FICHTNER
Consulting Engineers Limited

Wren Kitchens

Barton Lorry Park

Air Quality Assessment

1 Introduction

1.1 Overview

Wren Kitchens have submitted a planning application (Ref: PA/2021/2257) for the development of a new lorry park (the Proposed Development) at land off Victory Way, Falkland Way, Barton upon Humber, in North Lincolnshire Council's (NLC's) administrative area.

The Proposed Development will address the current lorry parking capacity issues prior to loading and unloading of products at the Wren Kitchen's facility, 'The Nest', by providing lorry parking for 156 HGVs within 1 km of The Nest. At present, HGVs are stored at other facilities in Brough, Howden and Scunthorpe, causing additional travel and routing through the centre of Barton-upon-Humber. The Proposed Development will therefore result in a reduction in HGV movements along the majority of routes, but there will be a short section of Falkland Way between the Proposed Development and The Nest where will be an increase in HGV movements.

This assessment has been provided by Fichtner to support the planning application for the Proposed Development. It provides a discussion of the air quality impacts that the Proposed Development will have on the local area, considering the change in traffic movements. The purpose of the assessment is to determine whether residents would be exposed to high levels of air pollution that would present a health risk, particularly with regard to nitrogen dioxide and particulate matter.

The discussion is split into two sections – a discussion on the impact of an increase in vehicle movements on the small section of Falkland Way to the north of The Nest; and a discussion on the decrease in vehicle movements for the rest of the vehicle routing through Barton and onward to the wider network. The assessment then concludes the overall air quality impact of the Proposed Development.

1.2 Traffic movements

The Transport Assessment submitted with the planning application was undertaken by Bryan G Hall in December 2021. It describes the traffic movements with and without the Proposed Development.

For the purpose of this assessment it has been assumed that the current baseline of HGV movements associated with The Nest is 260 HGV movements per day. The current routing is along the southern part of Falkland Way and through Barton town centre to the A15. For the purpose of this note, this routing is referred to as 'Falkland Way south and through Barton'.

The Proposed Development will not change the total number of HGV movements associated with The Nest, but will change the routing of them to avoid unnecessary trips to other depots. The entrance to the Proposed Development is to the north of The Nest, approximately 1 km along The Nest entrance road, Falkland Way and Victory Way. Therefore, along Falkland Way to the north of The Nest, there will be 260 new HGV movements. For the purpose of this note, this routing is referred to as 'Falkland Way north'.

As the Proposed Development will provide HGV parking HGVs will not need to travel to the other depots to be stored, and so the Proposed Development would result in a reduction of 130 HGV movements along Falkland Way south and through Barton.

The Transport Assessment has assumed that there will be some staff members generating LDV trips between 15:00 and 22:00, however since there are only 6 staff present at the Proposed Development, these trips will be limited and below the IAQM criteria for an air quality assessment (see section 1.4). The assumption that there will be 6 members of staff seemingly dismisses the planned 51 car parking spaces. However, even if it is assumed that these spaces are filled and there are 51 two-way LDV journeys each day, this still falls well below the IAQM criteria (see section 1.4) and therefore an air quality assessment would not be required based on the change in LDV numbers.

The above has been confirmed with the transport consultant and, for clarity, the assumed vehicle movements for the purpose of this assessment are:

Table 1: Change in HGV movements caused by the Proposed Development

Route	Change in HGV movements caused by the Proposed Development (24-hour AADT)
Falkland Way north	+260
Falkland Way south and through Barton	-130

As shown, although there is an increase in HGV movements along the ~1 km length of Falkland Way north, there is net reduction along Falkland Way south and through Barton.

1.3 Need for assessment

In 2017 the IAQM published the guidance document titled, "*Land-Use Planning & Development Control: Planning for Air Quality*" (referred to within this report as the IAQM 2017 guidance). This has been developed for professionals operating within the planning system. It provides them with a means of reaching sound decisions, having regard to the air quality implications of development proposals. The IAQM 2017 guidance states that an air quality assessment is required where a development would cause a "significant change" in Light Duty Vehicles < 3.5t (LDV) or Heavy Duty Vehicles >3.5 t (HDVs). The indicative criteria to progress to an assessment are:

- A change in LDV flows of:
  - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA); or
  - more than 500 AADT elsewhere.
- A change in HDV flows of:
  - more than 25 AADT within or adjacent to an AQMA; or
  - more than 100 AADT elsewhere.

Where the change in numbers is less than these criteria the impact is deemed to be negligible and not significant and further assessment is not required.

The Proposed Development and routing along Falkland Way north are not located within an AQMA. It is possible that some HGVs which travel along Falkland Way south, through Barton and to the Scunthorpe Depot may travel through Scunthorpe AQMA, which was designated due to exceedences of the for daily mean particulate matter (as PM_{10}) air quality assessment level (AQAL). The Scunthorpe AQMA has been declared due to emissions from the Steelworks and not directly related to road traffic. As the Proposed Development will reduce the HGV movements in this area, it will be a net benefit to emissions and therefore any further assessment has not been deemed necessary.

Table 1 show that the trip generation rate exceeds the IAQM criteria for progressing with an air quality assessment, hence this assessment. The IAQM guidance states that an air quality assessment may take the form of a Simple Assessment (relying on published information and without quantification of impacts) or a Detailed Assessment (quantification of impacts, most often using a dispersion model. The IAQM guidance states that:

> *"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. "*

For the purpose of this assessment, a simple assessment has been considered the most appropriate for the following reasons:

- There is only a small section of Falkland Way to the north of the access to The Nest which will have an increase in traffic movements,
- The Proposed Development will mostly impact the local road network positively because the number of HGV movements associated with deliveries to and from The Nest will be halved, and there will be 1.1 million miles less driven per annum.
- The receptors along Falkland Way north, where there is an increase in vehicle movements, are all located at least 9 m from the road; and
- The baseline concentrations of traffic related pollutants are low.

The Design Manual for Roads and Bridges (DMRB) considers any ecological receptor within 200 m of a road source to be potentially affected by that operation. The Humber Estuary SPA, SSSI and Ramsar lies within 200 m of the site boundary and the HGV route. At the closest point the Proposed Development site boundary is approximately 100 m from the edge of the Humber Estuary and the HGV routing approximately 130 m from the edge of the Humber Estuary. As this is within the distance of 200m, the impact of traffic emissions on the Humber Estuary has been discussed.

1.4 Assessment criteria

The IAQM (2017) guidance includes the following matrix which should be used to describe the impact based on the change in concentration relative to the AQAL and the overall predicted concentration from the scheme - i.e. the future baseline plus the process contribution.

Table 2: IAQM magnitude of change descriptors

Long term average concentration at receptor in assessment year	% change in concentration relative to the Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

It is intended that the change in concentration relative to the AQAL is rounded to the nearest whole number. Therefore, any impact which is greater than 0.5% but less than 1.5% would be classified as a 1% change in concentration. An impact of less than 0.5% is described as negligible, irrespective of the total concentration.

In May 2020 the IAQM released the guidance document 'A guide to the assessment of air quality impacts on designated nature conservation sites'. This guidance draws on the EA Air Emissions Guidance, which states that to screen out impacts as 'insignificant' at European and UK statutory designated sites:

- the long-term process contribution must be less than 1% of the long-term environmental standard (i.e. the Critical Level or Load); and
- the short-term process contribution must be less than 10% of the short-term environmental standard.

If the above criteria are met, no further assessment is required.

2 Baseline air quality

In order to gain an understanding of the current baseline air quality, existing air quality monitoring and mapped background datasets have been reviewed.

2.1 Mapped background data

Department for the Environment Food and Rural Affairs (Defra) provides modelled background concentrations of pollutants throughout the UK on a 1 km by 1 km grid. This model is based on known pollution sources and background measurements and is used by local authorities in lieu of suitable monitoring data.

Mapped background concentrations have been downloaded for the grid squares containing the Proposed Development and the immediate surroundings. The mapped background data is calibrated against monitoring data. For instance, the 2018 mapped background concentrations are based on 2018 meteorological data and are calibrated against monitoring undertaken in 2018. As a

conservative approach, where mapped background data is used the concentration for the year against which the data was validated has been used. This eliminates any potential uncertainties over anticipated trends in future background concentrations.

Concentrations will vary in the local area. Therefore, the maximum mapped background concentration within the local area. within 2 km of the Proposed Development has been calculated for each pollutant. These are presented in Table 3 alongside the concentration for the grid square containing the Proposed Development.

Table 3: Mapped Background Analysis

Pollutant	AQAL/CL (µg/m³)	Concentration (µg/m³)		Dataset
		At Proposed Development	Maximum within local area	
Nitrogen dioxide	40	7.32	9.62	DEFRA 2018 Dataset
Oxides of nitrogen	30	9.31	12.47	DEFRA 2018 Dataset
PM_{10}	40	12.03	15.96	DEFRA 2018 Dataset
$PM_{2.5}$	25	6.29	6.98	DEFRA 2018 Dataset

The mapped background data shows that at background locations pollutants are well below the AQALs.

2.2 AURN and LAQM monitoring data

The UK Automatic Urban and Rural Network (AURN) is a country-wide network of air quality monitoring stations operated on behalf of Defra. This includes automatic monitoring of oxides of nitrogen, nitrogen dioxide and particulate matter. There are no AURN monitoring stations within 5 km of the Proposed Development, with the closest being Hull Freetown, an urban background site located approximately 8.5 km to the north-east of the Proposed Development. Due to the distance from the Proposed Development, monitoring is not considered to be representative of conditions at the Proposed Development and data from this site has not been considered further in this assessment.

In addition to the national AURN, local authorities undertake monitoring of a range of pollutants as part of the LAQM review process. A review of the monitoring undertaken by NLC as part of their LAQM commitments has shown that the council operates 11 continuous analysers. However, the closest of these is South Ferriby, located approximately 7 km west of the Proposed Development. Due to the distance from the Proposed Development, monitoring from this site is not considered to be representative of conditions at the Proposed Development and data has not been considered further in this assessment.

NLC also undertakes passive (diffusion tube) nitrogen dioxide monitoring at 21 locations. A review of these monitoring locations shows that only one is located within 10 km of the Proposed Development, which is Holydyke, Barton (Ref DT17). This site is located 1.1 km to the south west of the Proposed Development, and is along the route of HGVs travelling through Barton, as shown on Figure 1. This diffusion tube is classified by NLC as a 'suburban' site, but a review of the site location shows that it is one metre from the kerb of the A1077 road and should be classified as a 'roadside' site. Roadside sites are only representative of concentrations in the immediate vicinity of the monitoring location. The most recent five years of monitoring results are presented in Table 4.

Table 4: Nitrogen dioxide diffusion tube monitoring results

Site	Annual mean nitrogen dioxide concentration (µg/m³)					
	Mapped Bg - 2018	2015	2016	2017	2018	2019
DT17	7.32	22.4	23.0	22.0	20.0	21.0
Note: *the diffusion tube is located at grid reference 503048, 421907, which is 1.1 km to the south west of the development.*						

As shown, no exceedances of the AQAL have been recorded within the last five years, and monitored concentrations have been well below the AQAL. The maximum concentration over the last 5-years was only 58% of the AQAL. The monitored concentrations are higher than the mapped background concentration due to the influence of vehicle emissions from the A1077, as the diffusion tube is one meter from the kerb.

Although there is no monitoring along Falkland Way it is not likely that levels would be significantly different to those monitored at this DT12. As the diffusion tube is located 1 m from the roadside, the concentrations would be lower at receptors at distances further than this.

3 Impact of emissions

3.1 Falkland Way south and Barton

Along Falkland Way south, through Barton and the wider local network, the Proposed Development will result in a reduction in HGV movements. Deliveries to and from The Nest will reduce from 260 to 130 movement per day. Therefore, although the total number of HGV movements (130) is above the IAQM criteria, because there is a considerable reduction in traffic numbers, there will be a net benefit in air quality impacts associated with the Proposed Development.

This routing makes up the majority of the roads which HGVs will travel upon; approximately 2.7 km of road through Barton to the A15, and then further into the wider network. Therefore, the benefit of the reduced HGV numbers will be experienced by the many residential properties along this route.

The reduction in numbers of HGVs would also have the added benefit of lower congestion of HGVs within the town centre, further reducing emissions from idling vehicles, reducing noise impacts of traffic and generally improving road safety and general amenity in the town.

3.2 Falkland Way north

Along Falkland Way north, between the Proposed Development and The Nest, the Proposed Development will result in an increase of 260 HGVs, and up to 102 LDVs (assuming each car space is used) movements per day.

As shown in Figure 1, the nearest residential receptors to Falkland Way north are 11 properties on Orangeleaf Way. These properties are separated from the road by their gardens, a wooden close board fence, a wide verge and a cycle lane/footpath. The distances from the edge of Falkland Way to the receptors (measured to the end of the garden) are between 9m and 14m. The distances from the edge of Falkland Way to the façade of the houses are between 14m and 23m.

3.2.1 Nitrogen dioxide impacts

As set out in section 2, there is no monitoring of nitrogen dioxide along Falkland Way. However, the nitrogen dioxide diffusion tube monitoring site DT17 is located along a section of the A1077 where existing HGVs associated with The Nest, along with other general traffic, travel. It is assumed that the roadside nitrogen dioxide concentrations along Falkland Way north would be similar to the monitored concentrations at DT17. The monitored concentration is well below the AQAL. Concentrations of road vehicle exhaust emissions drop off with distance from the road. As such, at a distance of at least 9 m from the road, existing concentrations at the residential receptors along Falkland Way are expected to be significantly lower than those measured at DT17 and therefore considerably below the AQAL.

In order to quantify the impact of the Proposed Development the DMRB tool has been used. Although this tool has been withdrawn Defra state that the screening tool can:

> *"still provide for a useful way to screen road traffic emissions to decide whether more detailed dispersion modelling needs to be undertaken. Results should however be treated with caution, particularly where predicted concentrations are close to the relevant Air Quality Objectives."*

As the local monitoring has shown that concentrations are unlikely to be close to the AQAL, the use of this as a screening tool is considered appropriate.

The most recent version of the DMRB tool is v1.03c. This uses very old emission factors. However, as a screening tool this can be useful. In addition, the wooden close board fence acts as a barrier between Falkland Way and the receptors and would potentially reduce the impact of emissions even further.

Using the DMRB tool, assuming 260 HGVs and 102 LDVs with a speed of 45 kph, the impact is predicted to be 0.4 µg/m^3 at a distance of 9 m from the road. This equates to an impact of 1.1% of the AQAL. In order to determine the magnitude of change the future concentration at the receptor with the development is needed. The magnitude of change would be described as negligible if the total concentration remains below 94% of the AQAL. The maximum monitored concentration at DT12 was only 57% of the AQAL. As described in 2.2, baseline concentrations at the receptors along Falkland Way are expected to be lower than this. Therefore, there is very little risk that the total concentration would be close to 94% of the AQAL and the magnitude of change would be described as negligible.

There are local plans to build a number of new dwellings in the space to the north and east of Orangeleaf Way. There are various planning permissions and applications, so it is not currently clear what the final plan layout will be. However, it is likely that there will be new residential receptors in the area marked in orange on Figure 1. The closest receptors to Falkland Way will be at a removed distance from the road, and be buffered by the verge and cycle lane/footpath. It is expected that the new builds which are closest to Falkland Way will be at a similar distance as the current receptors along Orangeleaf Way. Therefore, the predicted impact at the new receptors will be the same as outlined above, and in line with IAQM descriptors, the magnitude of change would be described as negligible.

In addition to the residential receptors on Orangeleaf Way, there is a nursey school located approximately 30 m from the turning point of vehicles from Falkland Way onto Victory Way. The DMRB tool has been used to calculate the impact at the nursery. This has assumed 260 HGVs and 102 LDVs but with a speed of 5 kph (to account for the low speeds at the junction). The predicted impact is 0.7 µg/m^3. This equates to an impact of 1.7% of the AQAL. The magnitude of change would be described as negligible if the total concentration remains below 75% of the AQAL. The maximum monitored concentration at DT12 was only 57% of the AQAL. As described in section 2.2, baseline

concentrations at the receptors along Falkland Way are expected to be lower than this. Therefore, there is very little risk that the total concentration would be close to 75% of the AQAL and the magnitude of change would be described as negligible.

3.2.2 Particulate matter impacts

The DMRB screening tool has also been used to predict the contribution of particulate matter (as PM_{10}).

At the residential receptors along Orangeleaf Way and the potential future new build receptors, the predicted impact of PM_{10} at a distance of 9 m from Falkland Way and assuming a vehicle speed of 45 kph, is 0.06 µg/m^3 or 0.2% of the AQAL. In accordance with the IAQM guidance, this impact is less than 0.5% of the AQAL and can therefore be screened out as negligible irrespective of baseline concentrations. When assessed against the AQAL for $PM_{2.5}$ the impact is 0.3% and also screens out as negligible irrespective of baseline concentrations.

At the Nursey School, the predicted impact of PM_{10} at a distance of 30 m from Falkland Way and assuming vehicle speeds of 5 kph, is 0.14 µg/m^3 or 0.3% of the AQAL. In accordance with the IAQM guidance, this impact is less than 0.5% of the AQAL and can therefore be screened out as negligible irrespective of baseline concentrations. When assessed against the AQAL for $PM_{2.5}$ the impact is 0.7% of the AQAL. When considering baseline $PM_{2.5}$ levels the overall concentration would be less than 75% of the AQAL and the magnitude of change described as negligible.

3.3 Ecological sites

At the closest point the Proposed Development site boundary is approximately 100 m from the edge of the Humber Estuary and the HGV routing is approximately 130 m from the edge of the Humber Estuary.

Using the DMRB screening model, assuming 260 HGVs and 102 LDVs with a speed of 5 kph, the impact of oxides of nitrogen is predicted to be 0.2 µg/m^3 at a distance of 130 m from the road. This equates to an impact of 0.6% of the critical level for oxides of nitrogen. As this is less than 1% of the critical level, the impact at the Humber Estuary can be screened out as insignificant.

4 Summary and Conclusion

This air quality assessment has been carried out to support the planning application for the Proposed Development. As detailed, the Proposed Development will result in a net overall reduction of HGV movements on the majority of the local road network, but an increase in HGV movements along a small section of Falkland Way between the Proposed Development and The Nest. The reduction of HGV movements along the road network will have beneficial air quality impacts for receptors along the vehicle route, as they will be subject to lower road traffic pollutant concentrations than the current scenario.

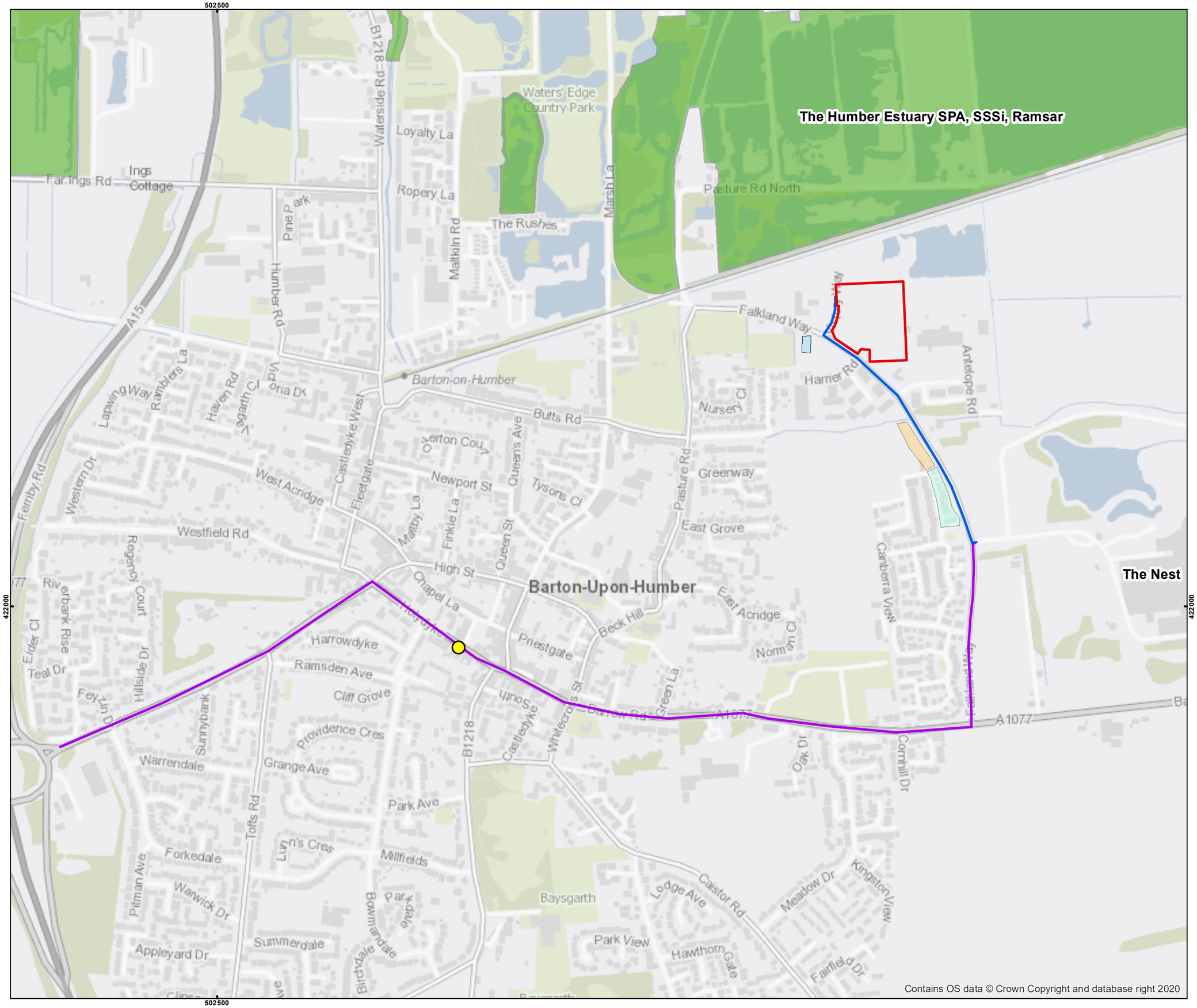
Despite the reduction across the majority of the road network there will be an increase in movements along Falkland Way north of The Nest. The impact of these additional movements has been assessed using the DMRB screening tool. Although this tool has been withdrawn Defra state that the screening tool is still useful. The tool has been used to predict the impact of emissions from HGVs and LDVs associated with the Proposed Development at some key receptor locations. This has shown that:

- the predicted impact of nitrogen dioxide and particulate emissions is negligible and when considering the uncertainty in the tool there is little risk of the AQAL being exceeded; and
- The predicted impact at the Humber Estuary can be screened out as insignificant.

Therefore, the Proposed Development is not expected to have a significant impact on local air quality.

Appendices

A Figure

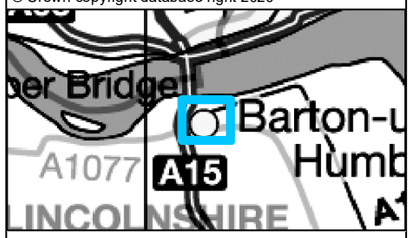


Legend

- Proposed Development site boundary
- Local monitoring site DT17
- Falkland Way north
- Falkland Way south and through Barton
- Current residential receptors along Orangeleaf Way
- Field View Day Nursery
- Potential new residential receptors
- The Humber Estuary

Client:	WREN Kitchens
Site:	Barton
Project:	Lorry Park planning application
Title:	Figure 1 - Site location

Drawn by: HKL | Date: 09/03/2022



0 0.075 0.15 0.3 km

Scale: 1:8,000

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