Environmental Statement

Appendix 11.2: Nutrient Neutrality Assessment

Land at Lower Berse Farm, Wrexham

On behalf of Redrow Homes Ltd

July 2024



NUTRIENT NEUTRALITY ASSESSMENT

DATE:	July 2024	**CONFIDENTIALITY:**	Public
SUBJECT:	Ruthin Road Nutrient Neutrality Assessment		
PROJECT:	70098269	**AUTHOR:**	Aidan Wilks Daly
CHECKED:	James Ellaway	**APPROVED:**	James Ellaway

INTRODUCTION

Redrow North-West (Redrow) is proposing a development at Ruthin Road in Wrexham consisting of 1,450 homes. For this nutrient neutrality assessment, it has been assumed that the 1,450 homes will discharge foul flows off-site to Welsh Water's Five Fords WWTW, which has a current total phosphorus (TP) discharge consent limit of 1.0mg/l that is being upgraded to 0.7mg/l.

The proposed development is located in the River Dee catchment.

PHOSPHORUS NEUTRALITY

In 2021 Natural Resources Wales (NRW) published a review of waterbody compliance against phosphorus standards and found that over 60% of river Special Areas of Conservation (SAC), including the River Dee, failed to comply.

Wrexham County Borough Council and Flintshire County Council took advice from NRW that reliance on the existing total phosphorus (TP) permit limits at WWTWs in the Dee catchment could not ensure that there would be no adverse effect to the integrity of the River Dee SAC from new development proposed in the Wrexham and Flintshire LDPs.

The Councils subsequently developed the Dee Catchment Phosphorus Reduction Strategy (DCPRS) to outline how new development could be delivered whilst achieving no net increase in phosphorus impacts to the River Dee. The DCPRS requires that new developments must achieve phosphorus neutrality before planning approval can be granted.

As the Ruthin Road development is located in the Dee catchment, the phosphorus neutrality requirements apply to the site, and it must achieve phosphorus neutrality.

The DCPRS sets out a phosphorus neutrality assessment method and this approach has been adopted for the Ruthin Road phosphorus neutrality assessment detailed in this technical note.

WASTEWATER TREATMENT WORKS

From the development there will be a discharge of foul flows to Welsh Water's Five Fords WWTW, which has a current TP discharge consent limit of 1.0mg/l that is being upgraded to 0.7mg/l. The load calculations have been based on the upgraded TP consent limit of 0.7mg/l.

In August 2023 a DCWW letter confirmed that the existing phosphorus consent limit at Five Fords WWTW of 1mg/l requires tightening to 0.7mg/l by 31st March 2030.

The DCWW letter outlined that Five Fords WWTW has the capacity to treat the foul flows from the planning application development sites currently being held in abeyance by WCBC, whilst maintaining compliance with both the existing and the proposed phosphorus consent limit. A copy of this letter is shown in **Appendix B**.

Additionally, Waterco, who have been developing the drainage strategy for the site, have confirmed that DCWW will permit a connection to the Five Fords WWTW, subject to the following planning conditions which would restrict occupancy of the proposed homes until:

- Upgrades have been made on the sewer network to accommodate development foul flows (DCWW have undertaken a Hydraulic Modelling Assessment and have presented 2 options which look feasible i.e. 2 options which don't involve off-site surface water removal work).
- Upgrades have been made at the Five Fords treatment works to improve capacity. Work is expected to be undertaken in the 2025 – 2030 amp cycle.

NUTRIENT NEUTRALITY ASSESSMENT

The nutrient neutrality assessment consists of calculation of the TP loads for the development using the DCPRS assessment method. This method specifies key input values including:

- The number of residents per unit – 2.4 (paragraph 4.3.3 of the DCPRS).
- Per capita water usage of 110 litres/person/day (paragraph 4.3.3 of the DCPRS).
- The use of 90% of the WWTW discharge consent limit (paragraph 4.3.3 of the DCPRS).
- A sustainable urban drainage system (SUDS) phosphorus removal efficiency of 50% (paragraph 4.4.31 of the DCPRS, this is applied to the TP load generated in runoff from the whole development).
- Existing and future land use TP export rates (mid values) as specified in Table 4.3 of the DCPRS.

The existing and proposed land use areas are detailed in Table 1. The proposed development masterplan, historical aerial photos and proposed land use areas are presented in **Appendix A**.

Table 1 – Existing and Proposed Land Use Areas (ha)

Land Use	Existing (ha)	Proposed (ha)
Arable	58.17	0.00
Lowland Grazing	5.81	0.00
Hedgerow / Woodland	7.85	Included in SANG / Open Space
Urban Development	1.02	46.21
SANG / Open Space	0.00	26.64
Total Site Area	**72.85**	**72.85**

The results of the phosphorus neutrality calculations are detailed in Table 2, with full calculations in **Appendix C**.

Table 2: Total Phosphorus Loads (kg/year)

Load Component	TP Load (kg/year)
Wastewater load (A)	92.34
Future landuse load (B)	42.08
Existing landuse load (C)	47.83
Future landuse urban load SUDS reduction (D)	21.04
Future nutrient load (= A + (B - C) - D)	65.55
Precautionary buffer (20%)	13.11
Total nutrient load for the proposed development	**78.66**

The results confirm that with foul flows treated at Five Fords WWTW, the development will generate a residual TP load of 78.66kg/year. However, DCWW outlined that Five Fords WWTW has the capacity to treat the foul flows from the planning application development sites currently being held in abeyance by WCBC, whilst maintaining compliance with both the existing and the proposed phosphorus consent limits. Therefore, there would be no net increase in phosphorus discharged into the Dee catchment.

CONCLUSIONS

The proposed development will be compliant with phosphorus neutrality requirements as DCWW have confirmed they have capacity to treat the foul flows from the planning application development sites currently being held in abeyance by WCBC, whilst maintaining compliance with both the existing and the proposed phosphorus consent limit.

APPENDIX A – Site Masterplan, Historical Site Imagery and Future Land Use Areas



1	Residential development up to 1,450 dwellings
2	Two site access points onto the A525 Ruthin Road
3	Two site access points onto Bersham Road
4	Main access roads suitable for buses with active travel walking and cycling routes, tree avenue planting and landscape verges with swales for drainage
5	Site for a primary school up to 2FE located close to the existing high school
6	Local centre reflecting historic courtyard layout with Lower Berse Farmhouse and associated buildings of heritage value retained and enhanced
7	Development blocks to front onto existing and proposed roads and open space to create active frontages
8	Development overlooking Ruthin Road and set back to create a green frontage to the road
9	Development to sensitively integrate with Bersham Conservation Area and create a rural character along Bersham Road and Berse Lane
10	Variations in density and building heights to be used to create different character areas with lower density development to the south and west to respect the Conservation Area and rural character
11	Development set back from the existing dwelling Bryn-moel at the site centre
12	East-west green corridor and active travel route along the PRoW Bridleway with buffers to development and central open space
13	Northeast southwest green link and active travel route along PRoW connecting Bersham to Wrexham and providing a wildlife corridor
14	Retention of the existing watercourse as a wildlife corridor and feature providing a green link through the northern part of the site
15	Retention of existing landscape features to create a strong landscape framework, including important hedgerows, veteran trees, and ancient woodland
16	Drainage attenuation basins integrated at low parts of the site and along primary roads as swales
17	Land to the south of the site retained as a strategic green space and Green Wedge to Bersham
18	Series of distinctive and attractive green spaces through the development to create a sense of place and legibility with play provision focused along the PRoW Bridleway at the centre of the site
19	Ancient Woodland adjacent Berse Lane protected and sensitively integrated with development with public access restricted
20	Access to the western development parcel from Berse Lane or if feasible from development on the east side of Berse Lane. Consider potential access/interconnectivity between development if Berse Lane closed and becomes a Greenway; or provide emergency access and ped cycle connection
21	Potential to close Berse Lane and Holmestead Lane to vehicles and create Greenways as active travel walking and cycling routes

Key

Existing

- Application Boundary (72.85ha)
- Trees/Woodland
- Hedgerow
- Watercourse
- Public Right of Way (PRoW) Footpath
- Public Right of Way (PRoW) Bridleway
- Public Right of Way (PRoW) BOAT

Proposed

- Residential Development in the region of 1,450 dwellings (38.10ha)
- 2FE Primary School Site (1.62ha)
- Local Centre with possible nursery, shops, cafe, public house and community facilities subject to viability(1.46ha)
- Land Reserved for Potential Future Highways Scheme (2.54ha excluding spine road)
- Telecom Mast Exclusion Zone
- Spine Road with Tree Avenue, Landscape Verge and Swale
- Secondary Road/Shared Drive
- Emergency Access
- Walking Route
- Walking and Cycling Route
- Public Open Space (15.39ha)
- Strategic Open Space (7.89ha)
- Drainage Attenuation (1.96ha)
- Tree Planting
- Hedgerow Planting
- Neighbourhood Equipped Area for Play (NEAP)
- Multi Use Games Area (MUGA)
- Locally Equipped Area for Play (LEAP)
- Local Area for Play (LAP)

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Rev	Description	Drawn	Approved	Date
I	Updates to Active Travel	SO	NKH	16/07/24
H	Updates to Active Travel	SO	NKH	25/06/24
G	Updates in relation to land for future highways scheme and removal of WWTW	SO	NKH	12/06/24
F	Title amended to Option 1	SO	NKH	07/08/23
E	Spine Road and NDA amended	NKH	NKH	23/03/23
D	Removal of WG highway scheme	NKH	NKH	17/03/23
C	Parcel L update	AJG	NKH	01/02/23
B	Update to primary school site	EL	NKH	09/12/22
A	Updates following DTM 06/12/22	EL	NKH	08/12/22

THE ENVIRONMENT PARTNERSHIP

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Project
Lower Berse Farm, Ruthin Road, Wrexham

Title
Masterplan Framework

Drawing Number
PS9730.001I

Scale
1:2500 @ A1

Date
24/11/2022

Drawn
EL

Checked
NKH

Approved
NKH

Existing Landuse

Google Earth Pro historical aerial imagery spanning 2010 to 2021 (provided below) establishes that there has been stability in the land usage over at least a decade, with most in arable plus lowland grazing, woodland/hedgerow and existing development.

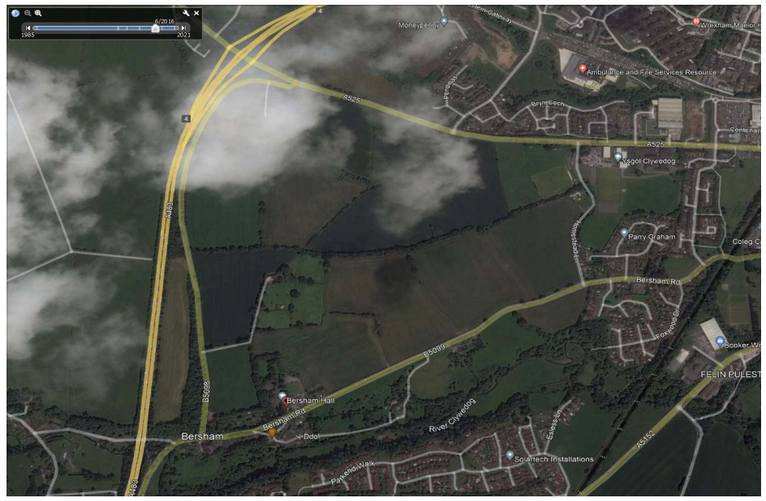
2021



2018



2016



2012



2010



Aerial imagery has been used to estimate the existing land use areas as:

Land Use	Area (ha)
Arable	58.17
Lowland Grazing	5.81
Hedgerow / Woodland	7.85
Urban Development	1.02
Total Area	**72.85**



Future Landuse

Source: Masterplan Framework Dwg No: PS9730.001I.

Land Use Classification	Area (ha)
Urban Development	46.21
SANG / Open Space	26.64
Total	72.85

Development Parcel	Area (Hectares)	Land Use Classification
A	2.57	Urban Development
B	0.78	Urban Development
C	3.12	Urban Development
D	5.52	Urban Development
E	2.58	Urban Development
F	2.91	Urban Development
G	1.41	Urban Development
H	1.52	Urban Development
I	2.91	Urban Development
J	3.52	Urban Development
K	3.75	Urban Development
L	2.15	Urban Development
M	2.94	Urban Development
N	1.89	Urban Development
O	2.55	Urban Development
School Site	1.62	50% Urban Development, 50% SANG / Open Space
Local Centre	1.46	Urban Development
Roads & footpaths outside development parcels	3.82	Urban Development
Public Open Space	15.98	SANG / Open Space
Strategic Open Space	7.89	SANG / Open Space
Drainage attenutation	1.96	SANG / Open Space
Total	72.85	-

APPENDIX B – DCWW Policy Statement regarding Five Fords WWTW

Dŵr Cymru
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FAO Matthew Phillips
Head of Service, Planning Development Management
(*via e-mail*)

Date: 22nd August 2023

Dear Matthew

Re: Development within the Five Fords & Gresford Wastewater Treatment Works (WwTW) catchments

We are content this letter be used in the place of re-consultation on the planning application development sites currently being held in abeyance by Wrexham County Borough Council (WCBC), full details of which are set out below:

Five Fords WwTW
As you will be aware, Natural Resources Wales (NRW) have completed the permit review for Five Fords WwTW and have issued the new permit, confirming that the existing phosphorus consent limit of 1mg/l requires tightening to 0.7mg/l by 31st March 2030.

Accordingly, I can advise that Five Fords WwTW has the capacity to treat the foul flows from the planning application development sites currently being held in abeyance by WCBC, whilst maintaining compliance with both the existing and the proposed phosphorus consent limit. As per Chris Smith's email of 21st August 2023, we understand that this amounts to 29 development sites and a total of 2,912 units.

If we have previously responded to a planning application outlining that a hydraulic modelling assessment is required in order to ensure that the proposed development will not hydraulically overload the public sewerage network, this particular matter will still need to be addressed in order to ensure the foul flows from the proposed development site will not cause detrimental impact to existing customers and the environment.

For clarity, we may be able to accommodate further development on top of the planning application development sites currently being held in abeyance and so will respond to any new planning consultations accordingly.

Gresford WwTW
As you will be aware, NRW have completed the permit review for Gresford WwTW and have issued the new permit, confirming that the existing phosphorus consent limit of 1mg/l is sufficient.

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We welcome correspondence in Welsh and English

Dwr Cymru Cyf, a limited company registered in Wales no 2366777. Registered office: Pentwyn Road, Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu goheniaeth yn y Gymraeg neu yn Saesneg

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Accordingly, I can advise that Gresford WwTW has the capacity to treat the foul flows from the planning application development sites currently being held in abeyance by WCBC, whilst maintaining compliance with the phosphorus consent limit. As per Chris Smith's email of 21st August 2023, we understand that this amounts to 7 development sites and a total of 171 units.

If we have previously responded to a planning application outlining that a hydraulic modelling assessment is required in order to ensure that the proposed development will not hydraulically overload the public sewerage network, this particular matter will still need to be addressed in order to ensure the foul flows from the proposed development site will not cause detrimental impact to existing customers and the environment.

For clarity, we may be able to accommodate further development on top of the planning application development sites currently being held in abeyance and so will respond to any new planning consultations accordingly.

We reserve the right to review our position on the above, but for completeness any decision to apportion the above capacity any differently to that set out is for WCBC as the competent determining authority.

Yours sincerely,



Ryan Norman
Development Growth Manager
Developer Services

glas
Glas Cymru Cyfyngedig

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Rydym yn croesawu goheniaeth yn y
Gymraeg neu yn Saesneg

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Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
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APPENDIX C – Nutrient Load Calculations

Ruthin Road, Wrexham - Phosphorus Neutrality Calculations

Notes

1. This calculation uses the method detailed in the Dee Catchment Phosphorus Reduction Strategy (DCPRS).
2. The proposed numbers of units are: 1,520 homes
3. Foul flows would be treated at Five Fords WWTWW which will be upgraded to have a TP discharge limit of 0.70mg/l.
4. The nutrient neutrality calculation method specifies the use of 90% of a WWTW permit consent limit.
5. A SUDS TP removal efficiency of 50% is adopted as per paragraph 4.4.31 of the DCPRS.

LOAD CALCULATION

Site Characteristics

Total site area (ha)	72.85
Number of homes)	1520
Number of residents per unit	2.40
Wastewater volume (litres/person/day)	110
Wastewater generated (litres/day)	401280
SUDS Nutrient Removal Efficiency (%)	50%

Wastewater Load

WWTW consent limit (mg/l)	0.70
90% of WWTW consent limit (mg/l)	0.63
Total nutrient load from wastewater (mg/day)	252806
Total nutrient load from wastewater (mg/yr)	92337538
Total nutrient load from wastewater (kg/yr)	92.34

Existing Landuse Load

Existing Landuse	Area (ha)	Total Phosphorus Export Rate (kg/ha/year)	Total Phosphorus Load (kg/year)
Arable / cereal	58.17	0.75	43.63
Lowland Grazing	5.81	0.55	3.19
Hedgerow / Woodland	7.85	0.02	0.16
Urban Development	1.02	0.83	0.85
Total	72.85	-	47.83

Future Landuse Load

Future Landuse	Area (ha)	Total Phosphorus Export Rate (kg/ha/year)	Total Phosphorus Load (kg/year)
Urban Development	46.21	0.83	38.35
SANG / Open Space	26.64	0.14	3.73
Total	72.85	-	42.08

SUDS Mitigation

Total nutrient load from surface water (kg/year)	42.08
SUDS TP removal efficiency (%)	50.0%
Total SUDS TP reduction (kg/year)	21.04

Mitigated Future Nutrient Load

Load Contribution	Total Phosphorus
Wastewater load (A)	92.34
Future landuse load (B)	42.08
Existing landuse load (C)	47.83
Future landuse urban load SUDS reduction (D)	21.04
Future nutrient load (= A + (B - C) - D)	65.55
Precautionary buffer (20%)	13.11
Mitigated future nutrient load	78.66

Conclusions

There is expected to be a residual TP load as a result of the development. However, DCWW have confirmed that this load can be accomodated at Five Fords WWTW whilst maintaining compliance with their phosphorus consent limits.