**From:** David Clements [mailto:David.Clements@nationaltransport.ie]
**Sent:** Wednesday 21 February 2018 17:23
**To:** Kieran Somers <K.Somers@pleanala.ie>
**Cc:** Paul Scully <Paul.Scully@nationaltransport.ie>; Hugh Creegan <Hugh.Creegan@nationaltransport.ie>; Michael MacAree <michael.macaree@nationaltransport.ie>
**Subject:** RE: NTA Submission - College Green EIAR

Kieran,

Please find attached the submission of the National Transport Authority on the proposed Civic Plaza at College Green and traffic management arrangements further information.

Can you please confirm receipt of this email at your earliest convenience.

Kind regards,
David

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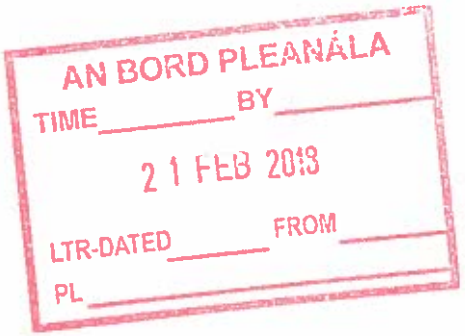

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An Bord Pleanála,
64 Marlborough Street,
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21st February 2018

**RE: Civic Plaza at College Green and Ancillary Traffic Management Measures**

Dear Sir / Madam,

I refer to the previous submission of the National Transport Authority (NTA) in relation to the proposed Civic Plaza at College Green and ancillary traffic management measures (submission dated 30th June 2017) and wish to supplement that submission as part of the current consultation process.

## Overview

I reconfirm that the NTA supports the development of the College Green proposal as submitted by Dublin City Council, subject to:

(a) two-way bus movement being facilitated on Parliament Street, using low NOx emission buses and ensuring full adherence to European air quality limits on nitrogen dioxide; and

(b) the carriageway layout on Dame Street being further refined during the later design development stages to provide segregated cycling facilities along this street as this link forms part of the overall Clonskeagh to City Centre cycle route of the Greater Dublin Area Cycle Network Plan.

The recent commencement of passenger services on the extended Green Line (Luas Cross City) has underlined the vehicular limitations of College Green. The College Green plaza proposal recognises those issues and would provide a simplified transport arrangement, with buses, trams and taxis proposed to travel along the north-south axis only. This would remove the current complex junction in College Green, which is the source of many of the delay events for transport movement in this area. In the view of the NTA, the revised arrangements set out in the Council's proposals would facilitate a higher volume of vehicular movement on this axis than is currently possible.

## Statutory Role of NTA

Under the applicable legislation (Dublin Transport Authority Act 2008 and the Public Transport Regulation Act 2009), the NTA is charged with the provision of public transport services across the State. In particular this includes the provision of the subsidised bus services operated in the Dublin

region. These services are currently provided under a contract awarded to Dublin Bus by the NTA. The individual bus services in the contract are defined by the NTA and delivered by Dublin Bus, who then receive payment from the NTA for the operation of the services. The current contract awarded to Dublin Bus runs up to December 2019 and the NTA will determine, during the current year, whether to renew that contract or place routes out to public tender.

Accordingly, it is the role of the NTA to design the bus network and to define the bus services to be operated as part of the subvented bus system across Dublin. Having regard to our statutory function, we have carefully considered the implications of the plaza proposal and the associated traffic management proposals. We are satisfied that the application proposals, subject to the provision of two-way bus movement on Parliament Street, do not preclude the continued delivery of a satisfactory bus network that meets the needs of the city and we have developed revised network proposals which have been considered by the Council in their development of the plaza proposals.

**Air Quality**

Separately, we note that we previously provided an air quality modelling report in relation to the use of Euro VI engine buses in Parliament Street. In the intervening period since our first submission, we have updated that exercise and attach a revised report. This report reconfirms the outcome of the earlier work, namely that the air quality modelling demonstrates that the NOx levels at the receptor locations in Parliament Street are all forecast to be significantly below the EU emission standards for nitrogen dioxide.

I trust that the views of the Authority will be taken into consideration by An Bord Pleanála in assessing this application.

Yours sincerely,

Hugh Creegan,
Director of Transport Investment and Taxi Regulation.

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# Parliament Street

National Transport Authority

## Air Quality Assessment

Document No. | 1

29th September 2017

TP-029.01

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# Parliament Street Air Quality Assessment

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|---|---|
| Project No: | TP-029.01 |
| Document Title: | Parliament Street Air Quality Assessment |
| Document No.: | TP-029.01 Report 1 |
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## Document history and status

| Revision | Date | Description | By | Review | Approved |
|---|---|---|---|---|---|
| Draft | 21/9/17 | Draft version of report for review | R. Mason | H. Peace | |
| Final | 29/9/17 | Final version for review | R. Mason | H. Peace & D. Burgdorf | B. Sloey |
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## Contents

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# 1. Introduction

Jacobs has been commissioned by the National Transport Authority – Ireland (NTA) to undertake air quality modelling of bus flows on Parliament Street, Dublin. Under the proposed scheme Parliament Street changes from one-way to two-way operation. There are concerns about the impact on air quality from the scheme so several air quality scenarios have been modelled to help advise on policy:

- Base year 2012
- Do-nothing 2018 (DM18)
- With Parliament Street 2018 (DS18)
- With Parliament Street 2018 with EURO VI buses (DS18 EU6)
- With Parliament Street 60 buses per hour in each direction 2018 with EURO VI buses (DS18 EU6 60v)
- With Parliament Street 40 buses per hour in each direction 2018 with EURO VI buses (DS18 EU6 40v)

Each scenario with EURO VI buses assumes that all buses operating on Parliament Street would meet the EURO VI standard for engines.

All air quality modelling undertaken by Jacobs for this report is based on the traffic data supplied by the NTA.

## 1.1 Relevant Legislation

The European Union Directive 2008/50/EC Ambient Air Quality and Cleaner Air for Europe[1] were published to consolidate previous European Directives on ambient air quality.

The Irish government is responsible to the European Commission (EC) for ensuring that it complies with the provisions of the EU Directives.

The Environmental Protection Agency (EPA)[2] is the designated competent authority for overseeing the implementation of legislation in Ireland. To assist in this the EPA runs the National Ambient Air Quality Monitoring Network and also runs the National Reference Laboratory for Ireland.

### 1.1.1 Engine Standards

The EURO standards for vehicle engines were introduced in the EU as a means of legislatively limiting the allowed amounts of pollution generated from road transport. Manufacturers are required to submit new vehicles for testing prior to sale in order to check they comply with legal emission limits. Buses are included under heavy duty vehicles and the latest standard to be introduced for heavy duty vehicles is EURO VI, which was introduced through European Regulation (EC) No. 595/2009 and implemented via European Regulation (EU) No 582/2011. This limits heavy duty engines to producing no more than 400 milligrams of $NO_X$ per kWh. All heavy duty vehicles registered from 31st December 2013 must comply with EURO VI standards[3].

[1] Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe
[2] EPA, Air Quality Standard, http://www.epa.ie/air/quality/standards/, accessed September 2017.
[3] RSA, Euro IV, Euro V and VI Emissions Regulations for Heavy Duty Vehicle Information Note, http://www.rsa.ie/Documents/Vehicle%20Std%20Leg/Information%20Notes/Information%20note%20for%20Euro%20IV%20Euro%20V%20and%20Euro%20VI%20Emissions%20Regulations%20for%20Heavy%20Duty%20Vehicles%20%20Feb%202012.pdf, accessed September 2017.

# 2. Methodology

The process for this assessment can be broken into three steps (Figure 1), each of which are described in the following sections.


**Figure 1: Assessment flow**

## 2.1 Traffic Data

The NTA supplied hourly traffic data (all vehicles split) for three scenarios:

- Base 2012;
- Do-Minimum 2018; and
- Do-Something 2018.

For each scenario the data covered five different time periods giving the average hourly flow and average link speed. This was further broken down into contributions by vehicle type. The five time periods were:

- AM – 0700-1000;
- Lunchtime – 1000-1300;
- School Run – 1300-1600;
- PM – 1600-1900; and
- Daily 24-hour flow

The off-peak period, which was not provided, running from 1900-0700 was extrapolated by subtracting the combined hourly flows from the 24-hour total, while the off-peak speed for each link was assumed to be the maximum from the supplied four daytime time periods.

The NTA also supplied information on the percentage of buses from each link in the model that passed through Parliament Street. From this percentage, the number of buses on each link that would need to be converted to EURO VI was calculated.

To represent restricting the number of buses on Parliament Street, the number of EURO VI buses on each link was adjusted depending on which direction of flow on Parliament Street that they contributed to. There were 33 modelled links which formed 6 distinct bus corridors. It was assumed that most vehicles would route through Parliament Street, based on the previous percentages discussed. For example, the northbound flow on Parliament Street had 77 buses composed of 47 from Lord Edward Street and 30 from Dame Street.

As the flow was being restricted to 60 or 40 buses per direction, vehicles compromising the northbound flow were scaled down, and those attributed to the southbound flow scaled up.

Table 1 shows the number of buses operating on Parliament Street and the contributing roads, for the Do something and two alternative flow scenarios. The position of the roads close to Parliament Street can be seen in Figure 2 at the end of this report.

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**Table 1: Scaled changes made to bus flow 2018 (EURO VI buses per hour)**

| Road | Direction | Do Something | | 60 Vehicle Flow | | 40 Vehicle Flow | |
|---|---|---|---|---|---|---|---|
| Parliament St | N/S | 77 | 53 | 60 | 60 | 40 | 40 |
| Essex Quay | W/E | 7 | - | 6 | - | 4 | - |
| Grattan Bridge | N/S | 70 | 6 | 55 | 6 | 36 | 4 |
| Wellington Quay | W/E | - | 48 | - | 54 | - | 36 |
| Lord Edward St | E/W | 47 | 48 | 37 | 54 | 25 | 36 |
| Dame St | W/E | 30 | 5 | 23 | 6 | 16 | 4 |

## 2.2 Emissions Calculations

The Emission Factor Toolkit (EFT) v7.0 is the recommended tool by the Department for Food and Rural Affairs (UK) for modelling of road based emission sources for schemes undertaken in the UK. EFT is based on the European emission tool COPERT. The main difference is that EFT incorporates the UK national vehicle fleet into the model (e.g. in terms of different EURO engine proportions). Version 7.0 is the current release from DEFRA and attempts to account for a slight increase in emissions relatable to cold starts.

The decision to use EFT was based on the assumption that the types of vehicles operating in the Republic of Ireland (ROI) would be very similar to those operating in Northern Ireland (NI), data for which is incorporated into EFT. It is suggested that this assumption is validated by comparing with actual fleet mix (e.g. age) of vehicles in Dublin, if data is available. The base year used for emissions modelling was 2013 (in place of 2012) as this is the earliest year available in EFTv7.0.

When given traffic flow and the percentage split between vehicle categories, unless specified in the input EFT uses a number of lookup tables to assign vehicles to specific classes. These settings can be manually modified such as setting all buses to run only on EURO VI settings. The default percentages used for 2018 are shown in Table 2, and the expected change in a EURO VI scenario.

**Table 2: Assumed EURO Class Percentages and Number of Buses on Parliament Street**

| EURO Class | 2018 Do Something | | 2018 Do Something EURO VI | |
|---|---|---|---|---|
| EURO I | 0% | 0 | 0% | 0 |
| EURO II | 2% | 3 | 0% | 0 |
| EURO III | 10% | 13 | 0% | 0 |
| EURO IV | 9% | 12 | 0% | 0 |
| EURO V EGR | 7% | 10 | 0% | 0 |
| EURO V SCR | 22% | 29 | 0% | 0 |
| EURO VI | 49% | 63 | 100% | 130 |

For calculation purposes, the background traffic data was separated from the Parliament Street bus flow data. The background fleet mix entered into EFT split vehicles into Car Petrol, Car Diesel, LGV, Rigid HGV and Articulated HGV and non-Parliament Street buses. A 54/46% split was assumed between petrol and diesel cars based on the previous work by AWN Consulting[4]. The same background mix (i.e. non-Parliament buses) was used for all Do-Something scenarios.

A separate emission calculation was run for the Parliament Street buses, allowing for a variation in the number of buses using Parliament Street and changing the engine standards from default to EURO VI only. It was assumed that all Parliament Street services operate buses only and not a mix of coaches and buses.

[4] Dublin City Council College Green Project, EIS Chapter 7- Air Quality and Climate Factors

## 2.3 Atmospheric Dispersion Modelling Software (ADMS)

Dispersion of the emitted pollutants was modelled using the ADMS-Roads Software, which has been developed by Cambridge Environmental Research Consultants Ltd (CERC) in the UK. It is an atmospheric modelling system that focuses on road traffic as a source of pollutant emissions, and is a recognised tool for carrying out air quality impact assessments from roads and has been validated by the manufacturers and independently.

It is used by regulatory authorities and commercially to assist in decisions related to air quality and traffic management, urban planning and public health in many countries around the world. Version 4.1.1.0 (released March 2017) was used for this assessment.

It should be noted that dispersion models provide an estimate of concentrations arising from the emissions entered into the model and historical meteorological data. The estimates produced, while appropriately representing the complex factors involved in atmospheric dispersion, are subject to uncertainty.

Whilst the predictions provided by the models should not be regarded as definitive statements of concentrations that will arise in the future, they are the most reasonable, robust and representative estimates available. The estimates are composed of calculations made at a single point for each receptor location considered (e.g. a residential property).

The previously completed work by AWN Consulting used ADMS Roads 4.1.1. To maintain consistency, some inputs remain the same in this study such as those relating to meteorological data, background (non-modelled concentrations) and receptor locations.

### 2.3.1 Background, Chemistry & Meteorological Data

The same background and meteorological data were used across all modelled scenarios. Due to the lack of verified future forecasts for background levels, it was conservatively assumed that background levels of air pollution would remain at the 2012 recorded data for all scenarios. This is a worst case assumption as it is likely in the future that background concentrations will reduce due to predicted reductions in road traffic emissions, especially in city centres such as Dublin. This assumption also has the advantage of allowing for direct comparison between the impacts from different traffic scenarios.

There are two automatic monitoring stations near the study area. These operate on a continuous basis all year monitoring a range of pollutants including Nitrogen Dioxide ($NO_2$), Nitrogen Monoxide (NO), Oxides of Nitrogen ($NO_x$), Sulphur Dioxide ($SO_2$) and Ozone ($O_3$).

The site used to provide background concentration was Rathmines, approximately 2km south of the city centre in a housing estate. It's location would categorise it as an urban background site which is ideal to use as a general background for Dublin as it would be exposed to similar levels of emissions from other sources such as heating, regional background and wider industrial sources but only low levels of traffic emissions.

The second site is that on Winetavern Street approximately 300m east of Parliament Street and was used for verification of the model results. This site's concentrations will also include a background concentration as well as being heavily influence by road traffic due to it's location. Table 3 gives the annual average levels recorded at both sites.

**Table 3: Annual Measured levels of background pollutants at Rathmines**

| | NO (ug/m3) | $NO_2$ (ug/m3) | $O_3$ (ppb) | $PM_{10}$ (ug/m3) | $SO_2$ (ug/m3) |
|---|---|---|---|---|---|
| Rathmines | 31.2 | 21.2 | 21.5 | 14.2 | 2.5 |
| Winetavern | 50.9 | 29.2 | | | |

ADMS has a built in chemistry module, that given background levels can calculate the secondary $NO_X$-$NO_2$ conversion rate. This option was enabled in the model, rather than perform post modelling processing.

The meteorological data used was that supplied by AWN Consulting for Dublin in 2012. The wind rose in Figure 3 plots the number of hourly occurrences for speed and wind direction over the year.

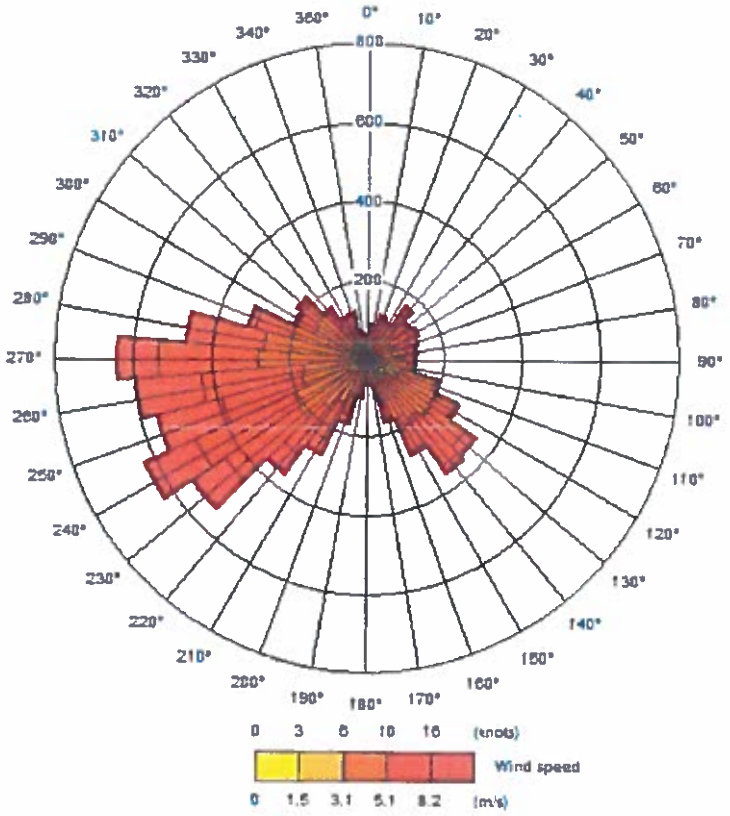




**Figure 3: Wind Rose for Dublin Meteorological Data in 2012**

### 2.3.2 Receptors

The receptors modelled were those supplied by AWN Consulting as used in the previous work. These are displayed in Figure 2 and are positioned so as to representative of the edge of a property and spaced approximately every 5 meters.

An additional receptor was added to represent the automatic monitoring station on Winetavern Street used to verify the model output.

### 2.3.3 Network

The traffic network supplied by the NTA covered a large extent of Dublin. Standard procedure is to only model roads within 200m of the identified receptors, as those beyond 200m only affect background concentrations. Links within 200m were identified and drawn in GIS to match the centreline of the road based on OpenStreetMap[5] imagery and road width was based on a combination of OpenStreetMap and Google Maps[6] satellite imagery.

[5] https://www.openstreetmap.org/#map=18/53.34507/-6.26764
[6] https://www.google.co.uk/maps/@53.3448261,-6.2674007,17.5z

### 2.3.4 Verification

The normal verification procedure compares several monitored locations to the same locations modelled. Under or over prediction of air pollution by the model can then be assessed and the modelled results adjusted appropriately. The adjustment is often referred to as a verification factor. For this study there was only one monitoring location available for verification, the automatic monitoring site on Winetavern Street.

Comparison of monitored and modelled data for the Winetavern location for 2012 was undertaken and is discussed in the next section.

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# 3. Results

The annual tonnage of $NO_x$ emitted from tailpipe sources is shown in Table 4. There is a large predicted drop in emissions of NOx from the base year to 2018. With conversion of the Parliament Street bus services to EURO VI there is a further 1.5 tonne predicted decrease of annual NOx emissions. The annual tonnage calculation only covers the modelled network area which is shown in Figure 4.

**Table 4: Annual Modelled NOx Emissions from Road Traffic Sources for the Modelled Network**

| | Base 2012 (2013 fleet mix) | DM18 | DS18 | DS18 EU6 | DS18 EU6 40 vehicles | DS18 EU6 60 vehicles |
|---|---|---|---|---|---|---|
| Annual Modelled NOx (1000kg) | 51.78 | 24.85 | 24.14 | 22.59 | 22.53 | 22.60 |

As the chemistry option is enabled in ADMS, there is no post-modelling processing to complete. Table 5 shows the average $NO_2$ results in Parliament Street over the different scenarios. Of the 2018 scenarios, the Do-something performs the worst as the number of buses increases with no mitigation applied. Modelling all Parliament Street buses with EURO VI engines resulted in the most impact but varying the numbers of vehicles has a less than a 0.5 $\mu g/m^3$ effect.

Table 5 shows the average, minimum and maximum modelled results modelled on Parliament Street.

**Table 5: Modelled $NO_2$ Results for Parliament Street – no verification factoring**

| $NO_2$ ($ugm^{-3}$) | Base 2012 | DM18 | DS18 | DS18EU6 | DS18EU6-40v | DS18EU6-60v |
|---|---|---|---|---|---|---|
| Average | 27.4 | 24.4 | 25.1 | 23.8 | 23.7 | 23.8 |
| Min | 25.6 | 23.7 | 23.8 | 23.2 | 23.2 | 23.2 |
| Max | 31.3 | 26.2 | 26.7 | 25.2 | 25.2 | 25.2 |

Highest levels of change were recorded on the corner of Parliament Street and Dame Street, although this receptor is positioned next to two traffic flows and will receive a higher than average contribution from traffic sources. Similarly, the locations of lowest change were those receptors on the steps to the City Hall. However, the City Hall receptors are furthest away from traffic sources, so the traffic sources have a greater distance in which to dilute/disperse.

Verification for this project was undertaken at the one monitoring site available in the vicinity of the study area, on Winetavern Street. Part of this under-prediction can be explained by the use of 2013 emissions factors (as oppose to 2012 which would predict slightly higher emissions), and may also be related to the use of none Dublin specific assumptions about the EURO fleet mix compositions. Comparing the monitored $NO_2$ to that modelled allows calculation of an uplift factor, to bring the modelled results in line with those monitored. As this is only based on one site it is not very reliable. Table 6 shows the monitored and modelled results for the Winetavern Street monitoring location and the calculated uplift factor.

**Table 6: Uplift Factors**

| 2012 | $NO_x$ ($ugm^{-3}$) | $NO_2$ ($ugm^{-3}$) |
|---|---|---|
| Monitored | 50.9 | 29.2 |
| Modelled | 40.9 | 25.0 |
| Uplift Factor | 1.2454 | 1.1661 |

Applying the uplift factor to the modelled results in 2018, gives a new set of results, as shown in Table 7.

Table 7: Uplifted $NO_2$ Results for Parliament Street

| $NO_2$ ($ugm^{-3}$) | Base 2012 | DM18 | DS18 | DS18EU6 | DS18EU6-40v | DS18EU6-60v |
|---|---|---|---|---|---|---|
| Average | 31.9 | 28.5 | 29.3 | 27.7 | 27.6 | 27.7 |
| Min | 29.8 | 27.6 | 27.8 | 27.0 | 27.0 | 27.0 |
| Max | 36.6 | 30.6 | 31.2 | 29.4 | 29.4 | 29.4 |

Even with the uplift factor applied, the maximum predicted levels on Parliament Street are still below the legal limit of $40\mu gm^{-3}$.

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# 4. Conclusion

The Do-Something uplifted maximum of 31.2µgm$^{-3}$ is still safely below the legal limit for $NO_2$. This implies that extra vehicles could be run without any of the proposed mitigation schemes. Converting buses on Parliament Street to EURO VI has the biggest impact on air quality, reducing roadside concentrations on average by 1.6µgm$^{-3}$. Altering the number of vehicles operating on Parliament Street, if they already meet the EURO VI standard, is predicted to have less than 0.1 µgm$^{-3}$ difference on $NO_2$ concentrations in Parliament Street.

**Figure 2** - Receptor Locations © OpenStreetMap contributors see http://www.openstreetmap.org/copyright

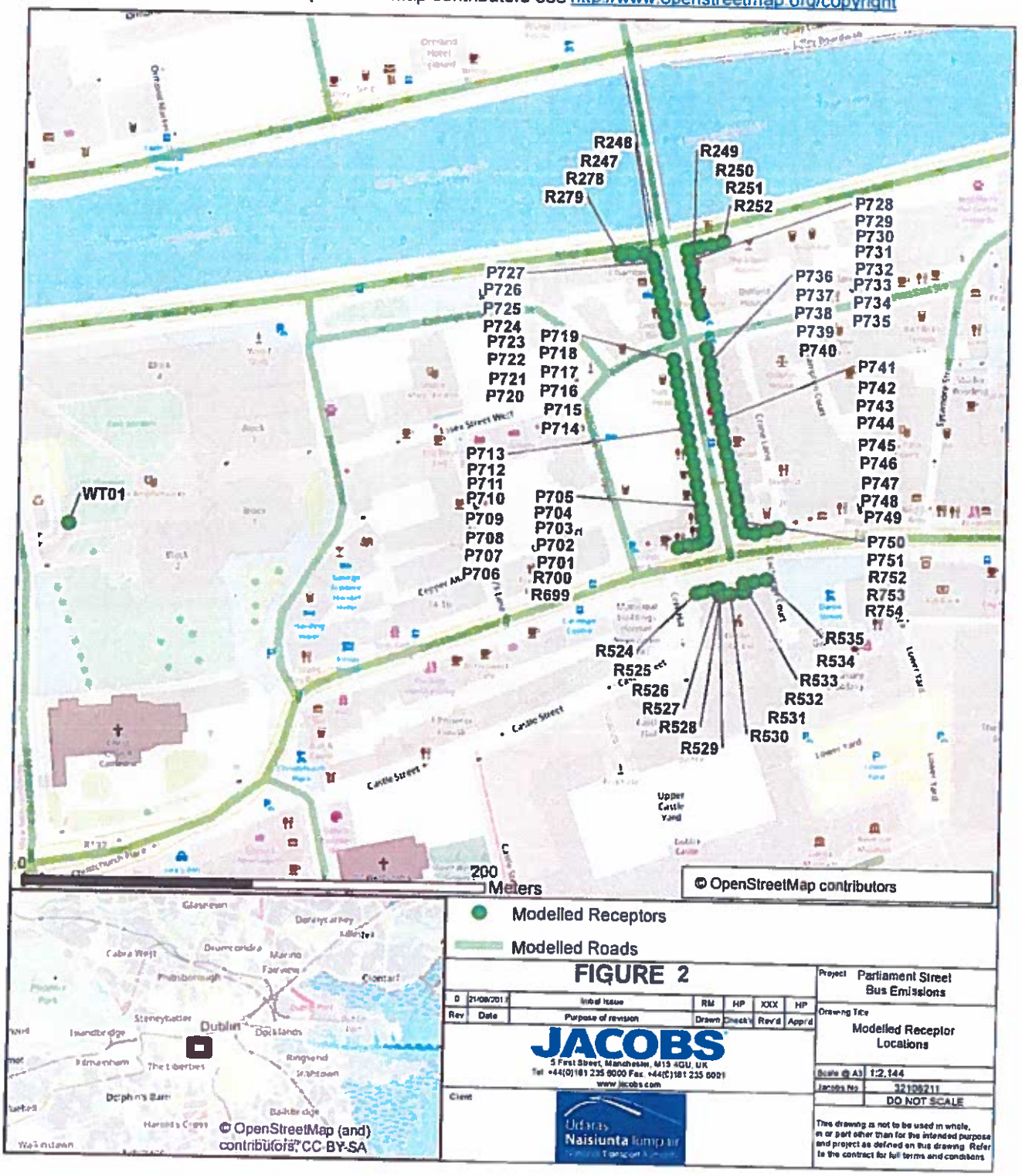

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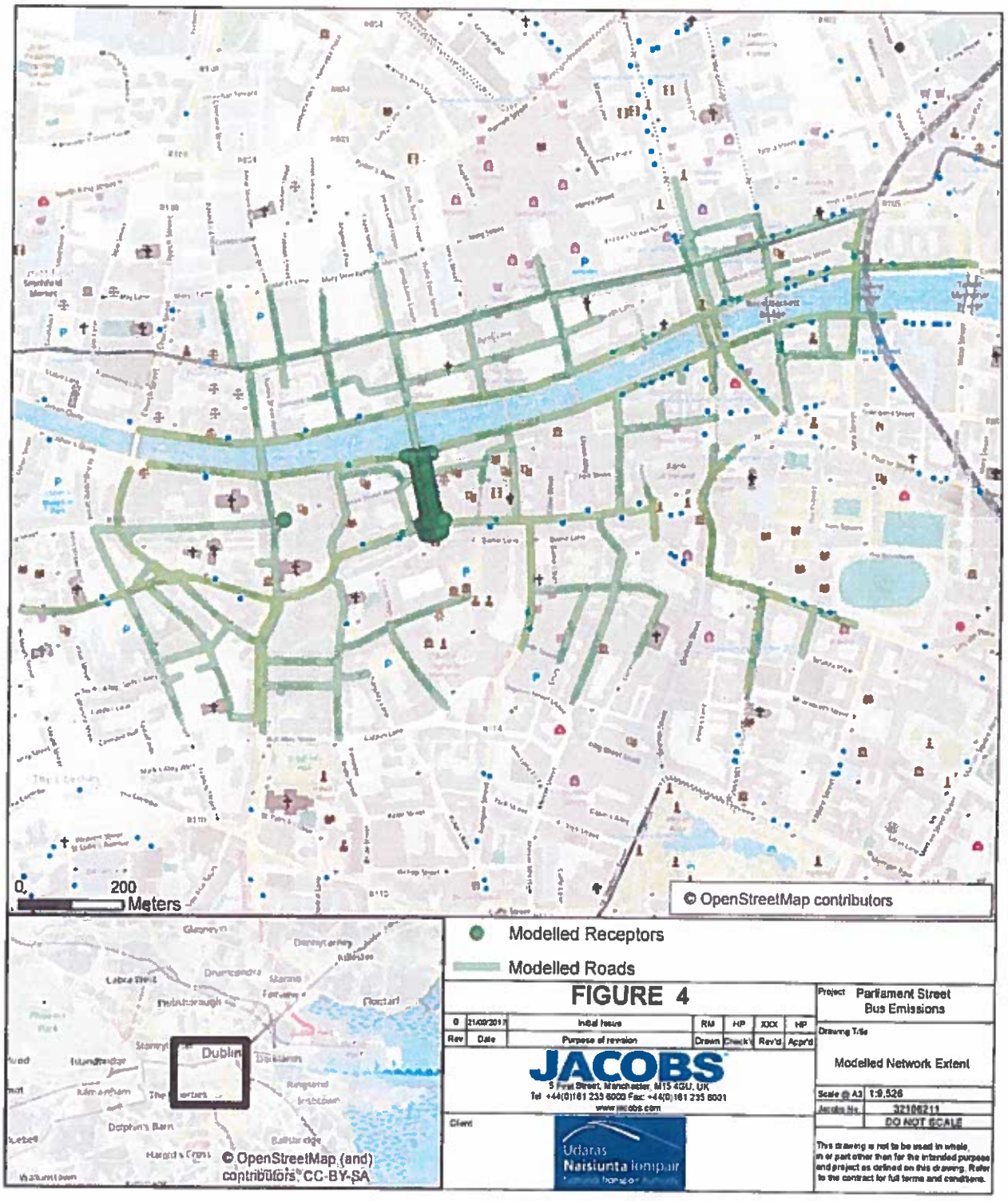
Figure 4 - Modelled Network © OpenStreetMap contributors see http://www.openstreetmap.org/copyright



# Appendix A. Unadjusted Results

| RecepID | X | Y | Base12 | DM18 | DS18 | DS18 EU6 | DS18 EU6 40 vehicles | DS18 EU6 60 vehicles |
|---|---|---|---|---|---|---|---|---|
| R247 | 315415.8 | 234156.5 | 31.3 | 26.2 | 26.5 | 25.2 | 25.2 | 25.2 |
| R248 | 315419.3 | 234154.5 | 29.4 | 25.4 | 26.1 | 24.6 | 24.5 | 24.6 |
| R249 | 315437.5 | 234159.2 | 30.1 | 25.7 | 26.6 | 24.9 | 24.9 | 24.9 |
| R250 | 315440.5 | 234159.7 | 29.8 | 25.5 | 26.4 | 24.9 | 24.8 | 24.9 |
| R251 | 315445.2 | 234160.6 | 29.6 | 25.4 | 26.2 | 24.8 | 24.7 | 24.8 |
| R252 | 315450.2 | 234162.1 | 29.6 | 25.4 | 26.1 | 24.8 | 24.7 | 24.8 |
| R278 | 315410.2 | 234156.1 | 31.3 | 26.2 | 26.2 | 25.2 | 25.1 | 25.2 |
| R279 | 315405.1 | 234155.7 | 31.3 | 26.2 | 26.0 | 25.2 | 25.1 | 25.2 |
| R524 | 315441.5 | 234010.6 | 26.0 | 23.9 | 24.1 | 23.3 | 23.3 | 23.3 |
| R525 | 315444.7 | 234011.6 | 26.1 | 23.9 | 24.1 | 23.4 | 23.3 | 23.4 |
| R526 | 315449.5 | 234012.5 | 26.1 | 23.9 | 24.1 | 23.4 | 23.3 | 23.4 |
| R527 | 315451.2 | 234013.0 | 26.1 | 23.9 | 24.2 | 23.4 | 23.3 | 23.4 |
| R528 | 315451.9 | 234009.5 | 25.6 | 23.7 | 23.8 | 23.2 | 23.2 | 23.2 |
| R529 | 315451.9 | 234009.5 | 25.6 | 23.7 | 23.8 | 23.2 | 23.2 | 23.2 |
| R530 | 315456.5 | 234010.4 | 25.6 | 23.7 | 23.8 | 23.2 | 23.2 | 23.2 |
| R531 | 315461.4 | 234011.4 | 25.6 | 23.7 | 23.8 | 23.2 | 23.2 | 23.2 |
| R532 | 315462.7 | 234011.8 | 25.7 | 23.7 | 23.9 | 23.2 | 23.2 | 23.2 |
| R533 | 315462.0 | 234015.4 | 26.2 | 24.0 | 24.2 | 23.4 | 23.4 | 23.4 |
| R534 | 315466.7 | 234016.3 | 26.3 | 24.0 | 24.2 | 23.4 | 23.4 | 23.4 |
| R535 | 315471.7 | 234017.2 | 26.3 | 24.0 | 24.2 | 23.4 | 23.4 | 23.4 |
| R699 | 315432.9 | 234030.3 | 28.2 | 25.0 | 25.5 | 24.1 | 24.0 | 24.1 |
| R700 | 315437.9 | 234031.2 | 28.5 | 25.1 | 25.7 | 24.1 | 24.1 | 24.1 |
| P701 | 315442.1 | 234032.1 | 28.6 | 25.2 | 25.8 | 24.2 | 24.1 | 24.2 |
| P702 | 315445.0 | 234033.6 | 28.6 | 25.1 | 25.8 | 24.1 | 24.1 | 24.1 |
| P703 | 315445.6 | 234035.1 | 28.3 | 25.0 | 25.7 | 24.0 | 24.0 | 24.0 |
| P704 | 315445.0 | 234038.1 | 27.7 | 24.7 | 25.4 | 23.8 | 23.7 | 23.8 |
| P705 | 315444.0 | 234043.1 | 27.1 | 24.3 | 25.1 | 23.6 | 23.5 | 23.6 |
| P706 | 315443.0 | 234047.6 | 26.8 | 24.2 | 24.9 | 23.5 | 23.4 | 23.5 |
| P707 | 315441.9 | 234052.6 | 26.5 | 24.0 | 24.8 | 23.4 | 23.4 | 23.4 |
| P708 | 315440.8 | 234057.7 | 26.4 | 24.0 | 24.7 | 23.4 | 23.3 | 23.4 |
| P709 | 315439.8 | 234062.7 | 26.3 | 23.9 | 24.7 | 23.3 | 23.3 | 23.3 |
| P710 | 315438.9 | 234067.2 | 26.3 | 23.9 | 24.7 | 23.3 | 23.3 | 23.3 |
| P711 | 315437.7 | 234072.2 | 26.2 | 23.8 | 24.7 | 23.3 | 23.2 | 23.3 |
| P712 | 315436.8 | 234077.2 | 26.2 | 23.8 | 24.7 | 23.3 | 23.2 | 23.3 |
| P713 | 315435.6 | 234082.2 | 26.2 | 23.8 | 24.7 | 23.3 | 23.2 | 23.3 |
| P714 | 315434.5 | 234086.8 | 26.2 | 23.8 | 24.7 | 23.3 | 23.2 | 23.3 |
| P715 | 315433.3 | 234091.8 | 26.3 | 23.8 | 24.7 | 23.3 | 23.3 | 23.3 |
| P716 | 315432.3 | 234096.8 | 26.3 | 23.9 | 24.7 | 23.3 | 23.3 | 23.4 |
| P717 | 315431.2 | 234101.3 | 26.4 | 23.9 | 24.8 | 23.4 | 23.3 | 23.4 |

| RecepID | X | Y | Base12 | DM18 | DS18 | DS18 EU6 | DS18 EU6 40 vehicles | DS18 EU6 60 vehicles |
|---|---|---|---|---|---|---|---|---|
| P718 | 315430.3 | 234106.3 | 26.6 | 24.0 | 24.9 | 23.5 | 23.4 | 23.5 |
| P719 | 315429.4 | 234111.3 | 26.9 | 24.2 | 25.0 | 23.6 | 23.5 | 23.6 |
| P720 | 315427.0 | 234122.9 | 26.9 | 24.2 | 25.1 | 23.7 | 23.6 | 23.7 |
| P721 | 315426.1 | 234125.9 | 26.7 | 24.1 | 25.0 | 23.6 | 23.6 | 23.6 |
| P722 | 315425.1 | 234130.9 | 26.6 | 24.1 | 25.0 | 23.6 | 23.5 | 23.6 |
| P723 | 315423.8 | 234135.9 | 26.7 | 24.1 | 25.0 | 23.6 | 23.6 | 23.6 |
| P724 | 315422.7 | 234140.4 | 26.9 | 24.2 | 25.1 | 23.7 | 23.6 | 23.7 |
| P725 | 315421.5 | 234145.5 | 27.3 | 24.4 | 25.3 | 23.9 | 23.8 | 23.9 |
| P726 | 315420.3 | 234150.5 | 28.1 | 24.8 | 25.6 | 24.1 | 24.1 | 24.1 |
| P727 | 315419.9 | 234153.0 | 28.8 | 25.1 | 25.9 | 24.4 | 24.3 | 24.4 |
| P728 | 315434.4 | 234158.3 | 30.0 | 25.7 | 26.7 | 24.9 | 24.8 | 24.9 |
| P729 | 315435.5 | 234153.8 | 28.3 | 24.9 | 25.9 | 24.3 | 24.2 | 24.3 |
| P730 | 315436.6 | 234148.7 | 27.5 | 24.5 | 25.4 | 23.9 | 23.9 | 23.9 |
| P731 | 315437.6 | 234143.7 | 27.0 | 24.2 | 25.2 | 23.7 | 23.7 | 23.7 |
| P732 | 315438.9 | 234139.2 | 26.8 | 24.1 | 25.1 | 23.6 | 23.6 | 23.6 |
| P733 | 315440.0 | 234134.2 | 26.8 | 24.1 | 25.0 | 23.6 | 23.6 | 23.6 |
| P734 | 315441.1 | 234131.2 | 26.9 | 24.1 | 25.0 | 23.6 | 23.6 | 23.6 |
| P735 | 315443.9 | 234116.1 | 27.3 | 24.1 | 25.1 | 23.6 | 23.6 | 23.6 |
| P736 | 315445.4 | 234110.6 | 26.9 | 24.0 | 25.0 | 23.5 | 23.4 | 23.5 |
| P737 | 315446.2 | 234105.6 | 26.7 | 24.0 | 25.0 | 23.4 | 23.3 | 23.4 |
| P738 | 315447.1 | 234100.6 | 26.7 | 24.0 | 25.0 | 23.4 | 23.3 | 23.4 |
| P739 | 315448.1 | 234095.6 | 26.6 | 24.0 | 25.0 | 23.4 | 23.3 | 23.4 |
| P740 | 315449.2 | 234090.6 | 26.6 | 24.0 | 25.0 | 23.4 | 23.3 | 23.4 |
| P741 | 315450.2 | 234086.0 | 26.6 | 24.0 | 25.0 | 23.4 | 23.3 | 23.4 |
| P742 | 315451.3 | 234081.0 | 26.6 | 24.0 | 25.0 | 23.4 | 23.3 | 23.4 |
| P743 | 315452.4 | 234076.0 | 26.7 | 24.0 | 25.1 | 23.4 | 23.3 | 23.4 |
| P744 | 315453.5 | 234071.0 | 26.8 | 24.1 | 25.1 | 23.4 | 23.3 | 23.4 |
| P745 | 315454.7 | 234066.5 | 26.8 | 24.1 | 25.1 | 23.4 | 23.3 | 23.4 |
| P746 | 315455.8 | 234061.5 | 27.0 | 24.2 | 25.2 | 23.5 | 23.4 | 23.5 |
| P747 | 315456.9 | 234056.4 | 27.2 | 24.3 | 25.3 | 23.5 | 23.5 | 23.5 |
| P748 | 315458.0 | 234051.9 | 27.4 | 24.4 | 25.4 | 23.6 | 23.5 | 23.6 |
| P749 | 315459.0 | 234046.9 | 27.8 | 24.6 | 25.6 | 23.8 | 23.7 | 23.8 |
| P750 | 315460.0 | 234041.9 | 28.3 | 24.9 | 25.9 | 24.0 | 23.9 | 24.0 |
| P751 | 315462.0 | 234037.4 | 29.2 | 25.4 | 26.2 | 24.3 | 24.2 | 24.3 |
| R752 | 315466.6 | 234036.8 | 29.2 | 25.4 | 26.0 | 24.4 | 24.3 | 24.4 |
| R753 | 315471.5 | 234038.2 | 28.6 | 25.1 | 25.6 | 24.2 | 24.1 | 24.2 |
| R754 | 315476.3 | 234039.7 | 28.2 | 24.9 | 25.3 | 24.1 | 24.0 | 24.1 |
| WT01 | 315169.4 | 234036.5 | 25.0 | 23.2 | 23.2 | 23.1 | 23.1 | 23.1 |

***Grid co-ordinates in Irish National Grid (TM65_Irish_Grid), WKID: 29902, Authority: EPSG**