CONSTRUCTION STAGE DRAINAGE STATEMENT

For

PROPOSED DEVELOPMENT OF
COAL CLOUGH WIND FARM
OVERTOWN ACCESS TRACK

JULY 2013
DOCUMENT REFERENCE NO: JU074/PCA/001

Donaldson Associates Ltd
Eastfield
Church Street
Uttoxeter
ST14 8AA
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1.0 INTRODUCTION

1.1 Donaldson Associates Limited (DAL) was appointed by Scottish Power Renewables (SPR) to provide drainage advice for the construction stage of Coal Clough Overtown Access Road.

2.0 RELEVANT GUIDANCE DOCUMENTS

2.1 Legislation and Planning Policy

The site development is bound by the conditions stated in granting planning permission for the development. In addition, all works affecting the water environment are bound by the following:

- EC Freshwater Fish Directive (78/659/EEC)
- Habitats Directive (92/43/EEC)
- Integrated Pollution Prevention & Control Directive (2008/1/EC)
- Flood and Water Management Act 2010
- UK Water Quality (Water Supply) Regulations 2000
- Pollution Control and Local Government Order 1978
- The Groundwater Regulations 1998
- Fisheries Act 1966
- Land Drainage Act 1994
- Code of Practice for Protecting Board Maintained Watercourses and Culverts
- The Environment Act 1995
• EC Dangerous Substances Act
• The Control of Pollution (Oil Storage) (England) Regulations 2001
• Development and Flood Risk PPS 25

2.2 Enforcement

It is an offence to cause or knowingly permit the entry of poisonous, noxious or polluting material into the water environment. Prosecution may ensue if the pollution is serious enough to lower the ecological status of the water body in terms set by the Water Framework Directive (2000/60/EC). For example, changing the ecological status of surface water from good to moderate or poor would be determined as ‘environmental damage’.

The polluter does not have to be prosecuted first for remediation of damage to be required. If water pollution is serious enough to be classed as environmental damage the damage will require to be remediated such that the area is returned to the condition it would have been in if the damage had not occurred.

An offence may also be committed if environmental damage or the threat of environmental damage is not reported by the polluter or if no action is taken by the polluter to prevent further damage. Third parties (e.g. private water supply users, landowners, recreational users (anglers etc), general public etc) who may be affected by possible damage may also report ‘risk’ of environmental damage to the enforcing authority; in this instance an offence may be committed if action is not taken to prevent the potential environmental damage occurring.

3.0 DRAINAGE DESIGN PRINCIPLES

3.1 General Principles

The principles of Sustainable Drainage Systems (SuDS) shall be applied to all components of design and construction with regard to surface water management. Any design or site works that may impact on the site drainage or water quality shall:

• Soakaway where soils allow
• Consider and manage erosion
• Retain any silts on site and prevent silts from discharging into watercourses or drains

• Remove pollutants in surface water

• Keep runoff rates at existing greenfield runoff

• Prevent accidental spillages reaching watercourses

3.2 Drainage and Silt Mitigation Design Considerations

The design of all permanent and temporary drainage controls and silt mitigation measures will consider the following:

• Topography / falls toward drains or watercourses.

• Underlying geology, including likelihood and type of generation of silt in excavations, due to soil types, clays, rock type in excavation and rock used as track aggregate.

• Vegetation type, including sensitivity of vegetation and habitats.

• Location of sensitive receptors (e.g. watercourses or protected habitats and species) and high risk areas (e.g. Pollution sources).

The design of measures will consider industry guidance in addition to the requirements stated in this document. A list of typical industry guidance is as follows:

• Environment Agency - Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (2001)

• EA Pollution Prevention Guidance Notes (PPGs):
  o PPG01 General Guide to the Prevention of Water Pollution
  o PPG02 Above Ground Oil Storage Tanks
  o PPG03 Use and Design of Oil Separators in Surface Water Drainage Systems
- PPG04 Disposal of Sewage where no Mains Drainage is available
- PPG05 Works in near or liable to affect Watercourses
- PPG06 Working at Construction and Demolition Sites
- PPG07 Refuelling Facilities
- PPG18 Managing Fire Water and Major Spillages
- PPG20 Dewatering Underground Ducts and Chambers
- PPG21 Pollution Incident Response Planning
- PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers

- BRE365 Guide to Soakaway Design
- BS6031:1981 Code of Practice for Earth Works (UK Guidance)
- CIRIA Report C502 Environmental Good Practice on Site
- CIRIA Report C532 Control of Water Pollution from Construction Sites
- CIRIA Report C648 Control of Pollution from Linear Construction Project – Technical Guidance
- CIRIA Handbook C650 Environmental Good Practice on Site
- CIRIA Handbook C651 Environmental Good Practice on Site Checklist
- CIRIA Report C609 SUDS – Hydraulic, Structural & Water Quality Advice
- CIRIA Report C689 Culvert Design and Operation Guide
- CIRIA Report C692 Environmental Good Practice on site 3rd Edition
3.3 Silt removal

Silt laden runoff is expected from any areas of exposed soil, clay, aggregate, or rock.

Prior to entering the water environment, all silt laden runoff will require treatment to remove suspended solids / silt.

Suspended solid (silt) removal features are to be designed in accordance with CIRIA C697 SuDS Manual, specifically Section 3.3 “Water Quality Criteria”; and CIRIA C648 Control of water pollution from linear construction projects, specifically Section 18 “Runoff and sediment control”.

All temporary and permanent drainage from the site shall initially be designed to have as a minimum three stages of treatment, as defined in the SuDS Manual. A single stage of treatment would be considered as any of the following:

- Filtration of water through filter media (sand / stone check dam, silt fence).
- Detention / settlement in settlement ponds or behind check dam in swales.
- Conveyance of shallow depths of water in vegetated swale.

3.4 Settlement Ponds

Temporary settlement ponds may be required during the construction period in order to provide adequate silt removal. Settlement ponds should comply with the following considerations.

- Sediment control structures may comprise a single or sequence of settlement ponds with additional incorporated filtration measures where required.

- The location and dimensions of settlement ponds, plus requirements for flow attenuation measures will depend on:
  - volume of water requiring treatment,
  - rate of inflow, particularly if inflow is pumped from excavations;
  - silt load characteristics,
  - topography and access constraints.
• Settlement ponds are to be designed to accommodate the critical storm (for volume) of the 1 year rainfall event for water quality protection.

• Settlement ponds should be designed to accommodate Treatment Volume “Vt” as defined by CIRIA C697.

• The use of synthetic liners within settlement ponds will be avoided in order to reduce the impact from disturbance of silt during liner removal and reinstatement of ponds on completion of construction works. The exception to this may be where impermeable liners are required to prevent risks to underlying groundwater from infiltration of contaminated water such as concrete wash out ponds.

• In the event that the natural or excavated ground profile in any area of the site does not lend itself easily to construction of an adequate settlement pond(s), water should be directed towards a sump area prior to being pumped away to a suitable settlement pond(s) or vegetated area with adequate silt mitigation measures well away from sensitive habitats or water courses.

• Where water depth within settlement ponds has the potential to exceed 0.6m, specific consideration is to be given within the Contractors design risk assessment / hazard inventory to the implications of hazard posed to site personnel due to potential for trips / falls in the vicinity of water. Consideration is to be given to demarcation of the perimeter of the ponds by safety fencing and appropriate warning signs.

3.5 Excavation Dewatering

Drainage management is to ensure that adequate provision is in place at all times to treat polluted water arising from all excavations.

3.6 Spoil Management

The Contractor will be required to consider potential for silt laden runoff from areas of temporary and permanent stockpiled and deposited spoil.

Design considerations are to include as a minimum:

• Requirement to cover clays with topsoil to prevent wash off of fine sediments
• Provision of sediment settlement features down slope of stockpiled material until such times as potential for silt loading had reduced and vegetation has established.

• Avoidance of placing permanent or temporary spoil stockpiles in close proximity to watercourses / drains.

4.0 SPECIFIC DESIGN MEASURES

4.1 Track Drainage

Runoff from earthworks during track construction, temporary track makeup and permanent track surface should be anticipated to have a high silt loading due to mobilised clays from excavated surfaces, fines from track aggregate and sludge due to trafficking of the track.

Track runoff is to be directed to a settlement feature to allow settlement or filtration of suspended solids. This shall take the form of shedding of water to a trackside swale on one side of the track to be channelled to a settlement or filtration feature.

Particular care is to be taken to control silt laden runoff within the vicinity of water courses and drains. Silt fences and check dams should be utilised where water is designed to shed to a watercourse.

Trackside swales are to comply with the following considerations:

• Swales to be designed to comply with the minimum performance specification hydraulic requirements previously stated.

• All swales are designed to ensure a positive longitudinal gradient (min. 1:500) to an outfall/level spreader.
• Swales to be re-vegetated by hydro-seeding with indigenous seed mix as soon as is practicable following excavation. This will reduce the flow velocity and increase the retention of silt.

• Clean aggregate check dams to be placed in swales at 8m centres. Check dams provide a level of attenuation, reduce velocity and promote settlement of suspended solids and silt. Check dams have a minimum 0.2m freeboard (from top of check dam) to top of swale level, to prevent overtopping of flows onto the access track.

• Additional settlement/silt removal features should be provided where concentrations of silt laden runoff are noted, or where the track alignment is in proximity to a watercourse / drain.

• Permanent trackside drainage has been designed to minimise the number of piped track-crossings required, in order to minimize future maintenance requirements.

4.2 Drainage Crossings

Drainage crossings under the track shall be in the form of piped crossings. It shall not be permissible to allow artificial or natural concentrations of surface water to flow through the track structure.

All piped crossings for track drainage shall be min. 300mm in internal diameter unless stated otherwise.

Pipe culverts used for cross drainage are to extend 0.5m beyond any road construction in order to prevent future blockage due to potential slippage of the track edge slope.

Measures for prevention of siltation / blockage of the pipe inlet can include:

• Locate a sump at pipe inlet (depth of sump to be minimum 0.3m below pipe inlet and maximum 0.5m below pipe inlet),

• Cut slope gradients in any adjacent embankment to be battered back to prevent future slippage of ground towards pipe inlet. Maximum slope gradients are to be determined by the Contractor specific to the particular soil types to ensure that no significant risk of slippage exists.
• Check dams are to be installed immediately downstream of cross drain inlets in order to divert water to the cross drain.

Silt removal features are to be installed at outlet points to prevent siltation and scour due to concentrated outflow rates.

4.3 Foul Drainage

Foul water from WC’s and welfare facilities at temporary construction compounds are to drain to a suitable storage tank and removed from site at regular intervals by a suitably licenced operator.

5.0 SPECIFIC CONSTRUCTION METHODS

5.1 Planning and Phasing of Drainage Works

Unless proven technically unfeasible, temporary or permanent drainage & silt management features (SuDS) are to be constructed prior to earthworks (including preliminary or enabling works) proceeding to construct any tracks, including:

• Trackside drainage swales should be installed in parallel with track construction. Note that this may require that drainage swales are reformed on an ongoing basis as temporary track alignments are modified to their eventual finished design level.

• Temporary silt fences should be erected downstream of level spreaders to prevent any silt within the discharge flowing overland.

In addition, temporary / permanent spoil management is to be planned in advance of earthworks and on an ongoing basis, in order to allow planning of drainage required in advance of spoil being deposited.

Suitable prevention measures should be in place at all times to prevent the conveyance of silts to the attenuation tank.
5.2 Working in the Vicinity of Water

The following procedures apply to the general construction activities either with the watercourses or in the vicinity of watercourses.

- Avoid construction near watercourses / drains in wet weather whenever possible.
- Avoid using acidic, metal or sulphide-rich spoil from mine workings for road construction.
- Keep cement and raw concrete out of watercourses.
- Runoff from excavations will NOT be pumped directly to watercourses. Where dewatering of excavations is required, water shall be pumped to the head of a treatment train (swale, basin, or detention pond) in order to receive full treatment prior to re-entry to the natural drainage system. Alternatively, bespoke dewatering facilities can be produced where there are specific requirements for dewatering.

5.3 Construction of Trackside Drainage

Trackside drainage typically comprises a swale located to the sides of access tracks. The cross fall on the track is to be aligned to divert surface water into trackside swales by overland sheet flow.

Swales should be constructed as per the design specification and Contract drawings to ensure adequate falls to discharge locations.

Rock filled check dams are to be installed within trackside swales at regular frequencies, in order to reduce flow velocities and improve conditions for the settlement of solids in transit.

The stone used for the construction of the check dams will be 50-75mm ‘clean’ graded stone. The frequency of the check dams shall be 8m centres.

The check dams will serve dual functions, by both removing and settling out silts and reducing flow velocities, therefore mitigating against the effects of erosion within the swale. A degree of attenuation will also be provided.
If during construction silt loads are higher than expected, then further silt interception methods can be utilised, for instance, installing temporary catchpits using 600mm twinwall plastic pipe placed vertically in the base of the swale. These will need to be maintained regularly.

5.4 Settlement Ponds

It may be possible to utilise the flow spreader ditch as a temporary settlement feature during construction by omitting the granular material and leaving the ditch open allowing it to fill with runoff and then overspill as designed. Silt fencing should be installed downstream of the feature to intercept any silts that are not retained within the temporary pond.

If the contractor requires additional temporary settlement features then the following shall apply to construction of ponds at the site:

- Pond depths generally to be excavated with a maximum depth of 0.5m.
- Side slopes to be shallow, nominally at a 1 in 3 side slope (maximum).
- Material excavated from the settlement pond should be compacted around the edge of the pond.
- Inspect mini-settlement ponds for damage after intense storms in particular at the entry point and around the forebay area. Settlement ponds are to be inspected regularly.

6.0 DRAINAGE MAINTENANCE

6.1 Guidance and Recommendations for Construction Phase

Regular inspections shall be undertaken specifically in relation to drainage management at the site.

6.2 Check dams & Settlement Features

All check dams, settlement and attenuation tanks to be checked at least once weekly via a walkover survey during the full period of construction. All excess silts to be removed and disposed of appropriately. Where check dams have become full blocked with silt, they should be replaced. Procedure for replacement of the check dam is as follows:
• Silt deposits to be removed from the upstream side of check dams.

• Removed silt to be disposed of by spreading in an area of the site where surface runoff will not convey silt deposits back to a water course.

• The existing check dams are to be removed and disposed of appropriately. Stone materials removed from the check dams will not be disposed of over vegetated areas of the site.

• Replacement check dam to be installed.

• Where there are regular incidents of check dam blockage further check dams to be installed within the swales.

6.3 Swales

• Soil in the swales should not to be smeared or compacted so that permeability is reduced.

• Debris (e.g. loose roots) to be removed from the base of the swale.

6.4 Miscellaneous

Any excavated materials should be placed in such a manner that any instability of excavated materials will not cause infilling of swales or excavations. Runoff from spoil material will not be allowed to discharge directly to watercourses.
Appendix A

Typical Drainage Details
SKETCH 1 - SWALE (CROSS SECTION)

SKETCH 2 - CHECK DAM (ELEVATION)
SKETCH 3 - TRACK PIPE CROSSING
SKETCH 4 - LEVEL SPREADER

- 25 Class 1 Mortar Bed
- Class 250G Concrete Race and Backing
- 250 x 60 Bullnose Concrete Edging Strip, Providing 50mm Upstand Above Ground Level
- NAG VMX50 Permanent Turf Reinforcement Mat (Or Equivalent Approved) Placed, Fixed and Anchored in Accordance with Manufacturers Guidance

STONE AND PIPE MAY BE OMITTED DURING CONSTRUCTION TO PROVIDE TEMPORARY POND, DEPTH TO BE INCREASED TO 1.2m TO PROVIDE SILT STORAGE CAPACITY. SILT TO BE REMOVED BEFORE GEOTEXTILE PIPE AND STONE PLACEMENT

- Terram 1000 or Equivalent Approved
- Filter Material Type 'B' to Clause 505 Specification for Highway Works
- 3000 Fully Perforated Pipe
- Filter Material Type 'A' to SHW Clause 505 Well Compacted