


TECHNICAL APPENDIX 14.6 VIKING WIND FARM ADDENDUM ENVIRONMENTAL STATEMENT		 <b>viking energy</b> Harnessing Shetland's natural resources
SITE ENVIRONMENTAL MANAGEMENT PLAN TECHNICAL SCHEDULE No. 6 FRAMEWORK WATER QUALITY MONITORING PLAN		
Document No.	TS6	
		Page i

# SITE ENVIRONMENTAL MANAGEMENT PLAN


## VIKING WIND FARM

### TECHNICAL SCHEDULE 6

### WATER QUALITY MONITORING PLAN


Rev No. :	Revision Description	Date :
0.0	Addendum ES, Appendix A14.6	Sept 2010

	Name :	Position :	Signature :
Prepared by :	Jane MacDonald	Environmental Manager	
Checked by :	Andrew Sloan	SSE Renewables / Viking Energy PM	
Reviewed by :	Oliver Moffat	BMT Cordah	
<b>Comment :</b> Document was also reviewed by all consultants involved in preparation of the Addendum ES.			

TECHNICAL APPENDIX 14.6 VIKING WIND FARM ADDENDUM ENVIRONMENTAL STATEMENT		 <b>viking energy</b> Harnessing Shetland's natural resources
SITE ENVIRONMENTAL MANAGEMENT PLAN (SEMP) TECHNICAL SCHEDULE No. 6 WATER QUALITY MONITORING PLAN		
Document No.	TS6	
		Page ii

## CONTENTS

1	INTRODUCTION.....	1
1.1	Scope and Requirements .....	1
1.2	Reference Documentation .....	1
2	RESPONSIBILITIES .....	2
2.1	General .....	2
2.2	Hydrochemistry Monitoring .....	2
2.3	Aquatic Ecology Monitoring.....	2
2.4	Reporting .....	3
2.5	Contingency Sampling & Emergency Response.....	3
2.6	Ancillary works .....	4
3	WATER QUALITY MONITORING: OUTLINE SCOPE.....	4
3.1	General .....	4
3.2	Hydrochemistry Monitoring .....	5
3.3	Ecological Monitoring .....	6

TECHNICAL APPENDIX 14.6 VIKING WIND FARM ADDENDUM ENVIRONMENTAL STATEMENT		 viking energy Harnessing Shetland's natural resources
SITE ENVIRONMENTAL MANAGEMENT PLAN (SEMP) TECHNICAL SCHEDULE No. 6 WATER QUALITY MONITORING PLAN		
Document No.	TS6	
		Page 1


# 1 INTRODUCTION

## 1.1 Scope and Requirements

- 1.1.1 The *Contractor* is solely responsible for pollution prevention for the duration of the contract and until such time as permanent measures, such as permanent drainage and silt mitigation controls, are deemed to be adequate and appropriately constructed.
- 1.1.2 In order to verify the efficacy of pollution prevention and mitigation works during construction, Water Quality Monitoring is required to be undertaken by a suitably qualified Environmental Consultant(s), prior to, during and post completion of construction works. This will extend to all watercourses within the catchment of the construction area as well as both the source and point of supply at Private Water Supply (PWS) properties as required. The monitoring will also comprise both hydrochemistry as well as aquatic ecology monitoring.
- 1.1.3 The details of the monitoring will be contained within a detailed Water Quality Monitoring Plan (i.e. Version 2 of this plan) to be prepared by Viking Energy Partnership and submitted to SEPA for approval prior to commencement of construction. The approved plan will be coordinated and implemented on site by the Environmental Consultant.

## 1.2 Reference Documentation

- 1.2.1 Construction works have the potential to cause pollution of the water environment. All construction works on site, and specifically construction works to be undertaken within and in the vicinity of any water courses, will be completed in compliance with current legislation and best practice as detailed within the SEMP and Technical Schedules, in particular:
- TS2: Pollution Prevention Plan
  - TS3 Site Waste Management Plan
  - TS4: Drainage Management Plan
  - TS5: Water Course Crossings Plan
- 1.2.2 The following reports (along with any further surveys conducted post-consent) will be used to inform the scope of the construction phase Water Quality Monitoring Plan.
- Hydrochemistry Survey, Technical Appendix 14.5, Viking Wind Farm 2009 Environmental Statement (ES), Mouchel, 2009.
  - Baseline Assessment of Fish Populations, Technical Appendix 10.6, Viking Wind Farm 2009 ES, Waterside Ecology, October 2008.
  - Freshwater Invertebrates, Technical Appendix 10.7, Viking Wind Farm ES 2009, Report to Envirocentre, Aquaterra Ecology, September 2008.

TECHNICAL APPENDIX 14.6 VIKING WIND FARM ADDENDUM ENVIRONMENTAL STATEMENT		 <b>viking energy</b> Harnessing Shetland's natural resources
SITE ENVIRONMENTAL MANAGEMENT PLAN (SEMP) TECHNICAL SCHEDULE No. 6 WATER QUALITY MONITORING PLAN		
Document No.	TS6	
		Page 2

## 2 RESPONSIBILITIES

### 2.1 General

- 2.1.1 Responsibility for the water quality monitoring programme, and coordination thereof, will lie with the independent Environmental Consultant(s) appointed at the start of the programme.

### 2.2 Hydrochemistry Monitoring

#### 2.2.1 Field Monitoring


- 2.2.2 Field monitoring of water quality parameters and collection of samples may be undertaken by the Environmental / Ecological Clerk of Works (ECoW) or other nominated person(s) based at the site. The ECoW or nominated site person(s) will be appropriately trained on the required monitoring methods and the use, calibration and maintenance of all monitoring equipment used. Training will be provided by the Environmental Consultant appointed to undertake the hydrochemistry element of the Water Quality Monitoring programme.
- 2.2.3 If the ECoW is to undertake duties relating to the Water Quality Monitoring programme, these will be in addition to the ECoW responsibilities for species and habitat monitoring, advance environmental checks and monitoring of mitigation works as detailed within Section 3 of the SEMP and Technical Schedules TS2 (Pollution Prevention Plan) and TS8 (Ecological Protection Plan).

#### 2.2.4 Laboratory Analysis

- 2.2.5 Laboratory analysis of water samples will also be undertaken as part of the monitoring programme by an independent and appropriately certified laboratory to be appointed by the Environmental Consultant.
- 2.2.6 Coordination of the laboratory sampling and analytical programme will be undertaken by the Environmental Consultant. Under the direction of the Environmental Consultant, the ECoW or other nominated site person(s) may be responsible for field collection of the samples required for laboratory analysis. Samples will be despatched for analysis under chain of custody procedures. Laboratory analytical results will be sent directly to the Environmental Consultant.
- 2.2.7 Interpretation and reporting of both the field and laboratory data will be the responsibility of the Environmental Consultant. Further detail on reporting requirements is provided in Section 2.4.

### 2.3 Aquatic Ecology Monitoring

- 2.3.1 Aquatic ecological receptors (fish, invertebrates, benthic diatoms etc) can provide useful indicators of impacts on water quality. Therefore, along with hydrochemistry monitoring, the results of any surveys on these receptors will be incorporated into the interpretation and assessment of impacts on water quality whenever new survey data becomes available.

TECHNICAL APPENDIX 14.6 VIKING WIND FARM ADDENDUM ENVIRONMENTAL STATEMENT		 viking energy Harnessing Shetland's natural resources
SITE ENVIRONMENTAL MANAGEMENT PLAN (SEMP) TECHNICAL SCHEDULE No. 6 WATER QUALITY MONITORING PLAN		
Document No.	TS6	

- 2.3.2 Ecological surveys will be undertaken by appropriately qualified specialists.
- 2.3.3 Ecological survey results and reports will be provided to the Environmental Consultant for inclusion into the ECoW's Monthly Report where completed that month. The results will also be incorporated into the final report on water quality.

## 2.4 Reporting

### 2.4.1 Monthly water quality reporting


- 2.4.2 Results of water quality monitoring shall assist in determining requirements for improvements in drainage and pollution prevention measures implemented on site. A monthly report on water quality will be prepared by the Environmental Consultant and provided to the ECoW.
- 2.4.3 It will be the responsibility of the ECoW to present the ongoing results of water quality and weather monitoring at site meetings and with outside bodies. This shall be done at weekly meetings and reported within the overall Monthly Environmental Report to be prepared by the ECoW.
- 2.4.4 The monthly reports on water quality will consider all field monitoring and results of laboratory analysis completed that month. Reports will describe how the results compare with baseline data as well as previous monthly reports on water quality. The reports will also describe whether any deterioration or improvement in water quality has been observed and whether any effects are attributable to construction activities and what remedial measures or corrective actions have been implemented.
- 2.4.5 Monthly reports on water quality will be provided to SEPA and the Local Authority.

### 2.4.6 Final report on water quality

- 2.4.7 Upon completion of all post-construction monitoring (including both hydrochemistry monitoring and aquatic ecology surveys), the Environmental Consultant will prepare a final report on water quality. This final report will cover the overall performance against baseline data, details on any impacts attributed to construction works and recommendations for remedial works if required.
- 2.4.8 The final report will be provided to SEPA and the Local Authority.

## 2.5 Contingency Sampling & Emergency Response

- 2.5.1 Where pollution arising from the construction works, such as that resulting from a spill or accidental release of chemicals, oils and fuels or concrete effluent, threatens to enter, or has entered a water course, additional sampling and analysis of surface water samples will be undertaken to determine the level of impact to the surface water receptor and remedial requirements where necessary.
- 2.5.2 Where a pollution incident has occurred as a result of construction works, the

TECHNICAL APPENDIX 14.6 VIKING WIND FARM ADDENDUM ENVIRONMENTAL STATEMENT		 viking energy Harnessing Shetland's natural resources
SITE ENVIRONMENTAL MANAGEMENT PLAN (SEMP) TECHNICAL SCHEDULE No. 6 WATER QUALITY MONITORING PLAN		
Document No.	TS6	

ECoW, Environmental Consultant and SEPA shall be consulted to determine sampling requirements and any additional ecological survey requirements where potentially significant impacts are identified. Where it is demonstrated that the pollution occurred as a result of non-compliance with this SEMP, the costs of any additional sampling or survey requirements shall be borne by the *Contractor*.

- 2.5.3 The results of any monitoring or survey work undertaken by the *Contractor* shall be made available to the ECoW, the Environmental Consultant and SEPA and copies of all correspondence and test certificates shall be retained on site.


## 2.6 Ancillary works

- 2.6.1 A room within the site cabins will be dedicated for use by the ECoW as an on-site 'laboratory'. This facility will have space for a work bench, fridge for storing samples, sink, and adequate storage for a full set of sample bottles, sampling equipment (including calibration fluids etc), PPE, records and documentation.
- 2.6.2 A rain gauge will be established in the site compound to help inform on weather conditions affecting site water quality. Advance weather forecasts will also be consulted to predict storm events and ensure preparation of additional flood and siltation mitigation requirements as appropriate.

## 3 WATER QUALITY MONITORING: OUTLINE SCOPE

### 3.1 General

- 3.1.1 The full scope of monitoring will be determined at the detailed design stages (prior to commencement) and will be tailored to take into account intended construction programme and phasing of works within each catchment. The full scope of monitoring will be agreed with SEPA prior to commencement of construction works.
- 3.1.2 Key trigger levels at which action will be required to prevent an impact occurring to either a water feature or Private Water Supply (PWS) will be determined through consultation with SEPA and analysis of the results of any baseline monitoring data.
- 3.1.3 Water Quality Monitoring locations (including any aquatic ecological baseline survey locations) will be identified through grid reference, photographic record and indicated on a plan. For repeat sampling locations, each location will also be marked on the ground (stake/post) to ensure that the correct location is sampled each time.
- 3.1.4 Sample locations shall be labelled consistently for the duration of the monitoring period. Where any additional locations are sampled during the works, the location (grid reference) of the sampling point will be recorded and a photograph will be taken at the time of sampling.
- 3.1.5 'Control' sample locations will also be included in the scope of any monitoring.


TECHNICAL APPENDIX 14.6 VIKING WIND FARM ADDENDUM ENVIRONMENTAL STATEMENT		 <b>viking energy</b> <small>Harnessing Shetland's natural resources</small>
SITE ENVIRONMENTAL MANAGEMENT PLAN (SEMP) TECHNICAL SCHEDULE No. 6 WATER QUALITY MONITORING PLAN		
Document No.	TS6	

## 3.2 Hydrochemistry Monitoring

- 3.2.1 Baseline data contained within the 2009 Hydrochemistry Survey (Technical Appendix 14.5 of ES 2009) will be used to inform the scope of future monitoring. The detailed scope will be determined and agreed with SEPA prior to commencement of construction.
- 3.2.2 Sample locations and monitoring frequency will be specified and agreed with SEPA.
- 3.2.3 As a minimum, the monitoring programme will include:
- At least three additional baseline monitoring visits.
  - A combination of daily and weekly monitoring on catchments where construction is on-going.
  - Post construction monitoring on a weekly basis for a period of three months. Post construction will be defined as when the reinstatement phase is completed.
- 3.2.4 Analytical determinands (including limits of detection and frequency of analysis) will be specified and agreed with SEPA for each sample location. The expected suite of determinands will include:

### Parameters for hydrochemistry analysis

pH  
Conductivity  
Alkalinity (CaCO<sub>3</sub>)  
Sodium  
Potassium  
Magnesium  
Calcium  
Chloride  
Nitrate  
Sulphate  
Phosphate  
Total Organic Carbon  
Biological Oxygen Demand (5 day)  
Soluble Iron  
Soluble Manganese  
Ammoniacal Nitrogen  
Total Petroleum Hydrocarbons (TPH)  
Chemical Oxygen Demand  
Total Suspended Solids  
Soluble Aluminium  
Colour  
Metals: Cadmium, Lead, Zinc, Nickel, Mercury, Arsenic, Chromium and Copper

TECHNICAL APPENDIX 14.6 VIKING WIND FARM ADDENDUM ENVIRONMENTAL STATEMENT		 <b>viking energy</b> <small>Harnessing Shetland's natural resources</small>
SITE ENVIRONMENTAL MANAGEMENT PLAN (SEMP) TECHNICAL SCHEDULE No. 6 WATER QUALITY MONITORING PLAN		
Document No.	TS6	

### 3.3 Ecological Monitoring

3.3.1 As with the hydrochemistry monitoring programme, the detailed scope of aquatic ecological monitoring will be determined and agreed with SEPA prior to commencement of construction.

3.3.2 Ecological monitoring requirements will be informed by the existing baseline data contained within the Freshwater Invertebrate Study, the Baseline Assessment of Fish Populations and also specific requests made by SEPA in response to the 2009 ES (letter of 28<sup>th</sup> July 2009). Based on these sources of information, as a minimum, the monitoring programme will include:

#### 3.3.3 Freshwater Invertebrates

- One pre-construction year baseline followed by post construction monitoring immediately after completion of works and again three years later.
- Monitoring locations to include upper watercourses where suitable habitat may be found. This will improve geographical coverage and should include sites closer to turbines/batching plants in order to improve the baseline from which to monitor impacts.
- SEPA also hold invertebrate data for a number of watercourses in the area and this information should also be considered as additional baseline information.
- Monitoring will include three control burns, one in each area of Delting, Nesting and Kergord.

#### 3.3.4 Fish

- Additional baseline survey (to include assessment of temporal variation in fish abundance to allow adequate assessment of post construction monitoring data).
- Post construction monitoring.

#### 3.3.5 Benthic Diatoms

- Benthic diatom surveys in Spring (April/May) and Autumn (Sept-Nov) to provide baseline information to assess impact of potential siltation on freshwater lochs.
- Surveys to include Truggle Water, Maa Water, Lamba Water, Petta Water, Loch of Skellister, Gossa Water, Laxobiggin and south burn of Burrafirth.