

# Warrington Borough Council Updated Proposed Submission Version Local Plan

Updated Habitat Regulations Assessment

Warrington Borough Council

August 2021

- 4.36 There are numerous publications that have shown the disturbance effects of recreational trail use on wintering waterfowl. For example, the number of waterfowl after disturbance through recreational trail use was significantly lower than pre-disturbance. This effect was most marked within 40m of the walk trajectories at sites with no existing trail usage, illustrating the sensitivity of waterfowl with little previous experience of disturbance<sup>51</sup>. In contrast, the disturbance effect was much less pronounced at existing trail sites, indicating that waterfowl are likely to show some degree of habituation to recreational use. Indeed, in other areas such as the Bedfont Lakes Country Park (functionally linked to the South-West London Waterbodies SPA / Ramsar), high recreational use does not prevent the site to fulfil its supporting role for waterfowl species. The populations of gadwall and shoveler congregate in specific areas of the Bedfont Lakes, allowing other parts of the site to be used for recreation. The Moore Nature Reserve near the Warrington Waterfront is already being visited for recreation (it is an attractive destination for bird watchers in particular) and therefore is already subject to recreational disturbance. Notwithstanding this, it will need to be ensured that the increase in recreational pressure due to the 1,070 proposed dwellings does not threaten the site's ecological functionality.
- 4.37 The Arpley Meadows Country Park will cover a relatively large area of 160ha, which is far more than would be required for the mitigation of the local population increase if one uses the most widely deployed area-based indicator of recreational pressure mitigation requirements: Natural England's SANG guidelines developed for the Thames Basin Heaths SPA and elsewhere of 8ha per 1000 population or 0.008ha per person. The Country Park would provide greenspace at a rate of 33ha per 1000 population, well in excess of the maximum typically required to protect European sites from direct recreational pressure. Therefore, there would be sufficient space to enabling recreational use of the country park while avoiding excessive pressure on the residual habitat areas of the Moore Nature Reserve. The primary means to ensure that the ecological functionality of the site is maintained would be to appropriately design and manage the park. This could involve some or all of the following measures:
- Planning paths to avoid sensitive areas (e.g. areas for loafing)
  - Planting of visual screens to shield waterfowl from visitors
  - Temporary closure of areas during peak sensitivity periods
  - Warden(s) to fulfil both educational and enforcement roles
  - Information boards to educate visitors about sensitive wildlife
  - Dog-on-lead zones
  - Zoning for different recreational activities
- 4.38 Given the very high rate of greenspace provision associated with the Warrington Waterfront development, it is considered that there is a high likelihood that an unsustainable increase in visitor pressure within the Moore Nature Reserve can be avoided. It can therefore be concluded that the Plan will not result in adverse effects on the site integrity of the Mersey Estuary SPA / Ramsar regarding visual and / or noise disturbance in the functionally linked habitat provided by Moore Nature Reserve (located in the Arpley Meadows Country Park).

## Air quality

- 4.39 Concentrations of pollutants in air and deposition of nitrogen can harm vegetation directly or affect plant health and productivity. Deposition of pollutants to the ground and vegetation can alter the characteristics of the soil, affecting the pH and nitrogen availability that can then affect plant health, productivity and species composition<sup>52</sup>. The air pollutant of most concern for sensitive vegetation in relation to road traffic emissions is oxides of nitrogen (NOx) concentrations<sup>53</sup>. NOx is composed of nitric oxide (NO) and its oxidation product nitrogen dioxide (NO<sub>2</sub>). Concentrations of NO<sub>2</sub> are higher close to roads so vegetation in these areas is exposed to a larger source of nitrogen (N). As a general rule roadside effects of NOx and nitrogen deposition

<sup>51</sup> Trulio L. & White H.R. (2017). Wintering waterfowl avoidance and tolerance of recreational trail use. *Waterbirds* 40: 252-262.

<sup>52</sup> Bobbink, R., Hicks, K., Galloway, J., Spranger, T., Alkemade, R., Ashmore, M., Bustamante, M., Cinderby, S., Davidson, E., Dentener, F. and Emmett, B., 2010. Global assessment of nitrogen deposition effects on terrestrial plant diversity: a synthesis. *Ecological applications*, 20(1), pp.30-59.

<sup>53</sup> Cape, J.N., Tang, Y.S., Van Dijk, N., Love, L., Sutton, M.A. and Palmer, S.C.F., 2004. Concentrations of ammonia and nitrogen dioxide at roadside verges, and their contribution to nitrogen deposition. *Environmental Pollution*, 132(3), pp.469-478.

will have reduced to background concentrations/rates within 200m of the roadside. Potential ecological consequences in response to high levels or prolonged exposure to such emissions can include:

- 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 (where present); and
- Resulting increases in nitrate leaching.

4.40 Emissions of NO<sub>x</sub> and resulting deposition can have community level impacts to habitats and European Sites. Habitats that are particularly sensitive to elevated nitrogen levels include bog habitat, which has a low nitrogen Critical Load of 5 kgN/ha/yr. As has been previously described, these habitats are rare and air pollution in the form of nitrogen deposition is a well-known pressure<sup>54</sup>. Supported communities within bogs are particularly sensitive to nitrogen deposition. Bryophytes (mosses and liverworts) lack a well-developed cuticle and absorb pollutants across their cell surface more easily. Their abundance decreases when a certain threshold of nitrogen is exceeded. Bryophytes are important organisms as they store large quantities of carbon and, to an extent, filter pollutants from the environment<sup>55</sup>. The protection of this habitat from nitrogen degradation is therefore of critical importance.

4.41 The main pathways of nitrogen impact described above are through toxicity and the movement of nitrogen through varying trophic levels. Another potential route is through nitrogen acidification. A study undertaken by Maskell et al (2010)<sup>56</sup> observed that with increasing acid deposition from NO<sub>x</sub> there was a decrease in species richness within heathland. Acid deposition can have serious impacts to the health of soil structure and the microbial communities found here. Microbial communities carry out a natural decay process known as nitrification (converting ammonium to nitrate) that generates acidity. However, when in combination with acid deposition from NO<sub>x</sub> pollution, the soil pH may become too acidic for specialised plant communities to survive, resulting in a net decrease in biodiversity<sup>57</sup>. Acidification tends to be more of an issue for acid substrates (which have poor buffering capacity) than neutral or calcareous substrates.

## Rixton Clay Pits SAC

4.42 Acidification of waterbodies within the north-west of England is amongst the highest due to heavy rainfall that results in the direct transfer of air pollutants to waterbodies. Consultation of the Air Pollution Information System (APIS) website identifies that the SAC is theoretically vulnerable to acid and nitrogen deposition given the habitats present. However, its sensitivity depends on the susceptibility of the SAC newt population to relatively subtle changes in vegetation structure and (for nitrogen deposition) whether the supporting waterbodies are phosphate-limited rather than nitrogen limited, such that phosphorus (which does not come from atmosphere) is the key pollutant in eutrophication.

4.43 Much of the Rixton Clay Pits SAC consists of standing water supporting a large population of great crested newts. Great crested newts are mostly found in hard water areas that are calcium rich. Of the three species of newts native to the UK, great crested newts are least sensitive to acidification of waterbodies. A study by Giffiths (1993)<sup>58</sup> observed that during larval development, feeding behaviour was not impaired by acidic condition (pH 4-5). Miro (2017)<sup>59</sup> also observed newts naturally occurring within ponds at low pH scales ranging from 4.9 and 9.3 suggesting that great-crested newts are tolerant of acidic to alkaline conditions. Additionally, great-crested newts found elsewhere in Europe can be seen thriving in naturally acidic

<sup>54</sup> Limpens, J. and Berendse, F., 2003. Growth reduction of *Sphagnum magellanicum* subjected to high nitrogen deposition: the role of amino acid nitrogen concentration. *Oecologia*, 135(3), pp.339-345.

<sup>55</sup> Phoenix, G., Emmett, B., Britton, A., Caporn, S., Dise, N., Helliwell, R., Jones, L., Leake, J., Leith, I., Sheppard, L., Sowerby, A., Pilkington, M., Rowe, E., Ashmore, M. and Power, S. (2011). Impacts of atmospheric nitrogen deposition: responses of multiple plant and soil parameters across contrasting ecosystems in long-term field experiments. *Global Change Biology*, 18(4), pp.1197-1215.

<sup>56</sup> Maskell, L.C., Smart, S.M., Bullock, J.M., Thompson, K.E.N. and Stevens, C.J., (2010). Nitrogen deposition causes widespread loss of species richness in British habitats. *Global Change Biology*, 16(2), pp.671-679.

<sup>57</sup> Defra (2007) Acid Deposition Processes. Nobel House: London.

<sup>58</sup> Griffiths, R.A. 1993 The Effect of pH on Feeding-Behaviour in Newt Larvae (*Triturus*, Amphibia). *Journal of Zoology* 231 285-90

<sup>59</sup> Miró, A., O'Brien, D., Hall, J. and Jehle, R., 2017. Habitat requirements and conservation needs of peripheral populations: the case of the great crested newt (*Triturus cristatus*) in the Scottish Highlands. *Hydrobiologia*, 792(1), pp.169-181.

conditions. For example, Dolmen (1980)<sup>60</sup> observed breeding populations of newts within acidic bog lakes occurring within coniferous woodland.

- 4.44 With regard to nitrogen deposition, it is considered that the flooded clay pits in which the great-crested newts breed are very likely to be phosphate- rather than nitrogen-limited. In most lowland freshwater bodies; eutrophication is primarily determined by phosphate inputs (which comes from agriculture or treated wastewater, but not atmosphere) rather than nitrogen inputs. Moreover, great-crested newts have very broad terrestrial habitat requirements and it is considered unlikely that the ability of the SAC to support newts would be affected by the relatively subtle effects (i.e. slight changes in species richness and percentage grass and shrub cover) that increased nitrogen deposition within 200m of the A57 may have on the terrestrial portions of the site. Therefore, it is considered that an adverse effect on the integrity of the SAC would not result from those policies that will lead to increased housing, minerals and employment development (and thus increased traffic on the A57). This is supported by examination of the Natural England Site Improvement Plan for the SAC which does not identify air quality as being a concern.
- 4.45 Dust deposition and subsequent coating of vegetation disrupting photosynthesis could be an effect of policies ENV4 and ENV5, which both promote minerals development, if the minerals development is located within 50m of the SAC<sup>61</sup>. However, both policies also confirm that development will only be supported if the site and equipment is sited at a location where it can be demonstrated that it will accord with all other policies of the Plan. This will include the protection of residents, infrastructure and the environment from dust deposition.

## Manchester Mosses SAC

- 4.46 Air quality impact pathways described within paragraph 4.39 are of particular relevance to the Manchester Mosses SAC as this site supports raised bogs and associated vulnerable species. Holcroft Moss lies within 200m of the M62 which will be a key journey to work route for residents of Warrington. Development allocations of potential concern due to various impact pathways include:

Green Belt release

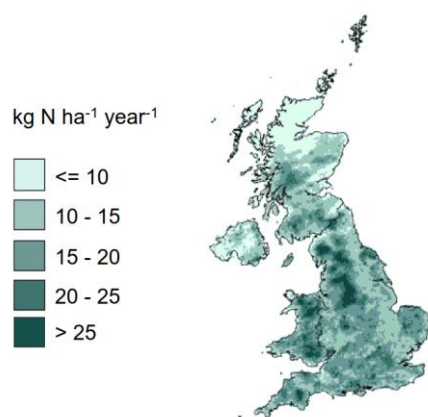
- Residential allocation at Hollins Green located 1.5km south of the SAC;
- Residential allocations at Lymm located 1.8km south of the SAC;
- Residential allocations at Culcheth located 2.3km north west of the Holcroft Moss and 1.2km west of Bedford Moss in Wigan;
- Residential allocations at Croft located 2.9km west of the SAC.

The Peel Hall located 4.2km west of the SAC.

- 4.47 However, since the M62 is a strategic route all policies that promote new housing and employment in the borough will collectively result in an increase in vehicle movements on the M62 past the SAC, particularly in combination with development in other surrounding districts and boroughs.
- 4.48 Intense combustion of fossil fuels within the north-west has caused significant emissions of NOx into the atmosphere resulting in air pollution and changes in rainfall chemistry. The deposition of these pollutants has resulted in the acidification of soils and waters throughout the north-west.

<sup>60</sup> Dolmen, D., 1980. Distribution and habitat of the smooth newt, *Triturus vulgaris* (L.) and the warty newt, *Triturus cristatus* (Laurenti), in Norway. In Coburn, J. (ed.), Proceedings of the European Herpetological Symposium, Oxford:127–139.

<sup>61</sup> Distance taken from page 13 of Institute of Air Quality Management. 2014. Guidance on the Assessment of Dust from Demolition and Construction <http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf>



**Figure 5: The nitrogen deposition measured between 2003-2005.**

- 4.49 Monitoring programs such as the Countryside survey and the New Plant Atlas<sup>62</sup> of the UK revealed shifts in species composition that favour nutrient-tolerant species<sup>63</sup>. N deposition within the north-west is strongly associated with the large amounts of precipitation experienced there. Experimental evidence suggests that hummock forming *Sphagnum* species may be lost from bogs that are experiencing high deposition rates. Based upon research constructed from the Main Valley Bogs SAC, which are located in Northern Ireland, the critical loads for bogs is described at 5-10 kgN/ha/yr compared to current deposition rates of 36 kgN/ha/yr at the closest area of SAC bog to the M62. Therefore, Holcroft Moss is already subject to a deposition rate far above its critical load.
- 4.50 In order to understand the potential ecological effect of the forecast 'in combination' change in nitrogen deposition reported in the HRA screening assessment (3 kgN/ha/yr) it is useful to know what the botanical effect of a 'dose' of 0.6 kgN/ha/yr would be on bog habitats.
- 4.51 It is also important to note that the general long-term trend for NO<sub>x</sub> concentrations in the UK has been one of improvement (particularly since 1990) despite an increase in vehicles on the roads<sup>64</sup>. Total nitrogen deposition<sup>65</sup> in the UK decreased by 13% between 1988 and 2008, while NO<sub>x</sub> concentrations decreased by 50% over the same time period<sup>66</sup>. According to Plantlife, 'There is an overall decreasing trend in the percentage of UK habitats affected by nitrogen deposition, with levels exceeding critical loads dropping from 75% of UK sensitive habitats in 1996, to 62.5% in 2011-2013'<sup>67</sup>. The trend has also been observed and documented by the European Union and has been recently used by them to develop a tool to monetise the biodiversity benefit of such improvements<sup>68</sup>.
- 4.52 This improving trend can be expected to continue, and indeed steepen, as drivers continue to replace older cars with newer vehicles and as further improvements in vehicle emissions technology are introduced, progressing towards the government's target of ending the sale of all new petrol and diesel cars and vans by 2030. For example, the latest and most stringent (Euro6/VI) emissions standard only became mandatory in 2014 (for heavy duty vehicles) and 2015 (for cars). The effects of these changes in standards will not be visible in the data available from APIS because relatively few people will have been driving vehicles compliant with that standard as early as 2016. In contrast, far more drivers can be expected to be using Euro6 compliant vehicles by the end of the Local Plan period (2038) since vehicles that are not compliant with Euro6 ceased manufacture in 2015. Defra's UK vehicle fleet projections show

<sup>62</sup> Preston, C.D., Peaman, D.A. & Dines, T.D. (eds), 2002. New Atlas of the British and Irish Flora. ISBN: 0198510675

<sup>63</sup> Haines-Young, R., et al., 2003. Changing landscapes, habitats and vegetation diversity across Great Britain. *Journal of Environmental Management*, 67, 267-281.

<sup>64</sup> Emissions of nitrogen oxides fell by 72% between 1970 and 2017. Source: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/778483/Emissions\\_of\\_air\\_pollutants\\_1990\\_2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/778483/Emissions_of_air_pollutants_1990_2017.pdf) [accessed 30/08/19]

<sup>65</sup> Oxidised nitrogen derives from combustion, such as vehicle exhausts, while reduced nitrogen results from ammonia primarily from agriculture. Total nitrogen deposition is both oxidised and reduced nitrogen combined.

<sup>66</sup> Rowe EC, Jones L, Stevens CJ, Vieno M, Dore AJ, Hall J, Sutton M, Mills G, Evans CD, Helliwell RC, Britton AJ, Mitchell RJ, Capom SJ, Dise NB, Field C & Emmett BA (2014) Measures to evaluate benefits to UK semi-natural habitats of reductions in nitrogen deposition. Final report on REBEND project (Defra AQ0823; CEH NEC04307)

<sup>67</sup> [https://www.plantlife.org.uk/application/files/1614/9086/5868/We\\_need\\_to\\_talk\\_Nitrogen\\_webpdf2.pdf](https://www.plantlife.org.uk/application/files/1614/9086/5868/We_need_to_talk_Nitrogen_webpdf2.pdf)

<sup>68</sup> Jones, L., Milne, A., Hall, J., Mills, G., Provins, A. and Christie, M. (2018). Valuing Improvements in Biodiversity Due to Controls on Atmospheric Nitrogen Pollution. *Ecological Economics*, 152: 358-366. [http://ec.europa.eu/environment/integration/research/newsalert/pdf/monetising\\_biodiversity\\_benefit\\_of\\_reducing\\_nitrogen\\_pollution\\_in\\_air\\_522na2\\_en.pdf](http://ec.europa.eu/environment/integration/research/newsalert/pdf/monetising_biodiversity_benefit_of_reducing_nitrogen_pollution_in_air_522na2_en.pdf)

that in 2030, 99% of petrol and diesel cars are expected to be Euro 6 compliant<sup>69</sup>. The Warrington Local Plan period runs significantly beyond this date to 2038. From 2030 a significant increase in the number of electric vehicles (which do not emit exhaust pollutants) can be expected even without local stimulation but since no official forecast trends are available this has not been taken into account in AECOM's modelling. Similarly, the Defra Emission Factor Toolkit for NOx only contains projections to 2030, so AECOM's modelling has effectively frozen improvements in emissions at 2030.

- 4.53 Bearing in mind the level of caution in the modelling, the modelling forecasts that the total nitrogen deposition rate at the closest area of bog in the hypothetical scenario of no growth at all is expected to be 33.23 kgN/ha/yr at 2038. When the Warrington Local Plan is added, this rate increases to 33.38 kgN/ha/yr, a small increase of 0.15 kgN/ha/yr. When all other growth (including surrounding Local Plans and the M62 Smarter Motorways scheme) is added, this increases to 36.31 kgN/ha/yr, a large increase of 2.93 kgN/ha/yr. Therefore, the vast majority (95%) of forecast additional nitrogen deposition due to traffic growth is not associated with Warrington Local Plan, even though the relevant section of the M62 lies within Warrington borough.
- 4.54 Natural England Commissioned Report 210<sup>70</sup> examines the ecological effect of a given nitrogen dose on various habitats including bog. Table 21 of the report identifies that at high background rates of nitrogen deposition (such as is experienced at Manchester Mosses SAC) a typical additional dose of 3.3 kgN/ha/yr is required to reduce species richness by the equivalent of 1 species. The limited species richness effect even when a large nitrogen dose is applied is probably due to the hydrological regime limiting further species responses to deposition once the critical load is exceeded<sup>71</sup>.
- 4.55 This analysis therefore leads to a conclusion that:
- a) The Warrington Local Plan will have a likely significant effect on Manchester Mosses SAC alone through a small, but not imperceptible, increase in nitrogen deposition (0.15 kgN/ha/yr) although this is a very precautionary conclusion as it uses the minimum part of the critical load range, which is most applicable in lower precipitation environments, freezes improvements in NOx emission factors at 2030, and takes no account of the significant shift to electric vehicles that can be expected between 2030 and 2038 as a result of the government ban on the sale of new petrol and diesel cars and vans (this was established in Chapter 3);
  - b) It will contribute to a likely significant 'in combination' effect on Manchester Mosses SAC (this was also established in Chapter 3);
  - c) However, the vast majority (95%) of the 'in combination' effect will be attributable to other sources (such as the Smart Motorways scheme and growth in Greater Manchester) rather than Warrington Local Plan ; and
  - d) The 'in combination' nitrogen dose is expected to cause a small (but greater than negligible) negative difference in the vegetation composition compared to a situation without growth, mainly regarding slight difference in species richness and a modest increase in percentage grass cover.
- 4.56 The worst-case 'in combination' effect at the closest area of bog to the M62 (64m away) is thus predicted to be botanically subtle. At distances greater than 64m (i.e. within the majority of Holcroft Moss up to 200m from the motorway) the effect will be even more subtle. Moreover, even the worst-case effect could be negated by changes in management or hydrological regime and the botanical effect that is forecast may prove to be even more subtle than identified in this report if the full improvement in vehicle emissions that Defra expect to arise by 2030 and beyond does occur.
- 4.57 However, to confidently draw a conclusion of no adverse effect on integrity the HRA of the Warrington Local Plan considers that some measures to reduce the (small) contribution of Warrington to the overall subtle effect is required for purposes of good stewardship and to reinforce the conclusion of no adverse

<sup>69</sup> Defra's Emission Factor Toolkit (EFT) v10.1 available at <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>

<sup>70</sup> Caporn, S., Field, C., Payne, R., Dise, N., Britton, A., Emmett, B., Jones, L., Phoenix, G., S Power, S., Sheppard, L. & Stevens, C. 2016. Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance. Natural England Commissioned Reports, Number 210.

<sup>71</sup> NECR210, pages 56 and 72. Page 72 also notes that the relationships expressed in the report for bog habitats should be regarded as conservative.

effect on integrity. This conclusion will be further underlined as vehicle purchasers react to the 2030 ban on the sale of new diesel and petrol cars and vans in the later part of the Local Plan period.

4.58 Following discussion between AECOM and Warrington Borough Council a three-tier approach to achieving positive air quality for Warrington and Manchester Mosses SAC has been agreed, as follows, the framework for which is provided by the Local Plan policies INF1 (Parts 1-4 and 7) and ENV8 (Parts 3/4):

- Tier One: Warrington Council will deliver a programme of borough-wide initiatives to reduce reliance on the private car and promoting and delivering improved public transport and low emission vehicles, such as requiring a certain percentage of new developments having electric vehicle charging points and working with the transport authorities to improve non-road connectivity between Warrington and Greater Manchester, producing materials to promote use of low-emission transport and/or deliver improved bus services with less polluting buses. These strategic initiatives would to some degree address the contribution of all new housing and employment in Warrington even on small sites. Warrington Council considers that the appropriate forum for this would be the revised Local Transport Plan (LTP4) that has just been out for consultation. This can be accessed via the following link:  
<https://www.warrington.gov.uk/info/201080/streets-and-transport/2383/local-transport-plan>.
- Tier-Two: Warrington Council will require the larger developments (MD1 to MD6) and those which line the M62 corridor (OS1, OS2, OS6) to each devise a scheme-specific range of measures to reduce reliance on cars, reduce trip generation and promote ultra-low emission vehicles. These 9 sites are responsible for a large proportion of Warrington Local Plan's new housing and the vast majority of its new employment such that applying this requirement would actually capture a lot of the planned development. It is noted that the updated policies for the main sites now require these developments *'to mitigate air quality impacts on the Manchester Mosses SAC in accordance with Policy ENV8...'* The kind of measures the applicants would be expected to introduce could include, but not be limited to, the following:
  - a. Electric vehicle charging points at parking spaces. The government has committed to ceasing the sale of all new petrol and diesel cars and vans from 2035. In the latter part of the plan period therefore people can be expected to show particular interest in electric vehicles;
  - b. Provision of a communal minibus (particularly if electric), and car club space. This will be effective for housing developments but particularly for employment developments;
  - c. Cycle parking and shower facilities for staff;
  - d. On-site services (e.g. GP surgery's and shops) to reduce need for off-site movements;
  - e. Personalised Journey Planning services for residents. If employment premises the company could provide incentives for car-sharing and minimising car journeys for work;
  - f. Production of sustainable travel information for residents e.g. accurate and easily understandable bus timetables;
  - g. Implementation of a Staff Management Plan to place restrictions on car use by Staff;
  - h. For vehicles generating HGV movements, restrictions to keep movements below 200 HDV per day, or a commitment to ensuring all HGVs used will be Euro6 compliant.
- Tier Three: Warrington Council will require all other developments that would exceed Warrington Council's thresholds for Transport Assessments to also devise a scheme-specific range of measures to reduce reliance on cars, reduce trip generation and promote ultra-low emission vehicles. This would avoid placing an undue burden on small sites and convey benefits to the SAC as well as air quality more broadly.

4.59 It is not possible to precisely forecast the effect of this strategy on nitrogen dioxide (NO<sub>2</sub>) emissions, or nitrogen deposition rates. However, retrospective data regarding the measured effectiveness of a broadly comparable package of measures elsewhere gives a reasonable broad indication of likely minimum

effectiveness. A report published by the DfT in 2004<sup>72</sup> reviewed the evidence for the impact of various 'soft' measures<sup>73</sup> such as workplace and school travel plans, personalised travel planning, travel awareness campaigns, public transport information and marketing, car clubs and car sharing schemes, teleworking, teleconferencing and home shopping on resident behaviour. The authors of the report concluded that a package of 'low intensity' interventions<sup>74</sup> could be expected to reduce traffic by 2-3%, whilst a package of 'high intensity' interventions<sup>75</sup> could be expected to lead to an 11% reduction.

- 4.60 The conclusions of the 2004 DfT report were used to inform large-scale Smarter Choice Programmes that were carried out in three designated Sustainable Travel Towns: Darlington, Peterborough and Worcester. This project involved implementing a limited package of soft measures in each town: workplace travel planning, school travel planning, personal travel planning, public transport information and marketing, cycling and walking promotion and travel awareness raising. Post-project appraisal of these schemes<sup>76</sup> confirmed an average 9% reduction in car-based trips by residents. This compared very well with a fall of approximately 1% in medium-sized urban areas that did not have such a package of measures.
- 4.61 AECOM's modelling indicates that Warrington Local Plan would increase traffic (in terms of AADT i.e. daily trips) on the M62 by 1.8% compared to the baseline situation.

2016 Baseline AADT on M62 past Manchester Mosses SAC	Additional AADT on M62 past Manchester Mosses SAC due to full implementation of Warrington Local Plan	Growth in traffic due to Warrington Local Plan as a percentage of the 2016 baseline
115,635	2,102	1.8%

- 4.62 Therefore, a *reduction* of 1.8% in M62 trips, vehicle kilometres travelled, or emissions (due to an increased proportion of vehicles with less polluting engines) compared to the situation without such measures, would entirely address the forecast contribution of Warrington Local Plan. The recorded trip reductions of 2% to 9% from implementation of soft measures in Peterborough, Darlington and Worcester compare very well with the 1.8% reduction that would be the target for Warrington. This is particularly the case since:

- a) the three-tier approach for Warrington would be much more fine-scale than the approach implemented at Peterborough, Darlington and Worcester, in that one element is to require a bespoke package of measures to be devised for specific new developments; and
- b) a number of the measures identified in the three-tier strategy, notably working with the transport authorities to improve non-road connectivity between Warrington and Greater Manchester and/or delivering improved bus services with less polluting buses, go beyond the 'soft measures' that were implemented at those other settlements.

- 4.63 The available evidence that exists regarding the effectiveness of local authorities implementing Smarter Choice Programmes, even without the additional measures set out in (a) and (b) above, indicates that it is reasonable to expect a reduction of at least 2% in AADT or NO<sub>x</sub> emissions on the M62 by 2038 (compared to the 2016 baseline), as a result of the implementation of the three-tier strategy for Warrington. The UK government's policy to end the sale of new petrol and diesel cars and vans from 2030 can be expected to considerably accelerate this reduction beyond the scale forecast above during the latter part of the plan period.
- 4.64 As such, with the aforementioned three-tier strategy in place it is considered that a conclusion of no adverse effect on integrity can be reached with confidence. In addition, the Council have agreed with Natural England to propose the insertion of the following supporting text into the Local Plan as a minor modification: '*Environmental impacts as a result of air pollution is an element of the plan where there is*

<sup>72</sup> DfT, 2004. Smarter Choices - Changing the Way We Travel <https://www.gov.uk/government/publications/smarter-choices-main-report-about-changing-the-way-we-travel>

<sup>73</sup> Soft transport policy measures seek to give better information and opportunities, aimed at helping people to choose to reduce their car use while enhancing the attractiveness of alternatives.

<sup>74</sup> The 'low intensity' scenario was broadly defined as a simple projection of the 2003-4 levels of local and national activity on soft measures.

<sup>75</sup> The 'high intensity' scenario identified the potential provided by a significant expansion of activity to a much more widespread implementation of present good practice, albeit to a realistic level which still recognised the constraints of money and other resources, and variation in the suitability and effectiveness of soft factors according to local circumstances.

<sup>76</sup> DfT, 2010. The Effects of Smarter Choice Programmes <https://www.gov.uk/government/publications/the-effects-of-smarter-choice-programmes-in-the-sustainable-travel-towns-full-report>



*limited evidence but one which requires LPAs to work together on wider solutions. The LPA is committed to continued engagement on this issue and it will make any necessary steps required to support wider initiatives that may come forward prior to a review of the plan, this includes working with neighbourhood authorities and combined authorities in the assessment of in-combination effects'.*

- 4.65 The Local Plan does not allocate the kinds of employment development that would require a permit from the Environment Agency (i.e. stack emissions) and therefore the impact pathway is primarily through increased vehicle movements. Policies ENV4 and ENV5 have the potential for stack emissions from (for example) diesel plant, depending on the details of the proposals that come forward. Dust deposition and subsequent coating of vegetation disrupting photosynthesis could be an effect of policies ENV4 and ENV5, which both promote minerals development, if the minerals development is located within 50m of the SAC<sup>77</sup>. However, both policies also confirm that development will only be supported if the site and equipment is sited at a location where it can be demonstrated that it will accord with all other policies of the Local Plan in relation to the protection of the environment, which will particularly include protecting residents, infrastructure and the environment from dust deposition or stack emissions. Any proposal with stack emissions will also require a permit from the Environment Agency before it can operate, and this will also take into account any pollution of European sites.

## Rostherne Mere Ramsar

- 4.66 Located in the neighbouring Borough of Cheshire East; Rostherne Mere Ramsar is located 3.3km to the south-east of the Warrington border. As such, there is the possibility that air quality issues arising from the Warrington Local Plan could impact site integrity. Rostherne Mere Ramsar, similarly to the Rixton Clay Pits SAC is primarily standing water. Therefore, the same implications of acid deposition and precipitation apply to this site.
- 4.67 Policies that have been screened in for the Rostherne Mere Ramsar due to issues associated with air quality include:
- Policy DEV1 – Housing Delivery;
  - Policy DEV3 – Gypsy & Traveller and Travelling Show People Provision;
  - Policy GB1 - Green Belt;
  - Policy TC1 – Town Centre and surrounding area;
  - Policy INF2 - Transport Safeguarding;
  - Policy OS3 – Hollins Green;
  - Policy OS4 – Lymm (Pool Lane / Warrington Road); and
  - Policy OS5 – Lymm (Rushgreen)

- 4.68 However, Rostherne Mere is located 170m from the A556 at its closest (and well over 300m from the M56) which are the two roads most likely to be used as journey to work routes by residents of Warrington. Given these distances, any additional nitrogen deposition due to these two roads will have fallen close to background levels at the SAC boundary. Moreover, the aforementioned provisions of Policy INF1 will ensure that emissions associated with increased housing and employment in Warrington are minimised. As a result, it is considered that a conclusion of no adverse effect on integrity can be made.

## Mersey Estuary SPA/ Ramsar

- 4.69 The Mersey Estuary SPA / Ramsar is situated in the neighbouring Borough of Halton within the boundaries of the City of Liverpool. At its closest point, the SPA/Ramsar lies approx. 3.7km from the Warrington Borough boundary. As such, there is the possibility that air quality issues arising from the Warrington Local Plan could impact site integrity. However, there are no significant journey to work routes associated with growth in Warrington Borough that lie within 200m of the SPA/Ramsar site. Moreover, intertidal mudflats and saltmarsh are more tolerant of nitrogen deposition since these are naturally nitrogen-rich environments. As such they have a much higher critical load range with the minimum part of the range being 20kgN/ha/yr.

<sup>77</sup> Distance taken from page 13 of Institute of Air Quality Management. 2014. Guidance on the Assessment of Dust from Demolition and Construction <http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf>

The current nitrogen deposition rate at the SPA/Ramsar site is a maximum of 16.94 kgN/ha/yr (thus being well below the critical load) and according to trend data on APIS the trend for oxidised nitrogen deposition (that associated with combustion such as vehicle exhausts) is an improving one despite an increase in traffic, with a reduction in nitrogen deposition of 1 kgN/ha/yr between 2005 and 2014 (the most recent year for which data are available).

- 4.70 It is also important to note that the experimental studies that underlie conclusions regarding the sensitivity of saltmarsh to nitrogen deposition, and the selection of 20 kgN/ha/yr as the minimum critical load have '*... neither used very realistic N [nitrogen] doses nor input methods i.e. they have relied on a single large application more representative of agricultural discharge*'<sup>78</sup>, which is far in excess of anything that would be deposited from atmosphere. For coastal saltmarshes such as those in the Mersey Estuary SPA/Ramsar, nitrogen inputs from air are not as important as nitrogen effects from other sources because the effect of any nitrogen deposition from the atmosphere is likely to be dominated by much greater flushes of more readily utilized nitrogen from marine, fluvial or agricultural sources. This is reflected on APIS itself, which states regarding saltmarsh that '*Overall, N deposition [from atmosphere] is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs*'<sup>79</sup>. Moreover, the nature of intertidal saltmarsh in this area means that there is flushing by tidal incursion twice per day. This is likely to further reduce the role of nitrogen from atmosphere in controlling botanical composition.
- 4.71 Furthermore, Natural England's Site Improvement Plan highlights that greater threats to the site integrity are the declines of designated seabirds and invasive species. Seabird declines are complex with studies tending to suggest the main causes of declines are marine litter and pollution, reduction in food caused both directly and indirectly from human fishing activities and loss of suitable foraging and breeding habitats<sup>80</sup>.
- 4.72 Therefore, it is considered that no adverse effect on integrity would result from the Warrington Local Plan through this pathway either alone or in combination with other projects and plans.

## Water quality

- 4.73 The quality of the water that feeds European Sites is an important determinant of the nature of their habitats and the species they support. Rivers, streams and aquatic environments supported by these sites can be affected by pollution from road run-off such as oil/ vehicle chemicals, and in the winter increased salt from de-icing the roads and pollution incident(s). Within areas of excavation there is a potential for increased risk to groundwater resources from any spills/ leaks of fuel and/or oil.
- 4.74 Poor water quality can have a range of environmental impacts. At high levels, toxic chemicals and metals can result in the immediate death of aquatic life. At lower levels, detrimental effects can also be experienced, including increased vulnerability to disease and changes in wildlife behaviour.
- 4.75 The impacts of poor water quality entering European Sites can have far-reaching consequences similar to atmospheric pollution. For example:
- At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour. Eutrophication, the enrichment of plant nutrients in water, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of eutrophication. In the marine environment, nitrogen is the limiting plant nutrient and so eutrophication is associated with discharges containing available nitrogen.
  - Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.
- 4.76 It was identified at the screening stage that only the Rixton Clay Pits SAC and Manchester Mosses SAC were susceptible to issues due to surface water quality. These sites are located within 1km of several residential developments allocated within the Local Plan. The remaining European Sites are located well

<sup>78</sup> UK Air Pollution Information System website [Accessed 21/11/18]: <http://www.apis.ac.uk/node/968>

<sup>79</sup> APIS website [Accessed 21/11/18]: <http://www.apis.ac.uk/node/968>

<sup>80</sup> Burger, J. and Gochfeld, M., 2002. Effects of chemicals and pollution on seabirds. *Biology of marine birds*, pp.485-525.