

Caversham Weir Hydropower Project

Construction Method Statement



Contents

1	Overview	3
2	Key Roles	3
3	Construction Schedule & Site Arrangements	3
4	Method of Works	7
5	Constraints	9
6	Risks and Contingencies	9

1 OVERVIEW

The scope of this project is to install low-head hydro turbines at Caversham Weir, Reading, Berkshire. The technical purpose of the project is to supply an estimated 46kW of renewably generated electricity to the National Grid.

This method statement explains the sequence of activities required in order to install the hydro turbines and associated works.

2 KEY ROLES

Term	Definition / Party
Client / Company	Reading Sustainability Centre / Reading Hydro Community Benefit Society Ltd
Project Manager	To be determined
Principal Designer	To be determined – subject to tender
Principal Contractor	To be determined – subject to tender

3 CONSTRUCTION SCHEDULE & SITE ARRANGEMENTS

A detailed execution schedule has the construction taking place during Q2 & Q3. The main schedule driver is river water level. The lowest level / flow in an average year is in Q2 & Q3. Works below water-level both permanent and temporary will be completed within this low-flow period.

Key construction milestones are shown on the schedule and include

- Mobilisation of temporary facilities complete
- Temporary works complete
- Concrete works complete
- Upstream flow control installed
- Automation of EA gate to assist with flood control/our equipment emergencies
- Turbines installed
- Generator house, generators installed & electrical connection complete
- Construction complete
- Temporary access and sheet piling removed
- Commissioning complete
- Project Complete - Hand-over to operation / maintenance

Forecast start date for construction is Q2 2020.

Forecast completion of construction by the end of Q3 2020.

Projects of this size typically take between 4 – 7 months depending on complexity, ground and weather conditions.

3.1 Hours of Work

Site working hours shall be 8am – 6pm Monday to Friday and 9am – 1pm Saturdays.

There will be weekly site meetings with the Construction Contractor, which will include a physical review of progress and a formal meeting to minute any key cost, schedule, technical or HSE problems and agree solutions.

3.2 Access arrangements

3.2.1 Vehicle Access to site

All traffic will enter the site from George Street into Hill Meadows car park. Vehicles will then be sign posted across the car park to the temporary construction plan as noted in plan READH-03.

A 10 metre wide corridor would need to be maintained from the entrance of the car park to the entrance of the temporary compound to ensure safe movement of vehicles to the compound. Any particular large vehicles or during busy periods in the car park – vehicles will be escorted by site personnel on foot.

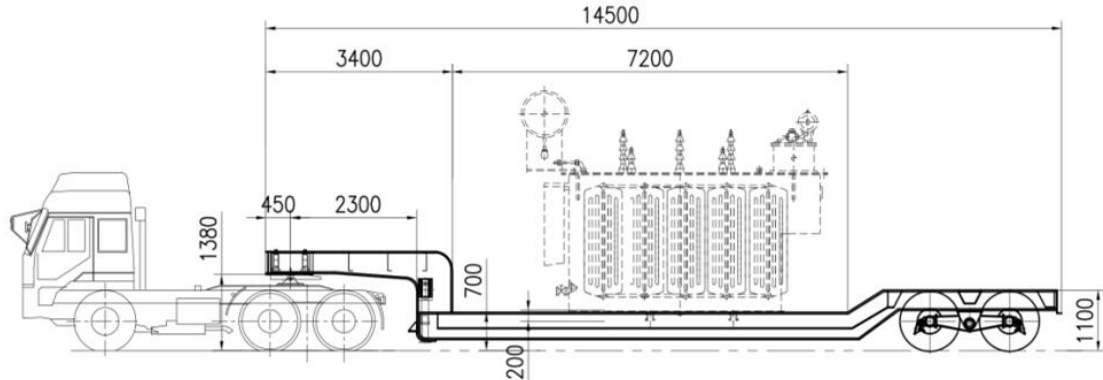
Large vehicles may require the temporary removal of the height restriction gates at the car park entrance.

Plant including excavators, crane and concrete deliveries will be the main large vehicles. The largest items to be delivered will be the Archimedes Screw turbines themselves – which are delivered on special low level trailers – see example from a 224kW twin screw project:



<https://www.renewablesfirst.co.uk/project-blog/archimedean-hydro-turbines/>

Typical trailer dimensions:



<https://www.anstertrailer.com/product/lowboy-low-bed-trailers/>

Although the screw diameters for the Reading project are 2.6m, they are transported very low to the ground level, typically 700mm which would give a total height on transport of 3.3 metres.

The general route will be M4 junction 11, A33, A329 East, B3345 to George Street. There are a number of bridges / underpasses to cross under but there is no reason to suggest any components will have any issue with clearance under height restrictions.

The following bridge structures have been reviewed along the route:

- A4 overpass - SU 71336 72585
- Footbridge - SU 71213 72954
- Castle Hill / Castle Street overpass - SU 71140 73080
- A329 Oxford Road overpass - SU 71047 73394
- Chatham Street / Friar Street interchange - SU 71115 73542
- Rail bridge 15'6" / 4.7 metres – SU 71210 73906

The rail bridge with a 4.7 metres restriction is deemed the lowest of the bridges enroute to the site and would provide suitable clearance to the 3.3 metre high screw delivery.

Directions and site access arrangements will be issued to all suppliers and hauliers prior to delivery. This will include contact details of site manager / foreman and no deliveries will be accepted onto the site without a pre-agreed time slot and the delivery driver calling the site nominated person 1 hour prior to arrival. Any deliveries not adhering to this process will not be permitted access onto the site. The construction compound entrance will be manned to regulate pedestrians as required.

Deliveries will be timed between 10am – 3pm ordinarily to avoid peak traffic hours. Certain exceptions may be required.

Site personnel would require to travel during peak traffic hours but lift sharing and public transport would be encouraged.

3.2.2 Parking areas

Designated parking areas within the temporary compound which is shown on drawing READH-03.

3.2.3 Loading and Unloading of plant and materials

Loading and unloading will take place within the temporary construction compound marked on plan READH-03.

3.2.4 Security Fencing

The temporary compound, active works area and footpath closure points will see heras or similar type security fencing installed. Any lifting operations which oversail any fenced off areas will be temporarily secured to ensure no unauthorised access underneath the lifting operation.

3.2.5 Biosecurity

A review of the site prior to construction will check for any invasive or non native species or signs of disease. If anything found, bio-security measures will be detailed and implemented along best practice guidelines. This could include protection clothing, boot and equipment disinfecting and tool box talks for all operatives.

3.2.6 Wheel washing

The construction is due to take place during summer and the compound being on solid ground – the risk of muddy vehicles or debris on vehicles exiting the site is low. However a wheel wash facility will be available and utilised as and when required. This will be located as close to the compound exit as possible.

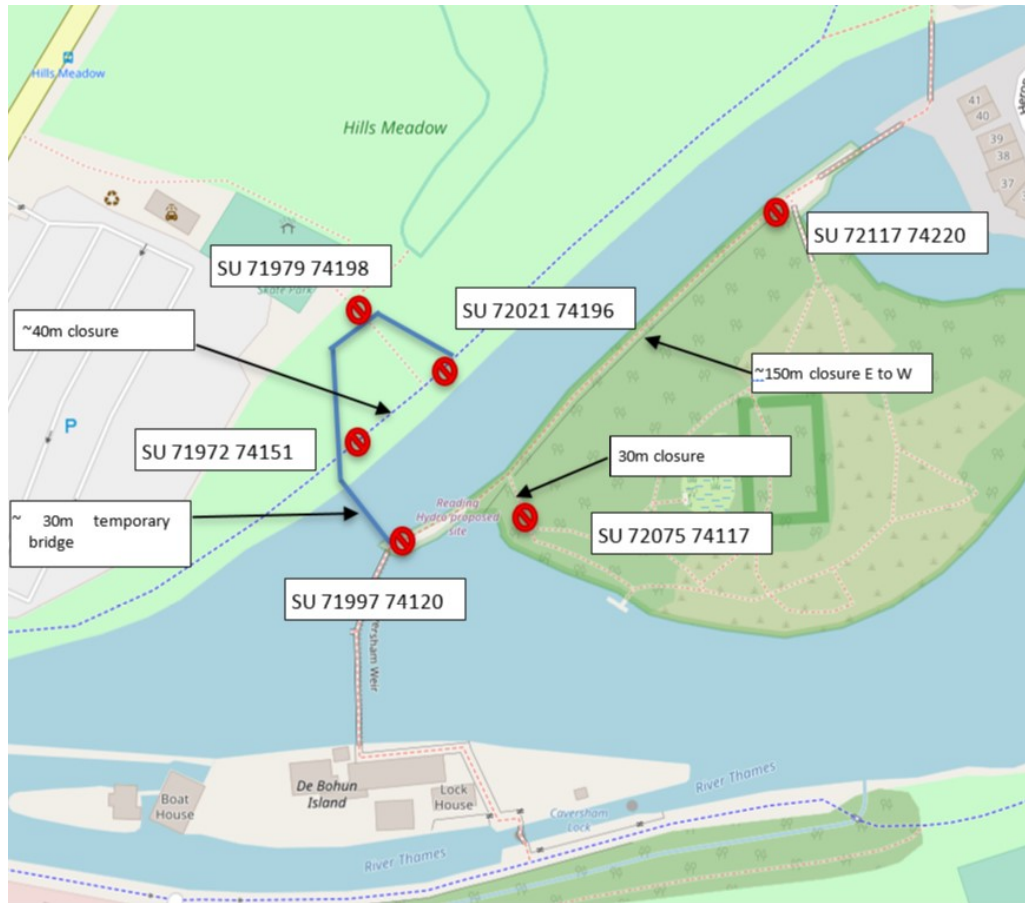
3.2.7 Measures to protect surface of public highway

The construction is due to take place during summer and the compound being on solid ground – the risk of muddy vehicles or debris on vehicles exiting the site is low. The above mentioned wheel wash facility will be available. Any vehicles transporting loose materials or materials that could become loose will require a protective cover or net to ensure no materials leave the vehicle in transit. In the unlikely event that mud or debris does escape onto the public highway the main contractor will ensure it is cleaned up and if required a road sweep will be employed. The site manager / foreman's contact details will be displayed on notices around and adjacent to the site to ensure any issues can be reported and dealt with promptly.

3.2.8 Footpath closure / Road closure

There will be no road closures.

The applicant is currently applying for a temporary footpath closure and diversion separately. The details of the closure / diversion are shown in the below plan – diversion in thick blue line and no entry signs denoting closure points.

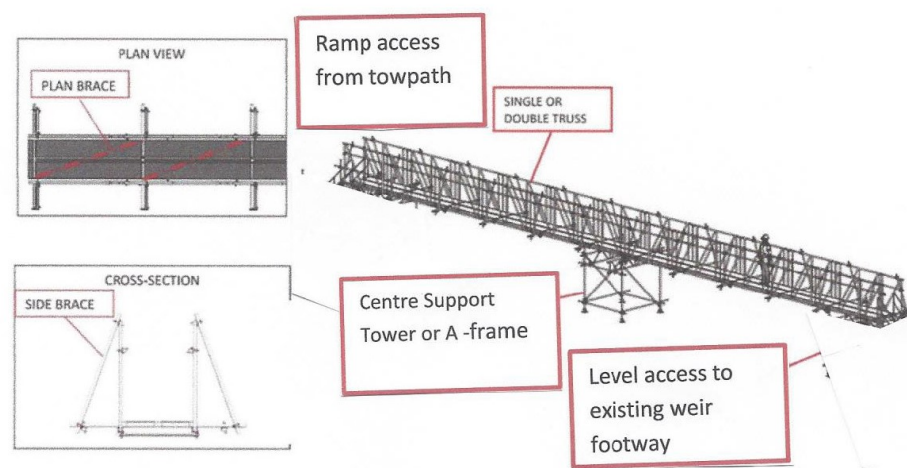


3.2.9 Traffic Management

There may be the need for some temporary traffic management for the delivery of the screw turbines ONLY however these would be under private escort. Prior arrangements would be made with local highways department as required.

3.2.10 Details of temporary bridge across the Mill Leat

A temporary foot bridge will be installed across the mill leat from scaffold construction or similar to ensure minimal disruption to public access. There would not be steps, it would be level with the bank and ramped down to the footpath. Span is 25 m so centre support would be provided by poles onto solid gravel in river bed by either a tower or 'A' frame. Design allows minimum of 850mm clearance above normal high water mark on the weir side 600mm near the northern bank.



Construction vehicles and access will be via a floating pontoon similar to the below:

Example of floating pontoon:



This is to be reviewed with construction contractor upon appointment.

4 METHOD OF WORKS

The key steps involved with the installation of hydro turbines are outlined below. All works are to be in accordance with detail design drawings. Installation of proprietary equipment shall be in accordance with manufacturer's instructions.

4.1 Site Establishment and Enabling Works

Before construction works can commence it will be necessary to set-up a safe working area. All works shall meet the requirements of the CDM Regulations.

1. Erect perimeter fence and gates, ground and tree protection measures, material storage and welfare facilities on North bank in Hills meadow
2. Erect perimeter fence and gates on View Island
3. Install temporary footbridge for pedestrian and site personnel access (see above plan on page 6)
4. Install foot path diversion (see diagram Appendix B)
5. Clear and remove vegetation in order to allow access for the temporary footpath, and as necessary to enable people and equipment to safely access the work area
6. Erect barrier fence around cable-route on South bank
7. Excavation of cable route on south bank to be completed and duct laid in preparation for cable pulling later in the schedule. Cable detection scans and buried service checks to be completed in advance of breaking ground and locations marked with spray paint.

4.2 Foundations

The first stage of construction will be to install the foundations for the new turbines. This will require:

1. Install sheet piles using barge or long reach excavator to form a rectangular water-tight coffer dam (see specific sub-contractor method statement and risk assessment).
2. Pump out water from the centre of the coffer dam using suitably sized submersible pumps and portable generator. Site the generator in a secure compound on View Island or the North bank as appropriate. Run all cables in a safe route / location. Ensure any fish confined within coffer dam are caught with nets before dewatering commences. All removed water shall be passed through a silt removal device prior to discharge back into the river. Pumping shall take place as necessary for the duration of the works. Spare pump and generator to be available in case of break-down
3. Excavate within cofferdam to the required depth using a barge mounted excavator / mini digger within the coffer dam or by manual digging. Waste spoil shall be disposed of via barge. (See specific sub-contractor method statement and risk assessment).
4. Pour concrete blinding course in base of excavation. Concrete shall be mixed and supplied by barge or pumped into place from the North Bank (see specific sub-contractor method statement and risk assessment)
5. Bend and place re-bar reinforcement into the foundations, steel shall be supplied by barge or crane pre-bent where possible and fixed in-situ by hand.
6. Any cast-in templates or holding-down bolts shall be fixed to re-bar prior to concrete pour
7. Complete foundations concrete pour and finishing operations (see specific sub-contractor method statement and risk assessment)
8. All concrete shall be protected from excess water ingress in the initial curing phase and from adverse weather (rain / sun)
9. Whilst concrete is wet the site shall be permanently manned to ensure no ingress by 3rd parties.

4.3 Generator Building

1. Materials for the generator building shall be transported by barge, craned over from the north bank or transported over the temporary bridge / pontoon structure
2. Foundations – see above and note steel piles driven from barge or ground based machine directly into river bed
3. Walls shall be block or steel framed and timber clad and the roof shall use standard construction techniques
4. All other details shall be installed per design drawings

4.4 Turbine Installation

1. Delivery of the turbines will be by barge with onboard hi-ab or crane
2. Turbines shall be fixed onto foundations in accordance with design drawings
3. Generators and gearboxes shall be mounted onto the drive shafts

4.5 Electrical Connection

Electrical installation will require installation of cable tray and ducting from the generator building along the weir, across Lock Island and under the existing lock channel (Detail design to define route). An existing 6" duct has been identified which could potentially be used. As-built drawings shall be sought for the lock, and if there are any existing ducts or pipe / cable transits the detail designer shall make enquiries with 3rd parties to determine they are appropriate.

1. Cable tray to be fixed along the weir
2. Excavation to be completed as necessary and ducts / cable draw-pits installed
3. Cable to be pulled from generator to the end-point on South Bank or visa versa.

If this option is not viable then Horizontal Directional Drilling would be used to install a 100mm duct under the river.

4.6 Commissioning

Before commissioning can take place it will be necessary to cut-away a section of the steel sheet piles in order to allow river flow to enter the turbine.

Mechanical commissioning shall be completed by the turbine vendor in liaison with the Environment Agency as required. Electrical commissioning shall be completed by the construction contractors appointed electrical sub-contractor / engineer in liaison with representatives of the DNO.

4.7 Fish Pass

A fish pass is to be constructed to ensure fish and eels have a safe means of passage past the turbines. Information. This will involve creating a concrete channel and then the fixing of the fish pass bristles and lining with stone material to re-create a natural river environment. Sheet piling will be installed to ensure a dry working area to create the channel. Stop logs will be installed to allow future maintenance.

4.8 Sediment Control Measures

The only part of the works which may cause some disturbance of existing sediment is when the first water flows through the turbines. This will be done in a controlled manner. Visual observations shall be completed at regular intervals during start-up for any signs of erosion down-stream. If previously undisturbed sediment is found to become mobilised into the river channel then the flow shall be stopped and start-up will be phased in short periods. Our weir pool survey suggests that there will be no impact and it should be appreciated that river flows vary and that at high flow rates silts are disturbed.

The majority of materials will be delivered and removed onto the existing car park area in Hills meadow some may be moved or delivered by river therefore there will be no need for wheel-wash facilities.

4.9 Pollution Control Measures

Spill-kits and oil-booms are to be available in-case of any diesel fuel spillages or hydraulic oil spills from any barge, barge mounted hi-ab or barge mounted excavator. During construction an oil boom will be located around the working area. Refuelling of machinery / generators will be completed in hard paved or bunded areas.

4.10 Additional Flood Control Measures

The scheme will use an Environment Agency gate to prevent loss of weir capacity during a power cut so the resultant localised increase in water level will remain acceptable. This will be subject to agreement on operation and maintenance.

The use of an automatic gate will require a live telemetry link-up to the EA systems to enable access to gate opening data for flood risk management and navigation. The modification and use of EA assets and telemetry equipment will need to satisfy EA standards.

5 CONSTRAINTS

Constraints for the site include:

- 1) Avoid disturbance of river bed / silting downstream
- 2) Noise working-hour constraints – sheet piling
- 3) Land ownership / working site perimeter to be established
- 4) Access to the installation site requires installation of a temporary access across the river. Alternatively the site access and material delivery may be possible entirely by barge.
- 5) Disposal of waste water from dewatering operations – need to establish allowable limits of silt entrainment.
- 6) The existing foot path will require re-route and a temporary footbridge in order to maintain public right of way
- 7) Height constraint on carpark entry
- 8) Fallen trees will require clearing which will require Local Authority and land owner approval
- 9) Bird nesting season may require pre-construction checks if between 1st March to 30th June

6 RISKS AND CONTINGENCIES

Risks may be identified as having significant potential to be detrimental to the project in the following typical areas, for further details see the Caversham Weir Impact Assessment and Hydrogeological Desk Study & Risk Assessment associated with the various stages of construction outlined in section 4 above.

- Safety
- Environmental impact
- Technical integrity
- Project schedule

The risks identified in Risk Assessments to-date shall form the basis for ongoing review as part of the regular project progress reporting by the project manager.