



Nutrient Neutrality Budget

a tool for assessing the nutrient loading
to a Habitats Designated Site

Solent Marine Sites



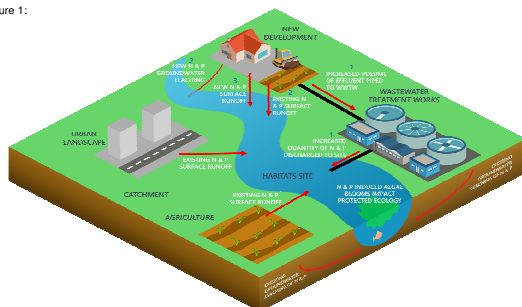
Image Source:
Neil Howard
Solent Buoys - Flood Tide
Copyright: © GrahamAndDairne 2013

Background

There have been a series of court cases in recent years relating to how new plans or projects interact with the Habitats Regulations process where there are existing high levels of background nutrients. These decisions have led Natural England to review its advice on water quality effects on Habitats sites.

The additional nutrient load from the increase in wastewater and/or the change in the land use of the development land created by a new residential development can create an impact pathway for potential negative effects on Habitats sites that are already suffering from problems related to nutrient loading. This impact pathway is shown diagrammatically in Figure 1.

Figure 1:



Habitats Regulations Assessments (HRAs) of new residential developments need to consider whether nutrient loading will result in 'Likely Significant Effects' (LSE) on a Habitats site. If an HRA finds LSE due to nutrient loading, the Appropriate Assessment will need to consider whether this nutrient load needs to be mitigated in order to remove adverse effects on the Habitats site.

The first step in an HRA involving nutrient neutrality is understanding both whether a residential development will need mitigation to achieve nutrient neutrality and, if so, the amount of nutrients that require mitigating on an annual basis. In order to understand the amount of nutrients a new residential development will create, a nutrient budget for the development is required.

This tool provides a step-by-step approach to calculating the nutrient budget for a new residential development. Before a nutrient budget can be completed using the methodology, certain site-specific details for the Habitats Site in question need to be determined. The required details for each stage of the nutrient budget methodology are shown in the instructions tab, with an associated guidance document that informs users of this calculator how to generate certain inputs to the calculator.

Solent Marine European Sites

The Solent Marine Habitats sites comprise a range of Special Areas of Conservation, Special Protection Areas and Ramsar sites with water pollution and eutrophication considered a threat to its condition.

The Solent is a complex site encompassing a major estuarine system on the south coast of England. The Solent and its inlets are unique in Britain and Europe for their hydrographic regime with double tides, as well as for the complexity of the marine and estuarine habitats present within the area.

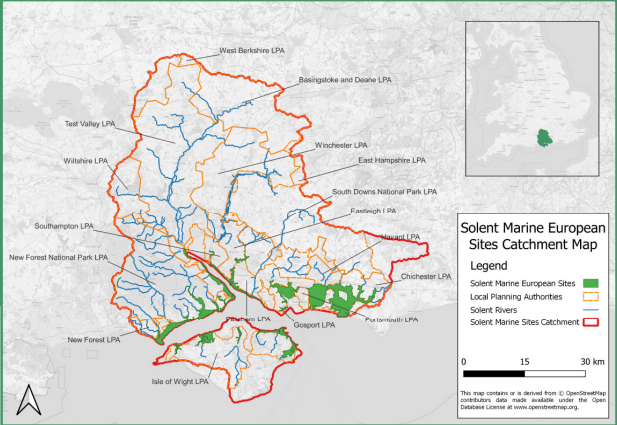
The river's vegetation is exceptionally species rich, with many of the typical chalk stream plants present in abundance, including species such as river water-crowfoot and stream water-crowfoot.

The rich intertidal mudflats, saltmarsh, shingle beaches and adjacent coastal habitats, including grazing marsh, reedbeds and damp woodland, support nationally and internationally important numbers of migratory and over-wintering waders and waterfowl such as ringed plover and sandwich terns, as well as important breeding gull and tern populations.

Increased levels of nitrogen and phosphorous entering aquatic environments via surface water and groundwater can severely threaten these sensitive habitats and species within the sites. The elevated levels of nutrients can cause eutrophication, leading to algal blooms which disrupt normal ecosystem function and cause major changes in the aquatic community. These algal blooms can result in reduced levels of oxygen within the water, which in turn can lead to the death of many aquatic organisms including invertebrates and fish.

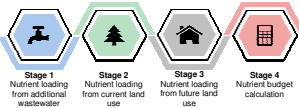
The species and habitats within the Solent Marine sites that result in their designations are referred to a 'qualifying features'. Not all of these qualifying features will be sensitive to changes in nutrients within the site. When completing an HRA involving nutrient neutrality, the Competent Authority (normally Local Planning Authority for developments) must identify and screen out qualifying features that are not sensitive to nutrients via a Habitats Regulations Assessment. Developers will be asked to submit information to support this process.

More detailed information on the qualifying features of the SPA and details of water quality data highlighting the current nutrient problems in the site are available in the Natural England Solent and Southampton Water SPA evidence summary



Instructions

The nutrient budget for a site is calculated in four stages, with each stage implemented in the following worksheets.



1. General tips:

Key:
Values to be entered by the user
Fixed or calculated values
Lookup tables

When a cell is selected, instructions are shown on how to fill out the cell:

Development Proposal (dwellings/units):	
Wastewater treatment works:	Please enter the total number of dwellings/units that will be within the development site as of the project completion date.
Wastewater treatment works P permit (mg TP/litre):	

It is advisable to retain a blank copy of this workbook and "Save as" a new copy each time you calculate a budget, in case of any mistakes in data inputs or to ease calculation of new nutrient budgets.

Note:

The values already included in this tool have been chosen based on research to determine suitable inputs to the nutrient budget that meet the HRA tests of beyond reasonable scientific doubt, in perpetuity (practically speaking this is 80-125 years) and in accordance with the precautionary principle. If editing any values in this tool, you must make sure there is a sufficient evidence base to justify these changes and that the new inputs are selected in accordance with the precautionary principle.

2. Stage specific instructions:

2.1 Stage 1 - calculate the new nutrient load associated with the additional wastewater:

In this section the user will need to enter:

The date of first occupancy. This is because some wastewater treatment works (WwTW) may be due an upgrade in 2025 which will change the nutrient concentration permit values. This will be shown through two values for the permits and nutrients load from before and after the upgrade.

The average occupancy rate of the development will need to be entered. The default setting is the national occupancy rate of 2.4 people per dwelling/unit. Only change this value if there is sufficient evidence that the development will be different to the national average.

The number of dwellings/units that will be in the development at the time of completion.

Whether the catchment of the proposed development has a deductible acceptable loading or not.

The receiving WwTW that the development will drain to. If it is uncertain what WwTW the site will drain to, please find this information from your sewerage company before completing the calculator. If it is not feasible to connect to a WwTW and a septic tank or package treatment plant is being used, please select this option. Please be aware that if the total nitrogen (TN) final effluent concentrations (in mg/l) are specified by the manufacturer, please select 'Septic Tank user defined' or 'Package Treatment Plant user defined' and enter the manufacturer specified value in the cell where prompted.

2.2 Stage 2 - calculate the annual nutrient load from existing (pre development) land use on the development site:

In this section some environmental information about the development will need to be entered as well as the type(s) and area(s) of landcover on the development site. Only landcovers for the land that is being altered by the development should be entered.

The drop down list of landcover types contains seven agricultural landcover types and eight different non-agricultural landcover types that may be present in the development. Please find out what landcover types are within the development before completing this tool. If there is a landcover within the development area that is not in the list please select the most similar landcover types.

The instructions at the bottom of this page detail how to find the environmental information for the site if it is unknown.

2.3 Stage 3 - calculate the annual nutrient load from new (post-development) land use on the development site:

In this section the user will need to select the type(s) and area(s) of the landcover present on the new site.

The drop down list of landcover types contains eight different landcover types that may be present on the development site. Please find out what landcover types will be within the development site before completing this tool. If there is a landcover within the development site that is not in the list please select the most similar landcover type.

The guidance document that accompanies this calculator breaks down what is included in each landcover type.

2.4 Stage 4 - calculate the net change in nutrient loading for the site and the final annual nutrient budget for the development site:

This final stage automatically calculates the results from Stage 1-3 using the equation below.

The value(s) shown are how much nutrient mitigation is required in kilograms per year to achieve nutrient neutrality.

If there are two values due to changing permits, the calculator will show the total amount of nutrient mitigation that is needed before and after the changing permit date.

2.5 The equation used to calculate the nutrient budget:

$$\left(\text{Stage 1} - \text{Stage 2} + \text{Stage 3} \right) \times 1.2 = \text{Stage 4}$$

Precautionary buffer (80%)

3. Site specific data collection instructions:

3.1 Instructions for finding the Operational Catchment that the development is situated within:

- Go to this link: <http://environment.data.gov.uk/catchment-planning/>.
- Search the location by place name, postcode etc. This will give a high-level view of the area. Use the zoom feature to find the exact location of the development.
- Click on the light blue area on the map in which the development is located. This will bring the user to the Operational Catchment page.
- Make note of the name of the Operational Catchment and select it from the dropdown list in the relevant cell.

3.2 Instructions for finding the drainage associated with the predominant soil type within development site:

- Go to this link: <http://www.landis.org.uk/soilpages/#>.
- Find the site location on the map by using the search bar on the right side of the map in the 'Search' tab. Searching an area will generate a pop up window in which you can view the soil information by clicking 'View soil information'. If this is not an option then click on the relevant soil type on the map and click on the 'Soil information' tab on the right hand side of the map, below the 'Search' tab.
- The 'Soil drainage type' value can be found in the 'Soil information' under the title 'Drainage'.
- Make a note of this soil type and select the relevant soil drainage type from the drop down list in the relevant cell.

3.3 Instructions for finding the annual average rainfall that the development will receive using the National River Flow Archive:

- Go to this link: <https://rfta.ceh.ac.uk/data/station/spatial/42019>
- This link will bring the user to the Tanners Brook at Milbrook flow gauge catchment information page.
- Click on the dropdown list next to the title 'Select spatial data type to view' on the left of the map and select 'Rainfall'. Next select the Legend tab.
- Zoom in on the map to find the location of the development and find the corresponding rainfall range from the Legend.
- Select the rainfall band from the drop down list in the table. If your rainfall band is not in the drop down list, please select the closest band shown in the list.

3.4 Instructions for finding out whether the development is in a Nitrate Vulnerable Zone (NVZ):

- Go to this link: <http://mapsapps2.baz.ac.uk/info/home.html?layers=NVEZ>
- Enter the location of the development site in the search bar.
- Once the area has been located, click on the map where the development is located to find out if it is within an NVZ.
- Make note of this and select this in the dropdown list.

Development site details

Date (dd/mm/yyyy):	11/10/2022
Site Name:	Land at Forty Acre Farm
Planning Application number:	APP/20/00510
Site Address:	Land at Forty Acre Farm, Havant Road, Havant, Bedhampton, PO9 3LW

Stage 1

User Inputs	
Date of first occupancy:	01/04/2023
Average occupancy rate:	1.00
Water usage (litres/person/day):	150
Development Proposal (dwelling units):	71
Include deductible acceptable loading?	Yes
Wastewater treatment works:	Budda Farm WwTW
Wastewater treatment works W permit (mg TN/litre):	2.7

Stage 1 Calculated Loading	
Stage 1 Nutrient Loading	
Additional population	71 people
Wastewater to development	6250 litres/day
Annual wastewater TN load	21.57 kg TN/yr

Stage 2

User Inputs

Catchment:	East Hampshire Rivers
Soil drainage type:	Naturally wet
Annual average rainfall (mm):	750.1 - 800
Within Nitrate Vulnerable Zone (NVZ):	Yes

Existing land use type(s)	Area (ha)	Annual nitrogen nutrient export (kg TN)
Horticulture	0.55	8.51
Total:	0.55	8.51

Stage 3

User Inputs

New land use type(s)	Area (ha)	Annual nitrogen nutrient export (kg TN)
Residential urban land	0.55	7.95
Total:		0.55
		7.95

Stage 4

Calculated Outputs

Annual Nutrient Budget

The total annual nitrogen load
to mitigate is:

25.2 kg TN/year

Look Up Tables

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574																																																																																																																																																																																																																																																																																																																																																																																																																																										

[illegible]

[illegible]