OTTERPOOL PARK

ENVIRONMENTAL STATEMENT

Nutrient Budget Analysis Update

OCTOBER 2022

ENVIRONMENTAL STATEMENT – Nutrient Budget Analysis Update

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VERSION CONTROL

Version	Date	Author	Changes
P1	15/07/2022	Elliot Blount-Powell	First issue - updating earlier WCS Report (March 2022) assessment to address Natural England latest Guidance and methodology for Nutrient Budget calculations (March 2022)
P2	21/07/2022	Elliot Blount-Powell	Second issue – update to additional wetland areas after consultation with Otterpool LLP
P3	13/10/2022	Elliot Blount-Powell	Third issue – revised to address LPA/AECOM review comments

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1 Introduction

This report has been prepared by Arcadis on behalf of Otterpool Park LLP. This is an update to the current Otterpool Park Environmental Statement – Appendix 15.2 Water Cycle Study (March 2022) that was prepared by Arcadis, as part of the amended outline planning application for the Proposed Development. The amended application for planning permission relates to an existing outline planning application that was submitted to Folkstone and Hythe District Council (F&HDC) as the local planning authority (LPA) in 2019 (the '2019 planning application'), under planning reference Y19/0275/FH.

This report provides the latest nutrient budget calculations and mitigation requirements, including some recommendations to the current nutrient mitigation proposals within the Otterpool Park Tier 1 Outline Planning Application (OPA) and the wider Otterpool Framework Masterplan (FMP), to achieve Nutrient Neutrality at the proposed Otterpool Park garden settlement.

This update is produced based on the latest Natural England (NE) Habitats Regulations Assessments (HRA) Advice for Water Quality and Nutrient Neutrality that was issued to F&HDC on 16th March 2022. This new methodology incorporates the updated information as detailed below as well as a catchment specific (Stodmarsh) nutrient budget calculator:

- The Generic Methodology includes the latest version of Farmscoper (version 5) which includes more up to date values for the various variables. The updated approach also uses the actual outputs rather than averaged values from Farmscoper for detailed farm types broken down by rainfall, soil drainage type and Nitrate Vulnerable Zones (NVZ). The benefit of taking the detailed farm types approach is that it offers a more specific budget calculation for the actual nutrient losses from the development or mitigation land to be taken into account.
- The Generic Methodology covers all potential different situations on water usage that might occur across the full range of catchments.
- It provides a more consistent approach for dealing with onsite wastewater treatment systems.
- Pet waste is not considered in the greenspace export coefficient as this type of waste is taken into account in the urban surface water run off element of the calculator.
- The new methodology uses a different approach for calculating the urban export co-efficient so that it is applicable across the country. The values take into account the type of urban land and development site specific rainfall. This results in export values that will be specific to the rainfall at the location within the catchment.

The draft report was issued in July 2022[1] to both the Local Planning Authority (LPA) and NE for their initial feedback although so far only LPA comments have been formally received. Therefore, the report has been now updated (October 2022) to address the key conclusion review comments of AECOM's Nitrogen and Phosphorus Nutrient Neutrality Habitats Regulations Assessment Draft Report (September 2022)[2] that has been prepared on behalf of F&HDC, as the LPA. AECOM's report is also given in Appendix F, but Table 1 below summarises AECOM's three main points and where to find Arcadis' responses to them.

[1] Otterpool Park Environmental Statement (July 2022) Nutrient Budget Analysis Update. Arcadis. (Deprecated)
[2] Otterpool Park Nitrogen and Phosphorus Nutrient Neutrality Habitats Regulations Assessment (September 2022). AECOM.

Table 1 AECOM's Review Comments and Arcadis Responses

AECOM Comment	Arcadis Response
1. The wrong units such that kg TP/yr is used for nitrogen (rather than phosphorus) and kg TN/yr is used for phosphorus (rather than nitrogen). This is only a typographical matter but should be addressed.	The correct units have been updated throughout the report and appendix documents.
2. For the Option of being served by Sellindge WwTW (Option 2) they have used different permit concentrations than are given in the Stodmarsh calculator. This WwTW has a permit of 1 mg TP/l and 27 mg TN/l according to the Stodmarsh Calculator, although the post 2025 permit will be tightened to 0.5 mg TP/l. However, the Applicant has used values of 0.3 mg TP/l and 25 mg TN/l in their calculations. The reason why these alternative permit values have been used needs to be clarified. If the permit values in the Stodmarsh calculator are used the amount of mitigation required for Option 2 increases considerably.	Sections 4, 5, 6 and 7 have been updated to reflect the current permit concentrations, as shown in the latest Stodmarsh Nutrient Neutrality Calculator. It was assumed that under this Sellindge WwTW option, the first occupancy will also be post 2025 in line with the tightened P permit of 0.5 mg TP/l. Appendix C provides the supporting calculations. The previous calculations have used a permit of 0.3 mg TP/l and 25 mg TN/l based on the previous consultations undertaken with Southern Water, the Environment Agency (EA) and NE for upgrading Sellindge WwTW to accommodate the Proposed Development as evidenced in Appendix D, along with the relevant July 2022 nutrient budget calculations. It is envisaged that this information still can provide useful information in the event of TP value is further tightened post 2025 - for example, as part of a potential mitigation option in line with the ongoing Water Industry National Environment Programme (WINEP) study for Stodmarsh.
3. The biggest issue, which the applicant acknowledges, is that whether Option 1 or Option 2 is chosen they don't (using the new calculator tool) currently have anything like enough mitigation identified at this time to demonstrate nutrient neutrality. The proposed wetland area in the previous Water Cycle Study (WCS) (March 2022) was 28.77 ha which means that for Option 1 there is currently a shortfall of approximately 6.88 ha for PCC Scenario 1 and 5.93 ha for PCC Scenario 2. For Option 2, this increases to 30.97 ha for Scenario 1 and 28.13 ha for Scenario 2; the shortfall for Option 2 is even larger if the actual permit values in the calculator tool for Sellindge WwTW are used. We recognise Option 1 is the preferred option but that still has a shortfall of c. 20-25%.	Section 6 addresses the revised mitigation proposals to address the identified shortfall in wetland area for Option 1 (Onsite WwTW) under both PCC scenarios. This involves extending some of the previous wetlands as well as reconfiguring suitable SuDS areas (with surplus storage capacity and footprint area) into stormwater wetlands/bio-retention areas to maximise their nutrient removal ability and wider benefits. Therefore, a total of 35.68 ha of wetland is now available as part of the revised mitigation strategy to meet the 35.65 ha required under the worst-case PCC Scenario 1 (or 34.70 ha under alternative PCC Scenario 2). However, the Proposed Development within the current OPA will only require a total wetland area of 30.64 ha. Further wetland areas within the wider FMP can also be provided, if necessary, when the development plans are more advanced outside the current OPA. We recognise that there is still a significant shortfall in wetland area (approximately 48ha) to address the nutrient loads from Option 2 (Sellindge). Therefore, this is not our preferred approach to the OPA as explained in Section 6.1.2.
4. To address (3), the Applicant proposes that the current SuDS area within the OPA boundary should be designed as wetlands or bio-retention	Additional assessment work was undertaken as part of this update to address this issue, as explained in Section 6.2 and our response to the Point 3 above. The updated

AECOM Comment	Arcadis Response
features to remove surplus P load. They note there is the potential for 8.97 ha of additional stormwater wetlands within the Otterpool Park OPA and FMP. If this is the case, it would be sufficient to address the shortfall for Option 1, the preferred approach. However, this would require further investigation and if that potential has been identified at this point, we would need to understand whether further work was to be undertaken prior to application submission to confirm that potential. Overall, if a resolution to grant outline planning permission is made it is recommended that it is subject to a planning condition that the Applicant identifies and details the additional required for wetland mitigation prior to the next planning stage.	assessment should now give a sufficient level of extra confidence to the LPA and NE to decide that the proposed mitigations are robust and can achieve nutrient neutrality without causing adverse effects on the integrity of the Stodmarsh designated sites either alone or in combination with other plans or projects. The assessments undertaken to date are precautionary and meet the level of detail expected for an OPA of a strategic site of this nature. Further detail on the mitigation proposals will be submitted as part of the planning conditions for each key development phase or multiple development phases.

2 Background

Appendix A Figure 1 gives a location plan for the Otterpool Park OPA and FMP.

Excessive nutrient levels (nitrogen and phosphorous) can negatively impact on the Stodmarsh Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site. The site is also designated as a Site of Special Scientific Interest (SSSI) and National Nature Reserve (NNR).

Background to this issue, including the assessments undertaken and proposed mitigations are fully covered in the relevant chapters of Otterpool Park Environmental Statement[3] and following technical documents:

- Environmental Statement – Appendix 15.2 Water Cycle Study (WCS)[4]
- Environmental Statement – Appendix 15.1 Flood Risk Assessment (FRA) and Surface Water Drainage Strategy (SWDS)[5]
- Environmental Statement – Appendix 7.19 Habitats Regulation Assessment[6]

[3] Arcadis (March 2022) OP5 – Environmental Statement
[4] Arcadis (March 2022) OP5 – Appendix 15.2 – Water Cycle Study
[5] Arcadis (March 2022) OP5 – Appendix 15.1 – Flood Risk Assessment and Surface Water Drainage
[6] Arcadis (March 2022) OP5 – Appendix 7.19 – Habitats Regulations Assessment

3 Proposed Development

3.1 Development Details and Assessment Parameters

Otterpool Park Garden Settlement is jointly promoted by F&HDC and Otterpool Park LLP. Details of the proposed Development are given in the Development Specification[7] and Strategic Design Principles Specification[8] submitted as part of the amended Tier 1 OPA documentation, along with the Parameter Plans[9] for approval, and other supporting plans and strategies.

The Otterpool Park Tier 1 OPA includes 8500 new residential homes and associated non-residential uses/infrastructure, covering a total area of 589 ha. However, the existing land use in 37.4 ha of the total OPA site area will be unchanged, and therefore is fully excluded in the updated nutrient budget calculations. In summary, the nutrient budget calculations for the Otterpool Park OPA are based on:

- 7,855 Class C3 residential units;
- 645 Class C2 extra care residential units;
- 117 rooms Class C1 hotel; and
- Land use proposals within a site area of 551.60 ha

The Otterpool Park FMP includes another 1,500 residential units (849 Class C3 and 651 Class C2) and associated non-residential uses/infrastructure, covering a total area of 756 ha which includes 71 ha of existing community areas and 54.9 ha of retained farmland However, the additional area included in the FMP in the nutrient budget calculations is 44.29 ha because the existing land use in the remaining FMP area will be unchanged or will be integrated in the form of the proposed strategic greenspace elements, which have the same nutrient export values.

The two PCC Scenarios shown in Table 2 are used in the nutrient budget assessment discussed in the remaining sections. Both PCC Scenarios provide a robust assessment as the rates used for Class C1 and C2 are significantly higher than the recommended minimum 110 litres/ person/day (l/p/d) by NE[10]. This is based on the optional tighter Building Regulations water use per person standard of 110 litres/person/day with an additional 10 litres per person per day to account for changes to less water efficient fittings throughout the lifetime of the development, as per the NE guidance.

Table 2 Assumed PCC Scenarios in Nutrient Budget Assessment

Residential Land use	Per Capita Consumption (PCC) (l/p/d) Scenario 1 See Note 1	Per Capita Consumption (PCC) (l/p/d) Scenario 2 See Note 2
Class C3	120*	120
Class C2	350	263
Class C1	300	225

[7] Quod (March 2022) OP5 – Appendix 4.1 – Development Specification
[8] Quod (March 2022) OP5 – Appendix 4.3 – Strategic Design Principles
[9] Farrells (March 2022) OP5 – Appendix 4.2 – Site Boundary and Parameter Plans
[10] Natural England (February 2022) Nutrient Neutrality Generic Methodology. Issue 1.

* The PCC rate for Class C3 is based on 110 l/p/d with an additional 10 litres per person per day to account for changes to less water efficient fittings throughout the lifetime of the development.
as per NE published guidance and CSR Policy SS9. However, for Class C2 and Class C1 are as per the recommended higher PCC rates in British Water Flows and Loads – 4 Code of Practice (revised in 2013)

Notes

1. Scenario 1 PCC rate for Class C3 is based on 110 l/p/d as per NE published guidance and CSR Policy SS9. However, for Class C2 and Class C1 are as per the recommended higher PCC rates in British Water Flows and Loads – 4 Code of Practice (revised in 2013)

2. Scenario 2 PCC rate for Class C3 is based on 110 l/p/d as per NE published guidance and CSR Policy SS9. However, for Class C2 and Class C1 are as per the recommended PCC rates in British Water Flows and Loads – 4 Code of Practice (revised in 2013) are reduced by 25% to reflect the additional water efficiency measures proposed at Otterpool Park. This is because a similar % reduction can be seen for PCC in relation to the standard Class C3 dwellings when compared with the British Water recommended PCC rates.

4 Nutrient Budget Assessment

4.1 Overview

The nutrient budget calculator requires a set of inputs to calculate a new development's nutrient budget. The calculations are completed as per the following four key stages, which is still broadly in line with the previous methodology:

Stage 1 - Calculate the new nutrient load associated with the additional wastewater from the development site.

Stage 2 - Calculate the pre-existing nutrient load from current land use on the development site.

Stage 3 - Calculate the future nutrient load from land use on the development site post-development.

Stage 4 - Calculate the net change in nutrient loading from the development to the Stodmarsh SAC and Ramsar site with the addition of a buffer. The net change in nutrient loading + the buffer is the nutrient budget.

As part of the Stage 2 assessment, the new calculator now requires the soil drainage type, annual rainfall (mm) and to specify if the Proposed Development is within a NVZ to determine the nutrient export coefficients for the site. However, Otterpool Park Framework Masterplan is a large site area with 756 ha which covers the following three main drainage types according to Soilscapes[11]:

1. Freely Draining
2. Impeded Drainage
3. Naturally Wet

Therefore, the existing land use classes within the impacted total site area within the OPA and FMP have been split into these three drainage types to undertake Stage 2 assessment. Similarly, proposed land use classes within the site under the Stage 3 assessment have been split according to the same three drainage types to ensure consistency.

One of the main shortcomings of the Stodmarsh calculator is that it is unable to perform nutrient budgets for all Stages 1 - 4 in a single spreadsheet when a specific site falls within multiple drainage types. To overcome this issue, Stages 1 - 3 calculations have been performed using several calculators and their outputs have been separately combined to obtain the Stage 4 nutrient budget for the total site area.

The latest nutrient loading and budget calculations outputs are provided in **Appendix B** and **Appendix C** along with a breakdown of the estimated land use classes for Otterpool OPA and Otterpool Framework Masterplan for each Soilscapes drainage type.

A summary of the nutrient loading for Stages 1 - 3 for the two drainage catchments and the total nutrient budget estimated at Stage 4 is given below.

4.2 Stage 1 Additional WwTW Nutrient Loading

As per the previous Nutrient Budget Analysis carried out in March 2022, there are two options for the WwTW solution. The preferred Onsite WwTW solution with Severn Trent Connect has an agreed permitting values with NE of 7.2 mg/l for Total Nitrogen (TN) and a Total Phosphorus (TP) limit of 0.1 mg/l. Nutrient budget estimates have also been undertaken for the alternative Southern Water's Sellindge WwTW solution where a TP discharge permit value of 0.5 mg/l is used and a TN limit of 27 mg/l was assumed (as per NE published guidance, Stodmarsh Calculator) in the absence of a defined discharge permit value for TN. A summary of these permits can be seen in Table 3.

[11] Cranfield Soil and Agrifood Institute. Soilscapes. Available at: http://www.landis.org.uk/soilscapes

As per point 2 in the Introduction, the Sellindge permits have been now updated to reflect that of the Stodmarsh Nutrient Budget Calculation (i.e., assuming that under this Sellindge WwTW option the first occupancy at the Proposed Development will also be delayed till 2025 until the existing P permit is tightened from 1 mg TP/l to 0.5 mg TP/l).

Table 3 WwTW TP and TN permit options

Description	Onsite WwTW	Offsite (Sellindge) WwTW[2]
TN permit	7.2 mg/l	27 mg/l
TP permit	0.1 mg/l	0.5 mg/l
90% of the proposed consent TN limit[1]	6.48	24.3
90% of the proposed consent TP limit[1]	0.09	0.45

[1] the input value for the permit level is multiplied by a factor of 0.9 in the NE calculator, as shown in **Appendix B and Appendix C**

[2] As per the Stodmarsh calculator, Sellindge WwTW has a permit of 1 mg TP/l which will be tightened to 0.5 mg TP/l by 2025, as first occupancy is not expected till 2025 if we were to connect to this WwTW, the offsite TP loads are based on 0.5 mg TP/l. Alternative permit values of 0.3 mg TP/l and 25 mg TN/l, which was based on the previous consultations undertaken with Southern Water, EA and NE during the latest WCS preparation to accommodate the Proposed Development, have also been used in **Appendix D** supplementary calculations for comparison.

4.2.1 Onsite WwTW Option

Table 4 shows the Annual Wastewater TP and TN load for the OPA area which are based on the TP and TN Permit levels for the Onsite WwTW against the two PCC water usage rates scenarios.

Table 4 Total Annual Wastewater TP and TN Load from the Onsite WwTW option within OPA.

Description	Onsite WwTW Scenario 1		Onsite WwTW Scenario 2	
	Annual wastewater TP load (kg/ TP/year)	Annual wastewater TN load (kg/ TN/year)	Annual wastewater TP load (kg/ TP/year)	Annual wastewater TN load (kg/ TN/year)
Class C3	74.4	5354.3	74.4	5354.3
Class C2	17.8	1282.3	13.4	963.6
Class C1	2.3	166.2	1.7	124.6
OPA Final Stage 1 Output	**94.5**	**6802.8**	**89.5**	**6442.5**

Table 5 shows Annual Wastewater TP and TN load for the 1500 residential units (849 Class C3 and 651 Class C2) covered by the FMP, as described in Section 3.1.

Table 5 Additional Total Annual Wastewater TP and TN Load from the Onsite WwTW option within FMP.

Description	Onsite WwTW Scenario 1		Onsite WwTW Scenario 2	
	Annual wastewater TP load (kg/ TP/year)	Annual wastewater TN load (kg/ TN/year)	Annual wastewater TP load (kg/ TP/year)	Annual wastewater TN load (kg/ TN/year)
Class C3	8.0	578.7	8.0	578.7
Class C2	18	1294.3	13.5	972.6
Class C1	-	-	-	-
Additional FMP Final Stage 1 Output	**26.0**	**1873.0**	**21.5**	**1551.3**

The Final Stage 1 output from Table 4 and Table 5 can be combined to give the total wastewater TP and TN load for the FMP, as shown in **Appendix B and Appendix C**. This method is also applicable from Table 6 to Table 15 for Stage 2 and Stage 3 of the nutrient budget calculations.

4.2.2 Sellindge WwTW Option

Table 6 shows the Annual Wastewater TP and TN load based on the TP and TN Permit levels for Sellindge WwTW against the two PCC water usage rates scenarios.

Table 6 Total Annual Wastewater TP and TN Load from the Sellindge WwTW Option within OPA

Description	Sellindge WwTW Scenario 1		Sellindge WwTW Scenario 2	
	Annual wastewater TP load (kg/ TP/year)	Annual wastewater TN load (kg/ TN/year)	Annual wastewater TP load (kg/ TP/year)	Annual wastewater TN load (kg/ TN/year)
Class C3	371.8	22309.7	371.8	22309.7
Class C2	89.1	5343.1	66.9	4015.0
Class C1	11.5	692.3	8.65	519.2
OPA Final Stage 1 Output	**472.4**	**28345.0**	**447.4**	**26843.8**

Table 7 shows Annual Wastewater TP and TN load for the additional 44.29ha area covered by the FMP, as described in Section 3.1.

Table 7 Additional Total Annual Wastewater TP and TN Load from the Sellindge WwTW Option within FMP

Description	Sellindge WwTW Scenario 1		Sellindge WwTW Scenario 2	
Class C3	40.2	2411.3	40.2	2411.3
Class C2	89.9	5392.8	67.5	4052.3
Class C1	-	-	-	-
Additional FMP Final Stage 1 Output	130.1	7804.1	107.7	6463.6

4.3 Stage 2 Baseline Land Use Nutrient Loading

The existing land use within the area impacted by Otterpool Park OPA boundary is predominately agricultural use or greenfield in nature. **Appendix A Figure 2** includes a figure showing the existing land type categories within the area impacted by the proposed Development.

As per Figure 1, 51.8% of the Otterpool Park Framework Masterplan boundary lies within the Freely Draining soil types, with 38.7% in Loamy and clayey floodplain soils with naturally high groundwater and the remaining 10% in Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. Therefore, the approach to Stage 2 is to run two nutrient budget calculations for each of the drainage types and then combine the final outputs together. Based on the Soilscapes soil information, the slowly permeable soil type is classified as “Impeded Drainage”, the freely draining soils classified as “Freely Draining” and the naturally high groundwater as “Naturally wet”.

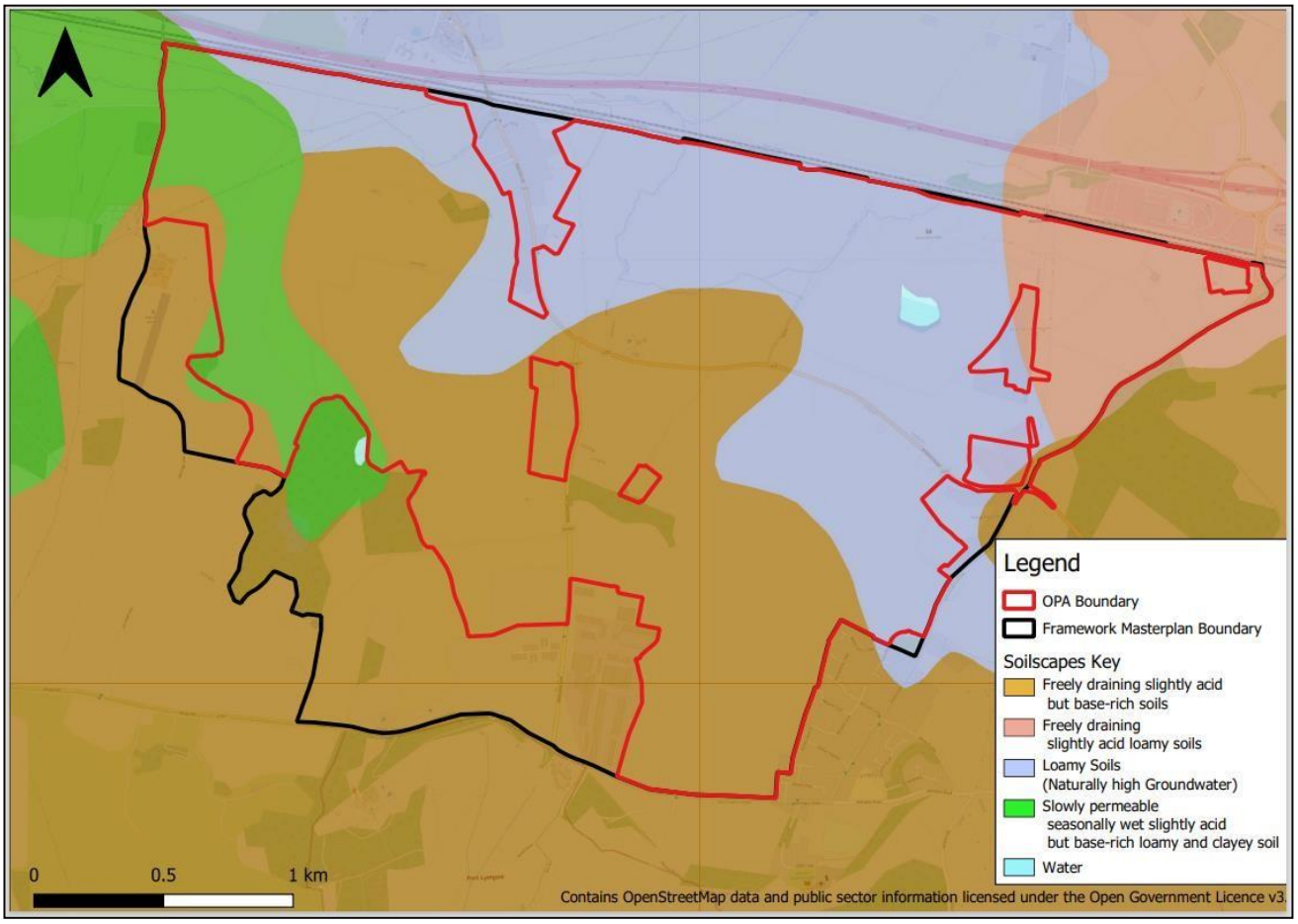

Figure 1 *Soil Drainage Types (Soilscapes) for Otterpool OPA and Framework Masterplan*

The existing land use types and their estimated nutrient loading with the 551.60 ha of the impacted total site area within the OPA boundary as well as the extra 44.29 ha of the impacted site area within the FMP boundary are shown below. It provides the Stage 2 nutrient loading outputs within each of the three Soilscapes drainage types.

4.3.1 Stage 2 – Freely Draining

Table 7 and Table 8 show the existing land use types by area and their nutrient loss rates, as per NE's calculator for the Freely Draining category within the Otterpool OPA and the additional area covered in the Framework Masterplan boundary.

Table 8 Existing Land Types and Nutrient Loss Rates for the Freely Draining soil type within Otterpool OPA

Existing Land Type	Area (ha)	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year
Open Urban Land	7.62	5.93	60.69
Greenspace	61.10	1.22	183.30
Lowland	60.76	6.82	867.44
Shrub	1.69	0.03	5.07
Woodland	0.04	0.00	0.11
Cereals	157.36	26.0	4906.60
Total	**288.57**	**40.0**	**6023.21**

Table 9 Additional Existing Land Types and Nutrient Loss Rates for the Freely Draining soil type within Framework Masterplan

Existing Land Type	Area (ha)	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year
Open Urban Land	2.96	2.30	23.57
Greenspace	16.17	0.32	48.51
Lowland	0.00	0.00	0.00
Shrub	0.28	0.01	0.84
Woodland	0.62	0.01	1.86
Cereals	6.11	1.01	190.51
Commercial/industrial urban land	18.17	19.28	130.91
Total	**44.31**	**22.93**	**396.2**

4.3.2 Stage 2 – Impeded Drainage

Table 10 shows the existing land use types by area and their nutrient loss rates, as per NE's calculator for the Impeded Drainage category within the Otterpool OPA. There is no additional area covered in the Framework Masterplan boundary within the Impeded Drainage category.

Table 10 Existing Land Types and Nutrient Loss Rates for the Impeded Drainage soil type within Otterpool OPA

Existing Land Type	Area (ha)	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year
Open Urban Land	0	0	0
Greenspace	0.80	0.02	2.4
Lowland	17.64	11.99	166.91
Shrub	0	0	0
Woodland	0	0	0
Cereals	34.61	32.17	761.72
Total	**53.05**	**44.18**	**931.02**

4.3.3 Stage 2 – Naturally Wet

Table 11 shows the existing land use types by area and their nutrient loss rates, as per NE's calculator for the Naturally Wet category within the Otterpool OPA. There is no additional area covered in the Framework Masterplan boundary within the Naturally Wet category.

Table 11 Existing Land Types and Nutrient Loss Rates for the Naturally Wet soil type within Otterpool OPA

Existing Land Type	Area (ha)	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year
Open Urban Land	18.09	14.08	144.06
Greenspace	18.51	0.37	55.53
Lowland	40.40	7.51	451.22
Shrub	0.36	0.01	1.08
Woodland	0.92	0.02	2.75
Cereals	131.70	89.83	3110.33
Total	**209.99**	**111.82**	**3764.97**

4.4 Stage 3 Future Land Use Nutrient Loading

As per Stage 2, the same development splits based on the three drainage types need to be applied to the proposed land types in the Otterpool OPA and FMP. This is based on the same 551.60 ha of the impacted site area in the OPA boundary and the extra 44.29 ha of the impacted site area within the FMP boundary. It should be noted that approximately 15% of the residential urban land shown in the current parameter plans will also include greenspace areas that are larger than 0.1 ha, which include some strategic SUDS features. Therefore, a general 15% allowance of greenspace is also included within the development parcels under the Stage 3 assessment. Any sports pitches within the designated Public Open Space are considered as open urban land and wetland areas are considered as water, and open space is adjusted to avoid double counting. **Appendix A Figure 3** includes a figure showing the proposed land type categories within the area impacted by the proposed Development.

4.4.1 Stage 3 – Freely Draining

Table 11 and Table 12 shows the proposed land types, area and nutrient loss coefficients for the Freely Draining category within the Otterpool OPA and the additional area covered in the Framework Masterplan boundary.

Table 12 Proposed Land Types and Nutrient Loss Rates for the Freely Draining soil type within Otterpool OPA

	Proposed Land Type	Area (ha)	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year
Land use in the Development Parcels	Residential urban land	145.21	210.62	1961.59
	Commercial/industrial urban land	14.50	15.39	104.47
	Greenspace	25.63	0.51	76.89
Land use in the Public Open Space	Open Urban Land	5.27	4.10	41.97
	Greenspace	95.07	1.90	285.21
	Community Food Growing	2.69	1.19	47.27
	Water (i.e. stormwater wetlands)	0.23	0.00	0.00
TOTAL		**288.6**	**233.71**	**2517.4**

Table 13 Proposed Land Types and Nutrient Loss Rates for the Freely Draining soil type outside OPA but within Framework Masterplan

	Proposed Land Type	Area (ha)	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year
Land use in the Development Parcels	Residential urban land	30.53	44.28	412.42
Land use in the Public Open Space	Open Urban Land	10.55	0.21	31.65
	Greenspace	3.23	2.51	25.72
TOTAL		**44.31**	**47.0**	**469.79**

4.4.2 Stage 3 – Impeded Drainage

Table 14 shows the proposed land types, area and nutrient loss coefficients for the Impeded Drainage category within the Otterpool OPA. There is no additional area covered in the Framework Masterplan boundary within the Impeded Drainage category.

Table 14 Proposed Land Types and Nutrient Loss Rates for the Impeded Drainage soil type within Otterpool OPA

	Proposed Land Type	Area (ha)	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year
Land use in the Development Parcels	Residential urban land	13.16	19.09	177.77
	Commercial/industrial urban land	1.50	1.59	10.81
	Greenspace	2.32	0.05	6.96
Land use in the Public Open Space	Open Urban Land	2.57	2.00	20.44
	Greenspace	27.98	0.56	83.94
	Water (i.e. stormwater wetlands)	2.00	0.00	0.00
	Water (i.e. wastewater wetlands)	3.51	0.00	0.00
TOTAL		**53.03**	**23.28**	**299.92**

4.4.3 Stage 3 – Naturally Wet

Table 15 shows the proposed land types, area and nutrient loss coefficients for the Naturally Wet category within the Otterpool OPA. There is no additional area covered in the Framework Masterplan boundary within Naturally Wet category.

Table 15 Proposed Land Types and Nutrient Loss Rates for the Naturally Wet soil type within Otterpool OPA

	Proposed Land Type	Area (ha)	Average Total Phosphorus (TP) Loss Rate - Kg/ha/year	Average Total Nitrogen (TN) Loss Rate - Kg/ha/year
Land use in the Development Parcels	Residential urban land	98.25	142.51	1327.23
	Community food growing	0.22	0.10	3.84
	Greenspace	17.34	0.35	52.02
Land use in the Public Open Space	Open Urban Land	6.26	4.87	49.85
	Greenspace	60.79	1.22	182.38
	Community Food Growing	4.07	1.80	71.54
	Water (i.e. stormwater wetlands)	14.96	0.00	0.00
	Water (i.e. wastewater wetlands)	8.08	0.00	0.00
TOTAL		**209.97**	**150.85**	**1686.86**

4.5 Stage 4 Nutrient Budget

Table 16 and Table 17 below summarise the estimated nutrient budget requirement for both WwTW options. The NE methodology adopts a precautionary approach to the nutrient budget calculation. To ensure robustness, an additional 20% buffer is added to the final figure, as can be seen in Stage 4 calculations presented in Appendix B and C.

It also shows the calculations for the following three situations for each WwTW option:

- Combined nutrient load from both WwTW and land use discharges
- Nutrient load from WwTW discharges only
- Nutrient load from Land Use discharges only

This was to better understand the influence of WwTW and land use runoff for identifying the best locations for the mitigation wetlands that is being discussed in Section 5.

4.5.1 Onsite WwTW Option

Table 16 below summarises the nutrient budgets related to the onsite WwTW Option.

Table 16 Nutrient Budget Assessment Summary for Onsite WwTW Option

WwTW Option	Loading Area Coverage	Combined Load From WwTW and Land Use		Sensitivity Test - WwTW Load Only		Sensitivity Tast - Land Use Load Only	
		TP (Kg/year)	TN (Kg/year)	TP (Kg/year)	TN (Kg/year)	TP (Kg/year)	TN (Kg/year)
Onsite WwTW - PCC Scenario 1	Otterpool OPA Area Loading	367.6	705.3	113.39	8163.36	254.21	-7458.02*
	TOTAL	**427.68**	**3041.2**	**144.6**	**10410.95**	**283.08**	**-7369.71**
Onsite WwTW - PCC Scenario 2	Otterpool OPA Area Loading	361.6	273.0	107.38	7731.01	254.21	-7458.02
	TOTAL	**416.32**	**2222.83**	**133.23**	**9592.53**	**283.08**	**-7369.71**

*Negative values mean that there is a net reduction in nutrients and there is no need to provide any offsetting mitigation measures

4.5.2 Sellindge WwTW Option

Table 17 below summarises the nutrient budgets related to the offsite WwTW Option.

As per point 2 in the Introduction, the Sellindge permits have been now updated to reflect that of the Stodmarsh Nutrient Budget Calculation (i.e., assuming that under this Sellindge WwTW option the first occupancy at the Proposed Development will also be delayed till 2025 until the existing P permit is tightened from 1 mg TP/l to 0.5 mg TP/l). Appendix C provides the additional information related to these updated calculations.

As mentioned before, Appendix D also provides the previous calculations undertaken using the potential alternative permit values (TP = 0.3mg TP/l and TN = 25 mg TN/l) to accommodate the Proposed Development for comparison purposes as another potential mitigation scenario (see Section 6.1.2).

Table 17 Nutrient Budget Assessment Summary for Sellindge WwTW Option

WwTW Option	Loading Area Coverage	Combined Load From WwTW and Land Use		Sensitivity Test - WwTW Load Only		Sensitivity Test - Land Use Load Only	
		TP (Kg/year)	TN (Kg/year)	TP (Kg/year)	TN (Kg/year)	TP (Kg/year)	TN (Kg/year)
Sellindge WwTW - PCC Scenario 1	Otterpool OPA Area Loading	821.11	26556.02	566.90	34014.05	254.21	-7458.02
	Extra Otterpool FMP Area Loading	184.96	9453.24	156.09	9364.93	28.87	88.31
	TOTAL	**1006.07**	**36009.26**	**722.99**	**43378.98**	**283.08**	**-7369.72**
Sellindge WwTW - PCC Scenario 2	Otterpool OPA Area Loading	791.09	24754.57	536.88	32212.60	254.21	-7458.02
	Extra Otterpool FMP Area Loading	158.14	7844.64	129.26	7756.33	28.87	88.30
	TOTAL	**949.22**	**32599.21**	**666.14**	**39968.93**	**283.08**	**-7369.72**

*Negative values mean that there is a net reduction in nutrients and there is no need to provide any offsetting mitigation measures

5 Updated Nutrient Mitigation Requirements

5.1.1 Onsite WwTW Option

Table 18 below summarises the indicative total area of the new wetlands required to offset the nutrient loading surplus shown in Table 16. Whilst wetlands are considered to be an effective nature-based nutrient mitigation solution that can provide multiple benefits they are opposite of wastewater treatment batch type processes in terms of space requirements.

Table 18 Mitigation Wetland Requirement Summary for Onsite WwTW Option

WwTW Option	Loading Area Coverage	Combined Load From WwTW and Land Use		Sensitivity Test - WwTW Load Only		Sensitivity Test - Land Use Load Only	
		TP [1] Wetland Area (ha)	TN [2] Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)
Onsite WwTW – PCC Scenario 1	Otterpool OPA Area Loading	30.64	0.77	9.45	8.78	21.19	-8.01[3]
	Extra Otterpool FMP Area Loading	5.01	2.51	2.60	2.42	2.41	0.09
	TOTAL	**35.65**	**3.28**	**12.05**	**11.2**	**23.6**	**-7.92**
Onsite WwTW – PCC Scenario 2	Otterpool OPA Area Loading	30.14	0.30	8.95	8.31	21.19	-8.01
	Extra Otterpool FMP Area Loading	4.56	2.10	2.15	2.00	2.41	0.09
	TOTAL	**34.7**	**2.4**	**11.1**	**10.31**	**23.6**	**-7.92**

1 Assumed TN removal rate of 93 g/m^2/yr for both wastewater and stormwater discharges, which is a well-accepted figure as a Median Removal rate[12].

2 Assumed TP removal rate of 1.2 g/m^2/yr for both wastewater and stormwater discharges, which is a well-accepted figure as a Median Removal rate[11].

3 Negative values mean that there is a net reduction in nutrients and there is no need to provide any offsetting mitigation measures

5.1.2 Sellindge WwTW Option

Table 19 below summarises the indicative total area of the new wetlands required to offset the nutrient loading surplus shown in Table 17, the WwTW load, based on the Sellindge permit levels is more than two times higher than the Onsite WwTW option and significantly increases the total load to be mitigated for the OPA and FMP areas.

[12] Natural England (December 2019) Advice on Nutrient Neutrality for New Development in the Stour Valley Catchment in Relation to Stodmarsh Designated Sites - For Local Planning Authorities

Table 19 Mitigation Wetland Requirement Summary for Sellindge WwTW Option

WwTW Option	Loading Area Coverage	Combined Load From WwTW and Land Use		Sensitivity Test - WwTW Load Only		Sensitivity Test - Land Use Load Only	
		TP [1] Wetland Area (ha)	TN [2] Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)	TP Wetland Area (ha)	TN Wetland Area (ha)
Sellindge WwTW – PCC Scenario 1	Otterpool OPA Area Loading	68.43	28.55	47.24	36.57	21.18	-8.02
	Extra Otterpool FMP Area Loading	15.41	10.16	13.01	10.07	2.41	0.09
	TOTAL	**83.84**	**38.72**	**60.25**	**46.64**	**23.59**	**-7.93[3]**
Sellindge WwTW - PCC Scenario 2	Otterpool OPA Area Loading	65.92	26.62	44.74	34.64	21.18	-8.02
	Extra Otterpool FMP Area Loading	13.18	8.44	10.77	8.34	2.41	0.09
	TOTAL	**79.10**	**35.05**	**55.51**	**42.98**	**23.59**	**-7.93**

[1] Assumed TN removal rate of 93 g/m^2/yr for both wastewater and stormwater discharges, which is a well-accepted figure as a Median Removal rate.

[2] Assumed TP removal rate of 1.2 g/m^2/yr for both wastewater and stormwater discharges, which is a well-accepted figure as a Median Removal rate.

[3] Negative values mean that there is a net reduction in nutrients and there is no need to provide any offsetting mitigation measures

6 Implications and Proposed Mitigations

6.1 Implications

The sections below compare the wetland mitigation requirements and wetland areas allocated (as presented in the previous WCS report) against the latest requirements reported in the previous sections based on the latest NE methodology and Stodmarsh Budget calculator.

In the previous WCS report, the Onsite WwTW option was recommended as the preferred nutrient mitigation option due to the following key reasons:

- Proposed Development had sufficient space Onsite to completely remove the extra WwTW and land use nutrient loads whereas the Sellindge WwTW option could not without large amount of offsite wetland mitigation
- The ongoing WINEP study for the Stodmarsh catchment presented significant risks for timely implementation of Sellindge WwTW upgrade and any nutrient mitigation measures (including new offsite sewer rising mains) in advance of the Proposed Development
- Onsite solution offers the implementation of a more efficient, integrated and holistic water management solution in line with the proposed development phasing

Figure 2 and Table 20 below summarise the key information related to the proposed wetlands in the previous WCS, totalling a 28.77 ha of wetlands that will comprise 11.59 ha of WwTW wetland and 17.18 ha of stormwater wetlands. It also recommended to optimise wetland sizes where possible to maximise their nutrient removal efficiency by interlinking smaller storm wetlands (including with SuDS features and existing smaller local watercourses where possible), to collectively provide a larger wetland area while maintaining sufficient base flow.

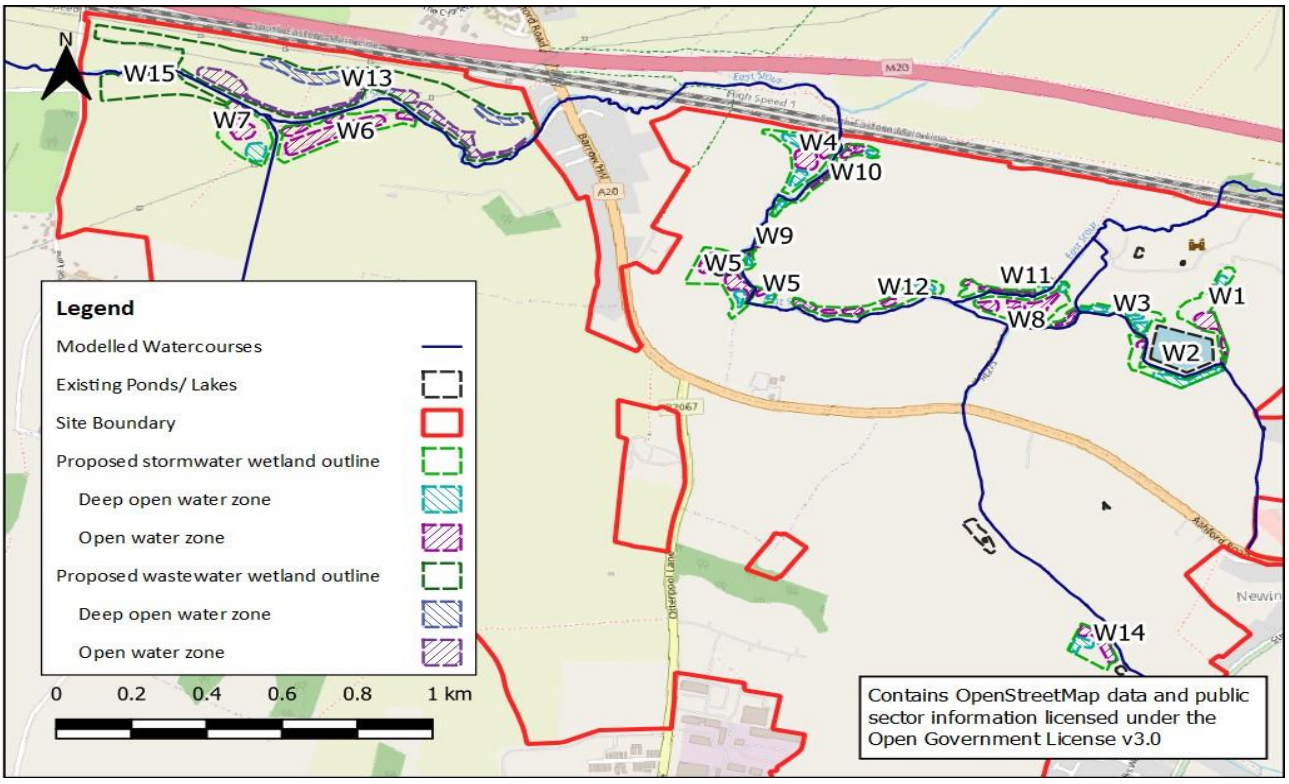

Figure 2 Overview plan of proposed wetlands in the previous WCS

Table 20 Summary of the Proposed Wetlands in the previous WCS

Wetland Location Ref.	Indicative Wetland Area (ha)	Treatment Depth (m)	Average Wetland Depth (m)	Comments
W1	1.46	0.35	0.65	Treats OPA Site storm discharge. W1, W2, W3 & W8 are interlinked (Total area: 4.9ha).
W2	0.92	0.38	0.68	Treats OPA Site storm discharge. W1, W2, W3 & W8 are interlinked (Total area: 4.9ha).
W3	0.94	0.04	0.34	Treats s OPA Site storm discharge. W1, W2, W3 & W8 are interlinked (Total area: 4.9ha).
W4	1.70	0.07	0.37	Treats OPA Site storm discharge, W4 and W5 are interlinked (Total area: 3.81ha).
W5	2.11	0.16	0.46	Treats OPA Site storm discharge. W4 and W5 are interlinked (Total area: 3.81ha).
W6	2.63	0.27	0.87	Treats OPA Site storm discharge.
W7	1.87	0.05	0.35	Treats OPA Site storm discharge but can also provide tertiary treatment for the extra wastewater discharge from the remaining 1500 homes in OFMA. W7 and W15 are interlinked (Total area: 3.71 ha).
W8	1.61	0.45	0.75	Treats OPA Site storm discharge. W1, W2, W3 & W8 are interlinked (Total area: 4.9ha).
W9	0.27	0.13	0.73	Treats OPA Site storm discharge. W9, W10, W11 and W12 are interlinked (Total area: 2.83 ha).
W10	0.78	0.21	0.81	Treats OPA Site storm discharge. W9, W10, W11 and W12 are interlinked (Total area: 2.83 ha).
W11	0.52	0.04	0.64	Treats OPA Site storm discharge. W9, W10, W11 and W12 are interlinked (Total area: 2.83 ha).
W12	1.26	0.04	0.34	Treats OPA Site storm discharge. W9, W10, W11 and W12 are interlinked (Total area: 2.83 ha).
W13	9.75	0.25	0.50	Provides tertiary treatment for the wastewater discharge from the OPA site. The total footprint of the wetland is 13.01ha but only 75% is taken as effective area (9.75ha) due to earth works required for cascade wetland features.
W14	1.11	0.08	0.38	Treats storm discharge.
W15	1.84	0.25	0.50	Not required for the Tier 1 OPA – but provides tertiary treatment for the extra wastewater discharge from the remaining 1500 homes in OFMA. W7 and W15 are interlinked (Total area: 3.71 ha).
Total Area	**28.77**			

Additional nutrient budget sensitivity testing for the worst-case PCC Scenario 1 (i.e., with WwTW and Land Use nutrient loads in isolation) was also performed in the WCS before, but it was undertaken only with the preferred Onsite WwTW option. Therefore, a full comparison of these additional sensitivity testing is not possible in this report for Sellindge WwTW, but a comparison of the total wetland area requirements against the combined nutrient load is presented below for both PCC Scenarios 1 and 2, as shown in Section 6.1.2.

6.1.1 Onsite WwTW

For the worst-case PCC Scenario 1, the WCS previously reported that a total of 20.5 ha of wetlands required for the OPA out of which 8.8 ha will be required to treat wastewater discharge and the remaining 11.7 ha will be required to treat the land use runoff discharges. Similarly, it reported that a total of 23.8 ha of wetlands required for the FMP out of which 11.4 ha will be required to treat wastewater discharge and the remaining 12.4 ha will be required to treat the land use runoff discharges.

For the worst-case PCC Scenario 1, the updated assessment above (Table 18) shows that a total of 30.64 ha of wetlands required for the OPA, out of which 9.45 ha will be required to treat wastewater discharge and the remaining 21.19 ha will be required to treat the land use runoff discharges. Similarly, it shows that extra 5.01 ha of wetlands required for the remaining FMP, out of which 2.60 ha will be required to treat wastewater discharge and the remaining 2.41 ha will be required to treat the land use runoff discharges. This means a total of 35.65 ha will be required for the entire FMP area and out of which 12.05 ha will be required to treat wastewater discharge and the remaining 23.60 ha will be required to treat the land use runoff discharges.

Table 21 below summarises the estimated differences in total wetland area requirements to achieve nutrient neutrality for both OPA and FMP, which shows that additional total wetland requirement due to the new NE's methodology is 10.14 ha and 11.85 ha for the OPA and FMP respectively. However, most of this additional wetland requirement is associated with managing land use runoff (i.e., 9.49 ha and 11.20 ha for the OPA and FMP respectively), which is attributed to the reduced baseline P load from the dominant freely draining Soilscapes type. This leads to reduced annual nutrient exports for the baseline case (Stage 2) whilst the dominant residential urban land use type now has a much higher nutrient exports for the proposed case (Stage 3). There is also a small increase of wetland area requirement by 0.65 ha to manage the WwTW discharges for both OPA and FMP, which is attributed to the extra 10 l/d/person buffer introduced in the new NE guidance.

Table 21 Differences in total wetland area requirements for both OPA and FMP

Nutrient Mitigation – Wetland Area Requirement Summary	Combined Load – PCC Scenario 1		WwTW Load – PCC Scenario 1		Land Use Load – PCC Scenario 1	
	Wetland for Area TP (ha)	Wetland for Area TN (ha)	Wetland for Area TP (ha)	Wetland for Area TN (ha)	Wetland for Area TP (ha)	Wetland for Area TN (ha)
Difference in previous WCS report Wetland areas against latest wetland areas – OPA Area	-10.13*	0.64	-0.65	-0.58	-9.48	-1.22
Difference in previous WCS report Wetland areas against latest wetland areas – FMP Area	-11.84	0.43	-0.65	-0.69	-11.19	-1.12

*Negative values here mean that there has been an increase in wetland area when comparing the wetland areas from the previous WCS against the latest wetland areas calculated in this assessment

OPA Impact

As shown in Table 20, the WCS had previously identified a total of 28.77 ha of wetlands (i.e., 11.59 ha of WwTW wetland and 17.18 ha of stormwater wetlands). This suggests that the current provisions in the WCS is sufficient to manage nutrients from the WwTW discharges within the OPA as the wetland W13 has an effective treatment area of 9.75 ha, which is greater than the required 9.45 ha. However, there is currently a shortfall of 4.01 ha for managing land use nutrients from the OPA as there is only 17.18 ha compared with the 21.19 ha required now.

FMP Impact

As shown in Table 18 above, an additional 2.6 ha of wetland is required to manage the nutrients from the WwTW discharges from the remining 1500 homes in the FMP area. W13 has a surplus area of 0.3 ha to treat the wastewater flows from the OPA, but the remaining wastewater wetland W15 can only provide another 1.84 ha, resulting a net shortfall of 0.46 ha in total wastewater wetland provision. Conversely, an additional 2.41 ha of stormwater wetland will be required for the FMP, increasing the shortfall in stormwater wetlands provision from 4.01 ha to 6.42 ha. Therefore, the total shortfall in stormwater and wastewater wetland provision will be 6.88 ha.

Proposed mitigation to offset the additional TP loads within both OPA and FMP are further discussed in Section 6.2.

6.1.2 Sellindge WwTW

As discussed under Section 6.1, the latest Sellindge WwTW mitigation requirements can only be compared to the previous combined load (WwTWs and Land Use) in the previous WCS report against the FMP requirements. As seen in

Table 22, the latest NE guidance has had a significant increase on the wetland areas required for this option (> 37 ha) to achieve nutrient neutrality. This also means that the total wetland area requirement is now 83.84 ha for the FMP out of which 60.25 ha will be required to treat wastewater discharge and the remaining 23.59 ha will be required to treat the land use runoff discharges, for the worst-cast PCC Scenario 1.

Table 22 Differences in total wetland area requirements for FMP

Nutrient Mitigation – Wetland Area Requirement Summary	PCC Rate – Scenario 1		PCC Rate – Scenario 2	
	Wetland for Area TP (ha)	Wetland for Area TN (ha)	Wetland for Area TP (ha)	Wetland for Area TN (ha)
Difference in previous WCS report Wetland areas against latest wetland areas – FMP Area	-37.44*	-8.82	-35.50	-8.25

*Negative values here mean that there has been an increase in wetland area when comparing the wetland areas from the previous WCS against the latest wetland areas calculated in this assessment

As highlighted before, the previous WCS only identified a total of 28.77 ha for onsite wetlands (i.e., 11.59 ha of WwTW wetland and 17.18 ha of stormwater wetlands), which means there will be a total shortfall of 55.07 ha for the wetlands now under the Sellindge WwTW option for the FMP.

Even with the potential alternative tighter permit values (TP = 0.3mg TP/l and TN = 25 mg TN/l) presented in Appendix D, the reduced total wetland requirement and the associated shortfall would be as follows:

- OPA – Total wetland requirement is 49.53 ha, giving a wetland area shortfall of 20.76 ha
- FMP – Total wetland requirement is 59.74 ha, giving a wetland area of shortfall of 30.97 ha

This is currently not a viable option for the Proposed Development as it requires significant offsite wetland mitigation, as part of a catchment-wide solution promoted by Southern Water, EA and NE following the

ongoing WINEP study. Therefore, Sellindge WwTW has been currently discounted for the Proposed Development, but this may be revisited by Otterpool Park LLP for the later development phases if needed (e.g., subject to the availability of potential future catchment-wide solutions and nutrient credits, as part of the ministerial statement announced in July)[13]

6.2 Proposed Mitigation

Section 6.1 confirmed that onsite WwTW is the preferred mitigation option for the Proposed Development. It highlighted that there is a need to provide 6.88 ha of additional wetlands (6.42 ha of stormwater wetland and 0.46 ha of wastewater wetland) within the current OPA development proposals and future FMP area, to ensure nutrient neutrality can be still achieved in line with the new NE's March 2022 guidance and new Stodmarsh budget calculator.

To account for this shortfall and address the Point 3 highlighted in Section 1, further work has been undertaken by Arcadis as part of this updated report. This involves extending some of the previous wetlands as well as reconfiguring suitable SuDS areas (with surplus storage capacity and footprint area) into stormwater wetlands/bio-retention areas to maximise their nutrient removal ability and wider benefits. The chosen SuDS areas within the OPA boundary have been slightly deepened and designed as stormwater wetlands (i.e., to hold up to 200mm depth of permanent shallow water) to efficiently remove the surplus phosphorus load. Therefore, as explained below a total of 35.68 ha of wetland is now available as part of the revised mitigation strategy to meet the 35.64 ha required under the worst-case PCC Scenario 1.

Appendix A Figure 4 shows the proposed suggestions for the extended wetlands and the Additional Stormwater Wetlands (ASWs) within the Otterpool Park OPA and extra FMP area, which indicates that they can provide a further wetland area of 6.91 ha in total. It should also be noted that where the current SuDS have been reconfigured as stormwater wetlands for the purpose of Phosphorus mitigation, they can still provide their stormwater flood attenuation function during the larger storm events, using the proposed integrated design approach. To enable this, additional storage capacity has been provided in these integrated wetlands by slightly deepening them to compensate for any loss of flood attenuation storage due to the permanently held shallow water in the wetlands.

Except for enlarged Wetlands W7, W15 and new ASW7, it is also worth noting that the enlarged wetlands and the ASWs are fully contained within the original SuDS footprint areas (as per the current FRA&SWDS report)[14] and therefore will not have any significant detrimental impact on the other proposed masterplan land uses. Enlarged Wetlands W7, W15 and new ASW7 are also within a large proposed Public Open space area and other known key constraints (i.e., outside the designated sports pitches at the northwest portion of the Proposed Development and at the northern end of Lympne Green), and therefore unlikely to cause any major impacts on the overall masterplan proposals. Any remaining design issues can be suitably addressed during the reserved matters stage.

Table 23 and Table 24 below summarises the key information related to the new proposed wetlands and additional stormwater wetlands which provides up to **35.68 ha** of wetlands, which mitigates the combined loads for both PCC scenarios for the Onsite WwTW option.

[13] Department for Environment, Food and Rural Affairs (DEFRA). July 2022. Government sets out plan to reduce water pollution, Press Release. Government sets out plan to reduce water pollution - GOV.UK (www.gov.uk)

[14] Arcadis (March 2022) Environmental Statement – Appendix 15.1 – Flood Risk Assessment and Surface Water Drainage .10029956-AUK-XX-XX-RP-CW-0010-P3-FRA & SWDS.

Table 23 Summary of the Proposed Wetlands

Wetland Location Ref.	Indicative Wetland Area (ha)	Treatment Depth (m)	Average Wetland Depth (m)	Proposed Changes
W1	1.46	0.34	0.72	No change to stormwater wetland.
W2	0.92	0.31	0.73	No change to stormwater wetland.
W3	0.94	0.04	0.45	No change to stormwater wetland.
W4	1.70	0.09	0.37	No change to stormwater wetland.
W5	2.11	0.18	0.46	No change to stormwater wetland.
W6	2.63	0.34	0.87	No change to stormwater wetland.
W7*	2.48	0.15	0.54	Combined Stormwater and Wastewater Wetland W7 has been extended further south within the current Public Open Space and wetland area increased by 0.61 ha; northern portion of Wetland W7 will also receive wastewater flows from the extra FMP development.
W8	1.61	0.57	0.79	No change to stormwater wetland.
W9	0.27	0.17	0.73	No change to stormwater wetland.
W10*	1.32	0.16	0.81	Stormwater Wetland W10 has been extended further east within the current SuDS footprint and wetland area increased by 0.54 ha.
W11*	1.00	0.02	0.65	Stormwater Wetland W11 has been extended further west within the current SuDS footprint and wetland area increased by 0.48 ha.
W12	1.26	0.05	0.34	No change to stormwater wetland.
W13	9.76	0.25	0.50	No change to wastewater wetland effective area.
W14	1.11	0.10	0.38	No change to stormwater wetland.
W15*	1.77	0.25	0.50	Wastewater Wetland W15 for the extra FMP flows has been extended further south within the current Public Open Space and wetland area increased to 2.73 ha. However, only 65% is taken as effective area (1.77ha) to account for the terraced wetland features and bridle way.
Total Area	**30.33**			An additional 1.56 ha has been added to the previous wetland's areas in the WCS.

* Wetland area has been increased from the previous wetland areas in WCS (Table 20).

The ASWs areas below are the reconfigured combined SuDS attenuation features that will make up the remaining shortfall of 5.32 ha to meet Nutrient Neutrality requirements for the worst-case PCC Option 1. Also, in this updated assessment as a precautionary approach, the indicative wetland area is based on the base area of the wetland (i.e., rather than the top surface area) minus any small bunding which might be required. This then gives the minimum effective area for each ASW.

Table 24 Proposed additional stormwater wetlands areas for OPA and FMP

Wetland Location Ref.	Indicative Wetland Area (ha)	Treatment Depth (m)	Average Wetland Depth (m)	Comments
ASW1	1.06	1.2	0.06	Treats OPA Site storm discharge. ASW1, W4 & W5 when interlinked can give a total area of 4.87ha.
ASW2	0.21	1.2	0.22	Treats OPA Site storm discharge. ASW2, ASW3, W9, W10, W11 and W12 when interlinked can give a total area of 4.86 ha.
ASW3	0.80	1.2	0.06	Treats s OPA Site storm discharge. ASW2, ASW3, W9, W10, W11 and W12 when interlinked can give a total area of 4.86ha.
ASW4	0.63	1.2	0.03	Treats OPA Site storm discharge.
ASW5	0.66	1.2	0.17	Treats OPA Site storm discharge.
ASW6	0.76	1.2	0.13	Treats OPA Site storm discharge.
ASW7	0.26	1.2	0.18	Treats OPA Site storm discharge. ASW7 and W14 when interlinked can provide a total area of 1.37 ha.
ASW8	0.49	1.2	0.14	Treats OPA Site storm discharge. ASW8 and ASW9 when interlinked can provide a total area of 0.95 ha.
ASW9	0.47	1.2	0.10	Treats extra FMP Site storm discharge. ASW8 and ASW9 when interlinked can provide a total area of 0.95 ha.
TOTAL	**5.35**			

The maximum depth of these wetlands is taken as 1.2m, which includes up to 200mm of permanent water depth as well as the required SuDS attenuation volumes. The drainage zones that each of the reconfigured SuDS have been proposed have surplus attenuation storage capacity for the 1 in 100 year annual chance flood event + 40% climate change allowance, as per the current SuDS storage calculations. Each of the wetland extensions and ASW have been modelled in Infraworks software to model, analyse and assess each of the area and depth parameters against the masterplan and topography so that the wetland footprint will not extend beyond the area currently allocated for SuDS attenuation.

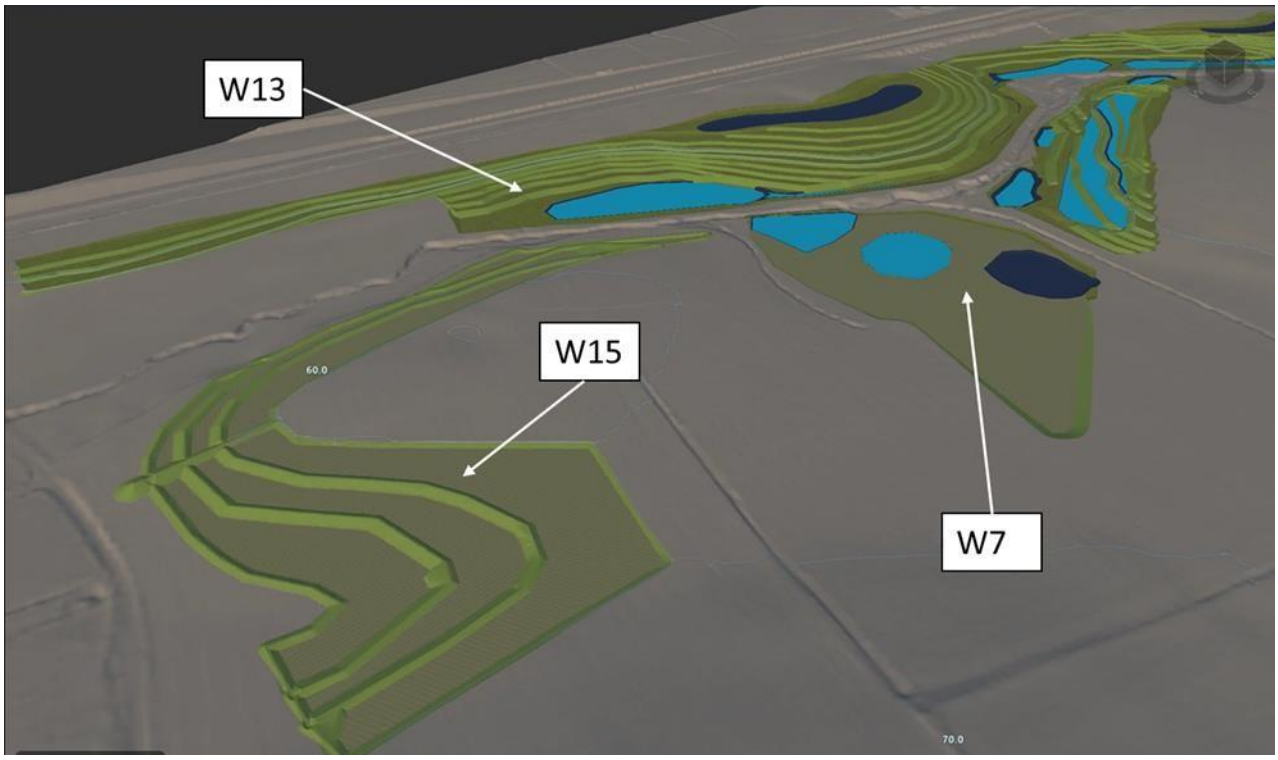

Figure 3 The area surrounding updated Wetland W7 and W15. W13 remains unchanged from the WCS.

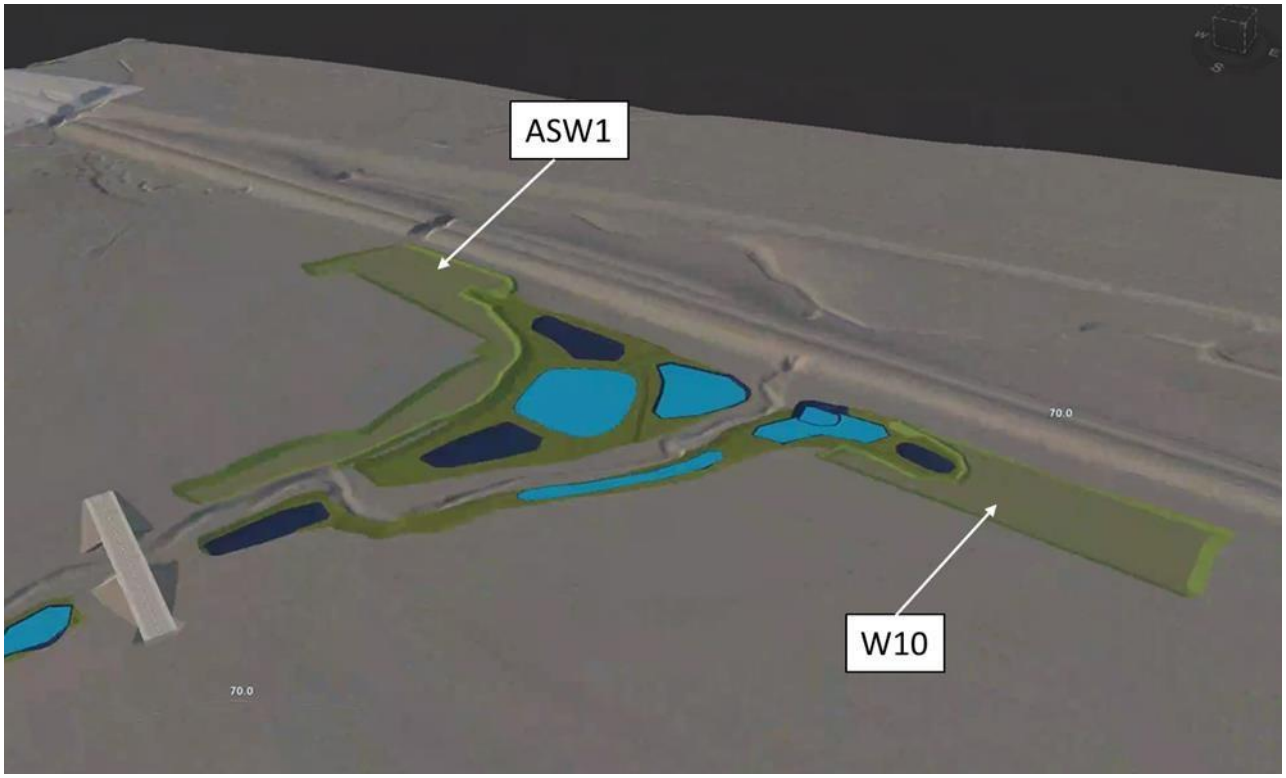

Figure 4 The area surrounding updated Wetland W10 and new ASW1

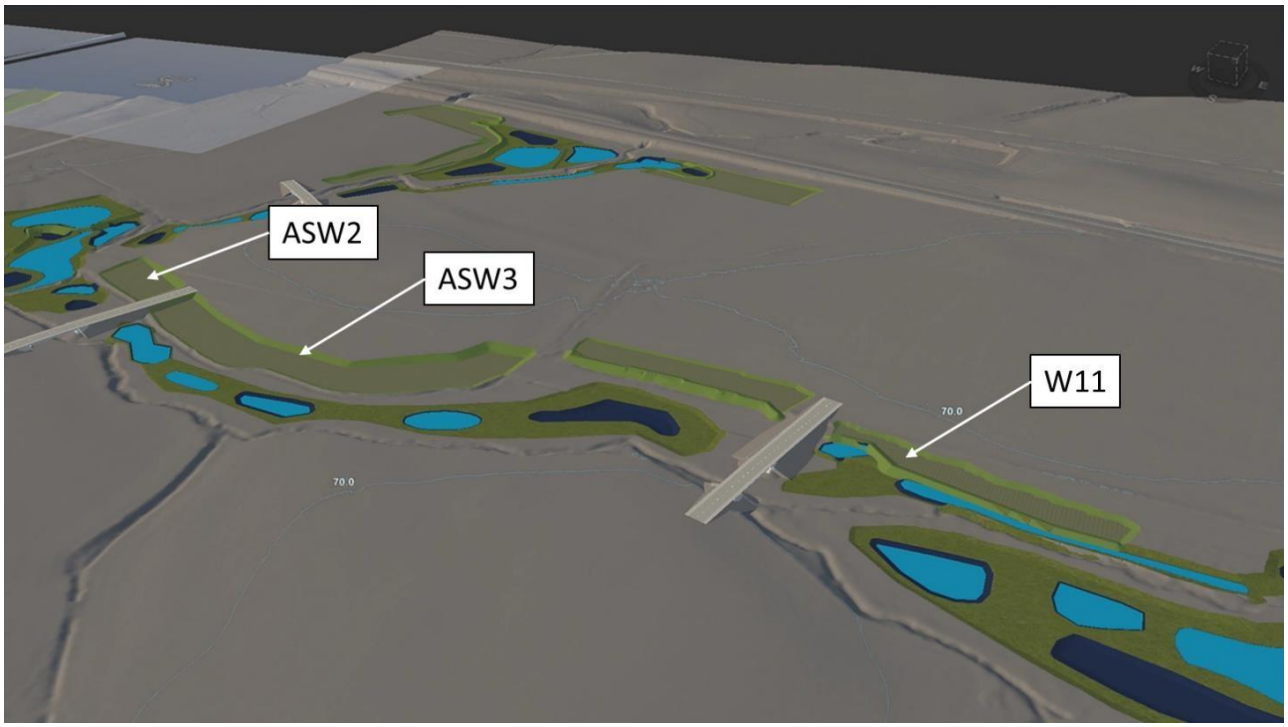

Figure 5 The area surrounding updated Wetland W11 and new ASW2 and ASW3

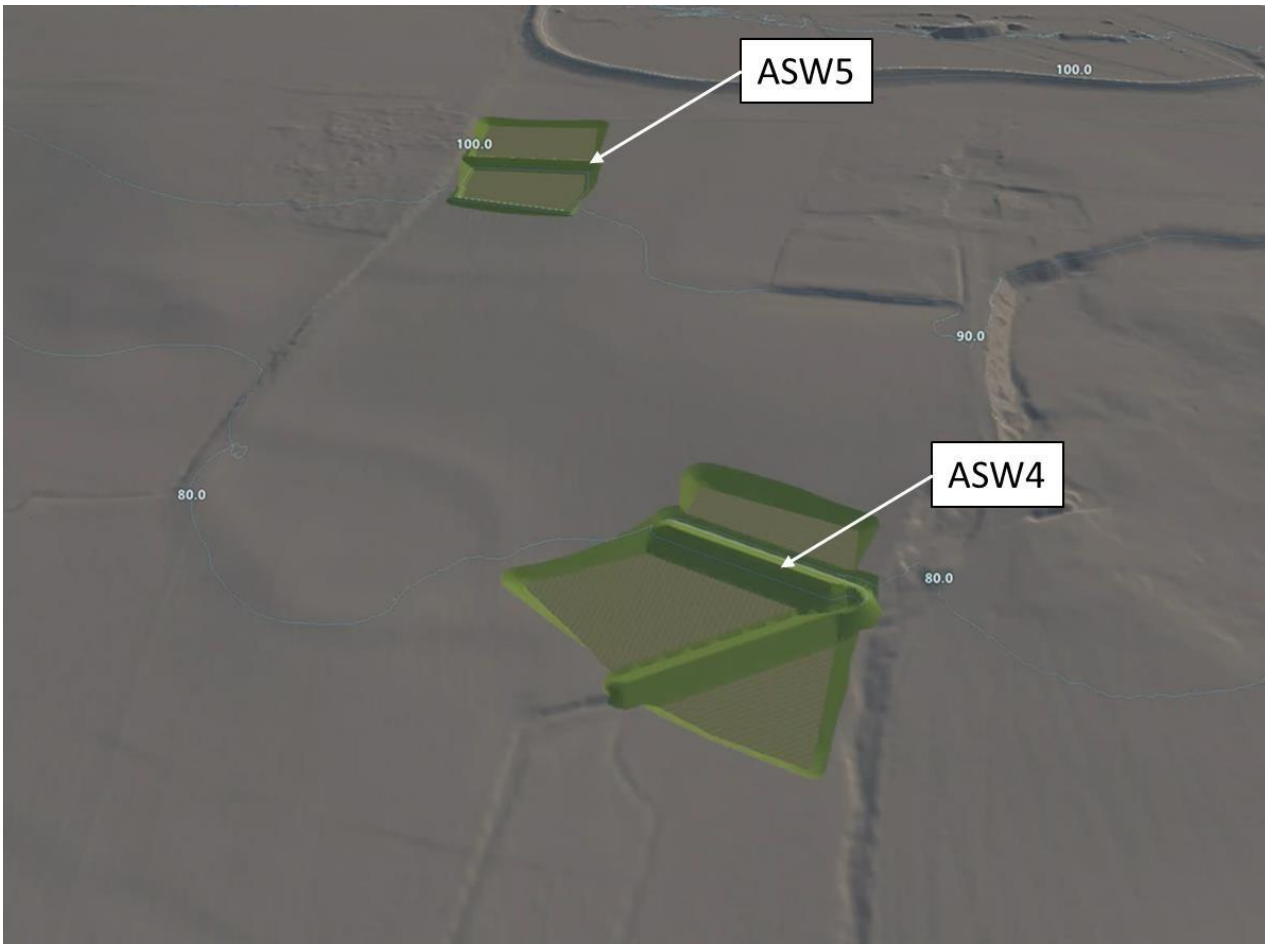

Figure 6 The area surrounding new ASW4 and ASW5

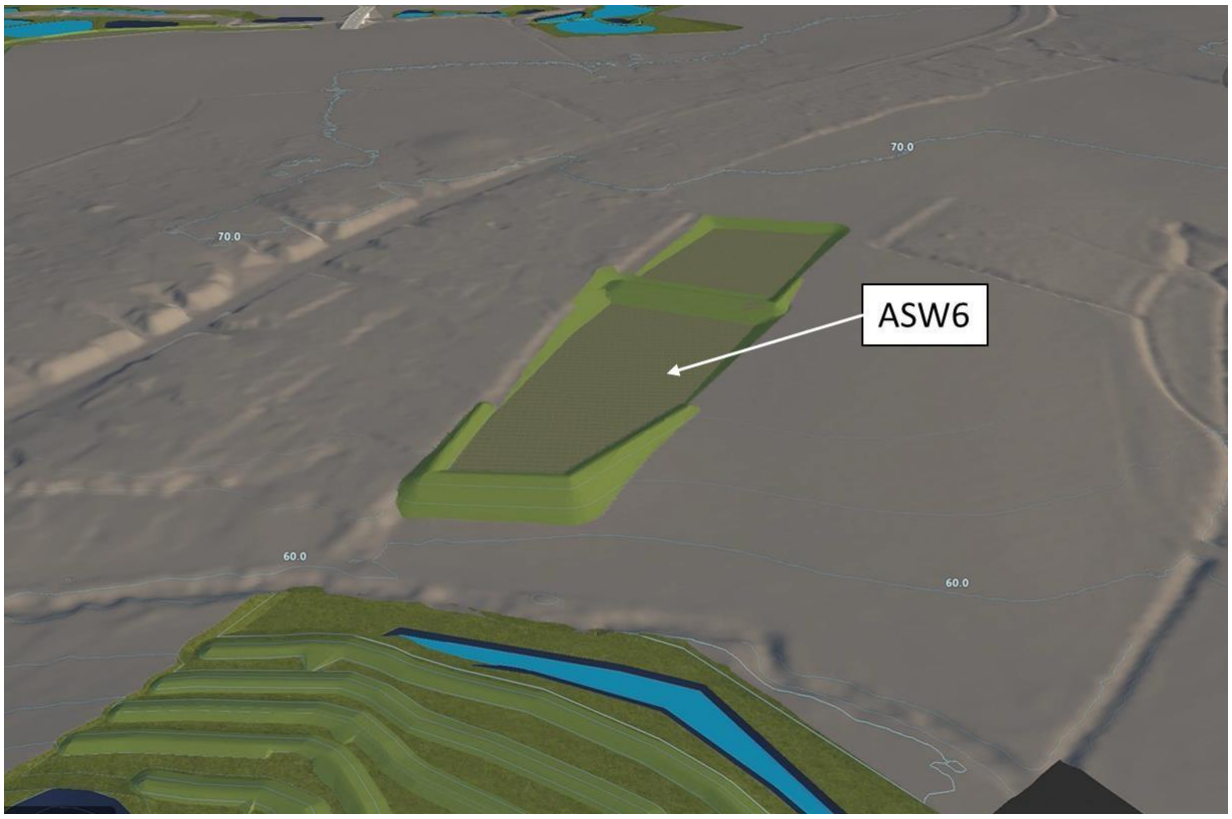

Figure 7 The area surrounding new ASW6

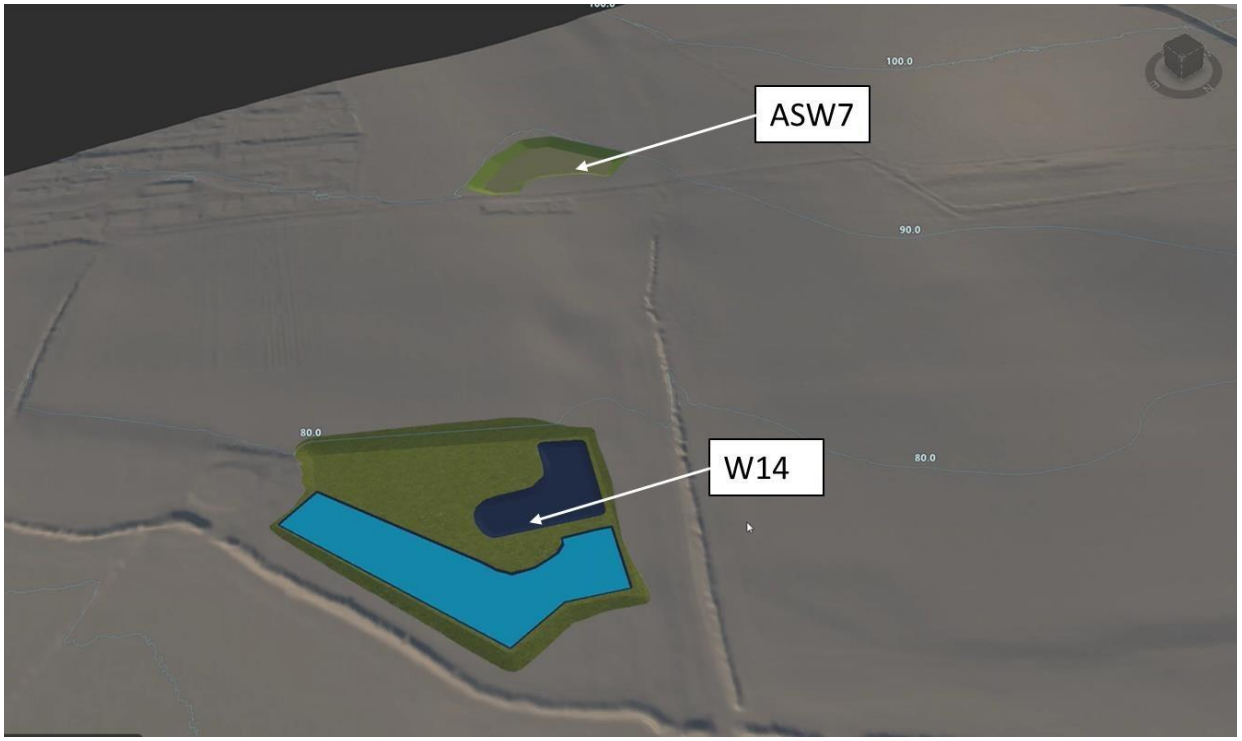

Figure 8 The area surrounding new ASW7 and W14. W14 remains unchanged from the WCS

Figure 9 The area surrounding new ASW8 and ASW9

Previous hydraulic loading calculations have been updated to check the treatment storage depths and Hydraulic Retention Times/ Hydraulic Loading Rates to reflect the proposed revised nutrient management strategy discussed above. The updated hydraulic loading calculations have been presented in **Appendix E**.

Therefore, this report demonstrates that the revised mitigation strategy is now robust and proposed stormwater and wastewater wetlands can collectively provide the worst-case total wetland treatment area requirement of 35.65 ha shown in Table 23 and Table 24 to achieve nutrient neutrality for the entire FMP development with the preferred Onsite WwTW solution.

7 Conclusions

The updated nutrient budget assessment in Section 4 and updated nutrient mitigation requirements in Section 5 show that the latest NE guidance has had a negative impact on the previous calculations and conclusions summarised in the previous WCS report.

For the preferred Onsite WwTW nutrient loads, the latest guidance has only had a minor increase (0.65 ha) on the wetland area requirements for the OPA and FMP due to the extra 10% buffer now introduced to the previous per capita water consumption rates. Therefore, as stated in Section 6.1, the latest proposed wastewater wetlands (W13, W15 and W7) can provide a total effective wetland area of 14 ha, exceeding the required wetland area of 12.05 ha from the FMP. The stormwater wetlands can provide a total area of 24.15 ha, which is also in excess of the required 23.6 ha as per the updated guidance. It should be noted that Wetland W7 will receive both stormwater and wastewater. It is expected that wetlands W7, W15 and ASW9 will be only required to accommodate the extra 1500 homes in the wider FMP area.

As per the previous WCS summary, the alternative Sellindge WwTW option is still the less favourable option for achieving NE's Nutrient Neutrality requirements. Furthermore, Sellindge WwTW has been now discounted for the Proposed Development, but this may be revisited by Otterpool Park LLP for the later development phases if needed. For example, subject to the availability of potential future catchment-wide solutions and nutrient credits, as part of the ministerial statement announced in July. This is because the higher TP and TN permit levels along with the increased land use nutrient loads means that nearly 84 ha of wetland would be now required to offset the latest nutrient loads, as per the latest Stodmarsh Calculator. Therefore, the Onsite WwTW option with STC is clearly preferred as this option is currently the only technically feasible to achieve nutrient neutrality for both PCC scenario rates assessed. Section 6.1 also highlights the other key reasons for selecting the Onsite WwTW as the preferred option in the previous WCS.

The main negative impacts to the revised nutrient budget calculations come from the new land use coefficients, which are based on the Soilscapes drainage types and rainfall. In terms of Phosphorus, as the majority of the site falls under the freely draining type, this leads to reduced annual nutrient exports for the baseline case (Stage 2) whilst the dominant residential urban land use type now has a much higher nutrient exports for the proposed case (Stage 3). The updated calculations increased stormwater and wastewater wetland requirements by 11.19 ha and 0.65 ha respectively (a total of 11.84 ha) for the FMP development compared with the latest WCS assessment. This has initially resulted a total shortfall of 6.88 ha stormwater and wastewater wetland provision in the FMP with the preferred onsite WwTW option.

Therefore, to address this identified shortfall an updated nutrient management strategy has been now proposed, by extending some of the previous wetlands as well as reconfiguring suitable SuDS areas (with surplus storage capacity and footprint area) into stormwater wetlands/bio-retention areas to maximise their nutrient removal ability and wider benefits. Therefore, a total of 35.68 ha of wetland is now available as part of the revised mitigation strategy to meet the 35.64 ha required under the worst-case PCC Scenario 1 (or 34.70 ha under alternative PCC Scenario 2). There is further opportunity to provide more stormwater wetlands outside the current OPA if needed, once the development plans are more advanced for the wider FMP.

The updated assessment should now give a sufficient level of extra confidence to the LPA and NE to decide that the proposed mitigations are robust and can achieve nutrient neutrality without causing adverse effects on the integrity of the Stodmarsh SAC and SPA/ Ramsar designated sites either alone or in combination with other plans or projects. The assessments undertaken to date are precautionary and meet the level of detail expected for an OPA of a strategic site of this nature. Further detail on the mitigation proposals will be submitted as part of the planning conditions for each key development phase or multiple phases.

In summary, this report provides the latest nutrient budget calculations and associated mitigation proposals to demonstrate that Nutrient Neutrality can be achieved at the Proposed Development as part of Otterpool Park OPA, including the remaining FMP. This is through the provision of a new Onsite WwTW serving the proposed development, accompanied by the proposed four interlinked constructed wetlands system, which will protect the integrity of the downstream Stodmarsh designated sites. Thereby, the updated development proposals and this report demonstrate that they can meet the required key tests under the Habitats Regulation

Assessment, which are based on average household occupancy rate of 2.4, Per Capita Consumption (PCC) rate of 120 l/p/d, 90% of discharge permit values (i.e. 90% of TP limit of 0.1 mg/l and TN limit of 7.2 mg/l) for the proposed Severn Trent Connect Onsite WwTW option as well as the latest NE methodology for land use nutrient budget assessment:

Nutrient Neutrality at Otterpool Park will be achieved by the implementation of the measures previously identified in Arcadis (March 2022) OP5 – Appendix 15.2 – Water Cycle Study, which have been now updated by this report to include the following:

- Direct treatment mitigation with the proposed Severn Trent Connect Onsite WwTW option
- Direct mitigation, which includes up to 35.68 ha of onsite wastewater and stormwater wetlands, including 35ha of new onsite woodland planting
- Indirect mitigation, which includes changing existing agricultural land use to a lower nutrient use, such as stormwater SuDS, SANG and ecology/landscape mitigation

The above mitigation will be implemented, as per an agreed and phased implementation plan with NE and the LPA for each development phase or multiple phases. Therefore, this demonstrates that the Proposed Development within the current OPA will have No Likely Significant Effect on Stodmarsh designated sites and thereby can meet the required tests of the Appropriate Assessment under the Habitats Regulation Assessment in respect to the potential nutrients impact.