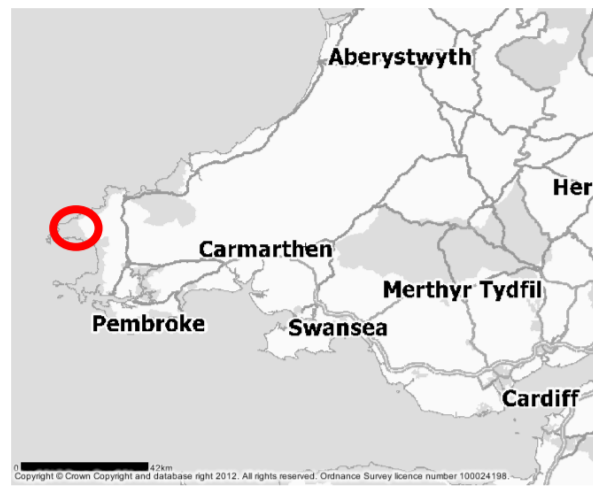


## Introduction

Waun Fawr is a groundwater dependent ecosystem made up of dry wet heath and marshy grassland located near St Davids, Pembrokeshire. It is a designated SAC and SSSI.



Under the Habitats Directive it has been identified as being in unfavourable condition due to nutrient enrichment from both diffuse and point source pollution.

Actions under Outcome 21

- Investigation of water quality (focus of this poster)
- Direct management of historic failing septic tanks (completed)

## Site Description

Waun Fawr is surrounded by agricultural land use. Several springs enter the site from south which flow through natural channels to the north of the site.

Annex 1 habitats on site include:

- Northern Atlantic wet heaths
- European dry heaths
- Molinia meadows on calcareous, peaty or clayey-silt-laden soils
- Transition mires and quaking bogs



Above: pond in the west of the site receiving enriched water.

## Removal of failed septic tank

A property to the south of Waun Fawr had a failing septic tank leaking into the site. This resulted in an enriched area clearly shown by the green flush in the aerial photograph (above right).

The septic tank has since been removed however there is still an area of enriched vegetation which requires further attention.

## Action: Removal of enriched vegetation

EAW, CCW and National Trust look to remove this enriched area down to the underlying clay layer. It is predicted this will result in the formation of an open pond area.

Removed peat is planned to be used for the creation of a reptile bank on a previously disturbed area of the bank.

EAW determined the extent of the enriched vegetation by undertaking a hand auger survey. This survey provided a guide as to the volume of enriched material that may need to be removed. The underlying clay may help retain water and provide a protective layer to any bedrock groundwater. The excavation will aim not to remove substantial sections of this clay.

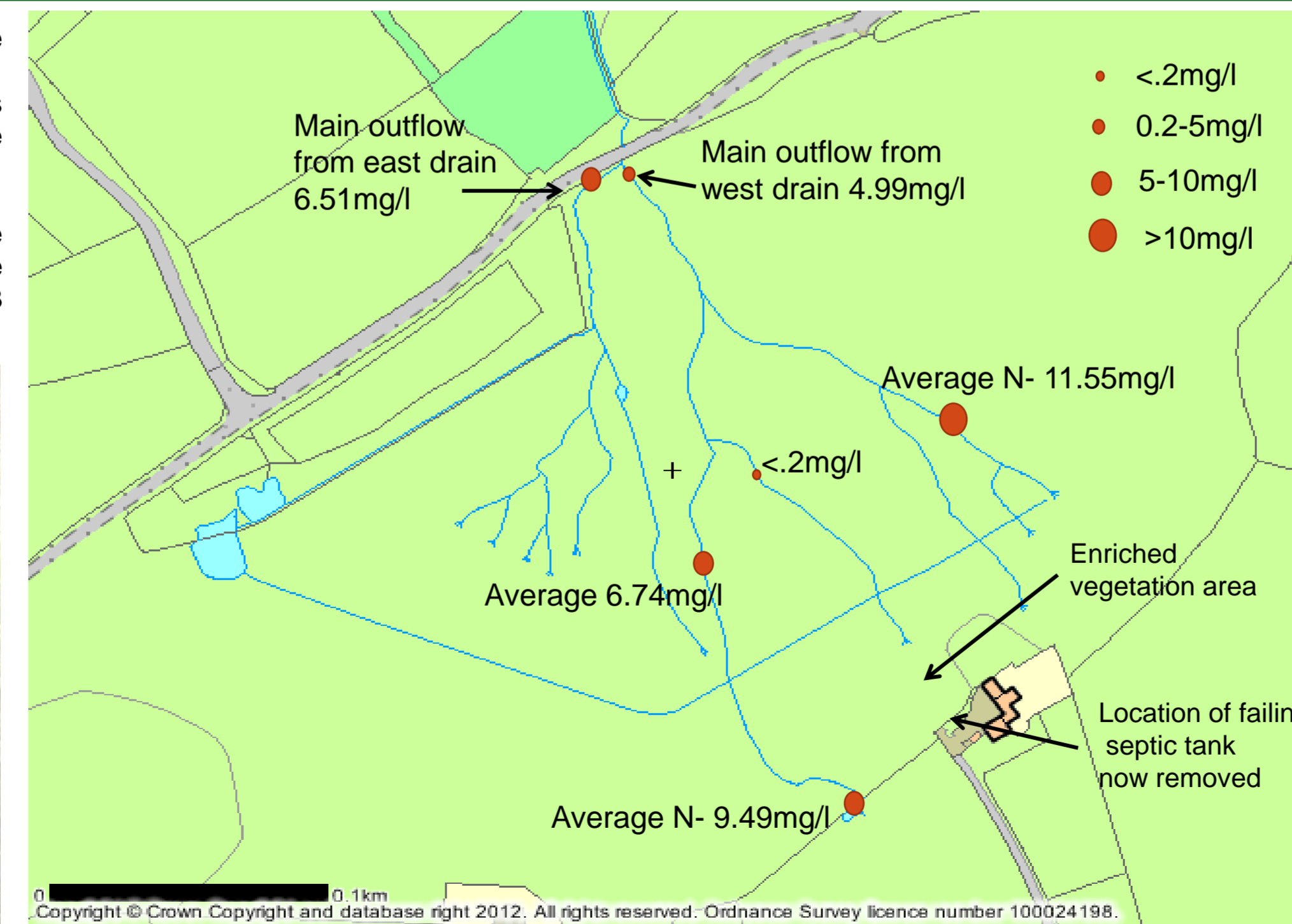


Above: Enriched vegetation from aerial photo (left) and on site (right)

## Water Quality Sampling

The suggested trigger level for nitrate at wet heath at low altitudes is 3mg/l (UKTAG Group 2011). This was exceeded across the site on all of the sampling rounds.

The map to the right summarises the average nitrate values that were recorded across the site over the 3 visits.



Left: Jon Hudson CCW collecting water samples.

Above: Summary of nitrate values (as N mg/l) collected between September 2011 and September 2012.

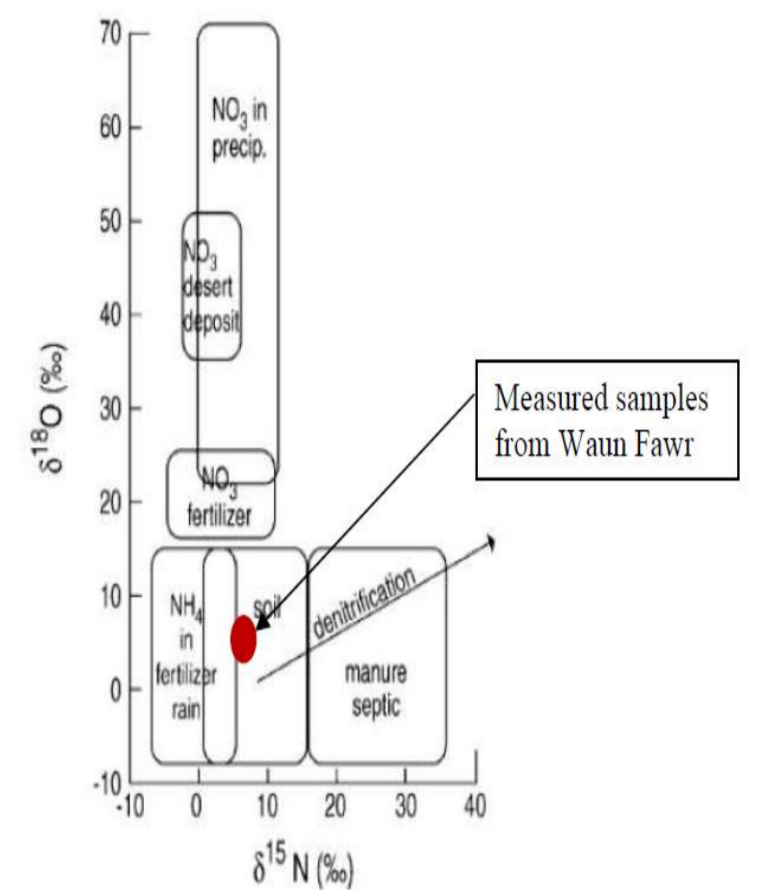
## Nitrogen and isotope analysis

In order to determine whether the source of high nitrates was from atmospheric deposition, organic fertilisers or inorganic fertilisers samples were sent to University of East Anglia for stable isotope analysis.

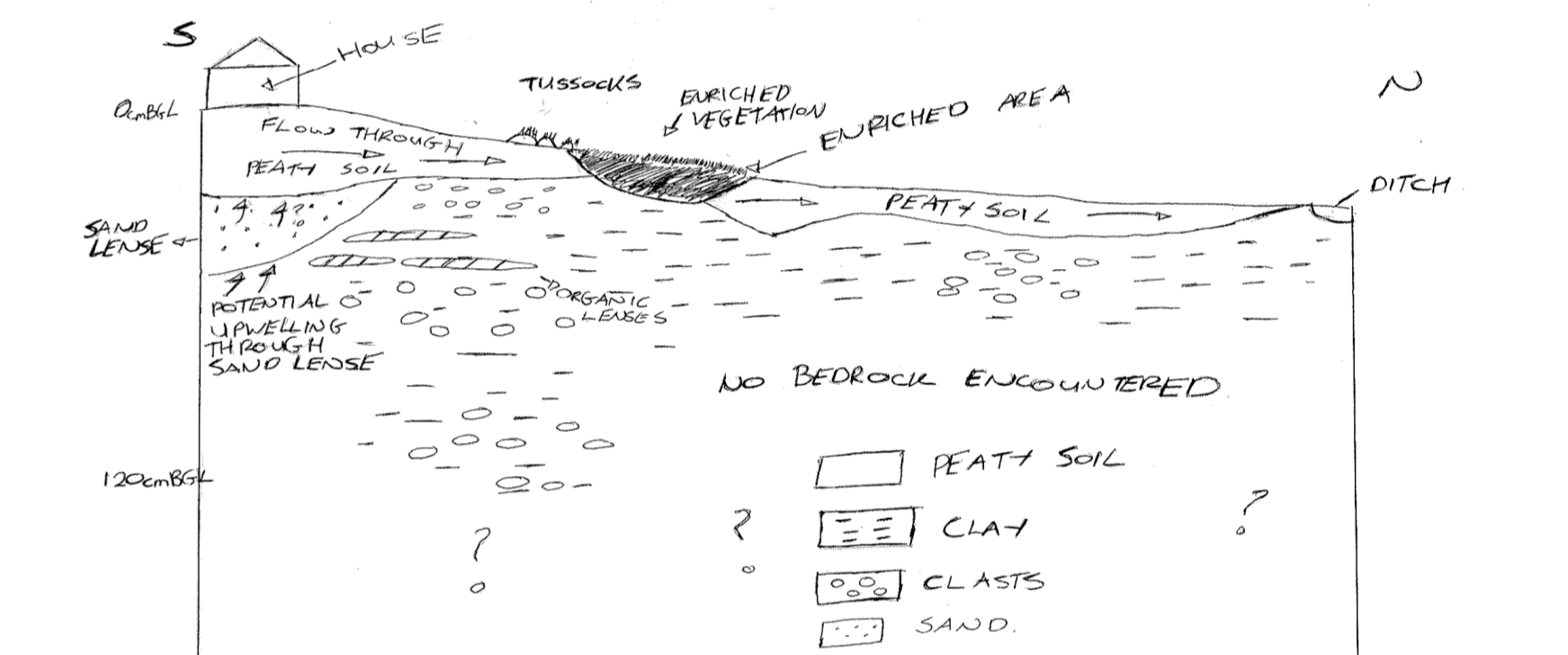
Analysis of Nitrogen and Oxygen isotopes can help determine the source of nitrogen. The analysis looked at nitrogen and oxygen isotopic composition of dissolved  $\text{NO}_3^-$  in water samples.

Results showed that the nitrogen is mainly derived from soil organic nitrogen originally from inorganic fertiliser inputs.

Right: Samples from Waun Fawr plot in the area shown by the red dot.



## Conceptual model



Above: initial conceptual model based on augers across the site

## Farm visits

Farms visits will be undertaken to see if inorganic fertilisers can be reduced:

• Potatoes are being grown in the field to the south west of the site. Under Cross Compliance there must be a 1 metre buffer strip between the plough line and the base of the hedge the top of the bank of a watercourse.

• A requirement of the Good Agricultural and Environmental Condition is not to apply organic fertilisers within 10m of a watercourse and within 50m of a spring. Inorganic fertilisers cannot be applied within 2m of a watercourse.

• Encourage the farmer to implement Nutrient Management Plans based on cost savings and to avoid any restrictions on the single farm payment under Cross Compliance.

## Future actions

Farm visit (as detailed) and removal of enriched vegetation area as soon as possible once the weather becomes suitable for heavy machinery.

## Acknowledgements

Gareth Farr (BGS), Jon Hudson (CCW), Nicky Middleton-Jones (National Trust), Brian Klass (EAW).

## References

UKTAG. 2012. Technical report on groundwater dependent terrestrial ecosystem threshold values.