
Environmental Statement

Appendix 11.2: Nutrient Neutrality Assessment

Land at Lower Berse Farm, Wrexham

On behalf of Redrow Homes Ltd

October 2025





NUTRIENT NEUTRALITY ASSESSMENT

DATE:	06 October 2025	CONFIDENTIALITY:	Public
SUBJECT:	Ruthin Road Nutrient Neutrality Assessment v2		
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 up to 1,450 homes. The proposed development is located in the River Dee catchment.

Two options are considered:

1. The construction of 1,360 homes with foul flows treated at a new public¹ on-site WWTW operated by a limited company appointed by Ofwat under the New Appointment and Variation process (NAV)².
2. The construction of 1,450 homes with foul flows treated at Welsh Water's Five Fords wastewater treatment works (WWTW).

The masterplans for each option are provided in **Appendix A**.

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.

¹ A NAV operating a WWTW has the same rights and responsibilities as the incumbent water company. The WWTW would therefore not be subject to the provisions and restrictions that would apply to a private facility.

² <https://www.ofwat.gov.uk/regulated-companies/markets/nav-market/>



WASTEWATER TREATMENT WORKS

ON-SITE WWTW

The construction of a cutting-edge WWTW on the development site would reduce the developable area and the number of homes to 1,360. The on-site WWTW would be operated by a NAV and would have a TP discharge consent limit of 0.10mg/l. As part of the detailed design process, the NAV would undertake river flow and water quality monitoring, modelling and impact assessment. They would then apply to Natural Resources Wales for a discharge consent permit for the discharge of high-quality treated effluent to the River Clywedog.

FIVE FORDS WWTW

The option consisting of 1,450 homes would discharge foul flows to DCWW's Five Fords WWTW. This has a current TP discharge consent limit of 1.0mg/l. The limit will be improved to 0.7mg/l by 1 April 2030.

In August 2023 a DCWW letter confirmed that the existing phosphorus consent limit at Five Fords WWTW of 1mg/l requires tightening to 0.70mg/l by 31st March 2030. The 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 provided in **Appendix B**.

Additionally, during development of the drainage strategy for the site, DCWW confirmed that they would permit a connection to Five Fords WWTW, subject to planning conditions that would restrict occupancy of the homes until:

- Upgrades have been made on the sewer network to accommodate development foul flows.
- 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.

The nutrient load calculations for this option have been based on the upgraded TP consent limit of 0.70mg/l.

NUTRIENT NEUTRALITY ASSESSMENT

The nutrient neutrality assessment consists of calculation of the TP loads for the development options 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).
- Existing and future land use TP export rates specified in Table 4.3 of the DCPRS³.

³ Note that use of the mid phosphorus values for the existing land uses of arable/cereals and lowland grazing is precautionary.

The detailed calculations and supporting information are presented in **Appendix C**, which also contains ten years of Google Earth Pro historical aerial imagery that confirms the existing land uses. The existing and proposed land use areas are detailed in Table 1.

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

Land Use	Existing (ha)	Proposed (ha)
Arable	58.17	-
Lowland Grazing	5.81	-
Hedgerow / Woodland	7.85	Included in Open Space
Urban Development	1.02	47.65
Open Space	-	25.20
Total Site Area	72.85	72.85

The results of the phosphorus neutrality calculations for both development options are detailed in Table 2 with full calculations in **Appendix C**.

Table 2: Total Phosphorus Loads for Development Options 1 and 2

Load Component	TP Load (kg/year)	
	Option 1 On-Site WWTW	Option 2 Five Fords WWTW
Wastewater load (A)	11.80	88.09
Future landuse load (B)	43.08	43.08
Existing landuse load (C)	47.83	47.83
Future landuse urban load SUDS reduction (D)	21.54	21.54
Future nutrient load (= A + (B - C) - D)	-14.49	61.80
Precautionary buffer (20%)	0.00	12.36
Total nutrient load for the development	-14.49	74.16

Treating foul flows from 1,360 homes through a cutting-edge on-site WWTW would deliver phosphorus neutrality for the development. This option would actually be phosphorus negative as it would generate a TP load reduction in the Dee catchment of 14.38kg/year – benefiting the Dee SAC.

With foul flows from 1,450 homes treated at Five Fords WWTW, the development would generate a residual TP load of 74.16kg/year. This option is compliant with extant phosphorus neutrality requirements given:

- NRW advice⁴ is that ‘it is likely that a conclusion of no likely significant effect could be drawn in the context of water quality impacts where the sewerage undertaker confirms...there is capacity to treat additional wastewater from the proposed development within revised environmental permit limits...AND the WwTW is currently operating in compliance with permit conditions...’ and

⁴ <https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/advice-for-planning-authorities/advice-to-planning-authorities-for-planning-applications-affecting-phosphorus-sensitive-special-areas-of-conservation/?lang=en>



- DCWW has confirmed (**Appendix B**) 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.

CONCLUSIONS

Option 1 – 1,360 homes plus a cutting-edge on-site WWTW – would deliver phosphorus neutrality for the development.

Option 2 – 1,450 homes with foul flows treated at Five Fords WWTW – is compliant with extant NRW advice on phosphorus neutrality. However, PEDW considers that it will not deliver phosphorus neutrality without mitigation, which is not currently available in the Dee catchment

It is concluded that the development would achieve phosphorus neutrality through the construction and operation, in perpetuity, of a NAV-run cutting-edge on-site WWTW.



APPENDIX A – Site Masterplans



- 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 1,360 dwellings (35.71ha)
 - Wastewater Treatment Plant (if necessary) with 50m easement (2.55ha)
 - 2FE Primary School Site (1.62ha)
 - Local Centre with possible nursery, shops, cafe, public house and community facilities subject to viability(1.48ha)
 - 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 (15.35ha)
 - 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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J	Added wastewater treatment plant	SO	NKH	11/08/25
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
Rev	Description	Drawn	Approved	Date

TEP **THE ENVIRONMENT PARTNERSHIP**

Genesis Centre, Birchwood Science Park, Warrington WA3 7BH
Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project
Lower Berse Farm, Ruthin Road, Wrexham

Title
Masterplan Framework - Option 1

Drawing Number
PS9730.001J

Scale 1:2500 @ A1	Date 24/11/2022
Drawn EL	Checked NKH
	Approved NKH



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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- 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 Holmstead Lane to vehicles and create Greenways as active travel walking and cycling routes

A	Updated to drawing PS9730.0011	AL	NKH	21/08/25
Rev	Description	Drawn	Approved	Date

THE ENVIRONMENT PARTNERSHIP

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Project
Lower Berse Farm, Ruthin Road, Wrexham

Title
Masterplan Framework - Option 2

Drawing Number
PS9730.002A

Scale 1:2500 @ A1	Date 21/11/2022
Drawn SO	Checked NKH
	Approved NKH



APPENDIX B – DCWW Policy Statement regarding Five Fords WWTW

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.

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



APPENDIX C – Nutrient Load Calculations

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

- Site Boundary
- Land Types
- Urban
- Hedgerow/ Treeline/Scrub
- Arable Farmland
- Lowland Grazing



Future Landuse

Land Use Classification	Area (ha)
Urban Development	47.65
Open Space	25.20
Total	72.85

Option 1 - On-site WWTW



Option 2 - Five Fords WWTW



RUTHIN ROAD PHOSPHORUS LOAD CALCULATIONS - OPTION 1 ON-SITE WWTW

Notes

1. This calculation uses the method detailed in the Dee Catchment Phosphorus Reduction Strategy (DCPRS).
2. Foul flows would be treated at an on-site WWTW operated by a New Appointment and Variation (NAV) company appointed by Ofwat. The WWTW would have a TP discharge consent limit of 0.1mg/l.
3. The nutrient neutrality calculation method specifies the use of 90% of a WWTW discharge consent limit.
4. 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	1360
Number of residents per unit	2.40
Wastewater volume (litres/person/day)	110
Wastewater generated (litres/day)	359040
SUDS TP Removal Efficiency (%)	50%

Wastewater Load

WWTW consent limit (mg/l)	0.10
90% of WWTW consent limit (mg/l)	0.09
Total nutrient load from wastewater (mg/day)	32314
Total nutrient load from wastewater (mg/yr)	11802542
Total nutrient load from wastewater (kg/yr)	11.80

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	47.65	0.83	39.55
SANG / Open Space	25.20	0.14	3.53
Total	72.85	-	43.08

SUDS Mitigation

Total nutrient load from surface water (kg/year)	43.08
SUDS TP removal efficiency (%)	50.0%
Total SUDS TP reduction (kg/year)	21.54

Mitigated Future Nutrient Load

Load Contribution	Total Phosphorus
Wastewater load (A)	11.80
Future landuse load (B)	43.08
Existing landuse load (C)	47.83
Future landuse urban load SUDS reduction (D)	21.54
Future nutrient load (= A + (B - C) - D)	-14.49
Precautionary buffer (20%)	0.00
Total nutrient load	-14.49

RUTHIN ROAD PHOSPHORUS LOAD CALCULATIONS - OPTION 2 FIVE FORDS WWTW

Notes

1. This calculation uses the method detailed in the Dee Catchment Phosphorus Reduction Strategy (DCPRS).
2. Foul flows would be treated at Five Fords WWTWW which will be upgraded to a TP discharge consent limit of 0.70mg/l.
3. The nutrient neutrality calculation method specifies the use of 90% of a WWTW discharge consent limit.
4. 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)	1450
Number of residents per unit	2.40
Wastewater volume (litres/person/day)	110
Wastewater generated (litres/day)	382800
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)	241164
Total nutrient load from wastewater (mg/yr)	88085151
Total nutrient load from wastewater (kg/yr)	88.09

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	47.65	0.83	39.55
Open Space	25.20	0.14	3.53
Total	72.85	-	43.08

SUDS Mitigation

Total nutrient load from surface water (kg/year)	43.08
SUDS TP removal efficiency (%)	50.0%
Total SUDS TP reduction (kg/year)	21.54

Mitigated Future Nutrient Load

Load Contribution	Total Phosphorus
Wastewater load (A)	88.09
Future landuse load (B)	43.08
Existing landuse load (C)	47.83
Future landuse urban load SUDS reduction (D)	21.54
Future nutrient load (= A + (B - C) - D)	61.80
Precautionary buffer (20%)	12.36
Total nutrient load	74.16