

**NS 2 FRESHWATER PEARL MUSSEL SUB-BASIN  
MANAGEMENT PLANS**

**REPORT ON MORPHOLOGICAL MONITORING AND  
CATCHMENT WALKOVER RISK ASSESSMENTS IN THE  
OWENEA CATCHMENT**

**September 2009**

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## 1.0 INTRODUCTION

In order to assess the hydromorphological alterations within the Owenea catchment the EPA WFD classification tool called the River Hydromorphology Assessment Technique (RHAT) was utilised by RPS. This tool was developed through the North South Share project, to classify rivers in terms of their morphology. It is a field technique which assigns a channel typology. This influences the rivers physical attributes assessed in the field. The technique assigns a morphological classification directly related to that of the WFD – high, good, moderate, poor and bad.

RHAT surveys were carried out at high risk areas located within pearl mussel populations. The methodology classifies river hydromorphology based on a departure from naturalness, and assigns a morphological classification, based on semi-quantitative criteria. It is designed to be a rapid visual assessment based on information from desktop studies, using GIS data, aerial photography, historical data and data obtained from previous field surveys as well as observations in the field.

A catchment walkover risk assessment survey sheet was also designed by the project team in conjunction with NPWS in order to focus the collation of the pressure data in the field with respect to the Freshwater Pearl Mussel. The risk sheet was divided into eight categories designed to highlight the main pressures within the catchment. The eight categories are as follows:

- Source of erosion
- Diffuse Nutrient
- Diffuse Silt
- Current Riparian Zone
- Field Drainage
- Outfalls
- Abstractions
- Barriers to Migration

Each sub-pressure within the eight categories is analysed and an overall risk assessment of High, Medium or Low is assigned to that category. The “one out all out principle” is then used to assign the river stretch or point an overall risk category. A detailed description, together with a series of photographs outlining the pressures is also taken. The risk assessment sheets will assist the project team in focussing the specific freshwater pearl mussel measures within the catchment.

Location of survey stretches and points are shown in **Figure 3.1**

## **2.0 METHODOLOGY**

Sampling was carried out on the 13<sup>th</sup> of May 2009.

### **2.1 RIVER HYDROMORPHOLOGY ASSESSMENT TECHNIQUE (RHAT)**

Classification of hydromorphology can be used to contribute to the status classification of water bodies at high ecological status only. However, RHAT plays a vital role in identifying why a water body might be failing to achieve Good Ecological Status as it is based on the observed impact in the field. It can assist in deciding what indirect and direct efforts are needed to improve status and in helping to prevent further deterioration.

The eight criteria that are scored are:

1. Channel morphology and flow types
2. Channel vegetation
3. Substrate diversity and embeddedness
4. Channel flow status
5. Bank and bank top stability
6. Bank and bank top vegetation
7. Riparian land use
8. Floodplain connectivity

Sheet 1 of the RHAT form contains the Field Health and Safety sheet which is filled on arrival at the site. Before the field survey, a desk study is required this element of the survey was completed as part of the development of the draft sub-basin management plans. The reach identification and physical characterisation sections for each field site are recorded on Sheet 2 (see Appendix 1) with all information available from GIS and aerial photographs, including:

- a. expected stream type and the description of various stream types
- b. catchment and reach-scale pressures (these may help to identify, confirm or explain field observations);
- c. expected riparian vegetation types (for high quality status);
- d. the weather conditions on the day of the survey, and those immediately preceding the day of the survey. This information is important to interpret the effects of storm events on the survey results;
- e. the estimated stream width and the reach length to be assessed (~ 40 x width).
- f. any other notable issues (e.g. from previous surveys).

A score is allocated to each relevant attribute (the number of attributes to be assessed will depend on the stream type). Where the condition departs from the reference condition, note should be made if this condition results from a particular identifiable pressure. Where possible and where relevant, all attributes should be included in the assessment, using the assessment sheet (Sheet 3, see Appendix 1). If an attribute is not assessed, the score-summary table should be amended (cells shaded) and a note made as to why the assessment was not carried out. The WFD status can still be calculated on the basis of other attributes, but with a note that a particular attribute was omitted.

Transfer scores for individual attributes to the summary table on the survey Sheet 2.

Finally the overall WFD category can be calculated using the following values:

> 0.8	= high
0.6 – 0.8	= good
0.4 – 0.6	= moderate
0.2 – 0.4	= poor
< 0.2	= bad

For the purposes of the assessment as part of the NS2 project, a high status for morphology is desirable for pearl mussel habitats. Through work carried out by the Shannon IRBD project on the Freshwater Morphology Programme of Measures Study, it was found that an observed relationship exists between biological data and a RHAT score. The study confirmed that morphological pressure can impact biology and therefore ecological status. In general, sites with RHAT scores less than 0.6 also have less than good Q scores. Similarly high levels of siltation affecting macrophyte populations are reflected by less than good RHAT scores.

Grid references were recorded at all sites using a GPS together with site photographs which were taken using a digital camera.

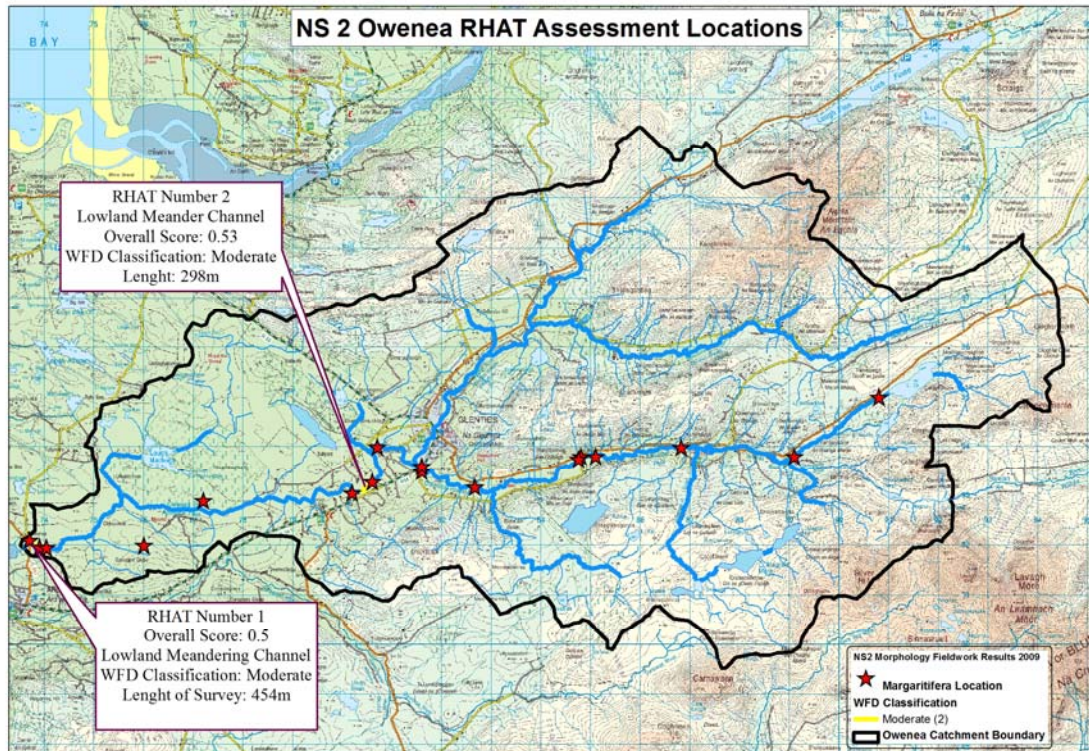
## **2.2 CATCHMENT WALKOVER RISK ASSESSMENT**

During the development of the draft sub-basin management plans throughout 2008 a complete desk study was conducted of all relevant biological, water quality and pressure source data within the Owenea catchment. Best use was made of all available datasets such as the pressure source data collated by the River Basin District Projects for the Article V Characterisation and Programme of Measures Studies. This work allowed the NS 2 project team to assess the catchment through the combined availability of aerial imagery and digitised pressure information. Where gaps in this data existed together with areas that required ground truthing such as physical barriers to migration, catchment walkover risk assessments were focussed throughout the 2009 field survey season.

The catchment walkover risk assessment sheet (See Appendix 3) covers eight main categories or pressures which are subsequently sub-divided into the various sources. Each source is ticked if present and an overall risk assessment for each pressure assigned from High to Medium to Low over the survey length or point. All eight pressures are combined to give an overall risk assessment to the catchment based on the “one out all out principle”.

### 3.0 RESULTS

**Figure 3.1** indicates where the Owenea RHAT assessments were carried out throughout the catchment.



**Figure 3.1 Morphology RHAT Assessment Locations**

(The RHAT numbering system corresponds to the site code which may mean they are not sequential where a RHAT was not carried out at a particular site)




#### 3.1 RHAT Survey Results

Two RHAT surveys were carried out throughout the Owenea catchment. The results of these surveys can be found in the electronic appendix.

RHAT Number 1 was carried out at the lower end of the catchment near Ardara on a lowland meandering channel over a 45m stretch. One major bridge and some over deepening was recorded along the survey stretch together with numerous land drains entering the channel. The channel appears to have been drained in the past. All attributes except for barriers to migration and substrate condition scored low. Bank structure and stability, bank vegetation and riparian landcover all only scored one out of four. This is due to the lack of buffer zone and the intensive landuse which in places is right up to the banks. Improved grassland can be found on one bank and recently ploughed land on the other bank with newly excavated drains discharging directly to the

river channel. Along a significant stretch of the channel a new access road has been laid using rock with little to no buffer with the river channel. In is <1m in most parts of the stretch. (See Site 1 Photo 9). Overall this stretch was classified as moderate status. It has significant alterations which have occurred in the past together with on-going pressures and risks such as the numerous un-managed drains and direct discharges.

**Plate 3.1 Representative photographs from reach:**




<p><b>RHAT 1 Site 1 Photo 3</b></p> 	<p><b>RHAT 1 Site 1 Photo 5</b></p> 
<p><b>RHAT 1 Site 1 Photo 9</b></p> 	

The second RHAT survey was carried farther up the catchment just outside Glenties at site 5. This was carried out over a 298m survey stretch on a lowland meandering channel. One major and one minor bridge together with a minor weir were recorded along the survey stretch. This stretch has under gone significant morphological



alterations with resectioning on both the left and right banks, excessive (>30%) reinforcement on the left bank and embankments on both the left and right bank. All attributes scored quite low along this survey stretch except for barriers to migration. In particular bank structure and stability, bank vegetation and riparian landcover all scored low due to the physical modifications. Very small amounts of algae were recorded on the bank side but largely the substrate was found to be in good condition.

**Plate 3.1 Representative photographs from reach:**

<p><b>RHAT 1 Site 5 Photo 1</b></p> 	<p><b>RHAT 1 Site 5 Photo 4</b></p> 
<p><b>RHAT 1 Site 5 Photo 11</b></p> 	

Details in relation to photographs are tabulated in Appendix 2.

### 3.1 Catchment Walkover Risk Assessment Results

A total of nineteen sites were surveyed in the Owenea sub-basin catchment, with a risk assessment carried out at sixteen of these sites (three stopping points). **Figure 3.2** outlines the stopping point locations in addition to the High to Low Risk Assessment from the Catchment Walkover Risk Assessments. Thirteen high risk sites were recorded out of the sixteen that were assessed. The remaining three sites were recorded as medium risk, meaning no low risk sites were recorded within this catchment. **Figure 3.3** outlines the percentage of sites classified at high and medium risk together with the number of stopping points throughout the catchment.

The most common high risk categories identified were:

- Erosion – evident at 77% of high risk sites,
- Current riparian zone – 38% of high risk sites.

The Current Riparian Zone category of the Catchment Walkover Risk Assessment slightly varies from the seven other categories or pressures. The Current Riparian Zone is not a pressure in itself; however the aspects listed in this category are the interceptors to the pressure and convey the extent or lack of buffer provided by the riparian zone. A high risk riparian zone indicates that the pressures acting on the river are more likely to have significant impact. For example the lack of fencing along a river stretch can lead to excessive trampling and/or poaching which in turn may lead to siltation within a pearl mussel habitat. The various categories and pressures listed in the Catchment Walkover Risk Assessment sheet were designed to assist the project in focusing the measures which will be needed to combat the pressure along its pathway, rather than removing a source which may not always be possible such as intensive agriculture. Recording the Riparian Zone in terms of its current performance as a buffer is important in this regard.

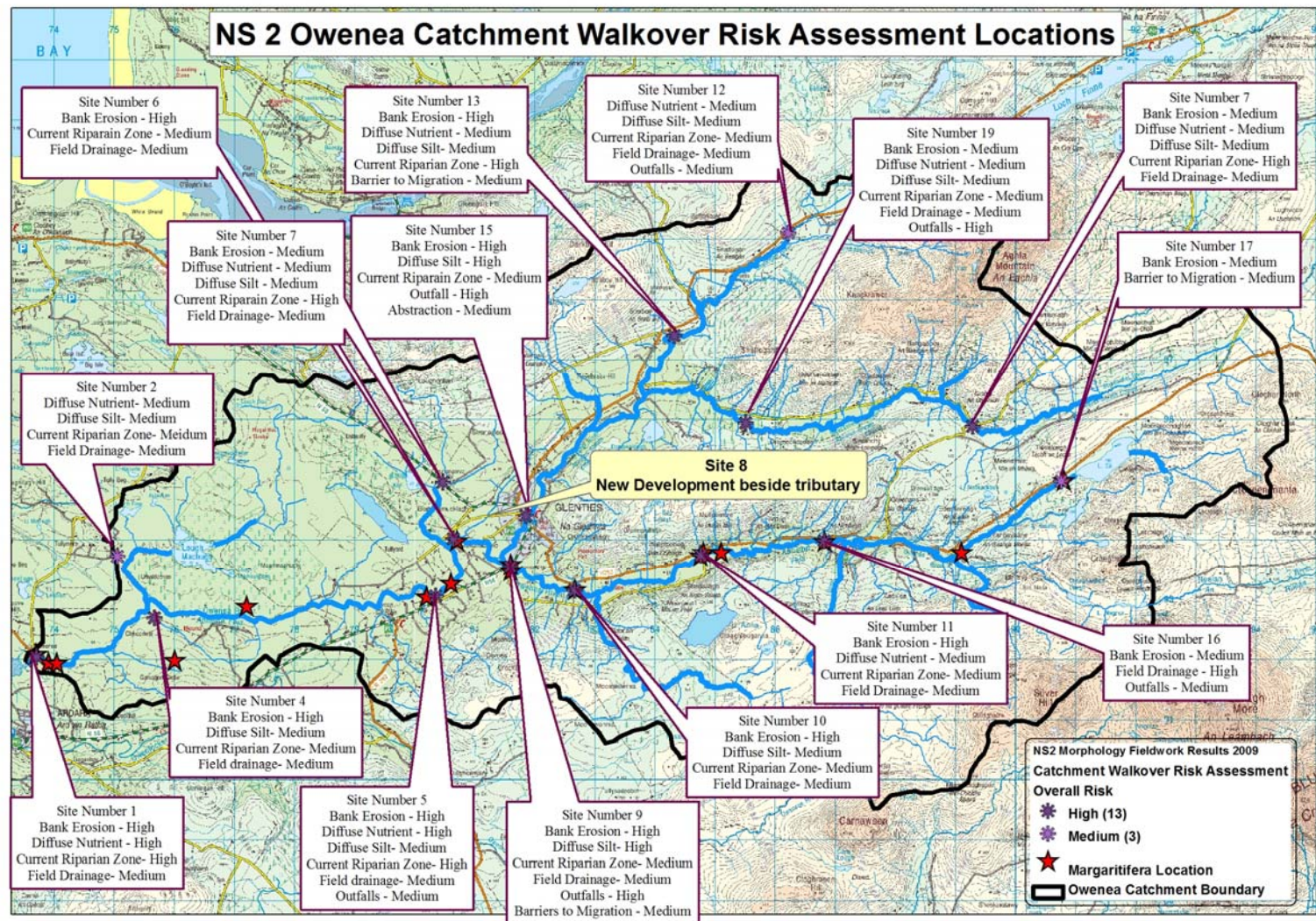
Current Riparian Zone has ten aspects as follows:

- Fencing
- Buffer
- Tree line at bank

- Tree line buffer
- Plantation with no buffer
- Urbanisation
- Flood Protection
- Marshy Land
- Landuse at bank
- Other Sources

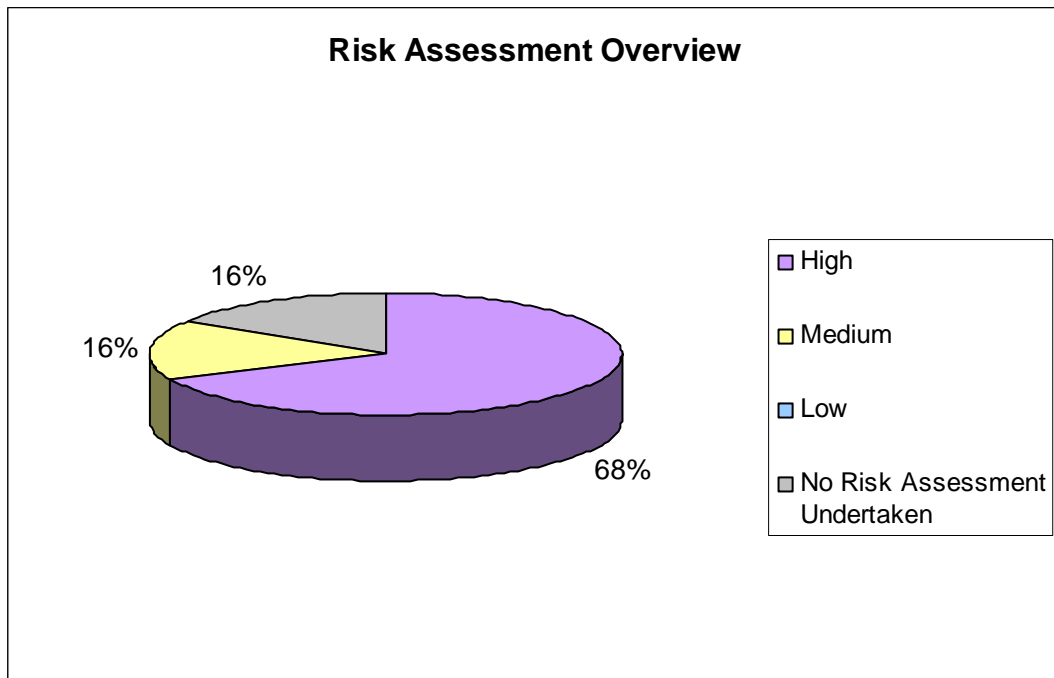
Where one or any of these aspects is found to be the cause of significant impact to the riparian zone, or the channel along the stretch then this category may be assigned a high risk score.



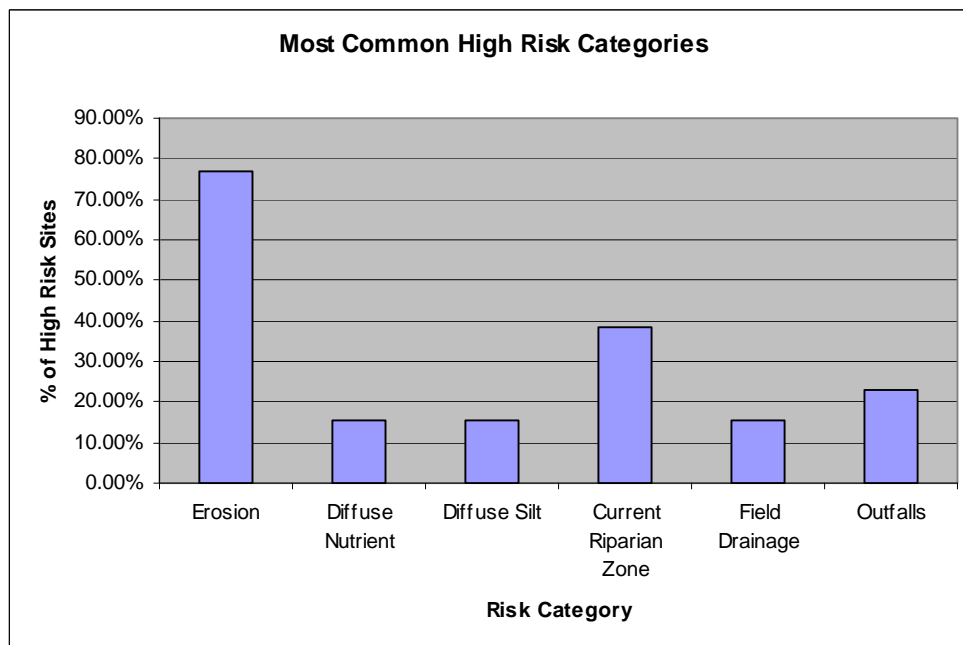


**Figure 3.2 Location of Stopping points and Catchment Walkover Risk Assessments**

**Figure 3.3 Risk Assessment Overview**

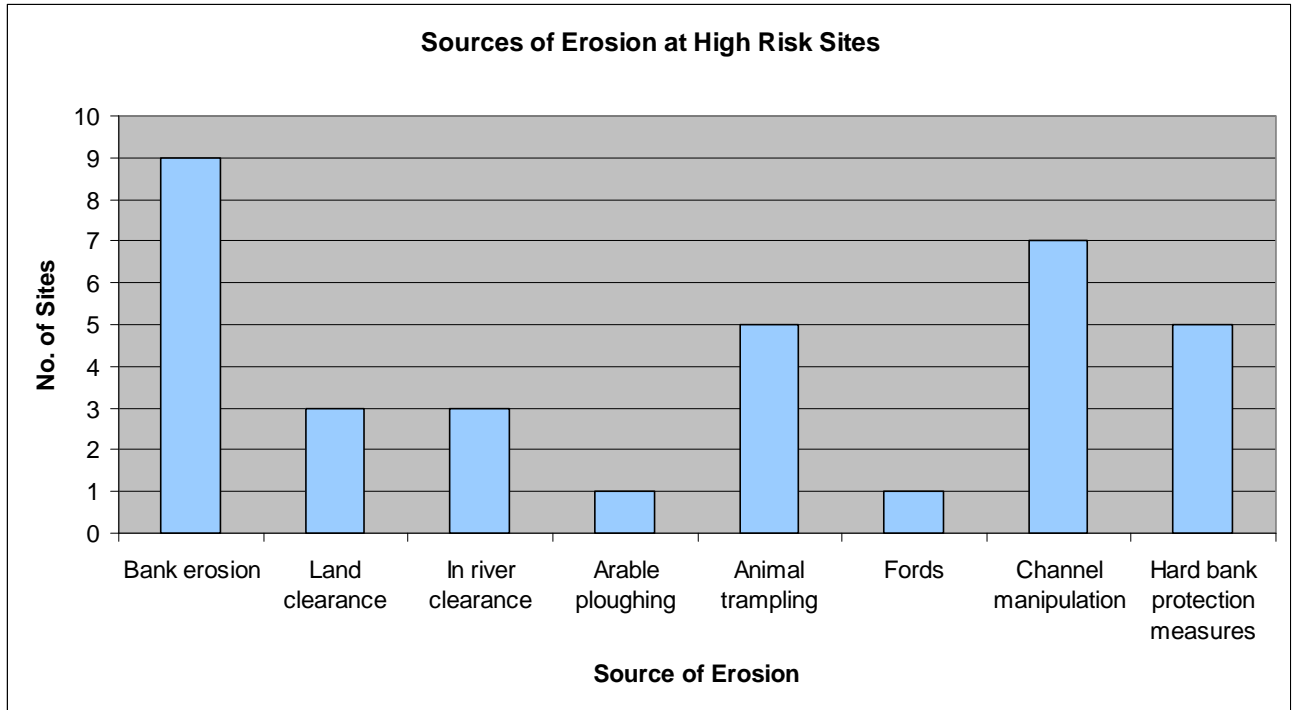


The break-down of pressure categories identified as high risk are outlined in **Figure 3.4**



**Figure 3.4 Breakdown of High Risk Categories**

The most frequent source of erosion is bank erosion which is apparent at nine of the thirteen high risk sites. Channel manipulation and bank protection are significant erosion pressures. Outlined below are the sources of erosion leading to a high risk site:



**Figure 3.5 Source of field drainage pressure at high risk sites**

The current riparian zone is another considerable pressure within this catchment, however generally this pressure relates to how a poor riparian buffer can intensify other pressures e.g. animal trampling caused by a lack of fencing or increased pressure from diffuse nutrient as a result of a poor buffer zone. Within the Owenea catchment the main cause of a high risk from riparian zone is:

- Inappropriate or lack of adequate fencing which prevents animal trampling on grazing land – this increased the impact of erosion which has already been identified as a major pressure as well as from diffuse nutrient and silt.
- Ineffective buffer on agricultural land and forestry – increasing potential impact of diffuse nutrient and diffuse silt particularly during tree-felling.

#### **4.0 CONCLUSION**

The Owenea sub-basin catchment is in poor condition with high risk sites identified throughout the catchment including the upper reaches of the rivers and in locations where Freshwater Pearl Mussel populations have been recorded. Eight risk assessments were undertaken along the main channel where Freshwater Pearl Mussel populations have been recorded. This comprises the Owenea main channel from where it drains Lough Ea to its mouth at Loughrosmore Bay near Ardara:

- Seven of these locations were high risk sites,
- One was considered medium risk and is located at the most upstream site on the Owenea River at Lough Ea.

An additional eight risk assessments were carried out along tributaries which drain into the Owenea:

- Six of these sites were high risk, located along the Stracashel River and other tributaries.
- Two were medium risk and are located upstream in the catchment at the source.

## **APPENDIX A**

### **RHAT Field Sheet**



**Field Health and Safety sheet**

River Name \_\_\_\_\_ Site Code \_\_\_\_\_ Date \_\_\_\_\_

1 = Low risk      5 = High risk

Please circle applicable number

PARKING	1	2	3	4	5
FENCES/BARRIERS	1	2	3	4	5
GROUND STABILITY	1	2	3	4	5
DENSE VEGETATION	1	2	3	4	5
BANK STEEPNESS OR STABILITY	1	2	3	4	5
RISK FROM ANIMALS	1	2	3	4	5
PHONE COVERAGE	1	2	3	4	5

Previous RHS/RAT/RHAT surveys - year and code \_\_\_\_\_

Details of access \_\_\_\_\_

## RHAT (VERSION 2)

TRIBUTARY / MAIN CHANNEL\*

### Site Identification

River Name \_\_\_\_\_ Site Code \_\_\_\_\_

Nearest WFD site FF10 \_\_\_\_\_

Water Body ID \_\_\_\_\_ Start U / S or D / S\*

First IGR \_\_\_\_\_ Last IGR \_\_\_\_\_

Bank surveyed from L / R / Both / in-Channel\*

Desk-study notes	Field Notes
<p><b>ACTION TO TAKE PRIOR TO FIELDWORK</b></p> <p>General overall shape of river Check weirs, impoundments etc. on catchment</p>	<p>River type</p> <p>Date</p>
<p>Floodplain connectivity and land use</p> <p>Expected river type</p> <p>Rain last week</p> <p>Estimated river width</p> <p>Estimated survey length</p> <p>Riparian land cover(s)</p> <p>River Agency designated?</p> <p>Other comments including geology - limestone / siliceous / peat*</p>	<p>Time</p> <p>Surveyors</p> <p>Weather conditions now</p> <p>Estimated river width (m) (average 3 readings)</p> <p>Estimated survey length (m) (40 X wetted width)</p> <p>Estimated river depth (m)</p> <p>Channel characteristics (e.g. different stream types on the reach)</p>
<p><b>RESULTS</b></p>	<p>Pressures</p>
<p>Hydromorph score</p> <p>WFD class</p>	<p>*Circle as appropriate</p>

Photograph details include IGR or approximate location

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*N.B. The survey length should be 40x the wetted width with a minimal stretch of 160m but not exceeding 1km.*

## NS RHAT

### Anthropogenic Impacts

River Name \_\_\_\_\_ Site Code \_\_\_\_\_ Date \_\_\_\_\_

Feature	Tick if present, record as E if > 30%
Resectioning	None <input type="checkbox"/> Left bank <input type="checkbox"/> Right bank <input type="checkbox"/>
Reinforcement	None <input type="checkbox"/> Left bank <input type="checkbox"/> Right bank <input type="checkbox"/>
Embankments NO*	LB <input type="checkbox"/> RB <input type="checkbox"/> Set back LB <input type="checkbox"/> SB RB <input type="checkbox"/>
Culverts**	Y / N / Unknown*
Over deepening	Y / N / Unknown*
Wver widened	Y / N / Unknown*
Narrowing	Y / N / Unknown*
Fords**	Y / N*
	Major / Intermediate / Minor
Bridges** NO*	
Weirs** NO*	
Fish Pass** NO*	

Physical features or resource use if applicable. \*

Deflectors / Jetties / Arterial drainage / Side channels / Mid channel bar / Field Drains / Mill Race

Navigation / Fishing / Recreation / Forestry/ Urban / Industry / HEP

Trashline present (height \_\_ m) above water / Buffer zone (LBm / RBm back from water edge)

Other observations - Invasives - Trees - Birds - Pollution indicators - Invertebrates\*

Rhododendron / Himalayan Balsam / Japanese Knotweed / Giant hogweed / Snowberry / Cherry-Laurel/ Gunnera

Sycamore / Beech / Conifers / Oak / Ash / Alder / Willow / Birch / Hazel / Hawthorn / Blackthorn / Holly

Heron / Sand martin / Grey wagtail / Dippers / Kingfishers /

Sewage fungus / Diatomaceous algae / Oil / Cladophora / Vaucheria / Dumping / Silt on Substrate

Other comments:

\* Circle as appropriate E - extensive. \*\* Tally as appropriate. LB - left bank / RB - right bank

## RHAT RIVER HYDROMORPHOLOGY ASSESSMENT TECHNIQUE

Field Assessment of Morphological Condition

River Name \_\_\_\_\_ Site Code \_\_\_\_\_ Date \_\_\_\_\_

If river in spate ignore 3 and 4 but deduct individual scores from overall if either feature not visible. Greyed boxes may be scored but note why in Comments/Notes.

	Bedrock	Cascade / Step-pool	Pool-riffle-glide	Lowland Meandering
1. Channel form and flow types	4	4	4	4
2. Channel vegetation	4	4	4	4
3. Substrate condition	4	4	4	4
4. Barriers to continuity	4	4	4	4
5. Bank structure & stability L+R	4	4	4	4
6. Bank vegetation L+R	4	4	4	4
7. Riparian land cover L+R	4	4	4	4
8. Floodplain connectivity L+R	4	4	4	4
<b>TOTAL</b>	<b>32</b>	<b>32</b>	<b>32</b>	<b>32</b>
Hydromorph Score *				
WFD class **				

\* Hydromorph score - Assessment score = Maximum Possible score

\*\* WFD Class

> 0.8 = high

>0.6 – 0.8 = good

>0.4 – 0.6 = moderate

>0.2 - 0.4 = poor

< 0.2 = bad.

**SHEET 5**

**NOTES**

## **APPENDIX 2**

### **PHOTOGRAPHS**

Photographs of site locations and catchment pressures on the Owenea River and tributaries 2009. All field work photographs can be found in the accompanying electronic appendix.

Overall Risk \* uses the “one out all out” principle

Site No.	Catchment Name	Location	X	Y	Photo No.	Bank Erosion	Diffuse Nutrient	Diffuse Silt	Field Drainage	Outfalls	Abstraction	Barriers to Migration	Current Riparian Zone	Overall Risk*	Pressure/Photo Details
1	Owenea		173706	392041		High	High	Low	Medium	Medium	Low	Low	High	High	Small plot for grazing on left bank. Improved grasslands. Rough grazing. Arable land. One off housing (20m back). Small Culvert
2	Owenea	Field	175056	393728		Low	Medium	Medium	Medium	Medium	Low	Low	Low	Medium	Plantation with no buffer d/s. Peat bog and forestry with drains present. Rough grazing
3	Owenea														
4	Owenea	Clonconwal	175670	392697		High	Low	Medium	Medium	Low	Low	Low	Medium	High	Bush burning. Extensive. Small stream with culvert.
5	Owenea	Downstream	180351	393085		High	High	Medium	Medium	Medium	Low	Low	High	High	Inadequate fencing on Right bank. Earth banks present as flood protection. 2 culvert. River Deepened and possibly widened.
6	Owenea	Mullantiboyl	180645	394022		High	Low	Low	Medium	Medium	Medium	Low	High	High	Buffer inadequate in parts. Recreational pitch on right bank. Extensive erosion occurring (fallen banks). Rough grazing.
7	Owenea	Sruhanganve Bridge	180472	394964		Low	Low	Low	Medium	Low	Low	Low	High	High	Housing/Driveway. Rough grazing.
8	Owenea														
9	Owenea	Angling Centre, Glenties	181596	393554		High	Low	High	Medium	High	Low	Medium	Medium	High	House built on river bank. Sewage treatment system. Inadequate fencing and rough grazing present. Weirs and Mill race at angling centre.
10	Owenea	R253	182667	393158		High	Low	Medium	Medium	Low	Low	Low	Medium	High	Very high river banks -may have been deepened. House 100m from banks. Historical peat cutting and peat bog drainage.
11	Owenea		184762	393745		High	Medium	Low	Medium	Low	Low	Low	Medium	High	Gravel deflectors used. Hill sheep grazing. Tree line on Right bank. Marshy on right bank and rough grazing on left bank

12	Owenea	Raudon Teo, Decking Systems (R252)	186218	399108		Low	Medium	Medium	Medium	Medium	Low	Low	Medium	Medium	Wood Farm, road with loose hardcore. Plantation set back from stream. Roads nearby (N252 and R5). Forestry, industry present. Fire hydrant abstraction present. 1st order stream.
13	Owenea		184322	397411		High	Medium	Medium	Low	Low	Low	Medium	High	High	Earth embankment present on left. Ford acting as weir. Young forest 50m from location. Evidence of historical peat cutting.
14	Owenea														
15	Owenea	Glenties Town Center	181858	394409		High	Low	High	Low	High	Medium	Low	Medium	High	Outfalls noted. Buildings and foundations at river banks
16	Owenea	Abhainn Fhia	186817	393989		Medium	Low	Low	High	Medium	Low	Low	Low	High	Boulder hard bank protection. Tributary culverted under farm track. Scrub, woodland, rough grazing u/s. New ditches and drainage present.
17	Owenea		190761	394987		Medium	Low	Low	Low	Low	Low	Medium	Low	Medium	Weir, small diversion channel. Forestry 50m back from left bank. Rough grazing and heath present. Fencing on left bank. Historical peat cutting.
18	Owenea		189292	395891		High	Low	Low	High	Low	Low	Low	Medium	High	Rough grazing on left bank. Scrub present and rough grazing. Lots of animal trampling.
19	Owenea		185510	395946		Medium	Medium	Medium	Medium	High	Low	Low	Medium	High	Two outfalls, 1 small pipe 80m d/s of bridge. 1 culvert at the bridge. Industrial sheds nearby. Rough grazing in area.



### **Appendix 3 – Catchment Walkover Risk Assessment Survey Sheet**



	Present?		Grid Reference of specific pressure	No. of Photographs	Comments	
	Yes	No				
Source of Erosion						
Bank erosion						
Land clearance						
In river clearance						
Arable ploughing						
Animal trampling						
Fords						
Channel manipulation						
Hard bank protection measures						
Other sources						
Overall Risk	High	Medium	Low			
Diffuse Nutrient						
Arable						
Grazing						
Improved grassland						
Silage						
Forestry						
Housing						
Industry and associated works						
Other sources						
Overall Risk	High	Medium	Low			
Diffuse Silt						
Arable						
Grazing						
Over-grazing						
Improved grassland (Re-seeding)						
Forest						
Silage						
Industry						
Construction stages						
Housing						
Infilling						
Peat cutting						
Quarries						
Other sources						
Overall Risk	High	Medium	Low			

	Present?		Grid Reference of specific pressure	No. of Photographs	Comments	
	Yes	No				
Current Riparian Zone						
Fencing						
Buffer						
Tree line at bank						
Tree line buffer						
Plantation with no buffer						
Urbanisation						
Flood protection						
Marshy land						
Landuse at bank						
Other sources						
Overall Risk	High	Medium	Low			
Field Drainage						
Ditch managed						
Ditch unmanaged						
Drainage on high slope						
Drainage on low slope						
Land drainage (perforated pipes)						
Other sources						
Overall Risk	High	Medium	Low			
Outfalls						
Industrial discharges						
Storm drains						
Culvert outfalls						
Other sources						
Overall Risk	High	Medium	Low			
Abstractions						
Small						
Large						
Overall Risk	High	Medium	Low			
Barriers to migration						
Culverts						
Bridge aprons						
Weirs						
Stone weirs						
Other sources						
Overall Risk	High	Medium	Low			