APPENDIX 6.2: TRAVEL PLAN

stomor
CIVIL ENGINEERING CONSULTANTS

RESIDENTIAL TRAVEL PLAN

GRID REF: 528027E, 193454N

PROPOSED DEVELOPMENT AT THE NORTH LONDON BUSINESS PARK

NEW SOUTHGATE, BARNET, LONDON

prepared for

COMER HOMES GROUP

AUGUST 2021

REFERENCE: ST3013/TP-2108North London Business Park
REVISION: Rev 0

This Travel Plan has been prepared by Stomor Ltd. based upon information obtained from others. Stomor Ltd cannot be held responsible for inaccuracies in this information.

This Travel Plan has been prepared for the Client for their sole and specific use. No professional liability or warranty shall be extended to other parties in connection with this report without the explicit written agreement of Stomor Ltd and payment of the appropriate fee.

Should the Client wish to pass copies of this Travel Plan to others for information, the entire Travel Plan should be copied.

Revision	*Author*	*Checked by*	*Issue Date*
0	*PLC*	*SAY*	*04/08/2021*

CONTENTS

APPENDICES

1.0 Background

1.1.1. Stomor Ltd. has been commissioned by Comer Homes Group to prepare a Travel Plan (TP) in support of a Hybrid Planning Application for the regeneration of the North London Business Park to provide a mixed-use development of up to 2,428 dwellings, 2,353sq.m of workspace, 3,835 sqm flexible non-residential floorspace, which could be used for community use, medical use, retail, offices, cafes etc. and a new 5FE school building with an anticipated 1,050-pupil capacity.

1.1 The site measures 16.37 hectares (ha), of which approximately 13ha comprises areas of disused open space and car parking. The site is bounded by the East Coast Mainline railway along the entire western boundary, with residential development and Brunswick Park Road adjacent to the eastern boundary. Further details of the site location are shown in the parameter plans produced by Plus Architecture contained in **Appendix A.**

1.2 The site benefits from planning permission for redevelopment. The original application was submitted in hybrid form and planning permission was granted at appeal in February 2020 for:

"the phased comprehensive redevelopment of the North London Business Park to deliver a residential led mixed-use development. The detailed element comprises 360 residential units in five blocks reaching eight storeys, the provision of a 5 Form Entry Secondary School, a gymnasium, a multi-use sports pitch and associated changing facilities, and improvements to open space and transport infrastructure, including improvements to the access from Brunswick Park Road, and; the outline element comprises up to 990 additional residential units in buildings ranging from two to nine storeys, up to 5,177 sqm of non-residential floor space (Use Classes A1-A4, B1 and D1) and 2.54haof public open space. Associated site preparation/enabling works, transport infrastructure and junction works, landscaping and car parking."
(London Borough of Barnet reference 15/07932/OUT and PINS reference APP/N5090/W/17/3189843)

1.3 In 2015, a Transport Assessment (TA) was prepared by Awcock Ward Partnership (AWP) for 1,200 dwellings, alongside the community, commercial and educational land uses. A Framework Travel Plan (FTP) was prepared and included within Appendix O of the 2015 TA. The 2015 FTP has been used to inform this TP.

1.4 This TP looks to influence behaviour change by proposing a package of measures aimed at promoting sustainable travel, with the emphasis being to minimise unnecessary single

occupancy car travel from the outset. This TP has been produced in accordance with the guidance set out by Transport for London (TfL)

1.5 It takes into account the size of the development, its location, phasing and considers a range of journeys that could be undertaken by future residents. It adopts and demonstrates a holistic approach by incorporating information, marketing and management measures necessary to address the transport demands of the development.

1.6 This TP consists of seven key sections as follows:

- Existing Conditions and Accessibility
- Sustainable Transport and Access Strategy
- Baseline Mode Split
- Travel Plan Objectives and Targets
- Travel Plan Management
- Travel Plan Initiatives
- Monitoring and Review

1.7 The TP is intended to be a flexible, evolving document that responds to varying travel demands and opportunities. Whilst it contains objectives and targets, it is intended that the primary focus is always on promoting access by sustainable modes of travel and the methods for doing this vary over time.

1.8 The development will be delivered in a series of phase, The TP will be updated and reviewed on an ongoing basis to enable a delivery of targets and efficient allocation of resources to respond to each respective phase.

1.9 The prosed school expansion will have its own respective School Travel Plan which will reduce and mange school related parking within the wider site.

2.0 Existing Conditions and Accessibility

2.1 Full details of the accessibility of the site are shown on the Accessibility Plan contained in **Appendix B.** In summary, the Accessibility Plan shows that:

- There are bus stops located close to the three site access locations (offering services every 10-15 minutes to key destinations) including:
  - Along the A109 Oakleigh Road North (adjacent to the existing Southern Access), facilitated via a zebra crossing
  - Along Brunswick Park Road (adjacent to the existing Eastern Access) facilitated via a zebra crossing
  - Along the B1453 Russell Lane (adjacent to the proposed pedestrian/cycle access)
- There is a network of footways surrounding the site along the A109 Oakleigh Road North/South to the west, Brunswick Park Road to the east and Ashbourne Avenue to the north. There are number of pedestrian crossings available at key locations along primary desire lines, as shown on the Accessibility Plan in **Appendix B**; and
- There is a range of key facilities within walking and cycling distance of the site including retail, employment, education and leisure facilities. These key facilities can be directly accessed from the site via the existing comprehensive footway and cycle network available within Barnet. Further details are shown on the Accessibility Plan contained in **Appendix B**.

3.0 Sustainable Transport Strategy

3.1 This section sets out the strategy to maximise the use of sustainable forms of transport and reduce the quantum of single occupancy car trips associated with the new development proposals.

3.2 The site is very well located in terms of sustainable transport, with local employment, retail, education and bus stops within easy walking and cycling distance of all parts of the site. New foot/cycle links and crossings will be provided to promote sustainable access to the wider network.

Pedestrian and Cycle Access Strategy

3.3 The site layout will be characterised by the creation of a comprehensive network of inter-connected streets and spaces that allow efficient movement on foot and by bicycle,

promoting a permeable network within the site with strong links to the surrounding employment, retail and residential areas.

3.4 The provision of direct and convenient routes for pedestrians and cyclists will encourage residents to use more sustainable travel options by reducing walk/cycle journey times.

3.5 To improve connectivity and promote walking and cycling, the following strategy is to be implemented within and adjacent to the proposed development:

- Provision of a new signalised junction with Brunswick Park Road (Eastern Access) which will incorporate pedestrian crossing facilities on each arm, providing a connection to the bus stops and existing footway/cycleway network;
- Widening/upgrade of the existing footways along Brunswick Park Road within the vicinity of the new signalised site access;
- Provision of a comprehensive on-site footpath network, shared surfaces and raised crossings based on key desire lines which prioritise pedestrians over vehicular traffic. This will include the delivery of a number of pedestrian and cycle connections between the site and the existing or new off-site footway and cycleway infrastructure, including a pedestrian/cycle only access with Asbourne Avenue to the north;
- Designing vehicle routes to have a maximum speed of 2omph to ensure a safe environment for all road users;
- From the early phases of the development onwards, combined foot/cycleways will be provided along with site access points solely for pedestrians and cyclists and speed control measures (such as speed tables and shared surfaces) to reduce traffic speed and promote safe access on foot/by bicycle; and
- Provision of signage to direct pedestrians and cyclists to the key locations on- and off-site. This signage will be delivered on a phase-by-phase basis dependent upon the facilities delivered within each phase.

3.6 The overall objective will be to design to make travel on foot or by bicycle the preferred mode of travel within the site and to immediately adjacent destinations.

3.7 The provision of a comprehensive foot/cycleway network and additional crossings/links off site will also mean travel to and through the site is also a viable option on foot/by bicycle (i.e., for future employees and pupils).

Public Transport Strategy

3.8 The demand for bus services at the development is intrinsically linked to the levels of development occupancy across each of the respective phases. Therefore, a flexible approach to the delivery of these services is paramount when:

- Responding to the needs of the occupiers of the proposed development;
- Balancing costs with anticipated demand / revenue responding to the needs of the occupiers of the development; and
- Ensuring value for money in the expenditure of any developer contributions.

3.9 As part of the S106 agreement associated with the existing Outline permission, a bus contribution sum of £825,000 was agreed to be delivered in five instalments to The Council to provide improvements to existing services. It is proposed that this figure is increased on a pro-rata basis to reflect the uplift in development proposed.

3.10 Furthermore, a shuttle bus service will be provided on-site operating on an 'on-demand' basis. This shuttle bus will provide links to key destinations for residents at the site.

Home and Remote Working

3.11 Census 2011 data indicates a significant number of people will work at or from home in the proposed development. We would expect this figure to have grown by the time of the next Census, and any increase reflected in the proposed development where new dwellings will be provided with high-speed broadband.

3.12 Increases in home working will reduce demand to travel to and from the site, especially at peak times.

Car Sharing and Car Clubs

3.13 Car sharing helps reduce travel costs and demand for parking as well as reducing demand for highway capacity. Negotiations have been undertaken with Zipcar, who have agreed to operate at the site. 1-2 car sharing spaces will be allocated within Phase 1 along the access road into the site from Brunswick Park Road. If there is a high demand

for Car Sharing vehicles, then the provision of additional spaces within the later Phases will be reviewed.

3.14 Promoting use of sustainable modes as well as Car Sharing and Car Clubs via a Travel Plan would help reduce demand for motor vehicle travel and have a positive impact on peak time travel.

4.0 Baseline Mode Share

4.1 The supporting TA sets out a baseline transport mode share for the site, based on 2011 Census 'Journey to Work' data. This mode share data is focussed on journeys to work, which is a good measure of travel habits and is considered to be a robust measure of travel demand to and from the site.

4.2 Baseline mode share is summarised below in Table 1 for Census 2011 'Travel to Work' data for the Barnet 010 ward (in which the site is located).

Mode	%
Work from Home	10.3%
Underground	22.7%
Train	7.2%
Bus	10.3%
Taxi	0.5%
Motorcycle	1.3%
Car (driver)	40.1%
Car (passenger)	2.0%
Cycle	1.0%
Walk	4.1%
Other	0.6%

Table 1: Baseline Mode of Travel to Work – Census 2011

4.3 The information above demonstrates that 47.9% of journeys to work are via single occupancy vehicle, and 50.22% travel via sustainable modes (Working from Home, Underground, Train, Bus, Car Passenger, Cycle and Walk).

5.0 Travel Plan Objectives and Targets

5.1 The Objectives of this TP are designed to focus on promoting access to the development by sustainable modes of transport in accordance with national and local policy.

5.2 Further promotion of sustainable transport will build on this to reduce reliance on single occupancy car use.

5.3 Therefore, the **Objectives** of this TP are as follows:

a) Reduce car dependency and especially single car occupancy;
b) Reduce the need to travel by promoting home working and delivery;
c) Promote access to/from site by sustainable modes;
d) Promote car sharing ahead of single occupancy car use;
e) Manage travel demand as efficiently as possible;
f) Continually advise residents and visitors of the benefits of sustainable travel;
g) Use opportunities to work with other organisations to help deliver the TP; and
h) To monitor and review the performance of the TP for up to five years from the date of its approval.

5.4 The access strategy outlined in Section 4 has been designed to reduce the number of single occupancy car trips to and from the proposed development by promoting more sustainable modes of travel. Furthermore, the proposed employment and school uses within the site will assist in reducing the number of external single occupancy car trips across the proposed development.

5.5 From a review of local policy documents, there are no specific mode shift targets for new developments within Barnet. However, the Mayor's Transport Strategy sets a target of 75% sustainable travel mode share for Outer London by 2040. Therefore, it is proposed to increase the percentage of those traveling to/from the site from 50.2% in 2021, to 62.2% by 2031. This target is reasonable and in line with the wider 75% by sustainable modes target set out by the Mayor of London.

5.6 The Targets are provisional at this stage will be revised as soon as the results of the initial Travel Survey are known. The provisional Targets for the end of Years 1 and 10 for the development are shown in Table 2 below.

Mode	Year 1	Year 10
	%	%
Work from Home	10.3%	13.0%
Underground	22.7%	26.0%
Train	7.2%	7.2%
Bus	10.3%	13.5%
Taxi	0.5%	0.9%
Motorcycle	1.3%	1.3%
Car (driver)	40.1%	26.7%
Car (passenger)	2.0%	2.9%
Cycle	1.0%	2.5%
Walk	4.1%	5.5%
Other	0.6%	0.6%
Total	**100.0%**	**100.0%**

Table 2: Travel Plan Mode Share Targets

6.0 Travel Plan Management

6.1 *Travel Plan Co-Ordinator*

6.1.1 The TP is run and managed by a Travel Plan Co-Ordinator (TPC), appointed by Comer Homes as part of the Managing Agent role for the site. The TPC will be assisted by Comer Homes.

6.1.2 The TPC is responsible for delivering the TP initiatives as well as undertaking the monitoring surveys, preparing survey reports and arranging meetings with the Travel Plan Liaison Group (see below).

6.1.3 The TPC is also the main point of contact for residents and external organisations with regard to assisting the promotion of sustainable transport opportunities. The TPC's main focus will be to:

- Manage and co-ordinate the development and implementation of the TP;
- Ensure residents are aware of sustainable transport opportunities at all times; and
- Be the conduit through which external organisations can direct promotions, activities and services to residents of the development.

6.1.4 In order to ensure the TP is delivered efficiently, the TPC will:

- Provide every new resident of each household with a Travel Welcome Pack on occupation;
- Provide local travel and transport information within the Welcome Pack and online;
- Maintain a database of travel and transport information and resources from the local authority, public transport providers, cycling groups, car share organisations and other web-based resource;
- Act as point of contact for residents requiring information;
- Organise the Travel Plan Liaison Group;
- Liaise with TfL's Travel Plan team on latest best practice;
- Undertake Travel Surveys to monitor the effectiveness of TP measures;
- Submit a revised full TP which shows actual mode split and revised Targets for Years 1, 3 and 5 to the Local Authority and TfL for their approval within 1 month of the Travel Survey; and
- Arrange and attend residents' meetings to promote the Travel Plan and get feedback and input from residents.

Travel Plan Liaison Group (TPLG)

6.1.5 The TPLG oversees the operation of the TP, considers the initiatives to implement and considers the resource implications of delivering them. It meets at least once per annum to consider the progress of the TP as well as monitoring information gathered through annual monitoring surveys.

6.1.6 Other organisations (i.e., local transport operators, local schools, other Travel Plan co-ordinators) may also be invited if there is scope for enhancing the promotion of sustainable modes of travel.

6.1.7 The TPLG shall be a mechanism for focussing on promoting sustainable modes of travel specifically for this site.

Reviewing the Framework Residential Travel Plan

6.1.8 This TP is an evolving document that will change as the development progresses to full occupancy and travel demand changes over time. In particular, as phases come forward the TP will need to evolve to reflect potentially different demands arising from each phase.

6.1.9 However, the process for preparing and reviewing the TP is likely to be similar year on year, as summarised below:

- A Residents' Travel Survey is to be undertaken one year after the first occupation, then Year 3 and Year 5 thereafter;
- The TP Objectives, Targets and Initiatives are reviewed following each survey; and
- TP initiatives undertaken throughout the year are reviewed and updated.

7.0 Travel Plan Initiatives

7.1 This section of the TP sets out the initiatives that will be implemented in line with the **objectives** and to achieve the proposed **targets**. Tabular format is used for ease of reference.

7.2 There are a number of 'hard' or 'infrastructure' measures provided by the development to help promote the use of sustainable modes. They will be in as the phasing progresses and will be used alongside the measures set out in this TP.

7.3 The 'hard 'measures are not included in the TP as initiatives, but the TP relies on them to be delivered effectively.

7.4 In summary the 'hard' measures are as follows:

- 20mph design speed for layout within site;
- Shared surfaces, cycle lanes and pedestrian footways;
- Traffic calming measures;
- Cycle parking provision;

- Car parking provision at an appropriate level with EV charging provided in accordance with The London Plan (1 space in every 5 to be EV;
- Delivery drop off area;
- Upgrade to pedestrian and cycle network adjacent to site including road crossing;
- New commercial, educational and office facilities on-site for all local residents;
- Provision of shuttlebus; and
- Enhanced bus services and stops

7.5 In addition to the above transport infrastructure, each property will be provided with high-speed broadband connectivity which will enable home working and delivery of home shopping and deliveries to avoid the need to travel and promote 'multi-drop' services.

7.6 This TP also sets out a range of 'soft' or 'promotional' measures that will allow residents and visitors to make use of the infrastructure provided from the development, take advantage of the sustainable location of the site and accessibility to services and facilities within Barnet and locations within reasonable public transport distance from the site.

7.7 In some cases, the TP initiatives build on existing national or local initiatives, making them available for future residents and visitors. As far as the TP is concerned any initiative that helps promote sustainable transport has the potential for use in this TP.

7.8 The following summarises the TP initiatives that will be delivered by the TPC over the five years from finalising this TP. All are subject to monitoring and review as this TP evolves.

7.9 The TP is focussed on promoting and enabling sustainable travel. It will rely on others to provide and maintain infrastructure and services. The TPC will ensure all opportunities to promote the use of both are made, including allowing public transport service providers with an opportunity to promote service or ticketing initiatives via the TPC to residents.

Promoting SUSTAINABLE TRANSPORT				
Ref	Initiative/Year	When?	Who?	Objectives
FRTP 1	*Appoint Travel Plan Co-Ordinator* TPC to be appointed by the Managing Agent on behalf of Comer Homes and contact details to be provided to Local Authorities and other key stakeholders. Any changes to TPC details will be provided to authorities 1 month before changing	1 month prior to occupancy of first dwelling	Managing Agent on behalf of Comer Homes.	A, E, G
FRTP 2	*Undertake a Residents Travel Survey* To establish updated mode share and, thereafter, undertake Travel Surveys, provide monitoring and review report and update Travel Plan. The Travel Surveys will be either i-TRACE of TRICS compliant.	Year 1, 3 and 5	TPC	A, H, E, G
FRTP 3	*Prepare and Issue Travel Welcome Pack to new residents* Provide package of information on walking and cycling routes to key destinations within Barnet, Shuttle Bus and other public transport services to key destinations within and beyond Barnet (TfL journey planner). Car Sharing and Car Club information and other sustainable travel information or resources.	Prior to first occupancy of each dwelling	TPC	A, B, C, D
FRTP 4	*Cycle Vouchers Offered to Residents* *Offer each resident* a £50 towards cycle purchase/equipment from a local cycle shop. 1 voucher per dwelling offered within the Travel Welcome Packs and via the development website.	Prior to first occupancy of each dwelling	TPC	A, C
FRTP 5	*Set up and manage Travel Plan Website for development* Provide information on all sustainable travel opportunities for residents on a simple to use website, including links to other resources and information to assist residents plan journeys.	Prior to occupancy of first dwelling, ongoing	TPC	A, B, C, D, E, F

FRTP 6	*Link with other Travel Plans in Barnet* Provide residents with information and contacts for other TPs within Barnet (i.e., School Travel Plans)	Prior to occupancy of 50th dwelling, ongoing	TPC	E, G
FRTP 7	*Promote 'National Walking Month' to Residents* www.livingstreets.org.uk/get-involved/campaign-with-us/national-walking-month-2019 Ensure national Walking Month is promoted to all residents.	Prior to occupancy of 50th dwelling then annually	TPC	A, C, G
FRTP 8	*Promote 'National Bike Week' to Residents* www.cyclinguk.org/bikeweek Ensure national Bikeweek is promoted to all residents.	Prior to occupancy of 50th dwelling then annually	TPC	A, C, G
FRTP 9	*Promote travel health and exercise benefits of sustainable travel* Promote the health and exercise benefits of walking and cycling to residents. This will include providing contact links to local walking or cycling clubs or facilitating the site setting up its own clubs.	Prior to occupancy of 50th dwelling then annually	TPC	A, B, E, F
FRTP 10	*Promote time and money saving benefits of sustainable travel* Promote the economic and time saving benefits of working at home or traveling by sustainable mode via leaflet or email marketing.	Prior to occupancy of 50th dwelling then annually	TPC	A, B, E, F
FRTP 11	*Promote benefits of Public Transport* Promote the use of local bus and rail services including any ticketing initiatives, promotions or rail cards including 'bus/rail' ticket integration.	Prior to occupancy of 50th dwelling then annually or as promotions occur	TPC	A, C, E
FRTP 12	*Report transport infrastructure and services defects/problems* Enable residents to email TPC to report problems with transport infrastructure and services. TPC will report to relevant organisation.	Prior to occupancy of 50th dwelling then as required	TPC	A, F
FRTP 13	*Brief Sales Team*	3 months after first occuaption of the site, then anually thereafter	TPC	A, B, E,F,G

	Brief the development sales teams on the background of the Travel Plan, its purpose and measures.			

8.0 Monitoring and Review

8.1 A key part of the TP will be regular, annual monitoring of residents' travel habits. This is important to ensure the TP remains relevant, delivers the initiatives that residents will use and achieves the objectives and targets set out in this Plan.

8.2 A Residents Travel Survey will be regularly undertaken for the duration of the Travel Plan to gather information that will be monitored and reviewed by the TPC in partnership with the TPWG. The first survey will be undertaken after one year of the first occupation of the site.

8.3 An example of the Travel Survey (which will be i-TRACE/TRICS compliant) is included in **Appendix C**. This will be adapted to suit the needs of residents as the TP progresses.

8.4 Information will be reviewed by the TPC in conjunction with the TPWG and an annual monitoring report will be prepared and issued to the Local Authority and TfL for its review.

8.5 Where Targets within this TP are not being met, further promotion of sustainable travel and promotion of this TP will be undertaken to all residents of the development.

8.6 Given that this TP is a 'dynamic strategy' which will continually evolve through the Monitoring period, it is expected that the Targets and initiatives will be revised and updated over time. Any future amendments to this TP and any new Targets will be agreed by the Managing Agent appointed by Comer Homes in writing and complied with thereafter.

7.0 Travel Plan Contacts

7.1 The following are key contacts and resources for the Travel Plan

- **Travel Plan Co-Ordinator 2021**
  TBC

- **TfL**
  https://tfl.gov.uk/plan-a-journey/

- **Living Streets (promoting walking)**
  https://www.livingstreets.org.uk/

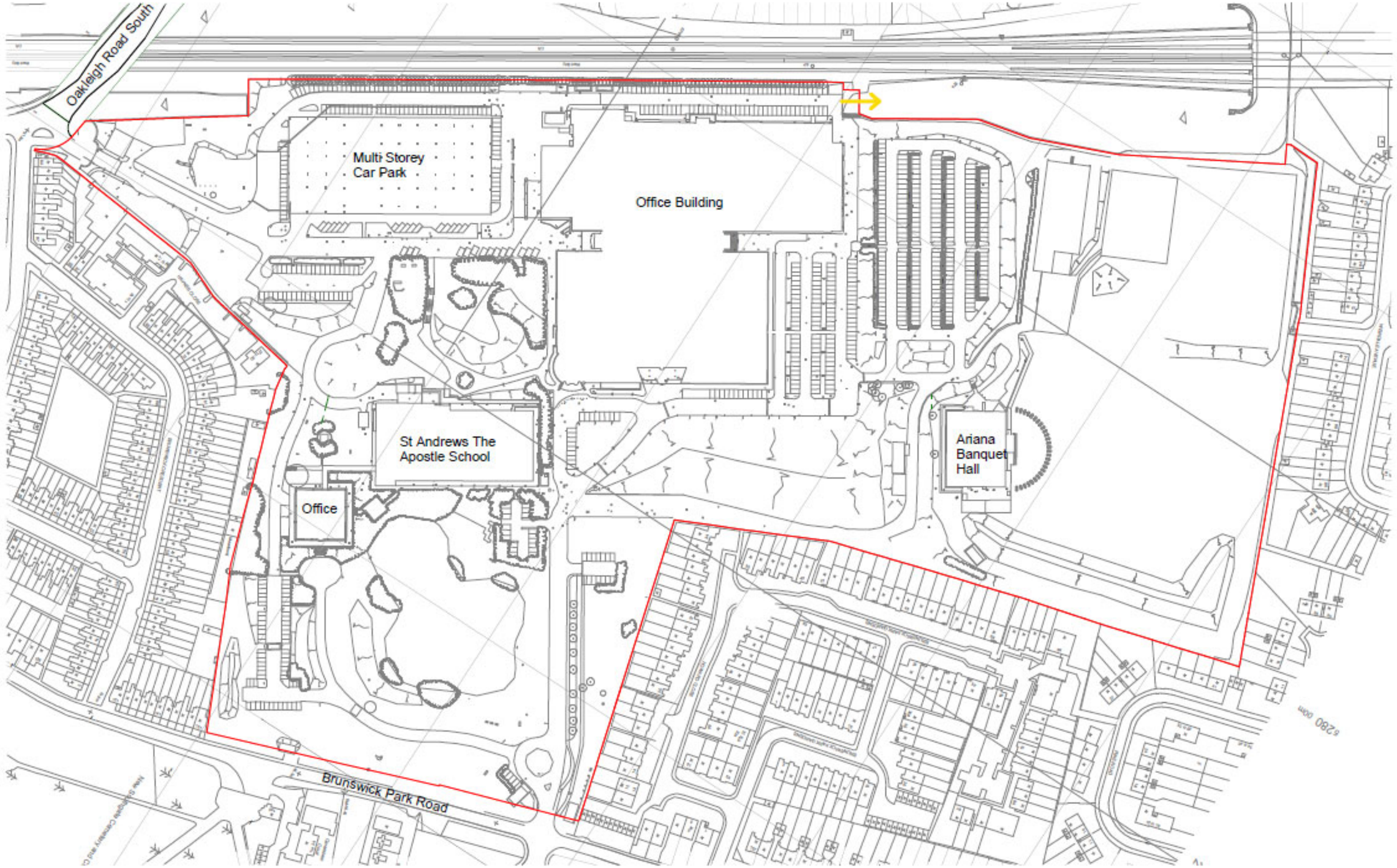
- **Sustrans (promoting walking and cycling)**
  https://www.sustrans.org.uk/
  https://www.sustrans.org.uk/map-ncn

- **Barnet Liftshare**
  https://liftshare.com/uk/journeys/to/barnet-greater-london-uk

- **Zipcar**
  https://www.zipcar.com

- **Traveline**
  https://www.traveline.info/

- **National Rail**
  https://www.nationalrail.co.uk/



General Notes

1. Developmentment Zones (within which development can occur) and public open spaces are identified on drawing number 211_WS_02_01
2. Access and circulation routes are identified on Drawing number 211_WS_02_02.
3. Landscape treatments are identified on drawing number 211_WS_02_03
4. Allowable uses at ground floor frontages are identified on Drawing number 211_WS_02_04
4. Allowable uses at ground floor frontages are identified on Drawing number 211_WS_02_04
5. Allowable horizontal limits of deviations are identified on Drawing number 211_WS_02_05
6. Proposed site ground levels and allowable vertical deviations are identified on Drawing number 211_WS_02_06
7. Heights and allowable vertical deviations are identified on Drawing number 211_WS_02_07
8. Basement extents and allowable horizontal and vertical deviation are identified on drawing number 211_WS_02_08

NOT TO SCALE IN REPORT APPENDICES

NOTES:

REV:	DATE:	DETAILS:	INITIALS:

Legend

Planning Application Boundary

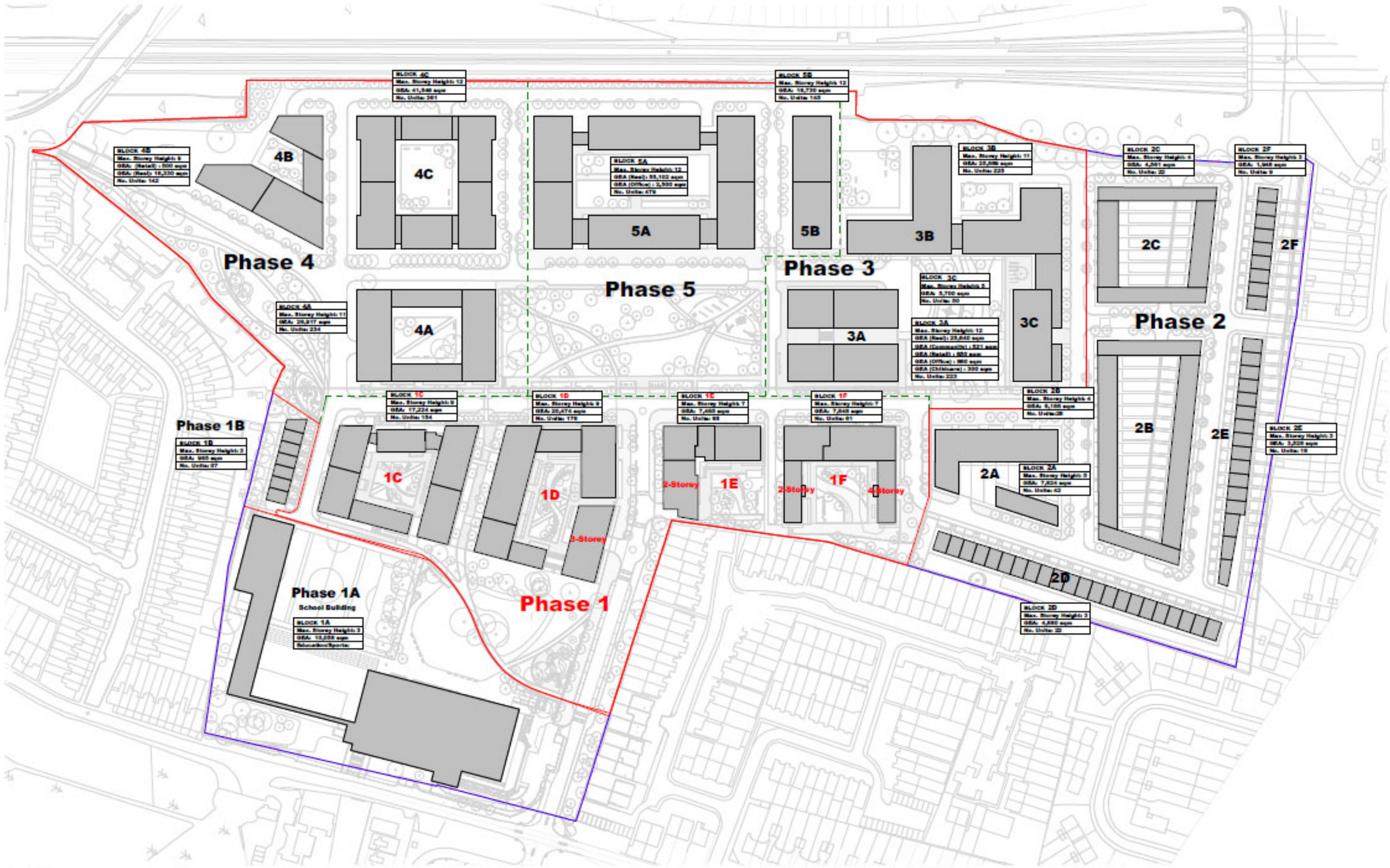
Land Owned by Applicant

NORTH POINT:

KEY PLAN:

PLUS ARCHITECTURE

PROJECT: North London Business Park	PROJECT: 211	DATE: 31/05/2021
CLIENT: The Corner Group	DRAWING NO.: 211_WS_02_00	REVISION NO.:
TITLE: RedLine Boundary Plan	DRAWN BY: JG	SCALE @ A1: 1 : 1000
ISSUE TYPE: Planning	CHECKED BY: DT	SCALE @ A3: 1 : 2000



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Additional Notes

1. Refer to Section 5 of the Design Principles Document for further guidance on the Development Zone.
2. Refer to section 4 of the Design Principles Document for further guidance on the Public Open Space Zones, access routes typologies , and landscaping treatments of streets and spaces.
3. Refer to section 3 of the Design Principles Document for further guidance on the streets and circulation routes.

NOT TO SCALE IN REPORT APPENDICES

Legend

- Planning Application Boundary
- Public Open Space
- Detailed Application Zone Blocks
- Phase 1 — Detailed Application Zone Reference
- 1A — Detailed Application Zone Block Reference
- + 57.00 — Proposed Site Basement Level (.AOD) Limit of Deviation +/- 2.0m
- Phasing of Outline Component of Application

NOTES:

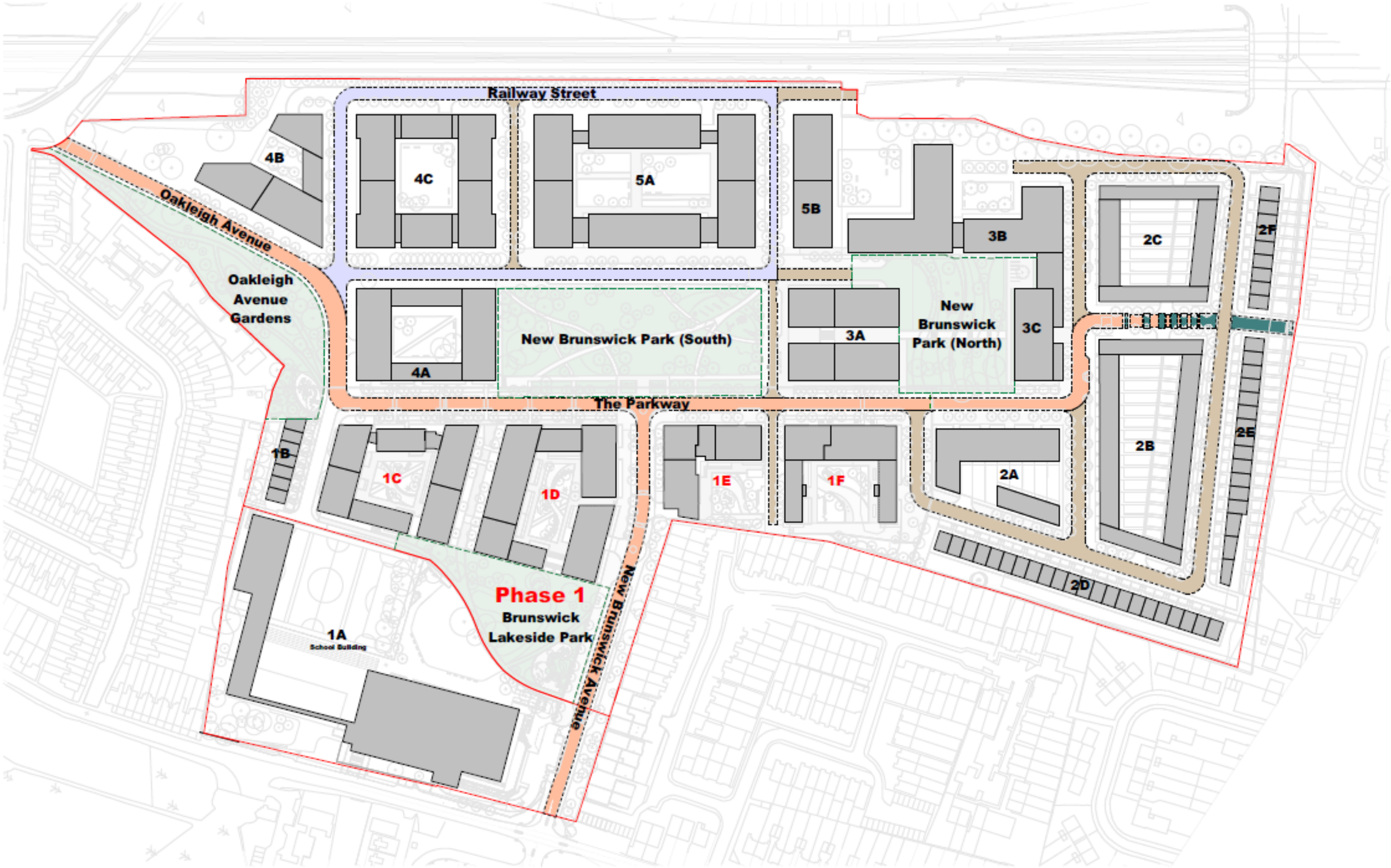
REV.	DATE	DETAILS	INITIALS

NORTH POINT:

KEY PLAN:

PLUS ARCHITECTURE Exchequer Chambers, Exchequer Street, Dublin 2, Ireland. W: www.plusarchitecture.ie T: 353 (0) 1 531 3078

PROJECT: North London Business Park	PROJECT: 211	DATE: 21/05/2021
CLIENT: The Corner Group	DRAWING NO.: 211_WS_02_01	REVISION NO.:
TITLE: Proposed Development Zone Plan	DRAWN BY: JB	SCALE AT A1: 1:1000
ISSUE TYPE: Planning	CHECKED BY: PP	SCALE AT A3: 1:2000



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Legend Minimum Street Widths

-Primary Streets-
Oakleigh Avenue to Site Boundary - 30m
The Parkway - 24m
New Brunswick Avenue - 25m
-Secondary Streets-
SST.02 - 20m
Railway Street -25m
-Tertiary Street
SST.03 - 21m

Weirdale Link-20m

Additional Notes

1. Plan shows the route typologies proposed between blocks. The exact location of routes can move horizontally to reflect the block frontage deviations in drawing number 211_WS_02_05.
2. All routes are subject to the minimum street widths identified on drawing number 211_WS_02_05.
3. Refer to Section 2 of the Design Principles Document for additional principle on access and circulation.

NOT TO SCALE IN REPORT APPENDICES

Legend

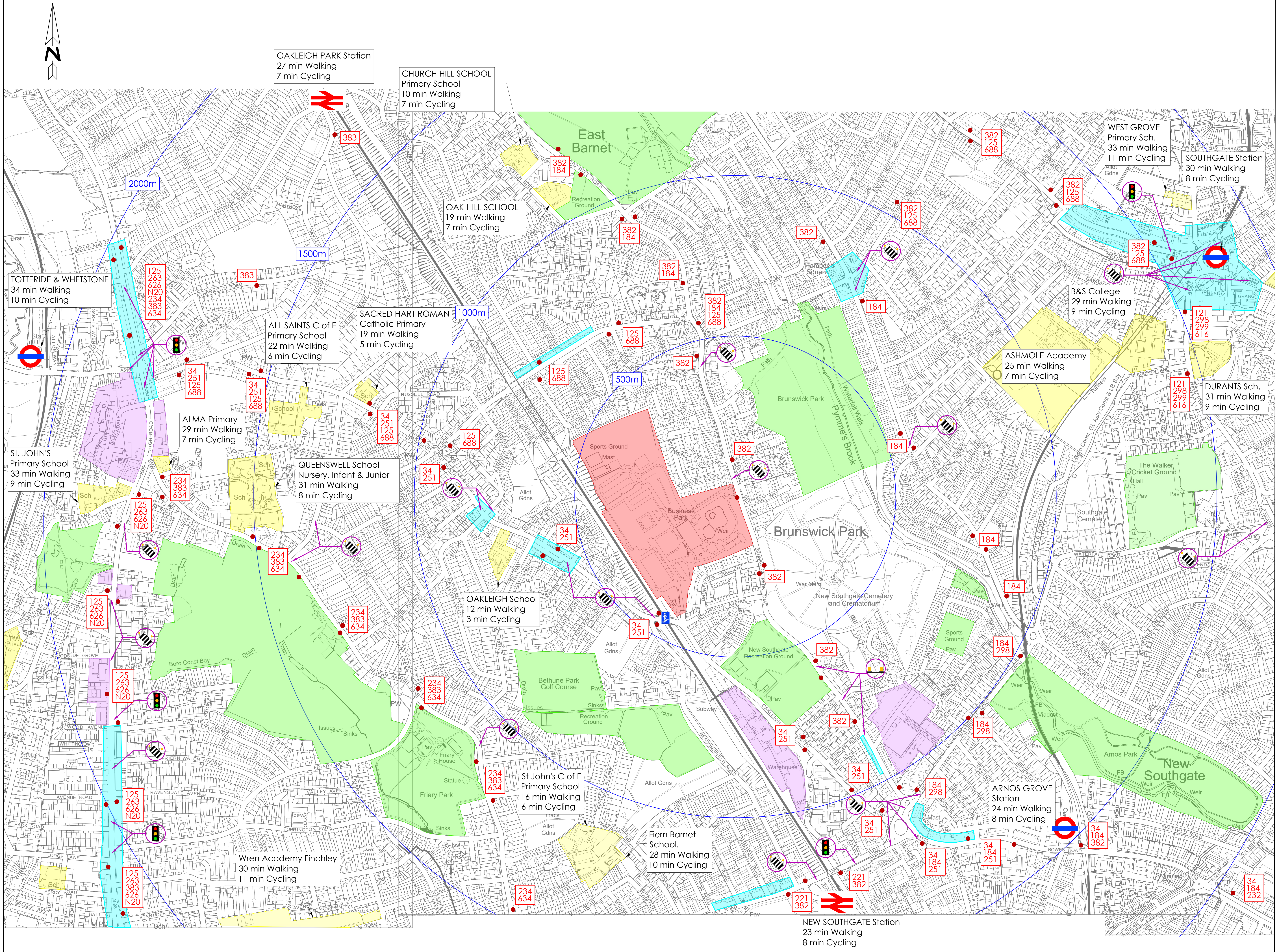
- Planning Application Boundary
- Public Open Space
- Detailed application Zone Blocks
- Phase 1 — Detailed Application Zone Reference
- 1A — Detailed Application Block Reference
- Primary Route
- Secondary Route
- Tertiary Route
- Weirdale Link

NOTES:

REV.	DATE:	DETAILS:	INITIALS:

PLUS ARCHITECTURE

PROJECT: North London Business Park	PROJECT: 211	DATE: 31/08/2021
CLIENT: The Comer Group	DRAWING NO.: 211_WS_02_02	REVISION NO.:
TITLE: Access & Circulation Plan	DRAWN BY: JG	SCALE AT A1: 1 : 1000
ISSUE TYPE: Planning	CHECKED BY: DT	SCALE AT A3: 1 : 2000



KEY
- SITE
- SCHOOLS/COLLEGES
- EMPLOYMENT AREAS
- RECREATIONAL FACILITIES
- SHOPS/RETAIL OUTLETS
- BUS STOP
- BUS SERVICES
- UNDERGROUND STATION
- RAILWAY STATION
- ZEBRA CROSSING
- UNCONTROLLED CROSSING
- SIGNALISED CROSSING
- ELEVATED CROSSING

ALL DISTANCES AS MEASURED FROM THE CENTRE OF THE SITE

Rev	Description	Date	Drawn	Checked	Apvd.

Project
New Southgate, Royal Brunswick Park
London

Drawing Description
Accessibility Plan

Project Number	Drawing Number			
ST-3013	02			
Scale	**Date**	**Drawn**	**Checked**	**Approved**
NTS@A2	22.03.21	LGM	PLC	XXX

Client
Architect

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Residents Travel Survey

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Please return by: {*insert date*} to {*insert email*}

SECTION A – ABOUT YOU

A1 What is your gender?

Male	
Female	
Prefer not to say	

A2 What is your age?

Under 25	
25-34	
35-44	
45-54	
55 or over	

A3 How many people live in your household?

A4 How many cars in your household?

A5 What is your employment status?

Employed	
Unemployed	
Student	
Retired	
Prefer not to say	

SECTION B - YOUR TRAVEL

B1 How do you normally travel?

	Usually	Sometimes	Never
Car-as driver			
Car as passenger			
Bus			
Underground/Train			
Cycle			
Walk-whole journey			
Motorcycle			
Combination of above			

B2 Where do you travel to?

B3 How long does it usually take you travel to your destination?

If you usually travel by car or motorcycle please complete SECTION C otherwise please go to SECTION D.

SECTION C - ONLY FOR JOURNEY BY CAR/MOTORCYCLE

C1 Why do you normally drive (or get driven) to your destination?

C2 What would encourage you to walk as a main mode of travel?

C3 What would encourage you to cycle as a main mode of travel?

C4 What would encourage you to travel by public transport?

Car *sharing is a practical way to reduce the cost of getting to work, it also helps to reduce peak hour traffic congestion and pollution.*

C5 What would encourage you to car share as a main mode of travel?

GO TO SECTION E IF YOU HAVE COMPLETED SECTION C, IF YOU DO NOT TRAVEL BY CAR/MOTORCYCLE PLEASE COMPLETE SECTION D

SECTION D

PLEASE ONLY COMPLETE THIS NEXT SECTION (D) IF YOUR JOURNEY IS MADE BY PUBLIC TRANSPORT/WALKING/CYCLING.

D1 Is a car available for your journey?

Yes	
No	

D2 **Why do you normally travel as you have indicated?**

SECTION E – PLEASE COMPLETE THIS SECTION

E1 Prior to undertaking this survey were you aware of the Travel Plan and measures and targets?

Yes	
No	

E2 Please use this space to provide further information you would like to provide about your existing travel routine including anything that may encourage you to walk, cycle, car share or use public transport more often.

Thank you for your time and assistance with this survey.

If you would like further information on the Travel Plan or to receive regular information on travel planning please provide your name and email contact details to the Travel Plan Co-Ordinator at: {*insert email*}

APPENDIX 7.1: AIR QUALITY ASSESSMENT

Comer Homes

Royal Brunswick Park

Air Quality Assessment Report

Report No.: 444267-AQ01 (01)

AUGUST 2021

RSK GENERAL NOTES

Report No.: 444267-AQ01 (01)

Title: Royal Brunswick Park – Air Quality Assessment Report

Client: Comer Homes

Date: 20th August 2021

Status: Draft for client comment

Author	Erin Zhang Senior Air Quality Consultant	**Technical reviewer**	Anna McMahon Senior Air Quality Consultant
Signature		Signature	
Date:	20th August 2021	Date:	16th August 2021

Summary

RSK Environment Ltd (RSK) has been commissioned to undertake an assessment of the potential air quality impacts associated with the Development at Royal Brunswick Park. The proposal comprises a residential-led mixed-use development. The site lies within the jurisdiction of the London Borough of Barnet and the approximate grid reference of the centre of the site is 527983, 193511.

Construction phase impacts of the Development on local air may potentially arise due to the generation and re-suspension of dust and particulate matter during the construction phase. The risk of dust impacts during demolition, earthworks, construction and trackout activities were assessed according to a widely used methodology published by the Institute of Air Quality Management (IAQM). Mitigation measures have been recommended based on the potential dust risks and with the implementation of appropriate mitigation measures, no significant impacts are anticipated during the construction phase.

The main potential operational phase air quality impact is likely to be emissions from road traffic associated with the Development (i.e. changes in flow volume and distribution). A detailed assessment of operational impacts has been undertaken using the ADMS-Roads atmospheric dispersion model. Latest guidance and data were used within the assessment. The assessment methodology and results are presented within this report.

The key air pollutants of concern were nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). Concentrations of these key pollutants were predicted at the most relevant receptor locations using the dispersion model for the base year 2021, and for the proposed opening year of 2031 with and without the Development in place.

The assessment results show that, the AQS objectives for NO_2, PM_{10} and $PM_{2.5}$ are predicted to be met at all receptor locations considered in the assessment. The impacts of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ concentrations, prior to mitigation, are predicted to be '**negligible**' at all receptor locations. Predicted concentrations across the Development site itself show that future occupiers are not predicted to be exposed to air quality concentrations exceeding the UK AQS objectives. Therefore, it is not considered that any specific mitigation measures will be required for operational phase. Nevertheless, it is recommended that transport related mitigation measures (such as provision of electric vehicle charge points and a Travel Plan) should be included to minimise the potential impact of the development on local air quality.

Abbreviations

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System – Roads (a dispersion modelling software application)
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EC	European Commission
EFT	Emission Factors Toolkit – developed by Defra
EPUK	Environmental Protection UK
GLA	Greater London Authority
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LBB	London Borough of Barnet
LDV	Light Duty Vehicle
LLAQM	London Local Air Quality Management
NPPF	National Planning Policy Framework
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
$PM_{2.5}$	Particulate matter of size fraction approximating to <2.5mm diameter
PM_{10}	Particulate matter of size fraction approximating to <10mm diameter
RSK	RSK Environment Limited

Contents

1 INTRODUCTION

RSK Environment Ltd (RSK) has been commissioned to undertake an assessment of the potential air quality impacts associated with the proposed development (hereafter referred to as 'the Development') at Royal Brunswick Park.

It is understood that the site has hybrid planning permission (part detailed, part outline) secured in February 2020 at appeal, for a residential-led mixed-use development providing 1,350 residential units, a secondary school and commercial space.

The new proposal is to apply for a hybrid planning application for the phased comprehensive redevelopment of the North London Business Park to deliver a residential-led mixed-use development. The detailed element comprises up to 461 residential units in five blocks reaching 9 storeys, the provision of a 5 form entry secondary school, a gymnasium, a multi-use sports pitch and associated changing facilities and improvements to open space and transport infrastructure, including improvements to the access from Brunswick Park Road and; the outline element comprises up to 1,967 additional residential units in buildings ranging from three to twelve storeys, up to 7,148 sqm of non-residential floor space (use Class E) and 20,250 sqm of open space, along with associated site preparation/enabling work, transport infrastructure and junction work, landscaping and car parking.

The site lies within the jurisdiction of the London Borough of Barnet (LBB) and the approximate grid reference of the centre of the site is 527983, 193511. Figure 1.1 shows the location of the development site.

This report presents the findings of an assessment of existing baseline air quality, the potential impacts on local air quality during the construction phase of the Development and predicted impacts on existing sensitive receptors as a result of additional traffic emissions generated by the proposed development once operational. Mitigation measures have been recommended, where appropriate.

Figure 1.1: Proposed Development Site Location

© OpenStreetMap contributors

2 LEGISLATION, PLANNING POLICY AND GUIDANCE

2.1 Air Quality Strategy

UK air quality policy is published under the umbrella of the Environment Act 1995, Part IV and specifically Section 80, the National Air Quality Strategy. The *Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in July 2007 sets air quality standards and objectives for ten key air pollutants to be achieved between 2003 and 2020.

The Air Quality Framework Directive (1996) established a framework under which the European Commission (EC) could set limit or target values for specified pollutants. The directive identified several pollutants for which limit or target values have been or will be set in subsequent 'daughter directives'. The framework and daughter directives were consolidated by Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which retains the existing air quality standards and introduces new objectives for fine particulates ($PM_{2.5}$).

The Clean Air Strategy 2019 supersedes the policies outlined in the 2007 strategy. This latest strategy aims to have a more joined-up approach, outlining actions the Government plans to take to reduce emissions from transport, homes, agriculture and industry. However, the air quality objectives remain as previously detailed within the 2007 strategy.

2.1.1 Air Quality Standards

The air quality standards in the United Kingdom are derived from EC directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the Air Quality Framework Directive into English Law. Directive 2008/50/EC was translated into UK law in 2010 via the Air Quality Standards Regulations 2010.

The relevant[1] standards for England and Wales to protect human health are summarised in Table 2.1.

Table 2.1: Air Quality Standards Relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m^3)
Nitrogen dioxide (NO_2)	1 calendar year	N/A	40
	1 hour	18	200
Fine particles (PM_{10})	1 calendar year	N/A	40

[1] Relevance, in this case, is defined by the scope of the assessment.

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m^3)
	24 hours	35	50
Fine particles ($PM_{2.5}$)	1 year	N/A	25[a]
[a] The annual mean $PM_{2.5}$ objective, which was a target to be met by 2020, is not within the Air Quality Regulations and therefore there is no requirement for local authorities to meet it.			

2.1.2 The Environment Act

The set AQS objectives are to be used in the review and assessment of air quality by local authorities under Section 82 of the Environment Act (1995). If exceedances are measured or predicted through the review and assessment process, the local authority must declare an Air Quality Management Area (AQMA) under Section 83 of the act, and produce an Air Quality Action Plan (AQAP) to outline how air quality is to be improved.

2.2 Planning Policy

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality concern that relates to land use and its development can, depending on the details of the proposed development, be a material consideration in the determination of planning applications.

2.2.1 National Planning Policy Framework

In July 2021, the revised National Planning Policy Framework (NPPF) was published, superseding the previous 2012 NPPF (revised in July 2018 and updated in February 2019) with immediate effect. The revised NPPF aims to "place greater emphasis on beauty, place-making, the environment, sustainable development and underlines the importance of local design codes."

Section 15 of the NPPF deals with Conserving and Enhancing the Natural Environment, and states that the intention is that the planning system should prevent '*development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability*' and goes on to state that '*new development* [should be] *appropriate for its location' and 'the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account*.'

With specific regard to air quality, the NPPF states that:

> *'Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel*

management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.'

2.2.2 Regional Planning Policy

In March 2021 the latest version of the London Plan was published. Policy **SI 1 Improving air quality** states:

"A Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

B To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1) Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits

c) create unacceptable risk of high levels of exposure to poor air quality.

2) In order to meet the requirements in Part 1, as a minimum:

a) development proposals must be at least Air Quality Neutral

b) development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures

c) major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1

d) development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure.

C Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:

1) how proposals have considered ways to maximise benefits to local air quality, and

2) what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.

D In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the

Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.

E Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."

2.2.3 Local Planning Policy

Barnet's Local Plan (Core Strategy) 2012 and Barnet's Local Plan (Development Management Policies) 2012

Barnet's Core Strategy includes Policy CS13: Ensuring the efficient use of natural resources, which states:

'We will seek to minimise Barnet's contribution to climate change and ensure that through the efficient use of natural resources the borough develops in a way which respects environmental limits and improves quality of life.

…

We will improve air and noise quality by requiring Air Quality Assessments and Noise Impact Assessments from development in line with Barnet's SPD on Sustainable Design and Construction.

…'

Barnet's Local Plan (Development Management Policies) includes Policy DM04: Environmental considerations for development, which states:

- *'where there is a localised source of air pollution, buildings should be designed and sited to reduce exposure of air pollutants*.
- *Development proposals will ensure that development is not contributing to poor air quality and provide air quality assessments where appropriate'*.

Barnet's Local Plan Supplementary Planning Document (SPD) 2016

Sustainable Design and Construction outlines the following air quality principles:

'A. Location – Ensure that development type suits development site

B. Siting and design – Ensure that where there is a localised and proximate source of air pollution, buildings are designed and sited to reduce exposure to air pollutants'

2.3 Best Practice Guidance Documents

2.3.1 Local Air Quality Management Review and Assessment Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality review and assessment work. This guidance, referred to in this document as LAQM.TG(16), has been used where appropriate in the assessment presented herein.

2.3.2 Guidance on the Assessment of Dust from Demolition and Construction (Institute of Air Quality Management, 2014) ('the IAQM 2014 guidance')

The Institute of Air Quality Management (IAQM) published a guidance document in 2014 (Holman *et al.*, 2014) on the assessment of construction phase impacts, which had minor updates in 2016 (v1.1). The guidance was produced to provide advice to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of disamenity, public exposure to PM_{10} and impacts on sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

2.3.3 The Control of Dust and Emissions During Construction and Demolition (Mayor of London, 2014)

The Control of Dust and Emissions during Construction and Demolition is Supplementary Planning Guidance (Mayor of London, 2014) ('the MOL SPG') and replaces previous guidance published jointly by London Council's and the Mayor in 2006. The MOL SPG aims to provide more detailed guidance on the implementation of relevant air quality policies in London. It sets out a methodology for assessing air quality impacts of the construction phase of development and identifies good practice for mitigating and managing any identified impacts. Both the construction phase assessment methodology and recommended mitigation measures are aligned within the IAQM 2014 guidance, detailed above.

2.3.4 Mayor of London's Sustainable Design and Construction Supplementary Planning Guidance 2014

The Sustainable Design and Construction (SDC) SPG, published in 2014 as part of the London Plan 2011 Implementation Framework, provides guidance on the requirements of air quality and air quality neutral assessments, and mitigation measures which can be used to improve air quality. This guidance was designed to assist in meeting the air quality policies specified in the London Plan.

2.3.5 Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK (EPUK) and the IAQM jointly published a revised version of the guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' in 2017 (herein the 'EPUK-IAQM' guidance) to facilitate the consideration of air quality in the land-use planning and developmental control process. It provides a framework for air quality considerations within local development control processes, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes a method for screening the requirement for an air quality assessment, undertaking the air quality assessment, the determination of the air quality impact associated with a development proposal and whether this impact is significant.

2.3.6 Air Quality Neutral Planning Support ('the GLA AQN guidance')

The GLA AQN guidance, published in 2014, provides a description of the 'air quality neutral' concept, including methods to calculate building and transport-related emissions associated with the development to building and transport emissions benchmarks. The guidance has been designed to enable assessment of air quality neutrality as is required in the SDC SPG.

2.3.7 London Local Air Quality Management Technical Guidance

The GLA has published technical guidance for use by London's 32 boroughs (and the City of London) in their air quality review and assessment work. This guidance, referred to in this document as LLAQM, has been used where appropriate. Where appropriate, additional guidance has been taken from the Defra LAQM.TG.16 guidance document.

3 ASSESSMENT SCOPE AND METHODOLOGY

3.1 Overall Approach

The approach taken for assessing the potential air quality impacts of the Development are summarised as follows:

- Baseline characterisation of local air quality;
- Qualitative assessment of the construction phase of the Development using the 2014 IAQM guidance and the MOL SPG 2014;
- Quantitative assessment of operational phase effects with reference to the 2017 EPUK-IAQM guidance;
- Undertaking air quality neutral assessment;
- Recommendation of mitigation/compensation measures, where appropriate, to ensure any adverse effects on air quality are minimised and development is air quality neutral; and
- Identification of residual impacts resulting from the Development.

3.2 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources. Consideration has been given to potential sources of air pollution and any AQMAs in the vicinity of the site.

A desk-based study has been undertaken including a review of potential sources of air pollution in the vicinity of the site, monitoring data available from LBB and estimated background data from the LAQM Support website maintained by Defra. Background concentrations have been mapped by Defra at a grid resolution of 1x1km for the whole of the UK.

3.3 Construction Phase Impact Assessment

3.3.1 Construction Dust and Particulate Matter

Construction works for the Development have the potential to lead to the release of fugitive dust and particulate matter. An assessment of the likely significant effects of construction phase dust and particulate matter at sensitive receptors has therefore been undertaken following the MOL SPG and IAQM's construction dust guidance.

Three separate dust impacts were considered:

- Annoyance to dust soiling;
- The risk of health effects due to an increase in exposure to PM_{10}; and
- Harm to ecological receptors.

In order to assess the potential impacts construction activities are divided into four types:

- Demolition;
- Earthworks;
- Construction; and
- Trackout[2].

Appendix A details how the 'dust emission magnitude' associated with each of these activities, is combined with the sensitivity of receptors (human or ecological), to determine the overall 'dust risk'. Once the level of risk has been determined, then mitigation proportionate to the level of risk can be identified. The 'dust risk' has been assessed and presented in **Section 5.1**.

3.3.2 Emissions to Air from Construction Traffic and Plant

Exhaust emissions from construction phase vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the site and in the vicinity of the site itself. Detailed information on the number of vehicles and plant associated with the construction phase is not available at this stage, therefore a qualitative impact assessment has been undertaken based on professional judgement and considering the following factors:

- The likely duration of the construction phase;
- The potential number and type of construction traffic and plant that could be required, where information is available; and
- The number and proximity of sensitive receptors to the site and along the likely construction vehicle routes.

3.4 Operational Phase Impact Assessment

3.4.1 Traffic Emissions

Once operational, the Development will generate additional traffic on the surrounding road network; the emissions to air associated with this traffic have the potential to impact on nearby sensitive receptors.

The EPUK-IAQM 2017 guidance provides an approach for determining the significance of air quality impacts associated with a development in relation to emissions from traffic. To assess the impacts of a development on the surrounding area, the guidance recommends that the degree of an impact is described by expressing the magnitude of

[2] Trackout is defined as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network.

incremental change as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion. The approach is further described in **Appendix B** including the descriptors for the impact significance.

3.4.2 Modelling Software

ADMS-Roads is an advanced dispersion model developed by the UK consultancy CERC (Cambridge Environmental Research Consultants). ADMS-Roads is widely used and validated within the UK and Europe. The model allows for the skewed nature of turbulence within the atmospheric boundary layer. ADMS-Roads is capable of processing hourly sequential meteorological data, whilst taking the turbulence caused by vehicles into account in calculating the dispersion profiles of emitted pollutants. ADMS-Roads enables the user to predict concentrations of pollutants of concern at multiple receptor locations.

ADMS-Roads (Version 5.0.0.1) has been used for assessing potential road traffic emission air quality impacts resulting from the operational phase of the Development, and the potential exposure of future occupiers at the Development site to poor air quality.

3.4.3 Modelling Scenarios

The following scenarios have been considered in this assessment:

- S1: 2019 '**Verification Baseline**' scenario[3] –for model verification purpose.
- S1a: 2021 '**Current Baseline**' scenario – for the current year
- S2: 2031 '**Without Development**' scenario – for the future year of opening of the completed development, without Development but with committed developments; and,
- S3: 2031 '**With Development**' scenario – for the future year of opening of the completed development, with Development and with committed developments.

2019 is used as the 'verification baseline' year in this assessment, for the purpose of model verification (i.e. S1) as the most recent year in which a full year of bias-adjusted and ratified local monitoring data is available. 2021 is considered as the 'current baseline' (i.e. S1a), representing current air quality baseline condition. 2031 has been considered as the Development opening year based on the year that Transport Assessment considered, however, it is understood that the Development is unlikely to be fully occupied by 2031. The air quality assessment assumes that the Development will be fully occupied by 2031 and will consider the overall impact of the total development traffic emissions on local air quality. As background concentrations and vehicle emissions are predicted to fall with time, this approach is considered to be conservative.

3.4.4 Traffic Data

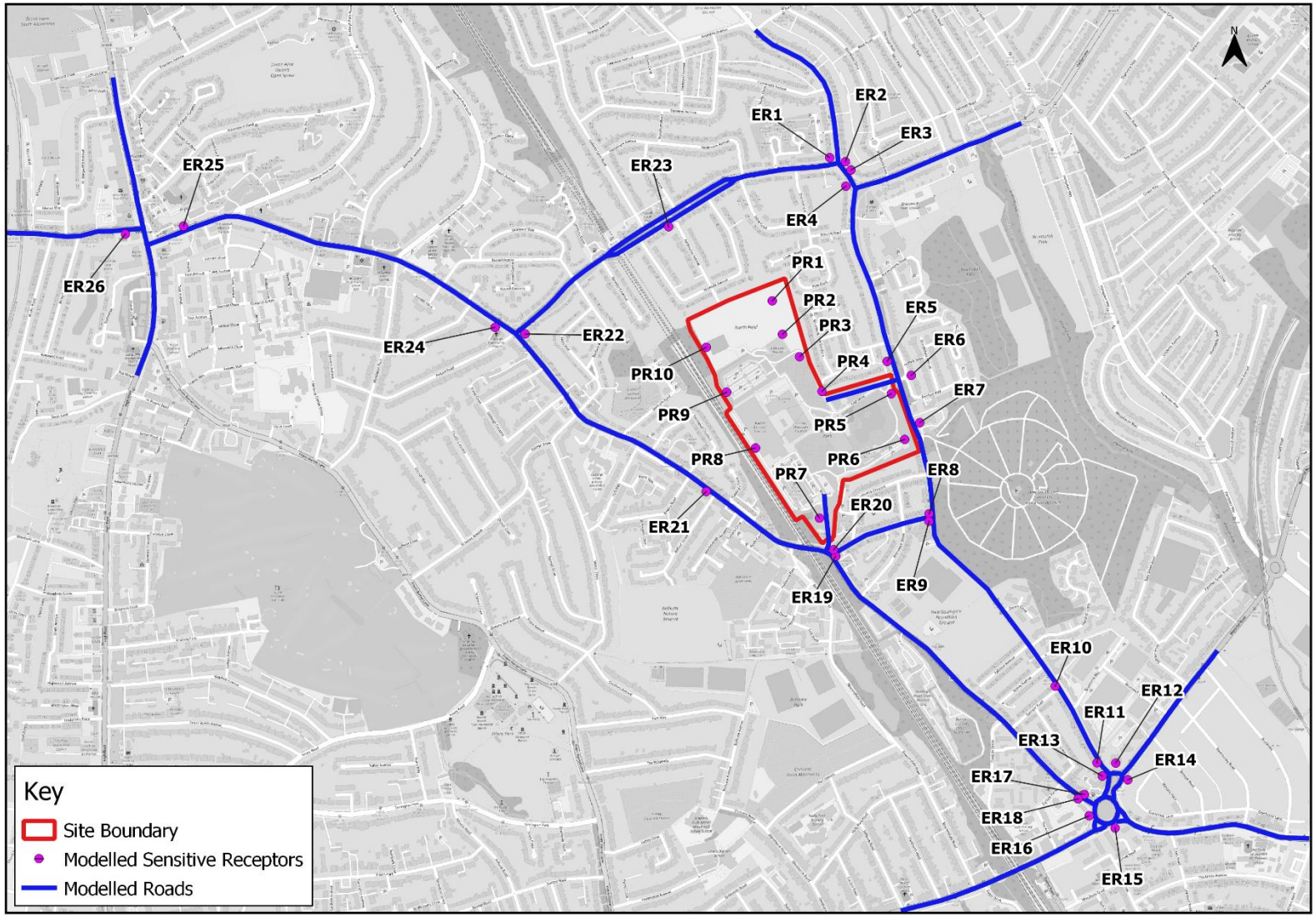
Traffic data used in the air quality assessment was provided by the appointed project transport consultant, Stomor Civil Engineering Consultants. Stomor advised that '*the information for the forecast year assessments is inclusive of local committed*

[3] Due to the Covid-19 pandemic in 2020, it was not considered appropriate to use 2020 as a baseline year.

development. The TfL data provided did not disaggregate the committed development, and as such this assessment considers `with committed development` scenarios only. This does however provide a robust assessment.'.

Therefore, both opening year scenarios (i.e. S2 and S3) have included traffic data associated local committed developments. Traffic data used in this assessment are presented in Table C1 in Appendix C. Guidance in Defra LAQM.TG(16) and professional judgement was used to estimate speeds for use within the assessment, including reduced speeds at junctions. Roads included in the model setup are presented in Figure 3.1.

Figure 3.1: The Roads and Receptors Included in the Dispersion Modelling Assessment



3.4.5 Traffic Emission Factors

Version 10.1 of the Emissions Factor Toolkit (EFT), published by Defra, was used to derive vehicle emissions factors (i.e. the amount of pollution emitted from the average vehicle fleet, in g/km/s) for NO_x, PM_{10} and $PM_{2.5}$. Within the EFT, emission factors are available for all years between 2018 and 2030 and take into account the most recent evidence relating to factors such as advances in vehicle and exhaust technology and changes in composition of the vehicle fleet. In the absence of 2031 vehicle emission factors, 2030 emission factors have been used for the '2031 without Development' and '2031 with Development' scenarios.

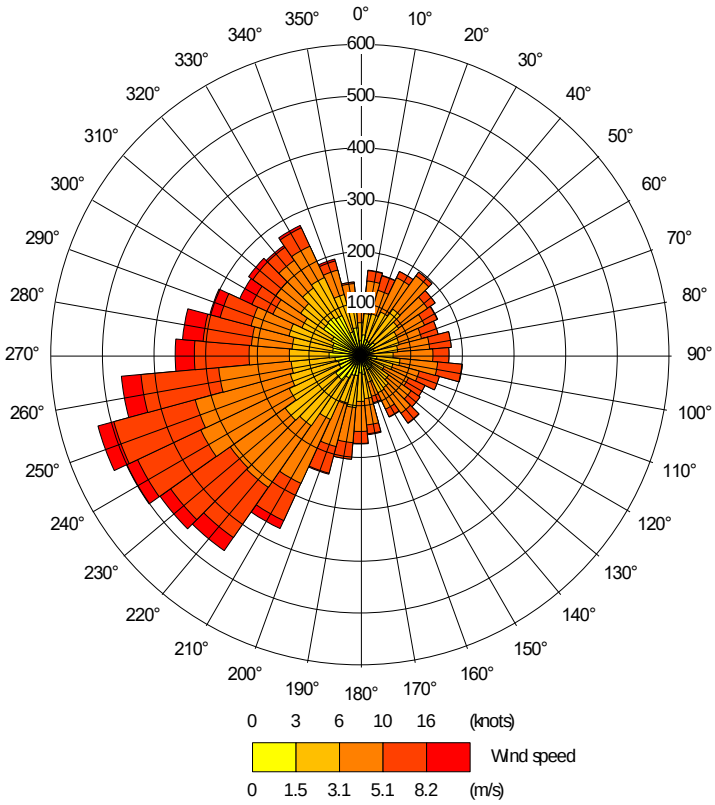
3.4.6 Time-Varying Profile

Vehicle movements vary with time. Diurnal profiles for the roads were not available and instead the UK National Profile 2019 published by the Department for Transport (DfT) was applied to all of the assessed roads. The diurnal profile is presented in **Appendix C**. A value of 1 on the y-axis is equivalent to the hourly average flow over 24 hours.

3.4.7 Meteorological Data

2019 hourly sequential meteorological data from the Northolt meteorological station was employed in the dispersion model. This meteorological station is located approximately 20.1km southwest of the site and is considered to be representative of the proposed development site with reliable data. The year used matches the baseline year of 2019 to allow consistency for model verification. The windrose derived from the 2019 dataset is presented in Figure 3.2.

Figure 3.2 Windrose from the Northolt Meteorological Station in 2019



3.4.8 Sensitive Receptor Locations

Pollutant concentrations were predicted at a number of receptor locations at both existing locations and future properties within the site. Details of all specific receptors included in the modelling study are summarised in Table 3.1 and shown in Figures 3.1.

The existing receptors were selected to represent the sensitive receptors (e.g. residential dwellings) at locations near to the site, and junctions and main roads in the vicinity, to ensure that 'worst-case' impacts were captured.

Table 3.1: Receptors Included in the Dispersion Modelling Assessment

Receptor ID	Receptor Location	Grid Reference		
		X	Y	Z
Existing Sensitive Receptors				
ER1	262, Church Hill Road, Brunswick Park	528104	194125	1.5
ER2	246, Brunswick Park Road, Brunswick Park	528142	194114	1.5
ER3	236, Brunswick Park Road, Brunswick Park	528156	194094	1.5
ER4	259, Brunswick Park Road, Brunswick Park	528144	194054	1.5
ER5	8 - 9, Howard Close, Brunswick Park	528245	193624	1.5
ER6	Goldrill Drive, Brunswick Park	528304	193590	1.5
ER7	151, Brunswick Park Road, North London Business Park	528325	193474	1.5
ER8	1, Brunswick Avenue, Brunswick Park	528348	193250	1.5
ER9	2a, Brunswick Avenue, Brunswick Park	528348	193232	1.5
ER10	21, Spencer Road, Brunswick Park	528658	192828	1.5
ER11	25, Brunswick Park Road	528760	192640	1.5
ER12	A1003, New Southgate	528806	192639	1.5
ER13	Boundary Court 1 - 8, Brunswick Park Road	528773	192607	1.5
ER14	A1003, New Southgate	528836	192598	1.5
ER15	Massey Close, New Southgate	528805	192480	1.5
ER16	Oakleigh Road South, New Southgate	528741	192510	1.5
ER17	8, Oakleigh Road South, New Southgate	528729	192562	1.5
ER18	Oakleigh Road South, New Southgate	528714	192551	1.5
ER19	Lisa Court 1 - 6, Brunswick Avenue, Brunswick Park	528119	193146	1.5
ER20	85, Brunswick Avenue, Brunswick Park	528114	193162	1.5
ER21	393, Oakleigh Road North, Brunswick Park	527801	193305	1.5
ER22	201, Oakleigh Road North, Brunswick Park	527357	193692	1.5
ER23	62, Russell Lane, Brunswick Park	527709	193955	1.5
ER24	164, Oakleigh Road North, Whetstone	527283	193708	1.5
ER25	25, Oakleigh Road North, Whetstone	526518	193956	1.5
ER26*	U-Pol, 1-3, Totteridge Lane, Whetstone	526375	193937	4

Receptor ID	Receptor Location	Grid Reference		
		X	Y	Z
Proposed Sensitive Receptors				
PR1	Sensitive Receptor at the Proposed Development	527963	193773	1.5
PR2	Sensitive Receptor at the Proposed Development	527988	193691	1.5
PR3	Sensitive Receptor at the Proposed Development	528030	193636	1.5
PR4	Sensitive Receptor at the Proposed Development	528085	193551	1.5
PR5	Sensitive Receptor at the Proposed Development	528255	193545	1.5
PR6	Sensitive Receptor at the Proposed Development	528288	193433	1.5
PR7	Sensitive Receptor at the Proposed Development	528079	193240	1.5
PR8	Sensitive Receptor at the Proposed Development	527922	193412	1.5
PR9	Sensitive Receptor at the Proposed Development	527851	193549	1.5
PR10	Sensitive Receptor at the Proposed Development	527801	193659	1.5
*First Floor Residential Receptor				

3.4.9 Background Air Quality Data Used in the Modelling

There are no background monitoring locations within the immediate vicinity of the site. Following a review of the previous air quality ES Chapter undertaken for the site (Kairus Ltd, 2018), it is noted that LBB advised applying monitoring data from the automatic background monitoring location at Chalgrove Primary School (LBB ref: ABN2) as a background concentration for the site. ABN2 is located approximately 5.2km southwest of the site and is considered to be in a more similar setting to the site. Therefore, monitored annual mean background NO_2 and PM_{10} concentrations from ABN2 are applied for all receptors. Due to the lack of representative background $PM_{2.5}$ monitoring data, Defra UK-AIR estimated annual mean background $PM_{2.5}$ concentrations, for the grid square in which the receptor falls was applied. Table 3.2 details background concentrations used for sensitive receptors within the assessment.

Background concentrations are expected to improve (i.e. reduce) over time, in line with predicted reduction in vehicle emissions as well as reduction in emissions from other sources. However, for a conservative approach, monitored 2019 background NO_2 and PM_{10} concentrations from ABN2 and estimated 2019 $PM_{2.5}$ concentrations from Defra UK-AIR background maps have been used for both the 2019 baseline scenario and 2031 opening year scenarios.

Table 3.2: Background NO_2, PM_{10} and $PM_{2.5}$ Concentrations used in the Dispersion Modelling Assessment

Receptor ID	Annual Average NO_2 ($\mu g/m^3$) *	Annual Average PM_{10} ($\mu g/m^3$) *	Annual Average $PM_{2.5}$ ($\mu g/m^3$) **
ER1	25	17	11.03
ER2	25	17	11.03
ER3	25	17	11.03

Receptor ID	Annual Average NO_2 ($\mu g/m^3$) *	Annual Average PM_{10} ($\mu g/m^3$) *	Annual Average $PM_{2.5}$ ($\mu g/m^3$) **
ER4	25	17	11.03
ER5	25	17	11.14
ER6	25	17	11.14
ER7	25	17	11.14
ER8	25	17	11.14
ER9	25	17	11.14
ER10	25	17	11.70
ER11	25	17	11.70
ER12	25	17	11.70
ER13	25	17	11.70
ER14	25	17	11.70
ER15	25	17	11.70
ER16	25	17	11.70
ER17	25	17	11.70
ER18	25	17	11.70
ER19	25	17	11.14
ER20	25	17	11.14
ER21	25	17	11.17
ER22	25	17	11.17
ER23	25	17	11.17
ER24	25	17	11.17
ER25	25	17	10.99
ER26	25	17	10.99
PR1	25	17	11.17
PR2	25	17	11.17
PR3	25	17	11.14
PR4	25	17	11.14
PR5	25	17	11.14
PR6	25	17	11.14
PR7	25	17	11.14
PR8	25	17	11.17
PR9	25	17	11.17
PR10	25	17	11.17

*2019 Monitored concentrations from ABN2

**Estimated concentrations from Defra background maps

3.4.10 Other Model Input Parameters

In order to represent the nature of the proposed development site and surrounding area, a surface roughness length of 1m was included in the model. The Monin-Obukhov length (related to atmospheric stability) was assumed to be 30m (cities and large towns). Settings were adjusted at the meteorological data site which is located in RAF Northolt; a surface roughness length of 0.5m and a Monin-Obukhov length of 30m were used.

3.4.11 Model Verification and Results Processing

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the development considered in this assessment. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results, and was carried out following the methodology specified in LAQM.TG(16).

There are no monitoring locations in the immediate vicinity of the site. Following a review of local air quality monitoring data, it is noted that there are four monitoring locations (LBB ref: ABN1, PBN1, PBN2 and PBN12) located within 4km of the site. PBN12 is located next to a bus stop, exhaust emissions from buses stopping/starting near the bus stop will have impact on the NO_2 monitoring at this location, which is not considered to be representative of the site nor was there sufficient bus data available to allow this site to be included within the model. PBN1 is located on Pointalls Close and approximately 25m to the A406 North Circular Road; considering the distance between PBN1 and the A406 this location is unlikely to be suitable for the model verification process. Based on above, PBN12 and PBN1 will be excluded from the model verification procedure. Therefore, model verification has been undertaken using 2019 NO_2 and PM_{10} monitoring data from the automatic monitoring site ABN1 and 2019 NO_2 monitoring data from diffusion tube monitoring site PBN2.

An adjustment factor of 2.12 was obtained for NO_x, which was applied to the modelled road-NO_x component predicted. The verified annual average modelled road contribution NO_x concentrations have then been converted into annual average road NO_2 by using the Defra NO_x to NO_2 spreadsheet (v8.1). An adjustment factor of 2.78 was obtained for PM_{10}, which was applied to the modelled road-PM_{10} component predicted. Full details of the verification calculations are presented within **Appendix D**.

Local monitoring data are not available for concentrations of $PM_{2.5}$ and consequently, the predicted road-$PM_{2.5}$ contributions have been adjusted using the factor calculated for road-PM_{10}, before adding the appropriate background concentrations. This approach is consistent with guidance given in LAQM.TG(16).

The number of days with PM_{10} concentrations greater than 50µg/m^3 was then estimated using the relationship with the annual mean concentration described in LAQM.TG(16).

LAQM.TG(16) advises that an exceedance of the 1 hour mean NO_2 objective is unlikely to occur where the annual mean concentration is below 60µg/m^3, where road transport is the main source of pollution. This concentration has been used to screen whether the hourly mean objective is likely to be achieved.

Once processed, the predicted concentrations were compared against the current statutory limit values and objectives for NO_2, PM_{10} and $PM_{2.5}$ set out in Table 2.1.

3.5 Uncertainties and Assumptions

The following uncertainties and assumptions have been made in the air quality assessment:

- Given the lack of local background monitoring data, background $PM_{2.5}$ concentrations have been taken from the Defra LAQM background maps.
- Vehicle emission factors for NO_x, PM_{10} and $PM_{2.5}$ were obtained from the Defra EFT v10.1.
- There will be uncertainties introduced because the modelling has simplified real-world processes into a series of algorithms. For example, it has been assumed that wind conditions measured at Northolt meteorological station in 2019 were representative of wind conditions at the site, as this meteorological station is the nearest station where the required meteorological data for predicting air quality impacts of the proposed development are measured on routine basis. Furthermore, it has been assumed that the subsequent dispersion of emitted pollutants will conform to a Gaussian distribution over flat terrain in order to simplify the real-world dilution and dispersion conditions.
- An important step in the assessment is verifying the dispersion model against measured data. The model verification was based on the comparison of model results based on 2019 traffic data with 2019 monitored NO_2 and PM_{10} concentrations. As no $PM_{2.5}$ monitoring data were available near the site area, the adjustment factors used for the predicted roadside PM_{10} concentrations have been applied to the predicted $PM_{2.5}$ concentrations, as per guidance provided in the LAQM.TG(16).
- The national diurnal profile published by the Department for Transport for 2019, has been assumed to be applicable for the roads assessed.
- There is an element of uncertainty in all measured and modelled data. All values presented in this report are best possible estimates.
- At the time of writing, detailed design of the boiler emission stack is not available. Boiler emissions have not been considered in this assessment, due to lack of information. However, given the low NO_x emission rate of the proposed boilers, it is considered unlikely that the boiler emissions will cause a significant impact.

4 BASELINE AIR QUALITY CHARACTERISATION

4.1 Emissions Sources and Key Air Pollutants

The site is located to the east of an existing railway between New Southgate and Oakleigh Park railway stations, as part of the East Coast Main Line (ECML), which is an electrified railway between London and Edinburgh. Diesel or coal fired moving or idling locomotives can contribute to elevated short-term nitrogen dioxide (NO_2) and sulphur dioxide (SO^2) concentrations close to the railway track. LAQM.TG(16) identifies those railway lines which are heavily trafficked by diesel passenger trains and where emissions from the locomotives may therefore result in significant air quality impacts at nearby receptors and therefore need further consideration. The ECML is an electrified railway and the section of railway track adjacent to the Development has not been identified within the guidance as experiencing a high number of diesel locomotives. Therefore, it is considered unlikely that emissions from the adjacent railway line will result in a significant impact on NO_2 or SO_2 concentrations in the local area. Therefore, emissions from the railway line will not be considered further in the air quality assessment.

It is noted that New Southgate Crematorium & Cemetery is located to the east of the Development. The cremation process will produce pollutants such as particulate matter (PM), hydrogen chloride, nitrogen oxides, carbon monoxide, volatile organic compounds, mercury compounds and polychlorinated dibenzo-p-dioxins and furans (PCDD/F). Fitting mercury arrestment is required for all UK cremations, and it is assumed that appropriate abatement plant has been installed in accordance with relevant guidance. Therefore, potential emissions from the New Southgate Crematorium & Cemetery are considered to be minimal.

Road traffic is expected to be the main source of air pollutants in the immediate vicinity of the site. The principal pollutants relevant to this assessment are therefore considered to be NO_2 and fine particulate matter (PM_{10} and $PM_{2.5}$) which are generally regarded as the most significant air pollutants released by vehicular combustion processes (as they tend to be more likely to be close to exceeding statutory limits in an urban environment), or subsequently generated by vehicle emissions in the atmosphere through chemical reactions.

4.2 Local Authority Review and Assessment of Air Quality

The Development site lies within the jurisdiction of LBB. LBB currently has one Air Quality Management Area (AQMA) declared, covering the whole borough. Therefore, the proposed development is located within an AQMA. This AQMA was declared for annual mean NO_2 and 24 hour mean PM_{10} in 2001. In 2010, the AQMA order was amended to include the one hour mean NO_2, due to exceedances in a bus station and some high streets.

4.3 Local Authority Air Quality Monitoring Data

A review of the LBB 2019 Air Quality Annual Status Report showed that there were no monitoring locations within the immediate vicinity of the site; the nearest monitoring location is diffusion tube PBN12, approximately 1.7km from the site. This tube is located adjacent to a busy high street road (the A1000, High Road), whilst the site is located further away from comparable major roads. Therefore, this monitoring location is not considered to be representative of the site.

Following a review of the Air Quality ES Chapter from the 2015 ES for the HPP (Kairus Ltd, 2018), it is noted that LBB advised applying monitoring data from the automatic background monitoring location at Chalgrove Primary School (i.e. ABN2) as a background concentration for the site. ABN2 is located approximately 5.2km southwest of the site and is considered to be in a more similar setting to the site. Table 4.1 presents available monitoring results (NO_2 and PM_{10}) at ABN2; there were no exceedances of the relevant objectives between 2015 and 2019.

Table 4.1: Monitoring Results at ABN2 (Chalgrove School)

Pollutants	Site Description	Approximate Distance from Site (in km)	Monitoring Results				
			2015	2016	2017	2018	2019
Annual Mean NO_2 Concentration ($\mu g/m^3$)	Urban Background	5.2	23	28	29	27	25
Number of Hours NO_2 >200$\mu g/m^3$			0	0	1	0	0
Annual Mean PM_{10} Concentration ($\mu g/m^3$)			22	23	21	21	20
Number of Days PM_{10} >50$\mu g/m^3$			6	4	6	1	4

4.4 LAQM-Support Estimated Background Data

In addition to local monitoring data, estimated background air quality data are available from the United Kingdom Air Information Resource (UK-AIR) website operated by Defra. The UK-AIR website provides estimated annual average background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ on a 1km^2 grid basis. Table 4.2 shows Defra estimated annual average background NO_2, PM_{10} and $PM_{2.5}$ concentrations at the proposed development site for 2019, current year 2021 and a future year of 2030. Background concentrations are well below the annual average air quality objectives for human health for NO_2, PM_{10} or $PM_{2.5}$. As background concentrations are predicted to fall with time, background

concentrations in future years would not be expected to exceed their respective annual mean standards.

Table 4.2: Defra LAQM Estimated Annual Average NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Development Site

Assessment Year	Estimated Annual Average Pollutant Concentrations (µg/m^3) Derived from the LAQM Support Website		
	NO_2	PM_{10}	$PM_{2.5}$
2019	20.96*	16.62	11.17
2021	17.62	16.03	10.77
2030	14.04	15.26	10.22
Air Quality Objective	**40**	**40**	**25**

Notes: Presented concentrations for 1km^2 grid centred on 527500, 193500; approximate centre of development site is 527983, 193511;

*Air Quality Consultants[4] reviewed Defra's 2018-based background mapped NO_x and NO_2 concentrations for 2019 against 2019 annual mean measured background concentrations at automatic monitoring sites. They identified that the 2019 Defra mapped data are under-predicting (except in inner-London), therefore, an adjustment factor of 1.0855 has been applied to background NO_2 concentrations for a conservative approach.

4.5 Modelled 2021 Current Baseline at Existing Receptor Locations

Detailed dispersion modelling has been undertaken with the use of the ADMS-Roads dispersion model software, following guidance in accordance with LAQM.TG(16). The modelled concentrations have been verified and results processed as detailed in Section 3. Based on the traffic data available (provided by the project transport consultant), 2021 Current Baseline (i.e. S1a) has been assessed and the modelling results are presented in Table 4.3. The results of the assessment indicate that in the current baseline of 2021, annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations for all assessed receptor locations are below the relevant objectives.

Table 4.3: Modelled 2021 NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Existing Receptor Locations

Receptor ID	Annual Mean NO_2 (µg/m^3)	Annual Mean PM_{10} (µg/m^3)	Annual Mean $PM_{2.5}$ (µg/m^3)
ER1	31.14	18.74	12.06

[4] Calibrating Defra's 2018- based Background NOx and NO2 Maps against 2019 Measurements, Air Quality Consultants (2020) <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=dc9e282e-b47e-4674-8fb9-9a68a1729ad4>[accessed 18 June 2021]

Receptor ID	Annual Mean NO_2 ($\mu g/m^3$)	Annual Mean PM_{10} ($\mu g/m^3$)	Annual Mean $PM_{2.5}$ ($\mu g/m^3$)
ER2	33.08	19.25	12.37
ER3	33.34	19.31	12.41
ER4	29.62	18.28	11.79
ER5	27.30	17.64	11.52
ER6	26.91	17.52	11.45
ER7	28.09	17.83	11.63
ER8	28.16	17.99	11.72
ER9	27.95	17.92	11.68
ER10	28.68	18.21	12.41
ER11	29.92	18.39	12.53
ER12	29.34	18.23	12.44
ER13	29.84	18.38	12.52
ER14	31.38	18.82	12.79
ER15	32.25	19.05	12.92
ER16	31.27	18.77	12.75
ER17	33.95	19.53	13.21
ER18	31.65	18.89	12.82
ER19	32.41	19.50	12.60
ER20	29.70	18.54	12.04
ER21	29.62	18.57	12.08
ER22	33.35	19.31	12.54
ER23	29.85	18.63	12.12
ER24	28.76	18.04	11.79
ER25	35.03	19.80	12.66
ER26	30.99	18.68	11.98
Objective	**40**	**40**	**25**

5 ASSESSMENT OF IMPACTS

5.1 Construction Phase

Atmospheric emissions from construction activities will depend on a combination of the potential for emissions (the type of activity and prevailing conditions) and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to reduce the potential for adverse air quality effects:

- Fugitive dust emissions from site activities; and
- Exhaust emissions from site plant, equipment and vehicles

5.1.1 Construction Dust and Particulate Matter

Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

Construction activities that are often the most significant potential sources of fugitive dust emissions are:

- Demolition activities;
- Earth moving, due to the handling, storage and disposal of soil and subsoil materials;
- Construction aggregate usage, due to the transport, unloading, storage and use of dry and dusty materials (such as cement and sand);
- Movement of heavy site vehicles on dry or untreated haul routes; and,
- Movement of vehicles over surfaces where muddy materials have been transferred off-site (for example, on to public highways).

Fugitive dust arising from construction activities is mainly of a particle size greater than the PM_{10} fraction (that which can potentially impact upon human health), however it is noted that construction activities may contribute to local PM_{10} concentrations. Appropriate dust control measures can be highly effective for controlling emissions from potentially dust generating activities identified above, and adverse effects can be greatly reduced or eliminated.

5.1.2 Potential Dust Emission Magnitude

With reference to the IAQM criteria outlined in **Appendix A**, the dust emission magnitudes for demolition, earthworks, construction and trackout activities are summarised in Table 5.1. Where information is not yet known, a conservative approach has been adopted and professional judgement has been used based on the scale of the Development and experience of working on similar schemes. Furthermore, where the criteria for each activity are from a range of magnitudes, the more conservative magnitude has been selected.

Table 5.1: Summary of Dust Emission Magnitudes (Before Mitigation)

Activity	IAQM Criteria	Dust Emission Magnitude
Demolition	- The total volume of buildings to be demolished is estimated to be > 50,000m^3. - On-site crushing and screening are proposed. - The height of demolition activities above ground will be 10-20m. - There will be minimal potential dusty demolition materials on site, mainly steel frame and cladding to be demolished. - Demolition is anticipated to be undertaken during wetter months	**Large**
Earthworks	- The total area where earthworks expected to take place is >10,000m^2. - The soil type is London Clay. Therefore, the soil at the site is expected to be potentially dusty. - The number of heavy earthmoving vehicles active at any one time will likely be 5-10. - Height of stockpiled materials will be <4m - Given the size of the site, the total material to be moved is estimated to be >100,000 tonnes. - Earthworks is anticipated to be undertaken during wetter months	**Large**
Construction	- Total volume to be built will be >100,000m^3. - No on-site concrete batching is proposed. - No on-site concrete sandblasting is proposed - There will be some potentially dusty construction material on site.	**Large**
Trackout	- There will be 10-50 HDV outward movements in any one day. - Onsite, the surface could potentially be dusty, however it is understood that the existing site access road will be retained for a temporary accessway plus widening to provide construction routes.	**Medium**

5.1.3 Sensitivity of the Area

As per the IAQM guidance, the sensitivity of the area takes into account a number of factors, including:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and,
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Consideration is given to human and ecological receptors and the trackout route proposed. Table 5.2 presents the determined sensitivity of the area. Demolition, earthworks and construction activities are relevant up to 350m from the areas of the site where work will be carried, whereas trackout is only considered relevant up to 50m from the edge of the roads likely to be affected (up to 200m from the site access based on medium dust risk magnitude), as per the IAQM guidance.

No designated ecological receptors have been identified within 50m of the site boundary or the anticipated trackout route. Therefore, following the IAQM guidance ecological, receptors have been screened out of the assessment and are not considered further.

Table 5.2: Sensitivity of the Area

Potential Impact		Sensitivity of the Surrounding Area		
		Demolition	**Earthworks and Construction**	**Trackout**
Dust soiling	Receptor sensitivity	High	High	High
	Number of receptors and distance from the source	10-100 within 50m of the demolition activities	>100 within 20m of the site boundary	10-100 within 20m of the trackout boundary
	Overall Sensitivity of the Area	**Medium**	**High**	**High**
Human health	Receptor sensitivity	High	High	High
	Annual mean PM_{10} concentration	<24μg/m^3	<24μg/m^3	<24μg/m^3
	Number of receptors and distance from the source	10-100 within 50m of the demolition activities	>100 within 20m of the site boundary	10-100 within 20m of the trackout boundary
	Overall Sensitivity of the Area	**Low**	**Medium**	**Low**
Ecological		N / A		

5.1.4 Risk of Impacts

The dust emission magnitudes from Table 5.1 have been combined with the sensitivity of the area from Table 5.2 to determine the risk of impacts of construction activities before mitigation, as summarised in Table 5.3. Based on these dusk risk categories, site specific mitigation measures have been defined as detailed in Section 6 and **Appendix E**.

Table 5.3: Summary of the Dust Risk from Construction Activities

Potential Impact	Dust Risk Impact			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	High	High	High	Medium
Human health	Medium	Medium	Medium	Low

5.1.5 Exhaust Emissions from Construction Plant and Vehicles

The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing pollutants including NO_x, PM_{10}, $PM_{2.5}$, volatile organic compounds, and carbon monoxide. The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition.

Construction traffic will comprise haulage/construction vehicles and vehicles used for workers' trips to and from the site. The greatest impact on air quality due to emission from construction phase vehicles will be in areas adjacent to the site access and nearby road network. It is anticipated that construction traffic will access the site via Brunswick Park Road, which has a number of residential properties located adjacent to it. At this stage, detailed information regarding construction phase traffic flow is not available. It is understood that the construction works will be phased into 5 construction areas which will help to minimise the volume of construction traffic delivering and collecting. Furthermore, a Construction Traffic Management Plan will be prepared for the Development to ensure that construction traffic should have no detrimental effect on the highways or the local community. Therefore, it is considered unlikely construction plant and vehicles will cause a significant impact on local air quality.

The operation of site equipment and machinery will result in emissions to atmosphere of exhaust gases. The Development is located within LBB, it is anticipated that Non-Road Mobile Machinery (NRMM) used on site will meet Stage IIIB of EU Directive 97/68/EC, in accordance with the London Local Air Quality Management Technical Guidance 2016 (LLAQM.TG(16)). It is considered that, with suitable controls and site management, as per the LAQM Technical Guidance 2016 and LLAQM.TG(16), such emissions are unlikely to be significant.

5.2 Operational Phase

5.2.1 Traffic Emission Dispersion Modelling Results

Detailed dispersion modelling has been undertaken with the use of the ADMS-Roads dispersion model software, following guidance in accordance with LAQM.TG(16). The modelled concentrations have been verified and results processed as detailed in Section 3.

Based on the traffic data available (provided by the project transport consultant), 2031 has been assessed as the opening year of the proposed development and two scenarios have been assessed for 2031, which are S2 '2031 without Development, with committed developments', S3 '2021 with Development, with committed developments'. The modelling results are presented and summarised as below:

Nitrogen Dioxide – NO_2

The AQS objective for annual mean NO_2 concentrations is 40µg/m^3. The results of the assessment indicate that in the anticipated opening year of 2031, annual mean NO_2 concentrations for all receptor locations will be below the objective.

Table 5.4 shows the comparison of annual mean NO_2 concentrations between the S2 '2031 without Development' and S3 '2031 with Development' scenarios at existing sensitive receptor locations. The results as percentages of the Air Quality Assessment Level (AQAL) (i.e. the UK AQS objectives) are also presented which are used in the determination of significance of impacts (based on the EPUK-IAQM guidance – see **Appendix B**).

The results indicate that in the opening year of 2031, no exceedances of annual mean NO_2 concentrations are predicted at any of the proposed receptors within the development site. The changes in annual mean NO_2 concentrations at existing receptor locations, as a result of the Development and traffic redistribution, are predicted to be '**negligible**' at all receptor locations. The effect of the Development on annual mean NO_2 concentrations, prior to mitigation, is therefore considered to be not significant.

LAQM.TG(16) notes that 'exceedances of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60µg/m^3 or above'. In the opening year of 2031, annual mean NO_2 concentrations (see Table 5.4) are not predicted to exceed 60µg/m^3 at any receptors. EPUK-IAQM guidance recommends it is not normally necessary to consider impacts on short-term concentrations unless there is a risk of the AQAL being exceeded due to the proposed development. As the annual mean NO_2 concentrations are well below 60µg/m^3, the significance of short-term results is considered to be **negligible** and has not been assessed further.

Table 5.4: Predicted Annual Mean NO_2 Concentrations for S2 '2021 Without Development' and S3 '2021 With Development' and Potential Impacts on Annual Mean NO_2 Concentrations

Receptor	S2 '2031 Without Development' NO_2 Concentration (µg/m^3)	S3 '2031 With Development'		NO_2 Concentration Change Between S2 and S3 (µg/m^3)	NO_2 Concentration Change Between S2 and S3 as % of AQAL*	Impact** of the Development (i.e. S3 impacts)
		NO_2 Concentration (µg/m^3)	NO_2 Concentration as % of AQAL			
ER1	27.62	27.67	69%	0.05	0.13%	Negligible
ER2	28.46	28.53	71%	0.07	0.18%	Negligible
ER3	28.59	28.66	72%	0.07	0.18%	Negligible
ER4	26.97	27.03	68%	0.06	0.15%	Negligible
ER5	25.98	26.14	65%	0.16	0.40%	Negligible
ER6	25.81	25.95	65%	0.14	0.35%	Negligible
ER7	26.31	26.49	66%	0.18	0.45%	Negligible
ER8	26.35	26.49	66%	0.14	0.35%	Negligible
ER9	26.27	26.39	66%	0.12	0.30%	Negligible
ER10	26.57	26.76	67%	0.19	0.48%	Negligible
ER11	27.1	27.32	68%	0.22	0.55%	Negligible
ER12	26.85	27.00	68%	0.15	0.37%	Negligible
ER13	27.07	27.24	68%	0.17	0.42%	Negligible
ER14	27.74	27.91	70%	0.17	0.43%	Negligible
ER15	28.08	28.33	71%	0.25	0.63%	Negligible
ER16	27.66	27.88	70%	0.22	0.55%	Negligible
ER17	28.93	29.18	73%	0.25	0.63%	Negligible
ER18	27.89	28.09	70%	0.20	0.50%	Negligible
ER19	28.25	28.50	71%	0.25	0.63%	Negligible
ER20	27.04	27.31	68%	0.27	0.67%	Negligible
ER21	27.01	27.13	68%	0.12	0.30%	Negligible
ER22	28.64	28.79	72%	0.15	0.37%	Negligible

Receptor	S2 '2031 Without Development' NO_2 Concentration (µg/m^3)	S3 '2031 With Development'		NO_2 Concentration Change Between S2 and S3 (µg/m^3)	NO_2 Concentration Change Between S2 and S3 as % of AQAL*	Impact** of the Development (i.e. S3 impacts)
		NO_2 Concentration (µg/m^3)	NO_2 Concentration as % of AQAL			
ER23	27.06	27.10	68%	0.04	0.10%	Negligible
ER24	26.63	26.72	67%	0.09	0.23%	Negligible
ER25	29.42	29.65	74%	0.23	0.57%	Negligible
ER26	27.56	27.62	69%	0.06	0.15%	Negligible
PR1		25.24	63%			
PR2		25.23	63%			
PR3		25.23	63%			
PR4		25.32	63%			
PR5		25.86	65%			
PR6		25.56	64%			
PR7		25.70	64%			
PR8		25.31	63%			
PR9		25.25	63%			
PR10		25.25	63%			

*As recommended in the EPUK-IAQM guidance, changes less than 0.5% will be described as 'negligible'.

**Impacts are determined in accordance with EPUK-IAQM guidance.

Particulate Matter - PM_{10}

The AQS objective for annual mean PM_{10} concentrations is 40µg/m^3. The results of the assessment indicate that in the anticipated opening year of 2031, annual mean PM_{10} concentrations for all receptor locations will be well below the objective.

Table 5.5 shows the comparison of annual mean PM_{10} concentrations between the S2 '2021 without Development' and S3 '2021 with Development' scenarios at existing sensitive receptor locations. The results as percentages of the AQAL are also presented which are used in the determination of significance of impacts (based on the EPUK-IAQM guidance – see **Appendix B**).

The results indicate that in the opening year of 2031, no exceedances of annual mean PM_{10} concentrations are predicted at any of the proposed receptors within the Development site. The changes in annual mean PM_{10} concentrations at existing receptor locations, as a result of the Development and traffic redistribution, are predicted to be '**negligible**' at all receptor locations. The effect of the proposed development on PM_{10} concentrations, prior to mitigation, is considered to be not significant.

Table 5.6 presents results for the predicted 24-hour mean PM_{10} concentrations as number of days greater than 50µg/m^3 for S2 and S3. The objective for 24-hour mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year. The number of days exceeding 50µg/m^3 is predicted to be a maximum of 3 days in both S2 and S3, which is well below the objective.

Table 5.5: Predicted Annual Mean PM_{10} Concentrations for S2 '2031 Without Development' and S3 '2031 With Development' and Potential Impacts on Annual Mean PM_{10} Concentrations

Receptor	S2 '2031 Without Development' PM_{10} Concentration (µg/m^3)	S3 '2031 With Development'		PM_{10} Concentration Change Between S2 and S3 (µg/m^3)	PM_{10} Concentration Change Between S2 and S3 as % of AQAL*	Impact** of the Development (i.e. S3 impacts)
		PM_{10} Concentration (µg/m^3)	PM_{10} Concentration as % of AQAL			
ER1	18.64	18.67	47%	0.03	0.09%	Negligible
ER2	19.11	19.16	48%	0.05	0.11%	Negligible
ER3	19.18	19.22	48%	0.05	0.12%	Negligible
ER4	18.21	18.25	46%	0.04	0.10%	Negligible
ER5	17.61	17.70	44%	0.10	0.25%	Negligible
ER6	17.50	17.59	44%	0.09	0.22%	Negligible
ER7	17.79	17.90	45%	0.11	0.27%	Negligible
ER8	17.95	18.05	45%	0.10	0.25%	Negligible
ER9	17.89	17.97	45%	0.09	0.22%	Negligible
ER10	18.16	18.30	46%	0.14	0.35%	Negligible
ER11	18.32	18.46	46%	0.14	0.35%	Negligible
ER12	18.17	18.26	46%	0.09	0.23%	Negligible
ER13	18.31	18.42	46%	0.11	0.27%	Negligible
ER14	18.73	18.84	47%	0.11	0.28%	Negligible
ER15	18.92	19.08	48%	0.16	0.39%	Negligible
ER16	18.66	18.80	47%	0.14	0.36%	Negligible
ER17	19.43	19.60	49%	0.16	0.41%	Negligible
ER18	18.81	18.94	47%	0.12	0.31%	Negligible
ER19	19.45	19.63	49%	0.18	0.46%	Negligible
ER20	18.51	18.69	47%	0.18	0.46%	Negligible
ER21	18.54	18.63	47%	0.10	0.24%	Negligible
ER22	19.21	19.30	48%	0.09	0.22%	Negligible

Receptor	S2 '2031 Without Development' PM_{10} Concentration (µg/m^3)	S3 '2031 With Development'		PM_{10} Concentration Change Between S2 and S3 (µg/m^3)	PM_{10} Concentration Change Between S2 and S3 as % of AQAL*	Impact** of the Development (i.e. S3 impacts)
		PM_{10} Concentration (µg/m^3)	PM_{10} Concentration as % of AQAL			
ER23	18.56	18.59	46%	0.03	0.07%	Negligible
ER24	18.01	18.07	45%	0.06	0.14%	Negligible
ER25	19.69	19.83	50%	0.14	0.35%	Negligible
ER26	18.59	18.63	47%	0.04	0.09%	Negligible
PR1		17.17	43%			
PR2		17.16	43%			
PR3		17.16	43%			
PR4		17.22	43%			
PR5		17.53	44%			
PR6		17.36	43%			
PR7		17.49	44%			
PR8		17.23	43%			
PR9		17.18	43%			
PR10		17.18	43%			

*As recommended in the EPUK-IAQM guidance, changes less than 0.5% will be described as 'negligible'.
**Impacts are determined in accordance with EPUK-IAQM guidance.

Table 5.6: Predicted 24-Hour Mean PM_{10} Concentration Results (as number of days > 50µg/m^3) for S2 '2031 Without Development' and S3 '2031 With Development'

Receptor ID	24-Hour Mean PM_{10}* (number of days >50µg/m^3)		
	S2 '2031 Without Development'	S3 '2031 With Development'	Change between S2 and S3
ER1	2	2	0
ER2	2	2	0

Receptor ID	24-Hour Mean PM_{10}* (number of days >50µg/m^3)		
	S2 '2031 Without Development'	S3 '2031 With Development'	Change between S2 and S3
ER3	2	3	1
ER4	2	2	0
ER5	1	1	0
ER6	1	1	0
ER7	1	1	0
ER8	1	1	0
ER9	1	1	0
ER10	2	2	0
ER11	2	2	0
ER12	2	2	0
ER13	2	2	0
ER14	2	2	0
ER15	2	2	0
ER16	2	2	0
ER17	3	3	0
ER18	2	2	0
ER19	3	3	0
ER20	2	2	0
ER21	2	2	0
ER22	3	3	0
ER23	2	2	0
ER24	1	1	0
ER25	3	3	0
ER26	2	2	0
PR1		1	

Receptor ID	24-Hour Mean PM_{10}* (number of days >50µg/m^3)		
	S2 '2031 Without Development'	S3 '2031 With Development'	Change between S2 and S3
PR2		1	
PR3		1	
PR4		1	
PR5		1	
PR6		1	
PR7		1	
PR8		1	
PR9		1	
PR10		1	
*Rounded to whole days			

Particulate Matter - $PM_{2.5}$

The AQS objective for annual mean $PM_{2.5}$ concentrations is 25µg/m^3. The results of the assessment indicate that in the anticipated opening year of 2031, annual mean $PM_{2.5}$ concentrations for all receptor locations will be well below the objective.

Table 5.7 shows the comparison of annual mean $PM_{2.5}$ concentrations between the S2 '2031 without Development' and S3 '2031 with Development' scenarios at existing sensitive receptor locations. The results as percentages of the AQAL are also presented which are used in the determination of significance of impacts (based on the EPUK-IAQM guidance – see **Appendix B**).

The results indicate that in the opening year of 2031, no exceedances of annual mean $PM_{2.5}$ concentrations are predicted at any of the proposed receptors within the Development site. The changes in annual mean $PM_{2.5}$ concentrations at existing receptor locations, as a result of the Development and traffic redistribution, are predicted to be '**negligible**' at all receptor locations. The effect of the Development on annual mean $PM_{2.5}$ concentrations, prior to mitigation, is considered to be not significant.

Table 5.7: Predicted Annual Mean $PM_{2.5}$ Concentrations for S2 '2031 Without Development' and S3 '2031 With Development' and Potential Impacts on Annual Mean $PM_{2.5}$ Concentrations

Receptor	S2 '2031 Without Development' $PM_{2.5}$ Concentration (µg/m^3)	S3 '2031 With Development'		$PM_{2.5}$ Concentration Change Between S2 and S3 (µg/m^3)	$PM_{2.5}$ Concentration Change Between S2 and S3 as % of AQAL*	Impact** of the Development (i.e. S3 impacts)
		$PM_{2.5}$ Concentration (µg/m^3)	$PM_{2.5}$ Concentration as % of AQAL			
ER1	11.94	11.96	30%	0.02	0.05%	Negligible
ER2	12.21	12.23	31%	0.03	0.06%	Negligible
ER3	12.24	12.27	31%	0.03	0.07%	Negligible
ER4	11.70	11.73	29%	0.02	0.06%	Negligible
ER5	11.47	11.53	29%	0.06	0.14%	Negligible
ER6	11.42	11.46	29%	0.05	0.12%	Negligible
ER7	11.58	11.64	29%	0.06	0.15%	Negligible
ER8	11.67	11.72	29%	0.06	0.14%	Negligible
ER9	11.63	11.68	29%	0.05	0.12%	Negligible
ER10	12.35	12.42	31%	0.08	0.19%	Negligible
ER11	12.44	12.52	31%	0.08	0.19%	Negligible
ER12	12.36	12.41	31%	0.05	0.13%	Negligible
ER13	12.44	12.50	31%	0.06	0.15%	Negligible
ER14	12.67	12.73	32%	0.06	0.16%	Negligible
ER15	12.78	12.86	32%	0.09	0.22%	Negligible
ER16	12.63	12.71	32%	0.08	0.20%	Negligible
ER17	13.06	13.15	33%	0.09	0.23%	Negligible
ER18	12.72	12.79	32%	0.07	0.17%	Negligible
ER19	12.49	12.59	31%	0.10	0.25%	Negligible
ER20	11.97	12.07	30%	0.10	0.26%	Negligible
ER21	12.02	12.07	30%	0.05	0.13%	Negligible
ER22	12.40	12.45	31%	0.05	0.12%	Negligible

Receptor	S2 '2031 Without Development' $PM_{2.5}$ Concentration (µg/m^3)	S3 '2031 With Development'		$PM_{2.5}$ Concentration Change Between S2 and S3 (µg/m^3)	$PM_{2.5}$ Concentration Change Between S2 and S3 as % of AQAL*	Impact** of the Development (i.e. S3 impacts)
		$PM_{2.5}$ Concentration (µg/m^3)	$PM_{2.5}$ Concentration as % of AQAL			
ER23	12.03	12.04	30%	0.02	0.04%	Negligible
ER24	11.73	11.76	29%	0.03	0.08%	Negligible
ER25	12.49	12.57	31%	0.08	0.20%	Negligible
ER26	11.88	11.90	30%	0.02	0.05%	Negligible
PR1		11.26	28%			
PR2		11.26	28%			
PR3		11.23	28%			
PR4		11.26	28%			
PR5		11.43	29%			
PR6		11.34	28%			
PR7		11.41	29%			
PR8		11.29	28%			
PR9		11.27	28%			
PR10		11.26	28%			

*As recommended in the EPUK-IAQM guidance, changes less than 0.5% will be described as 'negligible'.

**Impacts are determined in accordance with EPUK-IAQM guidance.

Summary

The AQS objectives for NO_2, PM_{10} and $PM_{2.5}$ are predicted to be met at all receptor locations considered in the assessment. In accordance with EPUK-IAQM guidance, the impacts of the Development on NO_2, PM_{10} and $PM_{2.5}$ concentrations, prior to mitigation, are predicted to be '**negligible**' at all receptor locations. Overall, the effect of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ concentrations, prior to mitigation, is considered to be **not significant**.

Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations at proposed receptors on the site itself show that future users of the Development are not predicted to be exposed to air quality exceeding the UK AQS objectives.

5.2.2 Boiler Emissions

The energy and sustainability consultants for the Development, MKP Consultants Ltd, have advised that a hybrid heat network, led by Air Source Heat Pump (ASHPs) and supplemented by gas fired boilers, will serve all new dwellings. ASHPs will be powered by electricity and will therefore have no combustion emissions at the site. It is considered that the main combustion emissions from the Development will likely be from the gas boilers.

At this stage, it is understood that 10 Hamworthy Modumax 254/762V low NO_x gas boilers or similar, which has a heat input of 807kW and 38.8mg/kWh NO_x emission rates, are proposed for the Development along with the ASHPs. Given the low NO_x emission rates, and predicted NO_2 concentrations at proposed receptor locations being below relevant objectives, it is considered unlikely that the proposed boilers will have a significant impact on local air quality.

6 AIR QUALITY NEUTRAL ASSESSMENT

6.1.1 Building Emissions Benchmark Calculations

Building Emissions Calculations

As discussed in section 5.2.2, a hybrid heat network, led by ASHPs and supplemented by gas fired boilers, will serve all new dwellings. ASHPs will be powered by electricity and will have no combustion emissions at the site. The main building emissions will likely be the gas fired boilers, it is understood that 10 Hamworthy Modumax 254/762V low NO_x gas boilers or similar, which has a heat input of 807kW and 38.8mg/kWh NO_x emission rates, are proposed for the Development along with the ASHPs. The gas boilers are unlikely to produce significant PM_{10} emissions and therefore PM_{10} has not been assessed for building emissions in the air quality neutral assessment.

The land use class category best suited for the proposed site is A1: Shops (commercial area), B1: Business (offices), C3: Residential dwellings and D1(c): school.

The calculated NO_x building emissions benchmark ('BEB') for the Development is presented in Table 6.1 and the estimated actual NO_x building emissions for the Development are presented in Table 6.2.

Table 6.1: Calculation of NO_x Building Emission Benchmarks for the Development

Type of land-use area	Gross floor area GFA (m^2)	NOx emissions benchmark (g/m^2/annum)	NOx Benchmark (kg/annum)
A1: Shops (commercial area)	3,835	22.6	86.67
B1: Business (offices)	2,353	30.8	72.47
C3: Residential dwellings	294,159	26.2	7,706.97
D1(c): school	11,154	31.0	345.77
Total Benchmark			**8,211.88**

Table 6.2: Calculation of NO_x Building Emissions for the Development

Source	Number of units	NOx Emission Rate (g/s)	Run hours per year (hr)*	Total NO_x Emissions (kg/annum)
Hamworthy Modumax 254/762V low NOx gas boilers	10	0.0087	8,760	**2,742.90**
*It is assumed that the boilers will run continuously throughout the year for a conservative approach				

The building emissions associated with the Development are predicted to be below the BEB and therefore the Development is predicted to be better than 'air quality neutral' in respect of building emissions.

6.1.2 Transport Emissions

The Development is located in outer London and the assessment has therefore used the outer London emissions factors specified in the GLA AQN guidance.

The Development will generate 4001 Annual Average Daily Traffic (AADT) flows, including 215 AADT flows from employment and 3786 AADT flows from residential units. The transport trip rates calculations for the Development, summarised in Table 6.3 below, have been calculated by multiplying the number of trips per annum by the emissions factors and the average distance travelled, applicable to business and residential uses in outer London.

The Development comprises school, residential units, retail space and office space. From the information provided by the project transport consultant, it is understood that the proposed school will be an extension of the existing school and therefore will not cause any significant change of traffic flows, therefore school trips have been excluded from this assessment. Traffic flow changes as a result of the Development have been provided for employment (retail + office) and residential area. Benchmarks are available for retail, office or residential end use. Compared to the benchmarks for retail, those for offices are more stringent, therefore, benchmarks for offices have been applied for all employment traffic flows, for a conservative assessment.

The calculated transport emissions benchmark ('BEB') for the Development is presented in Table 6.3 and the estimated actual transport emissions for the Development are presented in Table 6.4.

Table 6.3: Transport Emissions Benchmarks associated with each Land-Use Category

Type of area	GIA (m^2/ no. flats)	NOx Transport Emissions Benchmark (g/m^2/annum or g/dwelling/annum)	PM_{10} Transport Emissions Benchmark (g/m^2/annum)	Transport Emissions Benchmark (kg per annum)	
				NO_x	PM_{10}
B1: Business (offices)	6,188 m^2	68.5 g/m^2/annum	11.8 g/m^2/annum	423.88	73.01
C3: Residential dwellings	2,428 dwellings	1,553 g/dwelling/annum	267 g/dwelling/annum	3770.68	648.28
Total:				**4194.56**	**721.29**

Table 6.4: Calculation of Transport Emissions associated with the Land-Use Category

Land use	Predicted traffic generation, AADT	Trips per annum	Emissions Factor (g/vehicle-km) (NO_x)	Emissions factor (g/vehicle-km) (PM_{10})	Distance travelled per veh-km	Total NO_X (kg/annum)	Total PM_{10} (kg/annum)
B1: Business (offices)	215	78,475	0.353	0.0606	10.8	299.18	51.36
C3: Residential dwellings	3786	1,382,004	0.353	0.0606	11.4	5,561.46	954.74
Total:						**5,860.64**	**1,006.10**

It should be noted that the emissions factors used in Table 6.4 (i.e. 0.353g/vehicle-km for NO_x and 0.0606g/vehicle-km for PM_{10}) are based on the GLA's AQN Planning Support Update document published in April 2014, which has not taken the latest fleet composition data and improvements in the quality of fuel and technology into consideration. A sensitivity test run of Defra's Emission Factor Toolkit (EFT) version 10.1 has shown that by 2031 (i.e. the proposed opening year), vehicle emission factor for NO_x will be 0.11784g/ vehicle-km and PM_{10} will be 0.03081g/ vehicle-km (assuming an average speed of 30mph), which is approximate 67% reduction in the NO_x emission factor and 49% reduction in PM_{10} emission factor provided in the guidance.

Taking the above into consideration, transport emissions associated with the Development in 2031 are predicted to be:

NO_x emissions = 5,860.64*(100%-67%) =1,934.01kg/annum

PM_{10} emissions = 1,006.10*(100%-49%) =513.11kg/annum

These updated calculations are well below the transport emissions benchmarks (TEBs) calculated in Table 6.3. Taking the above into consideration, it is considered that the transport emissions associated with the Development will likely to be below the TEBs and therefore the Development is likely to be 'air quality neutral' in respect of transport emissions.

It is noted that the London Plan 2021 includes a requirement of the preparation of an Air Quality Positive (AQP) Statement for large-scale developments subject to an EIA. At the time of writing, the guidance on preparing an AQP was in draft format only and detailed mitigation for the Development has not yet been agreed, therefore it is anticipated that an AQP Statement will be required at a later stage.

7 MITIGATION MEASURES & RESIDUAL IMPACTS

7.1 Construction Phase Mitigation

The dust emitting activities outlined in Section 6.1 can be effectively controlled by appropriate dust control measures and any adverse effects can be greatly reduced or eliminated.

Prior to commencement of construction activities, it is anticipated that an agreement on the scope of a dust management plan (DMP, this may be as part of a Construction Environmental Management Plan (CEMP)) for the construction phase will be reached with the Local Authority to ensure that the potential for adverse environmental effects on local receptors is minimised. The DMP should include inter alia, measures for controlling dust and general pollution from site construction operations, and include details of any monitoring activities, if appropriate. Controls should be applied through the construction period to ensure that emissions are mitigated.

It is recommended that plant used on-site comply with the NO_x, PM and CO emissions standards specified in the EU Directive 97/68/EC (as replicated in the MOL SPG) and subsequent amendments as a minimum, where they have net power of between 37kW and 560kW. The emissions standards vary depending on the net power the engine produces. It is recommended that these emissions standards are also applied on the site. The following actions can be taken to enable compliance:

- Ensure all equipment complies with the appropriate NRMM standards by reorganising the fleet and replacing equipment where necessary;
- Where feasible, ensure further retrofit abatement technology is installed on existing NRMM equipment, e.g. Diesel Particulate Filters (DPFs);
- Ensure all vehicles switch off engines when stationary – no idling vehicle;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where possible; and
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

The dust risk categories identified have been used to recommend appropriate, mitigation measures, which are presented in **Appendix E**. With the proposed construction activities mitigation measures in place, the likely residual impact of works undertaken during the construction phase on local air quality can be considered as ‘not significant’.

7.2 Operational Phase Mitigation

The assessment predicts that the operational phase of the Development will have a negligible impact on local air quality. Therefore, it is not considered that any specific mitigation measures will be required for operational phase. However, given that the Development site is located in an AQMA, transport related mitigation measures (such as provision of electric vehicle charge points) will be implemented to minimise the potential impact of the Development on local air quality. This includes a Travel Plan, that has been prepared by the project transport consultant. The Travel Plan sets out measures to encourage sustainable means of transport, which will assist in increasing accessibility whilst reducing congestion and local air pollution.

7.3 Residual Impacts

With the implementation of the proposed mitigation measures (as detailed in section 6.2), the residual impacts of the Development on local air quality are considered to be '**not significant'**.

8 CONCLUSIONS

An air quality assessment report has been prepared to consider the potential air quality impacts associated with the Development at Royal Brunswick Park.

An assessment of construction phase impacts has been undertaken following the IAQM guidance. The potential risk of construction phase impacts from dust soiling was predicted to be 'medium' to 'high' risk, and on human health was predicted to be 'low' to 'medium' risk. Mitigation measures have been recommended to reduce the risk of dust and particulate matter being generated and re-suspended, and also to reduce emissions from vehicles and plant associated with construction related activities. With implementation of an appropriate selection of measures, such as those recommended in **Appendix E**, no significant impacts are anticipated during the construction phase.

The main potential air quality impact once the Development is complete and occupied is likely to be emissions from road traffic (i.e. changes in traffic flow volume and distribution) associated with the Development. The key air pollutants of concern were NO_2, PM_{10} and $PM_{2.5}$. Concentrations of these key pollutants were predicted at the most relevant receptor locations using ADMS-Roads dispersion model for the base year 2019, and for the proposed opening year 2031 with and without the Development in place.

The impact of the Development on NO_2, PM_{10} and $PM_{2.5}$ concentrations at existing sensitive human receptors, prior to mitigation, was negligible at all locations. Therefore, it is not considered that any specific mitigation measures will be required for operational phase. Nevertheless, it is recommended that transport related mitigation measures, as detailed in section 6.2, should be included to minimise the potential impact of the development on local air quality.

9 REFERENCES

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ANNEX A - CONSTRUCTION DUST ASSESSMENT GUIDANCE

This appendix contains the construction dust assessment methodology used in the assessment.

To assess the potential impacts, construction activities are divided into demolition, earthworks, construction and trackout. The descriptors included in this section are based upon the IAQM 2014 guidance. The assessment follows the steps recommended in the guidance.

Step 1: Screen the requirement for assessment

The first step is to screen out the requirement for a construction dust assessment, this is usually a somewhat conservative level of screening. An assessment is usually required where there is:

- a 'human receptor' within:
  - 350m of the boundary of the site; or
  - 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- an 'ecological receptor':
  - 50m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Step 2A: Defining the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude category for demolition n is varied for each site in terms of timing, building type, duration and scale. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total building volume >50,000m^3, potentially dusty construction material, on-site crushing and screening, demolition activities >20m above ground level;
- **Medium**: Total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10m – 20m above ground level; and,
- **Small**: Total building volume <20,000m^3, construction material with low potential for dust release, demolition activities <10m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude category for earthworks is varied for each site in terms of timing, geology, topography and duration. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total site area >10,000m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes;
- **Medium**: Total site area 2,500 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8m in height, total material moved 20,000 – 100,000 tonnes; and,

- **Small**: Total site area < 2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10,000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude category for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large**: Total building volume >100,000m^3, piling, on site concrete batching;
- **Medium**: Total building volume 25,000 – 100,000m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and,
- **Small**: Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

Factors which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large**: >50 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- **Medium**: 10 – 50 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100m; and,
- **Small**: <10 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health and ecosystems. The sensitivity of the area takes into account the following factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and,
- Site-specific factors, such as whether here are natural shelters such as trees, to reduce the risk of wind-blown dust.

Table A1 was used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Table A1: Sensitivity of the Area Surrounding the Site

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	• Users can reasonably expect a enjoyment of a high level of amenity. • The appearance, aesthetics or value of their property would be diminished by soiling. • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	• Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day) • Examples include residential properties, hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	• Locations with an international or national designation *and* the designated features may be affected by dust soiling. • Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. • Examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home. • The appearance, aesthetics or value of their property could be diminished by soiling. • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Examples include parks and places of work.	• Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. • Locations with a national designation where the features may be affected by dust deposition. • Example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
Low	• The enjoyment of amenity would not reasonably be expected. • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	• Locations where human exposure is transient. • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations with a local designation where the features may be affected by dust deposition. • Example is a local Nature Reserve with dust sensitive features.

Based on the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. Tables A2 to A4 indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the guidance, it is only considered necessary to consider trackout impacts up to 50m from the edge of the road.

Table A2: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distances from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A3: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
High	>32µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
		>100	High	High	Medium	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
	28-32 µg/m³	10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area to Ecological Impacts

Receptor Sensitivity	Distances from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C: Defining the Risk of Impacts

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to determine a potential risk of impacts for each construction activity, before the application of mitigation. Tables A5 to A7 indicate the method used to assign the level of risk for each construction activity.

Table A5: Risk of Dust Impacts from Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table A6: Risk of Dust Impacts from Earthworks/Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table A7: Risk of Dust Impacts from Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

ANNEX B – OPERATIONAL PHASE IMPACT SIGNIFICANCE CRITERIA

This appendix contains the significance criteria used in the assessment for the operational impact assessment from the 2017 EPUK-IAQM guidance.

To assess the impacts of a development on the surrounding area, the EPUK-IAQM 2017 guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion. Table C1 presents the suggested framework, provided within the EPUK/IAQM guidance, for describing the impacts.

Table B1: Impact Descriptors for Individual Receptors

Long term average concentration at receptors in assessment year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial
Notes AQAL = Air Quality Assessment Level, which for this assessment related to the UK Air Quality Strategy Objectives. Where the % change in concentrations is <0.5%, the change is described as 'negligible' regardless of the concentration. Where concentrations increase the impact is described as adverse, and where it decrease as beneficial.				

The EPUK/IAQM guidance notes that the criteria in Table C1 should be used to describe impacts at individual receptors and should only be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the severity of impacts.

ANNEX C - TRAFFIC DATA

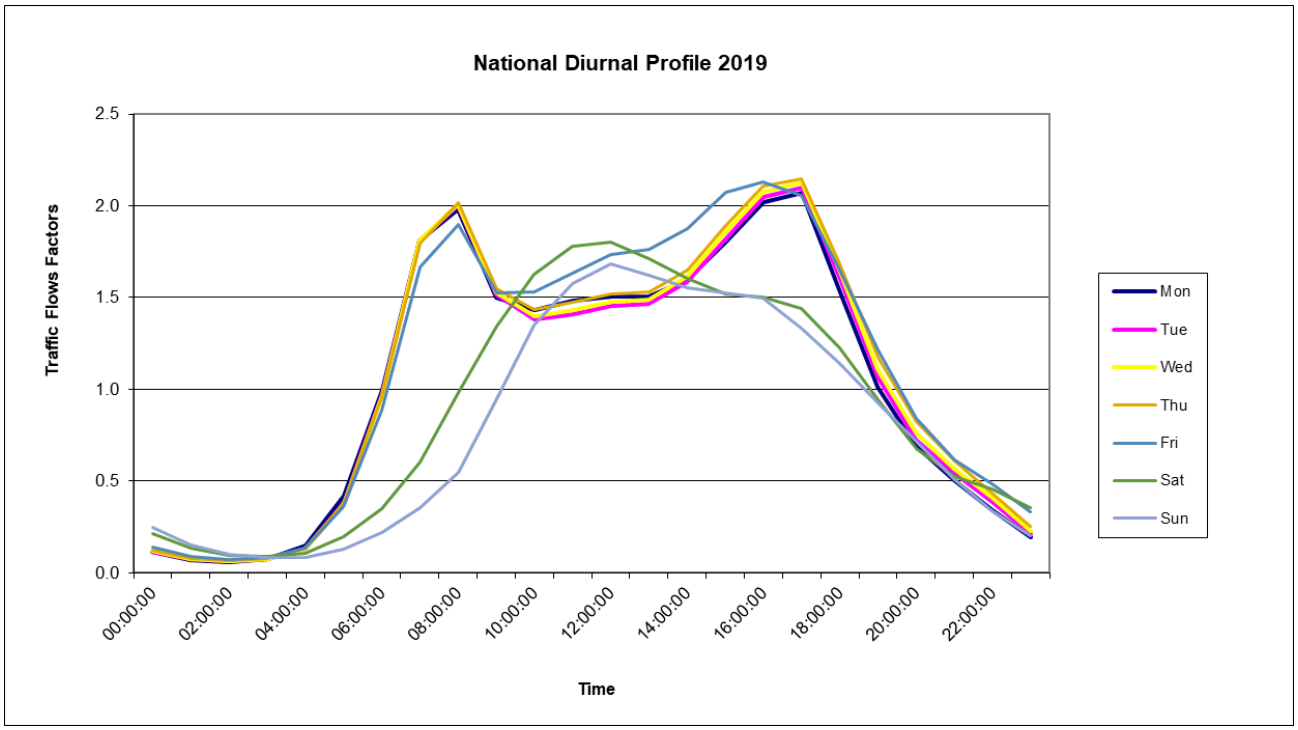
This annex contains the traffic data used in the dispersion modelling assessment, provided by the project transport consultant (i.e. Stomor Civil Engineering Consultants) for the development. Included are traffic flow data in 24-hour daily flows, percentage Heavy Duty Vehicle (HDV), the speed data for each road link and the diurnal profile used. Reduced speeds were used at junctions and known areas of congestion.

Table C1: 24-hour Traffic Flows (AADT) and Speed Data used in the Dispersion Modelling Assessment

Ref	Road Link	Average Speed (mph)	S1 '2019 Verification Baseline'*		S1a '2021 Current Baseline'		S2 2031 'Without the proposed development'		S3 2021 'With the proposed development'	
			Total AADT	HDV%	Total AADT	HDV%	Total AADT	HDV%	Total AADT	HDV%
1	Brunswick Park Road	28.2	-	-	7,102	3.2%	7,360	2.9%	8,344	2.9%
2	Waterfall Road	30	-	-	10,626	1.8%	10,966	1.7%	11,183	1.8%
3	Bowes Road	30	-	-	14,055	4.3%	14,746	4.3%	15,062	4.3%
4	Friern Barnet Road	30	-	-	15,997	3.2%	16,023	3.3%	17,581	3.3%
5	A109 Oakleigh Road	28.1	-	-	12,804	3.3%	13,475	3.3%	14,308	3.2%
6	A1000 High Road S	30	-	-	28,333	4.7%	28,257	4.6%	28,257	4.6%
7	Totteridge Lane	30	-	-	16,006	4.9%	16,564	4.8%	16,968	4.8%
8	B1453 Russell Lane	30	-	-	18189	2.5%	18,640	2.4%	18,928	2.5%
9	Church Hill Road	30	-	-	9062	0.4%	9,060	0.4%	9,300	0.5%
10	Osidge Lane	30	-	-	15767	2.9%	16,338	2.8%	16,795	2.8%
11	Goldrill Drive	30	-	-	832	2.0%	862	2.0%	862	2.0%
12	Eastern Access	30	-	-	2780	0.7%	2,880	0.7%	5,005	1.2%
13	Southern Access	30	-	-	1489	2.5%	1,566	2.5%	3,442	3.3%
14	Brunswick Avenue	30	-	-	2147	1.8%	2,259	1.8%	2,306	2.0%
15	A1000 High Road N	30	-	-	20883	2.1%	20,995	2.1%	21,543	2.1%
16**	A598 Ballards Lane (North of Kingsway)	30	13,125	6.6%	-	-	-	-	-	-
17**	A1000 High Road	30	13,761	5.7%	-	-	-	-	-	-
18**	A598 Ballards Lane (South of Kingsway)	30	16,563	5.1%	-	-	-	-	-	-

*2019 Verification base traffic data has been obtained from the DfT traffic counts (https://roadtraffic.dft.gov.uk/#6/55.254/-4.340/basemap-regions-countpoints)
**Only used for 2019 base year scenario for model verification purpose.
Note: Lower speeds (25-30kph) were used at junctions and known areas of congestion as appropriate.

Figure C1: Diurnal Profile Included in the Dispersion Modelling Assessment



ANNEX D - MODELLING OF OPERATIONAL PHASE – VERIFICATION METHODOLOGY AND MODEL RESULTS

The dispersion model results were verified following the relevant guidance in LAQM.TG(16). Predicted results from a dispersion model may differ from measured concentrations for a variety of reasons, these are identified in LAQM.TG(16) to include:

- Estimates of background concentrations;
- Meteorological data uncertainties;
- Uncertainties in source data for example, traffic flow data, stack emissions and emission factors;
- Model input parameters such as roughness length, minimum Monin-Obukhov and overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

As discussed in section 3, model verification has been undertaken using 2019 NO_2 and PM_{10} monitoring data from the automatic monitoring site ABN1 and 2019 NO_2 monitoring data from diffusion tube monitoring site PBN2. Table D1 presents details of these two locations, which have been used for the dispersion model verification against traffic data obtained from the transport consultants. Table D2 and D3 present the NO_2 verification process and Table D4 presents the PM_{10} verification process.

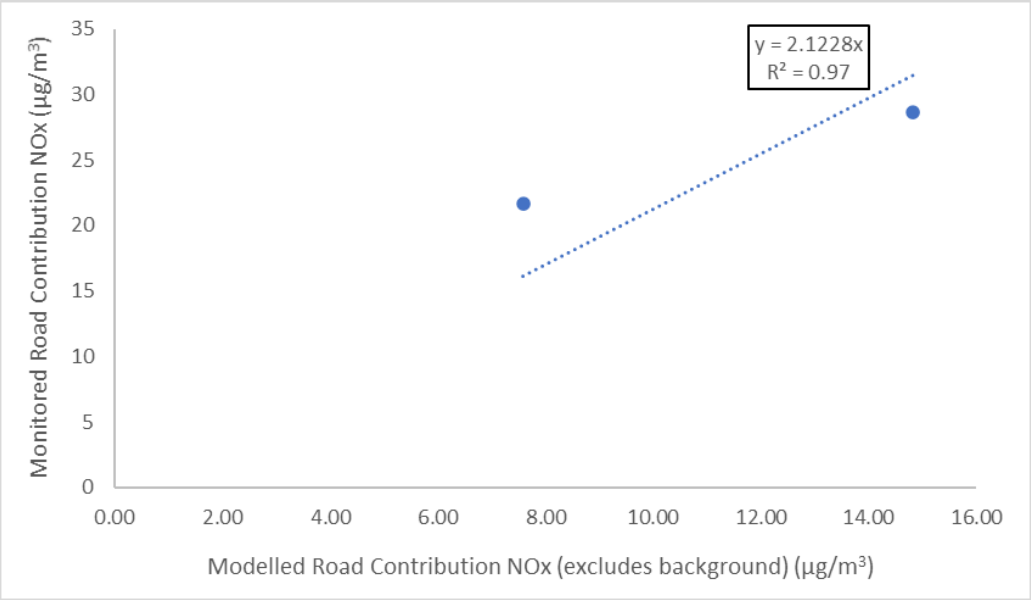
Table D1: Monitoring Locations used in Verification Process

Site ID	Receptor Location	Site Type	Grid Reference		Height (m)
			X	Y	
ABN1	Tally Ho	Kerbside	526344	192219	3
PBN2	71 Ballards Lane	Urban Centre	525410	190980	2.5

In line with the LAQM.TG(16) guidance, modelled versus measured road NO_x at the above two sites are shown in Table D2 and D3.

Table D2: Modelled versus Monitored NO_x/NO_2

Site	Monitored total NO_2	Background NO_2	Monitored Road Contribution NO_x	Modelled road contribution NO_x	Ratio of Modelled and Measured Road NO_x
ABN1	38	25	28.65	14.83	1.93
PBN2	35	25	21.63	7.58	2.85
Overall Adjustment Factor					2.12



An adjustment factor of **2.12** was obtained and applied to the modelled road-NO_x component predicted at all receptors. The verified annual average modelled road contribution NO_x concentrations have then been converted into annual average road NO_2 by using the Defra NO_x to NO_2 spreadsheet; a comparison of monitored and model adjusted NO_2 is presented in Table D5. This shows that, following adjustment, all modelled NO_2 results are within +/- 25% of monitored NO_2 concentrations. In accordance with the LAQM.TG(16) guidance, it is not considered that further verification is required.

Table D3: Modelled versus Monitored NO_2 Concentrations

Site	Background NO_2	Monitored total NO_2	Modelled total NO_2 after adjustment	% Difference [(modelled – monitored)/monitored]x100
ABN1	25	38	39.18	3.11
PBN2	25	35	32.55	-7.00

In line with the LAQM.TG(16) guidance, modelled versus measured road PM_{10} at the ABN1 is shown in Table D4.

Table D4: Modelled versus Monitored PM_{10}

Site	Monitored total PM_{10}	Background PM_{10}	Monitored Road Contribution PM_{10}	Modelled road contribution PM_{10}	Ratio of Modelled and Measured Road PM_{10}
ABN1	20	17	3	1.08	2.78
Overall Adjustment Factor					2.78

An adjustment factor of **2.78** was obtained and applied to the modelled road-PM_{10} component predicted at all receptors.

It is noted that there was no $PM_{2.5}$ monitoring data available in the vicinity of the proposed development. Therefore, as per the recommendations in LAQM.TG(16), adjustment factors used for the predicted roadside PM_{10} concentrations were applied to the modelled $PM_{2.5}$ concentrations.

ANNEX E – SITE-SPECIFIC CONSTRUCTION PHASE RECOMMENDED MITIGATION MEASURES

The IAQM 2014 guidance divides site-specific mitigation measures are divided into general measures applicable to all sites, and measures specific to demolition, earthworks, construction and trackout. Depending on the level of risk assigned in relation to each type of construction activity, different mitigation is assigned. The method for assigning mitigation measures as detailed in the IAQM guidance has been used. For those 'general' mitigation measures, the greatest risk category assigned to the assessed construction activities should be applied. Therefore, in this case, the 'high risk' 'general' site mitigation measures have been recommended.

There are two categories of mitigation measure – 'highly recommended' and 'desirable', which are indicated according to the dust risk level identified in Table 5.3. Desirable measures are presented in *italics*.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of people accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

Dust Management

- Develop and implement a DMP, which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures. The desirable measures should be included as appropriate for the site.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site or the action taken to resolve the situation in the log book.
- Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority if asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with any dust management plan, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- If required, agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring location with the Local Authority.

Preparing and maintaining the site

- Plan site layout so that machinery and dust causing activities are located away from receptors as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles/Machinery

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.
- Ensure all earthworks and construction vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up as soon as reasonably practicable after the event using wet clean methods.

Waste Management

- Avoid bonfires or burning of waste materials.

Measures Specific to Demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- *For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.*

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent the escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable
- Record any inspections of haul routes and subsequent action in site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.