Method Statement

Description of Activity / Sequence of Operations

Horizontal directional Drill to install 1 of 125mm SDR11 pipe.

Advantages

- Directional drill crossings have the least environmental impact of any alternate method. The technology also offers maximum depth of cover under the obstacle thereby, affording maximum protection and minimizing maintenance costs.

1.1

Transportation of the Ditch Witch 4020 Jet-Trak

- Ditch Witch 4020JT directional drilling rig and mud mixing equipment are transported by a 32ton HGV lorry and drag. The drilling rig will be unloaded and trailer stored at a pre agreed locations. Setup drilling rig and mud mixing equipment at launch pit location.

- Hard standing must be provided for the drilling rig, lorry and mud mixing equipment.

- All plant equipment must be check daily and maintained using correct oils and grease.

1.2

Working near utilities

Carry out utility sweep of the works area, locate and trace using utility drawings provided by Solstice Renewables, CAT/Genny and Ground Probing Radar to scan the area and mark up its locations using marker paint, marker flags or wooden pegs.

- Wear fire retardant coveralls when working near live cables.
- 2 x co2 fire extinguisher on site at all times.

1.3

Launch pit – Reception pit

Before works start Solstice Renewables will issue a permit to work, Gleeds will provide heras fencing to go around all excavations and left position until such time the pits are ready for reinstatement.
Gleeds will provide ladders to enter the pits and design a method in securing the ladders to prevent them from slipping/falling when weight is applied to them.
The launch pit and reception pit are sited in accordance with drawing number gle/solstice/……. The drill pit dimensions are 2m x 1.5m x 900mm deep, the drill head will be launched at 700mm and at a pitch of -24% and exit angle 21.58%. The tracking operator will track and adjust the drill head in accordance with Gleed bore design

1.4

Pilot Hole

A pilot hole is drilled through by connecting 4.5 metre drill rods together using the automatic rod connection system on the Ditch Witch 4020JT. The drill head is monitored and directionally steered by the tracking engineer who will check the direction, pitch and depth in accordance with bore plan provided by Gleeds. Two way radios will be used to communicate between tracking operator and machine operator. Drill fluids (bentonite clay slurry mix) are pumped down the drill rods to the cutting face of the Radius drill head, this process transports the cuttings away from drilling face out of the pilot bore hole to the launch pit. The clay water slurry is stored in the launch pit and transported to a registered site at Wessex water treatment plant, Avonmouth, Bristol. Registered waste carrier for this project Bale Group, 90 Durham Way, Heathpark Industrial estate, Honiton, EX14 1SQ

1.5

Back reaming

Disconnect the drilling head from EZ Connect and connect 300mm back reamer to the drill string, charge system with drilling fluid to ensure the reamer jets are clear and operating correctly. Proceed with reaming the bore out to a diameter of 300, repeat the same process if required.

1.6

Preventative Measure

Cebo Drill-Grout plus is a product that is pumped into the bore hole at the same time as the pipes are being installed, the grout will harden around pipe, it's a non permeable material and therefore ideal to fill up annual spaces should this be required.

1.7

Emergency Frac-out Response and Contingency Planning

See separate document

1.8

Risk - Heave or frac out

Surface heave is a condition that usually a result of excess pumping of drill fluids after a loss of circulation. This condition can quickly pressurize the formation and cause a heave at the surface. Heaving can also arise from reaming with a barrel reamer without enough depth, which can result in a displacement of soil towards the surface. Pulling the reamer or product through the bore hole too rapidly can also result in surface heave or frac out.

1.9

Risk - Hydrolock

Hydrolock is a condition that may occur when the circulation from the bore hole is lost and the subsurface formation is resistant to fracturing, resulting in a hydraulic cylinder in the bore. This problem is common in fine-grained rock, frozen ground etc

(2)
1.10

Risk - Bore Hole Collapse

Bore hole collapse severely impacts the chances of success on any HDD project. Soft or loose soils present a high risk of collapse during HDD operations. When a bore hole collapse, there is an immediate increase in rotary torque and pressure or loss of circulation.

A premium Bentonite and water mix and the use of polymers ie Condet, EZMud, Pack etc will be used for the pilot drilling and back reaming process, a yield time of 30mins is required prior to use. Bentonite slurry particles penetrate the finest interstitial spaces of the pores between sediment grains in the bore hole wall, this is referred to as Mud-cake. The ideal Mud-cake will form quickly during construction of the bore wall and prevent the intrusion of drilling fluids into the formation. This is especially needed in unconsolidated soils, by building a Mud-cake lining and a low positive hydrostatic pressure against the bore-hole wall prevents bore collapse and drill slurry escaping into the formation.

1.11

Pipe loading and jointing

The pipes are delivered to site on a Gleed 7.5ton lorry. Setup butt fusion equipment at a pre-agreed location away from site traffic and operated plant, allow enough area for pulling 100 plus metres of pipe.

- The butt fusion equipment is hired from Fusion Hire at Bristol. Before leaving depot the equipment is calibrated and tested, a 4.7 kva generator is required to operate fusion equipment. The generator must have a spill kit, trip tray, fire blanket, 2 x foam and 2 x dry powder fire extinguishers near the works when operating the fusion equipment and whilst the generator is in operation.
- Setup fusion tent and place equipment inside (generator to remain outside of tent)
- Place two pipes both ends of the clamping cradle and tighten, set out pipe rollers along route.
- Once the first two pipes are fused together, insert 125mm towing head into the end of pipe and connect a certified 3 ton sling to a 5t excavator, tow the fused pipes of the rollers to prevent damage and ease of use.
- It is important not to attempt to fuse pipe together whilst installing the pipe into bore hole, Tie-ins of successive pipe strings during pullback may considerably increase the risk of unsuccessful installation.
- Once all the pipe are fused together and placed 3 metres away from reception pit, insert 180mm towing heads into each pipe end and tightened to the manufacturer's specification. Each towing head is connected via 20ton swivel, steel towing rope and shackles bolted to the back of 300mm reamer, the 20ton swivel enables the reamer to rotate without rotational damage to the pipe whilst being installed.

1.12

Working near live utilities

Before carrying out works near existing utilities – check utility plans for the location of each utility that our works will have direct impact on. With the use of CAT/Genny, scan the area and mark up the locations with marker flags or wood pegs. Excavate ground surface to a depth of 300m, continue the rest of dig by hand to locate the live HV cable and Water main. Once both utilities are exposed and undermined, excavate reception pit to the dimensions required - reduce ground level and slope sides to prevent the need for shoring trench walls should the depth become greater than 1.2m deep if possible.

- Wear fire retardant coveralls when working near live HV cable.
- 2 xFire extinguisher (Powder)

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1.13

Safety System

- The drilling rig is fitted with a strike alarm system – should the drilling head strike a power cable whilst drilling through or back reaming, the alarm system will activate, loud siren will sound with LED flashing beacon at the front of the drilling rig indicating a cable strike.
- Shut down the drilling rig and remove key from ignition.
- The drill operator must remain seated – **DO NOT ATTEMPT TO EXIT CAB** remain seated until further instruction given from site foreman or engineer.
- *Gleed's to immediately contact SSE 30min reporting time*
- Setup a 4 meter safety zone area around the drilling rig using orange bunting or something similar to prevent other site employees from entering that area.
- When setting up the 4 metre safety zone, do not approach or attempt to touch drilling rig at any time in case of electrocution. A person will be appointed to man the safety zone until further instructions from the site foreman or engineer.

1.14

Automatic rod handling system

- Before operating the equipment make sure the locking pin holding the safety rail in a upright position is removed from the end of the shuttle arms, lower safety rail over shuttle arms and lock into position. The safety rail when stowed for traveling will not allow the shuttle arms to operate due to the locking pin, this will also prevent the rest of the system from functioning.

- The drilling rig is fitted with fully automatic rod handling system, the system selects a rod from the bottom of the rod box using the shuttle arms, the selected rod is then carried forward towards the centre of the drilling rig between the rod box and engine compartment, once in position the drill operator slowly offers the rotary gear box towards the female end of the drill rod slowly rotating clockwise until resistance is felt, by releasing the finger clamps on the end of the shuttle arms allows the drill rod to move into position at the preinstalled drill rod clamped in the hydraulic vice at the front of the drilling rig, connect the male end into the female end of the drill rod, rotate the drive train until the rod is fully tighten, release the hydraulic vice clamps, retract the shuttle arms, the drill rod is now ready for use.

- The Ditch Witch 4020JT drilling rig does not have any external safety features that can be activated in case of an emergency.

1.15

Completion of the bore

Once the back reaming process as finished and pipe's installed, remove drill slurry from reception pit and launch pit via a vacuum tanker and taken to a registered landfill site to be dispose of. Cut back pipe to 1.2 metre deep and reinstate area with mechanical digger.

1.16

Keep works area secure - Safety precautions

The works area can get busy at times, please ensure the following is completed and regularly reviewed.

- Erect barrier system around drilling rig, launch pit and reception pit to prevent unauthorised access into works area. The drilling rig frame that carries the rotation gearbox extends 1.5m outside the foot print of the main rig, erect barriers to prevent contact with this.
- Attach warning signs to the barrier system, given clear warning of potential danger when entering the work site.
- Full **PPE** must be worn at all times when on site.

(4)

1.17

Securing Drilling rig when leaving site

- When leaving drilling rig unattended or leaving site, remove key from ignition, lock instrument panel, lock cab door and all side panels, switch the isolation devise into the off position to stop power to the ignition and hydraulic system.

1.18

Environmental

- All plant machinery must be re-fuelled using electric fuel pump fitted with none return valve drawn from steel fuel containers placed in a drip tray. Spill kits are fitted to all Gleed Services vehicles and on display near the directional drilling rig.

1.19

Water Course

- If any plant equipment is within 10mtrs of a water course the equipment must be removed to a safe area for refuelling.
- A minimum of 10mtrs from any water course and surface water drains must be maintained at all times. Place fuel container in drip tray, spill kit must be at hand and super sorb granules as a precaution.
- Bore-Gel bentonite clay water drilling slurry will not have an impact on the fauna or flora of the drilling location but if released into a watercourse it can settle on the bed of the watercourse and have an impact to that environment. The drilling slurry is contained in the entry and exit pits and removed via a tractor tanker that will empty its load into a lorry tanker to be disposed at a landfill site.
- Handling of bentonite – Refer to Halliburton information below.

Noise - How loud is to loud

- Noise is measured in DBA, which is a decibel scale modified to take into account the sensitivity of human ears to different pitches of sound. It is a logarithmic scale, which means that an increase or decrease of 3 DBA represents a doubling or halving of intensity, the energy it contains. So, for example, 73 DBA is twice as intense as 70 DBA. However, due to the way we hear sounds, a person with normal hearing will only think a sound has doubled in loudness when it is ten times more intense. For example: 80dBA will only sound twice as loud as 70dBA despite actually having ten times as much energy!
- An average conversation will reach around 60DBA while a busy street can peak at 80 to 90 DBA. Generally, exposure to sound levels below 80dBA are unlikely to cause any hearing damage. Prolonged exposure to sounds over 80 DBA can damage your hearing and the risk increases as the sound level increases. So at 140 DBA noise causes immediate injury to almost any unprotected ear.
- As a general guide, if you have to shout to make yourself heard by someone two metres away the noise level could be dangerous.
- Although there are laws about acceptable levels of noise in different situations, it is impossible to set an objective noise level that is safe for all. Provided the ear is allowed ample rest afterwards, a level of 80 DBA might be tolerated for up to 8 hours, but increase that level by just 3 DBA and the time is reduced to just 4 hours. By 95 DBA the tolerance is less than 15 minutes.
- However, no two people will have an identical tolerance to noise. Research suggests that a genetic predisposition towards hearing loss is an important factor.

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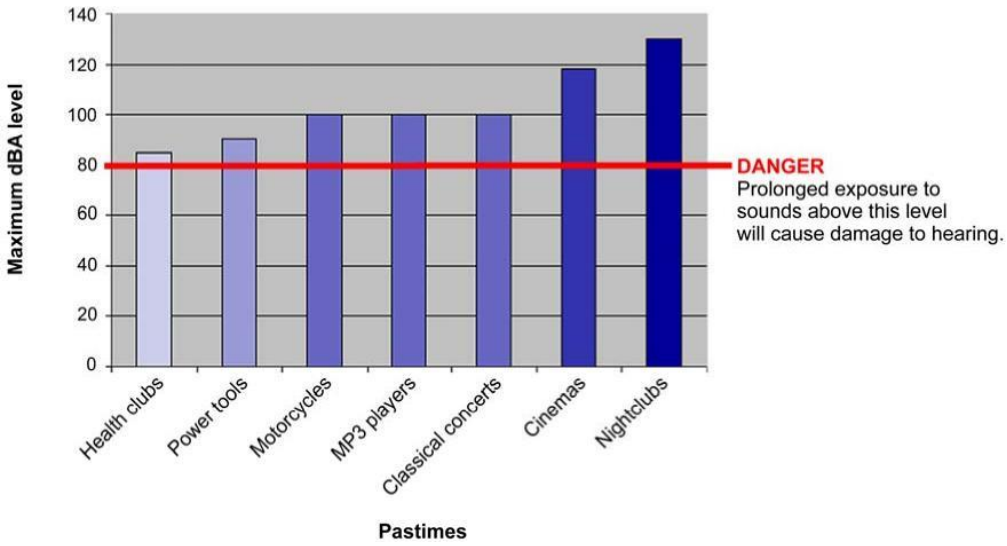

The drilling rig will operate above 80dbs due to maximum power required when back reaming to increase the bore diameter. Should the machinery noise become a problem to the local residents Gleeds will discuss with SSE to resolve the issue by screening off the area to reduce the levels that are acceptable to the residents.

1. **Location of Activity**

2. **Duration of Activity**

3. **Plant and Equipment**

1 X DITCH WITCH 4020JT HORIZONTAL DIRECTIONAL DRILL
1 X TRACTOR AND VACUUM TANKER
1 X MINI DIGGER
1 X LORRY AND MUD MIXING SYSTEM
1 X VACUUM TANKER
2 X FIRE EXSTINGQUSHERS
Fusion machine
Spill kits
Hand tools
Track ladder

(6)

- Plant and machinery shall be accompanied with appropriate registers, current test certification and operatives inspection prior to use. All plant will also be accompanied with a spill kit.

- Close liaison shall be carried out with all plant and material suppliers to ensure that all deliveries have a safe load and unload plan acceptable to the AWE. If safe method is not available deliveries will be sent away.
- Any hired plant will not be allowed on site unless it is accompanied by a valid test certificate and/or any other corresponding instruction manuals/certification.

- Vehicles and equipment shall only be operated by persons authorised and competent to do so.

Plant and machinery shall be accompanied with appropriate registers, current test certification and operative's inspection prior to use. The aforementioned information is contained within the site file held within the site office.

4. Temporary Lighting & Power

Day light hour working

5. Personnel / Training

Gleed services personnel all have CPCS cards to operate plant equipment.
Slinger/Banksman , fusion welding, drill operator.

6. Sequence of Operations

- Delivery of plant, equipment and vehicles
- Site engineer to ensure adequate access to and from site
- Gleed operatives to be given SSE site induction.
- **HOLD POINT** - all operatives to attend method statement briefing talk ~MS & RA to be reviewed and record of operatives attendance recorded by signing site register.
- Ditch Witch 4020JT directional drilling rig and mud mixing equipment are transported by a 32ton HGV lorry and drag. The drilling rig will be unloaded and trailer stored at a pre agreed locations. Setup drilling rig and mud mixing equipment at launch pit location
- Hard standing must be provided for the drilling rig, lorry and mud mixing equipment.
- All plant equipment must be check daily and maintained using correct oils and grease.

7. Inspection and Testing

All plant to be accompanied by latest test sheets

- The plant/equipment will be inspected upon delivery to site and recorded upon the relevant forms contained within the site file

- All plant and equipment must be inspected weekly on the appropriate forms, which are held within the site file.

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8. Access Arrangements

Plant will be stored on site, with drip tray placed under engine compartment

9. Manual Handling Activities

See Manual Handling Operations form *gleed/SR-MHO-0102*

10. Personal Protective Equipment

See PPE form gleeds/sr-ssow-ppe-0103

11. Communications

All ops will be briefed every morning and will sign on to the daily RA.
Radios for tracking operator and drilling rig operator.

12. Emergency / First Aid Arrangements

Hospital directions will be issued at site induction.

13. Procedure for changes to planned activities

Any changes of activity will require revisions to our method and risk documentation, no work will work will be carried out until the approval has been sought at Solstice Renewables

14. Reporting of Accidents Incidents and Near Misses

Solstice Renewables

15. Safety documentation / Permits Required

CSCS/ CPCS card inspection
Plant inspection certificates.

16. Waste Management and Housekeeping

Soil / Ground Contamination:
Waste carrier – Earth Line, Upper Lime Works, Obourne, Marlbrough, SN8 1TD
Landfill Site – Newbury Rugby Club, Monks Lane, Newbury.

Spill kits provided and on site for all mobile plant . Operatives to be trained in use
Drip trays to be placed under plant and machinery when idle to prevent contamination.

Safety

Safety is paramount at all times and will be regularly reviewed. Risk assessments will be carried out each day and all PPE should be used when required.

Appendices: - [append as required]