

FOL16/670: DRILL, CONSTRUCT, DEVELOP & TEST PUMP A NEW BOREHOLE WITHIN

THE REGENT’S PARK TOGETHER

WITH PERMANENT INSTALLATION

WORKS, CONTROLS

AND PIPE WORK

SCHEDULE 4 - WORKS INFORMATION,

DOCUMENTS AND DRAWINGS

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### INTRODUCTION

The *works* are in four parts as follows.

1. Drilling and construction of a new 8” Upper Chalk borehole within Marylebone Green at The Regent’s Park
2. Development of the borehole by airlifting, surging and (possibly) by acidisation
3. Installation of all permanent works, including pumping and control systems, and pipe work
4. Test pumping

The purpose of this contract is to provide clean non-potable chalk-derived water for distribution around the park for toilet flushing, irrigation, lake management and other non-potable uses. The contract start date is provisionally end of January 2017 and the end date is provisionally end of March 2017.

### PRELIMINARIES AND MOBILISATION

### Access is only available off Chester Road. See Dwg. No. 576.T.YBS.01. Any heavy plant movements into and out of the site must be supervised by a banksman. The *Contractor* shall construct the compound over as the site is required and agreed with the Park Manager. Allow for temporary storage, site welfare facilities, site office and accommodation. The boundary of the site shall be demarked by 2.4m Heras fencing with lockable gates and fitted with appropriate signage and shall enclose the complete compound including the rig, tanks, generators, screens etc. included within this mobilisation section.

### Drilling hours shall be limited to 7.00am – 6.00pm Monday to Friday with negotiated extensions and weekend working by arrangement with the Royal Parks. Test pumping shall be carried out as required.

### No slurry pits are to be constructed. Settlement tanks and solids handling equipment to be set up as and where appropriate. Allow for containment of waste to be removed from site – includes returned sediment from borehole flushing.

### This mobilisation component shall comprise all necessary H&S, CDM, permitting and administrative work.

### Potable and non-potable water is available on site.

### The *Contractor* shall allow to locate buried & overhead services and to allow for their protection.

### All damage must be made good at handover. This includes, but is not limited to tarmac and hard standing (except as directed immediately around the borehole), kerbs, rails, kiosks, posts & poles.

### Submission of O&M Manuals including but not limited to drilling log and data, water quality, pump test results, geophysical reports. The *Contractor* shall also adhere to statutory reporting requirements.

### This preliminaries and mobilisation component shall comprise all necessary H&S, CDM, permitting and administrative work.

### Method Statements and other H&S aspects of this project may vary outside of the control of the Engineer. Additional to this document which forms part of the contract tender documentation is ‘Conditions specific to site of Regents Park’.

### GENERAL STANDARDS OF INSTALLATION

The *Contractor* shall diligently follow the manufacturers’ recommendations for the installation of all pipes, ducts, chambers, valves and any other item of equipment or component used in delivering the *works*.

### HEALTH & SAFETY

The *Contractor* shall be the Principal Contractor under the terms of the CDM2015 Regulations. The *Contractor* shall note the content of the Information File that will be produced by the *Employer* or the Principal Designer. The Principal Designer and Designer of these Works is Marcus White of Irriplan Ltd (mobile: 07904 526307). Sufficient resources shall be allocated at this stage by the *Contractor*, who shall follow all relevant H&S instructions given by the *Employer* and Principal Designer. During the course of the Works, the *Contractor* shall take all necessary precautions to ensure the protection of the safety of employees and of the general public using the park.

The full cost of complying with the safety legislation and the regulations shall be covered in the *Contractor’s* Offer. No extra claims will be entertained for the provision of Risk Assessments, Safety Statements, Safety Plans, Safe Work Practice Sheets, other safety Documentation or for attending Safety Meetings.

If the *Employer*or Principal Designer is of the opinion that the *Contractor* is not taking satisfactory precautions in relation to such safety he may instruct the *Contractor* to carry out the necessary operations to ensure such safety but this shall not relieve the *Contractor* of his obligations to take adequate precautions in the first place.

The *Contractor* shall perform the function of Principal Contractor in developing the Construction Phase Plan as necessary and shall adhere to all requests by the Principal Designer. Particular risks associated with this project as identified by the Designer are to be found within the Designer’s Risk Assessments which are below. The assessments do not relieve the *Contractor* of his obligation to ensure he has sufficient information to ensure the protection of his employees and others prior to starting the *works*.

Upon appointment, the *Contractor* shall prepare a site- and project-specific Health and Safety Plan for the construction phase which shall include but be not limited to:

1. Risk Assessment and Procedures for Activities with Risks to Health and Safety
2. Health and Safety Welfare Arrangements
3. General COSHH Assessment package
4. Contract Safe Working Procedures
5. Emergency Procedures
6. Plant and Equipment Maintenance and Inspection Procedures
7. Site Rules
8. Quality Assurance/Monitoring Procedures relating to Health and Safety Issues

A copy of the project Health and Safety file will be held on site by the *Contractor*. The *Contractor* shall provide the *Employer* and the Agent with copies of all information that is required to be placed on the Health and Safety File and this shall be submitted with the Operation and Maintenance file submission at the completion of the project.

### GENERAL SPECIFICATIONS FOR MATERIALS AND INSTALLATION

### Trenching

Pipe and duct installation shall be by open trenching only using a combination of hand-digging and by mini-digger only. The *Contractor* shall satisfy himself of ground conditions and buried services/roots in order to do this and is reminded of The Royal Park’s policy on working under and close to trees.

The trench width and depth shall be as small as required to provide the correct degree of separation between the equipment to be installed. The NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities’ Apparatus shall be followed, but provisionally equipment shall be laid as follows:

All new equipment laid within Marylebone Green should have a depth of cover of 1.2m to crown. Outside of Marylebone Green, cover shall be as follows:

|  |  |  |
| --- | --- | --- |
| **Equipment** | **Min depth to crown** | **Max depth to crown** |
| Potable water | 900mm | 1350mm |
| Borehole water | 750mm | 1350mm |
| General ducts | 600mm | 1350mm |
| LV signal cable duct | 600mm | 750 |
| Fibre-optic duct | 600 | 750 |

Where trenching takes place, the Contractor shall first remove the turf – if present - with a turf cutter and store the turf on polythene sheets. The base of the trench shall be backfilled with an approved material free of stones, frozen material, vegetation or sharp objects (either imported material or screened arisings), to ensure a smooth floor.

It is anticipated that as-dug material shall be used for pipe embedment and backfill with excess material removed from site at the *Contractor’s* expense. As dug materials shall have the following properties:

* It should be easy to scrape or shovel to form a bed on which to lay a pipe, and also be easy to distribute uniformly beneath the haunches of a pipe by tamping.
* The largest particle size should not be excessive in relation to the pipeline diameter otherwise impact damage and concentrated point loading can occur.
* It should not contain particles with sharp edges when used with those pipes or pipe coatings that are susceptible to damage.
* The grading should be such that water passing through will not encourage fine materials to be carried away and thus reduce the support for the pipeline.

If required by the engineer, Compaction Fraction tests shall be carried out in order to further determine the suitability of the arisings for reinstatement, and the quantity of import fill to be used. This may be done on a location by location basis.

Pipes and ducts shall be laid and embedded with the approved as-dug material and compacted by using manual punners. Backfilling shall be done in loose increments of no more than 150mm depth and properly compacted prior to the next increment. Mechanical compactors should not be used until the total depth of backfill over the pipe exceeds 450mm. The final increment shall be a topsoil material and the Contractor shall re-lay the turf. Where turf is of poor quality it shall be replaced with new turf of an equivalent type at the *Contractor’s* expense. If and where as-dug material is not appropriate for backfill, instructions shall be sought from the engineer and appropriately costed into the contract.

In addition the following shall be adhered to:

**Spoil:** spoil from excavated holes or trenches shall be placed on boards or mats and not directly onto the adjacent turf or planted area.

**Lawn area**: lawn is to be lifted and placed to one side on boards and replaced following installation of equipment. Where the turf is of insufficient quality, the *Contractor* shall replace with new. This part may be sub-contracted out to the existing on-site grounds-care contractors by prior-arrangement.

**Trees:** tree roots shall be avoided and it is likely that hand-digging only shall be permitted beneath the tree canopy and then only by agreement with the Park Manager. No roots of greater diameter than 25mm are to be cut.

**Shrubbery:** shrubs are to be treated as trees except with the permission of the existing gardeners and the tree officer.

Codes of practice for pipe and cable installation, including manufacturers’ codes shall be followed.

Where paths are open cut the Contractor shall re-instate the paths to the same surface standard as the original construction. Rammal or hoggin bases not complying with Tables 5/3 (coarse aggregate) or Table 5/4 (fine and all-in aggregated) material for pipe bedding, haunching and surrounding (EN13242), shall be removed and the path base re-made with Type 1and then finished to the Royal Parks standard to insure full re-instatement. This will involve hot-tarmac and top-dressing to The Royal Parks specification.

### Polyethylene Pipe Work

PE pipe work for non-potable use shall be as follows:

• Black

• SDR17

• PE100

• Complying with BS EN12201 (all parts)

• Jointed by electrofusion sockets only or butt-welded only

• All fittings WRAS approved

• Installed with a ‘Caution – Raw Water Main’ Detectable mesh such as the 200mm x 100mm Terram wire Detectamesh (or approved equal) laid at 350mm below finished ground level and above the centre line of the pipe

All pipe work shall be laid with a depth from finished ground level to the crown of the pipe of between 750mm and 1350mm.

The Contractor must state their proposed machinery and plant list for pipe installation in their method statement, indicating the type, make and model of machine.

All open ends of pipe which may fill with dirt or mud in the event of rain, shall always be plugged or capped before leaving each day or when work is not in progress.

Pipes should be installed such that horizontal and vertical curvature do not exceed manufacturer’s specifications. Under no circumstances should pipes be bent or re-shaped by means of heat or any other method.

After the completion of each section of pipe-work, pipes shall be flushed to remove any dirt or debris and then tested by the Contractor in accordance with the instructions of the Engineer. As a minimum this shall be as follows:

The entire pipe network shall be tested for a period of not less than 6 hours at 1.5 times the rated pressure. During this time losses due to leakage shall not exceed 5% of the calculated stored volume in the pipe network, to be calculated by the Engineer prior to enactment of the test. Where components of existing systems are re-used (e.g. cast-iron pipe work) temporary blanking shall be used to restrict the testing to the polyethylene network. Any leaks or bursts resulting from the tests shall be repaired at the *Contractor’s* expense.

### General Ducting

All general ducts shall be installed in accordance with the Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works, Series 500 – Drainage and Service Ducts, Table 5/2, and be of thermoplastics structured wall (Twin Wall) to BS EN 50086-2-4 and to BS EN 50086-2-4. Path crossings (of which there are three excluding Chester Road) shall be fitted with 1 No. additional 150mm Twin Wall duct. With a full-length draw-rope fitted and plugged with removable plugs prior to backfilling.

### Low Voltage Signal Cable Ducting

Internally smooth ducting for copper-based signal cabling (<40VAC) shall meet the minimum requirements of EN50086 and installed generally as per the Manual for Contract Documents for Highway Works Volume 3. It shall be sized at nominally 100mm and is termed Flexiduct elsewhere in these documents. This ducting shall be used in-contract by The Royal Parks for the installation of fibre-optic cabling.

### Low Voltage Signal Cable

Signalling for Motorised Valve actuation

Signal cabling (for electrically actuated motorised butterfly valves) shall comprise 2c x 2.5mm2 XLPE insulated, PVC bedded, steel wire armoured and PVC sheathed cable with annealed copper conductors complying with BS EN 60228 class 2 and designed in accordance with BS 546.

There should be no cable joints between valve actuators and control panels.

NB: All motorised valves shall be capable of being manually over-ridden with a hand-wheel. See later specification.

Signalling for other Non-motorised Valve Actuation Requirements

Control cables shall comprise 2c or 3c (as specified) x 2.5 mm2 solid copper conductors, double insulated and sheathed with pure, non-hydroscopic PE, conforming to BS6346/69 or CEI 60502-1.

No cable joints are to be made below ground level.

### Inspection Chambers

All pre-cast manholes are to be made to BS EN 5911-3 and BS EN 1917and sized at DN900 or DN1200 as appropriate for valve and pipe work, except as where otherwise specified. Chambers for signal cabling and fibre-optic ducting shall be manufactured in accordance with BS EN 13598-2:2009. Manufacturers to be approved prior to installation and the manufacturer’s installation recommendations are to be followed.

Where instructions and specifications are not given which are contrary to the Manual of Contract Documents for Highway Works Volume 1 – Specification for Highway Works, Series 500, Clause 507, the Manual of Contract Documents for Highway Works shall be followed. This includes method of laying and penetrations.

Concrete chambers shall be installed upon ST1 C25 concrete with a minimum depth of 200mm.

### Concrete, Bricks & Blockwork & Mortar

Where instructions are not given which are contrary to the Sewers for Adoption 7th Edition (SFA7), Part 5 – Civil Engineering Specification, the Sewers for Adoption 6th Edition, Part 5 – Civil Engineering Specification shall be followed.

All concrete shall follow the specifications within the following standards:

BS EN 206-1 Concrete – Part 1: Specification, performance, production and conformity

BS 8500-1 Concrete – Complementary British Standards to BS EN 206-1. Part 1: Method for specifying and guidance for the specifier

BS 8500-2 Concrete - Complementary British Standards to BS EN 206-1. Part 2. Specifications for constituent materials

The supply of ready-mix concrete shall be via a plant is approved by a Third Party Certification Body accredited under Category 2 (Product Conformity) by the National Accreditation Council for Certification Bodies.

All cement shall be sulphate resisting Portland Cement complying with the provisions of BS EN 197-1. Mortar shall be mixed on site as required and shall comply with the requirements of BS EN 998-1 and BS EN 998.2

All bricks used below ground or as part of a below ground structure shall be Class B Engineering bricks complying with the relevant provisions of BS 3921 and shall be F-Category frost resistant.

### Testing and Commissioning

Allow for all testing and commissioning for all system components (as a separate exercise from borehole testing) and the interaction of newly installed components with existing systems.

### DETAILED SPECIFICATION

### Part 1 – Drilling & Construction

### Location & Access

The location of the borehole has been set, subject to final approval at NGR TQ2850,8257 as indicated on Dwg. No. 576.T.YBS.01. The site is within the Marylebone Green at The Regent’s Park at approximately 34mAOD. Services drawings will be provided by the *Employer* but it is the responsibility of the *Contractor* to locate and protect all services within the site, site access and routes of temporary pipe work. Additional information shall be available from the *Employer* and Principal Designer at the appropriate time.

Access is off the Outer Circle via Chester Road as shown on Dwg. No. 576.T.YBS.01. The location may move within Marylebone Green depending on any time or weather dependent restrictions on access.

### Geology

The information on the geology is derived from the nearby boreholes at ‘The Colosseum (TQ28789,82491), ‘Doric Villa (20, York Terrace East)’, ‘London Transport No. 6’ and ‘The Regent’s Park Hanover Gate’ borehole sunk in July 2006, and is deemed to be as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| 0 | – | c.2mBGL | Made ground  |
| 2m | – | c.44mBGL | London Clay |
| 44m | – | c.59mBGL | Lambeth Group (Woolwich and Reading Beds) |
| 59m | – | c.64mBGL | Thanet Sands  |
| 64m | – | 100+mBGL | White Chalk (Upper Chalk) |

Tenderers should satisfy themselves of this information upon tendering.

### Statutory Compliance and Environmental Standards

The Royal Parks Agency has Crown Exemption from the need to submit a WR32 Consent and to apply for an abstraction licence. However the Royal Parks Agency undertakes to collaborate with the Environment Agency. As such, the tenderer shall understand that all normal conditions which the Environment Agency would apply to the project shall be adhered to in the construction and testing of the borehole. The application for Section 32 consent shall be made in parallel with this tender process.

### Borehole Summary

|  |  |
| --- | --- |
| Depth | 100mBGL |
| Diameter | Casing | 219mm OD x 8.1mm BS879 steel casing |
| Open hole  | 200mm |
| Anticipated drilling method | Top c.30m | Auger |
| To depth | Direct Flush Rotary |
| Casing | 219mm grouted into top 3m – 5m of Chalk |
| Yield aim | 15m3/hr |
| Power Source | Supplied by *Contractor’s* generator during drilling |
| Supplied by Royal Parks during test pumping (to 7.5kW) |
| Development | Air Lifting/surging |
| Acidisation (possibly) |
| Anticipated RWL | c.70 - 75 mBGL |
| Pump depth | 85mBGL |
| Pump testing | Calibration |
| Step testing |
| 4 day constant rate testing |
| Test pump discharge | To York Bride Spur of The Regent’s Park Lake |
| Waste | Clean water only No slurry pits – tanks only |
| Logs | Drilling and sampling |
| Geophysical | Fluid Temperature and Conductivity |
| Pump velocity log |
| Four Arm Caliper |
| Natural Gamma |
| Borehole Video Camera |
| Gamma-Gamma Density |
| Cement Bond Log |
| Water quality testing | Standard suite |
| Permanent Pump | Grundfos SP17-10 |
| Dip tube | 2 x 32mm |
| Finishing | Topped with blanked flange 200mm BS4504 PN16to suit below ground chamber |

### Borehole Construction

The drilling fluid used within the upper strata shall incorporate a natural organic polymer. The viscosity and solids content shall be at the driller’s discretion.

Clean chalk borehole-derived water is available within the adjacent lawn via a hydrant from the irrigation system

1. Provide on-site power requirements for duration of the drilling stage via quiet-running generator
2. Excavate 1.2m deep trial hole at borehole location
3. Drill hole to diameter and depth for large diameter temporary or unrecoverable upper casings and allow for grouting as required.
4. Verticality and alignment of drilling to be checked at all stages as required.
5. Drill hole to required diameter (minimum 320mm) and install 219mm OD BS879 steel casing through London Clay, Reading and Woolwich Beds and Thanet Sands allow for grouting in. Any temporary or unrecoverable casings shall be included within this component. Hole to be drilled as shown in Dwg. No. 576.T.YBS.02 with casing to c. 69mBGL. Steel casing to be installed to c. 5m into chalk. Note that it is likely that much of the fissure flow within the Upper Chalk shall be within a few metres of the top of the chalk and so this grouted-in casing must extend only as deep as is necessary. This notwithstanding, it shall be the *Contractor’s* responsibility to ensure a good seal with the permanent casing and ensure that the Thanet Sand is cased-out.
	1. Exterior of casing to be painted with two coats of black bituminous coating to BS3416/11
	2. Casing joints to be butt-welded and flush.
	3. 50mm annulus to be retained outside permanent 219mm casing for grouting. Guides to be used to ensure centralisation.
	4. Grout annulus with cementitious grout using approved bottom entry grout method to within 1.2m of original ground surface accounting for volume required at regular depth intervals. Allow for removal of any temporary casings as might be required by the driller’s methodology.
	5. Allow min. 36 hours for grout to go off
6. Continue drilling of open hole at 200mm diameter within Upper Chalk to c.30m of Chalk penetration.
7. Weld 200mm NP16 flange to top of casing at c. 450mm below original ground level and fit with blanking plate
8. Backfill hole around casing with Type 1 for subsequent removal for chamber installation in Part 2
9. Remove all drilling slurries and wastes off site

### Borehole Abandonment

If the borehole is abandoned by the *Contractor* for whatever reason, a new borehole shall be begun immediately to the same specification following notification to the Engineer. The abandoned borehole shall be filled in and decommissioned correctly at the *Contractor’s* expense and any monies paid to the *Contractor* for the abandoned borehole shall be judged as being payments on account for the appropriate stages of the new borehole.

### Part 2 – Development & Acidisation

Water arising during the development and clearance stages shall be removed from site via vacuum tanker, bowser or similar under this contract. Alternative or additional arrangements may be made with The Royal Parks / Thames Water as may be feasible. Precise methodology will reflect ability to remove contaminated water.

Acidic residues to be taken off-site to approved licensed disposal points

1. Allow for installation of air lift plant & operate plant to develop borehole by cyclic surging for min. 5hrs prior to acidisation including:
	1. On/off pumping
	2. Yield estimation & notification to engineer prior to committing to acidisation which may not be carried out
2. Allow for installation of all hydrochloric acid handling and injection plant
3. Inject acid to chalk borehole under closed well-head conditions
4. Allow for 5m3 hydrochloric acid
5. Monitor pressure decay at well head at appropriate intervals for at least 12 hours
6. Remove acid residue from borehole and site
7. Airlift for 5 hours as above following acidisation

### Part 3 – Installation of All Permanent Works, Including Pumping and Control Systems, and Pipe Work

### Borehole Pump & Well Head Installation

Provisionally and subject to the findings of the air-lifting the pump shall be a Grundfos SP17-10 (5.5kW 3-Ph) or approved equal submersible pump and installed on 85m of 3” Certa-Lok PVC spline-sealed rising main or approved equal. The pump shall be started via an autotransformer start or similar (non-VFD) soft-starting mechanism (to be agreed at tender stage). The borehole pump shall be fitted with an integral non-return valve. Above the pump, between it and the Certa-Lok, and manufactured from the same galvanic grade AISI 304 stainless steel shall be inserted a six-fin stainless steel ‘flute’. This flute’s fins shall be made out of 6mm steel as per Dwg. No. 576.T.YBS.03 and shall serve to guide the pump up into the steel casing, below which the pumped water level will draw down to. The fabrication of this bespoke component and its interaction with the pump and the rising main shall be agreed with the Engineer, but not withstanding the Engineer’s design specification for the installation to be fit for purpose, the adequate suspension of the pump on the rising main shall remain the responsibility of the *Contractor*.

The well-head shall be constructed from an appropriate fitting to connect to the 3” Certa-Lok drop pipe welded/threaded to a DN200 BS4504 PN16 mild steel flange. Connected to this flange shall be a flanged tee either branch of which shall connect to a DN80 BS4504 flange assembly which shall hold a 6mm (thickness) orifice plate as may be required to throttle the flow in each branch. The drilling out on site of this orifice plate, bevelling and fitting to reach a tolerance agreed by the Engineer in accordance with the later results of the pump test shall be part of this contract. If a completely separate pump is required, this shall be further and separately agreed in lieu of the SP17-10. The orifice plates on the branch outlets shall be sandwiched on the outer side by a DN80 motorised butterfly valve actuated by a Valbio Series 86 VB110M (or approved equal) 24vDC actuator. These 90º actuators shall be fail-safe (i.e. battery back-up) with the branch to the lake failing in the normally open position and the branch to the irrigation tank failing in the normally closed position.

The well head shall be fitted with 2 No. 32mm PE dip tubes via glands fitted through the flange head. No gate valve is required at the well head.

A rubberised 4-core 10mm2 borehole cable (or other in accordance with the starting method) shall be installed with the pump and clipped to the drop pipe alongside the dip tubes. The dip tubes shall extend to the pump. The borehole cable shall be connected to 10mm2 4-core XLPE SWA cable within the borehole chamber in a dedicated IP67 switched isolator.

The borehole head works shall be completed within a DN1200 concrete chamber all as per Dwg. No. 576.T.YBS.03. A cover slab to suit shall be fitted together with a 900mm x 750mm D400 ductile iron lid or other sized for access to all necessary components. The cover and lid shall be fitted in such a way as to allow future maintenance of the borehole installation.

The well head branched outlets are to lead to as shown on Dwg. No. 576.T.YBS.03 to two separate inspection chambers holding each, 1 No. DN80 pulse-reading mechanical water meter such as the Sensus Meistream PN16 DN80 meter fitted with the HRI-Mei 0.1m3 pulser.

Ducting for power for the borehole pump, actuation and control of the motorised valves, pulse meter reading and borehole data logger (outside of this contract) from the pump house shall be included within this part/phase.

### Power Supply

See Dwg. No. 576.T.YBS.04.

The *Contractor* shall familiarise himself with all aspects of taking power from the location shown in the above drawing to the existing pump house shown in the same drawing. This includes entry into the supply building and all works within – the client shall make available a dedicated power supply either as a new isolator or panel. It also includes trench excavation on the north side of Chester Road, some of which shall be hand-digging.

One road crossing of Chester Road shall be made as shown on Dwg. No. 576.T.YBS.04. This shall be an open cut and includes the fences, footpaths, road and verges. Reinstatement shall be on a like for like basis c/w red SMA. The road crossing shall hold the power supply, the spare 100mm flexiduct and two additional 150mm ducts from outside fenceline to outside fenceline. A newly planted avenue of trees along Chester Road must not be disturbed.

Trenching to the pump house shall afford a service cover of minimum 1200mm to grade.

See also Dwg. No. 576.T.YBS.06.

The existing power supply within the pump house is single phase and supplies the fountain pumps and the existing irrigation system. It is not proposed to upgrade these systems as part of this contract, but provision shall be made for future upgrading.

The *Contractor* shall install a new mains isolator and 3Ph distribution board with sufficient capacity for future connections to a 3Ph irrigation pump set, a separate borehole distribution booster set, the fountain pumps, all controls and ancillaries. Total power to be limited by cable sizing from the new connection north of Chester Road, and the size of that connection itself.

### Control

Within the existing pump house shall be installed the borehole starter panel supplied via the new distribution board.

The pump shall be a 5.5kW 3Ph pump, or similar, as described above. Within the pump house shall be sited the borehole starter and control panel. This shall feature:

* IP56 steel enclosure with door interlocked isolator, motor rated fusing and fan ventilation
* Electronic soft-start – to be approved
* Motor protection: Phase failure, Phase reversal, Low voltage condition,
* Pump dry running protection

The control panel for switching the borehole pump and the two motorised valves shall carry out the following functions:

Note that the discharge to the lake (which shall be called ‘Lake’) shall be normally open, i.e. and open under failed circumstances. The discharge to irrigation tank (which shall be termed ‘Tank’) shall be normally closed and closed under failed circumstances.

The control panel shall operate as follows on the following basis:

|  |  |
| --- | --- |
| Off: | The pump shall not start under any circumstances |
| Lake only: | The pump shall start and discharge to the Lake only |
| Auto 24hrs: | The pump shall start and discharge to the Lake but when a signal is received calling for water from the Tank, the valves will actuate in tandem and water shall be diverted to the Tank until the calling for water is no longer received. |
| Auto timed: | As above except that the Lake fill shall be governed by a mechanical time clock currently fitted within this same panel. This clock shall be a large circular faced dial. Note that if the Tank calls for water and the pump is not running, the valves will actuate such that no water can go to the lake but will go to the Tank and after a time delay in order to allow this to happen, the pump shall start and then stop when the call for water signal is no longer received |
| Tank Only: | Whenever the Tank calls for water, the valves will actuate such that no water can go to the Lake but will go to the Tank and after a time delay in order to allow this to happen, the pump shall start and then stop when the call for water is no longer received and the valves revert to their normal conditions |

This functioning will take place via a five-position switch clearly labelled on the panel.

The call for water signal shall be relayed via a new pair of float switches within the existing tank. The level of this existing float switch that signals the sending of water to this tank from elsewhere shall be adjusted so that water is preferentially supplied (and under all normal circumstances) by the new borehole.

There is no provision within this contract to connect the water meters to a data logger system. This may be added as a variation.

All electrical power work, trenching and installation shall be in accordance with IEE Regs 17th Edition.

### Permanent Pipe Work and Ducting in Marylebone Green

Pipe work and ducting shall be installed all as per Dwg. No. 576.T.YBS.04.

Note that depths of cover to services laid within this contract shall be as per the table in section above excepting the length between Point A and Point B as marked on the plan and shown highlighted in yellow. Cover to all services laid here shall be 1.2m.

At the southwest extremity of these works the Ø90mm black PE is to be terminated within the basin at the head of the cascade. This work shall be carried out in such a way that the pipe outlet is not submerged at any time in the basin and is held securely in a neat and vandal-resistant manner. This pipe supplies the ‘Lake’.

Within the same trench across Marylebone Green shall be installed a second Ø90mm black PE pipe terminating in a hydrant as shown in Dwg. No. 576.T.YBS.05. This hydrant shall be an AVK Underground Fire Hydrant model 29/288 with a 2½” London round thread outlet. The location of this hydrant is indicative only and shall be determined on site.

Note that all pipe and power cable routes feature a parallel 100mm flexiduct. This duct is to be laid with the pipe / cable and provision made for TRP to install at the time of laying their own cable-based service within the duct.

### Permanent pipe work and ducting in the vicinity of the borehole and pump house

See Dwg. No. 576.T.YBS.06.

1. Location of existing irrigation pump discharge line and connection into it of the Ø90mm black PE that extends to the Marylebone Green hydrant as detailed above.
2. Installation of Ø90mm black PE to head of existing irrigation tank including, return to down-vertical over the top, new box enclosure, drain-cock and Type O lagging,

### Part 4 – Test pumping

Following installation of the above, the test pumping phase is to be carried out. Clean water may be pumped to The Regent’s Park Lake via the cascade. Contaminated water must be removed from site. All processes, plant and equipment for the test pumping of the borehole shall be in accordance with the British Standard for test pumping of boreholes, BS6316.

### Observation hole monitoring

* 1. Obtain permission, set up and install pressure depth transmitters and dataloggers within the following locations:
	2. Doric Villa – 20, York Terrace East (TQ 28/250) (if possible)
	3. Colosseum – Regents Park (NGR TQ 28790 82491) (TQ28/SE) (if possible)
	4. To retain these data loggers for a period of three days prior and three days post test pumping
	5. To down load these data files plus allow for receipt of any Environment Agency data logger information from nearby boreholes at the end of the pump test stage
	6. To allow for receipt of data logger information from The Regents Park Borehole near Hanover Bridge

### Installation of free-issue borehole data logger

The Royal Parks has a number of borehole monitored by Hydro-Logic’s Frog system. An additional pressure transducer and logger/transmitter shall be supplied free-issue by the Royal Parks for installation and commissioning within this contract

1. Calibration Test

Run pump for up to three hours and check all equipment. Dip borehole prior to start of calibration to ensure full recovery prior to Step Test. Note that the step test may require an additional temporary valve either on the end of the 90mm pipe at the cascade or at the well-head.

1. Step Test

Carry out four or more steps of increasing discharge over 100 minute cycles in accordance with the Specimen WR32 Consent (to be confirmed). Step discharges to be confirmed prior to the test but provisionally to be 5m3/hr, 10m3/hr, 15m3/hr, and possibly 20m3/hr

1. Constant Rate Test
	1. Following a recovery period of up to 24 hours a constant rate test shall be undertaken at a discharge to be set by the engineer.
	2. The constant rate test may be undertaken for up to three days constant pumping with up to three days recovery
	3. At end of test pumping period promptly remove temporary pipe work, spray irrigation system etc..

### Analysis of Pump Test Results

1. To provide raw data in spreadsheet form
2. To provide a written and graphical analysis of the test pump results

### Geophysical Logging

1. To carry out all logging and to provide a report detailing:
	* 1. Fluid Temperature and Conductivity
		2. Pump velocity log
		3. Caliper
		4. Natural Gamma
		5. Gamma-Gamma Density
		6. Cement Bond Log
2. To provide a down the hole DVD

### Water chemistry analysis

1. To sample the water prior to test pumping using the following metrics:
2. Temperature
3. Conductivity
4. pH
5. Dissolved Oxygen
6. To provide a detailed analysis of water quality once test pumping is under way as follows:
7. pH
8. EC
9. TDS
10. Total Hardness
11. Alkalinity
12. Sulphates
13. Ammoniacal Nitrogen
14. Sulphide
15. Iron
16. Magnesium
17. Calcium
18. Potassium
19. Manganese
20. Nitrogen: Total as N
21. Nitrogen: Total Oxidised as N
22. Nitrite as N
23. Nitrate as N
24. Phosphorous: Total as P
25. Orthophosphate, as P
26. Silicate, reactive as SiO2
27. Chloride
28. Conductivity at 20C

### Sub-contractors

The *Contractor* is obliged to submit within the tender document details of all sub-contractors to be employed during the period of the contract for the Works stating the scope of the sub-contractor's responsibility and the company’s name and address.

### Supervision

The *Contractor* shall have a qualified supervisor on site throughout the installation who will liaise with Irriplan as to the programme of works. The supervisor will be responsible for all the *Contractor*'s personnel and machinery.

### Insurances & Indemnities

The Contractor shall specifically indemnify the *Employer* in respect of accidental injury, loss or damage caused by, through or in connection with the *works*. The Contractor shall arrange insurance to cover the risk of such accidental injury, loss or damage and shall have the *Employer* indemnified by such insurance. The Contractor shall produce satisfactory evidence of such insurance to the *Employer* before commencement of any work and, on demand, at any time during progress of the work. In particular, the Contractor shall take out insurance policies with approved insurance companies as detailed hereunder and shall take all necessary steps to keep such policies valid and in force during the period of the Contract. The Contractor shall immediately inform the *Employer* of any changes in their insurance arrangements;

Employer’s Liability Policy

Indemnification of the *Employer* in respect of claims which could be made against it as principal by employees of the Contractor and a limit not less than £5 Million in respect of any one incident.

Public Liability Policy

Unlimited cover generally and a limit not less than £5 Million in respect of any one incident.

Neither the client nor Irriplan or their employees shall be held responsible in any form for losses or damages that may occur to property or persons as a result of the *Contractor*'*s* or sub-contractor's operations to carry out the contract. It is the *Contractor*'*s* responsibility to indemnify the above mentioned group against all damages received or sustained by any person or persons by or from the *Contractor* or sub-contractor in the construction of the *works* or any consequence or negligence in performing same, or by improper or defective materials used, or on account of any negligent act or omission, or satisfy other liabilities for which the *Contractor* or sub-contractor and their agents are responsible.

The *Contractor* shall be liable for all costs involved arising out of claims or actions which may be brought about against the *Employer*, Irriplan Limited or their employees by reason of any of the above.

The security of all materials, plant & fuel shall be the responsibility of the *Contractor*. Insurance against theft, damage or fire shall be the *Contractor’s* responsibility.

### Obligations

The Tenderer shall examine the site and satisfy themselves about all matters relating to the nature and extent of the proposed contract. The tenderer shall check all particulars relating to site boundaries, access, *Contractor’s* compound, under/over ground services and obstructions, site location and all other matters to be inferred from the conditions of the contract.

The tenderer shall carefully study the specification and design drawings in order to fully comprehend the requirements of the Contract.

No allowance will be made for claims due to failure to examine the design, specification and ascertain the site conditions. The *Contractor* shall be responsible for the protection of all buried services on the site.

The Contractor shall ensure that no vehicles entering or leaving the site shall deposit mud or material of any kind on the public road or the Parks’ internal roads.

The Contractor shall adhere to any policy imposed by The Royal Parks. This shall include but not be limited to stipulations on vehicle permitting and access, operating hours, noise nuisance and tree protection.

If, in the opinion of the *Employer* or Engineer, damage has been done to another contractor’s work by the borehole *Contractor* then the cost of corrective repair or replacement shall be at the borehole *Contractor's* expense.

Any such corrective work shall be undertaken by the *Contractor* whose work has been damaged and the cost of this work shall be charged to the borehole *Contractor*.

The client reserves the right to withhold final payment, in the event the *Contractor* has not settled the cost of corrective work.

### Company Profile & References

The tender shall be accompanied by a brief profile of the company detailing the following:

* Date of foundation and/or registration including address of
* registered office
* Location of principal depot and any regional offices/depots
* Names of owners/shareholders
* Names of principal management team and brief description of their experience
* Client reference list of no less than two similar exercises detailing nature and scope of contract and reference contact name.

### Method Statements

The tender shall be accompanied by a Method Statements which shall include the following minimum information:

* Proposed staffing levels inc. foremen, machinery operators, labourers and frequency of site visits by management/supervisor/s
* Accommodation and site welfare facilities
* Drilling method
* Temporary, unrecovered and permanent casing installation method
* Verticality and alignment checking method
* Grouting method
* Spoil and slurry handling
* Pollution control
* Fuel handling
* Acidisation injection, handling, removal
* Trenching methodology
* Proposed machinery and plant list
* Materials selection – pump, valves, control system

Additional detailed method statements and risk assessments shall be required immediately prior to a permit for work being granted.

### Standards & Regulations

The installation of the *works* should be carried out according to all relevant UK and European standards. The borehole specification shall be the ‘Civil Engineering Specification for the Water Industry 7th Edition’ 2011, and the supplement ‘Well construction specification for the water industry 2nd Edition’ 1985. In addition, specific clauses are inserted to this document which shall, where there is any conflict with the general specifications, supersede them.

Any local statutory laws, codes or regulations governing the *works* on the site shall be adhered to by the *Contractor*, his employees and/or sub-contractors.

### Adverse weather conditions

The Engineer and *Employer* shall retain the right to suspend the *works* in the event of inclement weather or adverse ground conditions that may lead to excessive damage and disruption to the site.

NOTE: It is the *Contractor’s* responsibility to ensure the protection of groundwater and surface hydrology, in particular in relation to and by:

* Sediment loading in run-off water
* Correct bunding and transfer of fuels and oils stored on site
* Correct spoil, slurry and drilling fluids, handling
* Acidisation fluid containment
* Dirty water arising from the development stages

### Site Facilities

The *Contractor* shall provide all necessary welfare site facilities for his staff including site toilet and cabins for permanent on-site presence if required. The *Contractor* shall also provide secure storage for tools, equipment and fuel such as lockable containers or other appropriate means.

Upon completion of the Works the Contractor shall remove their facilities and all other equipment, materials and any waste products immediately.

### Appendix 1 Regents Borehole Drawings:-

* Location of proposed borehole within The Regents Park
* Borehole Design
* Pump installation and headworks
* Site works plan layout
* Standard U/G non potable hydrant for The Regents Park
* Existing Tank & P H area works

<https://www.royalparks.org.uk/__data/assets/pdf_file/0020/67502/Appendix-1-Regents-Borehole-Drawings.pdf>

### DESIGNER’S RISK ASSESSMENT FORM

|  |  |  |
| --- | --- | --- |
| **Project:** | New borehole within The Regent’s Park | Page 1 of 4 |
| **Activity:** | **All works** | **Location:** | The Regent’s Park |
| **Prepared by:** | MW | **Reviewed by:** |  | **Date:** | 30th November 2016 | **Accepted by****(if applicable)** |  |
| **Comments** | The over-riding factor in ensuring a safe site with regards to the operation of heavy plant is to exclude unauthorised persons from the site in such a way that plant operators do not waste concentration on looking for unauthorised persons other than as normally required on a secure site, and secondly to ensure that plant operators, do not become complacent in their working routine and take risks. It is assumed that only contractors who are fully conversant with the techniques to be used will tender for the work and shall employ fully trained personnel to carry out the project specific functions at all times. There are special conditions for working within the Royal Parks which all contractors must make themselves aware of. |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **Facet of activity** | **Hazard****(Description)** | **No. of Persons at Risk** | **When?** | **Risk Severity****L-M-H** | **Risk Likelihood****L-M-H** | **No. of people****potentially affected** | **Risk Reduction Measures** | **Final Risk Class** |
| 1 | General site activities, including persons inspecting and working on site | All general hazards to health shown below | 6 | Continuous | M | L | 4 | Only persons authorised by Site H&S manager to be permitted on site. All persons must have a reasonable degree of physical and mental health and wear Hi-Vis vests and hard hats, and all workers must wear steel toe boots. Site Induction to be undertaken by Site Manager prior to anyone accessing the site, including visitors. Only authorised and certified personnel to be permitted near plant. | L |
| 2 | Off-loading/Loading of plant from transport at site.. | Reversing/rolling over | 3-4 | Start/completion | H | L | 3-4 | No vehicle to be loaded/ offloaded without a banksman or loader driver being present who shall stay clear of the manoeuvre. Loading/offloading to take place on level ground clear of any works. Reversing to be minimised and only with a banksman present. | L |
| 3 | Site access and exiting | Traffic accidents, pedestrians, cyclists | many | Continuous | M | L | many | All non-PLG vehicles to be escorted onto and off site. Banksmen to be used with slow vehicles and those with large turning circles | L |
| 4 | Erection of Heras fencing | Falling of panels and stabilisers causing twisted fingers and crushing injuries | 2-3 | Start/completion | L | L | 2-3 | PPE to be worn including hard hat, steel toe-caps & appropriate gloves | L |
| 5 | Excavation | Rolling over, sliding, Crushing | 3-4 | Continuous throughout construction | L | L | 3-4 | Operators to be sufficiently trained and able with the excavation plant being used. Shoring to be used as appropriate | L |
| 6 | Movement of site lifting equipment | Rolling over, sliding, inverting | 3-4 | Continuous throughout construction | M | L | 3-4 | Operators to be sufficiently trained and able to operate lifting plant and hoists. | L |
| 7 | Drilling | Entanglement, crushing | 1 | Continuous throughout construction | H | L | 1 | Access to within inner cordon strictly limited at all times to two trained personnel | M |
| 8 | Asphalt Cutters | Cuts, abrasions | 1 | Start | L | L | 1 | Trained operators and PPE | L |
| 9 | Reversing Plant | Crushing, rolling over | 3-4 | Continuous throughout construction | H | L | 3-4 | Reversing to be kept to an absolute minimum and banksmen used where appropriate No unexpected reversing to be undertaken. |  |
| 10 | Grouting | Materials handing, pumping, burns | 1-2 | Continuous throughout construction | L | L | 1-2 | Trained personnel wearing PPE only | L |
| 11 | Acid handling and introduction | Materials handling, pumping, burns | 1-3 | During this phase/part | H | L | 2 | No untrained person to be permitted access to the inner cordon and handling area during use | L |
| 12 | Overhead services | Danger of electrocution and service damage | 3-4 | Continuous throughout construction | L | L | 3-4 | H&S Plan to include all information of nearby overhead services. Goal posts to be erected where necessary.  | L |
| 13 | Buried services | Danger of electrocution and service damage | 3-4 | Continuous throughout construction | L | L | 3-4 | H&S Plan to include all info of nearby buried services. Search by CAT & Genny & hand-dig-only instructions. | L |
| 13 | Refuelling | Risk to health caused by diesel spillage | 2 | Continuous throughout construction | L | L | 2 | No Smoking. Designated and trained staff only to refuel. PPE to be worn. Bunded fuel bowser to be operated by trained person wearing appropriate PPE.  | L |
| 14 | Walking on the site | Trips and falls | 3-4 | Continuous throughout construction | L | L | 3-4 | Staff to be made aware of dangers, particularly slopes. During out-of-work hours, steep excavations to be separately fenced off within the compound. All persons on site to wear hard hats, hi-vis vests and steel-toe boots. | L |
| 15 | Noise & Vibration | Hearing damage and vibration effects | 3-4 | Continuous throughout construction | L | L | 3-4 | All plant to be correctly serviced and appropriate PPE to be worn which may include ear-defenders. |  |
| 16 | Chamber Installation (deeper than 1.2m) | Falling, confined spaces | 1-2 | Continuous | H | L | 1-2 | Confined spaces processes to be followed by trained personnel at all times |  |
| 17 | Electrical work | Electrocution before & after installation | many | Continuous and post installation | H | L | many | Trained electricians only. Correct liaison to be made between power supply installer and pumping systems electrical engineer. |  |
| 18 | Work near water | Drowning, hypothermia | 1-2 | Installation | M | L | 1-2 | No lone working |  |