

## **Technical Note** **Foul Drainage & Pumping Station**

London Sustainable Industries Park  
Choats Road  
Dagenham  
RM9 6RJ

March 2015  
Version 1

## Document Control Sheet

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For and on behalf of Bingham Hall Associates				

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## 1 Introduction

- 1.1 At the request of Turner & Townsend, the project manager for the above scheme, and following changes to the design flows, this Technical Note will outline:
- i) The current design proposal, associated risks and mitigation measures
  - ii) Alternative approach – retention of Halyard Street pumping station & provision of separate London Sustainable Industries Park (LSIP) North drainage system including pump station.

## 2 Current Design

### Design Basis

- 2.1 The current design is based upon the existing pumping station in Halyard Street becoming redundant, and all flows into this pump station, along with all flows from LSIP North, being diverted to a new pumping station situated on Plot 4 of LSIP North. This design hinges upon the existing foul sewers on LSIP North being adopted along with the pumping station and rising main. Other than the obvious benefit of removing the responsibility and associated costs of operation and maintenance of the pumping station and sewers from Greater London Authority (GLA), the adoption of the sewers is also critical since the emergency storage volume that must be provided within the pumping station and associated sewer network must be entirely within adopted sewer assets and below the lowest private sewer or lateral. Owing to the depth of the existing network which must be connected, the invert level of the pipe into the pumping station will be approximately 5.5m below ground level, and if this network were not intended to be adopted, then the storage top water level in the pumping station would have to be below the incoming pipe. This would increase the total depth of the pumping station by around 2.5m. The current design top water level is -1.96m AOD (approx. 3.2m below ground), which is just below the level of the lowest incoming private lateral. This happens to be on plot 5, where PDM will be connecting their foul drainage.
- 2.2 Current design flows are detailed in 'Foul Drainage Schedule' Version 8, Tables 1 & 2. This differs from Version 7 only in that flows are now defined as 'Design Flow', and '1/3 Design Flow' rather than in terms of 'Dry Weather Flow' (DWF) in order to accord more closely with Sewers For Adoption.
- 2.3 Sketches outlining the current design are attached.

### Risk

- 2.4 Under the current design, the problems that are being experienced due to Closed Loop Recycling's (CLR) discharge of plastic material, and the uncertainty regarding their flow rates, would remain until resolved by Thames Water Utilities Ltd (TWUL), who have so far apparently made no effort to resolve the current situation. There is therefore a risk that blocked pumps and pipework would also occur in the new pumping station.

- 2.5 TWUL have issued a letter of 'approval in principle' regarding our initial application for Section 104 adoption of the pumping station and sewers on LSIP North. We have had their technical comments relating to the pump station, which are relatively minor and will be addressed in the next revision of the design drawings. Due to the recent increase in design flows, the design has changed somewhat from the original application with regard to the size of the pump station shaft but we do not consider these changes likely to alter TWUL's view.
- 2.6 While we have not reviewed in detail the construction detail drawings for the LSIP North sewers produced by TR Collier & Associates (2012), we do not feel that these are explicitly compliant with Sewers For Adoption (SFA) 6<sup>th</sup> Edition. Furthermore, having briefly reviewed the flows in the existing LSIP North sewers, we feel that based on current design flows the minimum self-cleansing velocities called for in SFA 6<sup>th</sup> Edition are not achieved in most of the existing pipe runs on LSIP North. In their letter of 'approval in principle' TWUL state that "*All plans should include the following statement: 'All adoptable drainage works to be constructed as detailed in Sewers for Adoption, 6th edition' or as stipulated in Thames Water's Addendum.*" The adoption of these sewers will be dependent upon a satisfactory survey and inspection by TWUL, so regardless of the letter of 'approval in principle' they could refuse to adopt if it is found that the sewers are non-compliant to SFA 6<sup>th</sup> Edition. TWUL were sent design flows some time ago and have not commented with regards to flow-velocities, nor have they asked for design calculations or modelling, so most likely this aspect of non-compliance has been missed and will not jeopardise the adoption process, however the risk remains.
- 2.7 Were TWUL to refuse to adopt the sewers on LSIP North, it is also possible that they could refuse to adopt the pump station and rising main, since it would not be possible to provide the necessary emergency storage below the level of the incoming private sewers. It would be possible (although not desirable) for GLA to continue to own and operate the sewers and pump station, but this would be contingent upon London Borough of Barking & Dagenham (LBBD) accepting the rising main in their highway under a Section 50 agreement.

### Risk Mitigation

- 2.8 In order to provide absolute certainty that the potential non-adoption of the LSIP North sewers would not affect the adoption of the pump station and rising main, it would be necessary to amend the design such that the storage top water level were below the level of the incoming sewer, which in this scenario would be private. This would result in the pump station shaft being approximately 3m deeper.

2.9 Sketches outlining this option are attached.

### 3 Alternative Approach

#### Alternative Approach – Halyard Street Pumping Station Retained

- 3.1 Under The Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011, all privately owned sewers and lateral drains which communicate with an existing public sewer as at 1 July 2011 were adopted on 1 October 2011. Any associated pumping stations were excluded at that time but will have been adopted by 1 October 2016, as will their rising mains. This means that the existing pumping station on Halyard Street, having been constructed prior to July 2011, could be retained in GLA ownership until October 2016 at the latest, when ownership will automatically pass to TWUL, with provision for LSIP North flows made separately by way of an adoptable scheme on Plot 4 of LSIP which would take flows from LSIP North only.
- 3.2 The benefits of this approach would be that the proposed pumping station shaft could be of a smaller diameter and shallower than the equivalent current design, as it would be required to provide a far smaller storage volume, and the current issues around CLR's uncontrolled discharge and discharge of plastic waste would become TWUL's responsibility. Arguably this is the case at the moment, as TWUL have adopted the sewers into which CLR discharge, and also should be enforcing their Trade Effluent Consent (TEC), however were the pump station also to come under their ownership there would be no room for doubt as to who must take action, and the costs of operating and maintaining this pump station, along with any potential litigation by tenants due to poorly functioning sewerage, would pass from GLA to TWUL.
- 3.3 Under the current scheme, the Halyard Street pump station could not be de-commissioned until the pump station on LSIP North were fully operational, which is likely to be late 2015 at the earliest, so the alternative approach would only entail a few additional months of operation by GLA.
- 3.4 It is our understanding that all of the plots on LSIP North other than Plot 6 will be let on long leases but retained in the ownership of GLA, while Plot 6 is in private ownership. Having removed the flows from LSIP South it would now be the case that all of the properties connecting to the pumping station would be within the same curtilage, since there is no drainage connection to Plot 6. In order to overcome this, it would be necessary to provide a foul drainage connection to Plot 6.
- 3.5 Sketches outlining the alternative design are attached.



## Risk

- 3.6 Owing to the inadequacies of the existing Halyard Street pump station and the ongoing issues with CLR, the operation and maintenance of this pump station will incur ongoing costs upon GLA until or unless CLR can be forced to abide by their TEC. Notwithstanding this, the risks associated with the LSIP North pump station component of this option are essentially the same as set out for the current design – i.e. the risk of non-adoption of LSIP North sewers. Also, a connection would need to be provided to Plot 6 – the risk being that the owner of Plot 6 may not want or permit this.

## Risk Mitigation

- 3.7 As with the current design, the mitigating measures associated with the risk of non-adoption of the LSIP North sewers would be the deepening of the pump station shaft by approximately 2.5m to provide all storage below the incoming sewer.
- 3.8 Sketches outlining this option are attached.

## 4 Summary

The design options and associated risks are summarised below:

### Current Design

- All flows from LSIP North and from Halyard Street pump station diverted to new pump station on Plot 4 of LSIP North. Storage volume partly within LSIP North sewers. Sewers and pump station adopted by TWUL under Section 104.
- Halyard Street pump station de-commissioned.
- RISK – issues of non-compliance by CLR not addressed, therefore could affect new pump station.
- RISK – TWUL may refuse to adopt existing LSIP North sewers if they fail inspection, therefore reducing storage volume and making pump station non-compliant, therefore pump station not adopted.

### Current Design Plus Mitigating Measures

- As Current Design, BUT storage volume provided entirely in pump station below incoming pipe.
- RISK – issues of non-compliance by Closed Loop not addressed, therefore could affect new pump station.
- RISK – TWUL may refuse to adopt existing LSIP North sewers if they fail inspection, but this would not affect adoption of pump station.

### Alternative Approach

- Halyard Street pump station retained until transfer to TWUL takes place by default on or before October 2016 under The Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011.
- Flows from LSIP North only diverted to new pump station on Plot 4. Storage volume partly within LSIP North sewers.
- Closed Loop's compliance issues become entirely the responsibility of TWUL once Halyard Street pump station transfers.

- RISK – TWUL may refuse to adopt existing LSIP North sewers if they fail inspection, therefore reducing storage volume and making pump station non-compliant, therefore pump station not adopted.
- RISK – Plot 6 must be connected, otherwise the system will not be adoptable.

### Alternative Approach Plus Mitigating Measures

- As Alternative Approach, BUT storage volume provided entirely in pump station below incoming pipe.
- RISK – TWUL may refuse to adopt existing LSIP North sewers if they fail inspection, but this would not affect adoption of pump station.
- RISK – Plot 6 must be connected, otherwise the system will not be adoptable.

## Appendix A: Design Sketches - Current Design



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**NOTES**

- This drawing has been produced with reference to design and record drawings produced by other organisations. Bingham Hall Associates cannot accept any liability for any inaccuracies.
- This drawing should be read in conjunction with Bingham Hall Associates engineering drawings.
- All works are to be carried out in accordance with the relevant standards and specifications.
- All works in new or altered areas shall be carried out in accordance with the relevant standards and specifications.
- All adoptable sewer works to be carried out, tested & commissioned in accordance with the following, in order of precedence:
  - Water's standards to Sewers for Adoption 6th Edition where applicable
  - Sewers for Adoption 6th Edition
  - CESM 7th Edition
- All works within the existing highway shall be carried out fully in accordance with the New Roads and Street Works Act 1991 and to Chapter 6 of the Traffic Signs Manual. The contractor shall provide, erect, maintain and remove.

**Scheme Drawings**

- 2702.10 Choats Road L/SIP - Existing Utilities Key Plan
- 2702.11 Choats Road L/SIP - Existing Utilities Sheet 1
- 2702.12 Choats Road L/SIP - Existing Utilities Sheet 2
- 2702.13 Choats Road L/SIP - Existing Utilities Sheet 3
- 2702.14 Choats Road L/SIP - Foul Drainage Key Plan
- 2702.15 Choats Road L/SIP - Foul Drainage Layout Sheet 1
- 2702.16 Choats Road L/SIP - Foul Drainage Layout Sheet 2
- 2702.17 Choats Road L/SIP - Foul Drainage Layout Sheet 3
- 2702.18 Choats Road L/SIP - Foul Drainage Layout Sheet 4
- 2702.19 Choats Road L/SIP - Foul Drainage Long Sections Sheet 1
- 2702.20 Choats Road L/SIP - Foul Drainage Long Sections Sheet 2
- 2702.21 Choats Road L/SIP - Foul Drainage Long Sections Sheet 3
- 2702.22 Choats Road L/SIP - Foul Drainage Long Sections Sheet 4
- 2702.23 Choats Road L/SIP - Rising Main Long Section
- 2702.24 Choats Road L/SIP - Adoptable Foul Manhole Schedule
- 2702.100 Pump Station CA & Details Sheet 1
- 2702.101 Pump Station CA & Details Sheet 2
- 2702.102 Pump Station CA & Details Sheet 3
- 2702.103 Pump Station CA & Details Sheet 4
- 2702.104 Construction Details Sheet 1
- 2702.105 Construction Details Sheet 2
- 2702.106 Existing Foul Pump Station - Demolition Details
- 2702.107 RC Details

**KEY**

- FOUL SEWERAGE FOR ADOPTION
- FOUL MANHOLE FOR ADOPTION
- FOUL RISING MAIN FOR ADOPTION
- EXISTING ADOPTED FOUL SEWERAGE
- EXISTING PRIVATE FOUL SEWERAGE
- EXISTING PRIVATE FOUL RISING MAIN
- LAND OWNERSHIP: G/A
- LAND OWNERSHIP: NON-G/A

**DESIGNERS RESIDUAL HAZARDS**  
CIVIL ENGINEERING WORKS

THE FOLLOWING DESIGNERS RESIDUAL HAZARDS HAVE BEEN IDENTIFIED AND SHOULD BE ADDRESS/MAINTAINED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE HEALTH AND SAFETY HAZARD REGISTER/REGISTRATION.

HAZARD	DESCRIPTION
1	INTERFERING WITH EXISTING SERVICES (UNDERGROUND SERVICES)
2	NEARBY STRUCTURES (UNDERGROUND SERVICES)
3	UNDERGROUND SERVICES (UNDERGROUND SERVICES)

**Tender Drawing**  
This drawing is for tender purposes only and must not be read as a construction issue.

Rev	Description	Date	By	App.
1	Issue for Tender	20/10/14	DJG	AB
2	Issue for Tender	07/03/14	SC	AB
3	Issue for Tender	16/12/13	DJG	AB
4	Issue for Tender	16/12/13	DJG	AB
5	Issue for Tender	16/12/13	DJG	AB
6	Issue for Tender	16/12/13	DJG	AB

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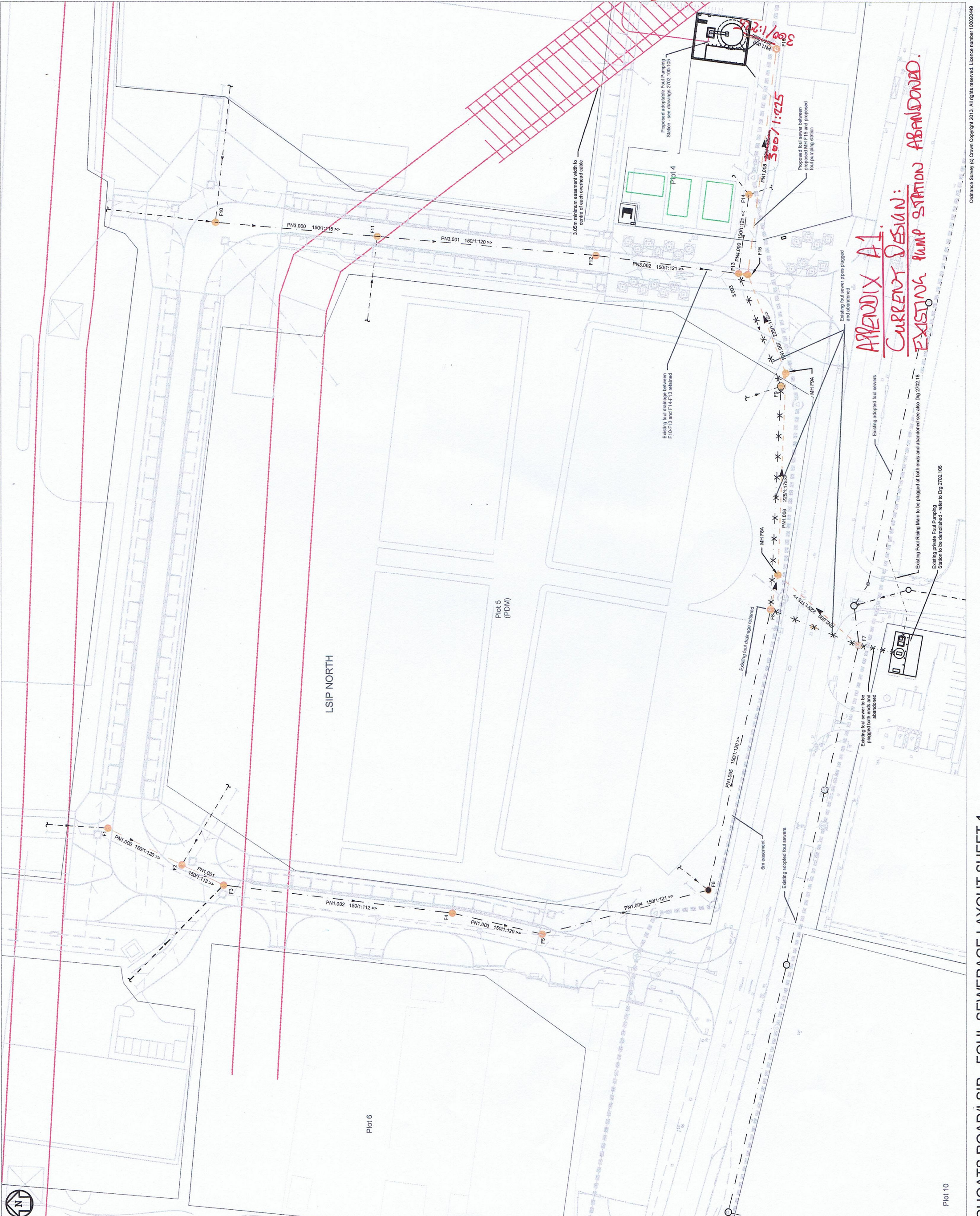
**Client**  
Greater London Authority

**Project Title**  
Choats Road  
Dagenham

Drawn by	Checked by	Date
SAC	AVB	Nov 2013
Size	Scale	Tender
A1	1:500	

Drawing Title	Rev
Choats Road L/SIP - Foul Sewerage Layout Sheet 1	C

Drawing No. 2702.16  
Rev C



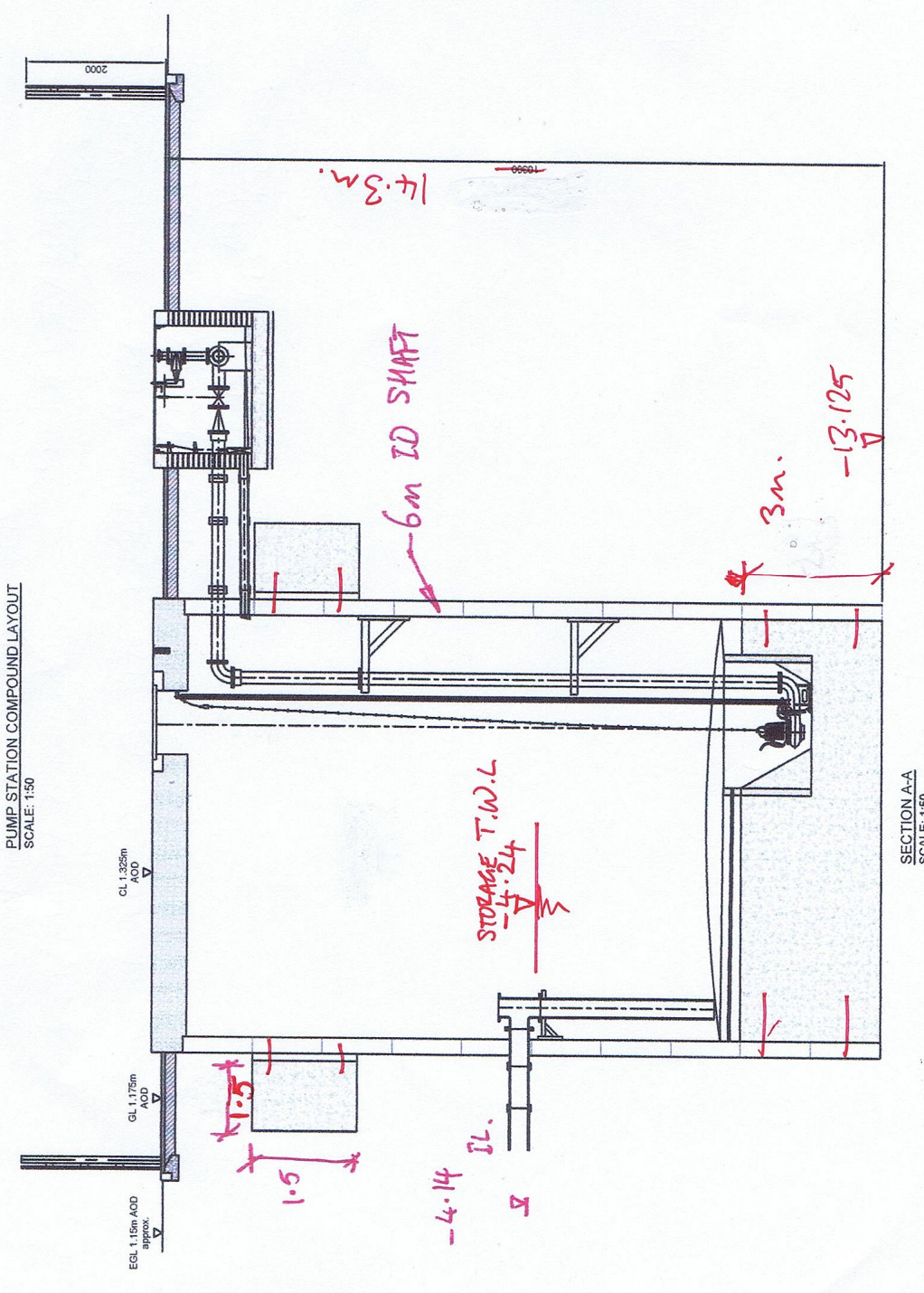
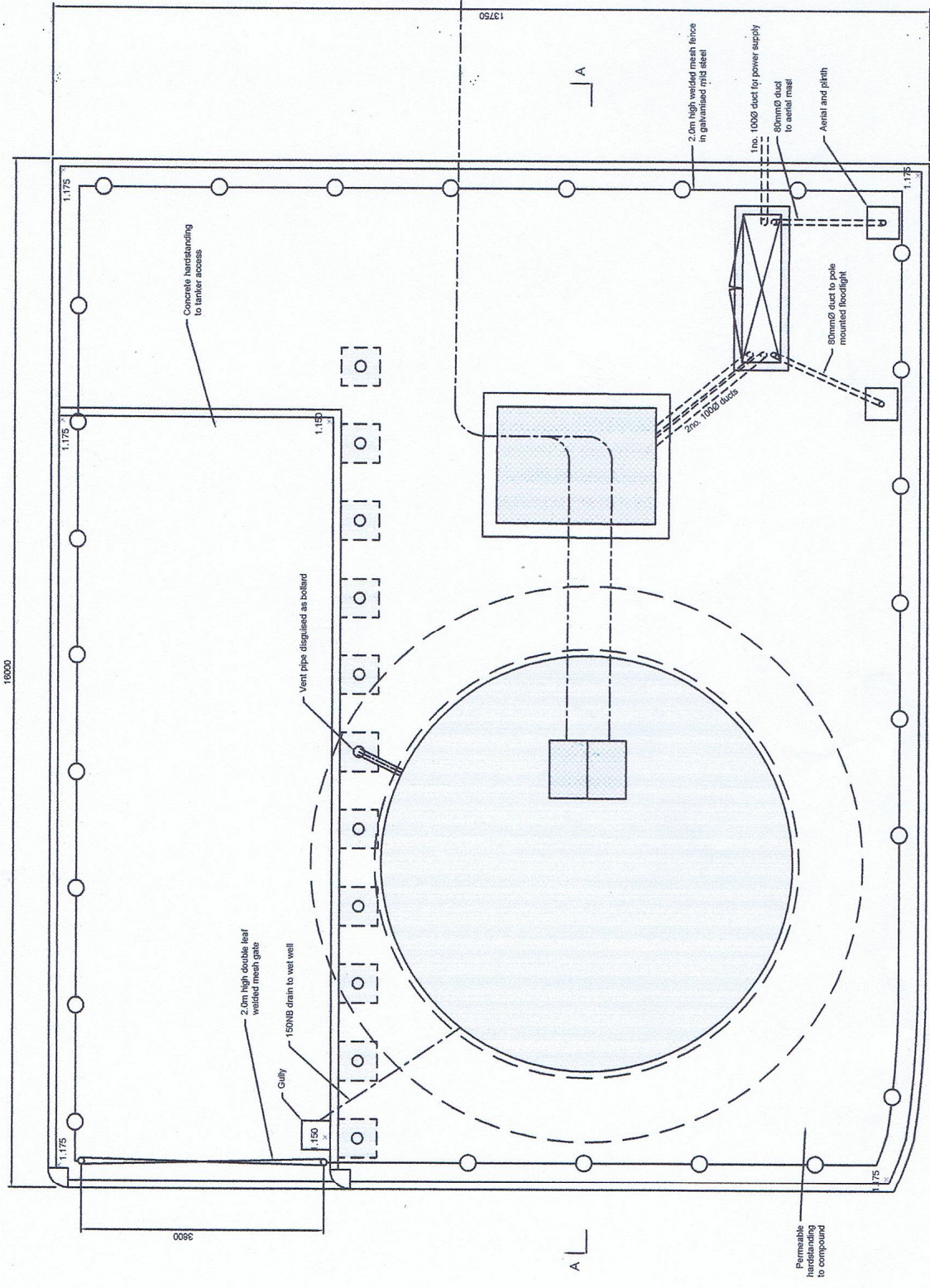






## Appendix B: Design Sketches - Current Design Plus Mitigation





**ADOPTABLE FOUL PUMPING STATION NOTES:**  
All works are to conform to BS EN 1171 and BS EN 1172. Joints to provide equivalent water resistance, as specified in BS 8007.

**General:**  
All concrete in contact with foul sewage to be sulphate resisting.  
All equipment retained within the wet well shall have the type hazardous zone protection specified by the manufacturer as detailed in BS EN 60079.

**Valves:**  
Gate valves shall comply with BS EN 1171 and incorporate non-rising valves. The inlet and outlet connections of the valves shall terminate with flange type PN16 (minimum) as detailed in BS EN 10522. Valves shall be provided with extension spindles, handwheels and support brackets. Spindles shall extend to approx. 50mm below the underside of the access cover, so that valves can be operated from above ground level using 'T' keys, which shall be provided by the Developer.

**Gate valves:** Gate valves shall be designed to close rapidly without shock and have good seating properties. Check valves shall comply with BS EN 12284 and be of the swing type, fitted with external lever arms and handwheels. The valves shall terminate with flange type PN16 (minimum), as detailed in BS EN 10522. All lever arms / counterweight assemblies shall be galvanized.

**Check valves:** Check valves shall be designed and sized to close rapidly without shock and have good seating properties. The valve design shall ensure that, when the valve disc is in the fully open position, the size and direction of the flow path is equivalent to that of the surrounding pipework. The valves shall be arranged so that there are no projections that could interfere with the passage of solids, rags and fibrous materials.

**Check valves:** Check valves shall be provided with removable covers, sized to allow adequate access to the valve internals.

**External Specification:**  
Duty/standby pumps with each pump set being capable of pumping at 21lit/s.

The pumps shall be of single stage, centrifugal, vertical type, suitable for pumping untreated sewage containing fibrous material, solid faecal matter and grit and capable of passing a solid sphere of 90mm dia.

The pumps shall comply with all relevant statutory regulations. Each pump set shall be capable of operating within the design operating envelope, including being run on a regular basis for short periods of time.

The pumps shall be selected such that the design flow rate is between 80% and 100% of the pumps best efficiency point (BEP) rate.

The pumps should be capable of discharging into an empty main and must be capable of operating without unclogging.

The noise level from each pump set must not exceed 80dB at a distance of 1m from the pump set centre line.

Each pump set shall be supported from and automatically coupled to the outlet pipework by its own weight and shall be positioned such that the pump set is self-aligning to the outlet pipe. The pump set shall be secured to the top of the wet well without the need to undo any lifting arrangements.

When circular connection tubes or a single square section tube shall be provided as a guide system. The tubes shall be made from mild steel, hot dip galvanized. Chain wires for pumps are not acceptable.

Hooks shall be provided at the top of the guide for securing the cable support sleeves and for passing the lift chain.

Each pump set shall be provided with an information plate, permanently fixed to one of the major pump set components. The plate must be made and manufactured from corrosion resistant metallic materials containing all relevant information.

Each pump set shall be provided with a clearly identified, permanent, corrosion resistant lifting point, locked to give a safe balanced lift.

Where chains are used they shall be of the short link type to BS EN 618-1 and BS 618-3. Cables shall be securely anchored inside the wet well. The method of securing the cables shall avoid excessive straining of the cables and allow the pumps to be withdrawn from the wet well without fouling of cables and other equipment.

Pumpset protection sensors shall be provided to prevent overhauling of the insulation and should detect if a seal has failed. The pumps must incorporate any fittings required for the location of condition monitoring and protection sensors.

**Control panel:**  
The control panel shall, as a minimum, incorporate the following functional units:  
- an in-cabinet compartment  
- a pump no. 1 motor starter compartment  
- a common control compartment  
- a cable marshalling compartment or cable way.

The control panel shall be Form 4 subdivision type 1 with bottom or side cable entry. All electrical components shall comply with BS EN 60947-1 to 7.

The control panel shall be mounted in such a way that all components are accessible from the front of the look.

**General electrical requirements:**  
The control panel shall conform to Part 3 - Mechanical & Electrical Specification for Small Pumping Stations - SPA 6th Edition.  
The electrical requirements for this pumping station shall typically comprise of the following elements:  
- a look  
- a control panel  
- a power supply  
- a battery communication connection  
- pumps  
- associated cabling and wiring  
- earthing and bonding

All electrical equipment shall be tested and commissioned on completion of the works, and associated documents shall be submitted with the building manual.  
The control panel shall be mounted in such a way that all components are accessible from the front of the look and earth. 4 wire supply. Equipment used in this pumping station shall be 415V, 50Hz, 3-phase. All electrical works shall be carried out by a contractor registered with the NICEIC.

**GENERAL NOTES:**  
1. All dimensions are in millimetres unless stated otherwise.  
2. All levels in metres above ordnance datum (AOD) unless stated otherwise.  
3. All adoptable sewer works to be carried out, tested & commissioned in accordance with the following, in order of precedence:  
i) Thames Water's standards to Sewers for Adoption 6th Edition, where applicable  
ii) Sewers for Adoption 6th Edition  
iii) CESW 7th Edition  
4. All large adaptions and pipe couplers to be self-anchoring.  
5. This drawing should be read in conjunction with Bingham Hall Associates engineering drawings.  
6. All works within the existing highway shall be carried out fully in accordance with the New Roads and Street Works Act 1991 and the Traffic Management Act 2004. The contractor shall submit to the street works coordinator the appropriate completion notices.  
7. Connections to the existing sewers shall be subject to the approval of the sewerage undertaker and shall be carried out by a contractor approved by them. The contractor shall comply with the requirements of the undertaker with regards to obtaining a 'permit to work' on the existing sewer.  
8. Where drainage is to be adopted, manhole covers are to be the lifting 'M' and 'S' for foul and surface water respectively.  
9. Where possible adjacent manhole access covers to be orthogonal with adjacent kerb line.  
10. Manhole covers to be set flush with binder course on new road or raised to fall levels within surface course to fall 10mm later date.  
11. Suggest restating cement and concrete products to be used for full coverage.  
12. All pipes entering or leaving manholes shall be laid with their soffit level, unless shown or agreed otherwise.

**DESIGNERS RESIDUAL HAZARDS:**  
THE FOLLOWING DESIGNERS RESIDUAL HAZARDS HAVE BEEN IDENTIFIED AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDRESSING THEM TO THE HEALTH AND SAFETY MANAGER OCCASIONALLY.  
1. UNDESIGNED SERVICES/WORKS TO BE REMOVED  
2. HAZARDOUS MATERIALS  
3. SERVICES/WORKS TO BE REINSTATED

**Tender Drawing:**  
This drawing is for tender purposes only and must not be read as a construction issue.

Rev	Description	Date	By	App
C	Change Volume revised - Planning	03/03/15	DJO	AB
B	Final Issue	20/10/14	DJO	AB
A	Site Application	17/02/14	SC	AB
D	Final Issue For Contract	03/11/13	SC	AB

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Greater London Authority

Project Title  
Choo's Road  
Dagenham

Drawing Title  
Pump Station General Arrangement  
& Details Sheet 1

Checked by	Date
AVB	Nov 2013
AS	Shown

Scale  
A1

Drawing No.  
2702-100

Revision  
Rev

Scheme Drawings

2702-10	Cheats Road, S.P. - Existing Utilities Key Plan
2702-11	Cheats Road, S.P. - Existing Utilities Sheet 1
2702-12	Cheats Road, S.P. - Existing Utilities Sheet 2
2702-13	Cheats Road, S.P. - Existing Utilities Sheet 3
2702-14	Cheats Road, S.P. - Existing Utilities Sheet 4
2702-15	Cheats Road, S.P. - Existing Utilities Sheet 5
2702-16	Cheats Road, S.P. - Foul Drainage Layout Sheet 1
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2702-22	Cheats Road, S.P. - Foul Drainage Long Sections Sheet 3
2702-23	Cheats Road, S.P. - Foul Drainage Long Sections Sheet 4
2702-24	Cheats Road, S.P. - Foul Drainage Long Sections Sheet 5
2702-100	Pump Station CA & Details Sheet 1
2702-101	Pump Station CA & Details Sheet 2
2702-102	Pump Station CA & Details Sheet 3
2702-103	Pump Station CA & Details Sheet 4
2702-104	Construction Details Sheet 1
2702-105	Construction Details Sheet 2
2702-106	Final Foul Pump Station - Foul Manhole Schedule

PROPOSED PUMP MAKE: IIT FLYGT  
PUMP MODEL: NP 3127 MT  
PUMP DISCHARGE RATE: 21 L/S  
STATIC HEAD: 9m  
RISING MAIN LENGTH: 615m  
RISING MAIN DIA: 200mm OD PE SDR17  
MINK. WET WELL WORKING VOLUME (BELOW INLET PIPE): 1.26m³  
TOTAL EMERGENCY STORAGE (INC SEWERS & MANHOLES): 160m³

**Safety:**  
Safety signage shall be provided in compliance with BS5397. As a minimum safety signs shall be fitted to manholes, connections, and doors of compartments containing:  
- incoming supply cable termination  
- incoming supply switching and isolation devices  
- control circuits  
- equipment located within the safe area but associated with certified apparatus located within a hazardous area.  
- all cable termination points

**500W floodlight:**  
500W floodlight to be mounted on a 4m pole located to illuminate the wet well.

**Telemetry:**  
Telemetry to monitor the following functions:  
- Pump running  
- Pump failure  
- Wet well high level  
- Wet well level

**Compass Lights:**  
500W floodlight to be mounted on a 4m pole located to illuminate the wet well.

**Control panel:**  
The control panel shall, as a minimum, incorporate the following functional units:  
- an in-cabinet compartment  
- a pump no. 1 motor starter compartment  
- a common control compartment  
- a cable marshalling compartment or cable way.

The control panel shall be Form 4 subdivision type 1 with bottom or side cable entry. All electrical components shall comply with BS EN 60947-1 to 7.

The control panel shall be mounted in such a way that all components are accessible from the front of the look.

**General electrical requirements:**  
The control panel shall conform to Part 3 - Mechanical & Electrical Specification for Small Pumping Stations - SPA 6th Edition.  
The electrical requirements for this pumping station shall typically comprise of the following elements:  
- a look  
- a control panel  
- a power supply  
- a battery communication connection  
- pumps  
- associated cabling and wiring  
- earthing and bonding

All electrical equipment shall be tested and commissioned on completion of the works, and associated documents shall be submitted with the building manual.  
The control panel shall be mounted in such a way that all components are accessible from the front of the look and earth. 4 wire supply. Equipment used in this pumping station shall be 415V, 50Hz, 3-phase. All electrical works shall be carried out by a contractor registered with the NICEIC.

**APPENDIX B**  
**CURRENT DESIGN: + MUTATION**  
**EXISTING PUMP STATION ABANDONED.**  
**STORAGE ENTIRELY WITHIN PUMP STATION.**  
**(LAYOUT AS PER APP. A1)**