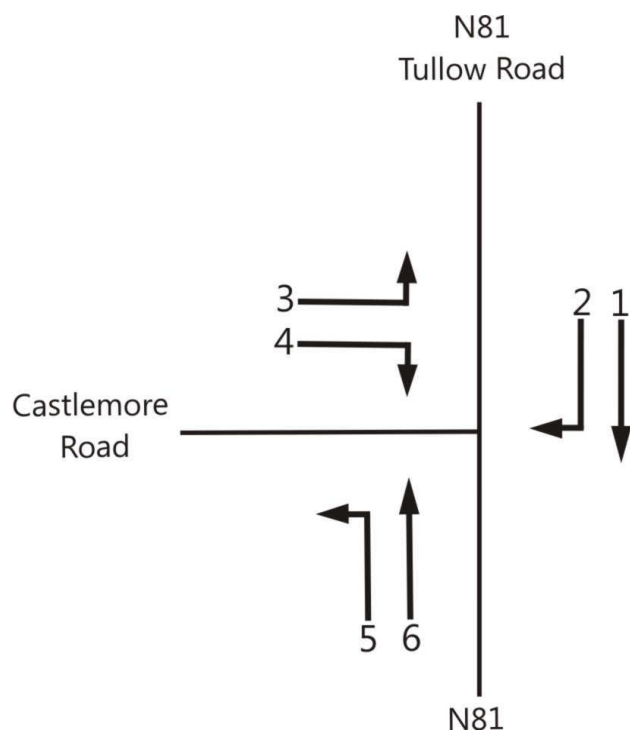




Appendix VII – TII Manual Count Data (N81 / L6026 junction, 24th May, 2018;
Traffnomics Ltd)

Site Location



Movement Numbering



| | | | | |
|---|---------------------------|--|------------------------------|---|
|  | Job number: TRA/18/080 | Job Date: 24 th May 2018 | Drawing No: TRA/18/080-01 |  |
| | Client: Alan Lipscombe | Job Day: Thursday | Author: SPW | |

TRAFFINOMICS LIMITED

**TULLOW TRAFFIC COUNT
MANUAL CLASSIFIED JUNCTION TURNING COUNT**

**MAY 2018
ATH/18/080**

SITE: 01

DATE: 24th May 2018

LOCATION: N81/Castlemore Road

DAY: Thursday

| TIME | MOVEMENT 1 | | | | | TOT | PCU | MOVEMENT 2 | | | | | TOT | PCU | MOVEMENT 3 | | | | | TOT | PCU | |
|--------------|------------|-----|------|------|-----|-----|-----|------------|-----|------|------|-----|-----|-----|------------|-----|------|------|-----|-----|-----|---|
| | CAR | LGV | OGV1 | OGV2 | BUS | | | CAR | LGV | OGV1 | OGV2 | BUS | | | CAR | LGV | OGV1 | OGV2 | BUS | | | |
| 7:00 | 14 | 2 | 4 | 0 | 0 | 20 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:15 | 11 | 3 | 2 | 1 | 0 | 17 | 19 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:30 | 16 | 6 | 2 | 0 | 1 | 25 | 27 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | |
| 7:45 | 11 | 4 | 2 | 1 | 0 | 18 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 8:00 | 10 | 1 | 3 | 3 | 0 | 17 | 22 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | |
| 8:15 | 15 | 4 | 5 | 0 | 1 | 25 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 8:30 | 17 | 2 | 0 | 1 | 1 | 21 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | |
| 8:45 | 18 | 2 | 5 | 1 | 0 | 26 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | |
| 9:00 | 20 | 6 | 2 | 4 | 0 | 32 | 38 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 1 | 0 | 0 | 3 | 4 | |
| 9:15 | 18 | 5 | 5 | 0 | 2 | 30 | 35 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 3 | 4 | |
| 9:30 | 11 | 4 | 1 | 0 | 1 | 17 | 19 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | |
| 9:45 | 20 | 4 | 1 | 0 | 0 | 25 | 26 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | |
| P/TOT | | | | | | | 121 | | | | | | 4 | | | | | | | | 10 | |

| TIME | MOVEMENT 1 | | | | | TOT | PCU | MOVEMENT 2 | | | | | TOT | PCU | MOVEMENT 3 | | | | | TOT | PCU |
|--------------|------------|-----|------|------|-----|-----|-----|------------|-----|------|------|-----|-----|-----|------------|-----|------|------|-----|-----|-----|
| | CAR | LGV | OGV1 | OGV2 | BUS | | | CAR | LGV | OGV1 | OGV2 | BUS | | | CAR | LGV | OGV1 | OGV2 | BUS | | |
| 16:00 | 38 | 5 | 3 | 1 | 0 | 47 | 50 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| 16:15 | 46 | 10 | 5 | 2 | 1 | 64 | 70 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 2 | 2 |
| 16:30 | 27 | 8 | 2 | 1 | 0 | 38 | 40 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| 16:45 | 30 | 9 | 2 | 0 | 0 | 41 | 42 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:00 | 28 | 6 | 4 | 0 | 0 | 38 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 2 |
| 17:15 | 33 | 1 | 4 | 1 | 0 | 39 | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:30 | 44 | 8 | 2 | 1 | 0 | 55 | 57 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 |
| 17:45 | 25 | 8 | 2 | 0 | 0 | 35 | 36 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 3 | 3 |
| 18:00 | 33 | 3 | 2 | 0 | 0 | 38 | 39 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18:15 | 29 | 6 | 0 | 0 | 0 | 35 | 35 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 2 | 2 |
| 18:30 | 42 | 8 | 7 | 0 | 1 | 58 | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| 18:45 | 17 | 4 | 0 | 0 | 0 | 21 | 21 | 2 | 0 | 1 | 0 | 0 | 3 | 4 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| P/TOT | | | | | | | 182 | | | | | | 4 | | | | | | | | 4 |

TRAFFINOMICS LIMITED

**TULLOW TRAFFIC COUNT
MANUAL CLASSIFIED JUNCTION TURNING COUNT**

**MAY 2018
ATH/18/080**

SITE: 01

DATE: 24th May 2018

LOCATION: N81/Castlemore Road

DAY: Thursday

| TIME | MOVEMENT 4 | | | | | TOT | PCU | MOVEMENT 5 | | | | | TOT | PCU | MOVEMENT 6 | | | | | TOT | PCU |
|--------------|------------|-----|------|------|-----|-----|-----|------------|-----|------|------|-----|-----|-----|------------|-----|------|------|-----|-----|-----|
| | CAR | LGV | OGV1 | OGV2 | BUS | | | CAR | LGV | OGV1 | OGV2 | BUS | | | CAR | LGV | OGV1 | OGV2 | BUS | | |
| 7:00 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 7 | 2 | 0 | 1 | 21 | 23 |
| 7:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 3 | 0 | 3 | 0 | 14 | 18 |
| 7:30 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 2 | 20 | 5 | 1 | 0 | 0 | 26 | 27 |
| 7:45 | 0 | 2 | 1 | 0 | 0 | 3 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 26 | 8 | 4 | 0 | 0 | 38 | 40 |
| 8:00 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 20 | 6 | 4 | 3 | 0 | 33 | 39 |
| 8:15 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 27 | 7 | 4 | 0 | 2 | 40 | 44 |
| 8:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 27 | 6 | 1 | 0 | 0 | 34 | 35 |
| 8:45 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 1 | 0 | 0 | 5 | 6 | 41 | 5 | 2 | 0 | 0 | 48 | 49 |
| 9:00 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 2 | 2 | 3 | 1 | 34 | 40 |
| 9:15 | 3 | 1 | 1 | 0 | 0 | 5 | 6 | 0 | 1 | 0 | 0 | 1 | 2 | 3 | 25 | 6 | 2 | 3 | 0 | 36 | 41 |
| 9:30 | 2 | 0 | 1 | 0 | 0 | 3 | 4 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 32 | 8 | 4 | 2 | 1 | 47 | 53 |
| 9:45 | 2 | 1 | 0 | 0 | 0 | 3 | 3 | 1 | 1 | 0 | 1 | 0 | 3 | 4 | 26 | 4 | 3 | 0 | 0 | 33 | 35 |
| P/TOT | | | | | | | 12 | | | | | | 11 | | | | | | | | 182 |

| TIME | MOVEMENT 4 | | | | | TOT | PCU | MOVEMENT 5 | | | | | TOT | PCU | MOVEMENT 6 | | | | | TOT | PCU |
|--------------|------------|-----|------|------|-----|-----|-----|------------|-----|------|------|-----|-----|-----|------------|-----|------|------|-----|-----|-----|
| | CAR | LGV | OGV1 | OGV2 | BUS | | | CAR | LGV | OGV1 | OGV2 | BUS | | | CAR | LGV | OGV1 | OGV2 | BUS | | |
| 16:00 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 5 | 2 | 1 | 0 | 27 | 29 |
| 16:15 | 1 | 1 | 1 | 0 | 0 | 3 | 4 | 2 | 0 | 2 | 0 | 0 | 4 | 5 | 18 | 5 | 2 | 1 | 0 | 26 | 28 |
| 16:30 | 2 | 1 | 1 | 0 | 0 | 4 | 5 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 25 | 6 | 1 | 0 | 0 | 32 | 33 |
| 16:45 | 2 | 1 | 0 | 0 | 0 | 3 | 3 | 2 | 0 | 3 | 0 | 0 | 5 | 7 | 18 | 9 | 2 | 1 | 0 | 30 | 32 |
| 17:00 | 6 | 0 | 0 | 0 | 0 | 6 | 6 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 43 | 3 | 5 | 0 | 0 | 51 | 54 |
| 17:15 | 6 | 1 | 1 | 0 | 0 | 8 | 9 | 4 | 0 | 1 | 0 | 0 | 5 | 6 | 34 | 9 | 5 | 1 | 1 | 50 | 55 |
| 17:30 | 5 | 0 | 1 | 0 | 0 | 6 | 7 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 13 | 5 | 1 | 0 | 0 | 19 | 20 |
| 17:45 | 5 | 1 | 0 | 0 | 0 | 6 | 6 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 27 | 5 | 2 | 1 | 0 | 35 | 37 |
| 18:00 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 1 | 1 | 0 | 0 | 5 | 6 | 21 | 3 | 2 | 0 | 0 | 26 | 27 |
| 18:15 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 23 | 3 | 3 | 0 | 0 | 29 | 31 |
| 18:30 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 1 | 0 | 0 | 0 | 5 | 5 | 0 | 21 | 4 | 5 | 0 | 30 | 39 |
| 18:45 | 5 | 3 | 2 | 0 | 0 | 10 | 11 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 17 | 5 | 2 | 0 | 24 | 29 |
| P/TOT | | | | | | | 24 | | | | | | 16 | | | | | | | | 160 |

| PCU's Through Junction | PCU's by hour |
|------------------------|---------------|
| 46 | 210 |
| 38 | 233 |
| 60 | 273 |
| 66 | 274 |
| 69 | 295 |
| 78 | 312 |
| 61 | 323 |
| 87 | 340 |
| 86 | 322 |
| 88 | |
| 79 | |
| 69 | |
| 340 | 0 |

| PCU's Through Junction | PCU's by hour |
|------------------------|---------------|
| 84 | 365 |
| 112 | 384 |
| 83 | 383 |
| 86 | 390 |
| 104 | 389 |
| 111 | 361 |
| 89 | 326 |
| 85 | 344 |
| 76 | 326 |
| 76 | |
| 108 | |
| 67 | |
| 390 | 0 |

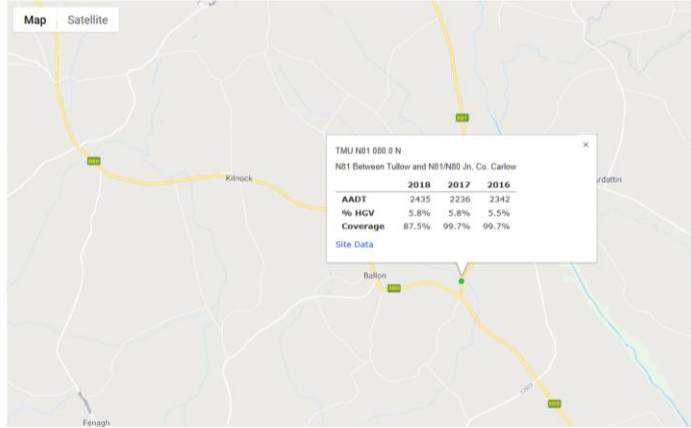
Appendix VIII – TII Automatic Count Data



Bonneagar Ionpair Éireann
Transport Infrastructure Ireland

Traffic

- ABOUT THE WEBSITE
- MAP INTERFACE
- SITE LIST
- SEARCH FUNCTION
- SITE DATA
- EXPLANATION OF REPORTS
- IMPORTANT NOTICE



Channel: All directions ▾

Precision: Normal ▾

Exclude data: Nor

| Date | Monday - Friday | | | | Monday - Sunday | | | | am Peak Hour | am Peak |
|----------|-----------------|------|------|------|-----------------|------|------|------|--------------|---------|
| | 12Hr | 16Hr | 18Hr | 24Hr | 12Hr | 16Hr | 18Hr | 24Hr | | |
| Jan 2017 | 1883 | 2179 | 2230 | 2266 | 1746 | 2023 | 2075 | 2116 | 08:18 | |
| Feb 2017 | 911 | 1057 | 1085 | 1103 | 866 | 1005 | 1034 | 1054 | 08:14 | |
| Mar 2017 | 1906 | 2229 | 2282 | 2327 | 1811 | 2117 | 2171 | 2217 | 08:19 | |
| Apr 2017 | 2022 | 2395 | 2461 | 2508 | 1915 | 2269 | 2335 | 2383 | 08:15 | |
| May 2017 | 2004 | 2387 | 2458 | 2500 | 1899 | 2260 | 2331 | 2377 | 08:28 | |
| Jun 2017 | 2028 | 2407 | 2482 | 2531 | 1941 | 2304 | 2382 | 2436 | 08:36 | |
| Jul 2017 | 2090 | 2497 | 2578 | 2630 | 1997 | 2387 | 2470 | 2528 | 10:59 | |
| Aug 2017 | 2088 | 2499 | 2573 | 2624 | 1980 | 2370 | 2445 | 2499 | 10:56 | |
| Sep 2017 | 2072 | 2445 | 2509 | 2562 | 1941 | 2291 | 2355 | 2412 | 08:11 | |
| Oct 2017 | 1972 | 2290 | 2346 | 2397 | 1847 | 2147 | 2204 | 2258 | 08:13 | |
| Nov 2017 | 2009 | 2329 | 2386 | 2439 | 1894 | 2188 | 2245 | 2300 | 08:13 | |
| Dec 2017 | 1843 | 2141 | 2200 | 2247 | 1728 | 2006 | 2065 | 2118 | 08:19 | |

Event key: ■ Accident ■ Road Works ■ Special ■ Road Closed ■ Holiday ■ Of ■ Weekends and defined holidays

Appendix IX – RSA Collision Data

The screenshot displays a web application interface for viewing road collision data in Ireland. On the left, a Google Maps interface is partially visible, showing a map of the Tullow area. A white error box from Google is overlaid on the map, stating: "Google This page can't load Google Maps correctly. Do you own this website? OK". The map shows several colored markers representing collisions: a large orange circle labeled "Site" near Ardristan Heights, and several smaller yellow and grey circles along the R725 road. The right-hand panel, titled "Ireland road collisions", contains the following controls:

- Help** (with a plus icon)
- Collisions** (checked, with a minus icon)
- Severity**: Radio buttons for Fatal (red), Serious (yellow), Minor (grey), and All (white). "All" is selected.
- Year**: Radio buttons for years 2014, 2013, 2012, 2011, 2010, 2009, 2008, 2007, 2006, 2005, and All. "All" is selected.
- Type**: Radio buttons for All, Pedestrian, Bicycle, Motorcycle, Car, Goods vehicle, Bus, and Other. "All" is selected.
- Collision information** (with a minus icon)
- Text below "Collision information": "Single click on a collision icon at the local level to see details of that collision."

At the bottom of the map, there is a "Google" logo and a "Map data © 2014 Google" notice.

Note: RSA website was faulty at time of download but data remains valid

Appendix X – PICADY Output – PM peak hour with proposed development, year 2034

PICADY

GUI Version: 5.1 AD
Analysis Program Release: 4.0 (SEPT 2008)

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Adapted from PICADY/3 which is Crown Copyright by permission of the controller of HMSO

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
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RG40 3GA, UK



Tel: +44 (0)1344 770758
Fax: +44 (0)1344 770864
E-mail: software@trl.co.uk
Web: www.trlsoftware.co.uk

The user of this computer program for the solution of an engineering problem is in no way relieved of their responsibility for the correctness of the solution

Run Analysis

| Parameter | Values |
|--------------|---|
| File Run | C:\AL Traffic jobs\Picady - Roscat Quarry\PM 2034 dev.vpi |
| Date Run | 12 December 2018 |
| Time Run | 10:42:32 |
| Driving Side | Drive On The Left |

Arm Names and Flow Scaling Factors

| Arm | Arm Name | Flow Scaling Factor (%) |
|-------|-----------|-------------------------|
| Arm A | N81 south | 100 |
| Arm B | L6026 | 100 |
| Arm C | N81 north | 100 |

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

| Parameter | Values |
|-------------|-------------------|
| Run Title | Roscaj Quarry |
| Location | Tullow |
| Date | 12 December 2018 |
| Enumerator | adl [ADL-PC] |
| Job Number | 7150 |
| Status | TIA |
| Client | Kilcarraig Quarry |
| Description | - |

Errors and Warnings

| Parameter | Values |
|-----------|-----------------------|
| Warning | No Errors Or Warnings |

Geometric Data

Geometric Parameters

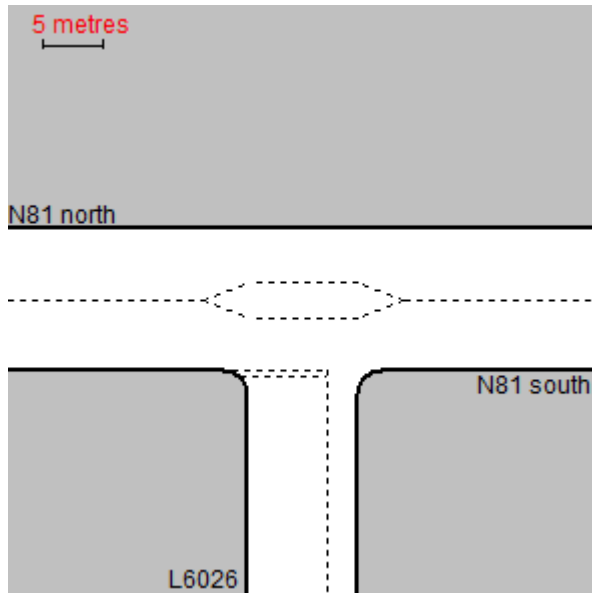
| Parameter | Minor Arm B |
|---|-------------|
| Major Road Carriageway Width (m) | 9.00 |
| Major Road Kerbed Central Reserve Width (m) | 0.00 |
| Major Road Right Turning Lane Width (m) | 3.00 |
| Minor Road Width 0m Back from Junction (m) | 6.50 |
| Minor Road Width 5m Back from Junction (m) | 5.30 |
| Minor Road Width 10m Back from Junction (m) | 3.30 |
| Minor Road Width 15m Back from Junction (m) | 3.30 |
| Minor Road Width 20m Back from Junction (m) | 3.30 |
| Minor Road Flare Length (veh) | 1 |
| Minor Road Visibility To Right (m) | 60 |
| Minor Road Visibility To Left (m) | 60 |
| Major Road Right Turn Visibility (m) | 80 |
| Major Road Right Turn Blocks Traffic | No |

Slope and Intercept Values

| Stream | Intercept for Stream B-A | Slope for A-B | Slope for A-C | Slope for C-A | Slope for C-B |
|--------|--------------------------|---------------|---------------|---------------|---------------|
| B-A | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| B-C | 0.000 | 0.000 | 0.000 | - | - |
| C-B | 674.299 | 0.227 | 0.227 | - | - |

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

| Parameter | Period | Duration (min) | Segment Length (min) |
|------------------------|-------------|----------------|----------------------|
| First Modelling Period | 16:30-18:00 | 90 | 15 |

ODTAB Turning Counts

Demand Set: Roscay Quarry
Modelling Period: 16:30-18:00

| From/To | Arm A | Arm B | Arm C |
|---------|-------|-------|-------|
| Arm A | 0.0 | 21.0 | 202.0 |
| Arm B | 31.0 | 0.0 | 9.0 |
| Arm C | 217.0 | 8.0 | 0.0 |

ODTAB Synthesised Flows

Demand Set: Roscay Quarry
Modelling Period: 16:30-18:00

| Arm | Rising Time | Rising Flow (veh/min) | Peak Time | Peak Flow (veh/min) | Falling Time | Falling Flow (veh/min) |
|-------|-------------|-----------------------|-----------|---------------------|--------------|------------------------|
| Arm A | 16:45 | 2.787 | 17:15 | 4.181 | 17:45 | 2.787 |
| Arm B | 16:45 | 0.500 | 17:15 | 0.750 | 17:45 | 0.500 |
| Arm C | 16:45 | 2.813 | 17:15 | 4.219 | 17:45 | 2.813 |

Heavy Vehicles Percentages

Demand Set: Roscay Quarry
Modelling Period: 16:30-18:00

| From/To | Arm A | Arm B | Arm C |
|---------|-------|-------|-------|
| Arm A | - | 10.0 | 10.0 |
| Arm B | 10.0 | - | 10.0 |
| Arm C | 10.0 | 10.0 | - |

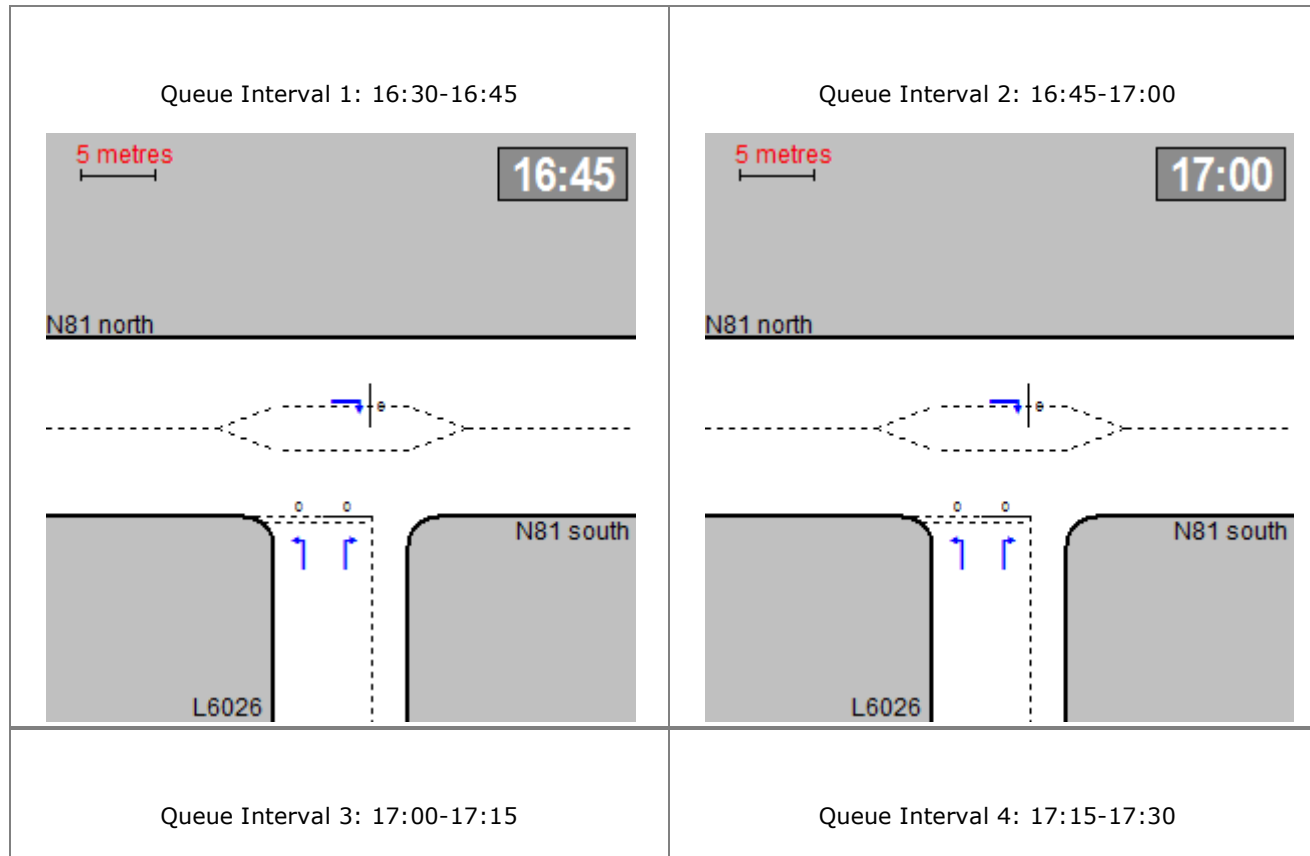
Default proportions of heavy vehicles are used

Queue Diagrams

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 18:00

Modelling Period: 16:30-18:00

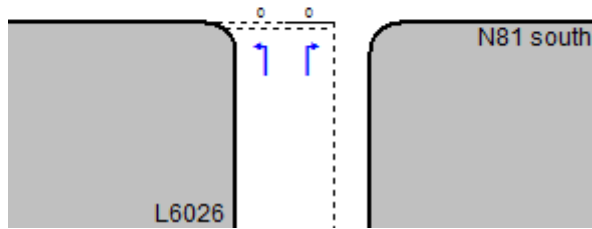
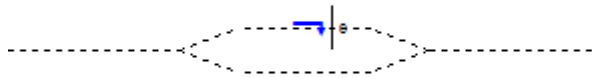
View Extent: 40m



5 metres

17:15

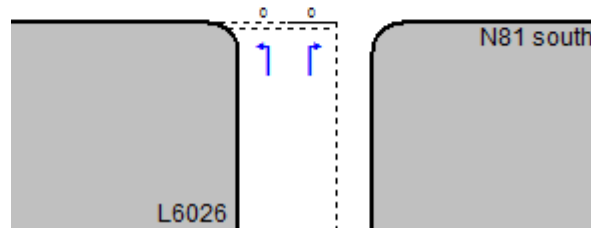
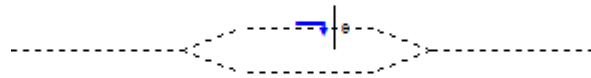
N81 north



5 metres

17:30

N81 north

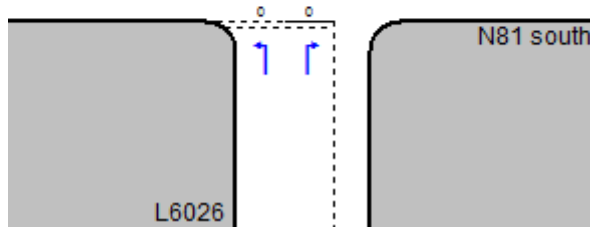
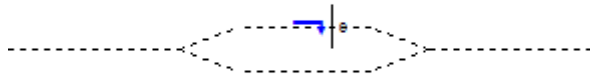


Queue Interval 5: 17:30-17:45

5 metres

17:45

N81 north

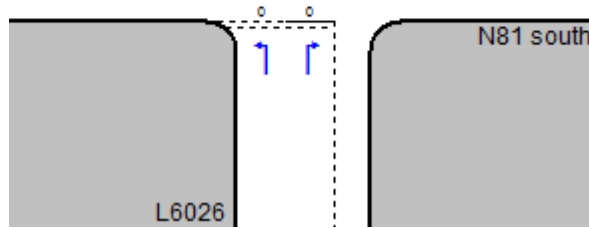
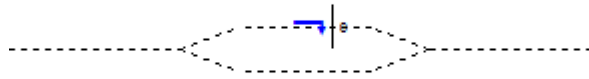


Queue Interval 6: 17:45-18:00

5 metres

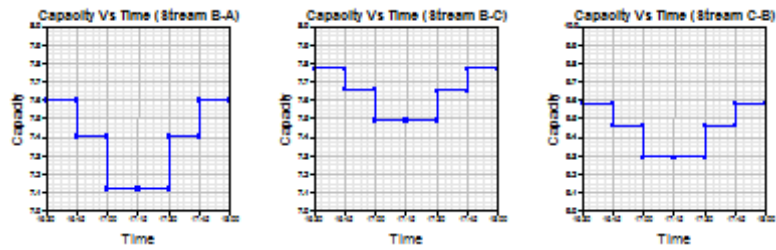
18:00

N81 north



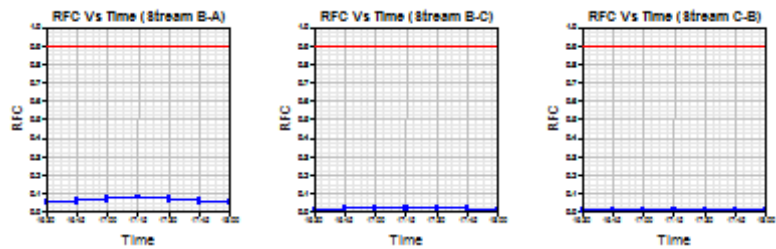
Capacity Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 18:00
Modelling Period: 16:30-18:00



RFC Graph

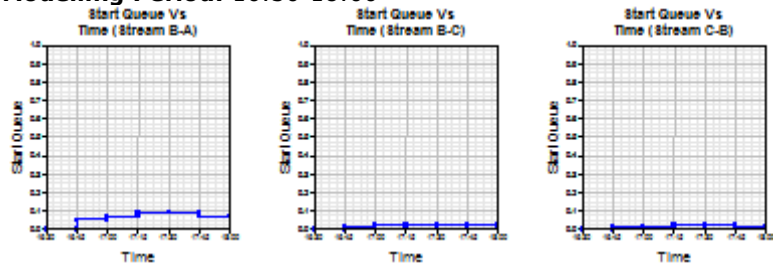
Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 18:00
Modelling Period: 16:30-18:00



Start Queue Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 18:00

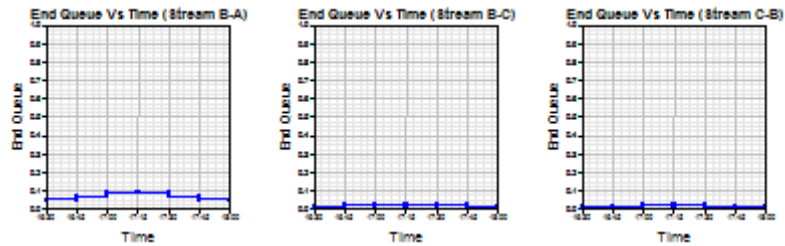
Modelling Period: 16:30-18:00



End Queue Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 18:00

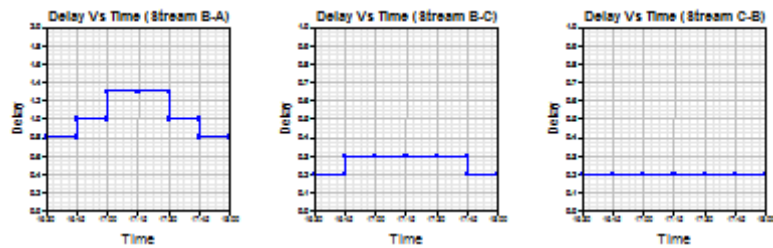
Modelling Period: 16:30-18:00



Delay Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 18:00

Modelling Period: 16:30-18:00



| Segment | Stream | Demand(veh/min) | Capacity(veh/min) | RFC | Ped.Flow(ped/min) | Start Queue(veh) | End Queue(veh) | Geometric Delay(veh.min/segment) | Delay(veh.min/segment) | Mean Arriving Vehicle Delay(min) |
|-------------|--------|-----------------|-------------------|-------|-------------------|------------------|----------------|----------------------------------|------------------------|----------------------------------|
| 17:45-18:00 | B-A | 0.39 | 7.60 | 0.051 | - | 0.07 | 0.05 | - | 0.8 | 0.14 |
| | B-C | 0.11 | 7.77 | 0.015 | - | 0.02 | 0.01 | - | 0.2 | 0.13 |
| | C-A | 2.72 | - | - | - | - | - | - | - | - |
| | C-B | 0.10 | 9.58 | 0.010 | - | 0.01 | 0.01 | - | 0.2 | 0.11 |
| | A-B | 0.26 | - | - | - | - | - | - | - | - |
| | A-C | 2.53 | - | - | - | - | - | - | - | - |

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.

In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.

Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Sum of Demand Sets for Modelling Period: 16:30 - 18:00

Modelling Period: 16:30-18:00

| Stream | Total Demand (veh) | Total Demand (veh/h) | Queueing Delay (min) | Queueing Delay (min/veh) | Inclusive Delay (min) | Inclusive Delay (min/veh) |
|--------|--------------------|----------------------|----------------------|--------------------------|-----------------------|---------------------------|
| B-A | 42.7 | 28.4 | 6.2 | 0.1 | 6.2 | 0.1 |
| B-C | 12.4 | 8.3 | 1.6 | 0.1 | 1.6 | 0.1 |
| C-A | 298.7 | 199.1 | - | - | - | - |
| C-B | 11.0 | 7.3 | 1.2 | 0.1 | 1.2 | 0.1 |
| A-B | 28.9 | 19.3 | - | - | - | - |
| A-C | 278.0 | 185.4 | - | - | - | - |

| | | | | | | |
|------------|--------------|--------------|------------|------------|------------|------------|
| All | 671.7 | 447.8 | 9.0 | 0.0 | 9.0 | 0.0 |
|------------|--------------|--------------|------------|------------|------------|------------|

Delay is that occurring only within the time period.

Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.

These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful

Appendix XI – Recorded Monuments within the Study Area

Recorded Monuments in the Study Area

CW013-012----ARDRISTAN Standing stone

Narrow granite flagstone tapering towards top (H 1.80m; 0.8m x 0.3m). Aligned E-W. Second standing stone (CW013-013----) 150m to SE.

CW013-013----ARDRISTAN Standing stone

Granite stone, with square cross-section (H 3m; 0.5m x 0.5m) with rounded edges, and six large, deep grooves. Pillar bulges slightly towards base where stone is exposed due to erosion of ground surrounding stone. Inclines slightly to W. Second standing stone is c 150m to NW (CW013-012----).

CW013-014001- ARDRISTAN Church

Present remains consist of nave and chancel church, standing at centre of square graveyard (CW013-014002-). Foundations of W gable, exposed in adjacent grave plot, consist of massive, regular granite blocks with no visible mortar. According to O'Donovan (OSL 1839, 109-10), nave (dims. 11.9m x 7.3m) and chancel (6.4m x 5.5m) divided by 'stone pointed arch'. Arch (Wth c 2.8m) has collapsed (ITA Survey 1945). Broken ope in E gable.

CW013-014002- ARDRISTAN Graveyard

Square-shaped graveyard (map dims. 33.5m) with church (CW013-014001-) roughly centrally placed.

CW013-029---- ARDRISTAN Ringfort – rath

Raised circular platform (diam. 20-25m; H 1.5-2m) enclosed by fosse, best preserved at E. Situated at base of gentle slope, close to stream. Fulacht fiadh (CW013-083----) between ringfort and stream.

CW013-082---- ARDRISTAN Fulacht fia

Slight rise (H c. 0.3m; diam. c. 15m) beside stream. Dark soil with fractured stone exposed by cattle. No charcoal visible. Two other low mounds noted nearby.

Sites in the Sites and Monuments Record

CW013-123---- RATHTOE Enclosure

OSI orthophoto (2005) shows cropmark of a curvilinear enclosure defined by a fosse.