



Nitrate Neutrality Study – First Residential Parcel One Horton Heath

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Contents

Executive Summary	i
1. Introduction.....	1
1.1. Background	2
1.2. Purpose	3
1.3. Structure	3
1.4. Scope of the Assessment	3
1.5. Limitation and Copyright	3
1.6. Declaration of Competency	3
2. Approach	4
2.1. Background	4
2.2. European Designated Sites	4
2.3. Methodology	5
3. Results.....	6
4. Mitigation Measures	7
4.1. General Mitigation Measures	7
4.2. Provision of Sustainable Drainage Systems (SuDS)	8
5. Summary and Conclusion	12
References	0

Executive Summary

Hilson Moran has been appointed by the One Horton Heath Project Team (HHPT) at Eastleigh Borough Council (EBC) to provide a Nitrate Neutrality Study for the development of its One Horton Heath site in Hampshire, centred approximately on National Grid Reference SU 48815 17105.

To facilitate timely delivery, initially two planning applications will be submitted:

1. An Outline Planning Application (OPA) for the whole One Horton Heath project which will comprise:
“the comprehensive development of the site, delivering up to 2,500 No. residential dwellings, local employment, local retail, leisure, employment and community facilities, primary school, formal and informal publicly accessible open space, including formal sports facilities, landscaping, green infrastructure and sustainable drainage systems [SuDS]”; and
2. A full planning application for the first phase of the One Horton Heath project, located in the south east corner of the OPA site, which will comprise;
“Erection of 393 residential units with public open space, hard and soft landscape works, internal roads, footway/cycleways, associated parking spaces, substation, SuDS and associated infrastructure (This application is subject to Environmental Impact Assessment).”

The First Residential Parcel application (hereafter referred to as FRP) forms Phase 1 of the wider Outline Planning Application, providing 393 of the 2,500 dwellings for which outline consent is sought. The FRP has been submitted as a standalone planning application to enable the early delivery of homes within the One Horton Heath development. However, the FRP proposal is entirely consistent with the outline parameter plans, with detailed assessment of the OPA and FRP having been considered in tandem to ensure consistency throughout the design process. In part, the FRP is reliant on the mitigation and enhancements of the OPA.

A detailed Nitrate Neutrality Study for the wider OPA scheme has been prepared by Hilson Moran, namely report 25709-RP-SU-02, dated 13/05/21.

The OPA Nitrate Neutrality Study has demonstrated that

- 1) The total N-loss from pre-existing agricultural uses from the whole pre-existing OPA site has been derived using site visits, farmer questionnaires and interviews, together with Farmscoper modelling (including an appropriate allowance (-4.3 %) to reflect the adoption of nitrate reducing farming practices within a Nitrate Vulnerable Zone (NVZ)) as **3,287.3 kg N/yr**. Spread over a farmed area of 115.82 ha, this equates to an average N-loss of **28.4 kg N/ha/yr**, which is slightly above the 26.9 kg N/ha/yr figure cited by NE above as an average N-loss for all farm types within the Solent catchment area.
- 2) In addition, in line with NE guidance, the remaining 8.88 ha of pre-existing dwellings, other buildings and highways are classed as “urban development” with an assumed N-loss of 14.3 kg/ha/yr, equating to **127.0 kg N/yr**.
- 3) The wastewater generated by the proposals will be conveyed to Chickenhall WwTW where it will be treated and discharged without any permit concentration limit for TN, with an estimated discharge concentration of 27.0 mg/l TN.
- 4) A modified NE Methodology has been developed in order to increase the accuracy of the end result, ensuring the incorporation of an appropriate precautionary buffer, including:

- i. The use of a bespoke calculation for the assessment of wastewater N from pre-existing dwellings as none of them are connected to the adopted foul water sewer system or discharge through a WwTW;
 - ii. Pre-development and post-development residential populations have been derived from house size (no. of bedrooms) and Eastleigh Borough Census derived occupancy rates supplied by Census Customer Services; and
 - iii. Post-development wastewater discharge volume has been calculated assuming a daily water usage of 110 l/person/day and the Southern Water supplied "return-to-sewer" rate of 92.5 %.
- 5) The results identify that a total of **3,218.8 Kg/TN /yr** will need to be neutralised in order to mitigate against the proposed development.
 - 6) As part of the proposals, it is intended to construct a network of SuDS features across the site comprising basins, swales, ponds and wetlands to sustainably manage runoff from the scheme. All proposed SuDS features will be planted and incorporate permanently wet areas around inlets, outlets and wetland areas within the base of the features;
 - 7) Wetlands have been shown to remove N from runoff through processes such as denitrification and sedimentation. Assuming a mean removal rate of 181 g N/m²/yr can be achieved in the permanently wet areas of the proposed SuDS features, at least c. 41.1 % of the base of each SuDS feature will be provided as a permanently wetted area in order to treat all N in the runoff from the scheme. This equates to **1,284.1 kg TN/yr**;
 - 8) It is intended that the remaining **1,934.7 kg TN/yr** increase in N-loss to the Solent, associated with the OHH scheme, will be wholly mitigated through EBC's own nitrate offsetting scheme.

As the FRP forms part of the wider OPA scheme, it will serve to contribute to the above N budget through:

- a. The elimination of N-losses from pre-existing agricultural uses by taking arable and pastoral farmland out of production;
- b. Limiting sewage-related N-loss, by conveying foul sewage to Chickenhall Lane WwTW, where it will be treated and discharged at an estimated concentration of 27.0 mg/l TN; and
- c. Treating N in runoff from the development by means of a network of SuDS features, included as part of the FRP scheme.

Calculations provided in this report estimate that:

1. As part of the wider scheme, the FRP will equate to a loading of **-2,391.7 Kg/TN /yr** required to be neutralised at this stage of the OHH development.
2. All runoff derived N liberated by the FRP scheme can be readily treated by the SuDS provided within the FRP red-line boundary. This will result in a further **127.3 Kg/TN /yr** prevented from reaching the Solent and influencing the qualifying features of its internationally designated sites.
3. Subsequently, as part of the wider scheme, the FRP will equate to a loading of **-2,519.0 Kg/TN /yr** required to be neutralised at this stage of the OHH development (*i.e.* a

net reduction in N-loss compared to the pre-existing situation) and thus, there is no requirement for mitigation using EBC's own nitrate offsetting scheme at this stage of the OHH development.

Consequently, the impacts of the FRP and the wider OPA scheme proposals will be fully mitigated and will ensure that they do not detrimentally affect local biodiversity or the conservation status of the downstream European Designated Sites.

1. Introduction

Hilson Moran has been appointed by HHPT at EBC to provide a Nitrate Neutrality Study for the development of its Horton Heath site in Hampshire, centred approximately on National Grid Reference SU 48815 17105 and identified in Figure 1.1.

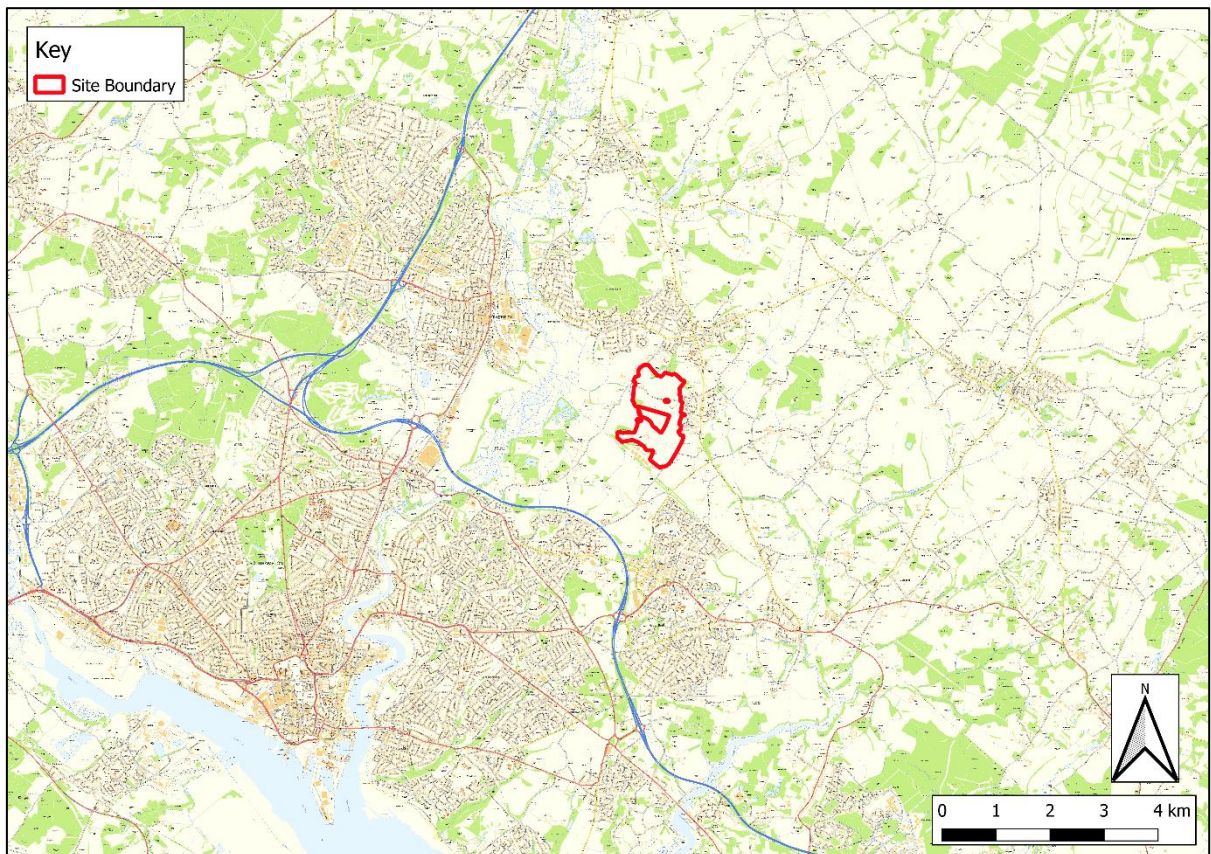


Figure 1.1 OPA Site location and boundary

The OPA for the whole One Horton Heath project which will comprise:

“the comprehensive development of the site, delivering up to 2,500 No. residential dwellings, local employment, local retail, leisure, employment and community facilities, primary school, formal and informal publicly accessible open space, including formal sports facilities, landscaping, green infrastructure and sustainable drainage systems [SuDS]”; and

The FRP is located in the south-east corner of the OPA site and constitutes the first phase of the One Horton Heath project. It will comprise:

“Erection of 393 residential units with public open space, hard and soft landscape works, internal roads, footway/cycleways, associated parking spaces, substation, SuDS and associated infrastructure (This application is subject to Environmental Impact Assessment).”

The FRP forms Phase 1 of the wider Outline Planning Application, providing 393 of the 2,500 dwellings for which outline consent is sought. The FRP has been submitted as a standalone planning application to enable the early delivery of homes within the One Horton Heath development. However, the FRP proposal is entirely consistent with the outline parameter plans, with detailed assessment of the OPA and FRP having been considered in tandem to ensure

consistency throughout the design process. In part, the FRP is reliant on the mitigation and enhancements of the OPA.

The layout of the FRP scheme is presented in Figure 1.2 below:



Figure 1.2 **Layout of FRP**

1.1. Background

Residential and tourism development applications within the Hampshire area have been being delayed or not permitted for more than a year due to the impacts associated with nitrate concentrations reaching the Solent and influencing the qualifying features of internationally designated sites associated with the Solent. These designated sites are the Solent Maritime Special Area of Conservation (SAC), Portsmouth Harbour Special Protection Area (SPA), Chichester and Langstone Harbours SPA and Solent and Southampton Water SPA).

Additional nitrate loadings from new development, principally associated with increased wastewater generation, has been identified to be causing algal blooms within the Solent that influence dissolved oxygen levels within the marine waterbody as well as smothering food resources for birds and marine life.

Developments that can provide mitigation that delivers nitrogen neutrality are permissible, *i.e.* those that include mitigation to remove an equal volume of nitrate from the catchment as they contribute can proceed as they demonstrate no impact upon the qualifying features of the designated sites.

1.2. Purpose

This Nitrate Neutrality Study has been produced to accompany the full application for the FRP scheme and to provide sufficient evidence to both EBC and Natural England (NE) that nitrate neutrality can be achieved as part of the OPA scheme, in order to avoid any detrimental impacts on downstream European Designated Sites.

1.3. Structure

The following sections of the report provide an introduction to the study, followed by a summary of the OPA nitrate neutrality study.

References are included at the end of the report with document control information included at the front.

1.4. Scope of the Assessment

This document comprises the Nitrate Neutrality Study for the FRP, as part of the wider One Horton Heath scheme.

1.5. Limitation and Copyright

This report has been prepared on behalf of and for the exclusive use of EBC and is subject to and issued in connection with the provisions of the agreement set out by Hilson Moran. Hilson Moran accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

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1.6. Declaration of Competency

This assessment has been carried out by Dr Paul Bond PhD MSc BSc CEnv CSci MEnvSc MCIEEM. Paul possesses over 30 years' experience of environmental, civil engineering and industrial projects within commercial, public and academic sectors. He holds a doctorate in SuDS, possesses post-doctoral experience in bacterial nitrogen transformations and is also a competent Ecologist, possessing 20 years environmental consultancy experience. As such, Dr Paul Bond is suitably qualified and experienced to conduct and direct the Horton Heath Nitrate Neutrality Study.

2. Approach

2.1. Background

There is currently uncertainty surrounding whether the condition of designated ecological areas located within the Solent Region will be detrimentally impacted by increases in discharges of treated sewage effluent from future housing growth in the area. This issue has been subject to ongoing detailed work commissioned by local planning authorities in association with NE, the EA and water companies. Until this work is complete, NE maintains the stance that the uncertainty remains and the potential for future housing developments across the Solent Region to exacerbate these impacts creates a risk to the potential future conservation status of designated sites. Consequently, NE has stated that one way to address this uncertainty is for new development to achieve nutrient neutrality by securing the required mitigation in compliance with the Habitats Regulations.

NE has developed a recommended methodology to determine the potential impact of new developments on local designated sites. Hilson Moran has been appointed by HHPT to provide a detailed Nitrate Neutrality Study for the development of its Horton Heath site in Hampshire. The aim of the study is to refine the NE approach, in order to provide a robust assessment of the impact of the development on downstream European Designated Sites and to inform the selection of appropriate mitigation measures for the scheme.

2.2. European Designated Sites

The Habitats Directive and Conservation of Habitats and Species Regulations 2017 (as amended) make reference to the consideration of likely significant effects of a project or plan on one or more European Sites, including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs).

However, national planning policy provided by the National Planning Policy Framework (NPPF)¹, also expects those sites under consideration for designation, *i.e.* potential SPAs (pSPAs) and candidate SACs (cSACs), Ramsar sites and areas identified to provide compensatory sites, to be considered through the Habitats Regulations Assessment (HRA) process. The legislation/agreement governing the designation of the sites are described further below:

- SPAs – classified under the European Council Directive 79/49/EEC ‘on the conservation of wild birds’ (also known as the ‘Birds Directive’) for the protection of wild birds and their habitats, including particularly rare and vulnerable species listed in Annex I of the Directive and migratory species;
- SACs – designated under European Council Directive 92/43/EEC ‘on the conservation of natural habitats and of wild fauna and flora’ (also known as the ‘Habitats Directive’), targeting particular habitats (listed on Annex I) and/or species (listed on Annex II) that are identified as being of European importance;
- Ramsar – listed under the Convention on Wetlands of International Importance (Ramsar Convention, 1971) as sites that support important wetland habitats and species, especially waterfowl habitat; and,
- Compensatory Sites – sites that have been identified to provide compensatory habitat for that impacted by plans or projects permitted through the ‘imperative reasons for overriding public interest’ (IROPI) assessment.

For ease of reference, these designations are collectively referred to within this Nitrate Neutrality Study report as 'European Designated Sites', despite Ramsar designations being made at the international level. SPAs and SACs are also referred to in guidance documents as 'Natura 2000' sites.

2.3. Methodology

The Nitrate Neutrality Study methodology is based on the NE approach (included as **Appendix 1** to the Hilson Moran Nitrate Neutrality Study for the wider OPA scheme, namely report 25709-RP-SU-02, dated 13/05/21 with additional detail designed to increase the accuracy of the methodology and confidence in the results.

3. Results

The OPA Nitrate Neutrality Study demonstrated that

- 1) The total N-loss from pre-existing agricultural uses from the whole pre-existing OPA site has been derived using site visits, farmer questionnaires and interviews, together with Farmscoper modelling (including an appropriate allowance (-4.3 %) to reflect the adoption of nitrate reducing farming practices within a Nitrate Vulnerable Zone (NVZ)) as **3,287.3 kg N/yr**. Spread over a farmed area of 115.82 ha, this equates to an average N-loss of **28.4 kg N/ha/yr**, which is slightly above the 26.9 kg N/ha/yr figure cited by NE above as an average N-loss for all farm types within the Solent catchment area.
- 2) In addition, in line with NE guidance, the remaining 8.88 ha of pre-existing dwellings, other buildings and highways are classed as “urban development” with an assumed N-loss of 14.3 kg/ha/yr, equating to **127.0 kg N/yr**.
- 3) The wastewater generated by the proposals will be conveyed to Chickenhall WwTW where it will be treated and discharged without any permit concentration limit for TN, with an estimated discharge concentration of 27.0 mg/l TN.
- 4) A modified NE Methodology was developed for the OPA scheme in order to increase the accuracy of the end result, ensuring the incorporation of an appropriate precautionary buffer, including:
 - iv. The use of a bespoke calculation for the assessment of wastewater N from pre-existing dwellings as none of them are connected to the adopted foul water sewer system or discharge through a WwTW;
 - v. Pre-development and post-development residential populations were derived from house size (no. of bedrooms) and Eastleigh Borough Census derived occupancy rates supplied by Census Customer Services; and
 - vi. Post-development wastewater discharge volume was calculated assuming a daily water usage of 110 l/person/day and the Southern Water supplied "return-to-sewer" rate of 92.5 %.
- 5) The results identify that a total of **3,218.8 Kg/TN /yr** will need to be neutralised in order to mitigate against the whole of the OPA scheme.

4. Mitigation Measures

4.1. General Mitigation Measures

As part of this Nitrate Neutrality Study, a high-level assessment of mitigation measures suitable for the proposed scheme was conducted early on in order to inform the design process and final mitigation measures, if required. The results of this assessment are presented as **Appendix 15**.

The report identified 4 main mitigation options that could have potential for the scheme. These comprised:

- 1) Addressing agricultural inputs within the catchment through the application of best practise measures, incorporating technology and providing intercepting wetlands. Although the success of these measures would be dependent upon identifying appropriate farmsteads within the River Itchen Fluvial Catchment and willing individuals to engage with the process, it was identified within the report that the provision of wetlands could be a valuable measure provided within the boundary of the post-development scheme, providing multifunctional water quality, flood prevention, biodiversity and amenity features.
- 2) The introduction of a suitable Reverse Auction Scheme for nitrogen reduction, in collaboration with Southern Water, which would offer funding to farmers in exchange for commitments that provide a reduction in the input of nitrogen in to the catchment. Whilst this mitigation option has significant and proven potential to reduce nitrogen inputs at a catchment level for the benefit of sensitive habitats downstream, it is currently unclear whether it is a realistic option for Horton Heath within the timeframe associated with the increase in residential occupancy resulting from the scheme.
- 3) On-site wastewater denitrification, either by providing a number of appropriate package treatment works across the proposed development or alternatively providing a single centralised on-site wastewater treatment plant. The report identified that this approach could wholly deliver the nitrate neutrality required and even result in a nitrate deficit, compared to the pre-existing agricultural uses of the site.
- 4) Offsetting, with the removal of low-grade agricultural land within the same catchment and returning it to unproductive green infrastructure with biodiversity and amenity value.

With regard to the mitigation measures listed above:

- 1) Horton Heath and its environs already lie within a Nitrate Vulnerable Zone (NVZ) which has been designated by DEFRA to protect water quality from nitrates from agricultural sources. As such, all farmers within the Itchen catchment are obliged to follow an Action Programme and follow a series of measures on fertilizer application to minimise the risk of nitrates polluting ground or surface water. Those who do not comply can be fined by the Government. Consequently, as the regulation of NVZs and the encouragement of farmers to adopt nutrient reduction measures lie largely with the government bodies such as the Environment Agency, DEFRA, the Rural Payments Agency and Natural England, the ability of EBC to influence farmers further may well be limited, however, the use of wetlands has been identified as a necessary measure to remove nitrate in runoff from within the site, whilst providing multifunctional water quality, flood prevention, biodiversity and amenity features.

- 2) It is understood that the UK Government is planning to establish an online ‘nitrate trading’ auction platform in the medium term, where developers will be able to buy credits from landowners looking to create new and less ‘nitrogen intensive’ habitats. The platform is expected to be rolled out over the next two years and will be delivered jointly between DEFRA, Ministry of Housing, Communities & Local Government, Natural England and the Environment Agency. However, this initiative will not be up and running in time to provide mitigation for the One Horton Heath scheme.
- 3) The Environment Agency has a presumption against private sewage treatment works in sewered areas and will always seek connection to the mains sewer where possible and practicable. A principle concern relates to the failure rates of package treatment plants (PTPs) and the lack of review and periodic upgrades via regulatory systems that apply to mains. Consequently, there may be some regulatory inertia against the adoption of development-scale package treatment plants, at least for the foreseeable future.
- 4) EBC are currently putting in place a land assembly project that will provide a permanent Borough wide nitrate mitigation approach. Consequently, it is anticipated that this scheme will be used to wholly offset the remaining increase in N-loss to the Solent associated with the OHH scheme.

4.2. Provision of Sustainable Drainage Systems (SuDS)

As part of the OPA proposals, it is intended to construct a network of SuDS features across the site comprising basins, swales, ponds and wetlands to sustainably manage runoff from the scheme as illustrated in **Appendix 15** of the Hilson Moran OPA Nitrate Neutrality Study.

It is intended that all the proposed SuDS features will be planted and incorporate permanently wet areas around inlets (sediment forebays), outlets (secondary sedimentation areas) and wetland areas within the base of the features, as illustrated in Figure 4.1 below.

With reference to the NE Nitrate Neutrality Methodology, the ability of wetlands to remove nitrogen from runoff through processes such as denitrification and sedimentation has been demonstrated in numerous studies. In particular, a recent systematic review of the effectiveness of wetlands for N (and P) removal conducted by Land *et al*, 2016³ used data from 203 wetlands worldwide. The average N removal rate for wetlands that were included in this review was 181 g N/m²/yr.

With regard to N in runoff from the entire OPA site this has been calculated to equate to **1,284.1 Kg/TN/yr**. Assuming the above N removal rate can be achieved in the permanently wet areas of the proposed SuDS features, in order to remove the total 1,284.1 kg TN/yr in runoff from the site a total of **7,094.5 m²** permanently wetted area would need to be provided across the OPA site.

With reference to **Appendix 15** of the Hilson Moran OPA Nitrate Neutrality Study, the total basal area of the proposed SuDS features equates to **17,246 m²**. Consequently, in order to provide the necessary treatment area within the bases of the SuDS would require a minimum **41.1 %** of the base of each SuDS feature to be provided as a permanently wetted area.

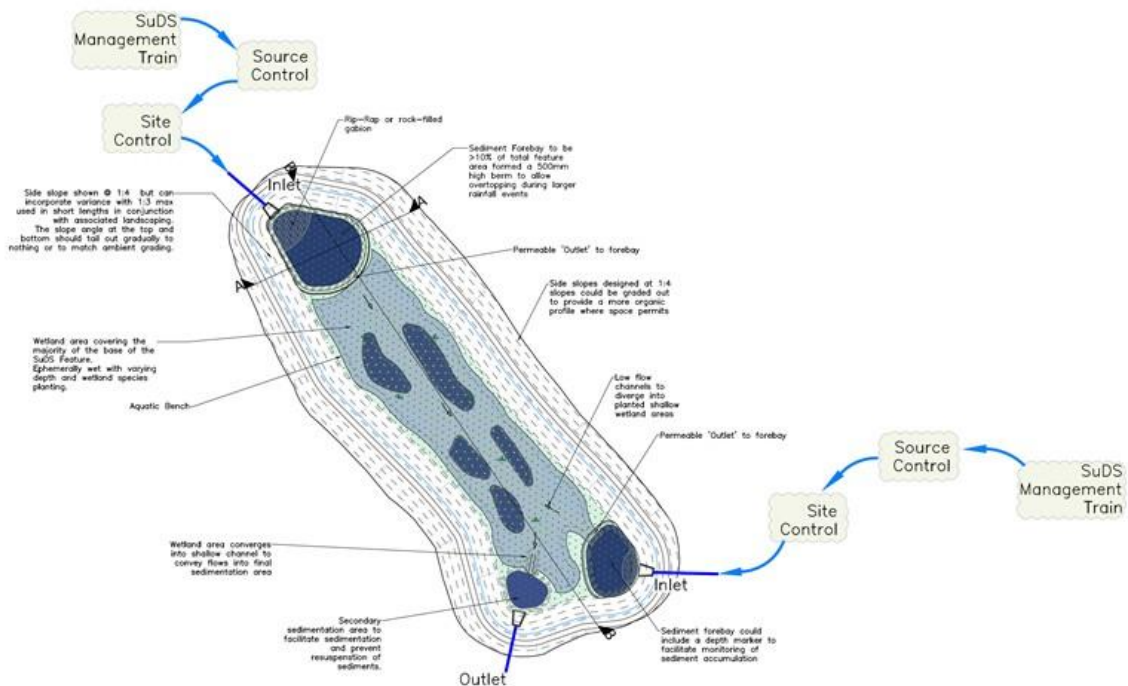


Figure 4.1 Schematic of Typical Proposed SuDS Feature

With reference to Figure 4.1 above, this percentage wetted area coverage is achievable within the proposed design and thus will be targeted within the detailed design of the features.

Consequently, it is anticipated that the proposed SuDS network should be able to remove all of the additional N within the runoff resulting from the scheme. This will ensure that the scheme will limit N-loss associated with the entire OPA scheme to **1,934.7 kg TN/yr**, which will be fully mitigated by EBC's Strategic Land Parcels offsetting scheme.

With regard to the contribution to overall N-loss that the FRP scheme will roughly equate to:

1. As demonstrated in the OPA Nitrate Neutrality Study, the OHH development will result in the cessation of **3,289.3 Kg/TN/yr** from pre-existing agricultural uses reaching the Solent and influencing the qualifying features of its internationally designated sites.
2. The FRP has a site area of 13.75 ha, which constitutes ~11.0 % of the total OPA area. With reference to the Hilson Moran OPA Nitrate Neutrality Study and adopting a pro-rata approach for post-development land uses, the FRP scheme will contribute approximately $1,157.1 \text{ Kg/TN/yr} \times 0.11 = \mathbf{127.3 \text{ Kg/TN/yr}}$ N load from future land uses.
3. The FRP will include the construction of 393 residential units, comprising 53 x 1 bedroom, 183 x 2 bedroom, 122 x 3 bedroom and 35 x 4 bedroom dwellings. Using the Census derived Eastleigh Borough occupancy rates described in Section 3.1.7 and **Appendix 17** of the Hilson Moran OPA Nitrate Neutrality Study, this equates to the introduction of $(53 \times 1.34) + (183 \times 1.90) + (122 \times 2.54) + (35 \times 3.05) = 835$ residents. This equates to $835/5,218 \times 100 = \mathbf{16.0 \%}$ of the total number of residents associated with the entire OPA scheme.
4. Consequently, with reference to the Hilson Moran OPA Nitrate Neutrality Study and assuming a pro rata approach to account for the pre-existing and post-development

wastewater emissions, the FRP will contribute approximately $4,814.5 \times 0.16 =$
770.3 Kg/TN/yr wastewater total nitrogen load to the OPA scheme as a whole.

5. Following the NE Methodology steps, the approximate net change that would result from the FRP development is presented in the table below:

CALCULATION OF THE NET CHANGE IN NITROGEN LOAD FROM THE DEVELOPMENT				
Step	Measurement	Value	Unit	Explanation
Step 1	Identify nitrogen load from wastewater	770.3 Kg/TN/yr	Kg/TN/yr	Refer to Point 4 above
Step 2	Calculate the net change in nitrogen from land use change - subtract existing land uses nitrogen load from future land uses nitrogen load	-3162.0	Kg/TN/yr	127.3 (Point 2 above) – 3,289.3 (Point 1 above) = -3162.0 Kg/TN/yr
Step 3	Determine nitrogen budget – the Total Nitrogen wastewater load for the proposed development plus the change in nitrogen load from land use change	-2,391.7	Kg/TN/yr	770.3 (step 1) + -3162.0 (step 2) = -2,391.7 Kg/TN/yr
Step 4	Where TN budget is positive add 20% precautionary buffer	-2,391.7	Kg/TN /yr	N/A
Total Nitrogen that needs to be neutralised	-2,391.7 Kg/TN /yr			

In addition, as illustrated above, approximately 127.3 Kg/TN/yr will be present in the runoff from the FRP site. As part of the FRP scheme, a number of SuDS basins/wetlands will be constructed to sustainably manage runoff from the scheme as illustrated in Figure 1.2 above. These will provide approximately 1,777.0 m² (Basin South) + 814.5 m² (Basin 8) + 814.0 m² (Basin 7A) + 278.0 m² (Basin 7B) + 415.0 m² (Basin 1) = **4098.5 m²** basin basal area.

Assuming a N removal rate of 181 g N/m²/yr can be achieved in the permanently wet areas of the proposed SuDS features, in order to remove the total 127.3 Kg/TN/yr in runoff from the site, a total $(127.3 \text{ kg TN/yr} \times 1,000) / 181 \text{ g N/m}^2/\text{yr} =$ **703.3 m²** permanently wetted area would need to be provided. Consequently, in order to provide the necessary treatment area within the bases of

the SuDS would require a minimum of $(703.3 \text{ m}^2/4098.5 \text{ m}^2) \times 100 = \mathbf{17.2 \%}$ of the base of each FRP SuDS feature to be provided as a permanently wetted area.

The network of SuDS for the entire OPA scheme will be interlinked so that runoff from other parts of the scheme may ultimately be treated in the SuDS features present within the FRP red-line boundary. Consequently, even though only 17.2 % of the basal area of the SuDS within the FRP red-line boundary is required as permanently wetted areas to treat runoff from the FRP land uses, the minimum target of 41.1 % averaged over the whole site described above, will be adhered to, in order to ensure that all runoff derived N can be treated for the whole OPA scheme by the available SuDS features.

Consequently, the calculations above demonstrate that all runoff derived N liberated by the FRP scheme can be readily treated by the SuDS provided within the FRP red-line boundary. As such, this will result in a further **127.3 Kg/TN /yr** prevented from reaching the Solent and influencing the qualifying features of its internationally designated sites.

As such, as part of the wider scheme, the FRP will equate to a loading of **-2,519.0 Kg/TN /yr** required to be neutralised at this stage of the OHH development (*i.e.* a net reduction in N-loss compared to the pre-existing situation).

Consequently, there is no requirement for mitigation using EBC's own nitrate offsetting scheme at this stage of the OHH development.

5. Summary and Conclusion

This report provides a summary of the evidence gathered to support the Nitrate Neutrality Study for the Horton Heath OPA scheme, of which the FRP constitutes the first phase.

The OPA Nitrate Neutrality Study has demonstrated that

- 1) The total N-loss from pre-existing agricultural uses from the whole pre-existing OPA site has been derived using site visits, farmer questionnaires and interviews, together with Farmscoper modelling (including an appropriate allowance (-4.3 %) to reflect the adoption of nitrate reducing farming practices within a NVZ as **3,287.3 kg N/yr**. Spread over a farmed area of 115.82 ha, this equates to an average N-loss of **28.4 kg N/ha/yr**, which is slightly above the 26.9 kg N/ha/yr figure cited by NE above as an average N-loss for all farm types within the Solent catchment area.
- 2) In addition, in line with NE guidance, the remaining 8.88 ha of pre-existing dwellings, other buildings and highways are classed as “urban development” with an assumed N-loss of 14.3 kg/ha/yr, equating to **127.0 kg N/yr**.
- 3) The wastewater generated by the proposals will be conveyed to Chickenhall WwTW where it will be treated and discharged without any permit concentration limit for TN, with an estimated discharge concentration of 27.0 mg/l TN.
- 4) A modified NE Methodology has been developed in order to increase the accuracy of the end result, ensuring the incorporation of an appropriate precautionary buffer, including:
 - i. The use of a bespoke calculation for the assessment of wastewater N from pre-existing dwellings as none of them are connected to the adopted foul water sewer system or discharge through a WwTW;
 - ii. Pre-development and post-development residential populations have been derived from house size (no. of bedrooms) and Eastleigh Borough Census derived occupancy rates supplied by Census Customer Services; and
 - iii. Post-development wastewater discharge volume has been calculated assuming a daily water usage of 110 l/person/day and the Southern Water supplied “return-to-sewer” rate of 92.5 %.
- 5) The results identify that a total of **3,218.8 kg/TN /yr** will need to be neutralised in order to mitigate against the proposed OPA development.
- 6) As part of the proposals, it is intended to construct a network of SuDS features across the site comprising basins, swales, ponds and wetlands to sustainably manage runoff from the scheme. All proposed SuDS features will be planted and incorporate permanently wet areas around inlets, outlets and wetland areas within the base of the features.
- 7) Wetlands have been shown to remove N from runoff through processes such as denitrification and sedimentation. Assuming a mean removal rate of 181 g N/m²/yr can be achieved in the permanently wet areas of the proposed SuDS features, at least c. 41.1 % of the base of each SuDS feature will be provided as a permanently wetted area in order to treat all N in the runoff from the scheme. This equates to **1,284.1 kg TN/yr**.
- 8) It is intended that the remaining **1,934.7 kg TN/yr** increase in N-loss to the Solent, associated with the OHH scheme, will be wholly mitigated through EBC's own nitrate offsetting scheme.

As the FRP forms part of the wider OPA scheme, it will serve to contribute to the above N budget through:

- a. The elimination of N-losses from pre-existing agricultural uses by taking arable and pastoral farmland out of production;
- b. Limiting sewage-related N-loss, by conveying foul sewage to Chickenhall Lane WwTW, where it will be treated and discharged at an estimated concentration of 27.0 mg/l TN; and
- c. Treating N in runoff from the development by means of a network of SuDS features, included as part of the FRP scheme.

Calculations provided in this report estimate that:

1. As part of the wider scheme, the FRP will equate to a loading of **-2,391.7 Kg/TN /yr** required to be neutralised at this stage of the OHH development.
2. All runoff derived N liberated by the FRP scheme can be readily treated by the SuDS provided within the FRP red-line boundary. This will result in a further **127.3 Kg/TN /yr** prevented from reaching the Solent and influencing the qualifying features of its internationally designated sites.
3. Subsequently, as part of the wider scheme, the FRP will equate to a loading of **-2,519.0 Kg/TN /yr** required to be neutralised at this stage of the OHH development (*i.e.* a net reduction in N-loss compared to the pre-existing situation) and thus, there is no requirement for mitigation using EBC's own nitrate offsetting scheme at this stage of the OHH development

Consequently, the impacts of the FRP and the wider OPA scheme proposals will be fully mitigated and will ensure that they do not detrimentally affect local biodiversity or the conservation status of the downstream European Designated Sites.

References

- ¹ Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework. February 2019.
- ³ Land M, Graneli W, Grimvall A, Hoffmann CC, Mitsch WJ, Tonderski KS, Verhoeven JTA (2016). *How effective are created or restored freshwater wetlands for nitrogen and phosphorus removal?* A systematic review. Environmental Evidence 5:9