The British Land Company plc

Regent's Place North-East Quarter Site

Environmental Wind Study

ISSUE

The British Land Company plc

Regent's Place North-East Quarter Site

Environmental Wind Study

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1 Environmental Wind Study

1.1 Introduction

This chapter of the Environmental Statement (ES), written by Arup, assesses the change in environmental windiness caused by the Development, and the impact that these changes have on pedestrian comfort and safety in and around the Development.

The presence of the taller building among medium rise buildings provides the potential for windiness in surrounding areas. The windiness depends on both the massing of the buildings within their surroundings and the orientation compared to the prevailing winds.

The design of a new urban environment gives an opportunity for creating amenable external spaces and minimising areas of windiness through good design practice from the outset.

A series of wind tunnel investigations have therefore been made to quantify this and guide the design to assess whether conditions will be acceptable. The results of a wind tunnel test are interpreted giving an overview of the wind conditions in terms of usability for pedestrian activities.

The wind tunnel measurements were carried out by BMT Fluid Mechanics Ltd to conform to UK practice. Wilkinson Eyre Architects (Triton Square Office Building) and Munkenbeck and Marshall Architects (Drummond Street Private Housing, Hampstead Road Affordable Housing, and Henry Street Office Building) provided information for, and reviewed the wind tunnel model. Acceptance criteria for pedestrian level winds were those of TV Lawson of Bristol University, which are widely used in the UK and overseas and are similar to other international guidance.

1.2 Review of Development Proposals

The Regent's Place North East Quarter (NEQ) site sits to the north of Euston Tower and to the west of Hampstead Road. The buildings in the surrounding area include Euston Tower to the south, approximately 36 storeys, and low to medium-rise developments of between 3 - 7 storeys to the north and west.

The Development comprises the Drummond Street Private Housing, a 25 storey tower, the Hampstead Road Affordable Housing and the Henry Street Office Building, both 9 storeys. The Triton Square Office Building is to the west. The Development also includes areas such as Triton Square to the south of the Triton Square Office Building, where comfortable external environments (for eating, shopping, outside entertainment etc.) are desirable particularly in summer months. In other areas, especially around the residential building, pedestrian access will be required throughout the year.

1.3 Methodology

1.3.1 Wind Tunnel Modelling

The effect of the Development on wind at street level was evaluated using the methodology described in "The evaluation of the windiness of a building complex before construction", TV Lawson, London Docklands Development Corporation. This method has been used widely in the UK and elsewhere.

The wind tunnel studies were undertaken by BMT Fluid Mechanics Ltd. A 1:300 scale model of the Site and its surroundings was constructed and placed in the wind tunnel for testing.

The windiness at locations around the site is measured in a boundary layer wind tunnel using scale models of the existing site and the Development. Gust and mean wind speeds were measured using Irwin probes for sixteen equal increments of wind direction and at locations chosen either due to sensitive activities expected in the area (building entrances, external seating etc.) or because the site geometry suggested the possibility of undesirable wind conditions.

The measured wind speed ratios were combined with the expected statistics for wind strength and direction for London (probabilities of strength and direction) obtained from the Holborn Weather Centre to calculate the windiness for each season of the year based on the "comfort" and "distress" criteria described below.

1.3.2 Lawson Criteria

The acceptability of windiness is subjective and depends on a number of factors, most notably the activities to be performed. The Lawson Criteria has therefore been developed to enable a quantitative assessment of acceptability for particular activities in terms of "comfort" and "distress" (safety); these are described in Table 1 in order of increasing windiness.

Criteria	Description
Long term 'Sitting'	Reading a newspaper and eating and drinking
'Standing' or short term sitting	Appropriate for bus stops, window shopping and building entrances
Walking or 'Strolling'	General areas of walking and sightseeing
'Business Walking'	Local areas around tall buildings where people are not expected to linger

Table 1 - Comfort criteria as defined by TV Lawson.

These conditions are the limiting criteria for comfort. For ideal conditions the windiness will be a category better than the limiting conditions above.

In the following assessment, the words 'Sitting', 'Standing', 'Strolling' and 'Business Walking' are used to describe comfort levels of windiness defined by Table 1.

The comfort criteria above describe more frequent wind conditions. There is also a distress criterion for "General Access", equivalent to a mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year. Conditions in excess of this limit may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.

There is a further limiting distress criterion beyond which even "Able-bodied" individuals may find themselves in difficulties at times. This corresponds to a mean speed of 20 m/s and a

gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Beyond this gust speed aerodynamic forces approach body weight and it rapidly becomes impossible to remain standing.

Distress Criteria	Description
'General Public Access'	Above which the less able and cyclists find conditions physically difficult
'Able-Bodied Access'	Above which it becomes increasingly impossible for an able bodied person to remain standing

Table 2 - Distress criteria as defined by TV Lawson.

1.3.3 Wind Climate

The most frequent and strongest winds of the UK at all times of the year blow from a quadrant centred on WSW (240°E of N). These winds are relatively warm and wet. Almost all cases of serious annoyance due to strong winds around buildings are caused by these winds.

NE winds are almost as common as the SW winds during the spring but are weaker. NE winds are relatively cold and dry. These winds are often associated with poor internal conditions due to cold air infiltrating through doors.

Winds from the NW can be as strong as the SW winds but are less frequent. They are relatively cold and can bring snow in winter.

SE winds are generally warm and light and are rarely associated with annoying ground level winds.

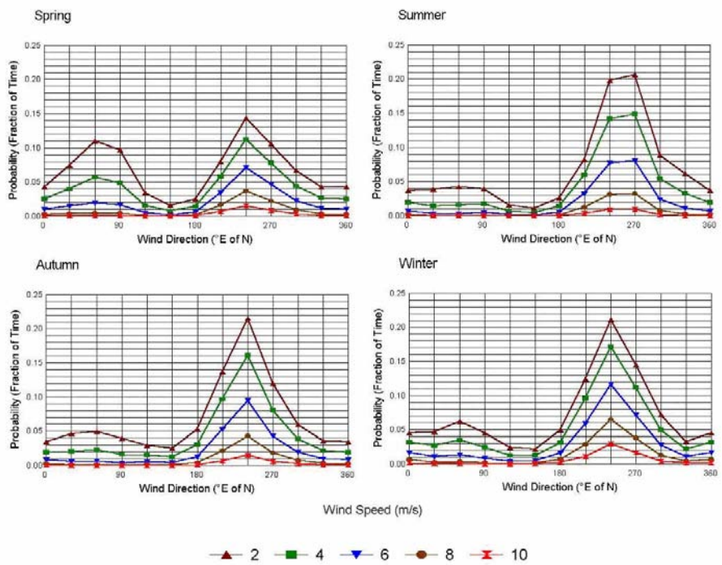

Figure 1 - Probability of wind speed with direction for each season.

1.3.4 Visualisation of Wind Results

The results of the wind tunnel study on pedestrian safety and comfort are graphically displayed in figures within sections 4 to 7. For ease of identification, comfort conditions at each measurement location are indicated by the colour of the spot. Figure 2 below shows the colour scheme used to represent the comfort conditions. The shade of the colour indicates whether the conditions are in the upper or lower end of that range. All upper podium level measurements are marked with a black square around the measurement point.

Red circles around a spot indicate an exceedence of the distress criteria as indicated in Figure 2.

Figure 2 - Visual representations of the Lawson Criteria.

1.4 Assessment

The results of the following wind tunnel test configurations are presented in this assessment:

- Existing site.
- The Development.
- The Development with mitigation measures.

Only 'Worst Season' and 'Summer' conditions are presented. 'Worst Season' is typically winter (December to February) but, at some locations, may be spring (March to May) depending on the geometry of the buildings. The 'Worst Season' conditions should be considered for activities likely to take place at all times of the year. 'Summer' (June to August) conditions are representative of the effect on activities that are only likely to occur outdoors in the warmer months.

1.5 Existing site

The existing site consists of a series of medium rise office and residential buildings. To the south of the existing site are Euston Tower and the open space of Triton Square.

Photographs of the model for this configuration are presented in Figures 3 and 4. A Site Plan is shown in Figure 5.

Figure 3 - View of the existing site model from the southwest.

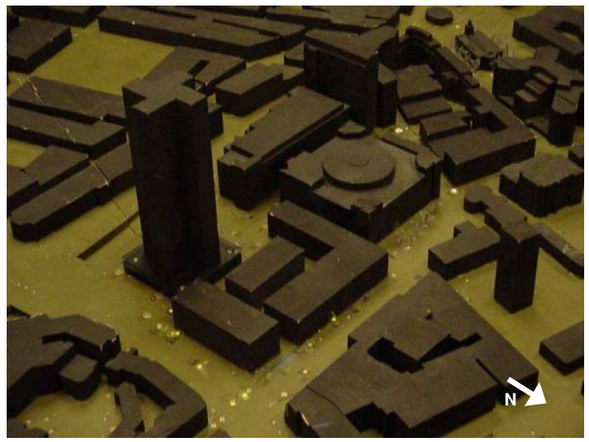

Figure 4 - View of the existing site model from the northeast.

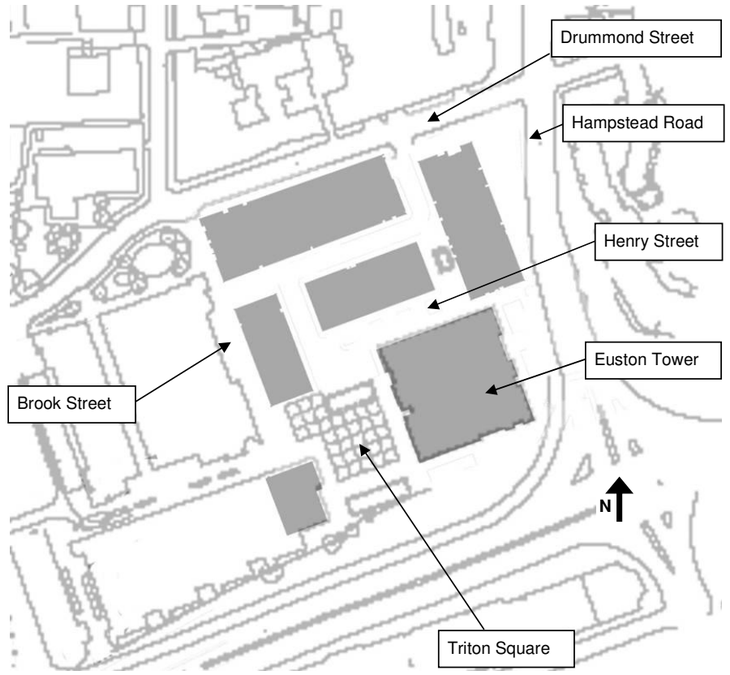

Figure 5 - Existing site plan.

1.5.1 Worst season conditions

Worst season conditions for the existing site are shown in Figure 6, and are described below:

Conditions along Henry Street are generally in the 'Strolling' range, the one exception is in the area where the gap narrows between Euston Tower and the building to the north. In this location the wind is funnelled, leading to conditions in the 'Business Walking' range with exceedence of the Distress Criteria for 'General Public' access.

In Triton Square conditions are generally in the 'Strolling' range.

Conditions along Drummond Street and Brook Street are relatively sheltered, with conditions in the 'Standing' or 'Sitting' ranges.

At the southern corners of Euston Tower the conditions are in the 'Business Walking' range with an exceedence of the Distress Criteria for 'General Public' access.

Along Hampstead Road conditions are generally in the 'Standing' range with some local 'Strolling' range conditions.

Please note that the existing site model did not include the existing trees along the south side of Euston Road and the eastern side of Hampstead Road. Conditions local to these trees are therefore expected to be slightly better than those given in Figures 6 and 7.

1.5.2 Summer season conditions

Summer season conditions are shown in Figure 7, and are described below.

Summer season conditions along Henry Street, within Triton Square and around the Euston Tower remain windy, in the 'Strolling' range with some areas of 'Standing'. Drummond Street and Brook Street have conditions in the 'Sitting' or 'Standing' ranges.

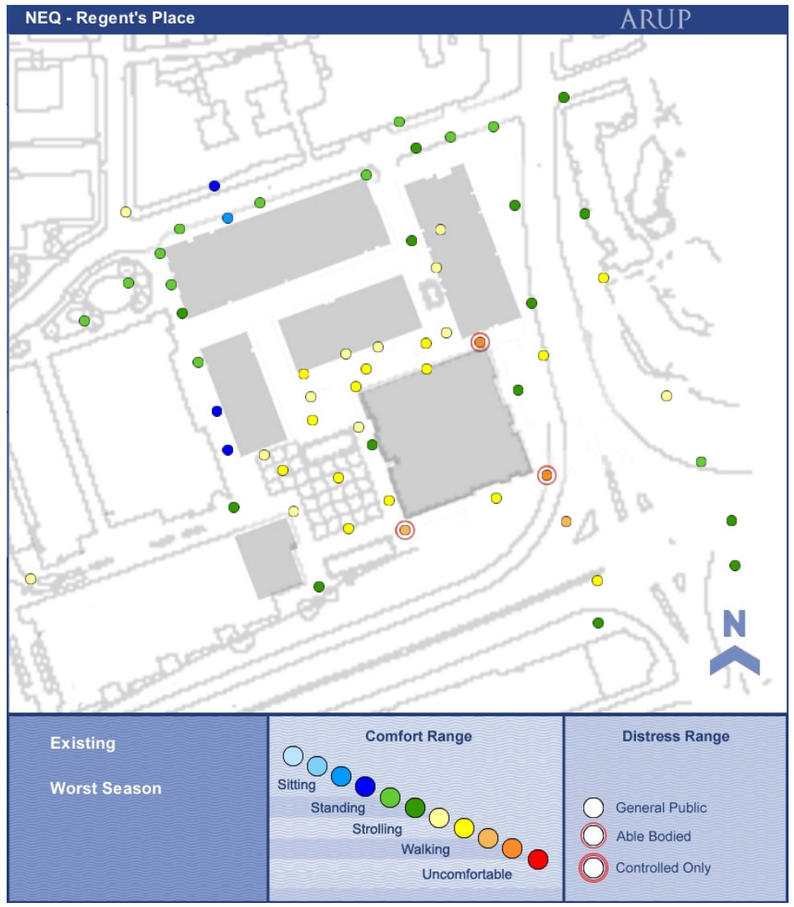

Figure 6 - Worst season conditions for the existing site.

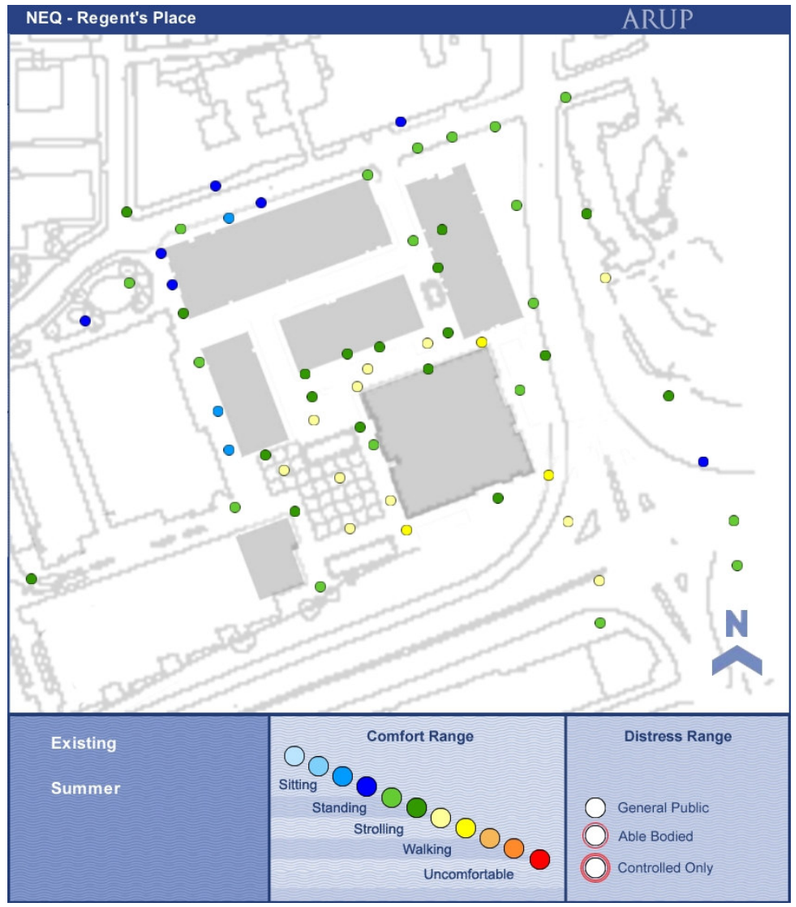

Figure 7 - Summer season conditions for the existing site.

1.5.3 Development without mitigation

The Development consists of commercial and residential buildings, sitting to the north of Euston Tower and Triton Square. The Drummond Street Private Housing development comprises a 25 storey tower. To the south and east of this tower respectively are the 9 storey Henry Street Office Building and the 9 storey Hampstead Road Affordable Housing block. The Triton Square Office Building is made up of 3 connected blocks of 8, 10, and 16 storeys. Figure 8 shows the site plan, while Figures 9 and 10 show images of the wind tunnel model of the Development.

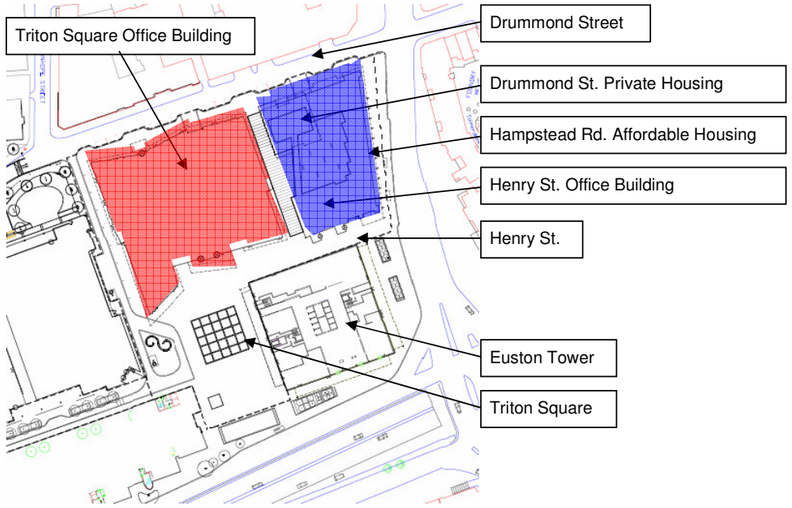

Figure 8 - Site plan of the Development.

Figure 9 - Image of the Development model (view from the south).

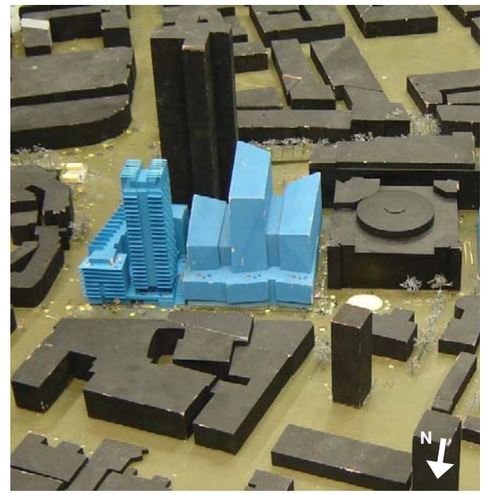

Figure 10 - Image of the Development model (view from the north).

1.5.4 Worst season conditions, Development without mitigation

Figure 11 shows the worst season conditions for the Development without mitigation.

Conditions within the Development site, described below, are generally in the 'Standing' or 'Strolling' range, with some local areas of 'Business Walking'. There is one exceedence of the distress criteria for 'General Access' on the Level 09 rooftop terrace on the Hampstead Road Affordable Housing. Mitigation measures are required in these areas as conditions are not appropriate for the intended use.

Conditions on the roof terraces of the Triton Square Office Building are shown to be in the lower 'Strolling' range and upper 'Standing' range. These conditions are acceptable for the intended occasional usage.

Conditions along Henry Street are slightly worse than existing, in the 'Business Walking' and Upper 'Strolling' ranges, and unacceptable for general access. This is unacceptable and improvements are necessary as conditions should be in the 'Strolling' range or better for this public walkway. It is noted however, that the wind conditions at the entrances to the Henry Street Office Building are in the 'Sitting' range. These are acceptable conditions for building entrances.

In Triton Square, conditions are generally in the Lower 'Strolling' range, which is a slight improvement from the existing site. In some localised areas greater improvement has been made, most apparently at the southwest corner of the Euston Tower. These conditions are now acceptable for general access; however further improvements are desired in order to achieve conditions suitable for regular use.

Conditions along Drummond Street and Brook Street are slightly worse than existing, generally in the 'Standing' range but with some localised 'Strolling' range conditions at the northern building corners. These conditions remain acceptable for general access.

Along Hampstead Road conditions are shown to be in the upper 'Standing' range and lower 'Strolling' range. These conditions are acceptable for general access use and therefore mitigation along this road is not imperative.

The conditions in the courtyard between the Drummond Street Private Housing, the Hampstead Road Affordable Housing, and the Henry Street Office Building are shown to be in the upper 'Strolling' and 'Standing' range. Although these conditions are acceptable for the intended use of the space, mitigation measures in the form of planting trees may offer a significant improvement in the conditions within this space.

When the wind conditions of the existing site are compared with those of the Development, the Development is shown to have minimal impact on the conditions in and around Osnaburgh Street, (this has also been demonstrated in previous studies). Along the east side of Hampstead Road the wind conditions remain fit for purpose, being in the upper 'Strolling' range. These conditions remain acceptable for general access.

The cumulative effect of the Osnaburgh Development and the NEQ Development, on the near-field wind conditions, has been shown in a series of wind tunnel investigations to be negligible when the mitigation measures on the two developments are employed.

1.5.5 Summer season conditions, Development without mitigation

Figure 12 shows the summer season conditions.

Summer season conditions are similar to existing, with the exception of Triton Square where there is some improvement due to the Development, with conditions generally in the upper 'Standing' range.

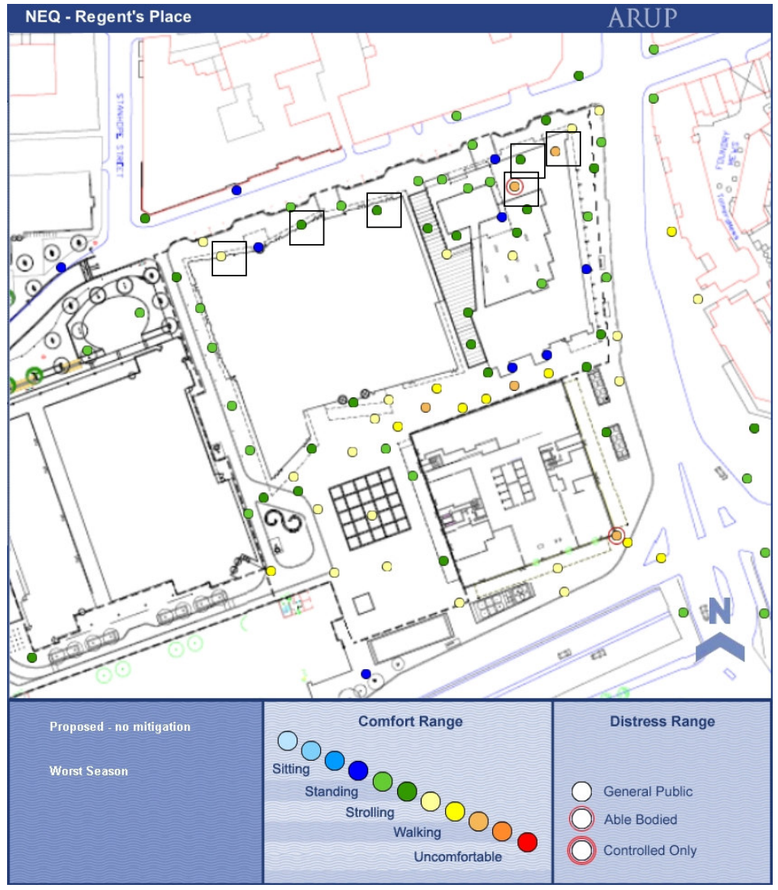

Figure 11 - Worst season conditions for the Development without mitigation. (NB Points inside squares are not at street level.)

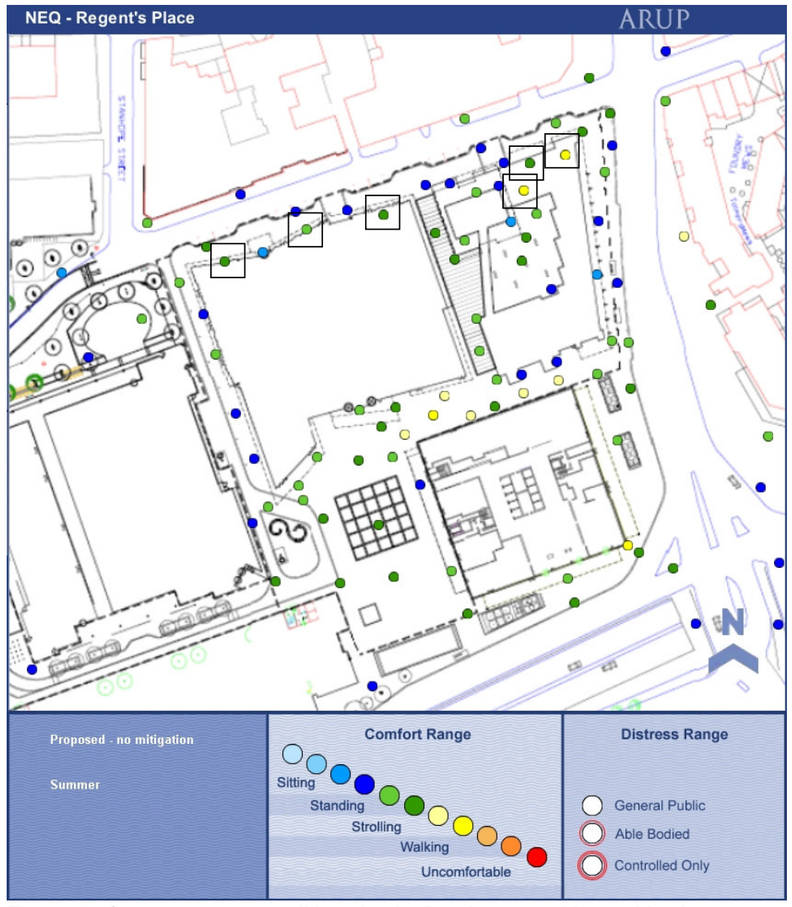

Figure 12 - Summer season conditions for the Development without mitigation. (NB Points inside squares are not at street level.)

1.5.6 Development with mitigation

Wind tunnel tests were carried out to assess the effectiveness of mitigation measures in improving the wind conditions around the development. Those discussed in the section below are the options which are to be included in the scheme.

Figure 13 below shows the final tested landscape features. Figures 14 to 17 show images of the mitigation measures in the wind tunnel model.

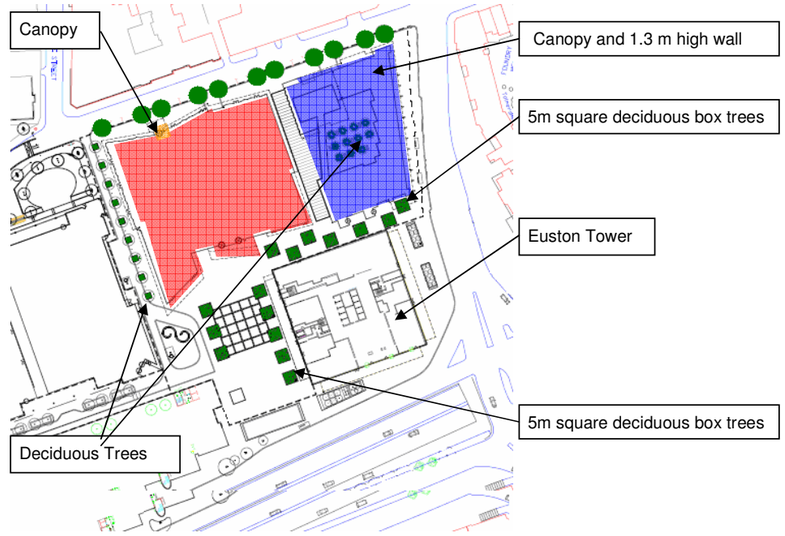

Figure 13 - Plan of the Development, with tested landscape features.

Figure 14 - Mitigation measures along Henry Street.

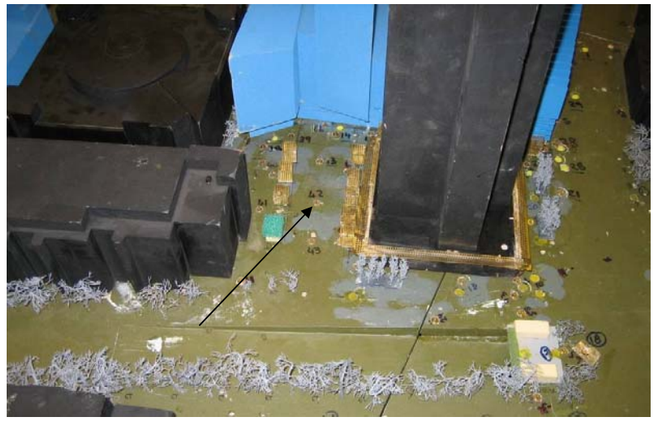

Figure 15 - Mitigation measures in Triton Square.

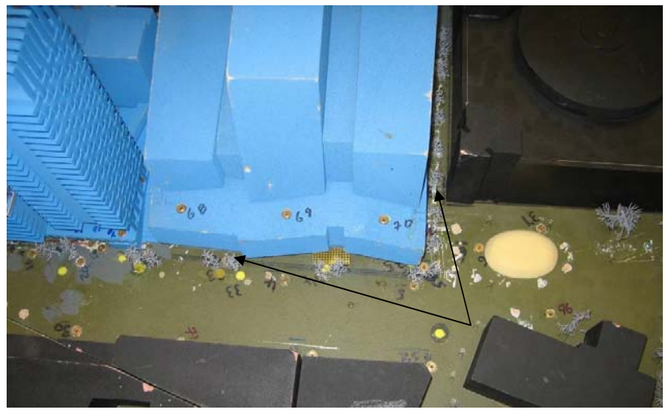

Figure 16 - Mitigation measures along Drummond Street and Brook Street.

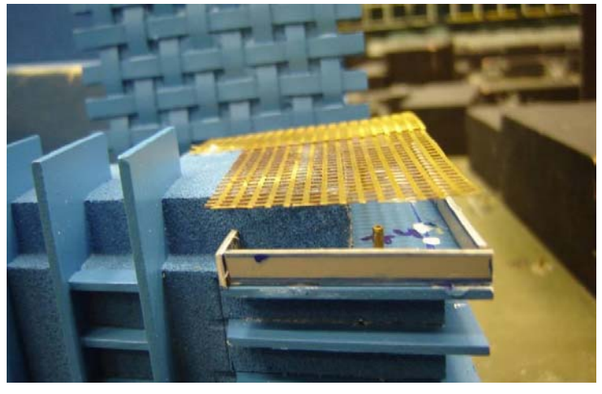

Figure 17 - Mitigation measures on Level 09 roof terrace.

1.5.7 Worst season conditions, Development with mitigation

Figure 18 shows the worst season conditions achieved with the mitigation measures.

With mitigation in place, worst season conditions in and around the Development are shown to be suitable for the intended uses of the area. The main areas are as follows:

Along Henry Street deciduous box trees in a staggered arrangement are used to interfere with the wind flow along the street. Worst season conditions along this street with these trees are significantly improved from the existing site conditions and are shown to be in the 'Strolling' range. This is acceptable for general access. At the building entrances to the Henry Street Office Building, conditions are in the 'Sitting' range; this is most appropriate for building entrances.

In Triton Square eight deciduous box trees are used to provide additional shelter to the square. Worst season conditions are in the 'Standing' range; this is an improvement on the existing site wind conditions.

The wind conditions at the main entrance to the Triton Square Office building from Triton Square are in the 'Standing' range. These conditions are acceptable for buildings entrances.

The tree planting along Brook Street improves conditions to the 'Sitting' and 'Standing' ranges which are good for general access and are similar to existing. Conditions at the building entrance to the Triton Square Office Building on Brook Street exhibit acceptable wind conditions, in the 'Sitting' range.

Conditions along Drummond Street are generally in the 'Standing' range and are fit for purpose. The northern entrance to the Triton Square Office Building remains in the 'Sitting' range. The wind tunnel test included a porous canopy over this entrance, however, previous tests have shown that this had no effect on conditions at the entrance and is not therefore essential to the scheme. The entrances to the Drummond Street Private Housing are in the 'Sitting' range and are therefore appropriate for their intended use.

Along Hampstead Road conditions are shown to be in the 'Strolling' and 'Standing' ranges, which continue to remain acceptable for general access use. Introducing landscaping along Hampstead Road may help to locally improve the wind conditions.

To the south and east of the Euston Tower, conditions are marginally improved when compared to the existing site, and are generally in the 'Standing' and 'Strolling' ranges. In addition, the distress criteria for 'General Access' is no longer exceeded. With the improvement in these wind conditions the areas are now acceptable for general access.

Conditions on the roof terraces of the Hampstead Road Affordable Housing are significantly improved by the incorporation of a solid 1.3 m high solid wall running around the outer edge of the terrace area and a 50 % porous canopy which follows the roof line of the current building and extends to the edge of the terrace area. The worst season conditions are now shown to be in the 'Standing' range and no longer exceed the criteria for 'General Access'.

The conditions in the courtyard between the Drummond Street Private Housing, the Hampstead Road Affordable Housing, and the Henry Street Office Building are shown to be in the lower 'Standing' and 'Sitting' range. These conditions are acceptable for the intended use of the space.

1.5.8 Summer season conditions, Development with mitigation

Figure 19 shows the summer season conditions achieved.

Summer season conditions in and around the Development are generally in the 'Standing' and 'Sitting' ranges and suitable for the intended pedestrian use.

In Triton Square summer season conditions are generally in the 'Standing' range. Further local shelter could be provided by porous screens in order to create areas suitable for sitting, but the current configuration of the box trees provides a significant improvement in wind conditions when compared to those measured on the existing site, and are acceptable for the proposed use.

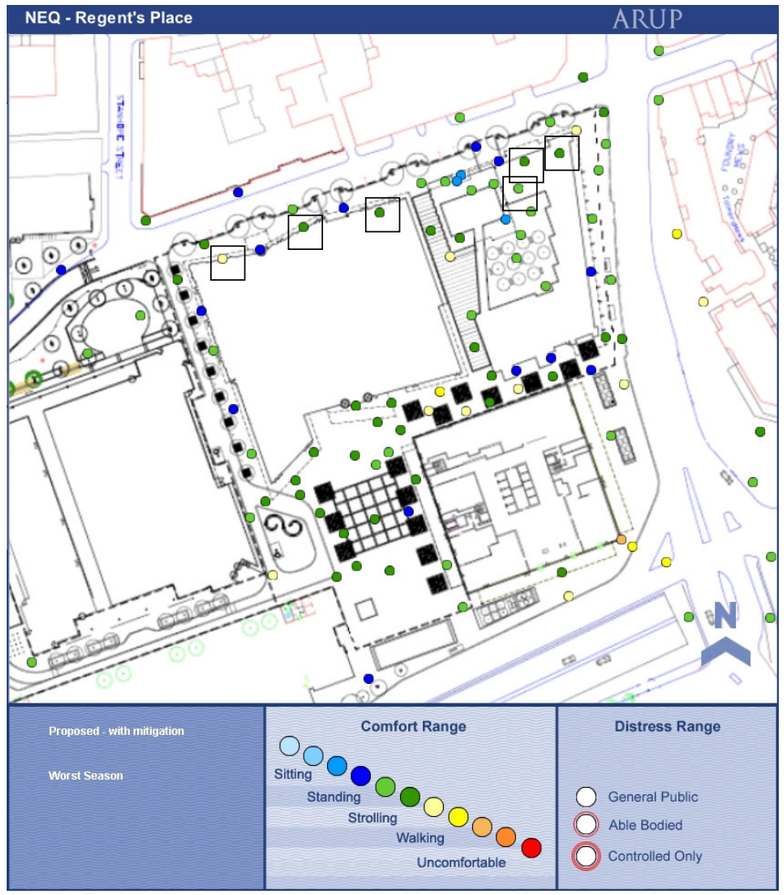

Figure 18 - Worst season conditions for the Development with mitigation. (NB Points inside squares are not at street level.)

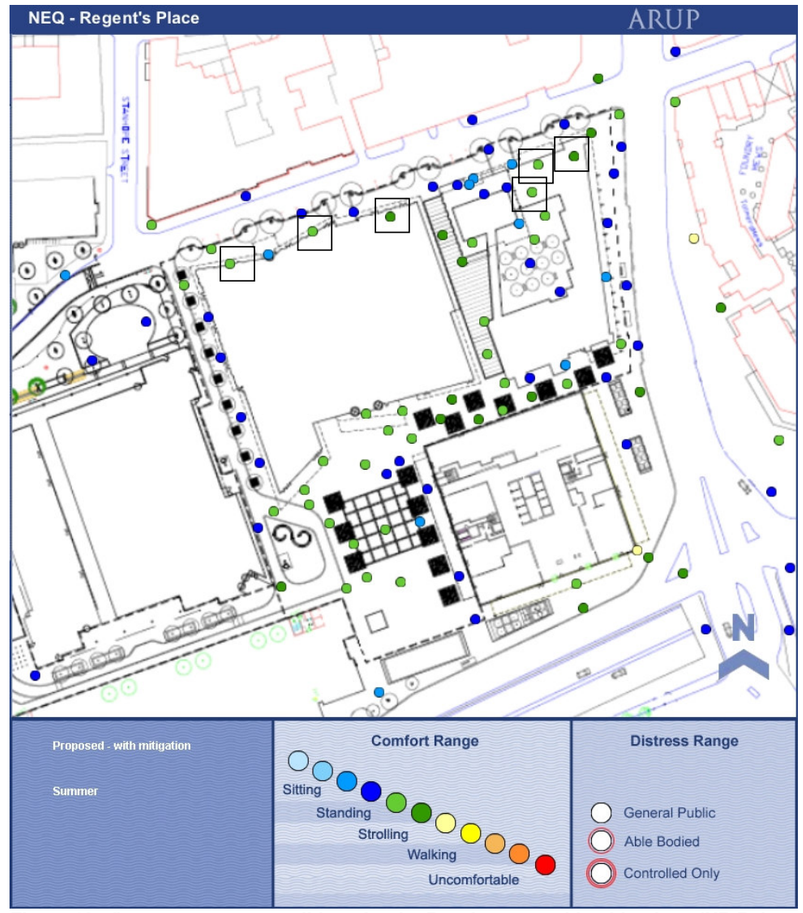

Figure 19 - Summer season conditions for the Development with mitigation. (NB Points inside squares are not at street level.)

1.6 Conclusions

A series of wind tunnel tests have been carried out to assess the windiness around the Regent's Place North East Quarter Development. Conditions around the Development are compared with existing conditions and windiness is described in terms of appropriateness for intended uses. A series of planted deciduous trees and a porous canopy around the site provided the necessary mitigation to achieve the conditions described below:

- The worst season conditions around the Development Site are generally in the "Standing" and "Strolling" ranges, which is acceptable for pedestrian access. All building entrances were observed to have acceptable "Sitting" or "Standing" range conditions.

- Summer conditions around the Development are generally in 'Standing' or 'Sitting' ranges. Conditions in Triton Square on a good day would be suitable for outside entertainment and seating areas.

- Wind conditions in the surrounding streets are generally similar to the existing conditions and in some locations, a marginal improvement upon the existing conditions. In all cases, the wind conditions are acceptable for purpose in given locations. The impact of the development is therefore negligible.

The British Land plc

Regent's Place North-East Quarter and Osnaburgh Site

Cumulative Impact - Environmental Wind Study

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The British Land plc

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Ove Arup & Partners Ltd
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1 Environmental Wind Study

1.1 Introduction

This chapter of the Environmental Statement (ES), written by Arup, assesses the cumulative change in environmental windiness caused by the Regent's Place North East Quarter (NEQ) and the Osnaburgh Street Developments, and the impact that these changes have on pedestrian comfort and safety in and around the two Developments.

The presence of the taller building among medium rise buildings provides the potential for windiness in surrounding areas. The windiness depends on both the massing of the buildings within their surroundings and the orientation compared to the prevailing winds.

The design of a new urban environment gives an opportunity for creating amenable external spaces and minimising areas of windiness through good design practice from the outset.

A series of wind tunnel investigations have therefore been made to quantify this and guide the design to assess whether conditions will be acceptable. The results of the wind tunnel tests are interpreted giving an overview of the wind conditions in terms of usability for pedestrian activities.

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1.2 Review of Development Proposals

The Regent's Place NEQ Site sits to the north of Euston Tower and to the west of Hampstead Road. The buildings in the surrounding area include Euston Tower to the south, approximately 36 storeys, and low to medium-rise developments of between 3 - 7 storeys to the north and west.

The Development comprises of the Drummond Street Private Housing, a 25 story tower, the Hampstead Road Affordable Housing and the Henry Street Office Building, both 9 storeys. The Triton Square Office Building is to the west. The Development also includes areas, such as Triton Square to the south of the Triton Square Office Building, where comfortable external environments (for eating, shopping, outside entertainment etc.) are desired for much of the year. In other areas, especially around the residential building, pedestrian access will be required throughout the year.

The Osnaburgh Street Site is to the west of the NEQ Development and situated to the north of Euston Road and to the east of Osnaburgh Street. The area is reasonably developed with the White House Hotel and Holy Trinity Church to the west and office buildings approximately 10 storeys in height to the east. The Development is mixed use with a residential building to the north (including a 20 storey tower) and two commercial buildings to the south.

The Development comprises areas where comfortable external environments (for eating, shopping etc.) are desirable for much of the year. In other areas, especially the residential building, pedestrian access will be required throughout the year.

1.3 Methodology

1.3.1 Wind Tunnel Modelling

The effect of the two Developments on wind at street level was evaluated using the methodology described in "The evaluation of the windiness of a building complex before construction", TV Lawson, London Docklands Development Corporation. This method has been used widely in the UK and elsewhere.

The wind tunnel studies were undertaken by BMT Fluid Mechanics Ltd. A 1:300 scale model of the two Sites and there surroundings were constructed and placed in the wind tunnel for testing.

The windiness at locations around the Sites was measured using this scale model of the existing site and the Developments. Gust and mean wind speeds were measured using Irwin probes for sixteen equal increments of wind direction and at locations chosen either due to sensitive activities expected in the area (building entrances, external seating etc.) or because the site geometry suggested the possibility of undesirable wind conditions.

The measured wind speed ratios were combined with the expected statistics for wind strength and direction for London (probabilities of strength and direction) obtained from the Holborn Weather Centre to calculate the windiness for each season of the year based on the "comfort" and "distress" criteria described below.

1.3.2 Lawson Criteria

The acceptability of windiness is subjective and depends on a number of factors, most notably the activities to be performed. The Lawson Criteria has therefore been developed to enable a quantitative assessment of acceptability for particular activities in terms of "comfort" and "distress" (safety); these are described in Table 1 in order of increasing windiness.

Criteria	Description
Long term 'Sitting'	Reading a newspaper and eating and drinking
'Standing' or short term sitting	Appropriate for bus stops, window shopping and building entrances
Walking or 'Strolling'	General areas of walking and sightseeing
'Business Walking'	Local areas around tall buildings where people are not expected to linger

Table 1 - Comfort criteria as defined by TV Lawson.

These conditions are the limiting criteria for comfort. For ideal conditions the windiness will be a category better than the limiting conditions above.

In the following assessment, the words 'Sitting', 'Standing', 'Strolling' and 'Business Walking' are used to describe comfort levels of windiness defined by Table 1.

The comfort criteria above describe more frequent wind conditions. There is also a distress criterion for "General Access", equivalent to a mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year. Conditions in excess of this limit may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.

There is a further limiting distress criterion beyond which even "Able-Bodied" individuals may find themselves in difficulties at times. This corresponds to a mean speed of 20 m/s and a

gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Beyond this gust speed aerodynamic forces approach body weight and it rapidly becomes impossible to remain standing.

Distress Criteria	Description
'General Public Access'	Above which the less able and cyclists find conditions physically difficult
'Able-Bodied Access'	Above which it becomes increasingly impossible for an able bodied person to remain standing

Table 2 - Distress criteria as defined by TV Lawson.

1.3.3 Wind Climate

The most frequent and strongest winds of the UK at all times of the year blow from a quadrant centred on WSW (240°E of N). These winds are relatively warm and wet. Almost all cases of serious annoyance due to strong winds around buildings are caused by these winds.

NE winds are almost as common as the SW winds during the spring but are weaker. NE winds are relatively cold and dry. These winds are often associated with poor internal conditions due to cold air infiltrating through doors.

Winds from the NW can be as strong as the SW winds but are less frequent. They are relatively cold and can bring snow in winter.

SE winds are generally warm and light and are rarely associated with annoying ground level winds.

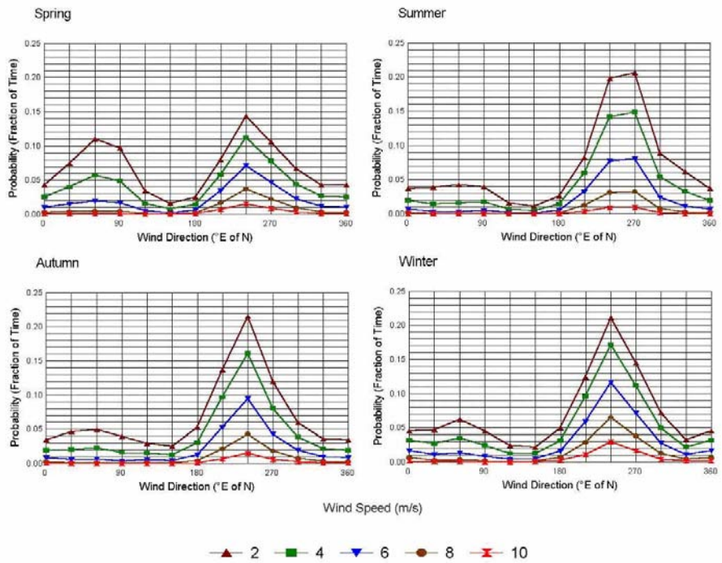

Figure 1 - Probability of wind speed with direction for each season.

1.3.4 Visualisation of Wind Results

The results of the wind tunnel study on pedestrian safety and comfort are graphically displayed in figures within sections 4 to 7. For ease of identification, comfort conditions at each measurement location are indicated by the colour of the spot. Figure 2 below shows the colour scheme used to represent the comfort conditions. The shade of the colour indicates whether the conditions are in the upper or lower end of that range. All upper podium level measurements are marked with a black square around the measurement point.

Red circles around a spot indicate an exceedence of the distress criteria as indicated in Figure 2.

Figure 2 - Visual representations of the Lawson Criteria.

1.4 Assessment

The results of the following wind tunnel test configurations are presented in this assessment:

- Existing site.
- The two Developments with mitigation measures.

Only 'Worst Season' and 'Summer' conditions are presented. 'Worst Season' is typically winter (December to February) but, at some locations, may be spring (March to May) depending on the geometry of the buildings. The 'Worst Season' conditions should be considered for activities likely to take place at all times of the year. 'Summer' (June to August) conditions are representative of the effect on activities that are only likely to occur outdoors in the warmer months.

1.5 Existing site

The existing site consists of a series of medium rise office and residential buildings. To the south of the existing Regent's Place NEQ site are Euston Tower and the open space of Triton Square. To the east and south of the Osnaburgh Street Development are larger office buildings, approximately 10 - 12 storeys in height.

Photographs of the model for this configuration are presented in Figures 3 and 4. A Site Plan is shown in Figure 5.

Figure 3 - View of the existing site model from the southwest.

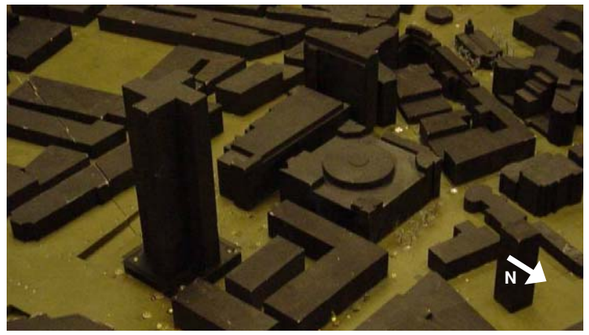

Figure 4 - View of the existing site model from the northeast.

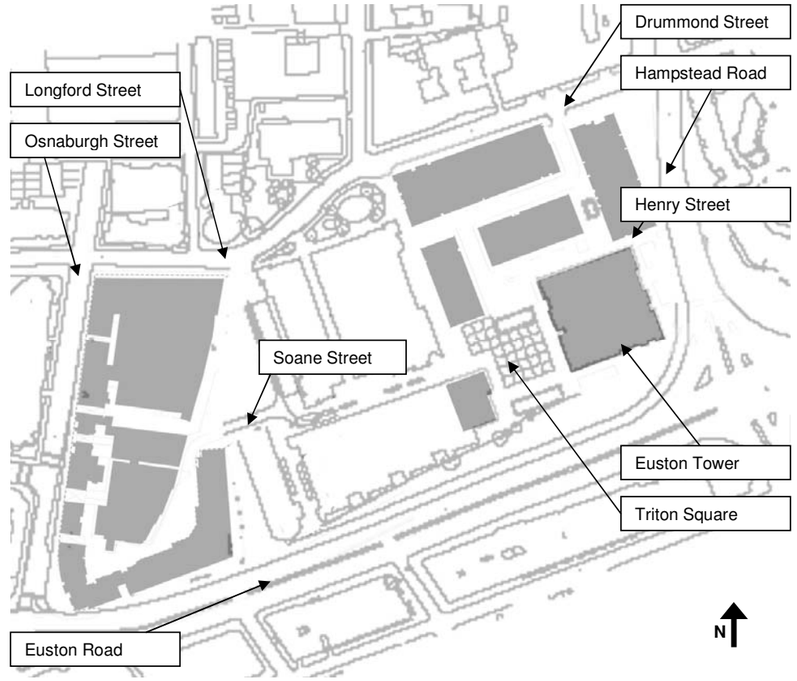

Figure 5 - Existing site plan.

1.5.1 Worst season conditions

Worst season conditions for the existing site are shown in Figure 6, and are described below:

Conditions along Henry Street are generally in the ‘Strolling’ range, the one exception is in the area where the gap narrows, where conditions are shown to be in the ‘Business Walking’ range with exceedence of the Distress Criteria for ‘General Public’ access.

In Triton Square conditions are generally in the ‘Strolling’ range.

Conditions along Drummond Street are relatively sheltered, with conditions in the ‘Standing’ or ‘Sitting’ ranges.

At the southern corners of Euston Tower the conditions are in the ‘Business Walking’ range with an exceedence of the Distress Criteria for ‘General Public’ access.

Along Hampstead Road conditions are generally in the ‘Standing’ range with some local ‘Strolling’ range conditions.

Conditions along Osnaburgh Street and Longford Street are observed to be mainly in the ‘Standing’ range, with occasional ‘Strolling’ conditions near the corner of Euston Road and opposite the end of the White House Hotel.

Increased windiness is observed around the 338 Euston Road building with conditions in the ‘Business Walking’ range measured in the area between 338 Euston Road and 350 Euston Road.

1.5.2 Summer season conditions

Summer season conditions are shown in Figure 7, and are described below.

Summer season conditions along Henry Street, within Triton Square and around the Euston Tower remain windy, in the 'Strolling' range with some areas of 'Standing'. Drummond Street exhibits conditions in the 'Sitting' or 'Standing' ranges.

Conditions around the Osnaburgh Street Development are predominantly in the 'Standing' and 'Sitting' range but with increased windiness in the 'Strolling' range measured in the area between 338 Euston Road and 350 Euston Road.

These measured conditions are commensurate with anecdotal experience of the windiness around the existing site

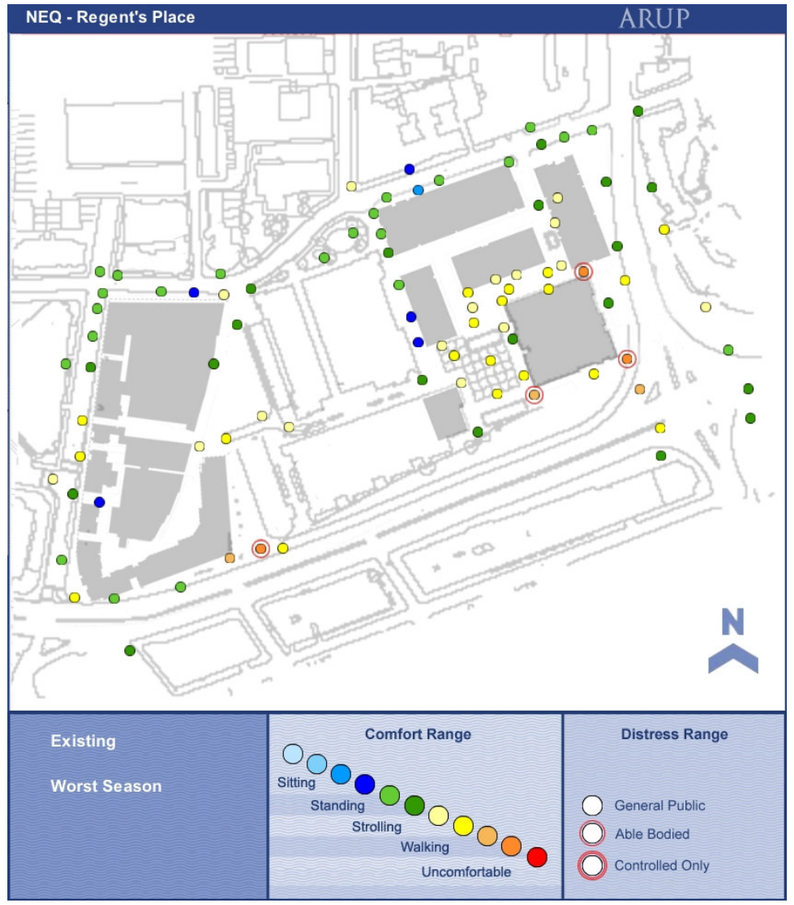

Figure 6 - Worst season conditions for the existing site.

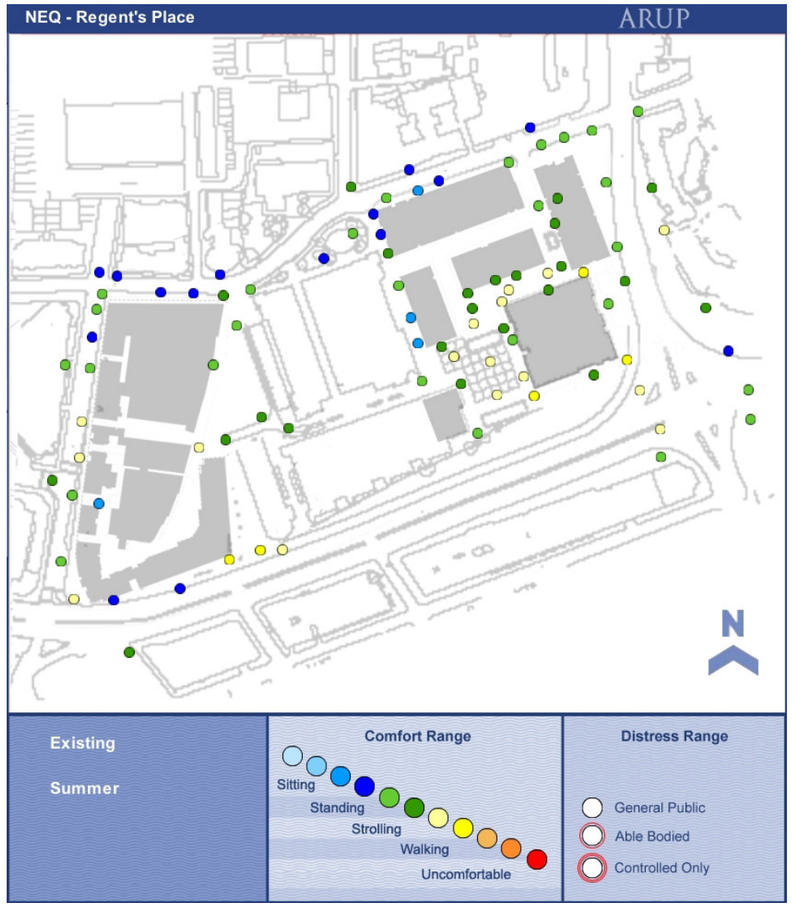

Figure 7 - Summer season conditions for the existing site.

1.5.3 Development with mitigation

The Regent's Place NEQ Development consists of commercial and residential buildings, sitting to the north of Euston Tower and Triton Square. The Drummond Street Private Housing development comprises a 25 storey tower. To the south and east of this tower respectively are the 9 story Henry Street Office Building and the 9 story Hampstead Road Affordable Housing block. The Triton Square Office Building is made up of 3 connected blocks of 7, 15, and 9 storeys in height from east to west.

The Osnaburgh Street Development consists of a residential building to the north of the site arranged around a courtyard and a 20 storey tower on the northwest corner of the site. To the south are two commercial buildings with a pedestrian street, Soane Street, running east west between them. These buildings are 10 and 11 storeys in height.

Wind tunnel tests were carried out to assess the effectiveness of mitigation measures in improving the wind conditions around the two Developments. Those discussed in the section below, and shown in the Site Plan in Figure 8 and in the photographs in Figures 9 – 14, are the options which are to be included in the schemes.

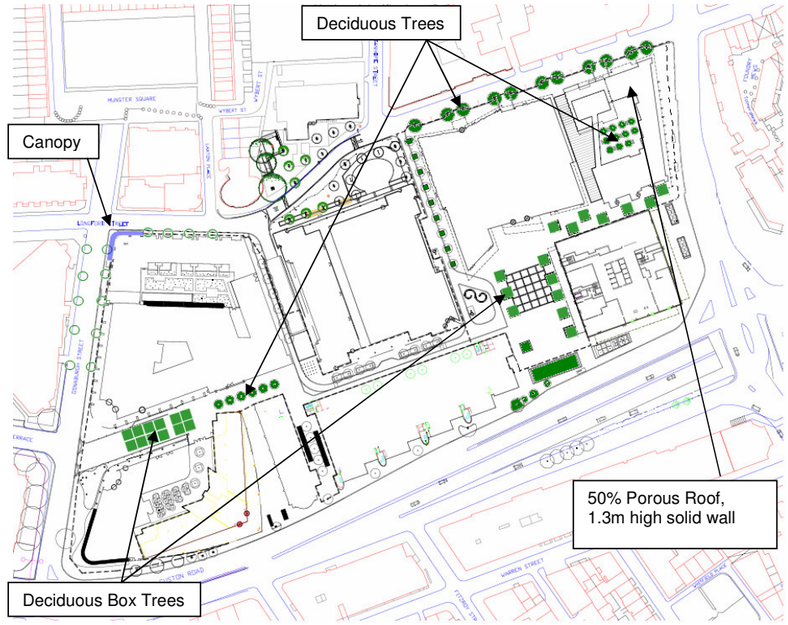

Figure 8 – Site Plan of the Development, with tested wind mitigation measures.

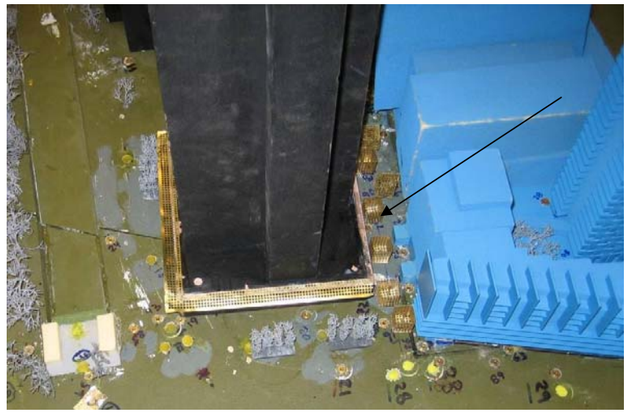

Figure 9 - Mitigation measures along Henry Street.

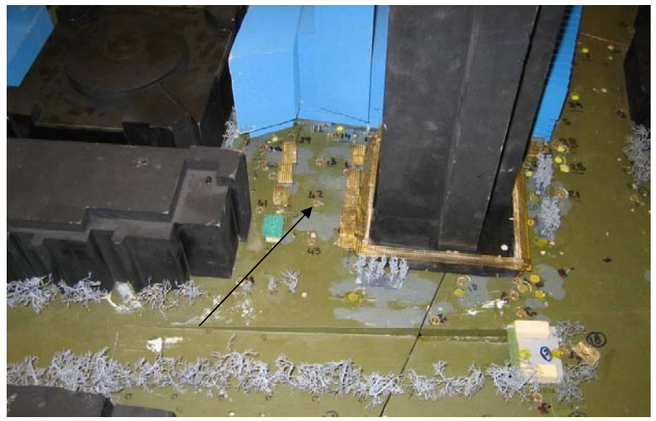

Figure 10 - Mitigation measures in Triton Square.

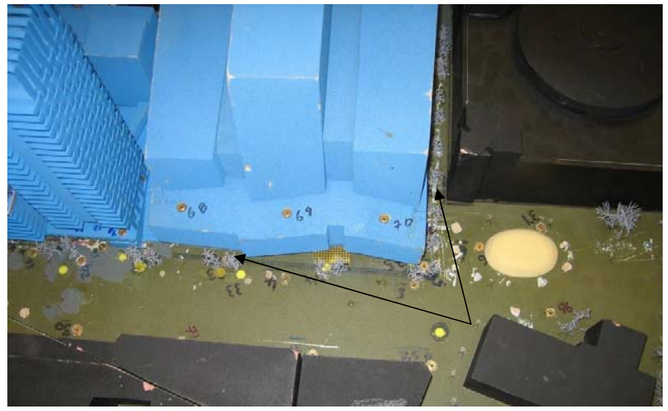

Figure 11 - Mitigation measures along Drummond Street.

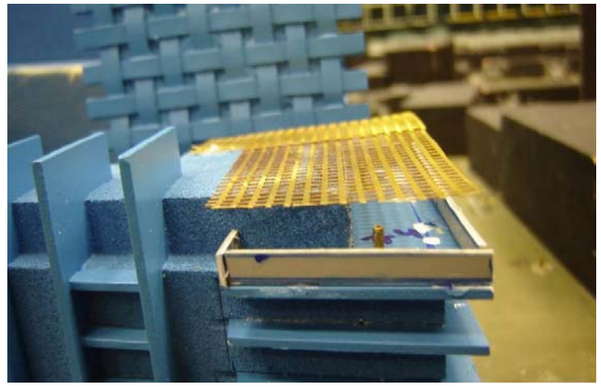

Figure 12 - Mitigation measures on Level 09 roof terrace of affordable housing block.

Figure 13 - Mitigation measures on Osnaburgh Site.

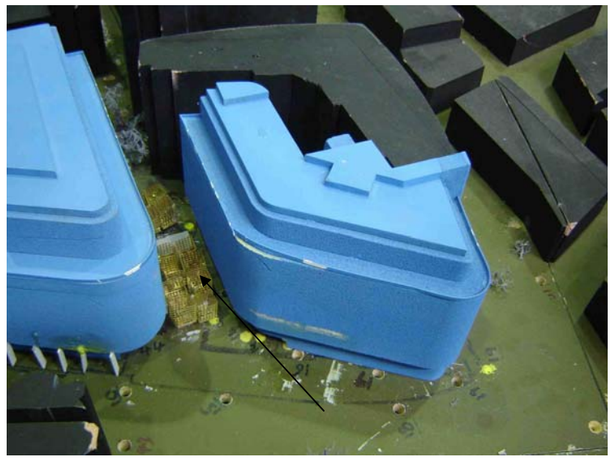

Figure 14 - Mitigation measures along Soane Street.

1.5.4 Worst season conditions, Development with mitigation

Figure 15 shows the worst season conditions achieved with the mitigation measures.

With mitigations in place, worst season conditions in and around the Development are shown to be suitable for the intended uses of the area. The main areas are as follows:

Along Henry Street deciduous box trees in a staggered arrangement are used to interfere with the wind flow. Worst season conditions along this street with these trees are significantly improved from the existing site conditions and are shown to be in the 'Strolling' range. This is acceptable for general access. At the building entrances to the Henry Street Office Building, conditions are in the 'Sitting' range; this is most appropriate for building entrances.

In Triton Square eight deciduous box trees are used to provide additional shelter to the square. Worst season conditions are in the 'Standing' range; this is an improvement on the existing site wind conditions.

Conditions at the building western entrance to the Triton Square Office Building exhibit acceptable wind conditions, in the 'Sitting' range.

Conditions along Drummond Street are generally in the 'Standing' range. However, the northern entrance to the Triton Square Office Building remains in the 'Sitting' range. The wind tunnel test included a porous canopy over this entrance, however, previous tests have shown that this had no affect on conditions at the entrance and is not therefore essential to the scheme. The entrances to the Drummond Street Private Housing are in the 'Sitting' range and are therefore appropriate for their intended use.

Along Hampstead Road conditions are marginally worse in some local locations than the existing site conditions and are shown to be in the 'Strolling' and 'Standing' ranges. These conditions continue to remain acceptable for general access use.

To the south and east of Euston Tower conditions are marginally improved when compared to the existing site, are generally in the 'Standing' and 'Strolling' ranges and are acceptable for general access.

Conditions on the roof terraces of the Hampstead Road Affordable Housing are significantly improved by the incorporation of a solid 1.3 m high solid wall running around the outer edge of

the terrace area and a 50 % porous canopy which follows the roof line of the current building and extends to the edge of the terrace area. The worst season conditions are now shown to be in the 'Standing' range and no longer exceed the criteria for 'General Access'.

The conditions in the square between the Drummond Street Private Housing, the Hampstead Road Affordable Housing, and the Henry Street Office Building are shown to be in the lower 'Standing' and 'Sitting' range. These conditions are acceptable for the intended use of the space.

The conditions on Osnaburgh Street remain generally in the 'Standing' and 'Strolling' ranges, which are acceptable for pedestrian access around the buildings. The entrance to the residential tower is sheltered beneath the colonnade and has 'Sitting' range conditions which are acceptable for the intended use.

The conditions on the pavement adjacent to the residential building entrances on Osnaburgh Street are in the 'Standing' range which is acceptable for entrance use.

Conditions along Longford Street remain a mixture of 'Sitting' and 'Standing' range conditions, which are acceptable for pedestrian access and the building entrances in this area and are similar to existing conditions.

Worst season conditions along the western end of Soane Street between the two commercial buildings are in the 'Sitting' and 'Standing' ranges. This is suitable for pedestrian access and a retail environment. Conditions at the entrances to the buildings are in the 'Sitting' range which is acceptable for this area.

The eastern end of Soane Street, to the north of 338 Euston Road, has conditions generally in the 'Strolling' range, which are similar to existing and acceptable for general access. The entrance to the Diorama has been recessed to create acceptable 'Sitting' range conditions.

The area between the 350 Euston Road and 338 Euston Road building remains similar to the existing conditions with 'Strolling' and 'Business Walking' conditions. The Development does not make any significant difference to conditions in this area.

1.5.5 Summer season conditions, Development with mitigation

Figure 16 shows the summer season conditions achieved on the two Developments with mitigation.

Summer season conditions in and around the two Developments are generally in the 'Standing' and 'Sitting' ranges and suitable for the intended pedestrian use.

In Triton Square summer season conditions are generally in the 'Standing' range. Further local shelter could be provided by porous screens in order to create areas suitable for sitting, but the current configuration of the box trees provides a significant improvement in wind conditions when compared to those measured on the existing site.

'Sitting' conditions are achieved in the NE corner of the courtyard to the residential building. Wind conditions along Soane Street will be suitable for a good retail area, with the benefit of low 'Sitting' range conditions in the area intended for external eating. The summer wind conditions exhibited on the two Developments are similar or improved from the existing conditions.

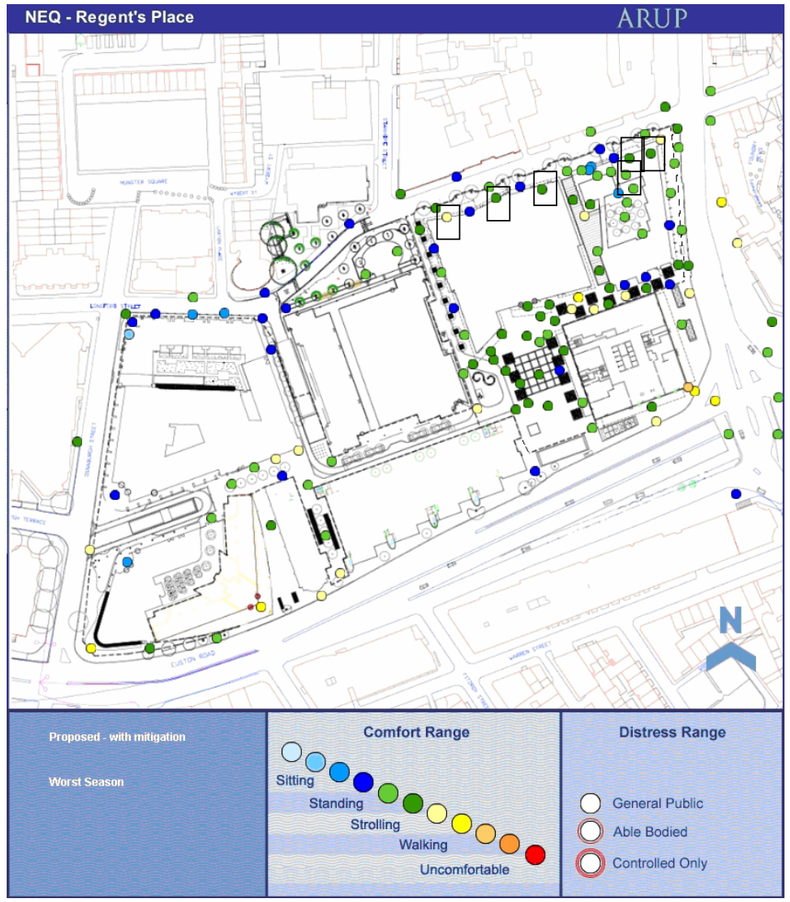

Figure 18 - Worst season conditions for the Development with mitigation. (NB Points inside squares are not at street level.)

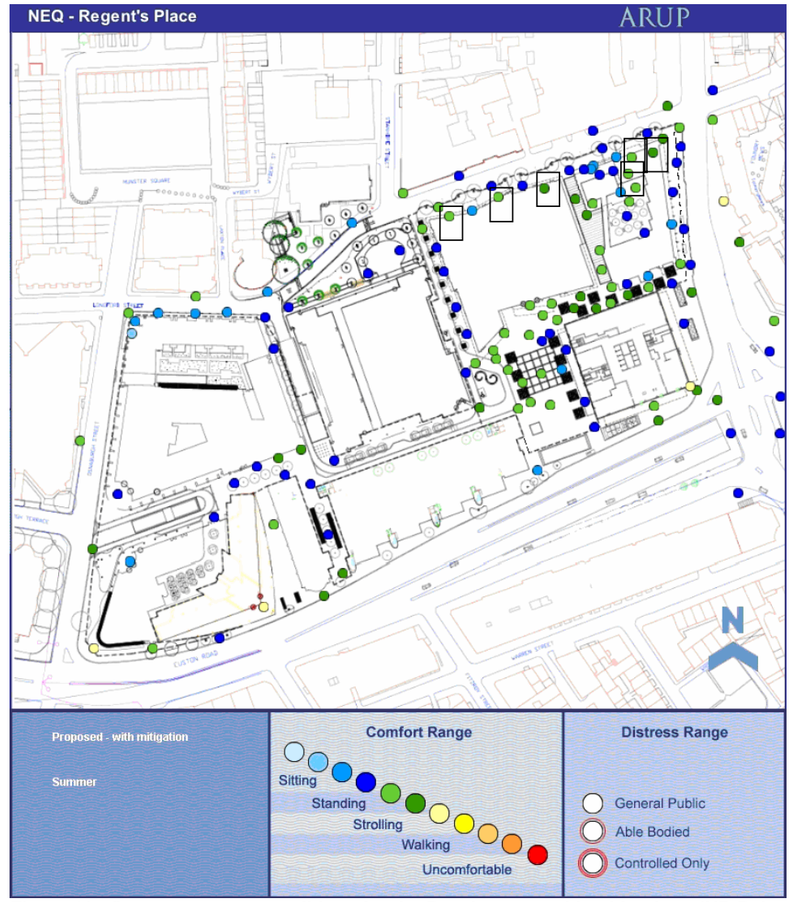

Figure 19 - Summer season conditions for the Development with mitigation. (NB Points inside squares are not at street level.)

1.6 Conclusions

A series of wind tunnel tests have been carried out to assess the windiness around the Regent's Place NEQ Development and Osnaburgh Street Development. Conditions around these two Developments are compared with existing conditions and windiness is described in terms of appropriateness for intended uses. A series of planted deciduous trees and canopies around the site provided the necessary mitigation to achieve the conditions described below:

- The worst season conditions around the Development Site are generally in the "Standing" and "Strolling" ranges, which are acceptable for pedestrian access. All building entrances were observed to have acceptable "Sitting" or "Standing" range conditions. There is a marginal improvement compared to existing conditions at the southeast corner of Euston Tower.
- Summer conditions around the Development are generally in 'Standing' or 'Sitting' ranges. Conditions in Triton Square and along Soane Street on a good day would be suitable for an outside entertainment and seating areas.
- Wind conditions in the surrounding streets are generally similar to the existing conditions and in some locations, an improvement upon the existing conditions. The impact of the development is therefore negligible.
- In summer, 'Sitting' conditions have been achieved in the northeast corner of the courtyard on the Osnaburgh Street Development, within the residential development, with 'Standing' conditions elsewhere in the courtyard.
- 'Strolling' range conditions were observed at the eastern end of Soane Street, to the north of 338 Euston Road, which are suitable for general access. The entrance to the Diorama has been recessed to create acceptable 'Standing' range conditions.
- The area between the 350 Euston Road and 338 Euston Road building remains similar to the existing conditions with 'Strolling' and 'Business Walking' conditions.