

**Archimedean Screw
Hydropower installation at
Guyzance Meander**

Environmental Management System

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0. ASSUMPTIONS

This document (EMS) is to be read in conjunction with the designer's drawings and the other application documents for consents. Reference is specifically made to the Designer's Risk Assessment (DRA) document, and to the Environmental Sustainability Assessment (ESA), which give the background to environmental risks of this project and to the ecological controls in the present document. **Construction Method Statements (CMSs) subsequently developed by contractors to the project are expected to defer to this EMS.**

1. INTRODUCTION

If uncontrolled and unmitigated, construction of a development of this sort could potentially have significant impacts on the environment. This Environmental Management System (EMS) details how environmental impacts of the scheme are to be managed during construction and how they have been mitigated during the design of the scheme. The EMS will be owned and further developed by the principal contractor once subcontractors have been appointed and before works commence on site.

The site at Guyzance Meander is on the riverbank in the River Coquet and Coquet Valley SSSI.

2. Scheme Objective

Construction of a micro-hydropower scheme utilising the head of water around Guyzance Meander, by installing an Archimedean screw turbine in a new bypass channel, creating an intake to the bypass, and (subject to agreement by the EA) adding superficial enhancements to the existing weir (Guyzance Mill weir).

3. SITE LOCATION

The site is at the base of Whirleyshaws Hill near Acklington. It is accessed via a track leading northeast from the minor road adjacent to Wellfield House, Acklington Park, Northumberland NE65 9AA. The holder of the permissions for works is the site owner Mr Jonathan Dodd.

4. SITE GEOLOGY

WHS Consulting report that the Coquet valley in this area has as its bedrock a sedimentary mudstone / siltstone / sandstone of the Stainmore Formation, with a Pike Hill Limestone in the area of the weir and downstream. The meander carves into these bedrocks as it flows around a glaciofluvial hill with alluvium and river terrace deposits at its base.

5. SITE MANAGEMENT

Though the site will be in overall control of the Contract Manager day-to-day management will be by a full time foreman or site manager. [Contact details to be inserted:] _____
Personnel will be site inducted and made aware of their environmental responsibilities.

6. CONSTRUCTION PHASES

The works will be undertaken in a single period of approximately 10-12 weeks in 2019 or a subsequent year, during the period from March to September, with works in the river itself between June and September only (to avoid disturbance to migrating salmonids).

Work will take place during daylight hours only. Progress on works in river will be interrupted in the event of high river flows, based on ongoing assessment of catchment weather and river flow conditions by the site manager or deputy.

Contractors will be required to develop working method statements for all key construction operations.

Proposed phases are as follows. Phases 3 to 7 may overlap and their sequence is subject to change.

Phase	Description
1	prelims, clearance, access track, turn circle
2	upstream cofferdam in
3	excavate and construct intake; stop off intake (sluice)
4	upstream cofferdam out (can overlap following works)
5	excavate and lay pipe; backfill (can overlap other works)
6	downstream cofferdam in (can overlap preceding works)
7	excavate and construct turbine foundation and outflow works
8	construct powerhouse shell
9	downstream cofferdam out

10	mechanical installation (turbine etc)
11	cable installation (can overlap preceding works)
12	powerhouse roof, cladding, details, electrics
13	manual works to weir (independent of other works)
14	tidy and clear site

7. WORKING METHODS

Contractors should note that the site, including areas for working space and compounds, falls within Environment Agency Flood Zone 3.

Contractors must work within the terms of Environmental Permits obtained from the Environment Agency – typically for all works within 8m distance of the riverbank and/or in the flood plain.

Working widths will be kept to a minimum to minimise impacts on vegetation and wildlife. A mini-digger will be used for the cable trench on the Guyzance Hall bank.

The turbine assembly will likely be demounted off-site into two parts for delivery to site in order not to exceed road width constraints. If so, the supporting trough will be delivered on its side, unloaded from its trailer by crane, rotated by crane, and installed by crane. The hydrodynamic screw will be delivered with sections demounted to reduce width for transport; these will be remounted on site, the screw being installed by crane from the trailer.

Heavy lifts at delivery date will be by heavy mobile crane using spreader pads. Other lifts during works will be by 360° excavator, small crane, HIAB, or telehandler.

8. ENVIRONMENTAL CONTROL MEASURES

Environment Agency (EA), Natural England (NE), and Northumberland County Council (NCC) have been consulted on the proposed works and methods.

Construction impacts are generally temporary, localised and short term in nature. The main impacts arising from the construction phase are noise and vibration arising from excavation and construction works, which could cause disturbance to adjacent wildlife or habitats. These impacts have been considered prior to consenting and mitigated by seasonality/timing of works.

Construction movements may also cause minor, intermittent and/or short term disruption to traffic on the public road. There is no public right of way through the site.

The most important risk to be reduced is potential pollution of the watercourse which at this site has the potential to cause detriment to the River Coquet and Coquet Valley SSSI.

The subsections below identify all ecologically sensitive features on site and any specific measures which personnel must take to ensure their protection. This forms part of the project management documentation, should be included in the CDM file, kept in the site office, and should be available to personnel on site at all times. The content of the following subsections should be presented in a toolbox talk to all personnel.

Works shall be carried out in accordance with following control measures to respect ecological constraints identified in consultation and described in the Environmental Sustainability Assessment. Contractors must regularly review with project manager to ensure awareness of any changes or updates to these constraints.

A project ecologist is appointed who is licensed by NE as required for specific species survey work. All ecological questions arising during works should be addressed to the project ecologist by or on behalf of the site manager. [Contact details to be inserted:] _____

A scale map of the site and environs will be printed out and displayed in the site office, to be known as site ecology map. Ecologically sensitive features must be marked onto this map by the ecologist prior to works or as soon as identified.

Any ecological buffers required as a result of the ecologist's findings during works should be demarcated clearly to all personnel.

Pollution prevention

All personnel will be advised of the necessity of protecting the landscape from pollution or contamination. Particular emphasis will be laid on the necessity of allowing no polluting or other material to enter the river.

Protected species

Personnel must read and apply guidance below in relation to protected species.

Identification photos of all protected species mentioned below should be displayed in the site office.

In addition to the specific measures below, **if any of these species is found on site during construction, work will stop until project ecologist has advised how best to proceed.**

Otters: Local otter activity is likely, though survey found no holts or other features of otter activity on site. Prior to the works the project ecologist must check within a 50m radius of the working site for signs including natal otter holts as per advisable best practice. Holts in this zone will then be screened or buffered, and avoided - or excluded/removed by licence from Natural England. A breeding otter should be strictly protected from disturbance to ensure that it does not abandon its cubs. Then if in the opinion of the ecologist any area of habitat offers reasonable potential to support a nursing female, this will be marked on the site ecology map. In all cases, works will be during limited daylight hours only (see 27). To avoid risk of otters becoming trapped in workings, any excavations left open outside working hours must be provided with an effective ramped exit (e.g. a gentle slope or a wide plank) to ground level.

Badgers: Local badger activity is likely, though survey found no setts on site. Prior to the works the project ecologist must check within a 30m radius of the working site for signs and if any new setts found mark these on site ecology plan. Setts in this zone will then be screened or buffered, and avoided - or excluded/removed by licence from Natural England. To avoid risk of badgers becoming trapped in workings, any excavations left open outside working hours must be provided with an effective ramped exit (e.g. a gentle slope or a wide plank) to ground level.

Native white-clawed crayfish: Ecologist has considered that crayfish are likely absent at this site, though potential habitat is present. Personnel must be alert to the potential presence of crayfish in this area and report any found.

Bats

Trees in the site area have been surveyed as having negligible to low potential for bat roosts. **Any clearance or trimming of trees must be preceded by an ecologist's aerial inspection to confirm absence of bat roosts.**

Birds**Minimising disturbance:**

Works should take account of the presence of bird populations in local woodland. No temporary exterior lighting shall be permitted above the ground contour. Where piling is necessitated by ground conditions on site, if this is allowed to proceed during sensitive periods, moveable temporary acoustic screens may be obtained to be placed around the piling rig. At all times any such disturbance will be limited to daylight weekday working.

Breeding birds

Breeding birds must be protected during clearance.

- **Any clearance or trimming of trees shrubs or hedges should preferably take place prior to the bird breeding season (March to August inclusive).**
- **Any clearance or trimming of trees shrubs or hedges between March and August inclusive must be preceded by an ecologist's inspection for nesting birds.**
- **ANY works within 10m of the riverbank between March and August inclusive must be preceded by an ecologist's inspection - specifically - for nesting kingfishers.**

Red squirrel:

Ecologist has considered that red squirrels are likely absent at this site - grey squirrels are present locally. No specific measures are proposed.

Water voles: Ecologist has considered that water voles and their burrows are likely absent at this site. No specific measures are proposed.

Great Crested Newts

Ecologist has found that potential for presence of GCNs is low. No specific measures are proposed.

Reptiles

Ecologist has considered that reptiles are likely absent at this site. No specific measures are proposed.

Freshwater fish

Subject to approved cofferdams and pollution control, no specific protective measures for fish are required during construction works. If a high flood event leaves fish isolated within a cofferdam, a fish rescue must be performed by the licensed ecologist with assistance from the EA.

It is also possible that a condition may be applied requiring **monitoring of habitat conditions** for fish before/during/after works or before/after hydro scheme operation. **Contractors must check with the project manager** to confirm whether the project is subject to a requirement to schedule monitoring works - such as invertebrate sampling or water quality sampling - prior to commencement of each phase of works.

Other fauna

Ecologist has considered that risk of detriment to common toads, hedgehogs, and butterflies is low and no measures are proposed.

Illegal spread of invasive plants

To avoid spread of invasive plant species, the procedures below must be followed. An information sheet for each of these species will be printed out and displayed in the site office to aid identification. Site personnel will be made aware of these requirements via a toolbox talk.

Himalayan balsam:

- Information sheet: http://www.europe-aliens.org/pdf/Impatiens_glandulifera.pdf
- Any visible plants may be removed by manual picking, taking care to pull out the shallow root
- Largest risk is from spread of fallen seeds, therefore all topsoil removed from the identified areas must be isolated.
- All such topsoil and parts of removed plants will be disposed of as controlled waste

Japanese knotweed:

- Information sheet: http://www.europe-aliens.org/pdf/Fallopia_japonica.pdf
- Any visible plants may be removed by cutting
- Largest risk is from spread of fragments of root rhizome, therefore all topsoil removed from the identified areas must be isolated.
- All such topsoil and parts of removed plants will be disposed of as controlled waste

Giant hogweed:

- Information sheet: http://www.europe-aliens.org/pdf/Heracleum_mantegazzianum.pdf
- During clearance, personnel will wear long trousers, long sleeves and gloves to prevent exposure to harmful sap
- In small populations, giant hogweed can be effectively killed by root cutting 10cm below ground level.
- As the plant flowers only once in its lifetime and dies after setting seeds, root cutting only can be applied to vegetative plants, together with destruction of all flowers/seeds from flowering plants.
- All parts of removed plants will be disposed of as controlled waste

Common rhododendron

- Information sheet: http://www.europe-aliens.org/pdf/Rhododendron_ponticum.pdf
- Any visible plants may be removed by cutting and digging out of roots
- Largest risk is from spread of seed – even when removing outside of flowering season, ensure that all parts of plant are removed
- All parts of removed plants will be disposed of as controlled waste

9. DRAINAGE AND WATER QUALITY

The works shall be planned and executed in accordance with the former PPG5 Pollution Prevention Guidelines of the Environment Agency: Works and maintenance in or near water:

There are no surface water drains or ground water openings in the vicinity.

Water from excavations shall be pumped to silt traps before allowed to return to the river.

Contractors must ensure operations do not give rise to discharge of other liquids into the watercourses.

Particular care is to be taken to prevent spilt concrete from entering watercourses or any identified ecologically sensitive features.

If plant and tools are washed on site, or if plant is refuelled on site, this must be within a bunded area away from the watercourse and any identified ecologically sensitive features.

Plant will use biodegradable drilling oils.

All site personnel will have immediate access to spill kits when machinery is being used.

In the event of any spillage, the first actions are to stop the source of pollution and contain the spillage.

Self-contained portable toilets and sanitary facilities will be provided for site use.

10. PROTECTION OF BURIED SERVICES

Enquiries with landowners have revealed no buried services at site. **On discovering any unknown buried services or former services, these must be appropriately marked and the project manager informed to undertake further investigation to ensure safety before proceeding with works.**

11. ARCHAEOLOGY AND HERITAGE

Before works, check whether any planning condition has been applied to require a watching brief during works. No deviation by contractors is permitted from strict terms of the agreed plans and methods unless approved beforehand by the project team. **If a need arises to make changes outside the terms of what is consented, first bring this to attention of the project manager.** Please note the following:

Guyzance or Brainshaugh Chapel on the opposite riverbank (at NU2083703136) is listed Grade II* and a Scheduled Ancient Monument. This asset is distant from and not physically affected by the works.

Guyzance Mill is classed as a Grade II listed building. This asset is distant from and not physically affected by the works. The nearby weir is not listed. The agreed modifications to the weir are superficial and underwater, and their location is not visible from or in public views of the listed building.

12. BIODIVERSITY and ECOLOGY

This plan details the prevention, and mitigation measures that have been incorporated into the scheme to minimise impacts identified during the consultation noted above. Any permanent mitigation required, in terms of replanting etc will be conditioned in the planning consent.

13. CONTROL OF POLLUTION.

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Self-contained portable toilets and sanitary facilities will be provided for site use.

14. STORAGE OF MATERIALS

The following measures will be taken to minimise the potential for impacts:

Oils, fuels, liquids and other potential pollutants will be stored securely in sealed containers capable of withstanding floodwaters. To prevent vandalism all valves will be tamper proof and lockable.

Drums and barrels, including those for fuel oils will be bunded, clearly labelled and fitted with flow control taps, and sited away from watercourses.

Spill kits will be located near the works area and within storage compound, and personnel trained in their use.

15. WASTE, RECYCLING OF MATERIALS

Excavated materials will be stored in separate stockpiles prior to sorting for re-use.

Soil contaminated with invasive plants or their seeds will be isolated for appropriate disposal

No other hazardous arisings are anticipated

16. SOURCING OF MATERIALS

Granular fill and aggregate will come from the nearest suitable quarry

Contractors will attempt to locally source all other building materials

FSC certificated timber will be preferred

17. RESTORATION OF SITE TO PRE EXISTING CONDITION

Topsoil will be replaced and recolonisation by locally-present species will be actively encouraged.

18. GROUND CONTAMINATION

Historic uses of this site identified from map regression give no basis to suspect ground contamination.

19. TREE PROTECTION PLAN (TPP)

Works must comply with the project TPP.

Site boundary fencing and protective bund will protect shrubs/hedges at boundaries.

Existing wall/fence lines along existing access track will protect trees/shrubs beyond.

20. LIASON WITH NEARBY RESIDENTS AND THE LOCAL COMMUNITY.

Project client will make any public announcements regarding the works.

21. ACCESS FOR PEDESTRIANS AND CYCLISTS

Site is not public. Nearby public routes are unaffected.

22. WELFARE

Mess huts, potable water, and portable toilets will be provided on site for use by personnel.

23. LOGISTICS TRANSPORT AND ROADS / SITE ACCESS DURING WORKS PERIOD

Construction traffic will not exceed ~10 vehicles per day at peak and these will not impact public routes. An exception will be the 24-48 hour period of delivery of the screw turbine, when the delivery trailer and the heavy crane may each slow traffic on the local road for two short periods: once during approach to the site, and once when quitting the site.

24. PROPOSED VEHICLES TO BE USED

25-tonne tracked excavator

Track or similar dumper truck

Mini-hydraulic excavator

(biodegradable hydraulic oil will be used)

Heavy lifts at delivery date will be by heavy mobile crane using spreader pads. Other lifts during works will be by 360° excavator, small crane, HIAB, or telehandler.

25 EMERGENCY PLAN IN CASE OF PLANT BREAKDOWN

In case plant working in the river breaks down, another machine will be made available to pull the broken down machine to a point of safety. When not in use, plant will be safely parked outside access routes.

26. CONTROLLING SEDIMENT RUNOFF

An impermeable bund will be employed in sensitive areas.

27. SITE HOURS

Normal working hours will be within 0800 – 1700 Monday to Friday, 0800- 1300 Saturday. No work will take place on a Sunday, Bank or Public Holiday.

28. NOISE AND VIBRATION

The nearest properties are >140m distant from the site, shielded by rising ground and trees.

Noise and vibration levels will be kept to a minimum and within specified limits.

Machines will be throttled down when standing and turned off when not in use

Care will be taken when unloading vehicles to minimise noise.

Deliveries will be timed to arrive during daylight hours only.

Whilst unloading engines will be switched off.

All plant will be properly maintained and operated in accordance with the operators' instructions.

29. AIR QUALITY AND DUST AND EMISSIONS

Care will be taken to ensure both dust and odours are minimised.

Burning of materials on site will not be permitted

30 SITE BOUNDARIES

Site perimeter where not already defined and obstructed by ground features (hedges, river, etc) will be lined with Heras fencing excluding public access.

31. ENVIRONMENTAL APPROVALS, LICENCES AND PERMITS

Planning consent is required from NCC

Environmental Permit/s for Flood Risk Activities are required from the EA
Fish pass formal approval is not required for proposed modifications, but the latter will be agreed with the EA
Approval will be required from NE as statutory consultee to EA and NCC regarding the SSSI
Abstraction (and, less likely, impoundment) Licences from the EA will be required for operation of the scheme, and will be obtained before construction

32. METHOD STATEMENTS

CMSs are to be elaborated by contractors for specific activities. Contractors are expected to implement the terms of this EMS in their CMSs. These should include information under the following or equivalent headings:

- Location of the activity and access / egress arrangements
- Work to be undertaken and methods of construction
- Plant and materials to be used
- Labour and supervision requirements and provision
- Health, safety and environmental considerations
- Understanding of and compliance with any permit or consent requirements

33. Operational management

On completion of construction and commissioning of the system, the operator will be the licence-holder of the abstraction licence obtained from the EA. The operator is legally obliged to operate the scheme in accordance with the terms of this licence. The licence terms will cover protection of the river environment, with the licence application having addressed those aspects of operation which are foreseen to incur potential environmental risk.

In the light of specific residual risks which cannot be conditioned in the licence itself, the EA is entitled to further require that an operating agreement is drawn up; and will do so in this case if it considers this to be an appropriate measure.