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South Meadows Caravan Park

Accommodation Expansion Nutrient Budget

Dunham Leisure Limited

Report No. K6115-TPR02

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1 Introduction

1.1 Report Objectives

This report has been prepared by ByrneLooby (BLA) on behalf of Dunham Leisure Limited. The report presents a nutrient budget for a proposed extension of the South Meadows Caravan Park, Belford, Northumberland, NE70 7DP (Figure 1) by 250 static caravans.

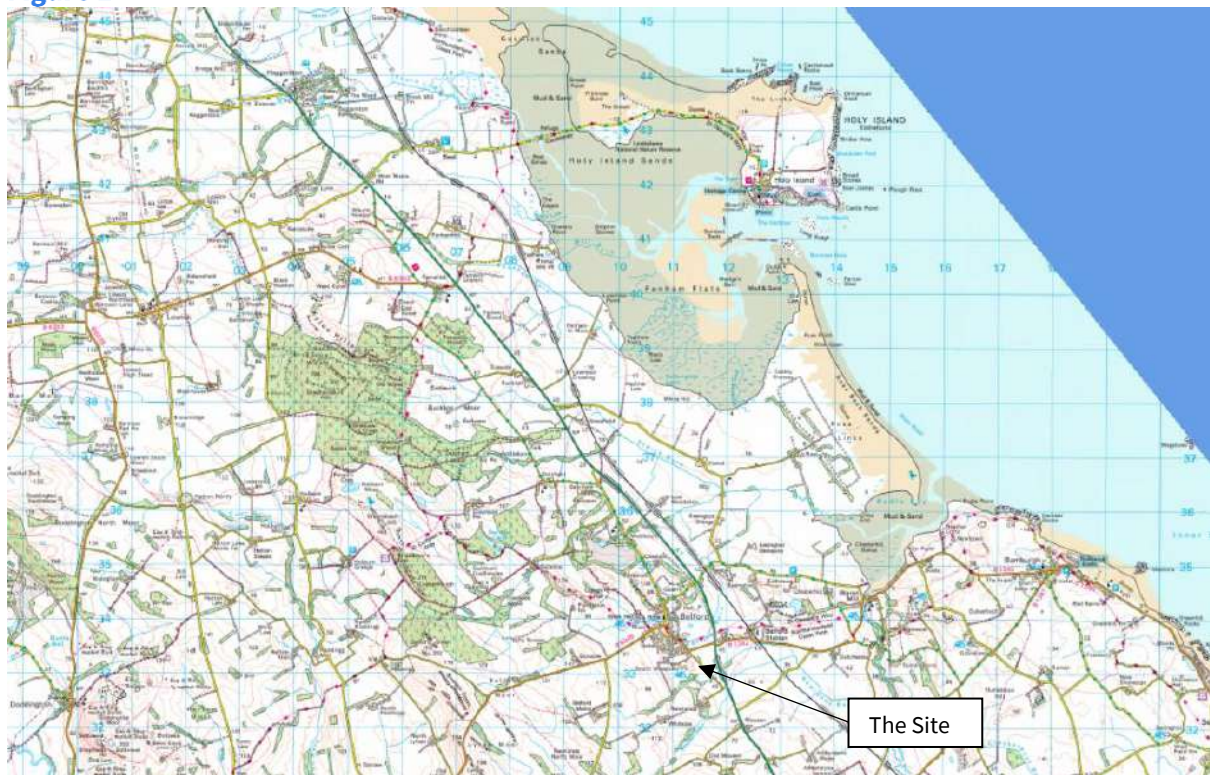
The caravan park is located at the southern edge of Belford and the expansion area extends the South Meadows Caravan Park across agricultural land to the west of the site as illustrated on Savills Drawing 5291/112/A and Figure 2 below. The application comprises a change in use from a combination of cereal crop production and poultry farming.

The site is within the catchment area for the Lindisfarne Special Protection Area and Ramsar which is designated by Natural England as requiring “nutrient mitigation” for any new developments¹.

This requirement follows a position statement made by Natural England on 16th March 2022, for which Northumberland County Council have released a position statement² as to the reasoning for the requirement to mitigate nutrient releases and the mechanisms to calculate nutrient production using Natural England’s calculator³.

This report has been prepared to quantify the nutrient budget for the proposed increase in capacity.

Figure 1 Site Location

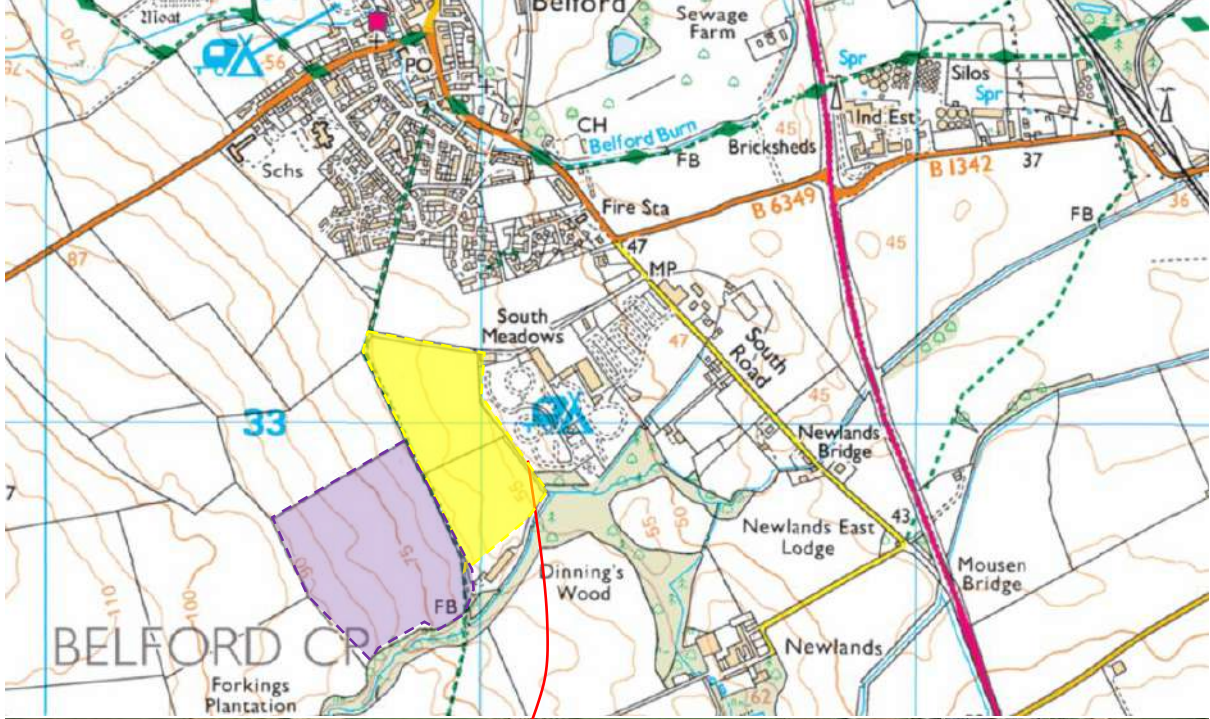


¹ <https://www.northumberland.gov.uk/Planning/Planning-News.aspx>

² [https://www.northumberland.gov.uk/Guidance For Applicants](https://www.northumberland.gov.uk/Guidance%20For%20Applicants)

³ <https://www.northumberland.gov.uk/CalculatorGuidanceDocument.pdf>

Figure 2 Primary Development and Habitats Recreation Area



Note. 0.33ha Poultry area is as defined by ByrneLooby Letter K6115/ENV/LT01 of 29/09/2022 to Mr J. Hudson of NCC. Planning Application 21/04014/FUL SOUTH MEADOWS. Updated Nutrient Calculator Poultry Area designated

1.2 Nutrient Neutrality

Nutrient neutrality is a core principle and the basis for Natural England’s standing objection to all development planning applications in the nutrient sensitive areas identified by Natural England. The policy was initially implemented in the southern counties where surface water catchments discharged into the Solent, Southampton Water and other nearby partially enclosed coastal bays. The areas of concern have now been expanded across a larger number of counties and a Policy Paper has been published by DEFRA⁴.

In Natural England’s guidance to the Lindisfarne Nutrient Budget Calculator³, the requirement for Nutrient Neutrality is justified as a potential future issue as:

There is uncertainty as to whether new growth will further deteriorate designated sites, and/or make them appreciably more difficult to restore. The potential for future housing developments to exacerbate these impacts creates a risk to their potential future conservation status.

One way to address this uncertainty is for new development to achieve nutrient neutrality. Nutrient neutrality is a means of ensuring that development does not add to existing nutrient burdens and this provides certainty that the whole of the scheme is deliverable in line with the requirements of the Habitats Regulations.

In essence, this future potential to depreciate habits is because nutrients have been entering the surface water system since industrialisation from a combination of fertilisers, other agricultural nutrients and sewage effluents (untreated and treated) to the extent that there is a perceived eutrophication problem in restricted flow waters. Natural England’s objective is to prevent developments from exacerbating these eutrophic regimes by removing an equivalent quantity of nutrients which are already in the environment and contributing to the surface water systems by either, or a combination of:

- 1) treating all additional nutrients that could be produced by the development at source;
- 2) reducing an agricultural nutrient contribution by permanently removing farmland from production; or
- 3) intercepting and treating the nutrient content of groundwater or surface waters which are already in the environment.

Potential mitigation measures are informed by a nutrient budget which quantifies the amount of mitigation required. Northumberland County Council, acting as the planning authority, have provided links to Natural England’s online guidance relevant to their area². This guidance includes direct links to a “Nutrient Budget Calculator” which will form the basis for determining the quantity of nutrient to be managed.

The quantity of nutrients to be managed is the balance between the current and future land use as well as the residual load released after wastewater treatment to the river system. However, this is tempered by the quality and quantity of the treated sewage effluent released to the environment, and other post development contributions.

⁴ <https://www.gov.uk/government/publications/nutrient-pollution-reducing-the-impact-on-protected-sites/nutrient-pollution-reducing-the-impact-on-protected-sites>

Recent Government Policy has however modified this position, whereby the UK government through the Chief Planner has released an updated position statement⁵

The ethos of this July 2022 is that nutrient neutrality obligations in future are to be addressed by three elements, namely:

- 1) obligating the upgrade of Wastewater Treatment Works in nutrient neutrality areas by 2030;
- 2) a strategic mitigation scheme; and
- 3) clarifying the application of Habitats Regulations Assessments for post permission approvals

Mitigation for schemes that are not in themselves nutrient neutral is therefore in the first instance time limited to the period that will be required for the upgrade to the Municipal Wastewater Treatment Works (WwTW) at some point between 2023 and the governmental imposed WwTW upgrade time limit of 2030.

This report presents a nutrient balance following the guidance and then identifies the extent of mitigation required in order to meet these obligations in the short and longer term.

2 Nutrient Formation

2.1 Site Setting

Ground Conditions

The site is located on a glacial clay surface. This is underlain by a limestone which forms part of the Lower Carboniferous Coal Measures sequence (Figure 3). The site's drainage status on the Soilsmap map⁶ of "Impeded Drainage" (Figure 4) correlates to the mapped distribution of the Boulder Clay.

The site is within a Nitrate Vulnerability Zone (NVZ)⁷ (Figure 5) as are all of the feeder areas to the Lindisfarne National Nature Reserve (NNR).

Rainfall data for the River Till at Etal Archive Station 21031⁸, the catchment area immediately to the west of the site area, identifies a 30-year average rate of 827mm/yr. The Belford area is however in the rain-shadow of this catchment and therefore rainfall rates are expected to be lower.

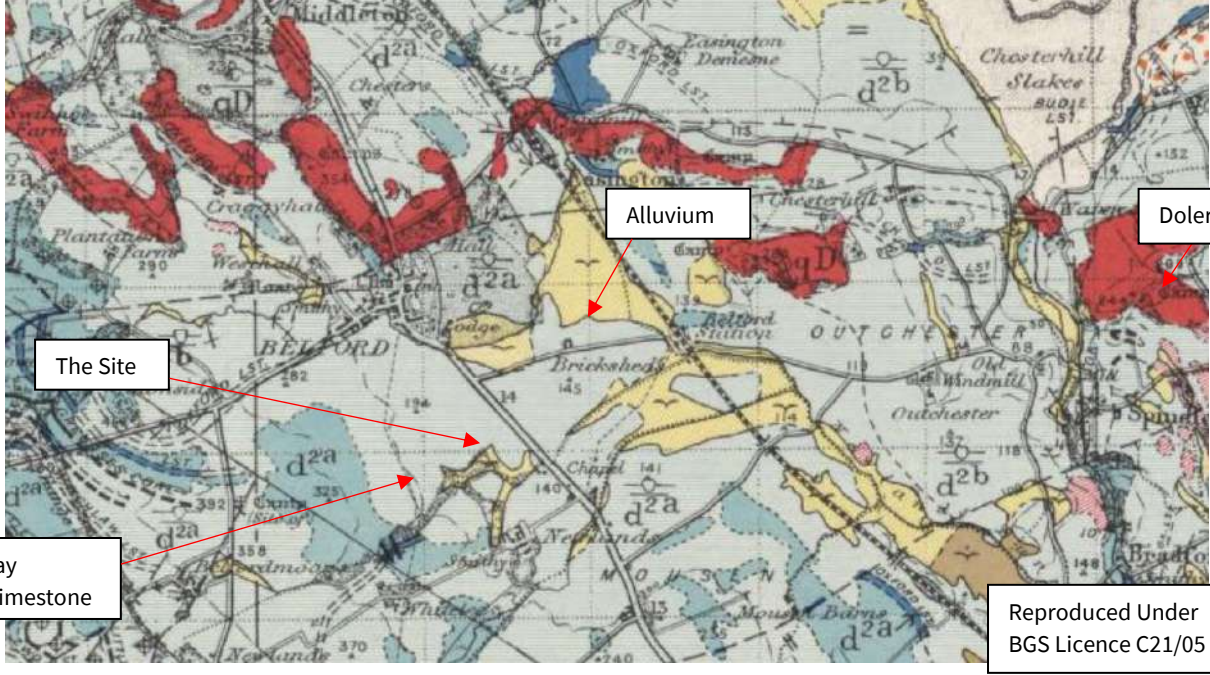
⁵ [Chief Planner Letter Nutrient Neutrality and HRA Update - July 2022](#)

⁶ <http://www.landis.org.uk/soilsmap/#>.

⁷ <https://mapapps2.bgs.ac.uk/ukso/home.html?layers=NVZEng>

⁸ <https://nrfa.ceh.ac.uk/data/station/spatial/21031>

Figure 3 Geological Setting (Extract from BGS Sheet 4 - Holy Isle)



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Figure 4 Drainage Type Extracted from Soilsapes

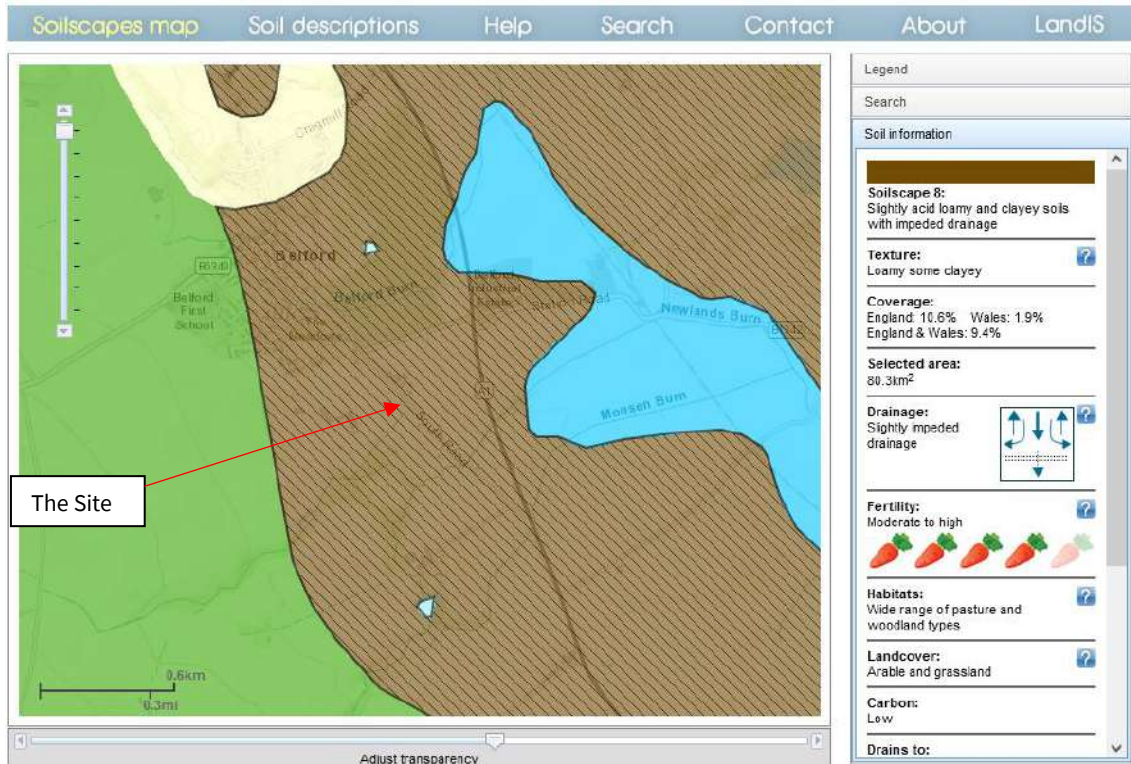
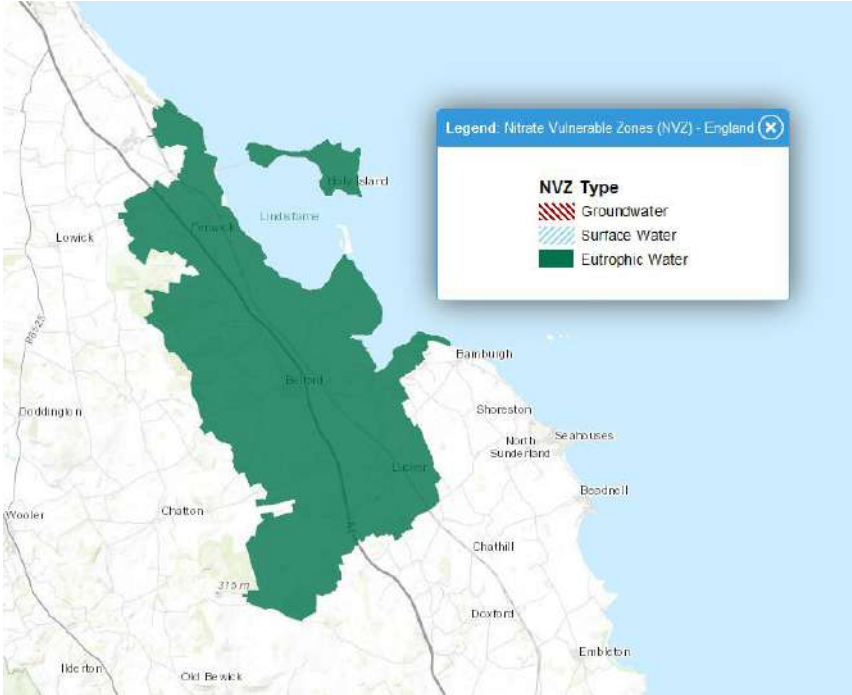


Figure 5 Nitrate Vulnerability Status



2.2 Land Use

The Developer has purchased some 25.5ha of land to facilitate the expansion of the site (Figure 6).

Figure 6 Land Use Change



Predevelopment

The land area comprises three defined field areas and land plots, comprising

- 1) Land Area 8262: 13.57ha, intensively farmed cereal crops
- 2) Land Areas 8902: 6.22ha, intensively farmed cereal crops
- 3) Land Area 0.281: 5.68ha, free range poultry farmed, including poultry shed

The main Static Caravan area being developed is to be primarily located across the second and third of these areas, with any remaining land converted to woodland and greenspace.

However, within this land area, some 0.55ha of the poultry rearing area has already been attributed to a parallel smaller expansion of the South Meadows Caravan Park⁹.

Post Development

The land area will become part of an existing caravan park. As such it does not readily fit into the land use descriptions within Natural England's nutrient budget calculators, as the following four descriptors could all be considered as equally valid.

Greenspace

*Natural and semi-natural outdoor spaces provided for recreational use where fertilisers will not be applied **and dog waste is managed**, e.g. seminatural parks. This does not include green infrastructure within the built urban environment, such as sports fields, gardens, or grass verges, as these are included in the residential urban land category.*

Open Urban Land

Area of land in urban areas used for various purposes, e.g. leisure and recreation - may include open land, e.g. sports fields, playgrounds, public squares or built facilities such as sports centres.

Commercial/industrial urban land

Areas that are used for industry. These are businesses that typically manufacture, process or otherwise generate products. Included in the definition of industrial land are factories and storage facilities as well as mining and shipping operations

Residential Urban Land

Areas of houses and associated infrastructure. This is inclusive of roads, driveways, grass verges and gardens

A key aspect distinguishing residential urban land from greenspace is the component related to an expected that dog waste will be managed whilst residential urban land does not. This caveat is imposed at the site as it is a managed facility where there is an expectation of a minimum level of hygiene.

Notwithstanding all of the above, the land use will holistically remain as a caravan park and therefore there is considered to be no net change in the before and after land use.

The nutrient component is therefore entirely determined by the sewage effluent component. The site's effluent is discharged to foul sewer and then treated at the discharges sewage at the Belford Wastewater Treatment Works (WwTW) some 600m to the north of the site.

⁹ ByrneLooby (July 2022) South Meadows Caravan Park. Touring Pitches Nutrient Budget. Rep. K6115-TPR01

2.3 Occupancy Rates

The development proposal is for 250 Static Caravans. Usage will be primarily during the warmer months of the year when weeklong residences could be expected. However, for the remainder of the year the pitches will only be occupied on an occasional basis.

Occupancy is limited to a 31% occupancy rate (*i.e.* 113 nights per year), of which 68 nights are during the summer peak period and the remaining 45 nights are spread throughout the year.

Occupancy rates do change as a Population Equivalent of 2.8 per van during the 68 night high season period, which then reduces to less than 2 Population Equivalent during the remainder of the year. This equates to an average occupancy per pitch as 2.5 (Table 1)

Table 1 Expected Occupancy Rates

	Nights/yr per year	Occupancy Person per van	Population Per Van per year
Peak Season	68	2.8	190.4
Off Season	45	2.0	90.0
Average	113	2.5	280.4
	30.9%		

A 31% occupancy rate and population of 2.5 per van for 250 caravans therefore equates to a full time equivalent additional population increase of 191.7 people. The closest approximation that can be input into the calculator is therefore the equivalent of 192 additional population comprising of:

- 80 Dwellings/units
- 2.4 Average Occupancy Rate
- 192 Additional Population

2.4 Receiving Treatment Works

The Lindisfarne Nutrient Calculator rates the Belford WwTW as discharging a nitrogen effluent at 27mg/l total nitrogen. This is therefore a relatively poor performing WwTW that until the release of the July 2022 Chief Planner’s policy statement⁵ did not specifically have a requirement to reduce nitrogen in its effluent stream.

There is therefore an obligation to upgrade this WwTW’s over the following 7 year period, which is readily achievable. This improvement in WwTW will therefore negate a large component, if not the entirety of the nutrient mitigation measures for the long term.

2.5 Nitrogen Budget Calculator

Natural England have recently published a “Nutrient Neutrality Budget Calculator: a tool for assessing the nutrient loading to a Habitats Designated Site”. The Lindisfarne Nutrient Budget

Calculator version available on the Northumbria County Council website¹⁰ under Note 15 has been considered in the preparation of this nutrient budget. However, it is noted that the version available on the Northumberland County Council webpage under their Planning guidance page does not incorporate a Poultry option for the pre- and post-development land uses. Consequently a secondary version of the calculator produced and supplied¹¹ by Northumberland County Council Ecologists has been used in this updated document.

The nutrient calculations take a four-stage approach of:

- 1) Establish net nutrient formation based on increase in residential developments as released to controlled waters
- 2) Calculate nutrient formation by the site development in its pre-development state
- 3) Calculate nutrient formation by the site in its as-built state
- 4) Calculate the difference between the pre-and post-development nutrient releases and multiple the difference by 120% to establish a nutrient budget

In the Lindisfarne catchment, the nutrient of concern is nitrogen.

Stages 1 and 3 determine the post-development nutrient releases to the surface water system and are based on the quantity of residential properties, receiving WwTW performance objectives and future land contributions. The Stage 3 component is influenced by factors such as rainfall rates, nitrate vulnerability status and infiltration potential.

However, there is no explanation in the nutrient budget calculator to explain the usage of the various factors for otherwise the same nutrient loadings. Stage 2 uses the same factors as Stage 3 for the pre-development scenario and are subtracted from the cumulative Stage 1 and Stage 3 calculated nutrient loads.

The four stages and parameters used within the assessment are discussed in more detail below.

2.5.1 Stage 1 (Nutrient formation due to increase in dwellings)

The stage 1 calculations are based on a standardised population rate and effluent quality at the receiving WwTW are set out as Table 2 and equate to an annual nitrogen generation rate of 227 kg total N per year for the 250 Static Caravans at a 31% occupancy rate. For context, at 100% occupancy, the nitrogen production rate is 710kg/yr in the Stage 1 calculation.

¹⁰ <https://www.northumberland.gov.uk/Planning/Applying-for-planning-permission.aspx> (under Note 15)

¹¹ Email James Hudson (Northumberland County Council) to Ian Mark (Savills) of 16th September 2022. Re. Planning Application 21/04014/FUL SOUTH MEADOWS

Table 2 Stage 1 Population Nitrogen Formation

Parameter	Units	100% Occupancy	31% Occupancy	Comments
Date of First Occupancy		01/10/2022	01/10/2022	Arbitrary date
Average Occupancy Rate		2.4	2.4	as above
Waste Usage	L/person/day	120	120	(Spreadsheet default parameter)
Development Proposal	Units	250	80	as above
WwTW		Belford STW		
WwTW Nitrogen Effluent	mg/l	27	27	Spreadsheet Default Belford STW
Stage 1 Calculated Loading from Treated Sewage Effluent Discharged to the Belford Burn and Lindisfarne SSSI				
Additional Population	Population	600	192	Calculations performed by Spreadsheet
Wastewater produced	m ³ /day	72	23.040	
Annual Total Nitrogen	kg/yr	710.05	227.21	

Note for context, each residential unit is generating 2.84kg/N per year according to the calculator at 100% occupancy

2.5.2 Stage 2 (Pre-development Land use Nutrient Formation)

The caravan park extension is to be located on an area of farmland. The Nutrient balance calculator assumes a land rating for different types of farming and agricultural. Cereal crops and general grazing is considered within the version of the calculator online, however there is a peculiarity in this calculator as it specifically excludes the possibility of considering dairy or poultry farming. This anomaly has however been addressed within the version of the calculator produced by NCC's ecologist (Table 3) and is required as for this scheme the site owners have acquired a poultry unit and associated grazing land (for 16,000 free-range hens) covering 6.28ha, as well as 19.79ha of intensively farmed arable crop land (*i.e.* cereals) as part of their expansion plans for the site.

It is however noted that the rating for a poultry farm under the same drainage and climatic condition options used by the calculator that the rating for Poultry farming is reduced from 38kg Total Nitrogen to 31.53kg TN per hectare between the Derwent and Bassenthwaite calculator in Cumbria to the revised Lindisfarne calculator.

Table 3 Mitigation Land Use Rating per Hectare Area under Impeded Drainage Conditions

Farmland Type	Nitrogen kg TN/yr per hectare
Mixed	17.54
Dairy	50.09
Pig	46.75
Poultry	31.53**
Less Favoured Area	7.83
Lowland	14.21
General	16.52
Cereal	20.85
Woodland, Shrub & Greenspace	2.5

**The equivalent land rating for Cumbria is 38kg TN per year

For illustrative purposes each field area has been calculated separately to determine their “pre-development nitrogen budget contribution. Within this, the Poultry area has been calculated using both a cereal nitrogen component, but also presented as for a poultry farming (Table 4).

Table 4 Stage 2 Pre-development Land Use Nitrogen Formation Rates

Catchment	Berwick to Alnmouth Coast		
Soil Drainage Type	Impeded Drainage		
Annual Average Rainfall	800 – 850mm/yr		
Within Nitrate Vulnerability Zone	Yes		
		Stage 2	
Land Use Type	Area	Release Load	Land Rating
	ha	kg TN	kg TN/ha
Site Specific Calculator			
Cereal	13.57	282.87	20.85
Cereal	6.22	129.66	20.85
Poultry Area (Lindisfarne Calculator)	5.35	168.71	31.53

The pre-development budget demonstrates that if the entirety of the area is considered the pre-development nutrient release is

- 581.24kg of nitrogen

The current land use loadings therefore significantly exceed the 227.21kg per year sewage releases.

A sensitivity analysis demonstrates that in order to mitigate the sewage component only the poultry field and 2.8ha of the cereal field is required to achieve neutrality.

2.5.3 Post Development Land Use Nutrient Releases

Caravan Parks do not fit into the standard model nutrient calculator as the parks are maintained for guests and there is a low occupancy which does not release significant nutrients from the land use constantly or at a rate expected for a normal residential development.

If the 31% residency factor is taken into account, then, for South Meadows, a 15.38kg/ha nutrient release rate for residential urban land would reduce to 4.77kg/ha, a rate that is slightly in excess of the nutrient release rate within the Calculator for Greenspace, Woodland and Shrub land use types *i.e.* 3kg/ha (0Table 4).

Table 5 Stage 3 Land Use Nitrogen Formation Rates

Catchment	Berwick to Alnmouth Coast		
Soil Drainage Type	Impeded Drainage		
Annual Average Rainfall	800 – 850mm/yr		
Within Nitrate Vulnerability Zone	Yes		
		Stage 3	
Land Use Type	Area	Post-Development	Land Rating
	ha	kg TN	kg TN/ha
Greenspace	11.35	34.05	3.00
Open Urban Land	11.35	102.88	9.06
Commercial/Industrial Urban Land	11.35	93.09	8.20
Residential Urban Land	11.35	174.54	15.38
Woodland/ Greenspace / Shrub	13.57	40.71	3.00

The caravan park extension is to be developed as a “green environment” and primarily within the smaller cereal field and the poultry area, *i.e.* an available cumulative 11.57ha. The adjoining continuous 13.57ha land is available as part of the scheme for neutrality purposes, should neutrality not be achieved within the development site.

Taking a conservative view of the land use, and the limitations of the calculator, then Commercial Urban Land at 8.2kg/ha the closest release rate to that of the actual land use type for that occupancy rate, *i.e.* a rate above greenspace, which is the closest approximation to the type of post-development land uses that for the caravan park.

The post-development land use nutrient releases for the 11.57ha area are therefore expected to be **<54kg** (at 4.77kg/ha) assuming, conservatively a proportional Residential urban Land use, but no less than 34kg (at 3kg/ha).

However, for the budget calculator, the closest approximation is 94.89kg from a commercial land use.

Note however that this use could be amended within the calculator by “normalising” the land use area, *i.e.* if residential urban land is reduced proportionally to 31% of the area and the remainder is left as greenspace.

2.5.4 Stage 4 (Annual Nutrient Budget)

The annual nutrient budget is the difference between the post and pre-development nutrient formation rates. Therefore the post-development land use, including sewage are aggregated and compared to the pre-development land use nutrient rate to determine if there is a net increase or decrease in nutrient releases.

The Stage 4 calculator then determines that if the net nutrient releases are below the post-development nutrient releases and a “nutrient mitigation” value is set as zero, irrespective of how far below the nutrient releases actually are. If there is a net increase in nutrient released by the

development the Stage 4 calculation also incorporates an additional 20% contingency factor for the land requiring mitigation.

In this case two scenarios are considered (Table 6) based on

- 1) Commercial land developed across the Poultry Field and Smaller Cereal Field
- 2) Normalised land use developed across the Poultry Field and Smaller Cereal Field

Table 6 Stage 4 (Nutrient Budget)

Scenario	Design Area Rated as Commercial	Design Area at "normalised" Post Development Use
Cereal Field	6.22ha	6.22ha
Poultry Area	5.35ha	5.35ha
Nutrients Formed		
Stage 1: Sewage	227.21	227.21
Stage 3: Post Development	94.89	54.14
Stage 1 & 3 Total	322.1	281.35
Background Nutrients		
Cereal	129.66	129.66
Poultry	168.71	168.71
Stage 2 Total	298.37	298.37
Net Change	23.73	-17.02

The nutrient budget calculator readily demonstrates that nutrient neutrality can be readily achieved for a caravan park extension across the Poultry area and the smaller of the two cereal fields (Land Area 8902).

Additional mitigation is therefore not required. This includes a significant factor of safety given the conservatism assumed for the post development land use in the calculator as an additional 17kg reduction in nitrogen releases to the environment will be gained from this development

3 Budget Calculation Summary and Mitigation Options

The nutrient Budget calculation demonstrates that there will be a net reduction in nutrient releases by some 17kg of nitrogen per year from the development of the caravan park across the two fields adjacent to the existing caravan park. This calculation excludes the 0.33ha area already designated for a separate development.

The larger Cereal Field the southwest can therefore be left outside of the neutrality requirements for this application (*i.e.* retained for agricultural), or offered as part of a regional Strategic Mitigation

scheme as per the second option of the Government Chief Planners guidance⁵ at a rating of 242kg of nitrogen per year.

The combined available nutrient “credits” which could be offered to an alternative scheme under thew applicant’s control is therefore 285kg of nitrogen per year.

Figure 7 Nutrient Mitigation Potential After Development



4 Conclusion

The owners of the South Meadows Caravan Park propose to increase the park by 250 static caravans.

The site is within a nitrogen vulnerable zone. Natural England have a standing objection to all residential developments in the Lindisfarne SPA and Ramsar water catchment area, which includes the site. This objection can only be overcome by demonstrating nutrient (in this case nitrogen) neutrality by offsetting the nutrients that will be released by either a change in land use or by another compensation scheme.

A nutrient mitigation balance has been undertaken for the proposed increase in occupancy following the methodologies as set out in Natural England's neutrality guidance. This methodology has been normalised to reflect the actual annual occupancy rates.

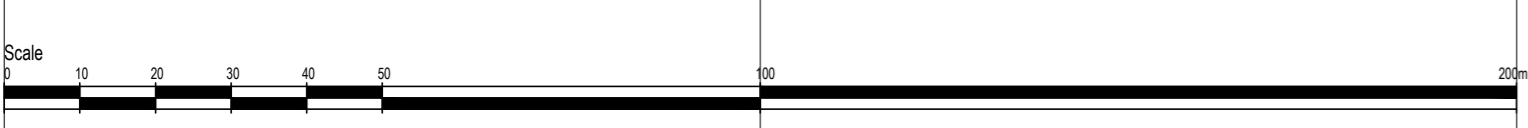
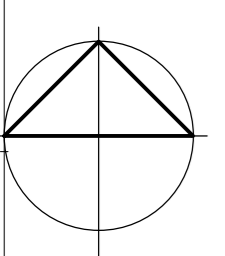
The owners have already purchased a 6ha poultry farm and ~20ha of cereal farmed area to develop the site. Part of the poultry farm area has already been attributed to a separate development phase, hence only 5.35ha of the poultry farm remains available for nutrient mitigation purposes.

Nutrient budget calculations demonstrate that only two of the three fields purchased by the owners of the caravan park are required for mitigation purposes. Consequently the remaining land area is not required for nutrient neutrality purposes.

It is recommended that if this land is not continued to be used for agriculture, then all (285kg Total nitrogen per year) or a proportion of the additional nutrient budgets (17kg of nitrogen) are offered to other development schemes during the period that nutrient mitigation is required. This can be part of a strategic mitigation scheme managed by or on behalf of the Council.

Such a scheme however may only be required until 2030, the date set for Water Companies to improve the quality of their treated effluent and thereby negate the majority if not all of developer nutrient mitigation requirements.

Drawings



Topographical Survey by -

DAVID BRIEN SURVEYING Ltd
 57 PARK LANE, SUNDERLAND, SR3 3JZ
 Tel: 0191 520291 email: david@briensky.com

Scale: 1:1 metric - 1:1000 @ A1 - (2D POINTS)
 Date: January 2021
 Datum: Ordnance Survey Origins

Notes :

Project :
**PROPOSED STATIC CARAVANS
 SOUTH MEADOWS CARAVAN PARK
 SOUTH ROAD
 BELFORD
 NE70 7DP**

Client :
DUNHAM LEISURE LTD.

Title :
PROPOSED SITE PLAN C

	The Lumen St James Boulevard Newcastle Helix Newcastle upon Tyne, NE4 5BZ Tel 0191 917 1444 www.savills.co.uk	
	Scale : 1:1,000 @ A1	Drawn : I.M. Date : JANUARY 2023
Drawing Number : 5354 / DRAFT		



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