

IN THE MATTER OF

The Infrastructure Planning (Examination Procedure) Rules 2010

Application by Mynydd y Gwynt Ltd for an Order Granting Development
Consent for the Mynydd y Gwynt Wind Farm

DEADLINE X

Water Quality Monitoring Strategy – Version 2 – tracked changes

14th May 2015

APPENDIX X.X:

DRAFT

OUTLINE WATER QUALITY MONITORING STRATEGY

<u>Date of Issue</u>	<u>Issue Type</u>	<u>Sign-off</u>	<u>Version no.</u>
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<u>13/03/2015</u>	<u>Final draft for comment</u>	<u>Nisha Rehm</u>	<u>v5</u>
<u>14/05/2015</u>	<u>Outline</u>	<u>Nisha Rehm</u>	<u>v6</u>

Introduction

1. This ~~draft outline~~ Water Quality Monitoring Strategy (“WQMS”) has been devised in accordance with best practice standards and guidelines, including, but not limited to, the following:
 - The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010;
 - Environment Agency Pollution Prevention Guideline (“PPG”) 5: Works In or Near Water;
 - Environment Agency PPG 6: Construction and demolition sites;
 - Environment Agency PPG 21: Incident response planning;
 - Control of water pollution from construction sites. Guidance for consultants and contractors (C532D);
 - Common Standards Monitoring Guidance for Rivers (2014); and
 - River Wye SAC Core Management Plan (2008; conservation objectives detailed in **Appendix 1** of this document).
2. The final monitoring plan will need to take into account any updates to these documents.
- 1-3. The Water Quality Monitoring Strategy will be agreed with Natural Resources Wales (“NRW”) before ~~construction work~~ begins. This plan will be ~~refined revised~~ as the wind farm detailed design is developed and finalised. Final plans will be submitted for consultation and/or approval with other interested bodies as required by agreement or planning condition. The monitoring plan will then be reviewed at key stages of the project. Further details on the hydrological regime on site and the impacts of the wind farm are given in **Chapter 14** of the Environmental Statement and include **Figure 14.3**.
4. ~~The~~ The overall aim of the water quality monitoring strategy is to demonstrate that construction (defined as the period between the arrival of machinery and materials on site to the first export of electricity) and decommissioning activities will not have an adverse impact on the water environment and that the relevant mitigation is effective in the short and long term. This document has also been produced to partially satisfy Requirements 9 (relating to a Construction Environmental Management Plan) and 29 (relating to a Surface Water Management Plan) of the Development Consent Order.
- 2-5. An additional purpose of the water quality monitoring is to demonstrate that the proposed scheme is not ~~impacting having any impact~~ on surface waters in accordance with the Water Framework Directive (WFD; 2000/60/EC), ~~including the~~. Multiple tributaries originating and/or flowing through the site flow into the River Wye (Upper Reaches Wye) Site of Special Scientific Interest, ~~which in its lowest reaches is part of~~ (“SSSI”), the Upper Wye Tributaries SSSI and the Afon Gwy (River Wye) Special Area of Conservation, ~~and into which multiple tributaries originating and/or flowing through the site flow~~ (“SAC”). The water quality monitoring must also ensure no adverse impact on the integrity of the River Wye SAC, alone or in combination.
- 3-6. Other relevant pieces of legislation (such as The Water Resources Act 1991 ~~and~~ Environmental Permitting (England & Wales) Regulations 2010) are listed in **Chapter 14** of the Environmental Statement.

7. This WQMS and its implementation is the responsibility of the Ecological Clerk of Works, who should keep the Strategy updated as necessary should any changes occur. Changes should be agreed with the Site Manager and NRW.

Water Quality Parameters and Sample Collection

~~4.8.~~ Water quality monitoring ~~will~~may be ~~undertaken~~required during the following stages of the development:

- before construction to determine baseline conditions;
- during construction; (including preparatory works);
- during ~~operation;~~ and site reinstatement;
- prior to decommissioning to determine new baseline conditions;
- during decommissioning; and

~~Water Quality Parameters and Sample Collection~~

- post decommissioning.

9. Daily visual checks will be undertaken during the construction period (including all preparation works) to give an early warning of any visually apparent changes in water quality, such as discolouration of the tributaries on site. This will be undertaken as necessary depending on the works programme.

~~5.10.~~ In situ results will provide useful and immediate information that could inform emergency and contingency monitoring response. The following water quality parameters will be measured *in situ* during sample collection and as necessary:

- dissolved oxygen (mg/l);
- pH;
- temperature (°C);
- conductivity (µS/cm); and
- turbidity (using a Secchi disc).

~~6.11.~~ Water samples will be collected ~~in appropriate sample bottles, by a suitably qualified and trained individual~~ according to best practice, and sent to a UKAS-accredited laboratory for testing. ~~There will be a range of test undertaken which, and~~ may include for example the following groups of parameters:

- WFD baseline physico-chemical parameters;
- basic nutrients;
- biochemical oxygen demand ~~(("BOD"))~~ (mg/l);
- alkalinity (as mg/l CaCO₃);
- suspended solids (mg/l);
- hydrocarbons; and
- selected heavy metals linked to vehicle use and mining activities.

~~7.12.~~ Samples will be received by the testing laboratory within 24 hours of collection to ensure timely receipt of samples. This is especially critical for measuring BOD.

- ~~8-13.~~ Water quality parameters will be tested using appropriate Limits of Detection for the site and receptor; these can be adjusted during baseline collection if necessary. Nutrients will be tested using the lowest Limit of Detection available.
- ~~9-14.~~ Continuous 24 hour continuous monitoring of turbidity will also be required, using permanent monitoring equipment with a data connection to allow remote monitoring, and an automatic alarm system, triggered when turbidity reaches a pre-determined level (to be ~~determined during baseline monitoring~~). informed by baseline monitoring). This will ensure that potential pollution is detected in time to ensure that remedial action can be undertaken to avoid an adverse impact on the integrity of the River Wye SAC.

Determining Baseline Conditions

- ~~10-15.~~ The purpose of the baseline monitoring will, amongst other things, establish/inform: typical ranges of turbidity for the ~~water courses~~ watercourses on site; levels below which work can take place; and, the maximum increase in nephelometric turbidity units (“NTU”) caused by the works before the operations should be halted.
- ~~11.~~ The following monitoring schedule ~~it~~ is recommended (~~subject to statutory body agreement~~):
- ~~12-16.~~ quarterly/undertake monthly spot monitoring for a approximately twelve months within the three year period; and immediately preceding the start of construction. This may need to be revised if further data are considered to be necessary and are justifiable.
- ~~• continuous monitoring of turbidity for one month each year for three years and during 2 storm events each year for three years.~~
 - ~~• continuous monitoring of turbidity during larger rally events.~~
- ~~13.~~ Water quality monitoring will take place at a range of agreed locations ~~which may comprise for example:~~
- ~~• , as shown in the River Wye main channel upstream and downstream of each tributary potentially affected by works;~~
 - ~~• in each tributary potentially affected by works at the site boundary; and~~
 - ~~• in **Appendix 2**. Locations plotted are indicative only and will need to be agreed with NRW pre-commencement of the River Wye main channel downstream of the zone of influence (i.e. immediately downstream of the site entrance).~~
- ~~14-17.~~ monitoring. Precise locations for water quality monitoring will be determined on site, taking into account local conditions, ease of access and suitability of the channel for the placing of permanent monitoring equipment.
- ~~18.~~ Where spatially appropriate, data from existing water quality monitoring locations used by NRW will be used as part of this strategy.
- ~~15-19.~~ The trigger for ceasing works during construction will be ~~determined using~~ largely informed by the baseline data, as well as the key relevant documents as listed in Paragraph 1 of this document, and will be agreed with NRW before works begin.

Construction and Site Reinstatement Monitoring

20. For the purpose of this Strategy the 'construction period' includes all preliminary site works, such as vegetation clearance, drainage works and amendments to existing tracks, as well as construction of the new tracks and turbine bases and turbine installation (see also **Paragraph 4**).

21. Monitoring will continue as set out in this section for up to one year following completion of initial site reinstatement activities in order to ensure no pollution occurs while any ground still exposed following works is in the process of being re-vegetated. If bare ground still exists on site after this period the need for further monitoring will be assessed and agreed with NRW.

16.22. The following monitoring schedule is recommended (subject to statutory body agreement):

- ~~bi-visual monitoring throughout the construction period;~~
- monthly (i.e. once every other month) spot monitoring throughout the construction period; and
- continuous monitoring of turbidity throughout the construction period.

17.23. The locations of spot and continuous monitoring will be as per **Paragraph 4.21** with the exception of where ~~no construction works are taking place (including site preparation activities such as vegetation clearance) have not yet begun~~ in a whole sub-catchment (as per **Figure 14.3**), monitoring will not be required. As soon as there is a risk of pollution due to construction activities (e.g. as soon as soils are exposed) monitoring will begin.

18. The Clerk of Works will ~~check the correct functioning of the water quality monitoring equipment at regular intervals and will ensure sufficient maintenance occurs throughout the monitoring period.~~ to ensure that sampling equipment is in good working order at all times so far as this is within his/her

19. ~~In the event that early warning of excessive sedimentation triggers the automatic alarm, the Clerk of Works, Site Manager and NRW will be informed as soon as is practicable. The source of sedimentation will be determined and the site inspected to allow a plan of action to be devised to protect the affected watercourse (e.g. utilising source control measures such as stabilisation of the eroding land and pathway control measures such as installation of silt fencing). NRW will be informed of the actions taken to prevent further sedimentation and it will be determined when works can safely continue in the affected area.~~

Operational Monitoring

20.24. ~~Depending upon the conclusions drawn during baseline and construction monitoring, operational monitoring may not be required. If required, the operational monitoring strategy will be devised following baseline monitoring.~~

Decommissioning Monitoring

21.25. Monitoring during the decommissioning period may be required and is likely be broadly similar to the construction monitoring strategy. A new set of baseline readings may be

needed before decommissioning begins; therefore the strategy needs to be devised ~~in good time~~ at least two years prior to decommissioning to allow baseline data collection.

Post-decommissioning Monitoring

26. Post-decommissioning monitoring may be required in order to demonstrate no long term effects have occurred due to the construction and operation of the wind farm and to demonstrate that the decommissioning and reinstatement works have been successful.
27. It is envisaged that post decommissioning monitoring will be undertaken monthly for approximately nine months after decommissioning activities have ceased. This is to be agreed with NRW (or any successor bodies) prior to the commencement of decommissioning.

Emergency Response

28. In the event that early warning of excessive sedimentation triggers the automatic alarm, the Clerk of Works, Site Manager and NRW will be informed within 2 hours of the alarm sounding during working hours (defined as 8.30am to 5.30pm) and within 4 hours of the alarm sounding outside of working hours. The source of sedimentation will be determined and the site inspected to allow a plan of contingency and remediation measures to be devised to protect the affected watercourse (utilising source control measures such as stabilisation of the eroding land and/or pathway control measures such as installation of silt fencing, as appropriate). NRW will be informed of the actions proposed to be taken to prevent further sedimentation (e.g. the affected substrate will be washed clean and replaced in the same state as before the sedimentation occurred) and it will be determined when works can safely continue in the affected area. An Incident Response Plan ("IRP") should be included in the Construction Environmental Management Plan (or as a separate document) and should be written with reference to PPG 21 and agreed with NRW in advance of works beginning. The IRP should include details of who must be contacted in the event of pollution occurring (including NRW, downstream users).
29. In the event that either laboratory-tested water quality or *in situ* monitoring, including visual cues, indicate potential pollution (judged against baseline levels) prevention measures will be put into place immediately. This will include further monitoring of the parameter(s) which has/have exceeded the pre-determined and agreed 'normal' range to ensure no impact occurs further downstream. Mitigation actions appropriate to the situation will be taken immediately to ensure pollution does not occur, as per **Paragraph 28** and in accordance with the IRP.

Data Management and Reporting

- 22-30. NRW will be allowed access to the water quality data upon request. Data will be compiled on agreed standard data forms.
31. A monthly data report will be produced and sent to NRW throughout the construction period. At the end of each monitoring period (i.e. baseline, construction, during decommissioning and post-decommissioning) a short report will be produced, summarising the data and commenting upon any trends, pollution incidents and other

relevant findings. These reports will be made available to NRW as soon as they are signed off after each monitoring period.

Appendix 1: Conservation Objectives for Relevant Afon Gwy (River Wye) SAC Features

No.	Conservation Objective for the Watercourse
1	The capacity of the habitats in the SAC to support each feature at near-natural population levels, as determined by predominantly unmodified ecological and hydromorphological processes and characteristics, should be maintained as far as possible, or restored where necessary.
2	The ecological status of the water environment should be sufficient to maintain a stable or increasing population of each feature. This will include elements of water quantity and quality, physical habitat and community composition and structure. It is anticipated that these limits will concur with the relevant standards used by the Review of Consents process given in Annexes 1-3 of the Core Management Plan (CCW, 2008).
3	Flow regime, water quality and physical habitat should be maintained in, or restored as far as possible to, a near-natural state, in order to support the coherence of ecosystem structure and function across the whole area of the SAC.
4	All known breeding, spawning and nursery sites of species features should be maintained as suitable habitat as far as possible, except where natural processes cause them to change.
5	Flows, water quality, substrate quality and quantity at fish spawning sites and nursery areas will not be depleted by abstraction, discharges, engineering or gravel extraction activities or other impacts to the extent that these sites are damaged or destroyed.
6	The river planform and profile should be predominantly unmodified. Physical modifications having an adverse effect on the integrity of the SAC, including, but not limited to, revetments on active alluvial river banks using stone, concrete or waste materials, unsustainable extraction of gravel, addition or release of excessive quantities of fine sediment, will be avoided.
7	River habitat SSSI features should be in favourable condition. Where the SAC habitat is not underpinned by a river habitat SSSI feature, the target is to maintain the characteristic physical features of the river channel, banks and riparian zone.
8	Artificial factors impacting on the capability of each species feature to occupy the full extent of its natural range should be modified where necessary to allow passage, e.g. weirs, bridge sills, acoustic barriers.
9	Natural factors such as waterfalls, which may limit, wholly or partially, the natural range of a species feature or dispersal between naturally isolated populations, should not be modified.
10	Flows during the normal migration periods of each migratory fish species feature will not be depleted by abstraction to the extent that passage upstream to spawning sites is hindered.
11	Flow objectives for assessment points in the Wye Catchment Abstraction Management Strategy will be agreed between the Environment Agency (EA) and CCW as necessary. It is anticipated that these limits will concur with the standards used by the Review of Consents process given in Annex 1 of the Core Management Plan (CCW, 2008).
12	Levels of nutrients, in particular phosphate, will be agreed between EA and CCW for each Water Framework Directive water body in the Wye SAC, and measures taken to maintain nutrients below these levels. It is anticipated that these limits will concur with the standards used by the Review of Consents process given in Annex 2 of the Core Management Plan (CCW, 2008).
13	Levels of water quality parameters that are known to affect the distribution and abundance of SAC features will be agreed between EA and CCW for each Water Framework Directive water body in the Wye SAC, and measures taken to maintain pollution below these levels. It is anticipated that these limits will concur with the Version 1.2 21 19 February 2008 standards used by the Review of Consents process given in Annex 3 of the Core Management Plan (CCW, 2008).
14	Potential sources of pollution not addressed in the Review of Consents, such as contaminated land, will be considered in assessing plans and projects.
15	Levels of suspended solids will be agreed between EA and CCW for each Water Framework Directive water body in the Wye SAC. Measures including, but not limited to, the control of suspended sediment generated by agriculture, forestry and engineering works, will be taken to maintain suspended solids below these levels.

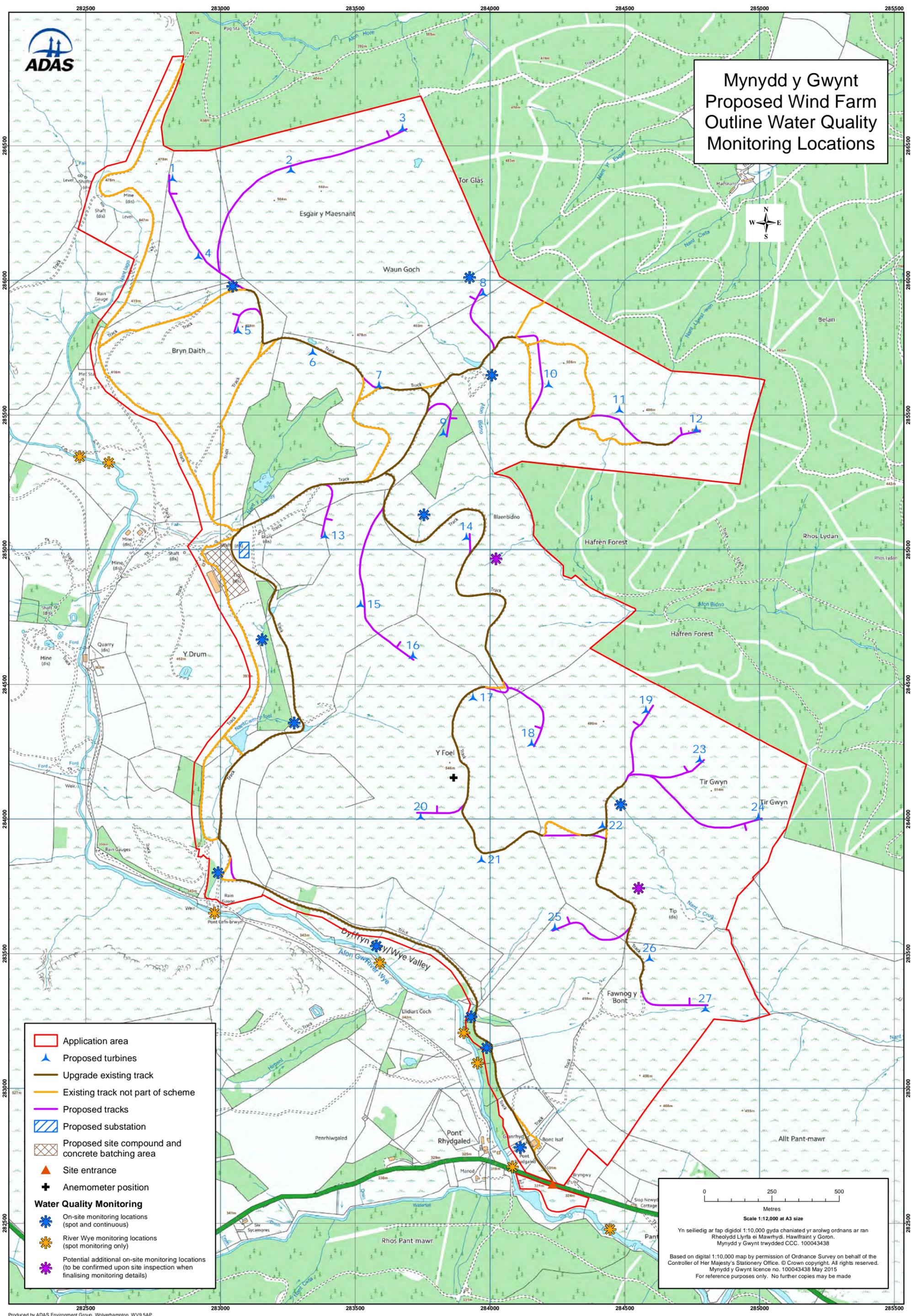
	<p><u>Conservation Objectives for Atlantic Salmon, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Allis Shad, Bullhead</u></p>
<p>1</p>	<p><u>To be in a favourable conservation status with the following conditions satisfied:</u></p> <ol style="list-style-type: none"> 1. <u>The conservation objective for the watercourse as defined above must be met.</u> 2. <u>The population of the feature in the SAC is stable or increasing over the long term.</u> 3. <u>The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. suitable flows to allow upstream migration, depth of water and substrate type at spawning sites, and ecosystem structure and functions e.g. Food supply.</u> 4. <u>Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future. Natural factors such as waterfalls may limit the natural range of individual species.</u> 5. <u>Existing artificial influences on natural range that cause an adverse effect on site integrity, such as physical barriers to migration, will be assessed in view of below.</u> 6. <u>There is, and will probably continue to be, a sufficiently large habitat to maintain the feature's population in the SAC on a long-term basis.</u> <p><u>Performance indicators are given for population density, adult run size and Juvenile densities, age/size structure, distribution, as well as biological, chemical and flow water quality.</u></p>
	<p><u>Conservation Objectives for European Otter</u></p>
<p>1</p>	<p><u>To be in a favourable conservation status with the following conditions satisfied:</u></p> <ol style="list-style-type: none"> 1. <u>The population of Otters in the SAC is stable or increasing over the long term and reflects the natural carrying capacity of the habitat within the SAC, as determined by natural levels of prey abundance and associated territorial behaviour.</u> 2. <u>The natural range of Otters in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches that are potentially suitable to form part of a breeding territory and/or provide routes between breeding territories. The whole area of the Wye SAC is considered to form potentially suitable breeding habitat for Otters. The size of breeding territories may vary depending on prey abundance. The population size should not be limited by the availability of suitable undisturbed breeding sites. Where these are insufficient they should be created through habitat enhancement and where necessary the provision of artificial holts. No Otter breeding site should be subject to a level of disturbance that could have an adverse effect on breeding success. Where necessary, potentially harmful levels of disturbance must be managed.</u> 3. <u>The safe movement and dispersal of individuals around the SAC is facilitated by the provision, where necessary, of suitable riparian habitat, and underpasses, ledges, fencing etc. at road bridges and other artificial barriers.</u> <p><u>Performance indicators are given for distribution, breeding activity and actual and potential breeding sites.</u></p>
	<p><u>Conservation Objectives for Watercourses of plain to montane levels with the <i>Ranuncion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation</u></p>
<p>1</p>	<p><u>To be in a favourable conservation status with the following conditions satisfied:</u></p> <ol style="list-style-type: none"> 1. <u>The conservation objective for the watercourse as defined above must be met.</u> 2. <u>The natural range of the plant communities represented within this feature should be stable or increasing in the SAC. The natural range is taken to mean those reaches where predominantly suitable habitat exists over the long term. Suitable habitat and associated plant communities may vary from reach to reach. Suitable habitat is defined in terms of near natural hydrological and geomorphological processes and forms e.g. depth and</u>

	<p><u>stability of flow, stability of bed substrate, and ecosystem structure and functions e.g. nutrient levels, shade. Suitable habitat for the feature need not be present throughout the SAC but where present must be secured for the foreseeable future, except where natural processes cause it to decline in extent.</u></p> <p><u>3. The area covered by the feature within its natural range in the SAC should be stable or increasing.</u></p> <p><u>4. The conservation status of the feature's typical species should be favourable. The typical species are defined with reference to the species composition of the appropriate JNCC river vegetation type for the particular river reach, unless differing from this type due to natural variability when other typical species may be defined as appropriate.</u></p> <p><u>Performance indicators are given for distribution within catchment, typical species, native species and alien and introduced species.</u></p>
<u>Conservation Objectives for White-clawed Crayfish</u>	
	<p><u>To be in a favourable conservation status with the following conditions satisfied:</u></p> <p><u>1. The conservation objective for the watercourse as defined above must be met.</u></p> <p><u>2. The population of the feature in the SAC is stable or increasing over the long term.</u></p> <p><u>3. The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. The natural range is taken to mean those reaches where predominantly suitable habitat for each life stage exists over the long term. Suitable habitat is defined in terms of near-natural hydrological and geomorphological processes and forms e.g. substrate type, water hardness and temperature, and ecosystem structure and functions e.g. food supply, absence of invasive non-native competitors. Suitable habitat need not be present throughout the SAC but where present must be secured for the foreseeable future. Natural factors such as waterfalls may limit the natural range of individual species. Existing artificial influences on natural range that cause an adverse effect on site integrity will be assessed in view of the below.</u></p> <p><u>4. There is, and will probably continue to be, a sufficiently large habitat to maintain the feature's population in the SAC on a long-term basis.</u></p> <p><u>Performance indicators are given for adult/juvenile densities, distribution, invasive non-native crayfish and porcelain disease.</u></p>
<u>Conservation Objectives for Quaking bogs and transition mires</u>	
	<p><u>To be in a favourable conservation status with the following conditions satisfied:</u></p> <p><u>1. The conservation objective for the watercourse as defined above must be met.</u></p> <p><u>2. The natural range of the plant communities represented within this feature should be stable or increasing in the SAC. The natural range is taken to mean those reaches where near-natural hydrological and geomorphological processes and landforms favour the development of this habitat. The feature need not be present in all suitable locations in the SAC but where present must be secured for the foreseeable future.</u></p> <p><u>3. The area covered by the feature within its natural range in the SAC should be stable or increasing.</u></p> <p><u>4. The conservation status of the feature's typical species should be favourable. The typical species are defined with reference to the species composition of the appropriate NVC type(s), unless differing from this type due to natural variability/local distinctiveness when other typical/indicator species may be defined as appropriate.</u></p> <p><u>Performance indicators are given for habitat extent, composition and structure, vegetation composition, native species, invasive non-native species.</u></p>

Appendix 2: Outline Water Quality Monitoring Locations



Mynydd y Gwynt Proposed Wind Farm Outline Water Quality Monitoring Locations



- Application area
- ▲ Proposed turbines
- Upgrade existing track
- Existing track not part of scheme
- Proposed tracks
- Proposed substation
- Proposed site compound and concrete batching area
- ▲ Site entrance
- + Anemometer position
- Water Quality Monitoring**
- ✱ On-site monitoring locations (spot and continuous)
- ✱ River Wye monitoring locations (spot monitoring only)
- ✱ Potential additional on-site monitoring locations (to be confirmed upon site inspection when finalising monitoring details)

Scale 1:12,000 at A3 size
 Yn seiliedig ar fap digidol 1:10,000 gyda chaniated yr arolwg ordnans ar ran Rheoldd Llyrlia ei Mawrhydi, Hawlfraint y Goron.
 Mynydd y Gwynt trwydded CCC. 100043438
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