Contribution to Water Quality

Executive Summary

'Contribution to water quality' is an indicator in the Nature Improvement Area (NIA) Monitoring and Evaluation Framework. Selected by the Nene Valley NIA partnership, this is a back dated report for 2012, 2013 and 2014 – reporting respectively on the financial years of 2011 (the baseline), 2012 and 2013. The NIA Partnership has decided to divide its monitoring into two categories: (1) Communications: outreach and consultation, and (2) Actions: implementation of relevant Environment Stewardship Scheme (ESS) options.

Communications took three forms: newsletters, training and awareness events and one on one consultation. Through these the targeted population (Figure 2.1) were made aware of the ESS options they could implement and guided in doing so. Everyone within Northamptonshire's part of the River Nene catchment boundary received at least one newsletter per year for the three years of the NIA funding, 99 people attended at least one of the 8-10 events offered in each of those years and 131 people received at least one consultation session. This reflects a good distribution range within the NIA and positive participation levels from farmers.

The Actions assessment is based on ESS options data provided by Natural England to the Northamptonshire Wildlife Trust (NWT). Five measurements were made to monitor the extent water quality has been improved and/or maintained for the River Nene. These were:

1. hectares of land affected by at least one ESS option from the table of water quality **maintenance** indicators(Table 3.1);
2. hectares of land affected by at least one ESS option from the table of water quality **improvement** indicators (Table 3.2);
3. meters of watercourse fencing maintained;
4. number of cattle drinking bays installed; and
5. total number of water quality ESS projects active at the end of the year of interest.

Each year's measurements were accumulative in the sense that each year's dataset reflected not only projects started in the year, but also those continuing from the previous year(s).

These measurements were calculated with three variations. Two are based on data provided by Natural England in GIS format. The difference between those two is the boundary applied. One used a 3 km buffer around the NIA and the other used the River Nene catchment boundary. The third variant was provided, also by Natural England, in an Excel format and was cut to the same 3km boundary as used with the GIS variant (Figure 3.3). The partnership chose to officially report the values of the GIS dataset cut to the River Nene catchment boundary (See

below: Excerpt from Table 3.5). This combination reports, in most cases, the smallest values, partially because it covers a smaller area. However, as is the case with both GIS variants, there is also likely some ESS projects unaccounted for. This means the estimate is conservative. Using the River Nene catchment boundary is more accurate compared to the 3 km boundary framework because it excludes ESS projects affecting tributaries to other water catchments.

Regardless of the variant used, the measurements suggest a successful three years in which water quality improvement and maintenance efforts increased through at least three of the five measurements from year to year. For the fourth and fifth measurements, number of cattle drinking bays installed and meters of watercourse fencing maintained, the GIS datasets suggest that there were none in 2012 or 2014, but it is assumed that in this case the Excel values – which do show an increase in both over time – are more likely accurate.

Excerpt from Table 3.5: Water Quality Indicators' Yearly Accumulative Results based on GIS format datasets for the River Nene catchment boundary framework

	Maintained		Improved		Total Number of Projects
Year	Hectares	Watercourse Fencing (_J11 in metres**)	Hectares	Cattle Drinking Bays (CDB in #)	
2012	10,177.62	0.00 (5,947*)	2,502.52	0 (15*)	7,290
2013	11,608.12	7,691.00	2,574.05	22	8,523
2014	12,502.98	0.00 (13,701*)	2,653.06	0 (23*)	9,211

*Values according to the Excel format data source provided by Natural England for the NIA plus 3 km buffer

**Where "_J11" represents any level of the stewardship scheme in which this option is offered.

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1 Introduction

'Contribution to water quality' is an indicator in the Nature Improvement Area (NIA) Monitoring and Evaluation Framework and has been selected by the Nene Valley NIA partnership for reporting from 2012-2015. This is a back dated report for 2012, 2013 and 2014 – reporting respectively on the financial years of 2011 (the baseline), 2012 and 2013. A basic proforma was produced nationally for this indicator, but it has been up to individual NIAs to decide exactly how to monitor and report. The NIA Partnership has decided to divide its monitoring into two categories: (1) Communications: outreach and consultation, and (2) Actions: implementation of relevant Environment Stewardship Scheme options.

2 Communications Reporting

The first means through which the partnership chose to assess their contribution to the maintenance and improvement of water quality was through its communications. The Northamptonshire Wildlife Trust (NWT) chairs the joint NIA Land Advisor / Catchment Sensitive Farming (CSF) group. The CSF officer was also the land advisor for the Nene Valley NIA and helped farmers in the River Nene catchment, within Northamptonshire, discern whether there were relevant Environmental Stewardship Scheme options suitable for them to apply for, in addition to CSF options. This entailed three forms of outreach. Everyone identified as potential participants within the Northamptonshire's part of the River Nene catchment received a newsletter and were offered relevant events to attended, hosted by the NIA and CSF amongst others. One on one consultation was done as much as possible as well. Through these three communication mediums the targeted population were made aware of the ESS options they can implement and guided in doing so.

2.1 Newsletter Distribution and Event Attendance

A newsletter with updates about groups, practices and grants aiming to improve water quality was distributed to the entire catchment area in Northamptonshire once a year. The target areas within the catchment received a quarterly newsletter (Figure 2.1). Furthermore, there were roughly 8-10 events offered per year in the three years of the Nene Valley NIA project – most free to attendees. These covered topics related to water quality management and ranged from information meetings about grant schemes to getting practical training with slug pelleting. 99 people attended at least one of these events and most, if not all, events were well attended. 44 of

those 99 people attended more than one event, the range spanning from 17 people who attended two events and one person who attended as many as 10.

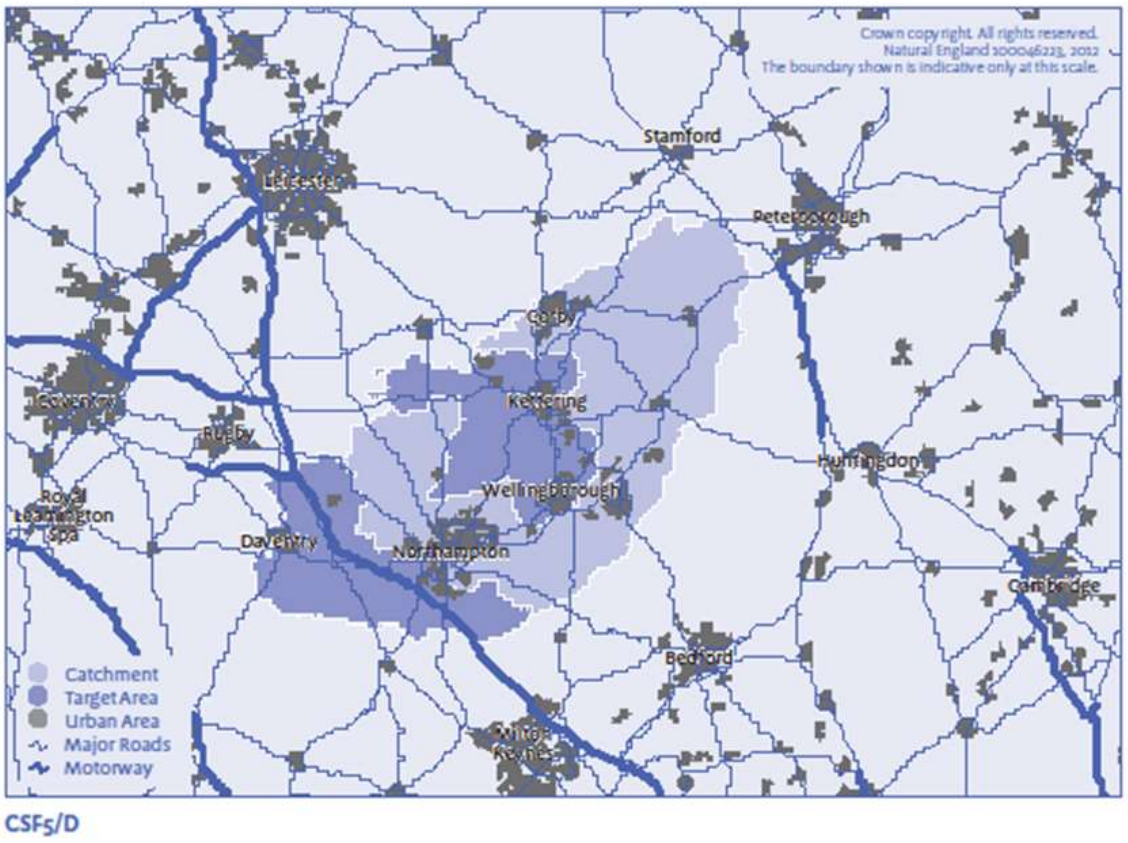


Figure 2.1: Map showing the Nene Valley NIA catchment boundary and its target areas for newsletter distribution.

2.2 One on One Visits

In the last three years (2011-2014), an encouraging 131 people received at least one site visit from the Nene Valley NIA land advisor/CSF officer, free of charge. During these visits the advisor would guide the land owner through the decision making process of whether or not to apply for ESS or CSF grant schemes, considering case-specific details. If the land owner wanted to apply, the advisor would guide them through the process. Most (85) land owners only received one site visit. Over the three years of the NIA funding, approximately 50 grants were given and most applications submitted were successful.

3 Action Reporting

The second assessment of contribution to water quality is calculated based on the Environmental Stewardship options active each year. The data was provided by Natural England to the NWT in two formats: for Geographic Information Systems (GIS) and Microsoft Office Excel (Excel). The indicators were measured in the reporting years of 2012 (the baseline), 2013 and 2014 using a subset of Environmental Stewardship Scheme (ESS) options from those monitored by Natural England. The subset was divided into two categories: those that maintain water quality and those that improve it (Table 3.1 and Table 3.2). Using these datasets the hectares of land impacted by ESS options maintaining or improving water quality could be determined as well as the number of cattle drinking bays installed, metres of watercourse fencing maintained and the total number of active ESS projects.

3.1 Water Quality Indicators

A subcommittee determined which ESS options to use as indicators of water quality using a list of options present in 2014 within the Nene Valley NIA and a 3 km buffer area around it as a starting point. From that list, those ESS options most directly related to water quality were selected. All codes related to the ESS options in the list were considered regardless of the stewardship level (i.e. Entry, higher, organic or organic higher). The division of this list into indicators maintaining water quality and those improving it was made by the same subcommittee to create the final reference list (Table 3.1 and Table 3.2).

Table 3.1: Environmental Stewardship Scheme Options Serving as Indicators of Maintained Water Quality

Level(s) Option was Available In				
Entry	**Higher**	**Organic**	**Organic Higher**	**Option Title** (measured in hectares unless otherwise specified)
EC25	*HC25*			Hedgerow tree buffer strips on grassland
ED5	HD5	OD5	OHD5	Management of archaeological features on grassland
	HD11			Restoration of traditional water meadows
EJ11	*HJ11*	*OJ11*	*OHJ11*	Maintenance of watercourse fencing (measured in metres)
EK2	HK2	OK2	*OHK2*	Permanent grassland with low inputs
EK3	HK3	OK3	*OHK3*	Permanent grassland with very low inputs
	HK6			Maintenance of species-rich, semi-natural grassland
	HK7			Restoration of species-rich, semi-natural grassland
	HK9			Maintenance of wet grassland for breeding waders
	HK10			Maintenance of wet grassland for wintering waders and wildfowl
	HK11			Restoration of wet grassland for breeding waders.
	HK12			Restoration of wet grassland for wintering waders and wildfowl
	HK15			Maintenance of grassland for target features
	HK16			Restoration of grassland for target features
	HQ3			Maintenance of reedbeds
	HQ4			Restoration of reedbeds
	HQ6			Maintenance of fen
	HQ7			Restoration of fen

Note: Options with *subtle emphasis in grey italics* were considered possible indicators, but were not present within the frameworks used for monitoring the River Nene NIA's water quality.

Table 3.2: Environmental Stewardship Scheme Options Serving as Indicators of Improved Water Quality

Level(s) Option was Available In				
Entry	**Higher**	**Organic**	**Organic Higher**	**Option Title** (measured in hectares unless otherwise specified)
CDB				Cattle Drinking Bay (measured by number of bays)
EC24	*HC24*	*OC24*	*OHC24*	Hedgerow tree buffer strips on cultivated land
ED2	HD2	OD2	OHD2	Take archaeological features out of cultivation
	HD7			Arable reversion by natural regeneration
EE1	HE1	OE1	*OHE1*	2 m buffer strips on cultivated land
EE2	HE2	OE2	*OHE2*	4 m buffer strips on cultivated land
EE3	HE3	OE3	OHE3	6 m buffer strips on cultivated land
EE4	*HE4*	*OE4*	*OHE4*	2m buffer strips on intensive grassland
EE5	*HE5*	*OE5*	*OHE5*	4m buffer strips on intensive grassland
EE6	HE6	*OE6*	OHE6	6 m buffer strips on intensive grassland
EE9	*HE9*	*OE9*	*OHE9*	6m buffer strips on cultivated land next to a watercourse
EE10	HE10	*OE10*	*OHE10*	Floristically enhanced grass margin
EF1	HF1	OF1	*OHF1*	Management of field corners
EF7	HF7	OF7	OHF7	Beetle banks
EF15(NR)*	HF15(NR)*			Reduced herbicide cereal crop preceding over-wintered stubble
EG1	*HG1*	OG1	OHG1	Under sown spring cereals
EJ13	*HJ13*	*OJ13*	*OHJ13*	Winter cover crops
EJ5	HJ5	OJ5	*OHJ5*	In-field grass areas to prevent erosion or run-off
EJ9	HJ9	OJ9	*OHJ9*	12 m buffer strips for watercourses on cultivated land
EK1	HK1	OK1	*OHK1*	Take field corners out of management
	HC10			Creation of woodland outside of the SDA & ML
	HF14(NR)*			Unharvested, fertiliser-free conservation headland
	HJ3			Reversion to unfertilised grassland to prevent erosion/run-off
	HJ4			Reversion to low input grassland to prevent erosion/run-off
	HK8			Creation of species-rich, semi-natural grassland
	HK13			Creation of wet grassland for breeding waders
	HK14			Creation of wet grassland for wintering waders and wildfowl
	HK17			Creation of grassland for target features
	HQ5			Creation of reedbeds
			OHK21	Legume- and herb-rich swards

Note: Options with *subtle emphasis in grey italics* were considered possible indicators, but were not present within the frameworks used for monitoring the River Nene NIA's water quality.

*(NR) means that there the option can have the code with or without "NR" at the end of it, where "NR" stands for non-rotational.

3.2 What was measured

Five measurements were used to determine the extent to which water quality has been improved and maintained for the River Nene NIA. These were:

6. hectares of land affected by at least one ESS option from the table of water quality **maintenance** indicators (Table 3.1);
7. hectares of land affected by at least one ESS option from the table of water quality **improvement** indicators (Table 3.2);
8. meters of watercourse fencing maintained (_J11 ESS option code, where "__" could be an E, H, O or OH to represent the stewardship level);
9. number of cattle drinking bays installed (CDB ESS option code); and
10. total number of water quality ESS projects active at the end of the year of interest.

These were measured for each year using the accumulative data provided by Natural England. The data was accumulative in the sense that each year's dataset reflected not only projects started in the year, but also those continuing from the previous year(s).

There were two frameworks used to determine which data points (ESS projects) to consider relevant to the River Nene. The first framework used a 3 km buffer around the Nene Valley NIA as the boundary (referred to here on in as the 3 km boundary). This boundary has the advantage in that it has been used for other analysis related to the Nene Valley NIA and the relevant data was available in two formats from Natural England, GIS and Excel. The datasets in these two formats had been created from the primary data at different times and using different methodology. The second framework was defined by the River Nene's catchment boundary, with the exception of the northernmost corner of the catchment, which was excluded beyond the 3 km boundary (referred to her on in as the catchment boundary; Figure 3.1). Being based on the catchment area, measurements are more true to the impact of ESS options on the River Nene's water quality. It excludes some irrelevant applications of options that the 3 km boundary includes. For example, the 3 km boundary includes some area that lies within the Welland catchment area and thus considers ESS options of that area as affecting the River Nene even though they would not (Figure 3.2). As a result of having two frameworks and two variations of the results for one of these frameworks, there are three variations of the results of the five measurements described above (Figure 3.3). It is important to remember that two of the three variations use the same original datasets (i.e. GIS format) and different measurement values simply reflect a difference of the boundary, or framework, used.

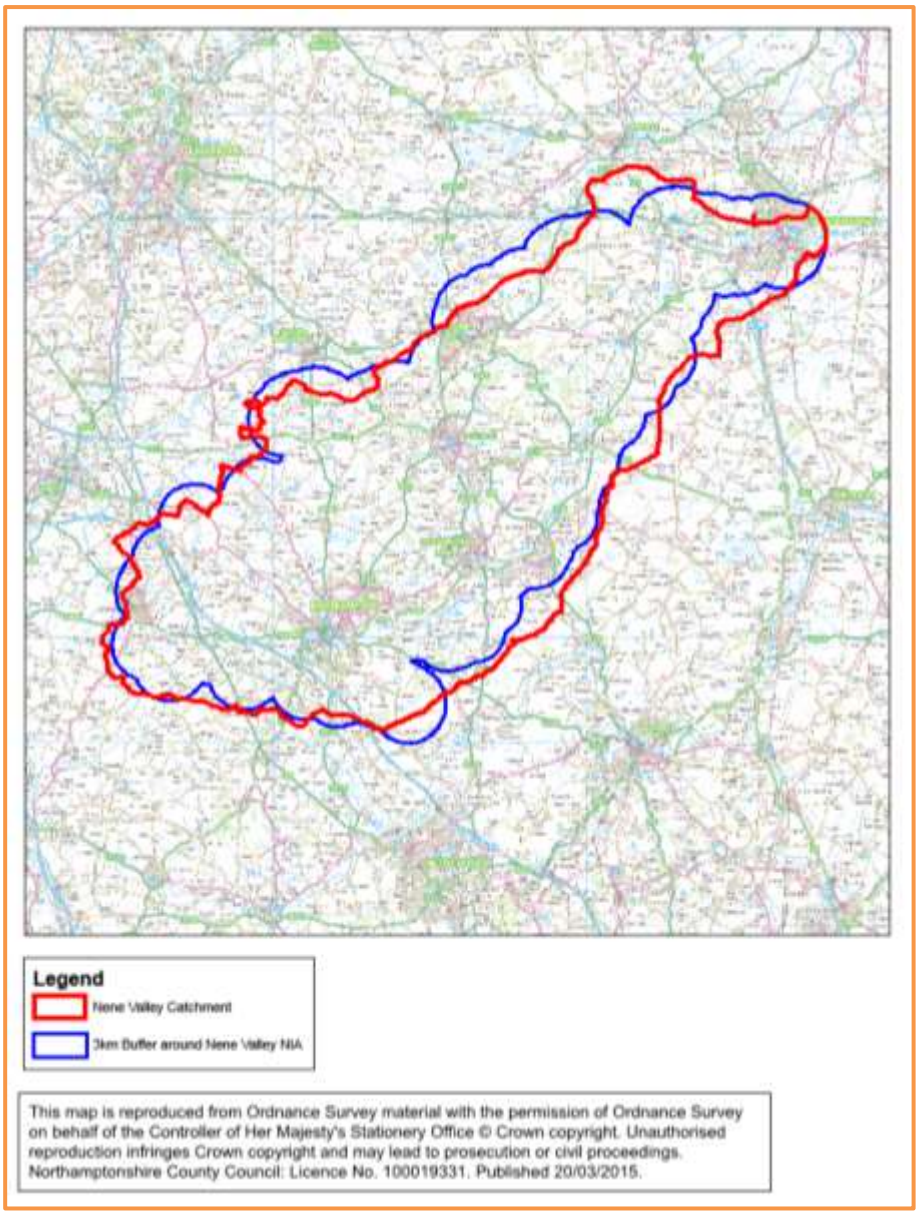


Figure 3.1: A comparison of the 3 km buffer boundary around the Nene Valley NIA and the River Nene water catchment boundary, the two different frameworks used.

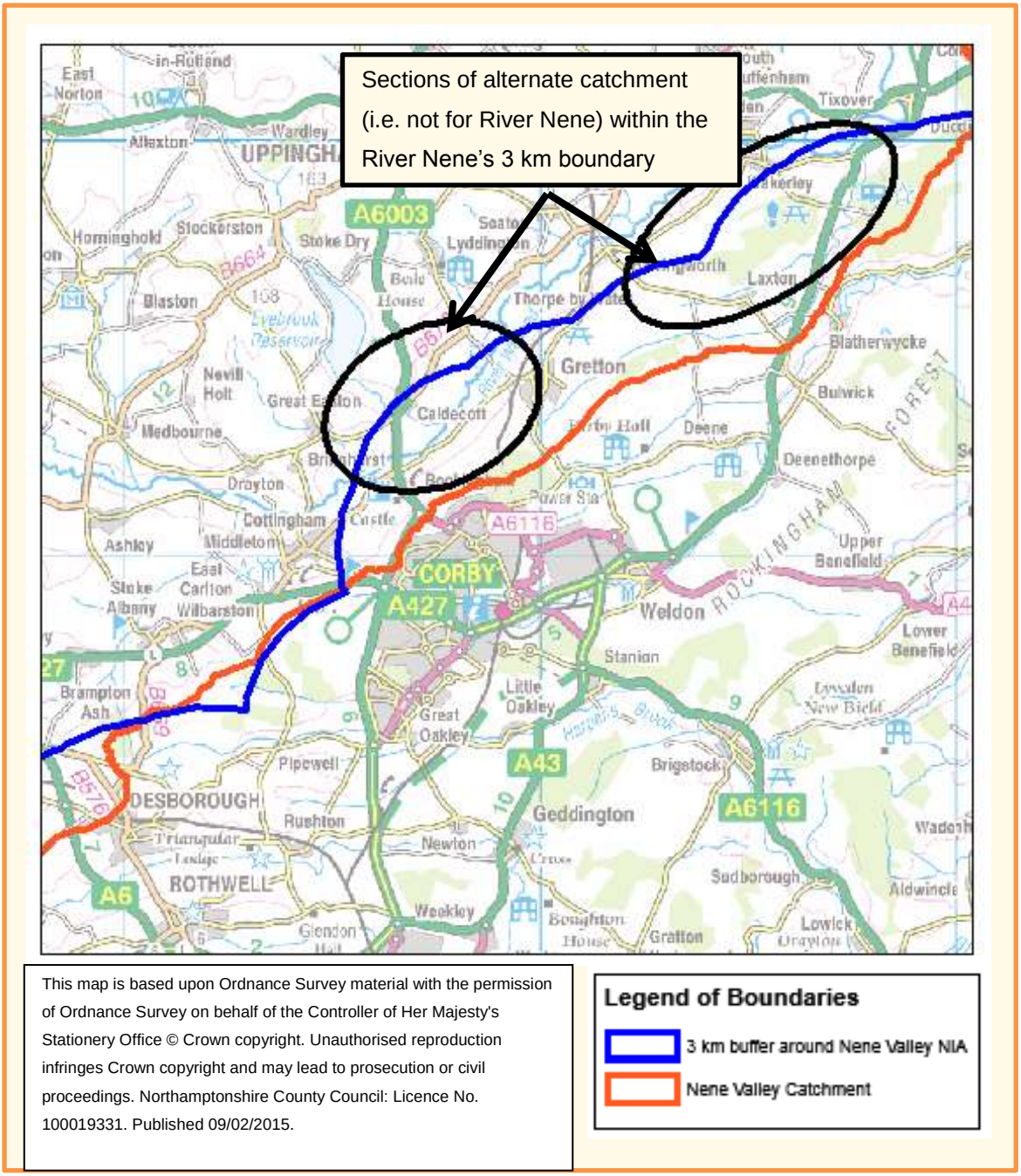


Figure 3.2: Showing an example of the disadvantage of the 3 km boundary. The figure shows where the 3 km boundary includes Welland water catchment, which neighbours the Nene Valley water catchment (red line).

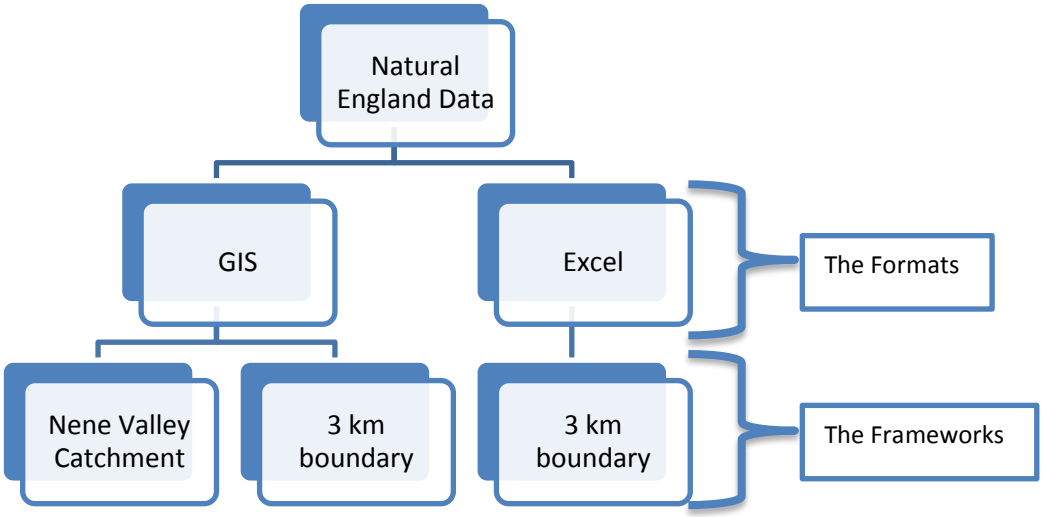


Figure 3.3: Illustration of the relationship between the data formats and frameworks. This relationship explains why there are three variations of the indicator measurements.

3.3 The Uncut Datasets

The following datasets, with distinguishing factors outlined below, were provided by Natural England to NWT. As explained previously in 3.2 What was measured, the GIS data from each year's dataset was accumulative, as were the results from the Excel dataset.

2012 GIS data:

- National dataset; includes East of England Region and East Midlands Region
- Latest start date is May 1, 2012 (adjusted by NWT to April 1, 2012 for better comparison)
- More data points in the northern most part of the catchment and buffer boundaries than the 2013 and 2014 datasets – the part of the catchment in East of England.
- Includes some data points within East Midlands Region that are not in the 2013 and/or 2014 datasets.

2013 GIS data:

- Regional dataset; East Midlands Region
- Latest start date is March 1, 2013
- Includes mostly East Midlands Region, but some data points from outside the regional boundary, including some points in the northern most part of the area of catchment and buffer boundaries.
- Includes some data points that are not in the 2014 dataset

2014 GIS data:

- Regional dataset; East Midlands Region
- Latest start date is December 1, 2013
- Includes mostly East Midlands Region, but some data points from outside the regional boundary, including some points in the northern most part of the area of catchment and buffer boundaries.

2012-2014 Excel data:

- Data for only 3 km buffer around Nene Valley NIA
- Includes some irrelevant points (e.g. in the Welland catchment) and excludes some relevant points relative to the River Nene catchment area boundary.

3.4 Methodology

The most steps were needed in interpreting the GIS format datasets, as opposed to the Excel one. Using MapInfo Professional 12.0 (MapInfo), the original GIS datasets received from Natural England were clipped to the appropriate framework boundary – either the 3 km boundary (1694 sq. km) or the catchment boundary (1678 sq. km). The boundary select tool in MapInfo was used in making the clip and deciding which points fell within the boundary. The boundary select tool only selects those data points whose centroids are within the boundary.

Once the appropriate data points were clipped from the original datasets, the data tables were converted to Excel spreadsheets. Clipped and converted, the GIS datasets could be analysed in much the same way as the Excel format dataset. However, several additional decisions had to be made for measurements based on the GIS datasets. Firstly, any data points with a scheme end date prior to April 1 of the reporting year were excluded, as were any points whose agreement statuses were not "live". Where two ESS options were being carried out on the same property, only one of the entries was accounted for in the measurement of hectares impacted by water quality indicators. This avoided double-counting any properties. If one of the options on the same property was towards water quality maintenance and the other towards water quality improvement, then the property was only counted towards the total hectares affected by water quality improvement indicators. This is different from how the total number of ESS projects was calculated, which would count two (or more) ESS options on the same property separately. Finally, the 2012 dataset was adjusted to exclude projects which started on May 1, 2012 so as to match the results as closely as possible to the 2011 financial year it is meant to reflect. Once these adjustments were made, the applicable Excel formulas could be used to calculate the values of interest for measuring water quality from the datasets, as was done for the Excel format dataset as well.

3.5 Limitations of Data and Interpretation

- *Excel dataset limitations discussed*
- *GIS 2012 and 2014 data do not account for CDB _J11 ESS options, maybe others too*
- *Latest starting dates for and 2014 GIS data sets the end of the financial y start dates of some later months are missing*
- *2013 and 2014 datasets only regional, excluding projects within the catch and 3 km boundaries*

The original datasets supplied by Natural England had already been processed in various ways which are not known to the NWT. There are inconsistencies between GIS format datasets of each reporting year and discrepancies in the results between the GIS and Excel format datasets within the 3 km boundary. This suggests that different datasets were prepared and processed differently by Natural England. While some explanation is attempted in this report, it should be seen as speculation based on the information available. All limitations outlined below relate to the GIS datasets as the methodology used in creating the Excel dataset is unknown.

One noteworthy problem with having used secondary data is the associated gaps. Most blatantly, unlike for the 2013 GIS dataset, there is no mention of Cattle Drinking Bays or watercourse fencing maintenance for the GIS datasets of reporting years 2012 and 2014, even when searching through applications that are not live in that year but were included in the table for that year's dataset. It appears as if this suggests these ESS options were simply not included in the datasets for those years, rather than the applications having been withdrawn or closed. It is unknown whether other water quality indicator ESS options were likewise excluded from the dataset.

Another gap arises upon closer inspection. The aim was to assess each year's data according to the financial year of April 1 to March 31 rather than the calendar year of January 1 to December 31. The 2012 dataset was to be used to create a baseline; showing the total area of land being managed for benefit to water quality prior to the start of the NIA project i.e. a snapshot of all active options on the 31st March, 2012, the end of the 2011 financial year. Future datasets were to be used to calculate the change in area of land managed to benefit water quality from the baseline in each financial year. E.g. a snapshot of data on 31st March, 2013 would include any new projects in place between 1st April, 2012 and 31st March, 2013, and will have lost any projects which have ended in this period. However, the latest start date of projects within each year's GIS dataset received was different. As described in the descriptions of the original datasets, 2012's latest start date is May 1, 2012 (adjusted to April 1, 2012 by the NWT for this analysis), in 2013 it is March 1st, 2013 and in 2014 it is December 1st, 2013. Consequently, the 2013 dataset is missing those options which started in March 2013, and the 2014 dataset is missing four months' worth of project start dates, from December 2nd 2013 to March 31st 2014. This may mean the GIS format datasets underestimate the number of projects active at the end

of the financial year being reported on. The results lend some support to this reasoning insofar as the Excel dataset's values are consistently greater than those of the GIS datasets that are also cut to the 3 km boundary (Table 3.9). The Excel format data for all three years was provided in June, 2014, but presumably divided each year's data according to the financial year. Even if this assumption is wrong, it is plausible that the Excel data for all three years was consistent in when during the year it reported, unlike the GIS format datasets.

In addition to the aforementioned gaps, there were some data points present in the 2012 dataset that were not in either the 2013 or 2014 dataset. Similarly, some data points in the 2013 dataset were not in the 2014 dataset (Figure 3.4). This could partly be because some projects or schemes would have ended by the following year and thus not been included in its dataset. However, the original datasets, as provided by Natural England, seemed to include schemes regardless of agreement status or work end date, as many which had ended or closed in previous financial years were still present in the datasets. The prevalence of more data points in earlier datasets relative to later ones, then, is likely attributable to other factors as well, if not solely so. One contributing factor to this discrepancy is that the 2012 dataset used was national, including ESS options in the East Midland Region and East of England Region which both overlap the frameworks used in this analysis. In contrast, the 2013 and 2014 datasets included only data points within East Midland Region. That being said, the data points in each dataset were not strictly within their respective boundaries. There were 2013 and 2014 data points in the East of England Region in the datasets for those years, but far fewer than the 2012 dataset's number of points in that region. One possible explanation for the presence of these East of England Regional data points in the 2013 and 2014 datasets is that the properties on which they are located are owned by persons whose primary address is in the East Midlands Region.

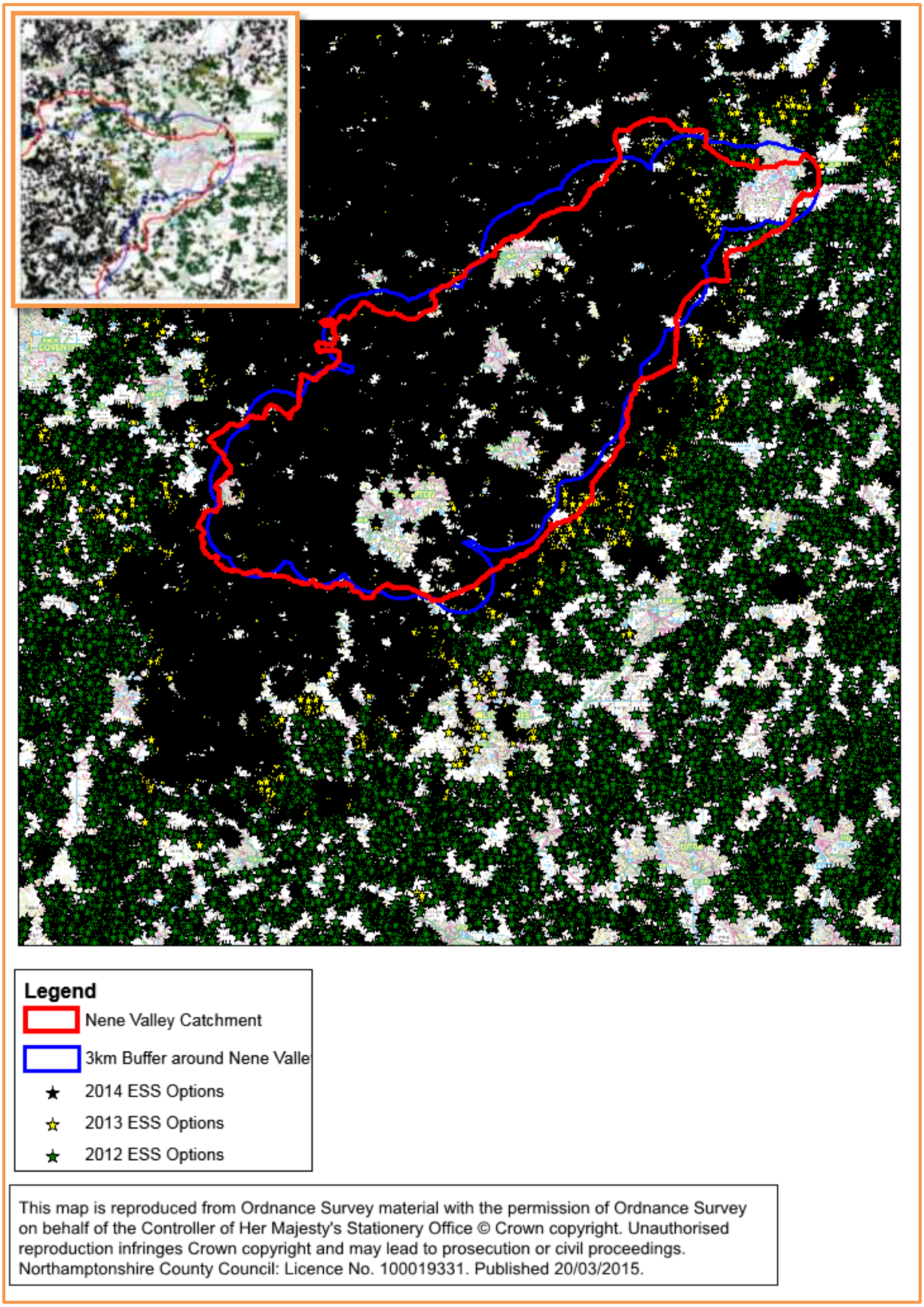


Figure 3.4: There are some gaps in the overlap of one year's data to the next, as illustrated here by layering the 2012, 2013 and 2014 datasets from bottom (2012) to top (2014). Within the frameworks, the primary discrepancy which 2012's broader coverage brings is shown in the zoomed shot in the top left corner

3.6 Results

Regardless of the framework and format combination used, the results reflect an increase for all measurements from April, 2012 to December, 2013 (i.e. reporting years 2012 to 2014), with one potential exception (Table 3.3). The GIS datasets suggest no cattle drinking bays were built in 2012 and those built in 2013 were no longer there in 2014. Likewise, it shows the watercourse fencing maintenance only happened in 2013. However, it is more likely that the 2012 and 2014 GIS datasets simply did not account for the watercourse fencing maintenance and cattle drinking bays. The general increase is encouraging. It indicates that overall the Nene Valley Nature Improvement Area partners' efforts have positively and increasingly affected water quality. While the discrepancy in exact values remains substantial, an attempt to understand it can be made by comparing the different values according to their formats and frameworks.

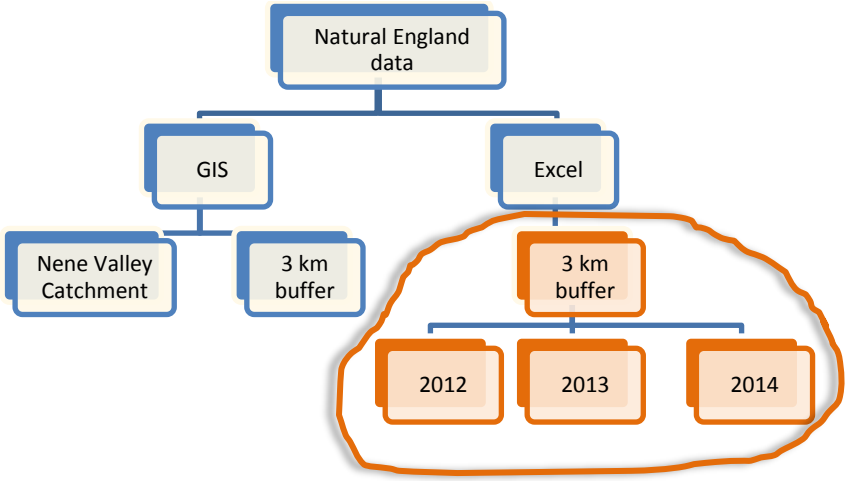
Table 3.3: The Values for the Five Measurements from the Results of all Format-framework Variations (rounded to the closest whole number)

		Maintained								Improved								Total # of Projects		Chang (year t
		Hectares		Change (year to year)		Watercourse Fencing (_J11 in metres*)		Change (year to year)		Hectares		Change (year to year)		Cattle Drinking Bays (CDB in #)		Change (year to year)				
Report Year	**Frame-work**	**Excel**	**GIS**	**Excel**	**GIS**	**Excel**	**GIS**	**Excel**	**GIS**	**Excel**	**GIS**	**Excel**	**GIS**	**Excel**	**GIS**	**Excel**	**GIS**	**Excel**	**GIS**	**Excel**
2012 (baseline)	3 km	12,776	10,542	N/A	N/A	5,947	0	N/A	N/A	2,594	2,448	N/A	N/A	15	0	N/A	N/A	7,647	7,430	N/A
	Catchment (GIS)	10,178		N/A		0		N/A		2,503		N/A		0		N/A		7,290		N
2013	3 km	14,678	12,259	1,902	1,717	10,291	9,991	4,344	9,991	2,984	2,593	390	145	22	22	7	22	8,924	8,636	1,277
	Catchment (GIS)	11,608		1,431		7,691		7,961		2,574		72		22		22		8,523		1,2
2014	3 km	15,747	13,255	1,069	996	13,701	0	3,410	-9,991	3,206	2,723	223	130	23	0	1	-22	9,506	2,421	582
	Catchment (GIS)	12,503		895		0		-7961		2,653		79		0		-22		9,211		6
Diff. from 2012 to 2014	3 km	2,971	2,713			7,754	0			613	275			8	0			1,859	1,991	
	Catchment (GIS)	2,325				0				151				0				1,921		

***Where "_J11" represents any level of the stewardship scheme in which this option is offered.

Note: The catchment framework values were the smallest and Excel-format 3 km boundary values were the maximum values, except for in these cases: (1) the hectares improved in 2012, (2) the 2012 to 2014 difference in total number of projects, and (3) when the two GIS formats report the same values or all three values are equal.

3.6.1 Excel Data Only: Comparing 2012, 2013, and 2014 Results within the 3 km boundary framework for only the Excel data



- All measuremen
increase from y

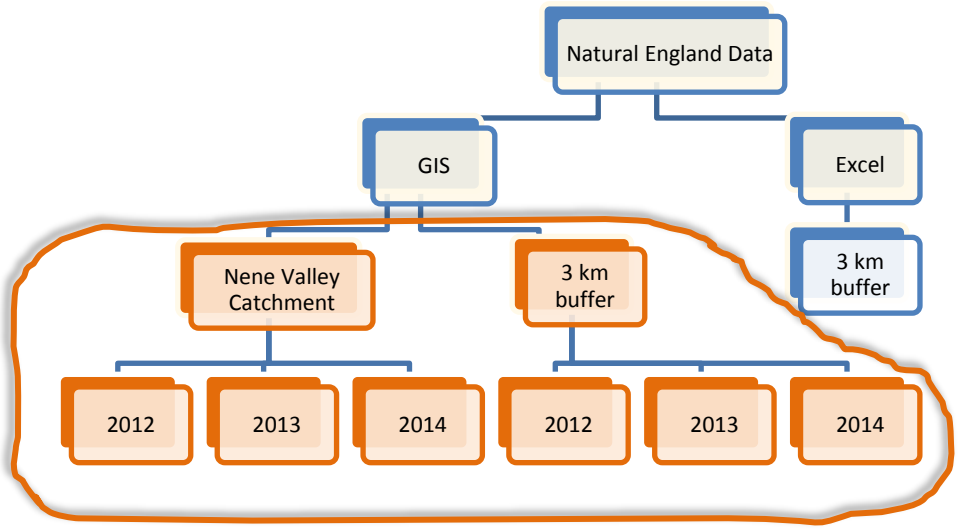
The data provided by Natural England in an Excel format and exclusively for within the 3 km boundary follows positive trends. There is a consistent increase from year to year for all measurements (Table 3.4). This suggests that each year new options were added to both maintain and improve water quality in the Nene Valley NIA 3km buffer, and options already in place continued. This is confirmed by considering the trends at option code level. For 21/25 of the water quality maintenance related codes there was an increase from year to year (i.e. 2012 to 2013 and 2013 to 2014). So too for 48/59 of the water quality improvement options. The trend at a per option level also provides further insight into the nature of this increase. It reflects that the increase in the five measurements' values was quite evenly distributed – most codes contributed to the overall increase (5 Appendix B: Number of ESS projects per ESS Option for Water Quality Maintenance – Comparing all Three Format-Framework Combinations and 6 Appendix C: Number of ESS projects per ESS Option for Water Quality Improvement – Comparing all Three Format-Framework Combinations).

Table 3.4: Water Quality Indicators' Yearly Accumulative Results based on Excel data source cut to the 3 km boundary

	Maintained		Improved		
Year	Hectares	Watercourse Fencing (_J11 in metres*)	Hectares	Cattle Drinking Bays (CDB in #)	Total Number of Projects
2012	12,776.33	5,947.00	2,593.89	15	7,647
2013	14,678.10	10,291.00	2,980.68	22	8,924
2014	15,746.83	13,701.00	3,206.44	23	9,506

*Where "_J11" represents any level of the stewardship scheme in which this option is offered.

3.6.2 GIS Data Only: Comparing Yearly Accumulative Results within the 3 km Boundary and Catchment Frameworks based on Only the GIS datasets



- *Both frameworks use original datasets (GIS*
- *Framework does not c measured values incre to year, except for CDE Options*
- *3 km boundary is larg the catchment bounda*
- *3 km boundary includ projects*
- *Both frameworks inclu projects not included i*

Both the 3 km and catchment frameworks, applied to the GIS datasets, show an increase in values from year to year when considered independently, except for the aforementioned absence of any cattle drinking bays or watercourse fencing maintenance in 2012 and 2014 (Table 3.5). The only difference between the two GIS datasets for every year is the framework applied. The two frameworks were used to cut the same original datasets. Reasons for using the two different frameworks are given under 3.2 What was measured. The 3 km boundary encompasses 1,695 sq. km whereas the catchment boundary only includes 1,678 sq. km.. Each year also reports more projects, overall, within the larger 3 km boundary than in the smaller catchment boundary.

In most of these cases, the 3 km boundary also encompasses more hectares with at least one ESS option applied than the catchment boundary, with the exception of hectares contributing to water quality improvement in 2012. In that year, there are 54.54 hectares more reported contributing to improved water quality in the catchment boundary than in the 3 km boundary (Table 3.6). This draws attention to the fact that some of those projects within the catchment boundary are not included in the 3 km boundary. There are likewise projects within the 3 km boundary that are not within the catchment boundary (Table 3.7). With this in mind, it can be surmised that while there is overall fewer projects within the catchment boundary in 2012, that year the combined area covered by the ESS projects in the catchment boundary was more than the sum of those in the 3 km boundary.

Table 3.5: Comparing Water Quality Indicators' Yearly Accumulative Results based on GIS format datasets for the 3 km boundary and catchment boundary frameworks

Year	Catchment (C) or 3 km boundary (3)	Maintained		Improved		Total Number of Projects
		Hectares	Watercourse Fencing (_J11 in metres*)	Hectares	Cattle Drinking Bays (CDB in #)	
2012	C	10,177.62	0.00	2,502.52	0	7,290
2012	3	10,542.05	0.00	2,447.98	0	7,430
2013	C	11,608.12	7,691.00	2,574.05	22	8,523
2013	3	12,259.45	9,991.00	2,593.36	22	8,636
2014	C	12,502.98	0.00	2,653.06	0	9,211
2014	3	13,255.01	0.00	2,722.93	0	9,421

*Where "_J11" represents any level of the stewardship scheme in which this option is offered.

Table 3.6 Water Quality Indicators: Difference between GIS datasets for the 3 km boundary and catchment boundary frameworks per year (accumulative) – shows catchment values subtract 3 km boundary values

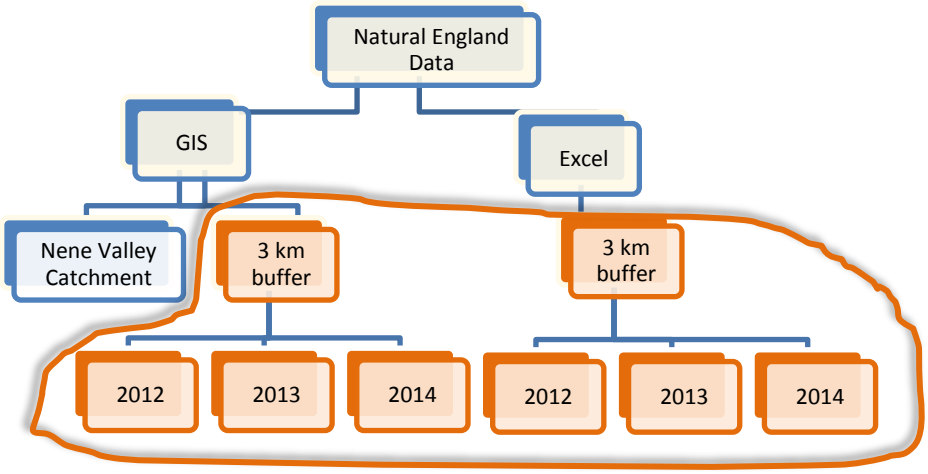
Year	Maintained		Improved		Total Number of Projects
	Hectares	Watercourse Fencing (_J11 in metres)*	Hectares	Cattle Drinking Bays (CDB in #)	
2012	-364.43	0.00	54.54	0	-140
2013	-651.33	-2,300.00	-19.31	0	-113
2014	-752.03	0.00	-69.87	0	-210

*Where "_J11" represents any level of the stewardship scheme in which this option is offered.

Table 3.7: Number of Environment Stewardship Scheme Projects per Reporting Year that are only in One of the Frameworks (Catchment or 3 km) for the GIS format datasets (accumulative)

Year	Catchment (# ESS projects)	3 km boundary (# ESS projects)
2012	505	645
2013	560	672
2014	472	682

3.6.3 GIS vs. Excel Data: Comparing Yearly Accumulative Results within the 3 km boundary Framework for the GIS and Excel formats



- *Excel's values for al measurements are g than those of the GI boundary datasets, for CDB in 2013*
- *Data limitations for datasets may partic account for the diff*
- *It is unknown why t 2014 discrepancy in number of projects between the format smallest and the 20 discrepancy is large*

The dataset provided in a GIS format and cut to the 3 km boundary presented consistently less hectares measured than in the Excel format dataset, which was also for within the 3 km boundary. However, both datasets reported 22 cattle drinking bays in 2013, while, for 2012 and 2014, the GIS dataset includes no cattle drinking bays or watercourse fencing. In contrast, the Excel dataset includes values for both these options (Table 3.8). That the GIS values are less than the Excel format values could possibly be attributable, in part, to the GIS dataset limitations discussed in 3.5 Limitations of Data and Interpretation.

The 2012 GIS format dataset was national whereas the 2013 and 2014 GIS format datasets were regional, including only the East Midlands Region. This means data points are missing for the part of the 3 km boundary in the East of England Region in the 2013 and 2014 GIS format datasets (Figure 3.4). Furthermore, values for the reporting years of 2013 and 2014 are underestimated as a result of there being a few months near the end of the financial year reported on missing starting dates of ESS option implementation.

Neither of these factors fully account for the discrepancy. They do not explain why the 2012 values of the GIS datasets are also less than those of the Excel format. Again, however, this may be a result of GIS data limitations. The absence of cattle drinking bays and watercourse fencing maintenance in 2012 and 2014 was stated earlier in this report to more likely be a result of missing data from the datasets as opposed to an actual absence/loss of these ESS projects. This gives reason to question whether other ESS options are also missing from these two

datasets. If so, it may be that only the Excel format accounts or includes these ESS options. Also intriguing is that in 2012 the GIS-Excel difference in total number of projects is greater than in 2014 (Table 3.9). Considering that 2014 has all of the above data limitations, while the other two years' datasets only have one or two of them – suggesting the discrepancy between GIS and Excel values should be greatest for 2014 –, and that the Excel-GIS difference in hectares improved and maintained increased from 2012 to 2014, the decrease in the Excel-GIS difference in total number of projects is perplexing.

Table 3.8: Comparing Water Quality Indicators' Yearly Accumulative Results based on GIS and Excel formats for the 3 km boundary framework

Year	GIS (G) or Excel (E)	Maintained		Improved		Total Number of Projects
		Hectares	Watercourse Fencing (_J11 in metres*)	Hectares	Cattle Drinking Bays (CDB in #)	
2012	G	10,542.05	0.00	2,447.98	0	7,430
2012	E	12,776.33	5,947.00	2,593.89	15	7,647
2013	G	12,259.45	9,991.00	2,593.36	22	8,636
2013	E	14,678.10	10,291.00	2,983.68	22	8,924
2014	G	13,255.01	0.00	2,722.93	0	9,421
2014	E	15,746.83	13,701.00	3,206.44	23	9,506

*Where "_J11" represents any level of the stewardship scheme in which this option is offered.

Table 3.9 Water Quality Indicators: Difference between GIS and Excel formats for the 3 km boundary framework per year (accumulative) – GIS values subtract Excel values

Year	Maintained		Improved		Total Number of Projects
	Hectares	Watercourse Fencing (_J11 in metres*)	Hectares	Cattle Drinking Bays (CDB in #)	
2012	-2,234.28	-5,947.00	-145.91	-15	-217
2013	-2,418.65	-300.00	-390.32	0	-288
2014	-2,491.82	-13,701.00	-483.51	-23	-85

*Where "_J11" represents any level of the stewardship scheme in which this option is offered.

3.7 Conclusion

Overall, results suggest a successful three years in which water quality improvement and maintenance efforts increased through at least three of the five measurements from the 2011 financial year (the 2012 dataset) to December, 2013 (the 2014 dataset). For the fourth and fifth measurements, number of cattle drinking bays installed and meters of watercourse fencing maintained, the GIS datasets suggest that there were none in 2012 or 2014, but it is assumed that in this case the Excel values are more likely accurate, which would also suggest an increase in both values from year to year.

The Excel format dataset, using the 3 km boundary, reported the greatest values. This is in part because of data limitations and potential missing data in the GIS datasets. When comparing the two frameworks applied to the GIS datasets – the NIA and 3 km boundary and the River Nene catchment boundary – the 3 km boundary values were generally larger. The one exception (excluding CDB and _J11 measurements from consideration) is that for 2012 hectares contributing to improving water quality, the catchment boundary includes fewer projects but larger ones, covering a greater area. The 3 km boundary encompasses a larger area, but each boundary contains some ESS option projects that the other does not.

All matters considered, the partnership chose to report the values of the GIS dataset cut to the River Nene catchment framework. This format-framework combination reports, in most cases, the smallest values. Being based on the GIS dataset, there are likely some ESS option projects unaccounted for, but this can be remedied in future years and means the estimate is conservative – erring on the side of caution. More importantly, using the River Nene catchment framework is more accurate relative to the 3 km boundary framework for water quality indicators. After all, if the ESS options selected as water quality indicators are in a different catchment, they will not be benefiting the River Nene and the surrounding Nene Valley NIA.

4 Appendix A: Glossary of Terms and Abbreviations

3 km boundary: Describes one of two boundaries to which the original GIS data was cut to create two different variations. "3 km boundary" is short hand for the boundary that encompasses the Nene Valley Nature Improvement Area and a 3 kilometre buffer around it.

Catchment boundary: Describes one of two boundaries to which the original GIS data was cut to create two different variations. "Catchment boundary" is short hand for the boundary that encompasses the River Nene catchment area as far as the eastern extent of the NIA 3km buffer boundary. The River Nene catchment area includes the Nene Valley Nature Improvement Area.

ESS option: An Environmental Stewardship Scheme (ESS) option is represented by a two-part code. The first part of the code specifies the level of the option and the second part describes the activity. For example, consider the EJ11 ESS option. The "E" means the option is entry level and "J11" means the activity is maintaining watercourse fencing. You can also have HJ11, OHJ11 and OJ11, all of which are still the same activity, but represent a higher, higher organic and organic level in the ESS respectively.

ESS project: There can be multiple parcels of land to which the same ESS option has been applied. There can also be one parcel of land on which multiple ESS options are implemented. To count and consider each of these activities separately they are referred to as "projects". There can be multiple projects for the same ESS option.

Format: To specify which original datasets were used, each is called a "format". There are two original datasets that were provided to the Northamptonshire Wildlife Trust by Natural England. The one dataset was in a Microsoft Office Excel format and the other was in a Geographic Information System (GIS) format.

Framework: There were two different ways to limit the ESS options to those relevant to the Nene Valley Nature Improvement area – the 3 km boundary or catchment boundary. These are each referred to as a framework.

NWT: Northamptonshire Wildlife Trust

5 Appendix B: Number of ESS projects per ESS Option for Water Quality Maintenance – Comparing all Three Format-Framework Combinations

Table 5.1: 2012 Reporting Year Number of ESS projects per ESS Option for Water Quality Maintenance – Comparing all Three Format-Framework Combinations

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	Option Titles ↓			
EC25	Hedgerow tree buffer strips on grassland	5	5	5
ED5	Management of archaeological features on grassland	171	154	148
EJ11	Maintenance of watercourse fencing	5	0	0
EK2	Permanent grassland with low inputs: outside SDA & ML	1552	1386	1480
EK3	Permanent grassland with very low inputs: outside SDA & ML	752	695	734
HC25	Hedgerow tree buffer strips on grassland	0	0	0
HD11	Restoration of traditional water meadows	1	1	1
HD5	Management of archaeological features on grassland	251	245	248
HJ11	Maintenance of watercourse fencing	0	0	0
HK10	Maintenance of wet grassland for wintering waders and wildfowl	34	33	34
HK11	Restoration of wet grassland for breeding waders.	2	2	2
HK12	Restoration of wet grassland for wintering waders and wildfowl	24	24	24
HK15	Maintenance of grassland for target features	170	153	170
HK16	Restoration of grassland for target features	60	64	60
HK2	Permanent grassland with low inputs	15	9	15
HK3	Permanent grassland with very low inputs	47	47	46
HK6	Maintenance of species-rich, semi-natural grassland	30	26	30
HK7	Restoration of species-rich, semi-natural grassland	93	97	94
HK9	Maintenance of wet grassland for breeding waders	15	12	15
HQ3	Maintenance of reedbeds	2	2	2
HQ4	Restoration of reedbeds	0	0	0
HQ6	Maintenance of fen	1	1	1
HQ7	Restoration of fen	4	4	4
OD5	Management of archaeological features on grassland	3	3	3
OHD5	Management of archaeological features on grassland	7	7	7
OHJ11	Maintenance of watercourse fencing	0	0	0
OHK2	Permanent grassland with low inputs	0	0	0
OHK3	Permanent grassland with very low inputs	0	0	0
OJ11	Maintenance of watercourse fencing	0	0	0

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
OK2	Permanent grassland with low inputs: outside SDA & ML(organic)	41	39	39
OK3	Permanent grassland with very low inputs: outside SDA&ML(organic)	3	8	3

Table 5.2: 2013 Reporting Year Number of ESS projects per ESS Option for Water Quality Maintenance – Comparing all Three Format-Framework Combinations

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	Option Titles			
EC25	Hedgerow tree buffer strips on grassland	5	5	5
ED5	Management of archaeological features on grassland	186	190	181
EJ11	Maintenance of watercourse fencing	10	8	9
EK2	Permanent grassland with low inputs: outside SDA & ML	1760	1626	1725
EK3	Permanent grassland with very low inputs: outside SDA & ML	923	885	897
HC25	Hedgerow tree buffer strips on grassland	0	0	0
HD11	Restoration of traditional water meadows	1	1	1
HD5	Management of archaeological features on grassland	273	275	265
HJ11	Maintenance of watercourse fencing	0	0	0
HK10	Maintenance of wet grassland for wintering waders and wildfowl	43	29	30
HK11	Restoration of wet grassland for breeding waders.	4	4	4
HK12	Restoration of wet grassland for wintering waders and wildfowl	39	37	37
HK15	Maintenance of grassland for target features	237	182	203
HK16	Restoration of grassland for target features	77	79	75
HK2	Permanent grassland with low inputs	11	3	3
HK3	Permanent grassland with very low inputs	51	51	50
HK6	Maintenance of species-rich, semi-natural grassland	39	33	33
HK7	Restoration of species-rich, semi-natural grassland	112	105	110
HK9	Maintenance of wet grassland for breeding waders	20	17	20
HQ3	Maintenance of reedbeds	5	5	5
HQ4	Restoration of reedbeds	2	2	2
HQ6	Maintenance of fen	4	4	4
HQ7	Restoration of fen	3	1	1
OD5	Management of archaeological features on grassland	5	0	0
OHD5	Management of archaeological features on grassland	7	7	7
OHJ11	Maintenance of watercourse fencing	0	0	0

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
OHK2	Permanent grassland with low inputs	0	0	0
OHK3	Permanent grassland with very low inputs	0	0	0
OJ11	Maintenance of watercourse fencing	0	0	0
OK2	Permanent grassland with low inputs: outside SDA & ML(organic)	28	16	16
OK3	Permanent grassland with very low inputs: outside SDA&ML(organic)	6	2	2

Table 5.3: 2014 Reporting Year Number of ESS projects per ESS Option for Water Quality Maintenance – Comparing all Three Format-Framework Combinations

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	Option Titles ↓			
EC25	Hedgerow tree buffer strips on grassland	7	6	6
ED5	Management of archaeological features on grassland	191	192	185
EJ11	Maintenance of watercourse fencing	13	0	0
EK2	Permanent grassland with low inputs: outside SDA & ML	1810	1803	1910
EK3	Permanent grassland with very low inputs: outside SDA & ML	915	910	931
HC25	Hedgerow tree buffer strips on grassland	0	0	0
HD11	Restoration of traditional water meadows	1	2	2
HD5	Management of archaeological features on grassland	297	284	272
HJ11	Maintenance of watercourse fencing	0	0	0
HK10	Maintenance of wet grassland for wintering waders and wildfowl	50	36	37
HK11	Restoration of wet grassland for breeding waders.	6	6	6
HK12	Restoration of wet grassland for wintering waders and wildfowl	42	39	39
HK15	Maintenance of grassland for target features	276	207	225
HK16	Restoration of grassland for target features	85	86	82
HK2	Permanent grassland with low inputs	11	3	3
HK3	Permanent grassland with very low inputs	56	49	48
HK6	Maintenance of species-rich, semi-natural grassland	43	25	29
HK7	Restoration of species-rich, semi-natural grassland	134	128	131
HK9	Maintenance of wet grassland for breeding waders	21	18	21
HQ3	Maintenance of reedbeds	5	6	6
HQ4	Restoration of reedbeds	5	5	5
HQ6	Maintenance of fen	5	5	5
HQ7	Restoration of fen	5	3	3
OD5	Management of archaeological features on grassland	9	5	5

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
OHD5	Management of archaeological features on grassland	7	7	7
OHJ11	Maintenance of watercourse fencing	0	0	0
OHK2	Permanent grassland with low inputs	0	0	0
OHK3	Permanent grassland with very low inputs	0	0	0
OJ11	Maintenance of watercourse fencing	0	0	0
OK2	Permanent grassland with low inputs: outside SDA & ML(organic)	36	24	24
OK3	Permanent grassland with very low inputs: outside SDA&ML(organic)	11	7	7

6 Appendix C: Number of ESS projects per ESS Option for Water Quality Improvement – Comparing all Three Format-Framework Combinations

Table 6.1: 2012 Reporting Year Number of ESS projects per ESS Option for Water Quality Improvement – Comparing all Three Format-Framework Combinations

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	Option Titles			
CDB	Cattle Drinking Bay	12	0	0
EC24	Hedgerow tree buffer strips on cultivated land	4	4	4
ED2	Take archaeological features out of cultivation	1	1	1
EE1	2m buffer strips on cultivated land	285	271	287
EE10	6m buffer strips on intensive grassland next to a watercourse	1	1	1
EE2	4m buffer strips on cultivated land	482	586	543
EE3	6m buffer strips on cultivated land	1146	1039	1048
EE4	2m buffer strips on intensive grassland	4	4	4
EE5	4m buffer strips on intensive grassland	16	14	16
EE6	6m buffer strips on intensive grassland	7	4	7
EE9	6m buffer strips on cultivated land next to a watercourse	287	300	293
EF1	Field corner management	587	580	571
EF15	Reduced herbicide cereal crop preceding over-wintered stubble	1	0	0
EF15NR	Reduced herbicide cereal crop preceding over-wintered stubble	0	0	0
EF7	Beetle banks	11	12	12
EG1	Under sown spring cereals	0	0	0
EJ13	Winter cover crops	1	0	0
EJ5	In-field grass areas	10	10	10
EJ9	12m buffer strips for watercourses on cultivated land	78	52	55
EK1	Take field corners out of management: outside SDA & ML	11	11	11
HC10	Creation of woodland outside of the SDA & ML	57	53	57
HC24	Hedgerow tree buffer strips on cultivated land	0	0	0
HD2	Take archaeological features out of cultivation	50	46	50
HD7	Arable reversion by natural regeneration	5	5	5
HE1	2 m buffer strips on cultivated land	48	33	48
HE10	Floristically enhanced grass margin	334	325	334
HE2	4 m buffer strips on cultivated land	75	65	75
HE3	6 m buffer strips on cultivated land	537	558	539
HE4	2m buffer strips on intensive grassland	0	0	0
HE5	4m buffer strips on intensive grassland	0	0	0
HE6	6 m buffer strips on intensive grassland	0	0	0

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
HE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
HF1	Management of field corners	95	95	96
HF14	Unharvested, fertiliser-free conservation headland	4	0	0
HF14NR	Unharvested, fertiliser-free conservation headland	2	2	2
HF15	Reduced herbicide cereal crops followed by overwintered stubble	1	0	0
HF15NR	Reduced herbicide cereal crops following overwintered stubble	2	2	2
HF7	Beetle banks	11	9	11
HG1	Under sown spring cereals	0	0	0
HJ13	Winter cover crops	0	0	0
HJ3	Reversion to unfertilised grassland to prevent erosion/run-off	6	6	6
HJ4	Reversion to low input grassland to prevent erosion/run-off	3	3	3
HJ5	In-field grass areas to prevent erosion or run-off	8	8	8
HJ9	12 m buffer strips for watercourses on cultivated land	6	6	6
HK1	Take field corners out of management	1	0	1
HK13	Creation of wet grassland for breeding waders	7	6	7
HK14	Creation of wet grassland for wintering waders and wildfowl	6	5	6
HK17	Creation of grassland for target features	43	54	43
HK8	Creation of species-rich, semi-natural grassland	30	30	30
HQ5	Creation of reedbeds	1	1	1
OC24	Hedgerow tree buffer strips on cultivated land	0	0	0
OD2	Take archaeological features out of cultivation	1	1	1
OE1	2m buffer strips on rotational land	4	0	0
OE10	6 m buffer strips on organic grassland next to a watercourse	0	0	0
OE2	4m buffer strips on rotational land	4	2	2
OE3	6m buffer strips on rotational land	20	20	20
OE4	2m buffer strips on intensive grassland	0	0	0
OE5	4m buffer strips on intensive grassland	0	0	0
OE6	6m buffer strip on organic grassland	0	0	0
OE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
OF1	Field corner management	3	2	2
OF7	Beetle banks	7	7	7
OG1	Under sown spring cereals	3	0	0
OHC24	Hedgerow tree buffer strips on cultivated land	0	0	0
OHD2	Take archaeological features out of cultivation (Org)	11	11	11
OHE1	2 m buffer strips on rotational land	0	0	0
OHE10	6 m buffer strips on organic grassland next to a	0	0	0

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	watercourse			
OHE2	4 m buffer strips on rotational land	0	0	0
OHE3	6 m buffer strips on rotational land	18	18	18
OHE4	2m buffer strips on intensive grassland	0	0	0
OHE5	4m buffer strips on intensive grassland	0	0	0
OHE6	6 m buffer strips on organic grassland	5	5	5
OHE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
OHF1	Management of field corners	0	0	0
OHF7	Beetle banks	1	1	1
OHG1	Undersown spring cereals	1	0	0
OHJ13	Winter cover crops	0	0	0
OHJ5	In-field grass areas to prevent erosion or run-off	0	0	0
OHJ9	12 m buffer strips for watercourses on rotational land	0	0	0
OHK1	Take field corners out of management	0	0	0
OHK21	Legume- and herb-rich swards	0	0	0
OJ13	Winter cover crops	0	0	0
OJ5	In-field grass areas to prevent erosion or run-off	1	1	1
OJ9	12m buffer strips for watercourses on cultivated land	3	3	3
OK1	Take field corners out of management: outside SDA & ML(organic)	1	1	1

Table 6.2: 2013 Reporting Year Number of ESS projects per ESS Option for Water Quality Improvement – Comparing all Three Format-Framework Combinations

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	Option Titles			
CDB	Cattle Drinking Bay	19	19	19
EC24	Hedgerow tree buffer strips on cultivated land	4	4	4
ED2	Take archaeological features out of cultivation	0	0	0
EE1	2m buffer strips on cultivated land	342	335	344
EE10	6m buffer strips on intensive grassland next to a watercourse	4	1	4
EE2	4m buffer strips on cultivated land	559	633	606
EE3	6m buffer strips on cultivated land	1268	1219	1230
EE4	2m buffer strips on intensive grassland	4	4	4
EE5	4m buffer strips on intensive grassland	16	15	16
EE6	6m buffer strips on intensive grassland	14	13	14
EE9	6m buffer strips on cultivated land next to a watercourse	341	358	345
EF1	Field corner management	733	717	705
EF15	Reduced herbicide cereal crop preceding over-wintered stubble	1	1	1
EF15NR	Reduced herbicide cereal crop preceding over-wintered stubble	0	0	0
EF7	Beetle banks	11	11	11
EG1	Under sown spring cereals	1	2	1
EJ13	Winter cover crops	1	1	1
EJ5	In-field grass areas	10	11	11
EJ9	12m buffer strips for watercourses on cultivated land	80	76	79
EK1	Take field corners out of management: outside SDA & ML	14	14	14
HC10	Creation of woodland outside of the SDA & ML	67	61	66
HC24	Hedgerow tree buffer strips on cultivated land	0	0	0
HD2	Take archaeological features out of cultivation	56	52	56
HD7	Arable reversion by natural regeneration	7	7	7
HE1	2 m buffer strips on cultivated land	56	41	56
HE10	Floristically enhanced grass margin	414	397	395
HE2	4 m buffer strips on cultivated land	78	69	78
HE3	6 m buffer strips on cultivated land	610	630	612
HE4	2m buffer strips on intensive grassland	0	0	0
HE5	4m buffer strips on intensive grassland	0	0	0
HE6	6 m buffer strips on intensive grassland	0	0	0
HE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
HF1	Management of field corners	105	104	104
HF14	Unharvested, fertiliser-free conservation headland	7	7	7
HF14NR	Unharvested, fertiliser-free conservation	4	4	4

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	headland			
HF15	Reduced herbicide cereal crops followed by overwintered stubble	1	1	1
HF15NR	Reduced herbicide cereal crops following overwintered stubble	2	2	2
HF7	Beetle banks	11	9	11
HG1	Under sown spring cereals	0	0	0
HJ13	Winter cover crops	0	0	0
HJ3	Reversion to unfertilised grassland to prevent erosion/run-off	6	6	6
HJ4	Reversion to low input grassland to prevent erosion/run-off	3	3	3
HJ5	In-field grass areas to prevent erosion or run-off	8	8	8
HJ9	12 m buffer strips for watercourses on cultivated land	8	9	8
HK1	Take field corners out of management	1	0	1
HK13	Creation of wet grassland for breeding waders	7	6	7
HK14	Creation of wet grassland for wintering waders and wildfowl	6	4	5
HK17	Creation of grassland for target features	46	34	32
HK8	Creation of species-rich, semi-natural grassland	35	31	32
HQ5	Creation of reedbeds	1	1	1
OC24	Hedgerow tree buffer strips on cultivated land	0	0	0
OD2	Take archaeological features out of cultivation	1	0	0
OE1	2m buffer strips on rotational land	4	1	4
OE10	6 m buffer strips on organic grassland next to a watercourse	0	0	0
OE2	4m buffer strips on rotational land	4	1	2
OE3	6m buffer strips on rotational land	31	2	2
OE4	2m buffer strips on intensive grassland	0	0	0
OE5	4m buffer strips on intensive grassland	0	0	0
OE6	6m buffer strip on organic grassland	0	0	0
OE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
OF1	Field corner management	4	4	4
OF7	Beetle banks	11	0	0
OG1	Under sown spring cereals	3	2	2
OHC24	Hedgerow tree buffer strips on cultivated land	0	0	0
OHD2	Take archaeological features out of cultivation (Org)	14	1	1
OHE1	2 m buffer strips on rotational land	0	0	0
OHE10	6 m buffer strips on organic grassland next to a watercourse	0	0	0
OHE2	4 m buffer strips on rotational land	0	0	0
OHE3	6 m buffer strips on rotational land	26	18	18
OHE4	2m buffer strips on intensive grassland	0	0	0
OHE5	4m buffer strips on intensive grassland	0	0	0

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
OHE6	6 m buffer strips on organic grassland	5	5	5
OHE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
OHF1	Management of field corners	0	0	0
OHF7	Beetle banks	1	1	1
OHG1	Undersown spring cereals	1	1	1
OHJ13	Winter cover crops	0	0	0
OHJ5	In-field grass areas to prevent erosion or run-off	0	0	0
OHJ9	12 m buffer strips for watercourses on rotational land	0	0	0
OHK1	Take field corners out of management	0	0	0
OHK21	Legume- and herb-rich swards	0	0	0
OJ13	Winter cover crops	0	0	0
OJ5	In-field grass areas to prevent erosion or run-off	1	0	0
OJ9	12m buffer strips for watercourses on cultivated land	6	0	0
OK1	Take field corners out of management: outside SDA & ML(organic)	0	0	0

Table 6.3: 2014 Reporting Year Number of ESS projects per ESS Option for Water Quality Improvement – Comparing all Three Format-Framework Combinations

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	Option Titles ↓			
CDB	Cattle Drinking Bay	20	0	0
EC24	Hedgerow tree buffer strips on cultivated land	5	0	0
ED2	Take archaeological features out of cultivation	0	0	0
EE1	2m buffer strips on cultivated land	379	374	387
EE10	6m buffer strips on intensive grassland next to a watercourse	6	3	9
EE2	4m buffer strips on cultivated land	588	675	705
EE3	6m buffer strips on cultivated land	1317	1336	1369
EE4	2m buffer strips on intensive grassland	5	5	5
EE5	4m buffer strips on intensive grassland	16	15	18
EE6	6m buffer strips on intensive grassland	15	13	14
EE9	6m buffer strips on cultivated land next to a watercourse	453	453	443
EF1	Field corner management	781	748	790
EF15	Reduced herbicide cereal crop preceding over-wintered stubble	1	0	0
EF15NR	Reduced herbicide cereal crop preceding over-wintered stubble	0	0	0
EF7	Beetle banks	12	6	6
EG1	Under sown spring cereals	1	0	0
EJ13	Winter cover crops	1	0	0
EJ5	In-field grass areas	15	16	16
EJ9	12m buffer strips for watercourses on cultivated land	89	89	90
EK1	Take field corners out of management: outside SDA & ML	13	11	11
HC10	Creation of woodland outside of the SDA & ML	69	62	64
HC24	Hedgerow tree buffer strips on cultivated land	0	0	0
HD2	Take archaeological features out of cultivation	63	57	61
HD7	Arable reversion by natural regeneration	7	7	7
HE1	2 m buffer strips on cultivated land	40	38	42
HE10	Floristically enhanced grass margin	480	457	451
HE2	4 m buffer strips on cultivated land	82	73	72
HE3	6 m buffer strips on cultivated land	613	646	597
HE4	2m buffer strips on intensive grassland	0	0	0
HE5	4m buffer strips on intensive grassland	0	0	0
HE6	6 m buffer strips on intensive grassland	2	2	2
HE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
HF1	Management of field corners	120	107	105
HF14	Unharvested, fertiliser-free conservation headland	11	0	0
HF14NR	Unharvested, fertiliser-free conservation	4	4	4

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
	headland			
HF15	Reduced herbicide cereal crops followed by overwintered stubble	1	0	0
HF15NR	Reduced herbicide cereal crops following overwintered stubble	2	2	2
HF7	Beetle banks	13	9	9
HG1	Under sown spring cereals	0	0	0
HJ13	Winter cover crops	0	0	0
HJ3	Reversion to unfertilised grassland to prevent erosion/run-off	12	12	12
HJ4	Reversion to low input grassland to prevent erosion/run-off	4	4	4
HJ5	In-field grass areas to prevent erosion or run-off	8	8	8
HJ9	12 m buffer strips for watercourses on cultivated land	7	5	5
HK1	Take field corners out of management	1	0	1
HK13	Creation of wet grassland for breeding waders	7	6	7
HK14	Creation of wet grassland for wintering waders and wildfowl	5	4	5
HK17	Creation of grassland for target features	40	30	28
HK8	Creation of species-rich, semi-natural grassland	46	42	43
HQ5	Creation of reedbeds	0	1	1
OC24	Hedgerow tree buffer strips on cultivated land	0	0	0
OD2	Take archaeological features out of cultivation	1	0	0
OE1	2m buffer strips on rotational land	4	1	4
OE10	6 m buffer strips on organic grassland next to a watercourse	0	0	0
OE2	4m buffer strips on rotational land	4	1	2
OE3	6m buffer strips on rotational land	28	2	2
OE4	2m buffer strips on intensive grassland	0	0	0
OE5	4m buffer strips on intensive grassland	0	0	0
OE6	6m buffer strip on organic grassland	0	0	0
OE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
OF1	Field corner management	4	4	4
OF7	Beetle banks	10	0	0
OG1	Under sown spring cereals	3	0	0
OHC24	Hedgerow tree buffer strips on cultivated land	0	0	0
OHD2	Take archaeological features out of cultivation (Org)	15	1	1
OHE1	2 m buffer strips on rotational land	0	0	0
OHE10	6 m buffer strips on organic grassland next to a watercourse	0	0	0
OHE2	4 m buffer strips on rotational land	0	0	0
OHE3	6 m buffer strips on rotational land	26	18	18
OHE4	2m buffer strips on intensive grassland	0	0	0
OHE5	4m buffer strips on intensive grassland	0	0	0

Option codes ↓	Format-Framework →	Excel-3 km boundary (# of projects)	GIS-Catchment boundary (# of projects)	GIS-3 km boundary (# of projects)
OHE6	6 m buffer strips on organic grassland	5	5	5
OHE9	6m buffer strips on cultivated land next to a watercourse	0	0	0
OHF1	Management of field corners	0	0	0
OHF7	Beetle banks	1	1	1
OHG1	Undersown spring cereals	1	0	0
OHJ13	Winter cover crops	0	0	0
OHJ5	In-field grass areas to prevent erosion or run-off	0	0	0
OHJ9	12 m buffer strips for watercourses on rotational land	0	0	0
OHK1	Take field corners out of management	0	0	0
OHK21	Legume- and herb-rich swards	1	0	0
OJ13	Winter cover crops	0	0	0
OJ5	In-field grass areas to prevent erosion or run-off	1	0	0
OJ9	12m buffer strips for watercourses on cultivated land	5	0	0
OK1	Take field corners out of management: outside SDA & ML(organic)	2	2	2

Internal Notes

All related resources, excluding uncut MapInfo layers are saved under S:\Projects\Nene Valley NIA\Monitoring & Evaluation\Water quality.

2012 GIS data: V:\Mapinfo\Maps\NI197 Data\NE 2012 (May)\ESRI Shapefile\ESS_BaseData_Options_point

2013 GIS data:

V:\Mapinfo\Maps\NI197 Data\NE 2013 (May)\ESS_SDL160_EM_MapInfo\ESS_BASEOPTIONS_EM

2014 GIS data:

V:\Mapinfo\Maps\NI197 Data\NE 2014 (May)\ESS_SDL160_BaseData_Options_2014_EM

2012-2014 Excel data:

S:\Projects\Nene Valley NIA\Monitoring & Evaluation\Priority ES options\Nene_Valley_NIA_3KM_buffer_options