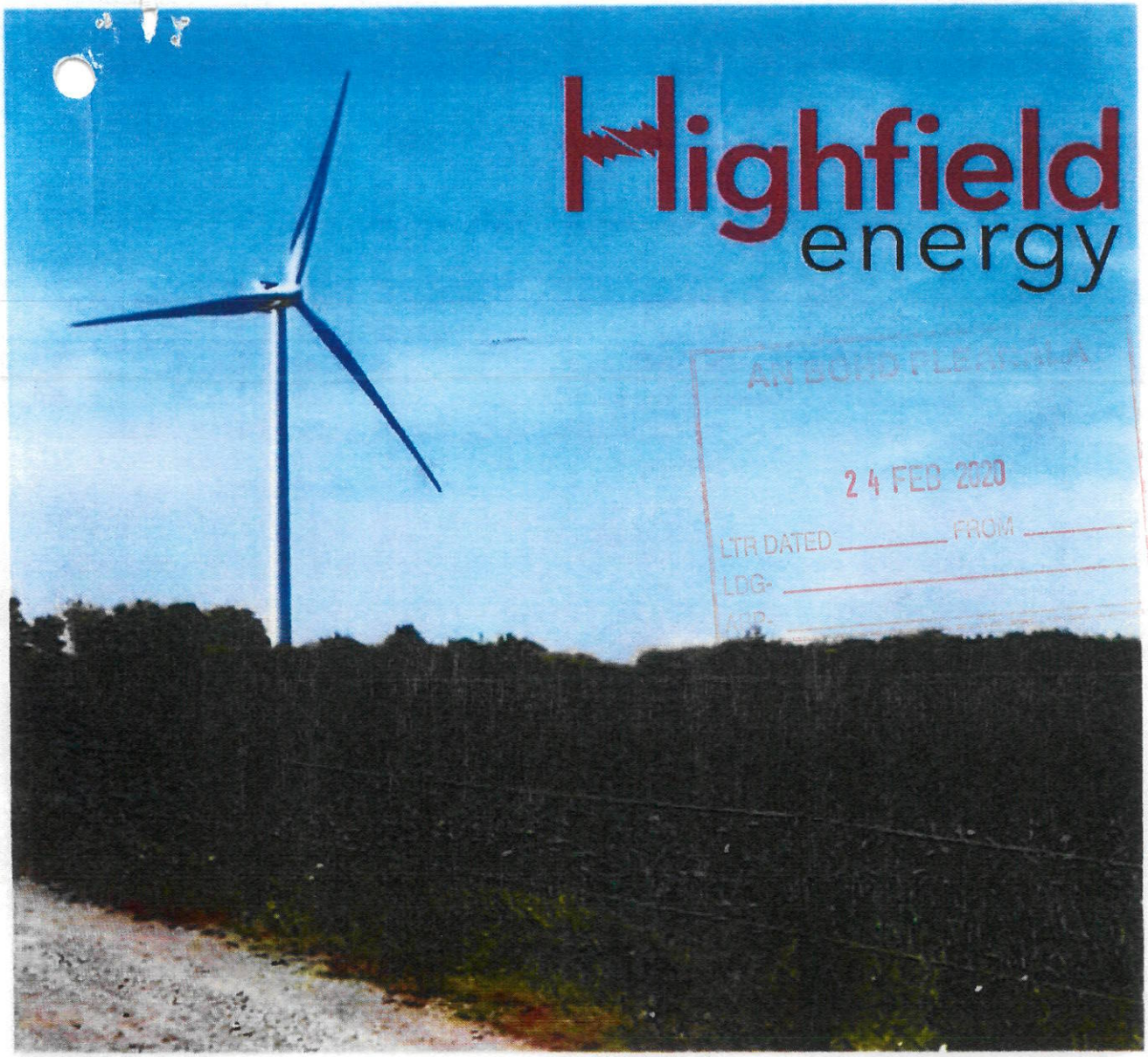
ATTACHMENT 2 (PART 2 OF 2

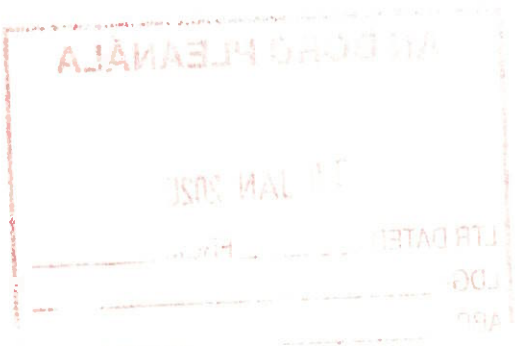


Highfield energy

ASHFORD WIND FARM CONSTRUCTION-STAGE DRAINAGE REPORT

REV B

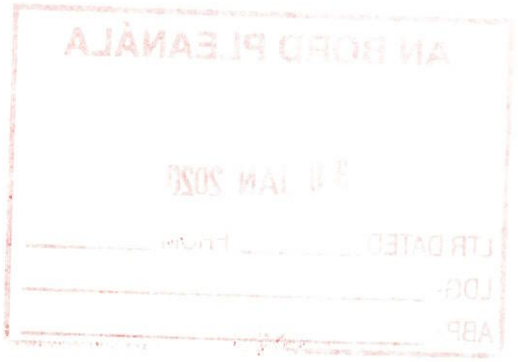
October 2017



Version Control

Document Name: Ashford Wind Farm – Construction Management Plan

Document Version	Date	Comment	Author	Reviewer	Approver
A	25/09/2017	Initial Draft	JOC	JB	JB
B	08/10/2017	Planning Submission	JOC	JB	JB



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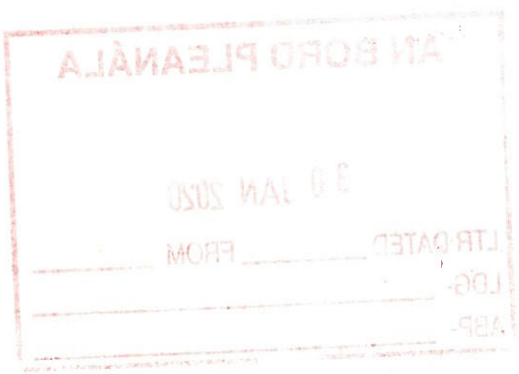
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1. Introduction

1.1 DESCRIPTION OF THE PROJECT

Ashford wind farm is located approximately located ca 1.5 km South of Ashford, Co. Limerick. Mauricetown Wind farm Ltd has obtained planning consent to construct a wind farm consisting of up to six number wind turbine generators with a blade tip height of up to 132 metres (hub height of up to 85 metres and rotor diameter of up to 93 metres) and crane hardstandings for each turbine, the construction of a meteorological mast, electrical substation, underground electrical cabling, access tracks, borrow pit, temporary construction compound, retention and completion of access tracks and ancillary services. The site is approximately 104 hectares in extent and is located on a moderate to steep sloping site at an altitude ranging from 140 m to 350 m asl.

The site, has obtained planning permission from An Bord Pleanála

- An Bord Pleanála ref PL13.240910
- Limerick County Council ref 12/379

The principal land use on site is agriculture (cattle grazing) with some commercial forestry. There are three isolated areas within the proposed development site that have been designated as part of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (NPWS site code: 4161). Lands to the West and South of the proposed development site are continuous with the main part of the SPA and comprise conifer plantation, rough pasture and heath / bog.

1.2 PROPOSAL

The purpose of this report is to describe the site drainage design and details for the treatment of site drainage to be adopted for the proposed Ashford wind farm development.

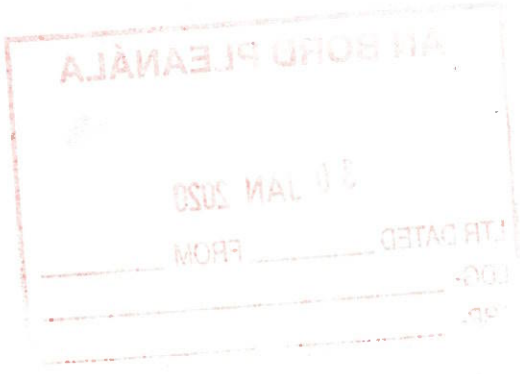
It has been prepared in accordance with recommendations of Inland Fisheries Ireland (IFI).

A Geology, Hydrology and Hydrogeology Assessment (GHHA see Appendix A) was completed for the development and included in the EIA (Chapter 9) submitted to Limerick County Council and An Bord Pleanála during the planning process for the development. The GHHA concludes:

"The likely residual impact on the water environment is the potential increase in surface runoff and reduced groundwater infiltration. This is considered to be an indirect, permanent, slight, negative impact. Careful design of this drainage will be undertaken to reduce the impact and mimic natural conditions where possible along the development sections of the site"

This report details how the impacts will be reduced at construction and operational stages of the wind farm.

Included as part of this submission in Appendix B: Indicative Proposed Drainage Layout is a drawing showing the proposed drainage management system to be employed at the site. The drainage design will be finalised at detailed design stage, but will be informed by the principles and commitments herein.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1.3 GENERAL APPROACH

To reduce the risks of pollution to sensitive local receptors (local tributary of the Bunoke River, which is itself a tributary to the River Deel) due to silt laden surface water from the construction, operation and decommissioning phases Highfield Energy Services Ltd have developed a drainage design layout in Appendix B (Indicative Proposed Drainage Layout) for the development. The final detailed design for the wind farm will incorporate the concepts and practices outlined within this report.

The following sections detail the methodologies to minimise the risk of silt release from construction and daily use of the site access roads, hardstandings and turbine foundations. Details in relation to the existing, proposed construction and post-construction drainage regimes and the installation and maintenance of the necessary environmental protection measures are enclosed herein.

Initially, a list of potential pollution sources is examined and this is followed by procedures for the phasing of the works to minimise potential impacts of pollution sources. This in turn is followed by a description of the proposed drainage system and descriptions of environmental protection measures for the construction and operational stages.

All contractors working on the wind farm development will all hold a copy of this drainage report and a copy will be located in the site office for inspection / consultation during construction.

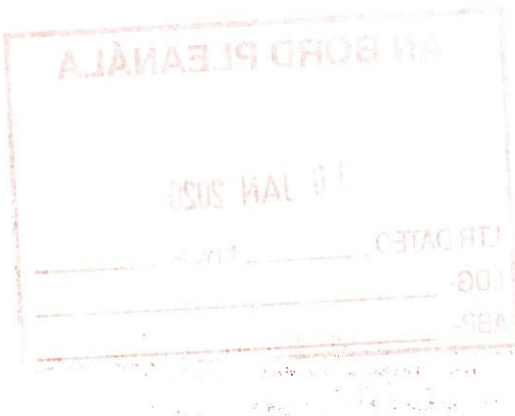
There are also Pollution Prevention Guidelines published which offer suitable guidance for construction works, handling & storage of hydrocarbons and works on or near watercourses. The general principles of these have been included herein.

2. Existing Drainage Network

Included in Section 9.4.14 of the EIS chapter attached in Appendix A is a description of the existing drainage network. The proposed development site is located 3.8 km South-east of the Lower River Shannon SAC. The proposed development site lies within the River Shannon catchment although the watercourses downstream (Bunoke River and River Deel) are not located within the designated site. Surface water from the proposed development site drains east and north towards the Bunoke River which feeds into the River Deel downstream to the north which in turn discharges into the River Shannon Estuary.

The lower River Shannon SAC is a large site that stretches along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km. The site encompasses the Shannon, Feale, Mulkear and Fergus Estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. This extensive site is of great ecological interest as it contains fifteen habitats and seven species listed on both Annex I and II of the E.U. Habitats Directive.

Section 9.4.15 of the EIS chapter attached in Appendix A also includes a description of the surface water quality within the existing drainage network. This has been further detailed in a Pre-Construction Aquatic Ecological Assessment prepared in consultation with IFI and included in Appendix C attached. The EIS chapter also includes a water balance assessment.



3. Phasing of construction works

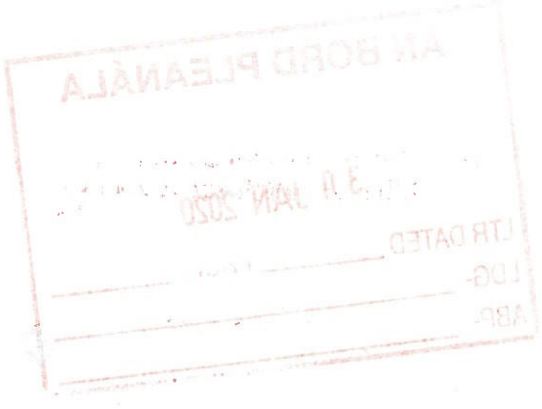
3.1 OVERALL WORKS PHASING

Environmental protection measures on site are outlined in more detail in Section 5, but at an outline level the works will be phased as follows:

- In advance of development, IFI requirements included for specific assessments and surveys. This has been carried out by Bill Quirke of Conservation Services, and their report is included in Appendix C.
- Following award of contract, a detailed drainage design shall be prepared by a suitably qualified Chartered Engineer. Stability has been generally assessed within Chapter 9 of the EIS, but even in the absence of peat on the site, in accordance with IFI recommendations and commitments outlined within the EIS, a geotechnical engineer shall also be engaged by the successful contractor to have oversight of the detailed design and construction methodologies to be employed.
- Immediately prior to commencement of excavation works for site infrastructure, initiate daily construction inspection regime and confirm phasing of work with the contractors responsible person;
- Identify, in detail, all drainage paths in development area;
- As much as possible, do not divert natural or existing flows. Upgrade existing drainage paths that cross the area of road construction;
- In accordance with Section 9.7 of the original CHHA, form suitable drainage paths from the construction areas including installation of silt traps and dispersal outfall fans, or dispersal channels. The drainage system will be installed from lower elevations to higher elevations to avoid any concentrated discharge onto areas without engineered drains (i.e. no material extraction works will take place unless a suitable drainage path from that construction area has been formed);
- On the upslope side of the borrow pit intercept drains will be formed to limit the volume of water entering the borrow pit area. Diverted water will be conveyed where possible directly to the upper reaches of the Shanna Bridge Stream in such a manner as to minimise contact with the works areas and thus minimise construction silt discharge;
- On the upslope side of site infrastructure intercept drains will be formed to limit the volume of water entering the excavation and construction areas. Diverted water will be conveyed where possible directly to the upper reaches of the tributaries of the Bunoke River in such a manner as to minimise contact with the works areas and thus reduce construction silt discharge;
- Camber the excavation and construction areas to allow silt laden surface water to flow into engineered or existing drains to the sides of site infrastructure where it is collected for storage and treatment;
- Treatment for suspended solids will be provided within these engineered drains in the form of silt traps at regular intervals for new engineered drains adjacent to new roads. Silt traps will also be provided at intervals along existing sections of roads;
- Initiate ongoing construction procedures for the maintenance of silt control systems for the duration of construction;
- The contractor's clerk of works / environmental manager will report on compliance with these mitigation measures. The responsible person will halt works where they consider that a continuation of the works will likely result in an unacceptable level of pollution or siltation to the local environment.
- Proceed to extract soil material by layers and remove to storage areas (i.e. borrow pit or linear banks adjacent to the site tracks);
- Exposed soil banks to be excavated at safe inclinations, maximum side slope of 45 degrees (this angle may be shallower depending on local material conditions);
- Proceed to import access track formation stone and complete track construction and cross-drains (where necessary);

- After construction of both access track and installation of grid connection cable, remove the type B silt traps and reinstate these areas within the operational drainage system. The type A silt traps will remain in place for operational attenuation and treatment purposes. Typical details of silt traps are included in below;
- Initiate ongoing operational procedures of inspection and maintenance of access tracks and other infrastructure for lifetime of wind farm.
- In accordance with IFI recommendations, a number of settlement areas are to be maintained during the operational phase to allow for the adequate settlement of suspended solids and sediments in order to minimise any deleterious matter from discharging into any natural waters.

The above bullet point list describes the main steps that will be followed and more detail of each infrastructural element is given below.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4. Proposed Drainage Works

4.1 CONSTRUCTION STAGE

As with any development of this type, the aim of all drainage works will be to slow the passage of water to minimise the volume of suspended solids discharged to the existing drainage network and wider environment. The design will also seek to maintain the existing drainage regime in so far as is possible. The proposed drainage works are highlighted in Appendix B (Indicative Proposed Drainage Layout).

The environmental protection measures proposed come under the following headings;

4.1.1 Maintain existing drainage channels

The aim of any drainage works carried out during the construction of the wind farm is to maintain the existing hydrology of the site, guard against soil erosion, protect the integrity of the works, and manage discharges to the environment. In so far as possible, existing surface water drains / drainage paths on site will remain unaltered. To this end, existing drains that cross the path of the proposed roads shall be upgraded with suitably sized cross drain piping prior to any excavation works for road construction taking place in that part of the site. Large surface water drainage pipes will be placed at these locations below the level of the proposed road sub-base. In accordance with IFI recommendations the minimum diameter for any new pipes shall be 900mm with 300mm embedment. These drainage pipes will be extended upslope and downslope of the proposed road, drainage and cable trench construction corridor, along the paths of the existing drains. By ensuring that these drainage paths remain unaltered, the design seeks to limit the flow of water that is to enter engineered drainage channels adjacent to the works. This will have the effect of maintaining existing drainage paths and surface drainage volumes draining to the upper reaches of the Bunoke River tributaries at these locations.

Note- in accordance with IFI requirements and in accordance with Planning Condition No. 5 (f), any instream works shall only be carried out during the open season which is from August 31st to September 30th;

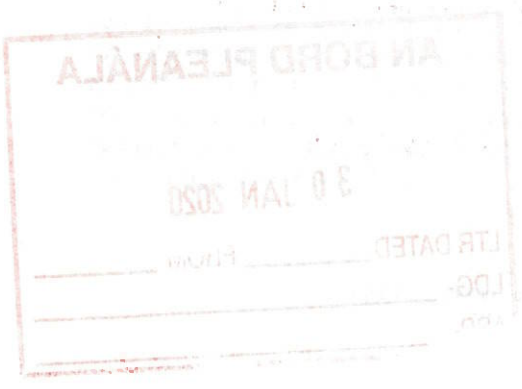
4.1.2 Appointment of a responsible person

A suitably experienced person will be appointed with responsibility for pollution prevention on site. The responsible person during construction will be an entity named under the civil contract and named in the various method statements. It will be a requirement of the civil contract that the responsible person will have previous wind farm construction experience on sites of a similar nature to the Ashford wind farm. The responsible person will incorporate environmental protection measures into the various tool box talks given prior to and during works.

4.1.3 Limiting surface water from entering excavations

Methods to reduce potential impacts of silt laden discharges include limiting the volume of water entering any open excavation. This will be achieved by:

- Intercepting surface water prior to it entering an excavation or works area. The use of an intercept drain on the upslope side of the borrow pit and other excavations will limit the volume of surface water that will enter excavations. The final locations for intercept drains will be determined on site. These will ensure that road construction materials are placed in conditions that are as dry as possible. With suitable compaction in dry conditions, adequate binding of the road and hardstanding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construction materials will again minimise the potential for silt laden run-off water from the works.

- Limiting the size of the excavation. During the construction phase, excavation of soils in the localised area around the turbine locations and new access roads will be kept to a minimum, to ensure minimal disturbance of the natural soil conditions.
- Limiting the duration that an excavation remains open. All excavation works will be programmed to limit the duration that excavations remain open. For new roads, topsoil stripping operations will be carried out no more than 100 metres ahead of construction works and road excavations will remain open for no more than 3 days. No section of excavated road should be left open overnight. For turbine and substation construction, operations will be programmed such that excavations to formation level will be exposed for no more than 2 days prior to blinding concrete being placed.

4.1.4 Collecting water from excavations for treatment

For surface water that does enter excavations, and for groundwater that arises from lowering the ground profile, it is proposed to collect this water into engineered drains / swales within the works area. Engineered drains as indicated in Appendix B (Indicative Proposed Drainage Layout) will be located around the majority of new and upgraded road locations and adjacent to critical areas: larger area excavations such as the borrow pit, turbine foundations and hardstandings.

Along flatter sections within the site, swales shall be installed and vegetated with flood tolerant, erosion resistant plants. The design of the swales promotes the conveyance of storm water at a slower, controlled rate and acts as a filter medium removing pollutants and allowing stormwater infiltration. A vegetated swale results in a significant improvement over the traditional drainage ditch in both slowing and cleaning of water.

The intention is to construct swales along the site footprint. Culverts will be installed to carry water under the road at regular intervals where necessary. These swales will feed to various treatment methods as outlined below which will help to reduce hydraulic loading to watercourses.

While pumping from excavations may be required at the borrow pit or at other locations as a result of unexpected adverse weather events, it is not likely to be needed due to favourable ground conditions.

4.1.5 Limiting stockpiles and collecting water from material stockpiles for treatment

Due to the shallow nature of the road construction, large stockpiles of materials are not envisaged adjacent to the new and upgraded roadways. Material excavated for the roadways will be spread across adjacent lands and landscaped, or stored in linear banks adjacent to the road following a risk assessment as recommended by IFI. Temporary stockpiles adjacent to turbine and hardstanding construction will be surrounded by the engineered drainage system feeding run-off to environmental protection measures listed below. These shall be limited to confined areas in accordance with IFI recommendations and either covered with temporary plastic sheeting or vegetated with suitable plants to promote stability. Where deemed appropriate by the responsible person, silt fences can be incorporated at the downslope toe of temporary stockpiles to limit by screening suspended solids from entering the engineered drainage systems (for further detail see section below on Treatment measure No.2 - silt fence).

No stockpiles will remain on site following completion of construction. No stockpiles will be placed within 50m of existing streams.

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4.1.6 Collecting water from road & hardstanding construction materials for treatment

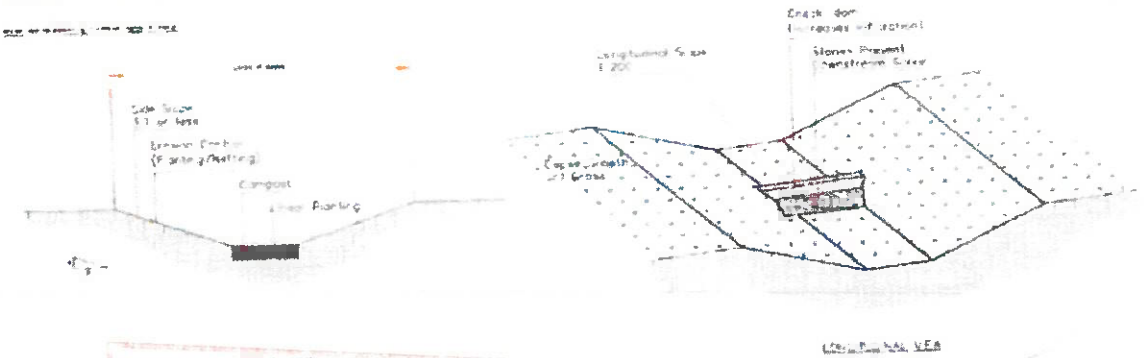
An interception system will be constructed to formalise the drainage paths from construction and storage areas. These interception drains will collect silt laden surface water for treatment.

Road cambers will be such that they feed run-off into the engineered drains at near perpendicular angles to the road and hardstanding edge. This will reduce the runoff path distance and thus the contact time between surface water and construction materials to limit the potential of surface water run-off collecting silt.

4.1.7 Swale attenuation

Storage within swales will buffer the larger volumes of run-off discharging form the drainage system during periods of high precipitation, by retaining water, thus reducing the hydraulic loading to water courses. Buffers shall be constructed within the swales using a dam of impermeable soil. This shall reduce the velocity of flows to encourage settlement of silt. The dams will be constructed from stone fill and lined with a geo textile layer to entrap any silt particles which may be present.

These will reduce the velocity of flow in the drains, thus reducing soil and subsoil erosion and reducing hydraulic loading to watercourses thus ensuring that there is no increase in the drainage efficiency of the site. Consideration will also be given to the insertion of hay bales at points along the drainage channel as a temporary measure during the construction phase to further mitigate against any sediment escaping to nearby watercourses. Any such bales shall be regularly replaced during the construction period, and removed following the completion of the construction period.

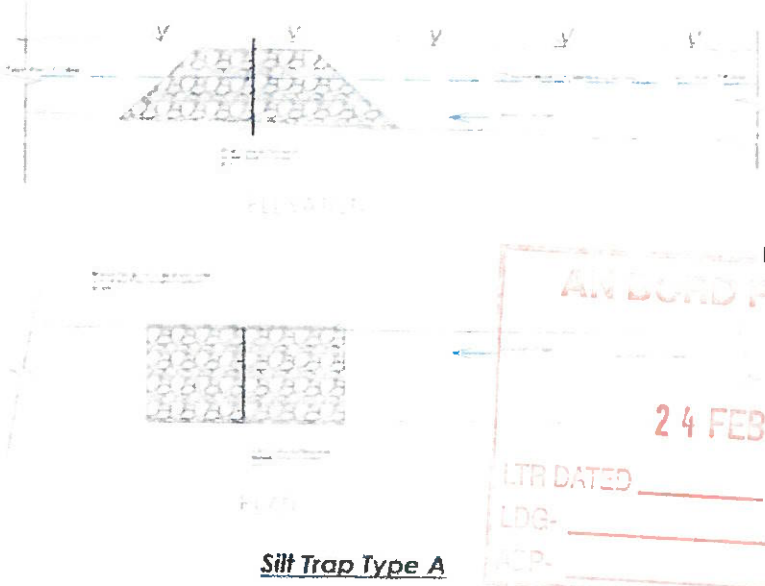


Swale Design (with Check-dam)

4.1.8 Treatment measure No.1- Silt traps and dispersal channels

Run-off from the works areas will be controlled by sediment traps or "silt traps".

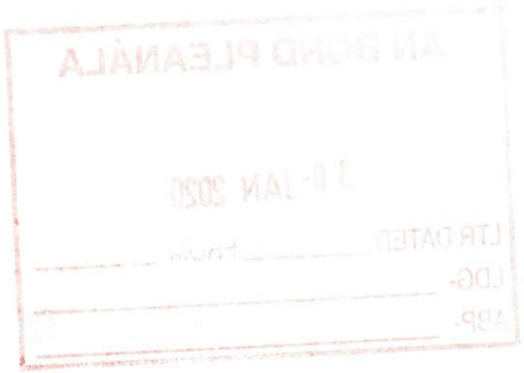
As identified on the attached map and accompanying detail, two types of silt trap are proposed to reduce the suspended solids content of water within the engineered drainage system. The first of which, Type A, will seek to simply reduce the velocity of flows within the engineered drainage systems. A washed stone and filter membrane will be used for this purpose as shown in detail Type A .



Silt Trap Type A

For Type B, it is proposed to have a larger silt trap to both reduce the velocity of silt laden water, and also filter suspended solids from water passing through the trap. It is also proposed to utilise the filtering potential of the existing vegetated areas to limit the flow of silt laden waters to the existing drainage channels. Dispersal channels to deflect flow across existing vegetated areas prior to a dissipated discharge into drainage ditches will be incorporated as required. The silt trap Type B construction is a filter membrane - stone - straw - stone - filter membrane arrangement that has the following functions:

- Slowing the water flow at a deeper section of the drain to help with the settlement of suspended solids;
- Filtering water that passes through the engineered drain prior to discharge to downstream sections;
- Diverting water to dispersal channels for filtration through the grassland/forested areas.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Road cambers will be such that they feed run-off into the engineered drains at near perpendicular angles to the road and hardstanding edge. This will reduce the runoff path distance and thus the contact time between surface water and construction materials to limit the potential of surface water run-off collecting silt.

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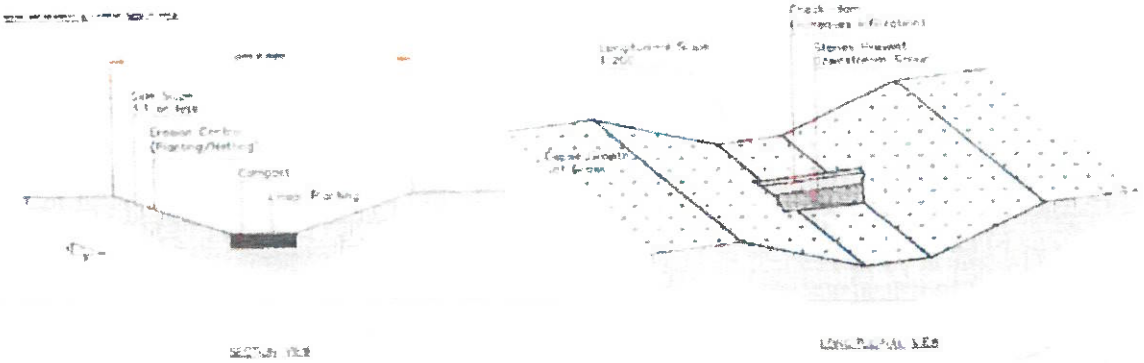
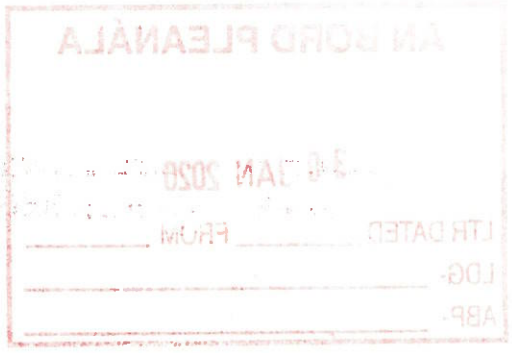
These will reduce the velocity of flow in the drains, thus reducing soil and subsoil erosion and reducing hydraulic loading to watercourses thus ensuring that there is no increase in the drainage efficiency of the site. Consideration will also be given to the insertion of hay bales at points along the drainage channel as a temporary measure during the construction phase to further mitigate against any sediment escaping to nearby watercourses. Any such bales shall be regularly replaced during the construction period, and removed following the completion of the construction period.



Swale Design (with Check-dam)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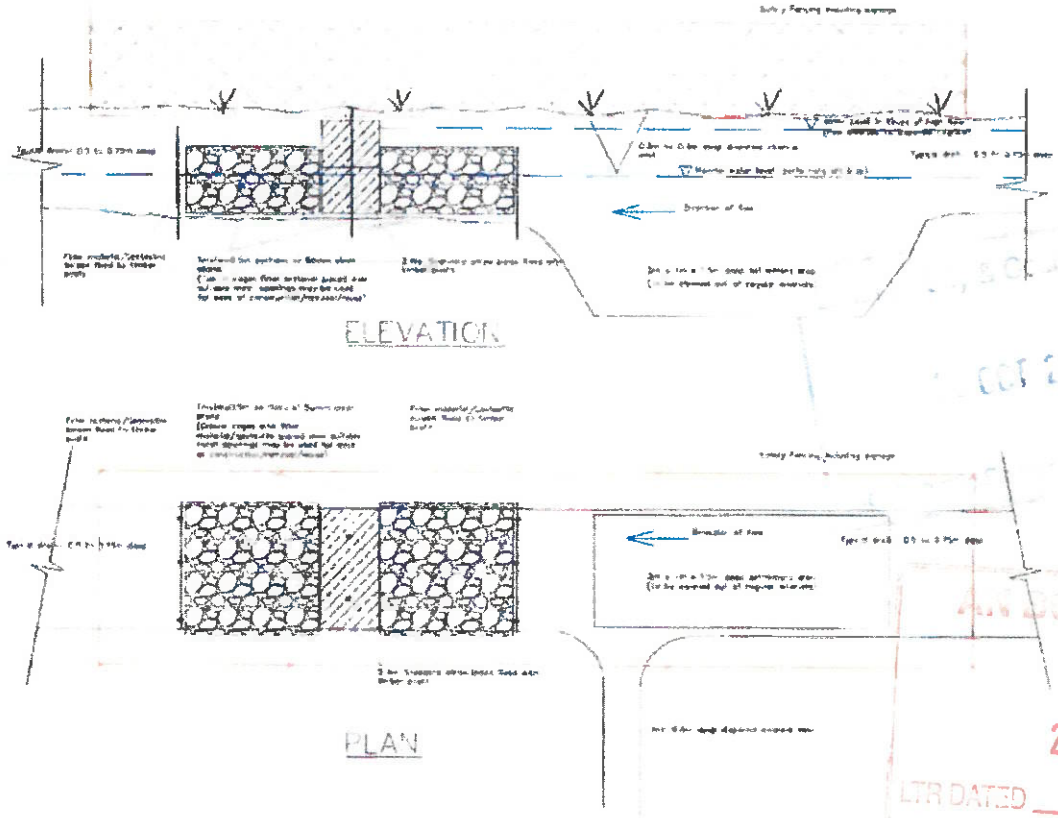


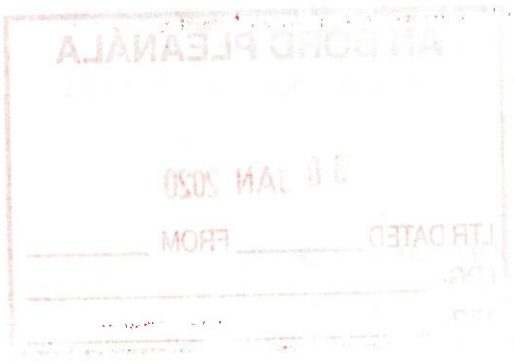
Silt Trap Type B (with inlet to dispersal channel)

Silt traps will also have the added effect of assisting on-site attenuation within the engineered drains at times of high flow. The terram that will be used in the silt traps is Terram NP3 (or trade product giving similar filtration performance) a 3.0mm thick geotextile which has a pore size of 120microns and a permeability of 100 l/m²/s as per the attached datasheet in Appendix D: Terram Filtration Material Technical Datasheet.

In accordance with IFI recommendations, the silt traps design and location settings shall be designed to minimise the movement of silt especially during intense precipitation events where the trap maybe hydraulically overloaded. Therefore, the top of the silt traps shall be fixed with a treated timber weir system for times of high flow. This weir is to be fixed to the silt trap with the top in a level plane to avoid a concentrated discharge over the top of the trap at any one point. Dissipating the flow across the weir in this manner will also assist with the settling of sediment upstream of the silt trap.

4.1.9 Treatment measure No.2 - silt fence

As an additional measure where deemed appropriate by the responsible person, a silt fence shall be placed. The silt fence shall comprise a filtering membrane (Terram NP3 material or similar approved) fixed with timber posts to interrupt sheet flow coming from heavily trafficked areas or temporary stockpile areas. This includes in particular a continuous silt fence immediately downslope from the consented borrow pit location (and upslope from the intercept drain). As with the silt trap maintenance regime, the silt fence is to be checked at regular intervals by the appointed responsible person and maintained as required.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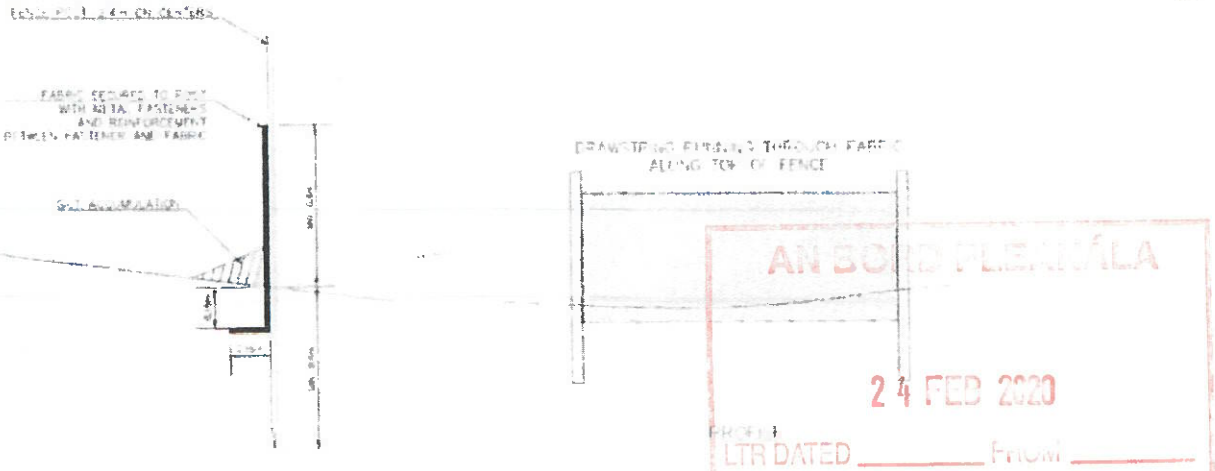


Silt Fence

4.1.10 Use of appropriate machinery

Low ground bearing pressure machinery (tracked machinery) will be used to minimise compaction of the soil. The machinery will in the main be operated from the road as it is constructed, and working of the machinery off of the road will be kept to a minimum.

Access for machinery to excavations will also be limited to the minimum timeframe prior to placement of engineering fill materials or blinding to minimise risks from fuel, oil or lubricant leaks. See also the section below on Environmental Protection Measures - Oil and grease, Fuel spills for additional machinery environmental protection measures.

4.1.11 Concrete from substation and turbine foundation construction

Concrete wagons will not be permitted to wash out on site. Only the chutes on the concrete wagons can be washed down at designated pollutant containment locations. These are to be sealed locations which will not permit discharge to any waters.

4.1.12 Environmental Protection Measures - Oil and grease, Fuel spills

The storage and use of hydrocarbons on site shall be strictly controlled. Measures are included within 9.7.2 of the EIS and include 110% bunding of fuel storage points. All site vehicles are to be equipped with appropriate spill kits and training in their use and application is to take place with all operatives.

4.1.13 Site office management and Removal of wastewater from the site

In accordance with IFI recommendations, details in relation to site offices and the services necessary for the site offices are included in the EIS. Wastewater from the temporary sealed type site welfare facilities shall be removed from the site on a regular basis.

4.1.14 Site Security

Controlling access to the site is a further measure that can reduce the risk of pollution. There is one point of access to the main wind farm site roads and this access point will be locked each evening and at weekends. Under health and safety rules, all personnel entering the site will be required to report to the site office and access will be further controlled in this manner.

4.1.15 Monitoring & Maintenance (recorded in an Environmental Management Plan)

Also in accordance with IFI recommendations, section 9.7.2 of the EIS and an Environmental Management Plan to be maintained on site. silt traps and pollution control measures are to be located with good access to facilitate monitoring, sampling and maintenance. Regular sampling is to take place at monthly intervals during the construction period.

As with any environmental protection measure, the systems outlined above will only work if properly maintained. It is proposed to keep a log of all environmental protection measures installed and indicative locations are shown in the drawing attached. The protection measures are to be checked by the responsible person on a daily basis during wet weather, or every third day during dry weather. Any non-performing or broken silt trap or silt trap constituents, or other protection measure, are to be removed and replaced as a priority. The number of silt traps will be increased on site in certain areas if necessary. A sample silt trap log is enclosed in Appendix E: Sample Silt Trap Log.

4.1.16 Incident Response Plan

An incident response plan shall be prepared and kept within the site office. This shall include procedures to be followed in respect of a pollution incident and contact details of the statutory stakeholders.

4.1.17 Wells

As outlined in the EIS, groundwater wells or springs are not to be impacted during construction. The GSI database indicates that there are no in-use domestic or agricultural wells within 1.5km of the site and no springs were identified on the site. As none are identified, water quality measurement is to be focused at the environmental protection measures on rather than at any wells removed from the site.

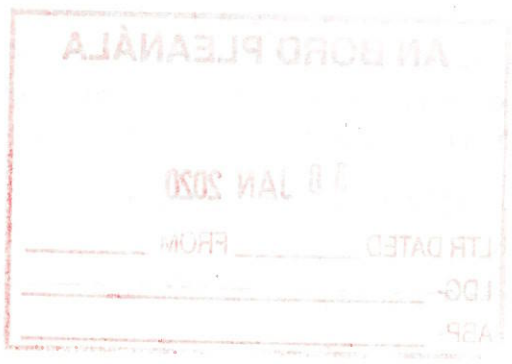
4.2 OPERATIONAL STAGE

After the main ground construction works are completed material disturbed during the ground construction stage will be reinstated and re vegetated. For the operational phase the proposed drainage regime will be a continuation of the drainage regime and protection measures used during construction.

The proposed drainage regime will consist of swales feeding directly into the wet ditches, dry ditches and local land drains on site, which flow in turn to the upper reaches of the tributaries to the Bunoke River.

In order to avoid pollution from silt traps that will disintegrate over time all straw and filter membrane material within the silt traps will be removed from the swales at the end of the construction phase and replaced with new washed stone where silt traps/check dams are being retained for the operational period. In accordance with IFI recommendations, a number of settlement areas are also to be maintained during the operational phase to allow for the adequate settlement of suspended solids and sediments in order to minimise any deleterious matter from discharging into any natural waters. Any dispersal drains used during the construction period will be reinstated.

At this stage the vegetation in the swales will now be mature enough to promote the conveyance of storm water at a slower, controlled rate and acts as a filter medium removing pollutants and allowing stormwater infiltration. This will result in a significant improvement over the traditional drainage ditch in both slowing and cleaning of water.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The excavation required for the borrow pit will be reinstated appropriately.

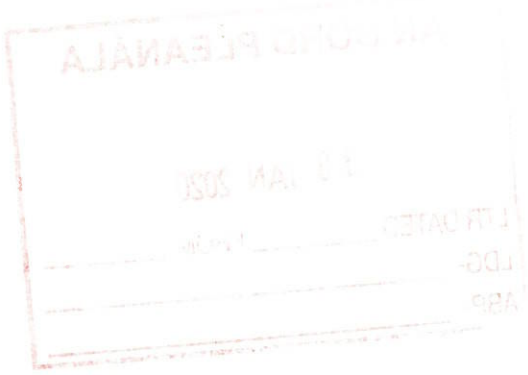
There will be limited wind farm related vehicular movement on site during the operation phase, limited to service vans (or similar light goods vehicles) making approximately 3 to 4 visits per month. The potential for pollution from these movements is negligible.

All service vehicles will carry spill kits. During the operational phase of the development, all materials required for the maintenance of the turbines will be stored according to good practice and in areas either off site or in bunded areas with impermeable floors on site.

As is the case with any unbound track, wind farm tracks require to be monitored during the operational phase. The following recommendations are given to be checked at regular intervals to ensure the access roads are in good repair and that maintenance is carried out before sufficient deterioration occurs in order to reduce the potential for significant silt release or track failure.

- Inspections should be carried out by suitably qualified personnel at least quarterly, after significant periods of poor weather, or after a report of track deterioration by service staff or local landowners;
- ensure that there is no significant standing water forming, which would lead to the forming of potholes in the running surface;
- if there are areas of track identified that are deteriorating, repairs should be carried out in favourable, preferably dry, conditions, to ensure that there is no saturation of the surface of the track;
- ensure that it is always possible for the surface run-off to clear the road edges. It will be necessary to clear channels periodically to allow the run off to exit clearly;
- ensure the transverse camber or cross fall surface profile is maintained;
- any installed silt traps retained after construction reinstatement should be regularly inspected and procedures should be put in place to have them inspected along with access tracks and cleared out regularly. It is recommended that clearing out is done in a period of dry weather, when flows would not affect the disturbed silt materials.

The risk of pollution from the wind turbines themselves during operation is negligible.



ATTACHMENT # 9
(PART 1 OF 2)

Annex to Condition 5- Construction-Stage Drainage Report and Construction Management Plan

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