BROOKBANKS

# 13086 Fairwood Terrace, Gowerton

## Technical Note 02 Rv1: Nutrient Neutrality Mitigation Strategy

12 February 2026

### Document Status

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| | | | | |

# 1 Executive Summary

1.1.1 Brookbanks has been appointed by Permission Homes Ltd to prepare a Nutrient Neutrality Mitigation Strategy for a proposed development includes the creation of up to 216 dwellings, with mixed use and a transit hub at Fairwood Terrace, Gowerton ('the Site'). This Strategy identifies and reviews potential mitigation measures to enable the development to achieve nutrient neutrality.

1.1.2 In October 2025, Natural Resources Wales (NRW) published Version 5.1 of its Advice to planning authorities for planning applications affecting nutrient sensitive Special Areas of Conservation (SACs). This should be read alongside NRW's advice titled 'Principles of nutrient neutrality in relation to development or water discharge permit proposals' (April 2025). Collectively, this guidance requires that new development must not contribute to further deterioration in water quality or undermine the ability of a SAC to meet its conservation objectives. While the guidance primarily relates to achieving phosphorus targets within river SACs, it also provides interim advice for Marine SACs. Accordingly, a nutrient assessment is necessary where development leads to increased nitrogen discharges either directly to, or within catchments draining to, marine SACs that are in unfavourable condition or where restoration efforts could be compromised.

1.1.3 NRW has identified several water bodies within Marine SACs as being in unfavourable condition. Of relevance to this assessment is the Burry Inlet Inner (part of the Carmarthen Bay and Estuaries SAC), which is failing for dissolved inorganic nitrogen (DIN), a component assessed within the overall internationally recognised metric Total Nitrogen (TN). It is therefore important to understand the hydrological connections and review whether surface water or treated foul effluent from the Site could contribute additional nutrient loading to this waterbody.

1.1.4 A Nutrient Budget Assessment prepared by Tetra Tech in October 2025 confirmed that the Site lies within the Carmarthen Bay and Gower catchment and is therefore subject to nutrient neutrality requirements to avoid further detriment to the Burry Inlet Inner. Their updated assessment (February 2026) concluded that **466.09 kg TN/year** would require mitigation for the Site to achieve nutrient neutrality. This assessment is provided in **Appendix A**.

1.1.5 This report reviews a range of potential mitigation measures capable of offsetting the identified nitrogen load and sets out a strategy to support the delivery of a nutrient neutrality.

# 2 Introduction

2.1.1 NRW released updated compliance test data in summer 2025, highlighting nutrient-related failures in many of Wales' Marine SACs, including the Burry Inlet Inner, also referred to as a feature, within the Carmarthen Bay and Estuaries SAC, primarily due to DIN.

2.1.2 The Carmarthen Bay and Estuaries SAC intersect a number of Water Framework Directive (WFD) waterbodies, including freshwater rivers that contribute to the Burry Inlet Inner. It is important to consider potential hydrological pathways from proposed developments to ensure no further deterioration of water quality in the failing units of the SAC. As a result, Local Planning Authorities (LPAs), acting as the Responsible Authority under the Conservation of Habitats and Species Regulations, are required to consider whether proposed developments within their administrative areas could contribute to nutrient pressures on affected SACs.

2.1.3 Planning consent has yet to be granted but a Planning Appeal has been lodged with PEDW and a mitigation strategy to deal with the nutrient/Marine SAC issue is urgently required.

## 2.2 Nutrient Budget Assessment

2.2.1 Tetra Tech have produced Nutrient Budget Assessment in October 2025, which identified the Site is located within the Carmarthen Bag and Gower catchment and requires nutrient neutrality in order to prevent further detriment to the downstream Burry Inlet Inner. The report calculated that **466.09kgTN/year** requires mitigation for the Site to achieve nutrient neutrality, as is attached in **Appendix A**.

2.2.2 The budget has been generated using the recently released Welsh Government Calculator along with a number of assumptions around the existing site and the development proposals. It is noted that the calculator is inherently conservative for lowland farmland within this particular catchment and more detailed Farmscoper calculations would likely yield a much higher nitrogen load for the existing/pre-development land holding. We would be more than happy to explore this in more detail with you.

2.2.3 The site area and proposed phasing are shown in the below drawing:



**Figure 2-1: Proposed Phasing Plan**

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# 3 Mitigation

3.1.1 Mitigation can be achieved through a variety of measures, including:

- Waste Water Treatment Works (WWTW) Upgrade – A developer-funded upgrade of the local WWTW to reduce nitrogen loading to the downstream SAC.
- Onsite Wastewater Treatment via a Package Treatment Plant (PTP) – Installation of PTP can reduce nitrogen discharge from wastewater, lowering the overall nitrogen load associated with the development.
- Fallowing – Temporarily or permanently taking agricultural land out of production to reduce nitrogen runoff. Fallowed areas can be replanted with woodland or grassland and must not be fertilised, grazed, or used for cropping. Importantly, mitigation land must be located upstream of the SAC in the same freshwater catchment.
- Constructed Wetlands (CW) – Wetlands within the catchment can capture and remove nitrogen from surface water through plant uptake, microbial processes, and sedimentation. These can include traditional CWs or engineered systems, such as floating treatment wetlands, specifically designed for nitrogen removal, located upstream of the SAC's catchment.
- Retrofitting of water efficient appliances to existing housing stock
- Upgrades to existing Septic tanks
- Diversion of existing surface water discharges
- Offset using credits generated by other schemes

## 3.2 Upgrade of local WWTW

3.2.1 Even though an upgrade of the local WWTW is not currently programmed by DCWW within the existing AMP period, there is potential for a developer-led upgrade to be explored and funded.

3.2.2 If the upgrade were funded by the developer, the resulting reduction in TN from improved treatment of existing effluent could be claimed as an offset against the TN generated by the proposed development. The scale of mitigation achievable would depend on the existing WWTW population and the extent of the upgrade (e.g. to BAT/TAL). The upgrade of the local WWTW would also have the benefit of reducing the development's TN budget, which would otherwise be based on the current WWTW treatment/Nitrogen Permit Limit. Further exploration would require engagement with DCWW and is likely to involve significant cost and a lengthy implementation period.

## 3.3 On-site PTP

3.3.1 Where an upgrade to the existing sewage treatment works (WWTW) may not be feasible, nutrient mitigation can alternatively be delivered through the installation of an on-site package treatment plant (PTP). Many PTPs are conservatively designed to achieve a treated effluent concentration of 10 mg/l total nitrogen (TN).

3.3.2 The difficulties that the Welsh Government Circular poses to the construction of a PTP where there is the potential if discharging to the mains sewerage system are clear however this remains an option for reducing the nutrient budget and therefore should not be ignored.

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3.3.3 Tetra Tech (2025) undertook a nutrient budget assessment for the Site based on discharge to the existing wastewater network, however the use of an on-site PTP with a discharge to the adjacent watercourse, rather than a discharge to the local WWTW would reduce the total nitrogen load arising from development

3.3.4 With a PTP providing treatment to 10 mgTN/l, the overall nitrogen load from the Site is estimated to be **340.49 kgTN/year**. As such, additional mitigation measures would still be required to offset the residual nitrogen load.

## 3.4 Fallowing

3.4.1 Fallowing land involves taking agricultural land out of use to allow regeneration of the land; it is also considered an important management strategy for the restoration of soil productivity. Fallow land generally carries a lower leachate rate than land used for agricultural purposes due to a number of reasons, including the removal of fertilisers, and the replenishing of nutrients that are generally removed by crops. This reduces erosion and leaching.

3.4.2 Note, a fallow rate buffer will need to be applied to the leachate rates for each land use proposed for fallowing. All Wales Nutrient Budget Calculator provides this figure of 3.00kgTN/ha/year.

3.4.3 As mitigation land for fallowing has not been identified at this stage. The indicative fallow land calculations are based upon the same assumptions as the Site itself, in terms of, catchment, land use, average annual rainfall, nitrate vulnerability and soil drainage characteristics.

3.4.4 The specific land use assumptions will be confirmed once land for fallowing has been identified and assessed.

3.4.5 Based on the same land characteristics as the Site, in order to mitigate **466.09kg TN/year**, the following areas could be fallowed:

- **56.7 ha** of LFA grazing (with a fallow rate of 8.22 kgTN/ha/year*), or;
- **32.2 ha** of lowland grazing (with a fallow rate of 14.48 kgTN/ha/year*), or;
- **26.8 ha** of cereal (with a fallow rate of 17.37 kgTN/ha/year*), or;
- **26.2 ha** of dairy (with a fallow rate of 17.81 kgTN/ha/year*) or,
- **23.4 ha** of mixed land (with a fallow rate of 19.96 kgTN/ha/year*).

** inclusive of -3.00kgTN/ha/year fallow buffer*

<u>On-site fallowing</u>

3.4.6 Given that the majority of the existing site is woodland/scrub there is little opportunity to fallow part of the site in order to allow an early phase to be offset.

<u>Off-site fallowing</u>

3.4.7 Off-site parcels of land are currently being investigated for potential mitigation which includes fallowing.

## 3.5 Constructed Wetland

3.5.1 In order to mitigate the proposed development, an on or off-site CW could be developed within the catchment to generate nutrient credits to offset the proposed nitrogen budget.

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3.5.2 To indicatively determine the size of a CW required to mitigate the TN budget generated by the Site, an average treatment rate of 930 kgTN/ha/year has been applied. This value is based on research by Land et al. (2016), which concluded that it is appropriate to assume a median removal rate of approximately 930 kgTN/ha/year for CWs.

3.5.3 These calculations are subject to a number of variables, and TN removal is highly dependent on site-specific factors such as hydraulic loading, retention time, and vegetation composition. Accordingly, further investigation and detailed design assessment should be undertaken in line with the design principles outlined by Kadlec and Wallace (2009) to ensure the proposed wetland achieves optimal treatment performance.

3.5.4 The pro rata constructed wetland size is illustrated in **Table 3-2.**

| TN Budget (kgTN/year) | Median treatment rate of CW (kgTN/ha/yr) | Nitrogen Load Treated (kgTN/yr) | Indicative CW (ha) |
|---|---|---|---|
| **466.09** | 930.00 | 474.30 | **0.51** |

**Table 3-1: Indicative pro-rata CW**

3.5.5 The indicative wetland area in **Table 3-2** represents a pro rata requirement based on nationally recognised wetland performance criteria. However, additional non-performance design considerations will influence the final size of any constructed wetland. Therefore, when identifying or allocating land for this mitigation option, it is recommended to assume a minimum practical wetland size in the range of **0.5–1 ha**, regardless of the calculated pro rata area.

3.5.6 Further analysis of the functionality and design of any proposed wetland will be required to ensure that it is efficient in nutrient treatment. Typically, a polishing rate of between 40% and 50% is applied; therefore, it is important to demonstrate that at least twice the calculated TN load would pass through the wetland to achieve the required reduction.

## 3.6 Retrofitting of water efficient appliances to existing properties

3.6.1 Retrofitting flow control devices into existing housing stock could help offset the nitrogen budget generated by the proposed development. Reducing water usage in inefficient properties proportionally reduces foul discharge, which in turn lessens the load on downstream sewerage systems, combined sewer overflows (CSOs), and WWTWs. This allows more effluent to be treated to the required standard and reduces the quantity of nitrogen-rich effluent entering receiving watercourses and sensitive habitats. There is also nitrogen in potable water supplies, so reducing household water use further limits the total nitrogen reaching WWTWs and downstream SACs.

3.6.2 The flow control devices are generally non-intrusive, installed on the incoming water supply to the home, and regulate water flow to all appliances within the property.

3.6.3 The scale of mitigation achievable depends on the location of the existing housing stock, the local WWTW, and the properties' water usage. As a guide, retrofitting 6–10 existing properties can offset the TN load from one new dwelling. Using this range, for **216 new dwellings**, approximately **1,296 to 2,160 existing properties** would need to be retrofitted to offset the nitrogen load from wastewater use alone. Additional retrofits may be required to offset any residual surface water nitrogen differences.

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## 3.7 Upgrades to existing septic tanks

3.7.1 In order to reduce the nutrient load discharged to the receiving system from existing septic tanks within the catchment, whether on- or off-site, mitigation could be achieved through one of the following measures:

- diversion of foul effluent to the mains sewerage system, where it would be treated to a higher standard at the WWTW; or
- upgrade of the existing septic tank to a package treatment plant (PTP) capable of achieving a higher level of nutrient removal.

3.7.2 In accordance with the All-Wales Nutrient Budget Calculator, the default TN limit for effluent from a septic tank is assumed to be **96.30 mgTN/l**, whereas the default limit for a PTP is **10 mgTN/l**. As such, upgrading a septic tank to a PTP, or diverting foul water flows to a WWTW, would result in a substantial reduction in nitrogen loading. The resulting nutrient savings could be used to generate nutrient credits to offset the nitrogen budget generated by the proposed development.

3.7.3 The next step would be to identify properties within the catchment that currently discharge to septic tanks and to assess whether these properties could feasibly be upgraded, either through connection to the local WWTW or through installation of a PTP. Further information on the location, discharge characteristics, occupancy, and existing treatment arrangements of these properties would be required in order to quantify the potential nitrogen reductions and calculate the total nutrient credits by progressing with this mitigation option.

## 3.8 Diversion of existing surface water discharges

3.8.1 There is potential to divert other existing/off-site surface water discharges that currently lack a SuDS treatment train into a newly constructed SuDS scheme. As with the proposed on-site SuDS solution, this would be assumed to follow a SAB-compliant treatment train and has the potential to achieve approximately a 30% reduction in total nitrogen (TN) within the diverted surface water flows. This reduction could be incorporated into the nutrient budget calculations to generate credits to offset the calculated nitrogen load from the development.

3.8.2 There is also potential for diverting surface water flows that currently discharge to combined sewerage systems. This would reduce the flows within the sewerage system, which in turn puts less pressure on the downstream sewerage system and its Combined Sewer Overflows and WWTWs. Thereby allowing more effluent to be treated (assuming that the local WWTW does this) and less being discharged as raw effluent into the receiving watercourses and downstream SAC. Should the surface water be removed and channelled through a SuDS system then there would be a further reduction of 30% of the TN within the surface water runoff.

3.8.3 The surface water scheme removal schemes that are proposed for this site (as part of the Burry Inlet Memorandum of Understanding (MoU) requirements) do not all have a SuDS system that they will benefit from, however one of the MOU schemes proposes to divert 1,100m2 through a new SuDS system and therefore can be relied upon as part of the mitigation to reduce the current nitrogen budget.

3.8.4 Should all MoU surface water removal required for the remaining 216 dwellings be passed through a new SuDS system before being returned to a local land drainage system then based on 9 $m^2$ per dwelling being diverted, then this would generate an offset of a single dwelling. There will also be benefit generated through a reduction in flows to the downstream sewerage system and its Combined Sewer Overflows and WWTW, however this is more difficult to quantify/agree.

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3.8.5 If however the surface water runoff from an existing housing scheme/schemes that were not currently benefitting from an existing SuDS scheme, then the runoff could be channelled through a newly constructed SuDS scheme and the default 30% removal of TN achieved. A similar density of housing scheme/schemes of 1,875-units or hardstanding only of around 42ha would offset the originally calculated nitrogen budget of **466.09 kg TN/year**.

## 3.9 Offset using credits generated by other schemes

3.9.1 Finally, there is potential for credits generated by other development/infrastructure projects within the catchment to offset against the originally calculated nitrogen budget. The mechanisms through which these credits are secured/ring-fenced are debateable however it is recommended that this is discussed with the LPA.

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# 4 Conclusion and Recommendations

## 4.1 Summary

4.1.1 The Nutrient Neutrality Mitigation Strategy has reviewed a range of options to offset the nitrogen load associated with the proposed **216**-dwelling development at Fairwood Terrace, Gowerton. The TN load requiring mitigation, as identified by Tetra Tech (2025), is **466.09 kg TN/year**. A number of mitigation options have been considered. The key findings include:

4.1.2 Directing foul flows from the Site to an on-site package treatment plant (PTP) capable of achieving a treated effluent concentration of 10 mg TN/l would significantly reduce the wastewater-related nitrogen load. Based on the updated nutrient budget calculations, this would reduce the overall nitrogen requirement from **466.09 kg TN/year** to approximately **340.49 kg TN/year**, leaving a residual load requiring further mitigation.

4.1.3 Fallowing has been assessed on an indicative basis using land characteristics consistent with those of the Site. The calculations demonstrate that very substantial areas of land would be required (ranging from approximately 23.4 ha to over 56 ha depending on land use). Given the scale of land required and the practical challenges of securing and managing suitable land within the catchment, fallowing may not be considered a feasible mitigation option for this scheme without a collaborative strategy.

4.1.4 A constructed wetland offers a potentially effective mitigation measure. Using a median TN removal rate of 930 kg TN/ha/year, a pro-rata wetland area of approximately **0.5 ha** would be required to offset the nitrogen budget. However, allowing for design constraints, hydraulic loading, and treatment efficiency, it is considered prudent to assume a minimum practical wetland size of 0.5–1.0 ha to ensure reliable performance and compliance.

4.1.5 Retrofitting water efficiency devices to existing housing stock within the catchment could also contribute to nutrient mitigation. Applying industry-standard assumptions, retrofitting approximately **1,296–2,160** existing properties could offset the wastewater nitrogen load generated by the proposed 216 dwellings. While technically viable, this option is dependent on the availability of suitable properties and delivery mechanisms and is therefore considered more appropriate as a complementary rather than primary mitigation measure.

4.1.6 Upgrades to existing septic tanks present a potentially efficient mitigation opportunity. The All-Wales Nutrient Budget Calculator assumes a default TN limit of **96.3 mg TN/l** for septic tanks, compared **with 10 mg TN/l** for PTPs. Upgrading septic tanks or diverting flows to the mains sewer could therefore generate meaningful nutrient credits. However, further information about the specific properties is required to quantify nutrient credits.

4.1.7 Diversion of existing surface water discharges from the combined sewer network represents a relevant and proportionate mitigation measure. Based on an assumed diversion of 9 $m^2$ of impermeable area per dwelling, the calculations indicate that diverting surface water from this area could potentially remove approximately **2.17 kg TN/year**, contributing a measurable reduction towards the overall mitigation requirement.

4.1.8 Overall, the assessment demonstrates that nutrient neutrality for the proposed development is achievable, provided that a coordinated approach of mitigation measures is secured, delivered, and appropriately verified in accordance with NRW guidance and local planning authority requirements.

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## 4.2 Recommendations

4.2.1 To deliver nutrient neutrality for the proposed development, the following recommendations are suggested:

- **WWTW Upgrade:** Enquiries should be made with DCWW about the upgrade of the local WWTW and/or other WWTWs within the upstream catchment of the Burry Inlet.
- **Constructed Wetlands:** Land within the catchment should be identified for a constructed wetland of at least 0.5–1.0 ha, subject to detailed hydraulic and ecological design, to provide robust and long-term nitrogen removal.
- **Surface Water Diversion:** Opportunities should be explored to divert surface water drainage in older housing estates to a newly constructed SuDS treatment train to achieve a reduction in nutrient load.
- **Septic Tank Upgrade Assessment:** A targeted assessment should be undertaken to identify properties within the catchment that discharge to septic tanks and to evaluate the feasibility of upgrading these systems to PTPs or connecting them to the mains sewer, with a view of generating nutrient credits.
- **Water Efficiency Retrofit Strategy:** Consider engagement with housing associations to explore opportunities for retrofitting water-efficient devices in existing properties, noting the scale required to achieve significant mitigation.
- **Integrated Mitigation Approach:** Nutrient neutrality should be achieved through a combination of measures, rather than reliance on a single intervention, to ensure resilience and deliverability.
- **Early Engagement with LPA and NRW:** Ongoing liaison with the County Council and NRW is recommended to agree the preferred mitigation strategy, verification mechanisms, and long-term management arrangements.
- **Detailed Design and Monitoring:** All selected mitigation measures should be subject to detailed design, implementation planning, and a monitoring and maintenance framework to ensure nutrient reductions are demonstrable, enforceable, and secured for the lifetime of the development.
- **Detailed Assessment of initial Credits from ecological mitigation land:** complete an assessment of initial credits that might be generated through the ecological mitigation works to potentially release a first phase of development for RM that would be totally within the developers control and can be delivered on day one.

4.2.2 The next steps involve confirming mitigation commitments, securing land for constructed wetlands and/or SuDS schemes, undertaking property surveys for septic tank upgrades and water efficiency retrofit. Also, preparing an implementation and monitoring plan to ensure all measures are achievable and maintained over the long term.

# 5 Disclaimer

5.1.1 The conclusions and recommendations contained herein are limited to those given the general availability of background information and the planned usage of the site.

5.1.2 Third party information has been used in the preparation of this report, which Brookbanks, by necessity assumes is correct at the time of writing. While all reasonable checks have been made on data sources and the accuracy of data, Brookbanks accepts no liability for same.

5.1.3 The benefits of this report are provided solely to Permission Homes Ltd for the proposed development Fairwood Terrace, Gowerton only.

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5.1.4 Brookbanks excludes third party rights for the information contained in the report.

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# Appendix A – Nutrient Budget Assessment (Tetra Tech, October 2025)

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|---|---|
| **Site:** | Fairwood Terrace, Gowerton |
| **Version** | 4 |
| **Date** | 17/10/2025 |
| **Client:** | Persimmon Homes Ltd |
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| **Report Type(s):** | Nutrient Budget Assessment |
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# 1.0 INTRODUCTION

Tetra Tech was appointed by Persimmon Homes Ltd (hereafter referred to as "the client") in August 2025 to calculate the change in nutrient outputs from existing to future use associated with the proposed development at Fairwood Terrace, Gowerton (See Figure 1). Fairwood Terrace, Gowerton is within the catchment of the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd Special Area of Conservation (SAC).

## 1.1 THE PROPOSED DEVELOPMENT

The Proposed Development is located on 8.71 hectares (ha) of land at Gowerton, Swansea and is centred at Ordnance Survey National Grid Reference SS 59441 96401 (see Figure 1). The Proposed Development is situated within the Carmarthen Bay and the Gower catchment.

The Proposed Development for the site includes the creation of up to 216 mixed-tenure homes, with mixed use and a transit hub.

This report has been prepared by Principal Ecologist Joe Salkeld and the conditions pertinent to it are provided in Appendix A.

## 1.2 REQUIREMENT FOR NUTRIENT BUDGET ASSESSMENT

Following the publication of the "Advice to planning authorities for planning applications affecting nutrient sensitive Special Areas of Conservation1" by Natural Resources Wales (NRW) in August 2025 a requirement is set out for planning authorities to consider nitrogen discharges from new developments on Marine SACs. This identified three marine SAC's in unfavourable condition due to current evidence of both chemical and biological failure;

- Milford Haven Inner (Pembrokeshire Marine SAC)

[1] Natural Resources Wales / Advice to planning authorities for planning applications affecting nutrient sensitive Special Areas of Conservation

- Burry Inlet Inner (Carmarthen Bay and Estuaries SAC) and
- Cemlyn Lagoon (Cemlyn Bay SAC).

Where SACs are failing to meet their conservation objectives for water quality due to high levels of nutrients, new developments requiring planning have the potential to affect a SAC must undergo a Habitats Regulations Assessment (HRA). The first stage of HRA requires a test for Likely Significant Effect (LSE) this is used to determine whether there is the potential for a proposal to undermine the Conservation Objectives of a SAC. A Nutrient Budget Assessment is carried out to assess if the new development will lead to the generation of additional nutrients in the waterbodies.

This principal is used within both England and Wales. In England there are bespoke calculators for the 27 catchments deemed at risk from increases in nitrogen and/or phosphorus. Currently in Wales there is a Nutrient Budget Calculator that covers nine SACs associated with rivers (Ricardo, 2025), however, this calculator does not include the catchments associated with the marine SACs.

In June 2025 NRW published Condition Assessments for the three marine SACs identified as in unfavourable condition. The Condition Assessment for Carmarthen Bay and Estuaries SAC identified Dissolved Inorganic Nitrogen (DIN) as a condition assessment failure (Natural Resources Wales, 2025).

As such a Nutrient Budget Assessment for nitrogen is required to support the client's planning application. Legislation relevant to this is set out in Appendix B

# 2.0 METHODOLOGY

## 2.1 DEVELOPMENT OF CARMARTHEN BAY AND ESTUARIES SAC CALCULATIONS

As there is no set methodology for Nutrient Budget Assessments in relation to the Carmarthen Bay And Estuaries SA, a bespoke methodology has been created taking into account the following documents

- Nutrient Budget Calculator Guidance - A guide on how to calculate a nutrient budget for a development using the Nutrient Budget Calculator for Wales (Ricardo, 2025);
- Nutrient Budget Calculator Technical Review - A review of the approach to calculate phosphorus budget in the West Wales region (Ricardo, 2022);
- Nutrient Budget Calculator Frequently Asked Questions (Ricardo, 2024);
- Nutrient Neutrality Generic Methodology (NECR459) (Natural England, 2022);
- Using the nutrient neutrality calculators (Natural England, 2025);
- Advice for development proposals with the potential to affect water quality resulting in adverse nutrient impacts on Habitats Sites (Natural England, 2022);
- Nutrient Budget Calculator (Welsh Goverment, 2025); and
- Natural England and The Solent Maritime Nutrient Neutrality Calculator (Natural England, 2024)

The Solent Maritime Nutrient Neutrality Calculator was selected out of the current Natural England calculators as it deals with a marine SAC and excess Nitrogen.

This bespoke methodology has been created to be as similar as possible to existing calculations to allow ease of assessment and understanding whilst still taking into account the specifics of the area.

## 2.2 RAINFALL

The average annual rainfall of the site was calculated using annual precipitation observations from 1991-2020. This information is based upon 12km grid squares and is taken from the Met Office (Met Office, 2025). As this bespoke calculator has been developed for use in in relation to the Carmarthen Bay and Estuaries SAC the rainfall average annuals rainfall was broken down into the following three categories

- Less than 1200mm;
- 1200 -1400mm; and
- Over 1400mm

## 2.3 SOIL TYPE

The soil type was determined using the Soilscapes Viewer produced by Cranfield University (Cranfield University, 2025). The soil type determines the drainage of the land with soil types ranging across the following categories

- Freeley draining;
- Slightly impeded drainage;
- Impeded drainage;
- Variable;
- Surface wetness; and
- Naturally wet

This information alongside rainfall and habitat type is used to inform natural nutrient runoff from sites.

## 2.4 PRE-DEVELOPMENT LAND

The pre-development land use is based on the results from the Phase 1 Habitat survey of the site (Celtic Ecology and Conservation Ltd , 2022). These are them converted in habitats in line with other nutrient calculators:

- Cereal crops;
- General agriculture;
- Horticulture;
- Dairy;
- Grazing;
- Mixed agriculture;
- Greenspace;
- Woodland;
- Scrub;
- Residential urban land;
- Commercial/industrial land; and
- Water.

## 2.5 POST-DEVELOPMENT LAND

The post-development land use is based upon the Illustrative Masterplan (EDP, 2024a). These are them converted in habitats in line with other nutrient calculators as set out in Section 2.4

## 2.6 NITROGEN EXPORT COEFFICIENT

The nitrogen export coefficient figures used have been based upon a on a literature review of the existing calculators (Natural England, 2024) (Welsh Goverment, 2025) and associated literature (Natural England, 2024)with data collected for the relevant habitats to the Proposed Development. The values used are set out in **Table 1**.

**Table 1: Nitrogen Export Coefficient Values and Justifications**

| Habitat Type | Nitrogen Export Coefficient | Justification |
|---|---|---|
| Greenspace | 3.0 | Current nutrient calculators use this as a blanket value for these habitats regardless of |
| Woodland | 3.0 | |

| Habitat Type | Nitrogen Export Coefficient | Justification |
|---|---|---|
| Scrub | 3.0 | rainfall values and soil types (Natural England, 2022). |
| Residential land | 24.85 | Values for Nitrogen Export Coefficient across calculators for Wales and Solent at a similar rainfall level very between 24.24 to 24.85 as a precaution the highest value was used. |
| Water | 0.0 | No runoff from standing water. |

## 2.7 OCCUPANCY RATES

As the development is for flats, an occupancy rate of 2.2 person per property has been deemed appropriate and used for this calculation based on communications with the client about the development. This is then multiplied by the number of units to give a total "Additional Population".

## 2.8 WASTE TREATMENT WORKS

It was determined that the Wastewater Treatment Works (WWTW) that would deal with waste water from the Proposed Development is Gowerton WWTW.

Data on Nitrogen permit limits for WWTW was gathered from Natural Resources Wales (NRW) Public Register [2]. The most recent permit for Gowerton was published in January 2025 (Natural Resources Wales, 2025b). Under permit BC0003001 Gowerton has a total nitrogen limit of 15 mg/L.

## 2.9 WATER USAGE

The water usage per occupant has been set at 120 litres per person per day this is based upon a usage of 110 litres per person per day as set out in the with then a 10 litre precautionary buffer applied. The 110 litres per person per day is taken from the estimated consumption figures for newly erected dwellings set out in The Building Regulations 2010 Approved Document G (Welsh Goverment, 2010). This approach is consistent with the approach used in the existing nutrient budget calculators used in Wales and England.

To get the annual wastewater amount produced by the Proposed Development the following calculation is used:

$$TWW = (WU \times AP) \times 365.25$$

Where:

[2] https://publicregister.naturalresources.wales/

- TWW = Total Waste Water Liters
- WU = Water Usage in Liters Per Person Per Days
- AP = Additional Population

## 2.10 SUSTAINABLE URBAN DRAINAGE SYSTEMS

Sustainable Urban Drainage Systems (SuDS) are a key method for controlling surface runoff and nutrient loading within developments. For this assessment it has been assumed that all SuDS will be created in line with either Option 1 (ponds followed by bioremediation devices) or Option 2 (lined infiltration devices followed by a pond) in line with CIRCA standards C815. As such it is considered that SuDS will be able to capture and remove 30% of nitrogen in runoff flowing into them (Bradley, 2022).

Development specific information required for SuDS includes area covered, area drained per SuDS and % of flow from catchment entering the SuDS.

For the Proposed Development this was informed by the following documents

- Land at Fairwood Terrace SuDS Strategy (EDP, 2024b) and
- Fairwood Terrace, Gowerton Swansea Catchment Plan and Basin Sizes (Phoenix Design, 2022)

## 2.11 CALCULATIONS

### 2.11.1 Nutrient loading from additional waste water

The Nutrient loading from additional wastewater is calculated using the following formula:

$$(TWW \times NP) \div 100000 = NLWW$$

Where:

- TWW = Total Wastewater Liters
- NP = Nitrogen permit
- NLWW = Nutrient Load Wastewater

This gives the annual wastewater Total Nitrogen load in kg TN/yr generated by the development.

### 2.11.2 Baseline Nutrient Load

The nutrient load from the existing landscape is calculated by multiplying the area of each habitat by its nitrogen export coefficient as set out in Section 2.6 and adding all the habitats scores together to give the “Nutrient Load Existing Landscape – NLEL”.

### 2.11.3 Post Development Nutrient Load

As with the baseline nutrient load the post development nutrient load is calculated by multiplying the area of each habitat by its nitrogen export coefficient as set out in Section 2.6 and adding all the habitats scores together to give the “Nutrient Load New Landscape – NLNL”.

### 2.11.4 Change

The overall nutrient budget is calculated using the following equation

$$NLWW - NLEL + (NLNL - NLSudS) = NB$$

Where:

- NLWW = Nutrient Load Wastewater
- NLEL = Nutrient Load Existing Landscape
- NLNL = Nutrient Load New Landscape
- NLSudS = Nutrient Load removed by SuDS
- NB = Nutrient Budget

### 2.11.5 Precautionary Buffer

Following these calculations a precautionary buffer of 20% is added to the results. HRA assessments work on a precautionary basis and this keeps the data in line with the calculations used in Wales and England.

# 3.0 ASSESSMENT

## 3.1 SITE BASELINE

The data for the development is provided in Table 2 and this information feeds into the calculations.

**Table 2: Baseline Data**

| | |
|---|---|
| **Number of proposed units:** | 216 |
| **Occupancy rate:** | 2.2 people per unit |
| **Population increase from the Proposed Development** | 475 |
| **The consent limit for the WwWT is:** | 15mg/l TN |
| **The wastewater from the site will be treated at this wastewater treatment works (WwTW):** | Gowerton WwTW |
| **Water consumption:** | 120 l/person |
| **River Catchment** | Carmarthen Bay and Gower |
| **Standard Average Annual rainfall (SAAR** | 1200 to 1500mm (Appendix C) |
| **Soil type** | Naturally wet |
| **The total site area:** | 8.65 ha |

The predevelopment site consists of the following habitats greenspace, shrub and woodland as shown on Figure 2 with a full break down by habitat parcel detailed in Appendix D

**Table 3: Pre Development Habitats Summary**

| Habitat Type | Area ha | Nitrogen Export Coefficient |
|---|---|---|
| Greenspace | 0.42 | 3.0 |
| Woodland | 7.29 | 3.0 |
| Scrub | 0.94 | 3.0 |

## 3.2 POST DEVELOPMENT

The site post development will be comprised of the following habitats greenspace, residential land, woodland and water as shown on Figure 3 the areas of these habitats are set out in Table 4 for the Proposed Development with a full break down by habitat parcel detailed in Appendix D

**Table 4: Post Development Habitats Summary for Proposed Development**

| Habitat Type | Area ha | Nitrogen Export Coefficient |
|---|---|---|
| Greenspace | 2.13 | 3.0 |
| Residential land | 5.40 | 24.85 |
| Woodland | 0.77 | 3.0 |
| Water | 0.35 | 0 |

## 3.3 SUSTAINABLE URBAN DRAINAGE SYSTEMS

### 3.3.1 Proposed Development Drainage

A total of five SuDS are located across the site draining four different sections of the site as shown on Figure 4. SuDS 4 and 5 have a combined drainage basin and as such will be treated as one in this report. The areas drained by each SuDS are shown in Table 5

**Table 5: SuDS Drainage for Proposed Development**

| SuDS Unit | Area drained | % of flow from catchment |
|---|---|---|
| 1 | 1.82ha | 100 |
| 2 | 1.66ha | 100 |
| 3 | 0.30ha | 100 |
| 4 and 5 | 2.70ha | 100 |

A total of 6.48ha of the site will be drained into SuDS the areas by habitat type and the amount of nitrogen removed based upon a 30% removal rate is shown in Table 6.

**Table 6: Areas drained by SuDS per habitat and Nitrogen reduction for the Proposed Development**

| Habitat Type | Areas drained | TN removed |
|---|---|---|
| Greenspace | 2.1 | 37.61 |
| Residential land | 5.4 | 0.73 |
| Woodland | 0.8 | 0.27 |
| Water | 0.3 | 0 |

## 3.4 RESULTS

Following the information set out in Sections 3.1, 3.2 and 3.3 the calculations for the Proposed Development are set out in **Table 7.**.

**Table 7: Summary of the results**

| TN Load From Development Wastewater (NLWW) | TN Load From Current Land Use (NLEL) | TN Load From Future Land Use (NLNL) | TN reduction via SuDS (NLSuDS) | Net Change in TN From the Development | With 20% Buffer |
|---|---|---|---|---|---|
| 312.42kg/TN/yr | 25.95 TN/yr | 142.96 kg/TN/yr | 38.62 kg/TN/yr | 390.71 kg/TN/yr | 468.93kg/TN/yr |

The calculations including the SuDS show that the development would result in an increased TN budget of **468.93kg /TN/yr** for the Proposed Development. As such additional mitigation will be required in order to achieve nutrient neutrality in regard to Nitrogen.

## 4.0 CONCLUSION

Under the Proposed Development of 216 units with an occupancy rate of 2.2 people per dwelling the in built SuDS would not provide sufficient reduction in kg/TN/yr to mitigate the Proposed Development and it will have a net increase of nitrogen of **468.93kg /TN/yr**. As such ways to mitigate will be investigated including but not limited to:

- Off-site mitigation / habitat enhancement;
- Changes to design of the Proposed Development;
- Water reduction methodologies
- Phasing on development
- Purchase of unit; and
- Supporting local schemes.

| Document Control | | | |
|---|---|---|---|
| **Version** | **4** | **Status:** | **Draft** |
| **Date:** | 17/10/2025 | | |
| **Prepared by:**<br>[redacted]<br>Joe Salkeld<br>Principal Ecologist | | **Checked by:**<br>[redacted]<br>Danny de la Hey<br>Associate Ecologist | **Approved by:**<br>[redacted]<br>Tom Rickman<br>Technical Director |
| **Prepared by:**<br>[redacted]<br>Joe Salkeld<br>Principal Ecologist | | **Approved by:**<br>[redacted]<br>Tom Rickman<br>Technical Director | |
| **Prepared by:**<br>[redacted]<br>Joe Salkeld<br>Principal Ecologist | | **Approved by:**<br>[redacted]<br>Tom Rickman<br>Technical Director | |
| **fourth Issue** | | | |
| **Changes** | **Update on WWTW permit information** | | |

# 5.0 REFERENCES


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# FIGURES

Figure 1: Site Location and Carmarthen Bay and Estuaries SAC

Figure 2: Pre Development Habitats

Figure 3: Post Development Habitats

Figure 4: SuDS and Catchment Zones




# Site Location and Carmarthen Bay and Estuaries SAC

**Fairwood Terrace, Gowerton**

**Persimmon Homes Ltd**

## Legend

Proposed development

**Notes:**

Symbology similar to that used within the MAGIC Application

Drawn by: MELISSA.ANDERSON1

Checked by: Joe Salkeld

Figure No. 1

Revision No. A

01 September 2025

0 0.5 1 1.5 Kilometres

Scale 1:30,000 @A3

British National Grid

NGR: 258830E 196729N

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# Current Nutrient Habitat Land Uses

**Fairwood Terrace, Gowerton**

**Persimmon Homes Ltd**

## Legend

- Proposed development
- Greenspace
- Woodland
- Shrub

Notes:

Drawn by: MELISSA.ANDERSON1

Checked by: Joe Salkeld

Figure No. 2

Revision No. A

01 September 2025

0 25 50 75 100 Meters

Scale 1:2,500 @A3

British National Grid

NGR: 259441E 196371N

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# Future Nutrient Habitat Land Uses

**Fairwood Terrace, Gowerton**

**Persimmon Homes Ltd**

## Legend

- Proposed development
- Greenspace
- Woodland
- Water
- Residential urban land

Notes:

Drawn by: MELISSA.ANDERSON1

Checked by: Joe Salkeld

Figure No. 3

Revision No. A

01 September 2025

0 25 50 75 100 Meters

Scale 1:2,500 @A3

British National Grid

NGR: 259471E 196360N

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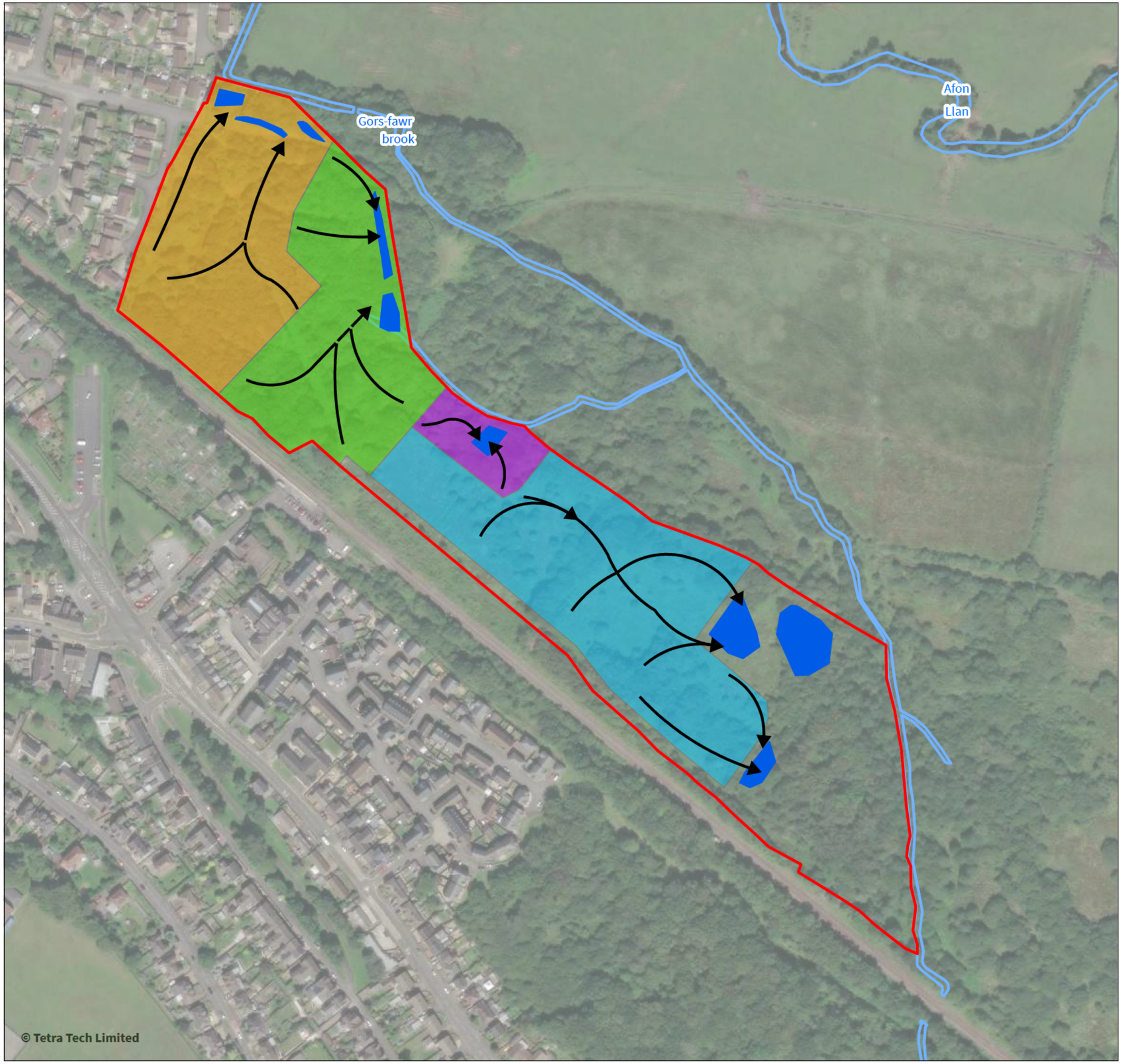


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# SuDS and Catchment Zones

**Fairwood Terrace, Gowerton**

**Persimmon Homes Ltd**

## Legend

- Proposed development
- Surface water
- SUDS ponds
- Catchment 1
- Catchment 2
- Catchment 3
- Catchment 4
- Indicative Flow Paths

Notes:

Drawn by: MELISSA.ANDERSON1

Checked by: Joe Salkeld

Figure No. 4

Revision No. A

01 September 2025

0 25 50 75 100 Meters

Scale 1:2,500 @A3

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# APPENDIX A: REPORT CONDITIONS

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The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

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# APPENDIX B: LEGISLATION

The Conservation of Habitats and Species Regulations 2017 are commonly referred to as the "Habitats Regulations". The Habitats Regulations define "European sites" as candidate Special Areas of Conservation (cSACs), Special Areas of Conservations (SACs), Special Protection Areas (SPAs), and Sites of Community Importance (SCIs). Additionally, it is Government policy that Ramsar sites (and proposed Ramsar sites) receive the same protection as European sites, as set out in the Planning Policy Wales 2024. In this report these sites are collectively referred to as "Habitat sites"

The Habitat Regulations are the principal pathway through which the European Council Directive 94/42/EEC on the conservation of natural habitats of wild fauna and flora (the "Habitats Directive") is transposed into domestic law in England and Wales.

The Conservation of Habitats and Species Regulations 2017 (Regulation 63) state that:

'*A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which—*

*(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and*

(b) *is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives.*

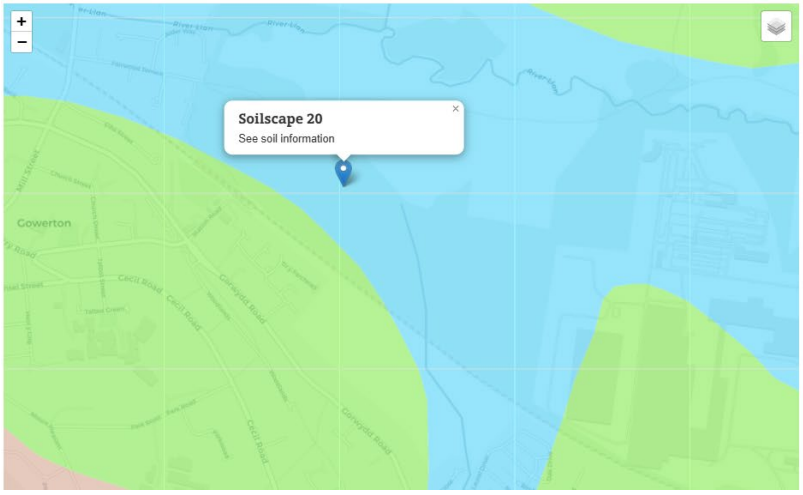
The Habitats Regulations further state that:

'*In light of the conclusions of the assessment, and subject to Regulation 64 (considerations of overriding public interest), the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site or the European offshore marine site (as this case may be)'.*

The Conservation of Habitats and Species Regulations 2017 came into force on 30th November 2017, however, these simply consolidate changes made to the previous Regulations since 2010 (which itself consolidated the 1994 Regulations and subsequent amendments) and do not alter the law regarding HRA (from the amended 2010 Regulations).

The application of the Habitats Regulations involves the precautionary principle; that plans and projects can only be permitted once it has been determined there will be no adverse effect on the integrity of a Habitat site. Plans and projects may still, however, be permitted if there are no alternatives, and there are imperative reasons of overriding public interest as to why they should go ahead. In such cases compensatory measures will be necessary to ensure the overall integrity of the network of Habitat sites.

# APPENDIX C: SOILSCAPES




**Soil Information**

**Soilscape 20:**
Loamy and clayey floodplain soils with naturally high groundwater

**Texture:**
Loamy and clayey

**Coverage:**
**England:** 2.6%,**Wales:** 1.7%,**England & Wales:**2.4%

**Drainage:**
Naturally wet

Water table

**Fertility:**
Moderate

**Landcover:**
Grassland some arable

**Habitats:**
Wet flood meadows with wet carr woodlands in old river meanders

## APPENDIX D: HABITAT PARCELS

Table 8: Pre Development Habitat Parcels

| Habitat Type | Area ha |
|---|---|
| Woodland | 7.18 |
| Shrub | 0.18 |
| Greenspace | 0.42 |
| Shrub | 0.76 |
| Woodland | 0.06 |
| Woodland | 0.05 |

Table 9: Post Development Habitat Parcels

| Habitat Type | Area ha |
|---|---|
| Residential urban land | 5.24 |
| Water | 0.08 |
| Water | 0.12 |
| Greenspace | 0.10 |
| Greenspace | 1.17 |
| Woodland | 0.16 |
| Woodland | 0.17 |
| Woodland | 0.09 |
| Woodland | 0.05 |
| Greenspace | 0.07 |
| Woodland | 0.16 |
| Woodland | 0.14 |
| Water | 0.02 |
| Water | 0.01 |
| Water | 0.01 |
| Water | 0.03 |
| Water | 0.02 |
| Water | 0.03 |
| Water | 0.03 |
| Residential urban land | 0.10 |
| Greenspace | 0.14 |

| Habitat Type | Area ha |
|---|---|
| Greenspace | 0.10 |
| Greenspace | 0.13 |
| Greenspace | 0.13 |
| Greenspace | 0.11 |
| Greenspace | 0.18 |
| Residential urban land | 0.06 |

# Appendix B – Nutrient Calculations: Incuding PTP

DRAFT

# Stage 1 - additional nutrient loading from wastewater

This sheet contains 2 tables. The tables are separated by a heading, which describes the following table.

The first table labelled 'Wastewater load input data' requires user inputs. Cells A8, A9, A13, A17 to A20, A22 to A23 are automatically generated and will state 'Not applicable' unless the required user inputs have been entered. You will need to fill in cells B6, B7, B10 to B12 and B14 to B23, unless the description states 'Not applicable'. Cells B8, B9, B13 are automatically generated and will state 'Not applicable' unless the user inputs have been entered. If the user does not enter a postcode in cell B7, cells A9 and B9 will state 'Not applicable', however this data can be selected in Cell B6 in Stage 2. Cells B24 and B25 are automatically generated and will state '0.00' unless the user inputs have been entered.

The second table labelled 'Final calculation of nutrient load from wastewater' does not require any user inputs. Cells B28 to B31 are automatically generated and will state '0.00' unless the user inputs have been entered in the second table labelled 'Wastewater load calculation table'.

How to fill in the table 'Wastewater load calculation table':
Cell B6: Select the Special Area of Conservation (SAC) from the dropdown list.
Cell B7: Enter the postcode, or the nearest postcode, for the proposed development site. This input is optional.
Cell B10: Select the project type or development type from the dropdown list.
Cell B11: Enter the number of additional units being created.
Cell B12: Enter the Local Planning Authority the development is within, if a valid postcode has not been entered into cell B7.
Cell B14: Select 'Yes' if the default occupancy rate is being used for the development if the project type is residential from the dropdown list. Select 'No' if the default occupancy rate does not apply to the residential development.
Cell B15: Enter the average occupancy rate of the development if the default occupancy rate is not automatically generated in cell B13.
Cell B16: Enter the water usage per resident or customer/user in litres per person per day. This value should be kept at 120 for residents unless other efficiency measures are used.
Cell B17: Enter the percentage of customers/users coming from outside the catchment if the project type is not residential. The default value is set to 100%.
Cell B18: Enter the number of employees per unit if the project type is not residential.
Cell B19: Enter the water usage per resident or customer/user in litres per person per day. The default value is 120.
Cell B20: Enter the percentage of employees coming from outside the catchment if the project type is not residential. The default value is set to 100%.
Cell B21: Select the connecting wastewater treatment works (WwTW) from the dropdown list.
Cell B22: Enter the certified value of total phosphorus (TP) if you select 'Package Treatment Plant user defined' or 'Septic Tank user defined' in cell B21. Otherwise the default values for these sewarage systems will be used in the calculation of the nutrient load associated with wastewater.
Cell B23: Enter the certified value of total nitrogen (TN) if you select 'Package Treatment Plant user defined' or 'Septic Tank user defined' in cell B21. Otherwise the default values for these sewerage systems will be used in the calculation of the nutrient load associated with wastewater.

## Wastewater load input data

| Description of required information | Data entry column - user inputs required |
|---|---|
| Special Area of Conservation (SAC): | Bae ac Aberoedd Caerfyrddin/ Carmarthen Bay and Estuaries |
| Postcode: | SA4 3GS |
| Local Planning Authority (LPA): | **Not applicable** |
| Rainfall: | **Not applicable** |
| Project type: | Residential |
| Development proposal (number of additional units): | 216 |
| Local Planning Authority (LPA): | Swansea Council |
| Default occupancy rate: | **2.27** |
| Is this default value being used? | Yes |
| Not applicable | |
| Water usage per resident (litres/person/day): | 120 |
| Not applicable | |
| Not applicable | |
| Not applicable | |
| Not applicable | |
| Wastewater treatment works: | Package treatment plant (PTP) user defined |
| Enter the bespoke P permit (mg TP/l): | |
| Enter the bespoke N permit (mg TN/l): | 10 |
| Phosphorus permitted limit (mg TP/l): | **0.00** |
| Nitrogen permitted limit (mg TN/l): | **10.00** |

## Final calculation of nutrient load from wastewater

| Description of values generated | Values generated |
|---|---|
| Additional population: | **490.32** |
| Annual wastewater production (litres): | **21490725.60** |
| Annual phosphorus load (kg TP/year): | **0.00** |
| Annual nitrogen load (kg TN/year): | **214.91** |