Botley West Solar Farm

Environmental Statement

Volume 3

Appendix 6.2: Cable Laying Methodology and Indicative HDD Crossing Locations

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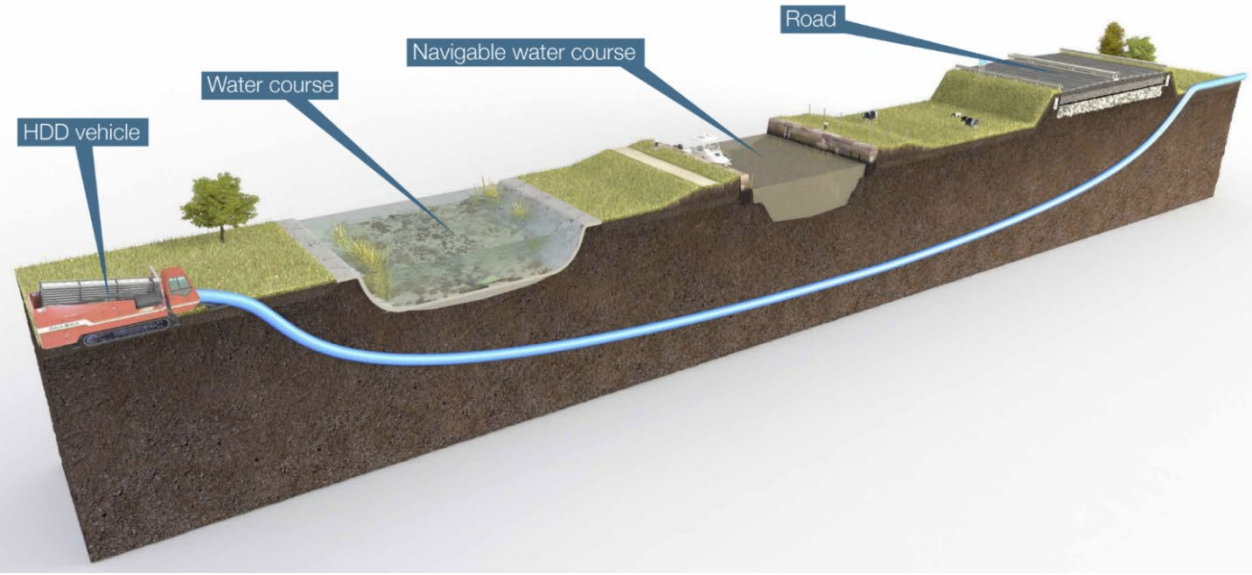
Botley West Solar Farm
840 MWe

Vol 3, Appendix 6.2: Cable laying Methodology and Indicative HDD Crossing Locations

EN010147/APP/6.5



[1]

I. 275 kV Cable Route

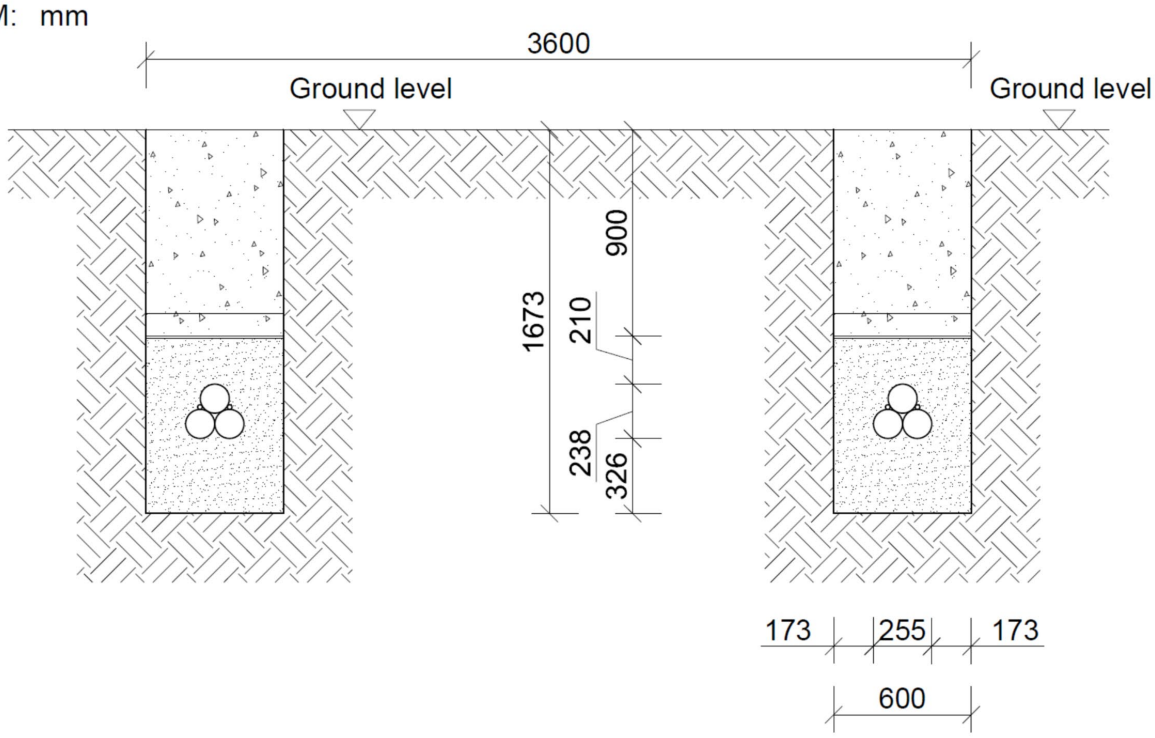
The three main development sites (Botley North, Middle and South) will be connected via **275 kV** underground cables. These 275 kV cables are required to connect all development sites with the main substation called Botley West.

The exact method of cable installation will depend on the constraints and obstacles encountered but will typically involve a **combination of** open cut, cable jointing and trenchless methods such as horizontal Directional Drill and dynamic pipe ramming.
For water crossings, only trenchless techniques will be used

The typical section (e.g. 275 kV cable, 2 systems) shown below is provided for illustration purpose only and will be subject to change upon completion of the detailed design.

275 kV trench size:

Scale: 1:40
DIM: mm



1. **Open cut or direct burial**

Open cut trenching is a method whereby a trench is excavated using conventional earth moving equipment. The cable is then pulled from the cable laying machine into the trench, the trench backfilled and the ground re-instated.

2. **Cable jointing**

Approximately every 600-800 m there will be a joint bay per circuit.

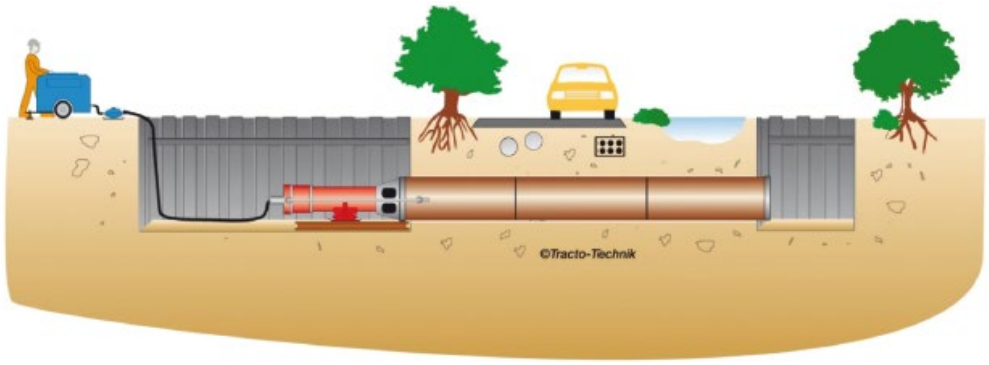
3. **Trenchless methods**

- **Horizontal Directional Drill** (HDD) is a method of installing underground cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area. Directional boring is used when trenching or exacting is not practical. It is suitable for a variety of soil conditions and jobs including road, landscape and river crossings. It is a sort of machine able to construct strictly and easily avoiding as per desirable route without affecting water pipe under the ground, gas pipelines, electric cable, fibre cable, and other associated pipes without excavation of the difficult spaces to coordinate with the crossing of a creek – crossed drains, sensitive hedgerows, streets of the villages, traffic light roundabouts and junction of downtown.

[2]

- **Dynamic pipe ramming**

  A pneumatically driven pile driver is attached to the end of a steel pipe with appropriate adapters. The steel pipe is provided with a reinforcement or cutting shoe against deformation. The steel pipe is driven into the ground with the pile driver, allowing the soil to penetrate the pipe. As a result, there is no soil displacement. The pipe sections of the steel pipe are joined by welding. After drilling is completed, the soil is removed from the pipe using suitable methods.
  This method could be used for sensitive hedgerows or a narrow road.

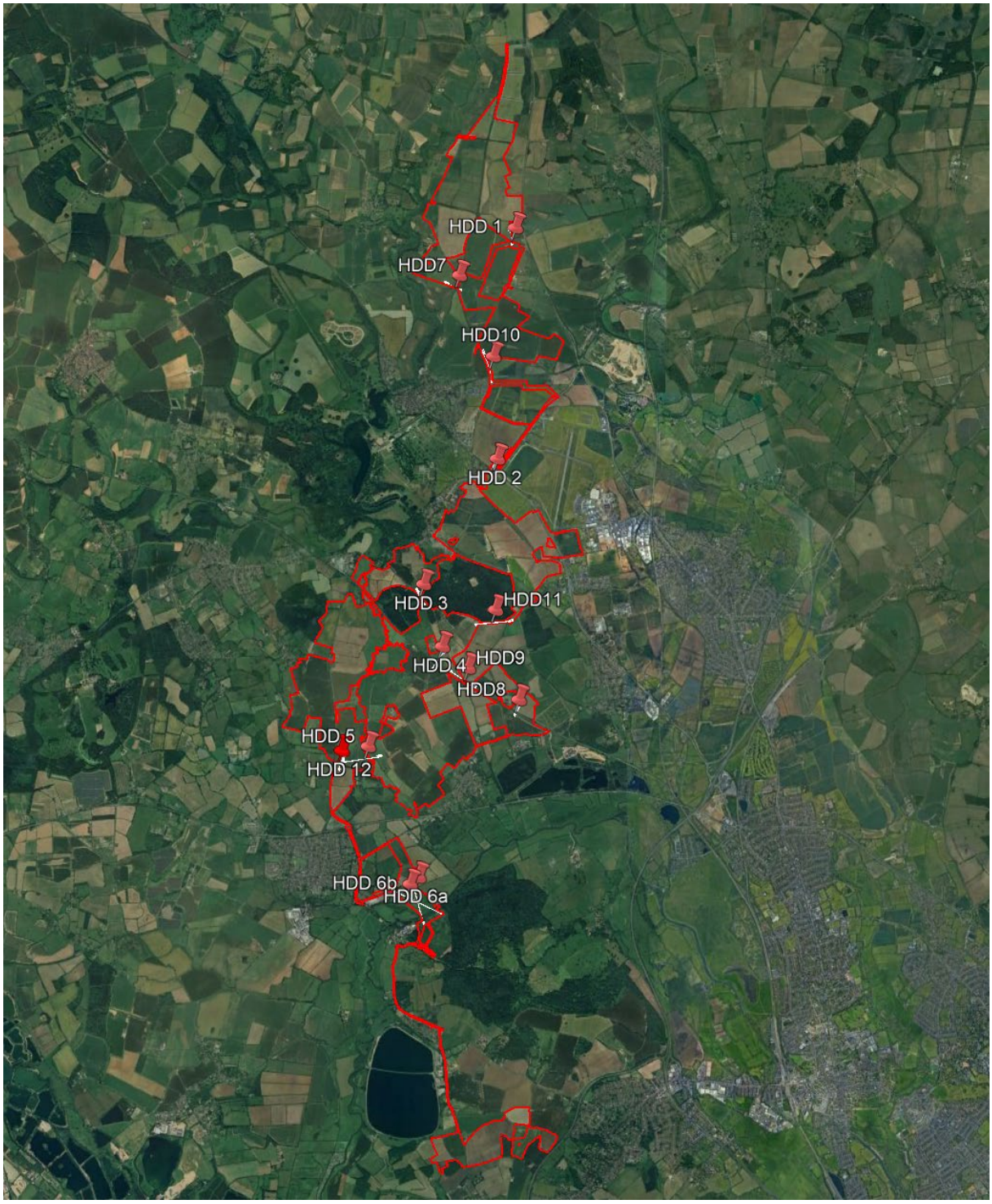


[3]

The preferred HVAC cable route from the first 33/275 kV transformer in the north section to the main transformer in the south section (Botley West substation) is approx. **24.5 km** long, located as follows:

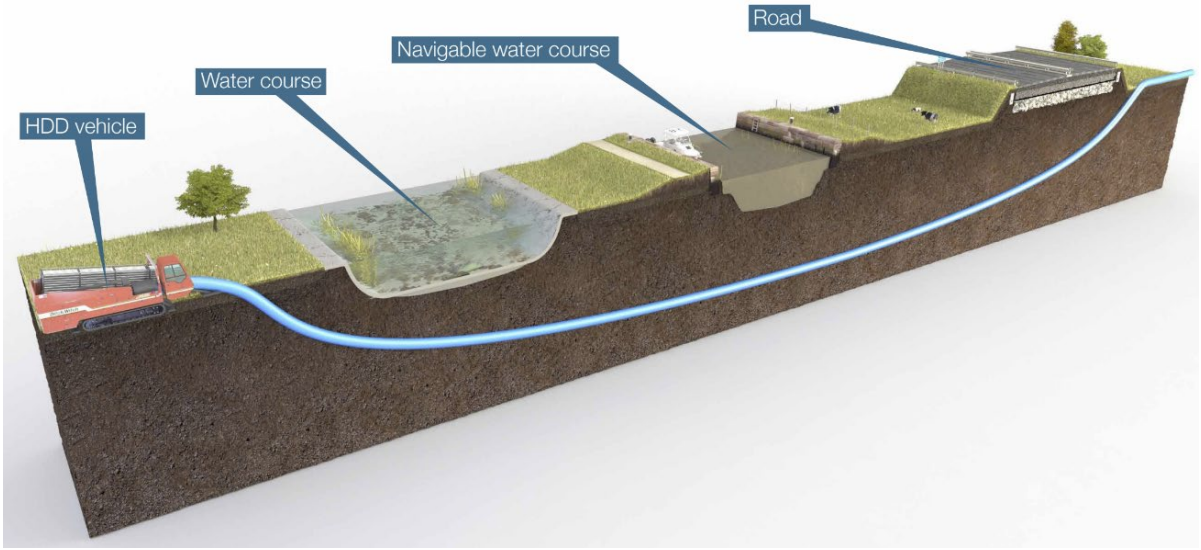
- **14.5** km in farm land
- **7.5 km** in roads (Oxford Road, Lower Road, B4449, B4044, B4017)
- **2.5 km** as Trenchless crossings

An overview of the route chosen is shown on the following figure:



II. Horizontal Directional Drill (HDD)

Horizontal Directional Drill (HDD) is a method of installing underground cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area. A typical schematic of a HDD site is shown in the following figure.



[1]

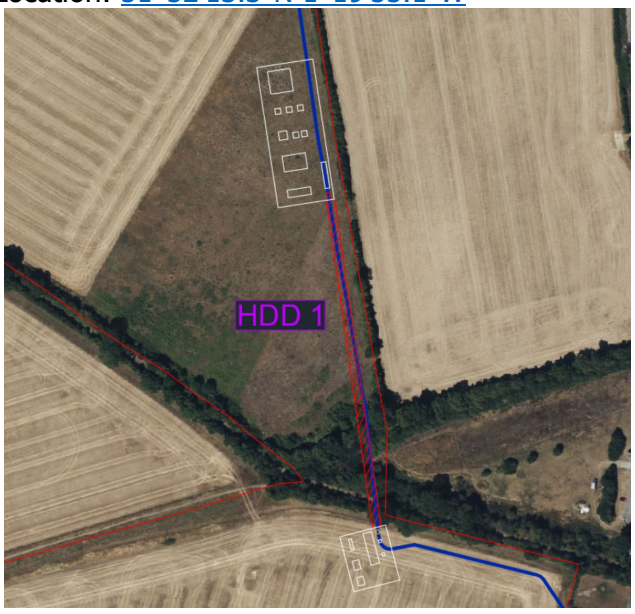
Depending on the ground conditions the drilling operations will take place in a series of stages:

- Drill an initial pilot hole , Increase the pilot hole to a larger diameter in stages
- A wire is inserted in the conduit or may be blown in afterwards using compressed air
- The cable would then be installed from the Cable Laying machine

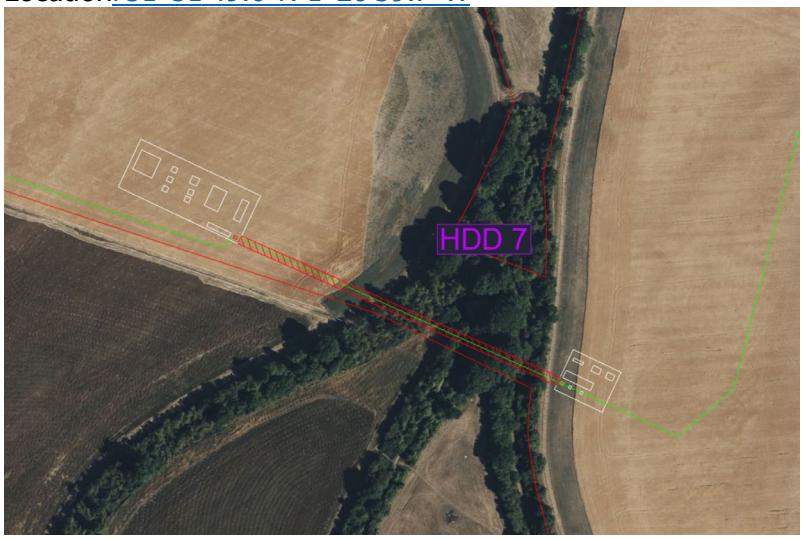
In total, it is assumed that there will be **12 HDD** locations:

Northern Section

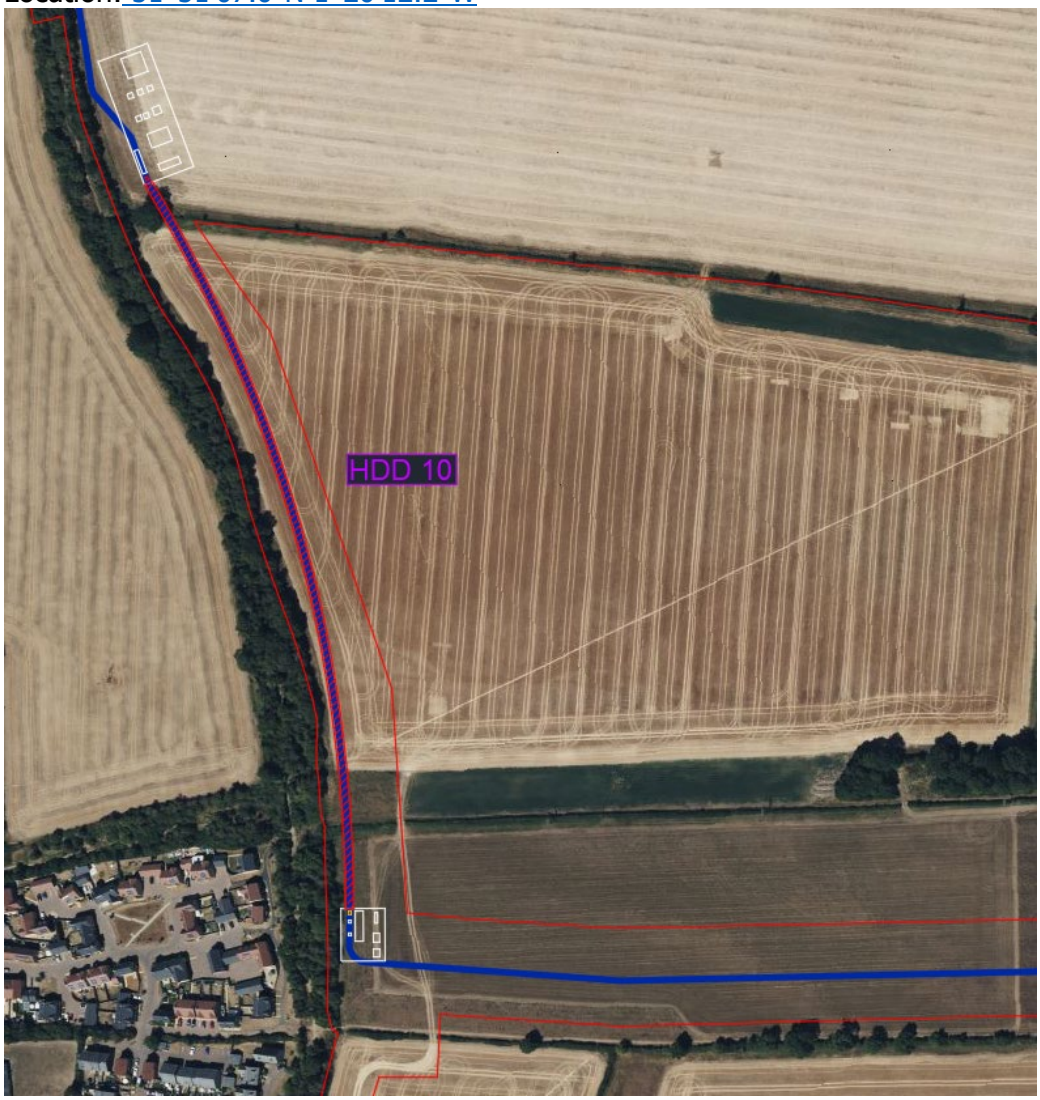
HDD 1: Hedgerow
Location: 51°52'13.3"N 1°19'55.1"W



HDD 7
Woodland (for 33kV cable)
Location: 51°51'49.6"N 1°20'39.7"W



HDD 10
Landfill (for 275kV cable)
Location: 51°51'07.0"N 1°20'12.2"W



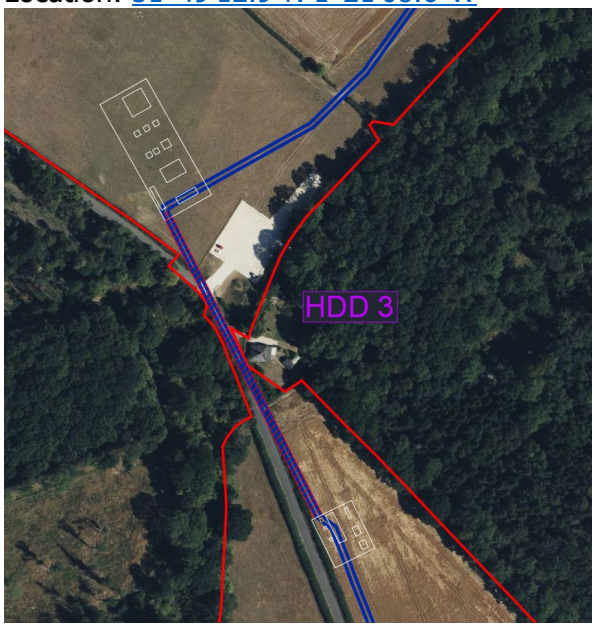
Middle Section

HDD 2: Road

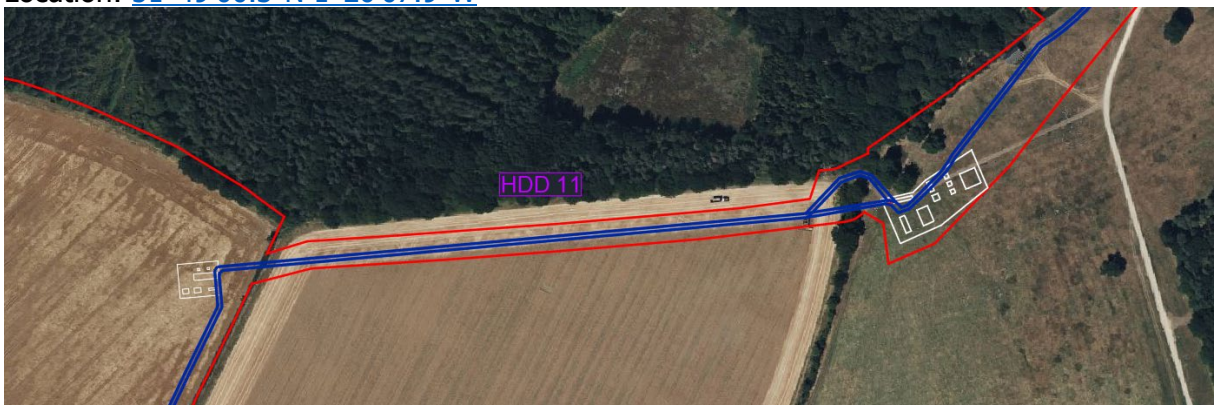
Location: 51°50'16.0"N 1°20'11.1"W

HDD 3: Road

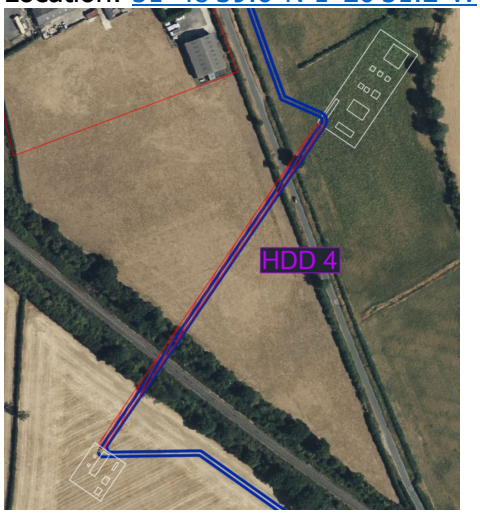
Location: 51°49'12.9"N 1°21'08.6"W



HDD 11: Veteran tree
Location: 51°49'00.3"N 1°20'07.9"W



HDD 4: Railway crossing
Location: 51°48'39.6"N 1°20'51.2"W



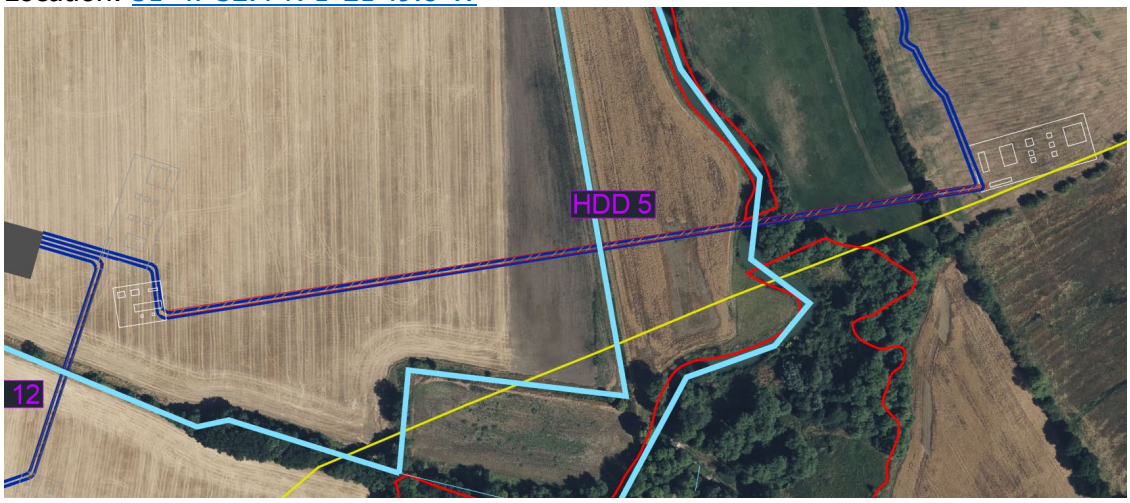
HDD 9
Hedgerow (for 33kV cable)
Location: 51°48'30.6"N 1°20'32.3"W

HDD 8:
Example for Railway crossing (33kV cable)

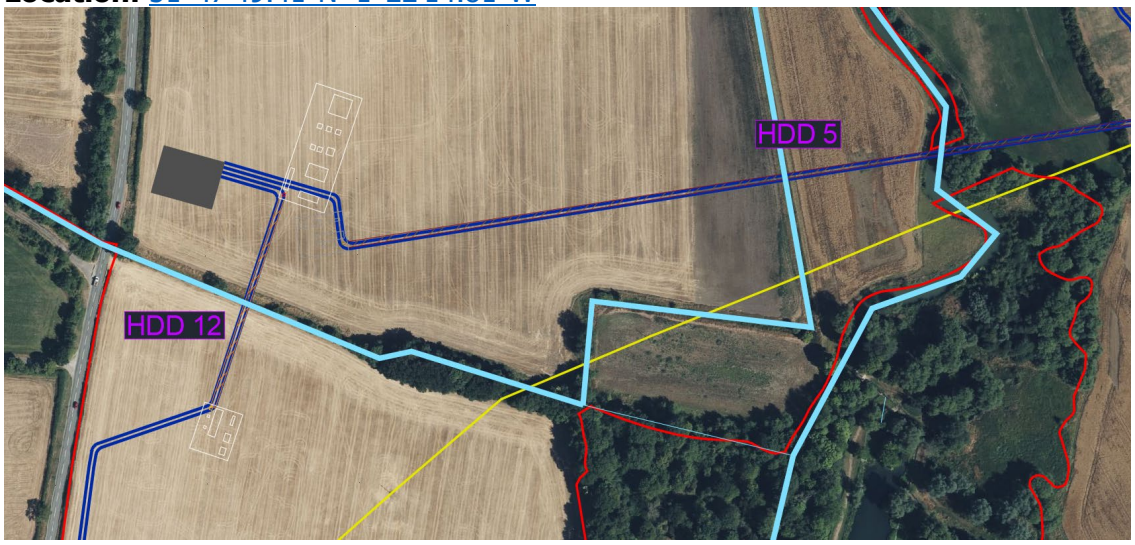
Location: from 51°48'54.37"N 1°21'23.17"W to 51°48'9.46"N 1°19'35.94"W Please refer to the works plan [EN010147/APP/2.3] sheet number 7 and 9.

The exact location of the railway crossing for the 33 kV cable will be determined at detailed engineering stage.

HDD 5: Evenlode River
Location: 51°47'52.4"N 1°21'49.8"W

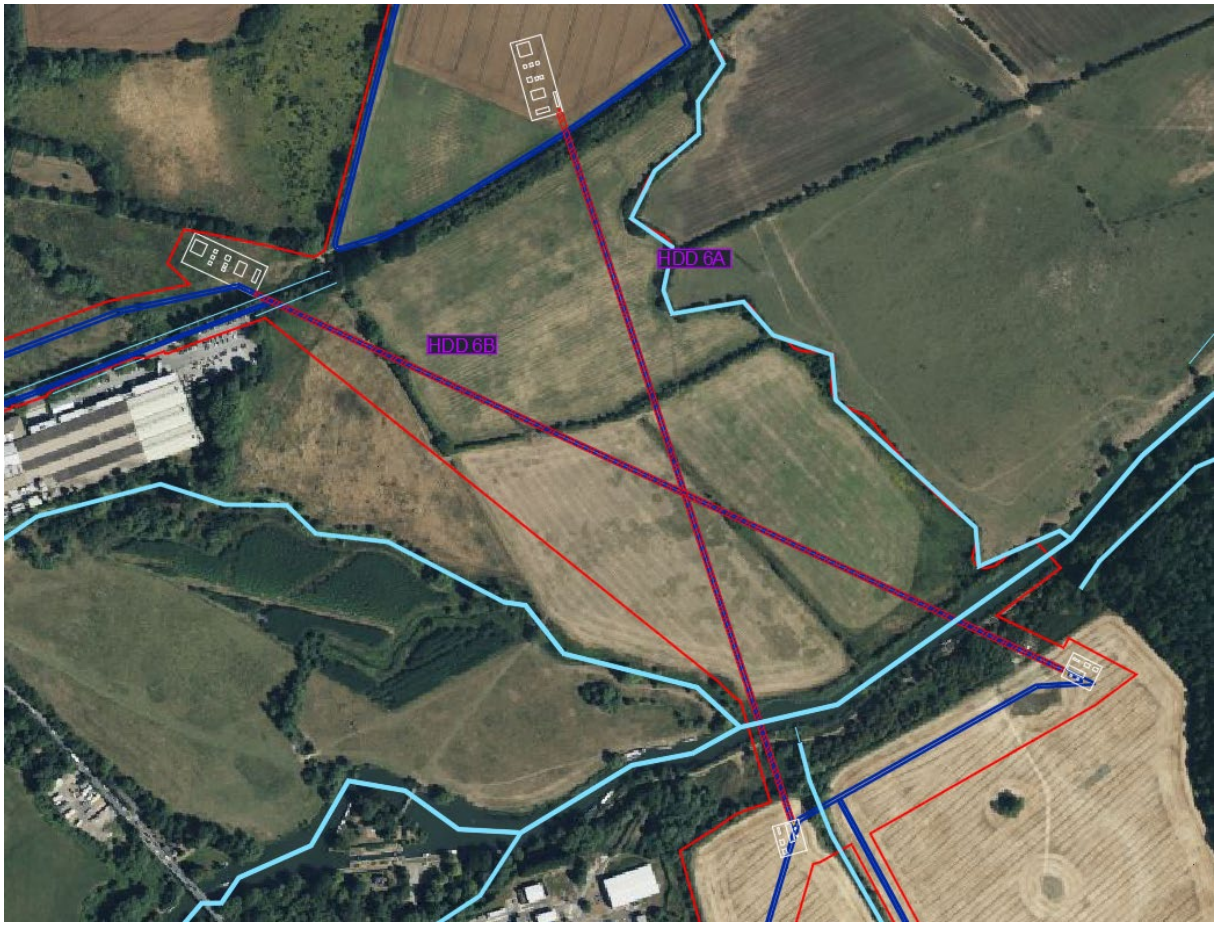


HDD 12: Water course & Hedgerow
Location: 51°47'49.41"N 1°22'14.81"W



Swinford Bridge

HDD 6
Option A: Thames River Location: 51°46'46.0"N 1°21'11.8"W
Option B: Thames River Location 51°46'42.5"N 1°21'18.6"W



- **HDD Construction compounds**

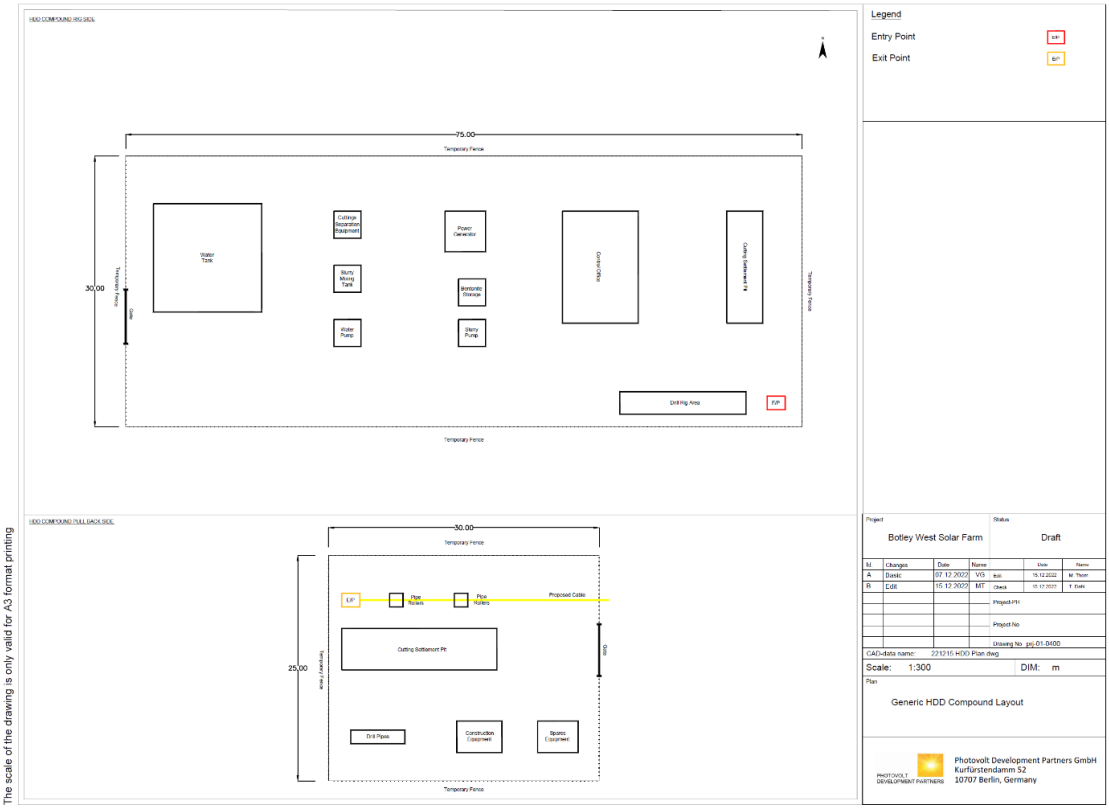
Construction compounds for HDD will be required at both entrance and exit holes.

The indicative dimensions of the HDD construction compounds are as follows and can vary dependent upon field boundaries and land availability:

- **30m width for 75m** stretch to the **entrance** hole
- **30m width for 25m** stretch to the **exit** hole

The main components of the HDD construction compound of the rig side (Entrance hole) and the pull back side (Exit hole) are as follows:

HDD compound rig side (30m*75m)	**HDD n compound pull back side(30m*25m)**
Control Office	Cutting settlement Pit
Power Generator	Drill Pipes
Slurry Pump	Construction equipment
Water Pump	Spares Equipment
Cutting settlement Pit	Pipe Rollers
Slurry Mixing Tank	Gate and Fence
Cuttings Separation Equipment	
Water Tank	
Drill Rig Area	
Gate and Fence	



III. Crossing Types

The cable route crosses a variety of obstacles such as:

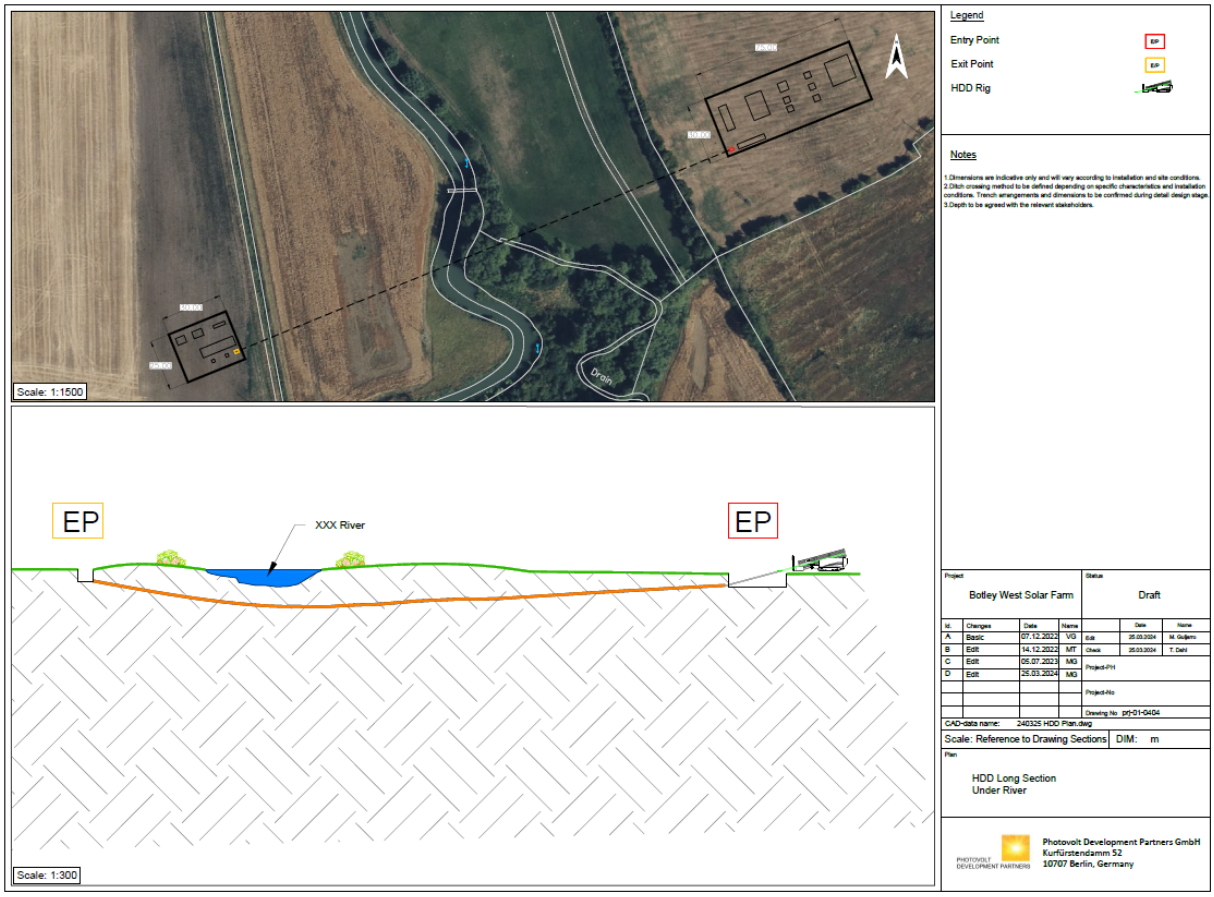
- Hedgerows
- Watercourses
- Rivers
- Railway lines
- Roads
- Tracks
- Public rights of way

The trenchless crossing method HDD will be used to cross large obstacles. Shorter obstacles should be further investigated.

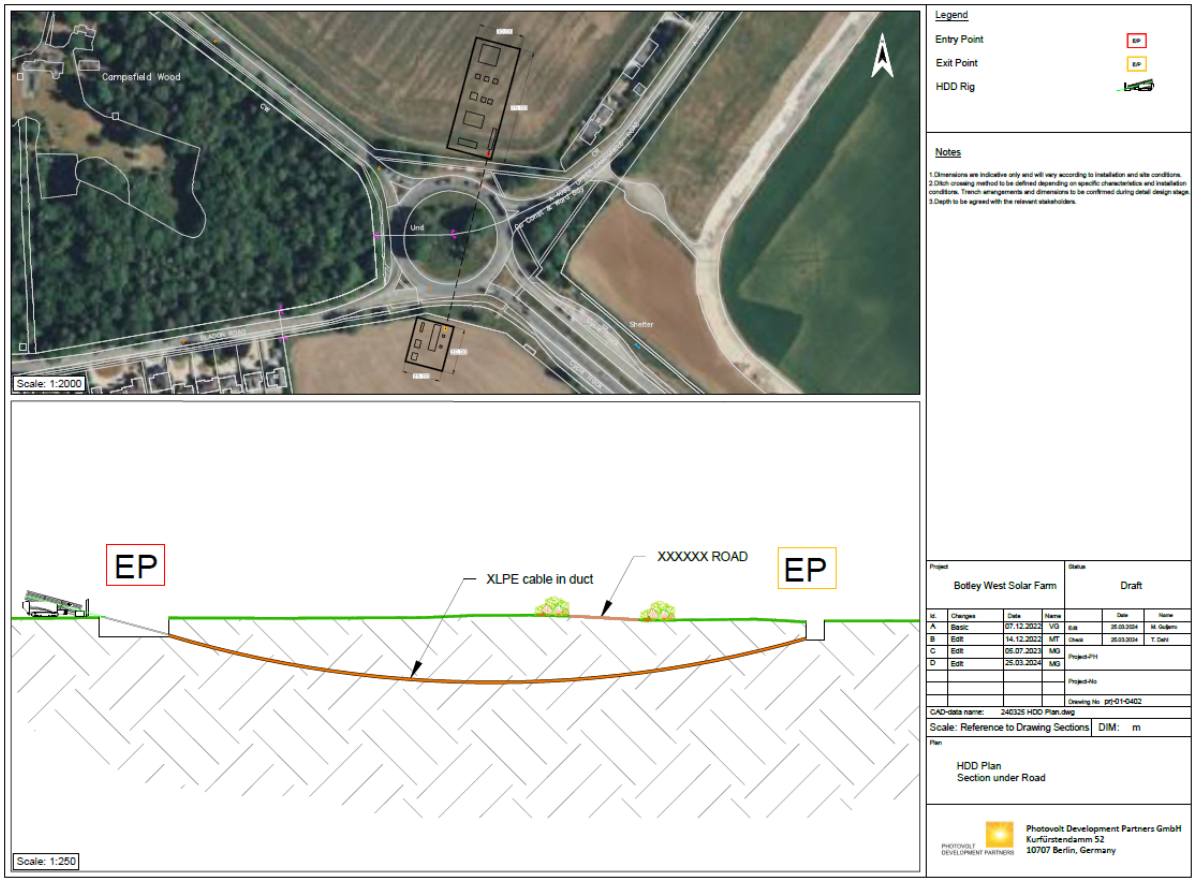
Hedgerow crossing

Hedgerow crossings will be excavated to a depth of **1.5-2m** followed by installation of the ducting to a minimum depth of **1.5m** beneath the hedgerow and backfilled.

Watercourses, rivers



Road crossing



Railway crossing

Burial Depth of cables

Open Cut			
Burial Depth of cables (m)	**Min**	**Max**	**Comment**
	1m	2m	subject to change upon completion of the detailed design

Horizontal Directional Drill (HDD)			
Burial Depth of cables (m)	Min	Max	Comment
	1.5m	30m	To be determined in detailed profile design of HDD later

References

- [redacted]
- France-Alderney-Britain (FAB) Link Interconnector: UK Cable Route Environmental Risk Assessment Report. Volume I -Text, December 2016
- Verfahrensbeschreibungen im Grabenlosen Leitungsbau