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Client: Pure Data Centres Group

Project: Priestley Way, Brent

Report: Ecology Statement

QUALITY ASSURANCE

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Prepared by:	Paul White	Paul White
Authorised by:	Morgan Taylor	Morgan Taylor
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1.0 EXECUTIVE SUMMARY

Greengage Environmental Ltd was commissioned to undertake a desk-based assessment of potential ecological impacts associated with the operation of the proposed data centre known as Priestley Way, Brent (Phase 2A) in the London Borough of Brent. This Ecology Statement is a report of the assessment and presents discussion focusing on potential air quality impacts associated with the running of emergency generators upon the adjacent Brent Reservoir Site of Special Scientific Interest (SSSI) and other potential ecological receptors.

Critical load data are not available for the habitats or qualifying species present in the adjacent SSSI and interpretation of the predicted impact of NOx emissions has therefore been completed based on a review of literature and professional judgement.

On the basis of the critical levels and critical loads suggested in this report and associated predicted nitrogen deposition and airborne concentrations, no significant impacts are predicted upon the conservation status of the SSSI.

Although exceedances of modelled NOx and nutrient nitrogen thresholds are reported within the AQA, the area subject to 6-monthly testing exceedance within the SSSI is small, restricted to an area in the east already subject to exceedances, and the modelled outage scenario is based on a worst-case scenario that is considered highly unlikely to occur, based on historical outage data.

The conclusions of the Air Quality Assessment that no significant impacts will occur are therefore considered appropriate.

2.0 INTRODUCTION

Greengage Environmental Ltd was commissioned to undertake a desk-based assessment of potential ecological impacts associated with the operation of the proposed data centre known as Priestley Way, Brent (Phase 2A) in the London Borough of Brent. This Ecology Statement is a report of the assessment and presents discussion focusing on potential air quality impacts associated with the running of emergency generators upon the adjacent Brent Reservoir Site of Special Scientific Importance (SSSI) and other ecological receptors (nearby Local Wildlife Sites, (LWS)).

2.1 SITE DESCRIPTION

The survey area extends to approximately 1.7 hectares and is centred on National Grid Reference TQ 22265 87214, OS Co-ordinates 522265,187214.

The site predominantly comprises buildings and hardstanding. Other habitats include ephemeral/short perennial vegetation, introduced shrub, species poor hedgerow and scattered trees.

The site is located within Brent, a borough comprising largely residential, industrial and commercial development. The site lies on the outskirts of a business park with the A406 immediately abutting the southern boundary and the A5 running 0.2km east. Immediately to the north of the site lies the woodland edge that surrounds Brent Reservoir, a statutory designated Site of Special Scientific Interest (SSSI) and Local Nature Reserve (LNR). Other notable greenspace in the area is limited to playing fields and parks.

2.2 BACKGROUND

The existing adjacent data centre, hereinafter referred to as 'Phase 1', was granted an Environmental Permit (EPR/QP3706LH) for the operation of standby electricity generating plant, consisting of 16 x 7.31 megawatt thermal (MWth) generators with an aggregated thermal input of 117 MWth. The plant is to be used for emergency backup power in the event of a National Grid outage only. The installation is not expected to have any significant environmental impacts on local air quality.

Due to the nature of the data centre, it requires continuous power supply from the National Grid. In the event of a National Grid outage, the additional 40 generators (with a combined electrical input of approximately 132 MWe) will be utilised to maintain power. The generators will only be used for testing/maintenance and in an emergency power outage. They are expected to be tested for up to 30 minutes every month (for 10 months) and up to four hours twice a year. Generators are expected to be tested separately at full load (up to 100%) for the four-hour tests and may be tested in groups of up to eight at low load (up to 50%) for the 30-minute tests. In the assessment the generators have been modelled under the assumption that they will run on diesel fuel, whereas in reality, hydrotreated vegetable oil (HVO 100) fuel from sustainable sources, which has a lower emission rate for oxides of nitrogen (NOx), is likely to be used. Each generator will have an individual flue, these will be grouped into four groups of ten flues, all of which will terminate at a height of 43.1 m.

2.3 BRENT RESERVOIR SSSI

The SSSI citation[1] states:

The Brent Reservoir is of interest primarily for breeding wetland birds and in particular for significant numbers of nesting great crested grebe. The diversity of wintering waterfowl and the variety of plant species growing along the water margin are also of special note for Greater London.

The reservoir, formed in 1835 by damming the valley of the River Brent below the confluence of its two constituent tributaries, is among the oldest of London's many large artificial lakes. It is unusual in being characterised by naturally sloping earth banks and a shallow depth, features which have encouraged the development of a rich mixture of wetland and waterside habitats.

Along much of the shoreline there is a fringe of fenland plants and several of the species have a restricted distribution in Greater London, the more notable include common spotted orchid Dactylorhiza fuchsii and greater spearwort Ranunculus lingua. Toward the head of the northern and eastern areas where, respectively, the Silk Stream and Dollis Brook enter the reservoir, wetland plant communities are more extensive, in places covering large areas of in washed silt deposits. Here there are varied gradations from open water, through swamp and mixed species fen to willow carr, with damp willow woodland occupying the higher ground. The juxtaposition and expanse of these habitats is of particular value in attracting a noteworthy variety of breeding wetland birds.

Breeding birds of the swamp, fen and willow carr include reed and sedge warblers, reed bunting, redpoll and willow tit. The more secluded areas adjoining open water are the favoured nesting sites for waterfowl species. Coot, great crested grebe, little grebe, moorhen, mute swan, pochard, shoveler and tufted duck regularly breed and gadwall are normally resident during summer. The numbers of nesting great crested grebe are of special significance with recent marked increases making the colony the largest in Greater London and among the largest in Britain. Artificial raft islands anchored across the eastern reservoir arm attract another breeding species, common tern, and are used by waterfowl as loafing places. Further breeding species are recorded in the willow woodland, these include: bullfinch, greenfinch, jay, willow warbler and wren.

The wetlands are also of interest for their plant communities. The swamps are characteristically dominated by a single species, mainly bulrush Typha latifolia and common reed Phragmites australis. In contrast the fen communities comprise a complex mixture of many wetland plants including: lesser pond-sedge Carex acutiformis, great willowherb Epilobium hirsutum, meadow-sweet Filipendula ulmaria, soft rush Juncus effusus, gypsywort Lycopus europaeus, water forget-me-not Myosotis scorpioides, reed canary-grass Phalaris arundinacea, branched bur-reed Sparganium erectum and marsh woundwort Stachys palustris. It is in this community type that most of the locally uncommon species are to be found, for example: water-plantain Alisma plantago-aquatica, flowering rush Butomus umbellatus, water dock Rumex hydrolapathum and lesser bulrush Typha angustifolia.

In winter the combination of secluded wetland, shallows and extensive open water serves to attract a wide range of waterfowl. Maximum counts of pochard and gadwall occasionally reach levels of national significance while wintering waders include snipe and jack snipe. The reservoir has also long been noted as one of the major wintering sites in Greater London for smew, the scarcest of the regularly wintering species of duck in Britain.

Recently, in common with a regional trend, numbers have declined but it is still occasionally recorded in winter.

The most recent status review was in March 2019 in which all three units of the SSSI were found to be in a favourable condition. The review stated:

The interest feature for this site is the breeding bird assemblage that is associated with the open water and its margins. An assessment was carried out using breeding bird data provided by the BTO. Only data for species occurrences with 'probable' or 'confirmed' breeding codes were used (based on the BTO's breeding status codes) and species were only counted once. The assessment was based upon the scoring system on the criteria sheet from when the site was first notified. From these data a total assemblage score of 34 is achieved, which is above target set for the site (26) and above the minimum score threshold for the assemblage type (31). The suitability of the habitats that support the assemblage of breeding birds was also considered. These are the open water and their margins, including fringing fen, carr and woodland. A basic objective is that there should be no loss of 5% or more of important supporting habitat and that the habitats should be in suitable condition to support breeding birds associated with the assemblage type. These objectives are being met but there will be a need to ensure that encroachment of scrub into fen and reed bed is kept in check. The site continues to support good numbers of pochard, shoveler and reed warbler.

However, this is contrary to news reports on the state of the reservoir[2] which question the ecological condition of the site, however pressures appear to arise from other sources such as litter, rather than air quality.

Furthermore, the Chartered Institute of Ecological and Environmental Management (CIEEM) Air Quality Advice Note (January 2021)[3] states 'it is also important that people using [condition status information] are aware of its limitations, as it uses the Common Standards Monitoring approach that is focused on identifying the presence or abundance of particular indicator species, for example, which are not necessarily good indicators of the effects of poor air quality'.

The list of operations listed as potentially damaging to the special interest does not include air quality or specifically airborne NOx[4], but again this is not necessarily an indication that air quality impact does not pose a threat to the designation.

2.4 AIR QUALITY ASSESSMENT CONTEXT

Potential impact pathways for the SSSI as a consequence of the data centre development are considered to be limited to those relating to potential changes in surrounding air quality through the associated emissions from fossil fuel combustion.

The origin of these potential emissions is associated with the running of the forty additional standby diesel generators intended to power the data centre in the event of emergency outage; this outage would be at Elstree Power Station which is understood to have experienced no more than 3 outages in the past decade, each of which occurred for a maximum of 2 minutes.

Nonetheless, it is understood that these emergency generators will run under three scenarios:

- Every month (for ten months) each generator will be tested for thirty minutes. This test is designed to test start signals and generator run up and would be at no or very low load. Each generator would be tested separately to minimise short-term impacts on local air quality.
- Twice a year each generator will be tested for four hours and will be at or near 100% load. Again, generators would be tested separately to minimise the short-term impact on local air quality. It is noted that this level of testing is a contractual requirement and cannot be altered.
- In the event of a power outage at Elstree substation.

On this basis an air quality assessment (AQA) has been undertaken by Hoare Lea to consider the resultant concentrations of long-term (annual mean) and short-term (24-hourly mean) pollutants under the above regime. The assessment considered the individual operating scenarios and the cumulative impact of the three scenarios.

Pollutants assessed include:

- oxides of nitrogen (NOx)
- sulphur dioxide (SO2);
- nutrient nitrogen; and
- acidification.

An atmospheric dispersion model has been used to predict concentrations of these pollutants at key ecological receptors, including Brent Reservoir SSSI.

The AQA has been conducted in line with the Environment Agency's standard 2-stage screening process.

Herein this document presents and discusses the key findings of the Hoare Lea AQA in the context of potential ecological impact pathways relating to the SSSI.

2.5 COMPETENCIES

Paul White, who prepared this report, has a Bachelor's degree in Marine Biology (BSc Hons), a Natural England Great Crested Newt Licence and Dormouse Licence, and is an Associate member of CIEEM. Paul has over 16 years' experience in ecological surveying and has undertaken and managed numerous ecological surveys and assessments.

Morgan Taylor, who reviewed this report, has a first class bachelor's and master's degree in marine biology (MSci Hons), a Natural England CL17 Bat Survey Level 2 Class Licence (2015-7369-CLS-CLS) and CL10 Dormouse Survey Licence (2017-30817-CLS-CLS). Morgan is a Chartered Environmentalist, Full member of CIEEM and has over 11 years' experience in ecological surveying, having undertaken assessments of numerous development sites of this type. He leads the Ecology team at Greengage.

This report was written by Paul White and reviewed and verified by Morgan Taylor who confirms in writing (see the QA sheet at the front of this report) that the report is in line with the following:

- Represents sound industry practice;
- Reports and recommends correctly, truthfully and objectively;
- Is appropriate given the local site conditions and scope of works proposed; and
- Avoids invalid, biased and exaggerated statements.

3.0 DISCUSSION

3.1 POTENTIAL ECOLOGICAL IMPACT

The Air Pollution Information System (APIS) and the scientific literature identifies a wide range of potential impacts caused through exceedances of critical levels and loads. These include, but are not limited to:

NOx

- Visible symptoms for example, leaf discoloration;
- Direct damage to mosses, liverworts and lichens, which receive their nutrients largely from the atmosphere;
- Direct Eco physiological impact to fauna, e.g. responses in birds to air pollution include respiratory distress and illness, increased detoxification effort, elevated stress levels, immunosuppression, behavioural changes, and impaired reproductive success[5]; and
- Changes in species composition.

Nitrogen deposition

Terrestrial impacts:

- Changes in species composition especially in nutrient poor ecosystems with a shift towards species associated with higher nitrogen availability (e.g. dominance of tall grasses);
- Reduction in species richness;
- Increases in plant production;
- Decrease or loss of sensitive lichens and bryophytes;
- Increases in nitrate leaching.

Freshwater impacts:

- Potential in N-limited systems to change algal productivity and nutrient regimes in upland lakes;
- Increase rate of succession.

Acid deposition

Terrestrial impacts:

- A decrease in soil base saturation, increasing the availability of aluminium (Al3+) ions, which may cause toxicity to plants and mycorrhiza, and have a direct effect on Lower plants (bryophytes and lichens);

Freshwater impacts:

- An increase in Al3+ concentrations, impacts on invertebrate populations, and toxicity to fish.

3.2 AQA FINDINGS

The 2023 AQA uses the same potential ecological receptors as those submitted in the Phase 1 report, as follows:

Ecological Receptor ID	Description
E1	Brent Reservoir SSSI
E2	Harp Island LWS
E3	Grange Roundabout Nature Area LWS
E4	Dollis Hill Reservoir LWS
E5	Gladstone Park LWS
E6	Dudding Hill Loop between Cricklewood and Harlesden LWS
E7	Railway Cutting LWS
E8	Metropolitan Line between Kilburn and Neasden LWS
E9	Clitterhouse Playing Fields LWS
E10	Clarefield Park LWS
E11	Lower Dollis Brook LWS
E12	Hendon Park and Northern Line LWS
E13	Silk Stream and Burnt Oak Brook LWS
E14	Kingsbury Road Bank LWS
E15	Meadow Way Copse LWS

Locations are shown in Figure 3.1 below.

Figure 3.1 Ecological Receptor Locations

The AQA summarises predicted habitat impacts as follows.

Six Monthly Testing

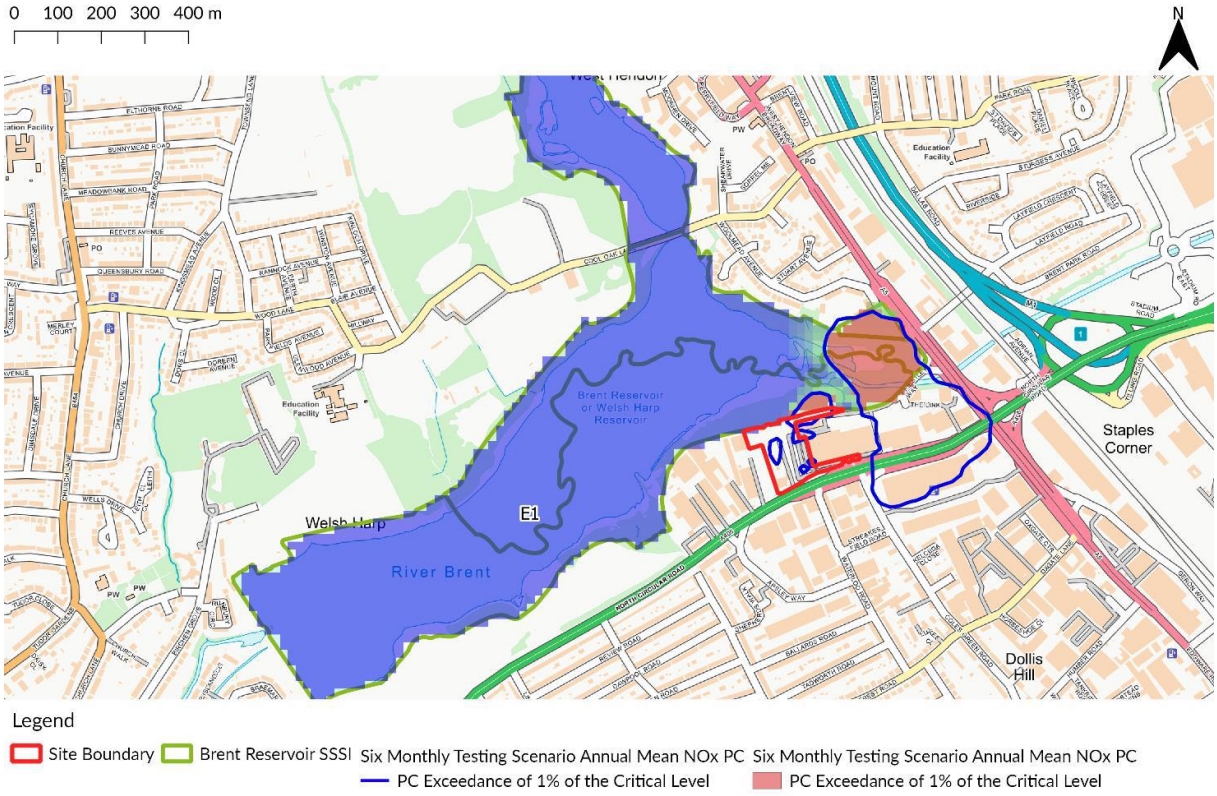
NOx

The AQA rules out impacts of NOx under the six-monthly testing scenario, on all ecological receptors, including the SSSI, as insignificant (either screened out at stage 1 or calculated as below significant thresholds under stage 2), with the following exception:

- For annual mean NOx, the AQA notes that at 1.5% of critical level, the Process Contribution (PC) at E1 (Brent Reservoir SSSI) exceeds 1%, and therefore impacts cannot be screened out under Step 1 of the air emissions risk assessment process.
- Although in step 2 of the screening process, the maximum Predicted Environmental Concentration (PEC) at E1 is noted as 35.8 µg/m3, or 119.2% of the critical level, this is because PEC exceeds the critical level due to the background concentrations already exceeding the critical level at E1. It is also noted that the background concentration considered here is from 2019 which is a conservative approach, as the background concentration within the opening year is likely to be lower. Furthermore, the area of Brent Reservoir that is predicted to experience a PC greater that 1% of the critical level is a small section of the SSSI in the eastern corner.
- The AQA concludes that, as outlined within the ecology report (ref. 551767mtMar22FV05_Ecology_Statement), submitted for the Phase 1 permit (EPR/QP3706LH), the SSSI is primarily a wet woodland located in an urban setting, and therefore it is likely to be more resilient to nitrogen input as it is already subject to long term NOx concentrations exceeding the critical level. The NOx background concentrations already exceeding the critical level is likely a result of the nearby busy roads, such as the A406 North Circular, the A5 and the M1. Furthermore, the ecology report stated that airborne NOx is not on the list of pollutants that are potentially damaging to the SSSI. As such the impacts on annual mean NOx at E1 within the testing scenario are likely to be not significant.

Figure 3.2 below shows the contour plan for the six-monthly resting scenario.

Figure 3.2 Six-Monthly Test Scenario Annual Mean NOx PC Contour



SO_2

The impact of SO2 emissions on all ecological receptors, including the SSSI, from the six-monthly testing of generators is likely to be insignificant, and are all screened out at stage 1 of the process.

Acidification

The AQA rules out impacts of acidification of nitrogen or sulphur under the six-monthly testing scenario, on all ecological receptors, including the SSSI, as insignificant (either screened out at stage 1 or calculated as below significant thresholds under stage 2).

Nutrient Nitrogen Deposition

In line with step 1 of the screening process, the PC for nutrient nitrogen deposition at the SSSI (1.34%) exceeds 1% of the critical load, therefore impacts cannot be screened out under step 1.

In line with step 2 of the screening process, the PEC at the SSSI (117.5%) exceeds 70% of the critical load, indicating potentially significant impacts.

The AQA again concludes, as noted above, the SSSI is primarily a wet woodland located in an urban setting, and therefore it is likely to be more resilient to nitrogen input as it is already subject to long term NOX concentrations exceeding the critical level. Furthermore, the ecology report stated that airborne NOX is not on the list of pollutants that are potentially damaging to the SSSI and it is therefore fair to assume that airborne pollution is likely to have little impact on the SSSI. As further backed up by APIS, which states nitrogen from the atmosphere is unlikely to be the largest source of NOX to eutrophicated standing waters and therefore nitrogen deposition from air is unlikely to be

harmful to eutrophicated standing waters. As such the impacts on nutrient nitrogen deposition at E1 within the month testing scenario are likely to be not significant.

The AQA rules out impacts of nutrient nitrogen under the six-monthly testing scenario, on all other ecological receptors, as insignificant (screened out at stage 1).

Monthly Testing

The AQA rules out impacts of NOx, SO_2, acidification and nutrient nitrogen, under the monthly testing scenario, on all ecological receptors, including the SSSI, as insignificant (either screened out at stage 1 or calculated as below significant thresholds under stage 2).

Outage Scenario

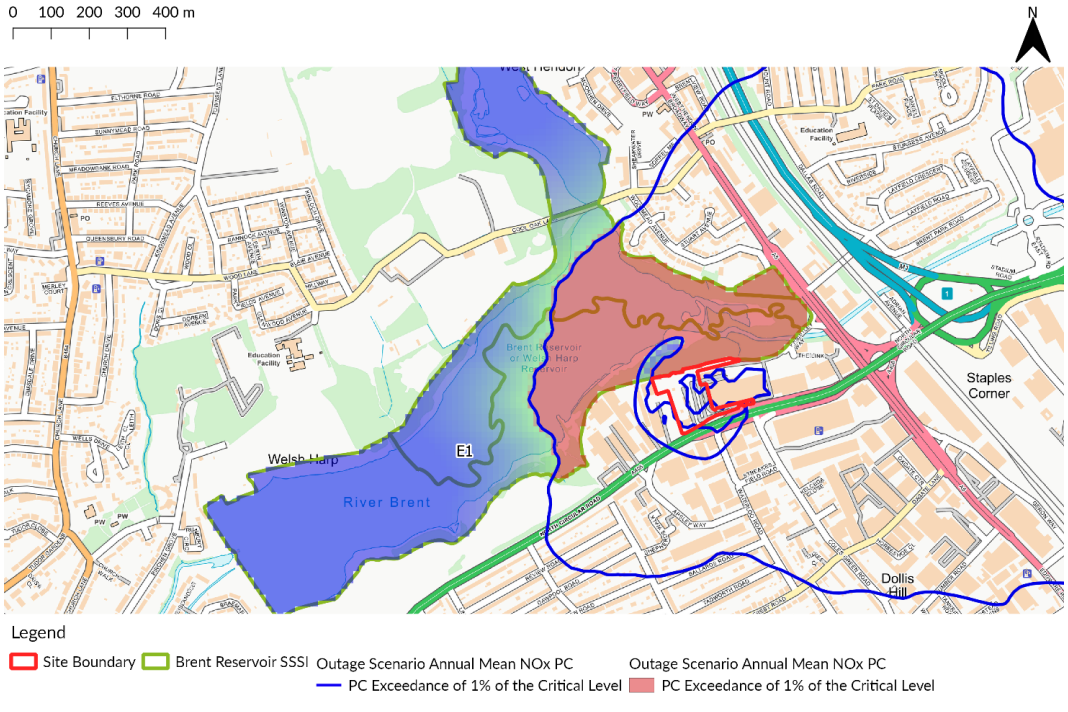
NOx

In line with step 1 of the screening process, the PC for annual mean NOx at the SSSI (6.1%) exceeds 1% of the critical level, therefore impacts cannot be screened out under step 1.

In line with step 2 of the screening process, the annual mean PEC at the SSSI (125.8%) exceeds the critical level, indicating potentially significant impacts.

The AQA notes that the PEC exceeds the critical level due to the background concentrations already exceeding the critical level at E1. However, it should be noted that the background concentration considered here is from 2019 which is a conservative approach, as the background concentration within the opening year is likely to be lower. Furthermore, as displayed in the contour plot in the figure below, the area of Brent Reservoir that is predicted to experience a PC greater that 1% of the critical level covers approximately one third of the SSSI.

Figure 3.3 Outage Scenario Annual Mean NOx PC Contour



In line with step 1 of the screening process, the PC for 24-hour mean NOx at the SSSI (1125%) exceeds 10% of the critical load, therefore impacts cannot be screened out under step 1.

In line with step 2 of the screening process, the 24-hour mean PEC at the SSSI (1420%) exceeds the critical load threshold, indicating potentially significant impacts.

Potentially significant impacts under the outage scenario are also noted at receptors E6 (Dudding Hill Loop between Cricklewood and Harlesden LWS), E9 (Clitterhouse Playing Fields LWS) and E10 (Clarefield Park LWS), at lower levels than the SSSI.

However, the AQA notes that the outage scenario is highly unlikely to occur, as in the past ten years the longest outage from the Elstree substation lasted no longer than 3 minutes. A number of worst case assumptions have also been made within this assessment, the modelled scenario has assumed no improvement from the Phase 1 assessment, diesel fuel emissions have been modelled instead of the HVO 100 fuel emissions, and the worst case meteorological conditions have been assumed. Furthermore, regarding the SSSI, airborne NOX is not on the list of pollutants that are potentially damaging to the SSSI and NOX is unlikely to be harmful to this habitat. As such the impacts on 24-hour mean NOX at E1, E4, E6, E9 and E10 as a result of the outage scenario are likely to be not significant as the 48-hour outage scenario is highly unlikely to occur.

SO2

The impact of SO2 emissions on all ecological receptors, including the SSSI, from the outage scenario, is likely to be insignificant, and are all screened out at stage 1 of the process.

Acidification

The AQA rules out impacts of acidification of nitrogen or sulphur under the outage scenario, on all ecological receptors, including the SSSI, as insignificant (either screened out at stage 1 or calculated as below significant thresholds under stage 2).

Nutrient Nitrogen Deposition

In line with step 1 of the screening process, the PC for nutrient nitrogen deposition under the outage scenario at the SSSI (7.05%) exceeds 1% of the critical load, therefore impacts cannot be screened out under step 1.

In line with step 2 of the screening process, the PEC at the SSSI (123.2%) exceeds 70% of the critical load, indicating potentially significant impacts.

The AQA again notes the SSSI is primarily a wet woodland located in an urban setting, and therefore it is likely to be more resilient to nitrogen input as it is already subject to long term NOx concentrations exceeding the critical level. Furthermore, the ecology report stated that airborne NOx is not on the list of pollutants that are potentially damaging to the SSSI and it is therefore fair to assume that airborne pollution is likely to have little impact on the SSSI. This is further backed up by APIS, which states nitrogen from the atmosphere is unlikely to be the largest source of NOx to eutrophicated standing waters and therefore nitrogen deposition from air is unlikely to be harmful to eutrophicated standing

waters. As such the impacts on nutrient nitrogen deposition at E1 within the testing scenario are likely to be not significant.

The AQA screens out nitrogen deposition impacts from the outage scenario on all other ecological receptors as insignificant at stage 1 screening.

Commentary on Critical Loads, Critical Levels and Acidification Rates Selection

Critical loads refer to the threshold beyond which deposition of pollutants to water or land results in measurable damage to vegetation and habitats. This takes the form of either gravitational settling of particulate matter (dry deposition) or wet deposition, where atmospheric pollutants dissolve in water vapour and then precipitate to the ground (e.g. as rain, snow, fog etc.).

The form of impact for deposition of pollutants in this instance would be through eutrophication and/or acidification.

APIS defines the critical loads for designated sites (SSSIs and Natura 2000 sites) in the UK.

The nutrient nitrogen critical load is based on a habitat and species' ability to tolerate high nutrient conditions, with habitats that are typically nutrient rich usually able to tolerate higher nutrient input levels, and vice versa.

The acidification critical load is based on a habitat's underlying soil and geology and requires a more complex assessment of the relative abundance of SO2, nitrogen oxides and acid gases.

It is defined by a critical load function which describes the relationship between the relative contributions of sulphur (S) and nitrogen (N) to the total acidification. The critical load function is defined by the following parameters:

CLmaxS, the maximum critical load of acidity for S, assuming there is no N deposition;

CLminN, is the critical load of acidity due to nitrogen removal processes in the soil only (i.e. independent of deposition); and

CLmaxN, is the maximum critical load of acidity for N, assuming there is no S deposition.

APIS does not however hold records for the critical load of Brent Reservoir SSSI[6] and an arbitrary proxy habitat has therefore been used in the AQA when drawing the conclusions reproduced above at 3.2. The AQA uses a critical load range of nutrient nitrogen deposition of 10 - 20 kg N ha-1a-1, based on the published APIS figures for broadleaved deciduous woodland. The lower value of 10 kg N $ha^{-1}a^{-1}$is used for the calculations.

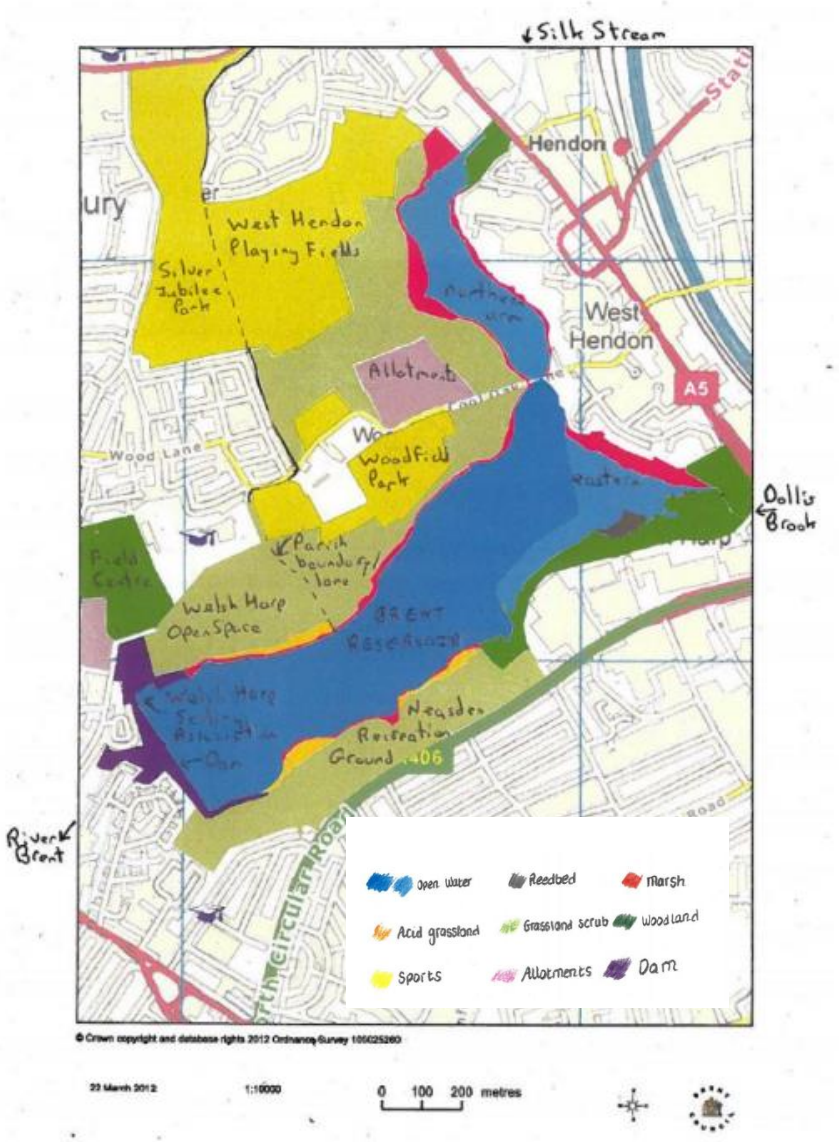
For acidification, the AQA also uses the proxy of broadleaved woodland. The critical load used is as follows:

- CLmaxS of 2.3541 keq ha-1a-1;
- CLminN of 0.357 keq ha-1a-1; and
- CLmaxN of 2.7111 keq ha-1a-1.

In assessing the reliability of the proxy critical loads used to assess significance a review of critical loads assigned to other designated sites which support similar receptors, as well as a more detailed analysis of habitats present within the SSSI, has been undertaken.

A habitat map produced for the site in the 2016 Habitat Management Plan (plan updated in 2023)[7],[8]. This maps habitat distribution and provides descriptions of the risks and opportunities associated with each habitat.

Figure 3.4 Habitat map extracted from HMP



The dominant habitat at the site is open water. With regard to nitrogen impact on this habitat APIS states:

'*deposition of ammonia, nitrate and other forms of nitrogen from the atmosphere is unlikely to be the largest source of [NOx] to eutrophic standing waters and, therefore, in general, N deposition is unlikely to be very harmful to eutrophic standing waters, even when close to sources*'.

Past issues with eutrophication in the open water habitats at the site are described within the HMP however, any excess nutrient deposition could accordingly exacerbate this, impacting both habitats and species[9].

Furthermore, the ecological functionality of the reservoir will be associated with the interaction between habitats, with no habitat alone forming the ecosystem. The citation lists a range of habitats as being of importance for the designation, with many of the species relying on a range of habitat types, as well as the open water habitats indirectly relying on the health and status of surrounding terrestrial habitats.

Succession of habitats from open water is described as below:

The Reservoir sits within a flooded London Clay valley, though deposits of alluvium of various depths have accumulated over the clay during the past 175 years since the reservoir was constructed. A narrow band of Taplow Gravels occurs, coincidently at about the current water level, so the marshland vegetation can variously be growing on the gravel, London Clay or alluvium. The marshland extends from the shallow water to damp areas above the water line. Above that the well-drained, nutrient-poor vegetation is of acid grassland. Slightly higher up the slope, the London Clay is again apparent and provides a more neutral pH substrate, though less well drained during wet weather. Here the vegetation is of rough grassland, mown amenity grassland or of other features with some scrub and areas of woodland.

The dominant habitat in areas of the SSSI closest to the site, and therefore subject to the highest concentrations of pollutant deposition, is broadleaved woodland, which is assigned a critical load range of 10-20 kg N ha^{-1} $year^{-1}$, the lower of which is the figure used for the AQA calculations.

The annual mean contour plot for NOx (Figure 3.2 above) for the six-monthly testing show that potential exceedances are almost entirely within the mapped woodland or the open water. The selection of broadleaved woodland as the proxy for critical load calculations is therefore considered appropriate.

Furthermore, as noted in the previous assessment, whilst the woodland will play a role in the overall ecosystem function and is described in the citation, it does not feature as a primary designated feature, which is described as '*assemblages of breeding birds – lowland open waters and their margins*'.

As the woodland is also primarily wet woodland, located in an urban setting (where thresholds are often already exceeded), it also likely to be more resilient to nitrogen input, already being subject to selective pressure.

Accordingly, using a critical load of 10 kg N ha^{-1} a^{-1} (the lower range of the woodland CL on APIS) is considered reasonable and precautionary in this instance.

As previously noted, APIS does not assign critical loads for the Brent Reservoir SSSI, however in terms of species sensitivity, wildfowl species such as pochard in the Walthamstow Reservoirs SSSI, in northeast London, an urban site geographically similar to Brent Reservoir, are assigned a load of 10-20 kg N ha^{-1} a^{-1}.

The critical loads used in the AQA modelling are therefore considered suitable.

In order to calculate acidification and nutrient nitrogen deposition, deposition velocities and conversion factors associated with woodlands have been used. This is again considered appropriate as the SSSI habitat closest to the site.

Critical levels are defined within the AQA *as thresholds for pollutant concentrations for vegetation and outline the concentrations below which harmful effects are unlikely to occur.*

Critical levels used within the AQA are as follows:

- NOx annual mean 30 µg m^{-3}
- NOx daily mean 200 µg m^{-3}
- SO_2 annual mean for ecosystems dominated by lichens and bryophytes 10 µg m^{-3}
- SO_2 annual mean for all other ecosystems 20 µg m-3

Levels are defined by the EU Directive on AmbiAir Quality/2010 Air Quality Standards Regulations and the Environment Agency Risk Assessment Guidance.

For NOx daily mean, because the background ozone is below the AOT40 and SO_2 is below the critical level of 10 µg/m3 , the less stringent critical level of 200 µg m^{-3} (rather than 75 µg m^{-3}) can be used.

For SO_2, the AQA uses the more stringent 10 µg m^{-3} for the calculations.

Commentary on AQA Conclusions

The majority of calculations rule out impacts as insignificant with the following exceptions:

1. Annual mean NOx, and nutrient nitrogen impacts on the SSSI identified as potentially significant under the 6-monthly testing scenario.
2. Annual mean and 24-hour mean NOx, and nutrient nitrogen impacts on the SSSI and to a lesser extent, three LWS, identified as potentially significant under the outage scenario.

For point 1, although an exceedance is calculated, the NOx background concentrations are already exceeding the thresholds, noted within the AQA as likely a result of the nearby busy roads, such as the A406 North Circular, the A5 and the M1.

Furthermore, as noted above, deposition of ammonia, nitrate and other forms of nitrogen from the atmosphere is unlikely to be the largest source of NOx to eutrophic standing waters and, therefore, in general, N deposition is unlikely to be very harmful to eutrophic standing waters, even when close to sources'. Also noted above, the closest habitat primarily wet woodland, located in an urban setting (where thresholds are often already exceeded), it also likely to be more resilient to nitrogen input, already being subject to selective pressure.

The contour map (Figure 3.2 above) shows that the modelled exceedance would only occur over a very discrete area of the site (a small section in the east, close to the A406 and A5 roads).

It is accordingly considered unlikely that the conservation status of the SSSI would be impacted by this limited exceedance; particularly given the existing baseline in which the site has maintained a favourable status.

For point 2, potential exceedances of the annual mean NOx and nutrient nitrogen thresholds are noted for the SSSI, and exceedances of 24-hour mean NOx at the SSSI, and to a lesser extent three LWS.

For annual mean levels, it is again noted that levels are already in exceedance of thresholds, and although the extent of modelled impact covers a larger area, the likelihood of this occurrence is considered extremely low, as detailed below.

A consideration 24-hour mean exceedances is whether short spikes in this background through 24-hour threshold exceedances would lead to negative effects upon species or habitats in the SSSI and LWS to a point where conservation status is impacted.

On this point, the CIEEM Air Quality Advice Note states:

It may also be useful to consider whether the NOx exceedance is for the annual mean critical level or the short-term critical level. The former is generally likely to be more important in determining the ultimate effect on plant communities due to the ability of many plants to recover from relatively short-term exposures even at high concentrations. According to work by the Centre for Ecology and Hydrology, the 'UN/ECE Working Group on Effects strongly recommended the use of the annual mean value, as the long-term effects of NOx are thought to be more significant than the short-term effects'.

The key point on the outage scenario is that the exceedances are modelled on an absolute worst-case scenario, far above the outage levels recorded in the last 10 years (the longest outage from Elstree Substation being no longer than 3 minutes).

A number of other worst case assumptions have also been made within this assessment, the modelled scenario has assumed no improvement from the Phase 1 assessment, diesel fuel emissions have been modelled instead of the HVO 100 fuel emissions, and the worst case meteorological conditions have been assumed.

As such the impacts at E1, E4, E6, E9 and E10 as a result of the outage scenario are likely to be not significant as the 48-hour outage scenario is highly unlikely to occur.

The conclusions drawn in the AQA are therefore considered appropriate.

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