Sustainable Drainage Maintenance Schedule

St Pancras Substation, Royal College Street, Camden, London, NW1 0DP

Prepared for UK Power Networks

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Rev00

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Revision	Date	Revision Description		Name	Signature
00	2003/2024	Initial Issue	Prepared	Jack Prest	JP
			Checked	Christopher Micklethwaite	CAM
			Approved	Michael Crown	MLC

Introduction

The following sustainable drainage maintenance plan & schedules have been developed in association with the proposed re-development at St Pancras Substation, Camden, London, NW1 0DP.

The proposals include the erection of a new car parking and van parking spaces for use of the UK Power Networks operatives and staff, and storage areas. The proposals also seek the creation of a new open metal fence to replace the existing wall.

As a result of the changes, alterations to the existing drainage networks will be undertaken and sustainable drainage provisions will be incorporated in the form of porous paving and attenuation within the car parking area.

The infrastructure at the St Pancras substation site is privately maintained by the UK Power Networks team in conjunction with their appointed sub-contractor partners.

A plan of the proposed surface water drainage strategy, highlighting the catchment area, key SuDS features, and existing sewer outfall can be found in **Appendix A**.

The following maintenance strategy and schedules are to be read in conjunction with the associated drainage strategy, flood risk assessment and as-constructed record plans for the proposed re-development. Inspection and maintenance of proprietary products that have been utilised or installed in the existing and proposed networks should be carried out in accordance with the manufacturers recommendations in addition to any site specific works.

Components of the Existing and Proposed Systems

The following components form part of the Private Drainage system and need to be maintained as indicated within this document.

- Porous Paving parking bays and Perforated Pipes
- Catchpit Manholes
- Cellular Crate Attenuation Tanks
- Control Chamber and Flow Control Device
- Linear Drainage Channel and Sump Units.
- Hydrocarbon interception device – Smart Sponge ™
- Non-return Valve and Chamber
- Bypass Separator/ Interceptor
- Gullies
- Foul water, surface water, and combined manholes and inspection chambers
- Below Ground Drainage Pipes and Rodding Eye Access Points

Health and Safety*

All inspections and maintenance should be undertaken by competent personnel using appropriate procedures and safety equipment. It is anticipated that most of the regular inspections can be carried out from ground level without the requirement to enter underground inspections chambers, manholes or other structures.

The following hazards have been identified:

- Below ground confined spaces (manholes chambers etc.)
- Hydrocarbon contamination in the existing bypass separator
- Standing water in attenuation, catchpits, and potentially blocked manholes.
- Diffused pollution and contamination of the surface water runoff in gullies and linear drainage channel sump units.
- Hydrocarbon contamination in the proposed smart sponge.
- Deep drainage infrastructure
- Combined drainage infrastructure

Maintenance Schedules

The below sets out the requirements for maintenance of the existing and proposed drainage system.

This document should be considered to compliment and extend the maintenance regime and should be added to, amended, or otherwise changed to suit site circumstances and as experience of maintaining the site drainage systems is gained in the future.

A severe storm is defined as any aspect of weather that poses risk to life, property or requires the intervention of authorities. Severe weather warnings will be issued by the Met Office.

A log of all maintenance and remedial works carried out at the site should be kept. This log is to be passed on should the maintenance contract be given to another organization or the site change ownership.

Porous Paving parking bays and Perforated Pipes

Permeable pavements are hard surface paving systems that manage surface water runoff flows and can improve runoff water quality. The porous surface of permeable pavement allows surface water to soak through to an underlying coarse gravel layer into the perforated pipes before draining into the cellular crate storage system.

Operation and Maintenance Requirements for porous paving parking bays and perforated pipes:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Visual inspections of porous paving surfaces and perforated pipes to detect signs of sediment buildup, clogging, or damage. - Monitoring of water infiltration rates and drainage performance to assess the effectiveness of the system. - Inspection of surrounding areas for signs of erosion or ponding, indicating potential issues with drainage.	Quarterly, 24 – 48hr after a storm. Annually Quarterly
Regular Maintenance	- Cleaning of porous paving surfaces to remove debris, sediment, and organic matter that may obstruct drainage. - Flushing of perforated pipes to clear accumulated sediments and maintain optimal flow rates. - Inspection and repair of damaged or deteriorated paving materials and pipe fittings.	End of Winter (April) – to collect winter debris. Mid-Summer (July/August) to collect dust and flower other plant type deposits. End of Autumn (November) to collect leaf fall.
Occasional Maintenance	- Removal of weed Growth. - Jetting or rodding of perforated pipes to remove stubborn obstructions or root intrusions. - Inspection and maintenance of inlet and outlet structures, such as catch basins or sumps, to prevent blockages and maintain flow.	Quarterly Annually Annually
Remedial Actions	- Replacement of clogged or damaged porous paving blocks or tiles to restore permeability and drainage efficiency. - Repair of cracked or broken pipes and fittings to prevent leaks and ensure proper function. - Retrofitting or upgrading of the stormwater management system to improve performance or meet changing regulatory requirements.	As Required As Required As Required

Catchpit Manholes

A catchpit is a manhole chamber with a sump unit below the incoming and outgoing pipes that is installed into a drainage system to prevent silt and debris from building up and causing blockages, or for silts and debris to be passed downstream.

Operation and Maintenance Requirements for Catchpit Manholes:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Regular visual inspections of catchpit manholes to check for signs of debris accumulation, sediment buildup, or blockages. - Monitoring of water levels to assess drainage efficiency and identify potential issues. - Inspection of inlet and outlet structures for any obstructions or damage.	Biannually, 24 – 48hr after a storm. During rainfall events Biannually.
Regular Maintenance	- Cleaning of catchpit manholes to remove debris, litter, sediment, and vegetation. - Clearing of inlet and outlet structures, including grates, screens, and pipes, to prevent clogging. - Inspection and maintenance of access points, covers, and frames to ensure proper sealing.	Biannually, 24 – 48hr after a storm. Biannually Biannually
Occasional Maintenance	- Flushing of the catchpit manholes and associated drainage pipes to remove accumulated sediments. - Inspection and testing of valves, pumps, or other mechanical components for functionality and leaks.	Annually/As Required Annually
Remedial Actions	- Repair of structural damage, including cracks, fractures, or leaks, identified during inspections or monitoring. - Retrofitting or upgrading of catchpit manholes to improve performance or meet changing regulatory requirements.	As Required As Required

Cellular Crate Attenuation Tanks

Surface water attenuation tanks (cellular crates) are used below ground to manage surface water volumes after heavy rainfall. Once installed, they are combined with a geotextile and waterproof membrane to create the attenuation system. The water captured during a rainfall event is retained in the tank and redirected to a surface water drain at a manageable rate to avoid flooding downstream or offsite. Attenuation tanks are used in conjunction with surface water flow control restrictions.

Operation and Maintenance Requirements for Cellular Crate Attenuation Tanks:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Regular visual inspections of the attenuation tanks to check for signs of damage, deformation, or blockages. Tanks should be CCTV inspected. - Monitoring of water levels within the tanks to ensure proper functioning. - Inspection of inlet and outlet structures for any obstructions or sediment buildup.	Monthly During and after rainfall events Quarterly
Regular Maintenance	- Debris removal from catchment area using sweeping and vacuuming. - Removal of silt and debris from rainwater gutters. - Removal of sediment from pre-treatment components i.e., catchpits via jetting. - Ensure that ventilation pipework is free from obstructions and blockages.	Quarterly Biannually Biannually Quarterly
Occasional Maintenance	- If jetting through the attenuation tank is required, this must be done following jet vac clearance of catchpit manholes. - Inspection and testing of valves, pumps, and other mechanical components for functionality and leaks.	As Required Biannually
Remedial Actions	- Inspection and repair of any damaged or deteriorated components, such as crates or geotextile liners. - Repair of structural damage, such as cracks or leaks, identified during inspections or monitoring.	As Required As Required

Control Chambers and Flow Control Devices

Flow Control Chambers are fitted with a head discharge flow control device to regulate the flow of surface water in a drainage system preventing downstream flooding during periods of heavy rainfall. Flow control devices restrict the rate of flow entering a drainage system to a maximum flow rate.

Operation and Maintenance Requirements for Control Chambers and Flow Control Devices:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Regular visual inspections of control chambers and flow control devices should be conducted to identify any signs of damage, corrosion, or blockages. - Monitoring of flow rates and pressure levels within the system to ensure optimal performance. - Inspections for any signs of leakage or malfunction.	Monthly Biannually Biannually and after large storms
Regular Maintenance	- Cleaning of flow control devices to remove debris, sediment, or biological growth that may affect performance. - Lubrication of moving parts to ensure smooth operation. - Tightening of fittings and connections to prevent leaks.	Monthly Biannually Biannually
Occasional Maintenance	- Fully Open and Close Bypass Penstock (if installed). - Jet Channel and benching. - Flushing of pipelines to remove accumulated sediments or contaminants.	Quarterly Quarterly Biannually
Remedial Actions	- Repair or replacement of damaged components identified during inspections.	As Required

Linear Drainage Channel and Sump Units.

A linear drainage channel is a type of drainage system used to collect and direct surface water runoff. It consists of a long, narrow channel typically made of materials like concrete, plastic, or stainless steel, with a grated or slotted cover on top to prevent debris from entering while allowing water to flow through.

Sump units are collection points or basins typically integrated into drainage systems to collect water and sediment, preventing them from clogging or overflowing the system, sump units may be incorporated at intervals along the channel's length to collect water efficiently. They often feature a sump pump to remove collected water and transport it away from the area.

Operation and Maintenance Requirements for Linear Drainage Channel and Sump Units:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Conduct regular visual inspections of the linear drainage channels and sump units to identify any signs of blockages, damage, or sediment buildup. - Use cameras or inspection tools if necessary to assess the interior condition of the channels and sump units. - Monitor water flow during rainfall events to ensure proper drainage performance.	Quarterly Biannually As Required
Regular Maintenance	- Clean debris, leaves, sediment, and other obstructions from the grates or covers of the linear drainage channels regularly. - Remove accumulated sediment and debris from the sump units at regular intervals. - Inspect and clean any sump pumps or drainage outlets connected to the sump units to ensure they are functioning correctly. - Check and maintain the integrity of seals, joints, and connections along the linear drainage channels to prevent leaks or water infiltration.	Weekly Every 3-6 Months Biannually Biannually
Occasional Maintenance	- Flush the linear drainage channels with water to remove any residual debris or sediment that may have settled in the channel bottom. - Conduct a thorough cleaning and maintenance of the sump pumps and associated components annually to ensure optimal performance.	Annually Annually
Remedial Actions	- Inspect and replace damaged or worn-out grates, covers, or components of the linear drainage channels and sump units. - Adjust the grading or positioning of the linear drainage channels if water pooling or inadequate drainage is observed.	As Required As Required

Hydrocarbon Interception Devices – Smart Sponge TM

A hydrocarbon interceptor device, such as Smart Sponges, is a device designed to capture and remove hydrocarbons from surface water runoff before it enters natural waterways or drainage systems. Hydrocarbons, including oil, grease, and fuel, can pose significant environmental risks if they are allowed to enter water bodies, as they can contaminate water, harm aquatic life, and degrade ecosystems.

Operation and Maintenance Requirements for Hydrocarbon Interceptor Devices:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Regular visual inspections should be conducted to check the condition of the Smart Sponges and surrounding area. - Monitor the accumulation of hydrocarbons in the device by observing the colour and saturation level of the sponge material. - Inspect for any signs of damage, displacement, or blockages that may impede the device's effectiveness. - Assess the water quality downstream of the device to ensure that hydrocarbons are being effectively captured.	Biannually Biannually Biannually Annually
Regular Maintenance	- Replace saturated Smart Sponges with clean ones on a routine basis. - Inspect and clean the device housing or container regularly to remove any sediment, debris, or accumulated hydrocarbons. - Check and maintain the integrity of seals, connections, and fittings to prevent leaks or bypass of contaminated water.	Every 3 to 6 months Biannually Biannually
Occasional Maintenance	- Conduct a comprehensive inspection and cleaning of the Smart Sponge housing and surrounding infrastructure. - Verify that the installation is properly graded and positioned to facilitate efficient capture and containment of hydrocarbons.	Annually Annually
Remedial Actions	- Replace any damaged or worn-out components of the device, such as seals, filter media, or support structures. - Adjust the maintenance schedule or upgrade the device capacity if the level of hydrocarbon contamination exceeds the device's design capacity.	As Required As Required

Non-Return Valves and Chambers

Non-return valves (NRVs) protect a property or drainage system from water backflows. This has been designed to prevent foul or combined drainage from backing up into the surface water flow control or attenuation tanks.

Operation and Maintenance Requirements for Non-return Valves and Chambers:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Visual inspections of non-return valves and chambers to check for signs of damage, wear, or corrosion. - Monitoring of flow rates and pressure within the system to detect any anomalies that may indicate potential issues with the valves or chambers. - Inspection of surrounding infrastructure for indications of leaks, surges, or other hydraulic problems that could affect the performance of the valves and chambers. - Open and close the valves to make sure they aren't seizing/ have not become caught or dislodged.	Quarterly Annually Biannually Quarterly
Regular Maintenance	- Cleaning of non-return valves and chambers to remove debris, sediment, or obstructions. - Lubrication of moving parts and mechanisms to ensure smooth operation and prevent sticking or jamming. - Inspection and testing of valve seals, gaskets, and other components to verify their integrity and effectiveness. - Adjustment of valve settings or mechanisms as needed to optimise performance and prevent leaks or backflow.	Quarterly Annually Annually As required
Occasional Maintenance	- Inspect pressure and temperature of fluid flowing through. - Ensure they aren't close or over the rated limit for valves. - Adjustment of monitoring equipment to maintain accuracy and reliability in detecting flow rates and pressure variations.	Annually Annually Annually
Remedial Actions	- Repairs or replacements of damaged or worn components such as valve seats, seals, or chambers themselves.	As Required

Bypass Separator/ Interceptor

A bypass separator, also known as a bypass interceptor, is a type of pollution control device used to remove pollutants, particularly hydrocarbons and sediment, from surface water runoff before it enters natural waterways or drainage systems.

Operation and Maintenance Requirements for Bypass Separator/ Interceptor:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Conduct visual inspections of the bypass separator to check for signs of damage, blockages, or sediment accumulation. - Monitor the water quality of the treated surface water downstream of the separator to ensure that pollutant levels are within acceptable limits. - Inspect the inlet and outlet structures to verify proper flow and functionality.	Quarterly Biannually Biannually
Regular Maintenance	- Clean debris, sediment, and pollutants from the bypass separator at regular intervals. - Inspect and clean any filter media, coalescing plates, or other treatment components to ensure optimal pollutant removal efficiency. - Check and maintain the integrity of seals, gaskets, and structural components to prevent leaks or bypass of untreated surface water. - Ensure that access points, such as manholes or inspection ports, are clear and accessible for maintenance activities. -	Every 3-6 months Biannually Biannually Annually
Occasional Maintenance	- Conduct a comprehensive inspection and cleaning of the bypass separator. - Verify that the bypass mechanism is functioning correctly and that there are no obstructions or malfunctions that could impede its operation during storm events. - Test the alarm and monitoring systems, if installed, to ensure proper functionality and early detection of issues.	Annually Biannually Annually
Remedial Actions	- Repair any damage to the separator structure, including cracks, corrosion, or deterioration, to maintain structural integrity. - Clear blockages using plumbing snakes, pressure washers, or manual removal techniques.	As Required As Required

Gullies

A gully is a type of inlet or drainage point designed to collect surface water runoff from roads, pavements, and other impermeable surfaces. A gully typically consists of a shallow basin or chamber connected to an underground drainage pipe or system.

Operation and Maintenance Requirements for Gullies:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Conduct regular visual inspections to assess the condition of gullies. - Check for signs of erosion, sediment buildup, blockages, and structural integrity issues.	Quarterly, after significant rainfall events Every 3-6 Months
Regular Maintenance	- Clear debris such as leaves, branches, and trash from gullies to prevent blockages. - Remove sediment buildup to maintain the designed capacity of the gully. - Manage vegetation to prevent overgrowth that can impede water flow.	Quarterly Quarterly Biannually
Occasional Maintenance	- Conduct deeper cleaning of gullies to remove accumulated sediment or debris that cannot be cleared during regular maintenance. - Consider upgrading or retrofitting gullies to improve performance if necessary.	Annually As Required
Remedial Actions	- Repair any damage to gully linings or structures. - Repair significant erosion or structural damage promptly.	As Required As Required

Foul Water, Surface Water, and Combined Manholes and Inspection Chambers

A manhole is a covered opening which allows access to the drainage system for the purposes of inspection, cleaning, unblocking or repair. In the instance of a blockage or other issue, work can be carried out using the manhole as an access point.

Inspection chambers function as an intermediate connection point for drainage, allowing maintenance workers to inspect and clear drains and sort out any blockages or perform other maintenance tasks, so they should always be properly covered with the correct manhole cover. This is especially important, as while some inspection chambers are installed at a shallow depth.

Operation and Maintenance Requirements for Foul Water, Surface Water, and Combined Manholes and Inspection Chambers:

Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Inspection chamber and manhole covers should be lifted and be visually inspected.	Quarterly
	- Regular visual inspections should be conducted to identify any signs of damage, blockages, or deterioration.	Biannually
	- Monitoring of flow rates and levels within the sewer system can be done using appropriate instrumentation.	Biannually
	- Inspections should also include checking for infiltration or exfiltration of water into or out of the system.	Biannually
Regular Maintenance	- Cleaning of manholes and inspection chambers should be carried out to remove debris, sediment, and any accumulated materials that could obstruct flow or cause odours.	Biannually
	- Routine checks and maintenance of access covers, frames, and sealing to ensure they are secure and watertight.	Biannually
	- Maintenance of ladders, steps, and other safety features to ensure they are in good condition and compliant with safety standards.	Biannually
Occasional Maintenance	- If any blockages are found the pipeline should be rodded or flushed out by jetting.	Annually
	- Structural inspections should be conducted periodically to assess the integrity of manholes and inspection chambers. This may involve CCTV surveys to identify cracks, leaks, or other defects.	Annually/ As Required
Remedial Actions	- Repairs or replacements of damaged components such as brickwork, concrete, or seals should be performed as needed.	As Required
	- Rehabilitation or relining of manholes or inspection chambers if significant deterioration is detected.	As Required

Below Ground Drainage Pipes and Rodding Eye Access Points

Underground drainage is the general term given to the system of pipes and fittings that is installed below ground level to transport foul drainage or rainwater flows to a sewage treatment facility or, in the case of rainwater, a soakaway or water course.

Within a drainage pipe, a rodding eye is a removable cover that aids access for a visual condition inspection and for removing the obstruction using drain rods. They are defined as a pipe fitting that offers access to inspection and cleaning. Rodding eyes can be located over the head of a drain or inside an intermediate position.

Operation and Maintenance Requirements for Below Ground Drainage Pipes and Rodding Eye Access Points:		
Maintenance Schedule	**Required Works/ Action**	**Frequency**
Monitoring	- Conduct regular inspections to check for signs of blockages, leaks, or structural damage in drainage pipes. - Inspect rodding eye access points to ensure they are accessible and not obstructed.	Quarterly Quarterly
Regular Maintenance	- Clear debris, sediment, and other obstructions from drainage pipes using high-pressure water jetting or mechanical rodding. - Ensure that rodding eye access points are clear and accessible for maintenance activities.	Annually Biannually
Occasional Maintenance	- Conduct CCTV surveys of drainage pipes to identify blockages, cracks, or other defects that may require attention. - Perform deeper cleaning or desilting of drainage pipes if significant sediment buildup occurs.	Annually As Required
Remedial Actions	- Repair any leaks or damage to drainage pipes promptly. - Upgrade or replace old or undersized drainage pipes to improve system performance.	As Required As Required

Design has considered storage for 100yr +40% climate change . Flow restriced to 2L/s

Indicative cellular crates & drainage network to provide Circa 350 Cu.m

Existing Thames Water combined sewer. Location indicative

Indicative cable culvert. Depth TBC.

Permeable paving without attenuation crates

Cellular crates beneath permeable paving to be Naylor Aquavoid - Metro or equivalent

Existing linear drainage channel

Existing Thames Water combined sewer. Location indicative

Connection to existing sewer location and depth to be confirmed

Proposed drainage system to utilise existing connection to Thames Water combined sewer.

Proposed drainage system to connect into existing network

Retrospective flow control chamber 2l/s subject to LLFA & Thames Water approval

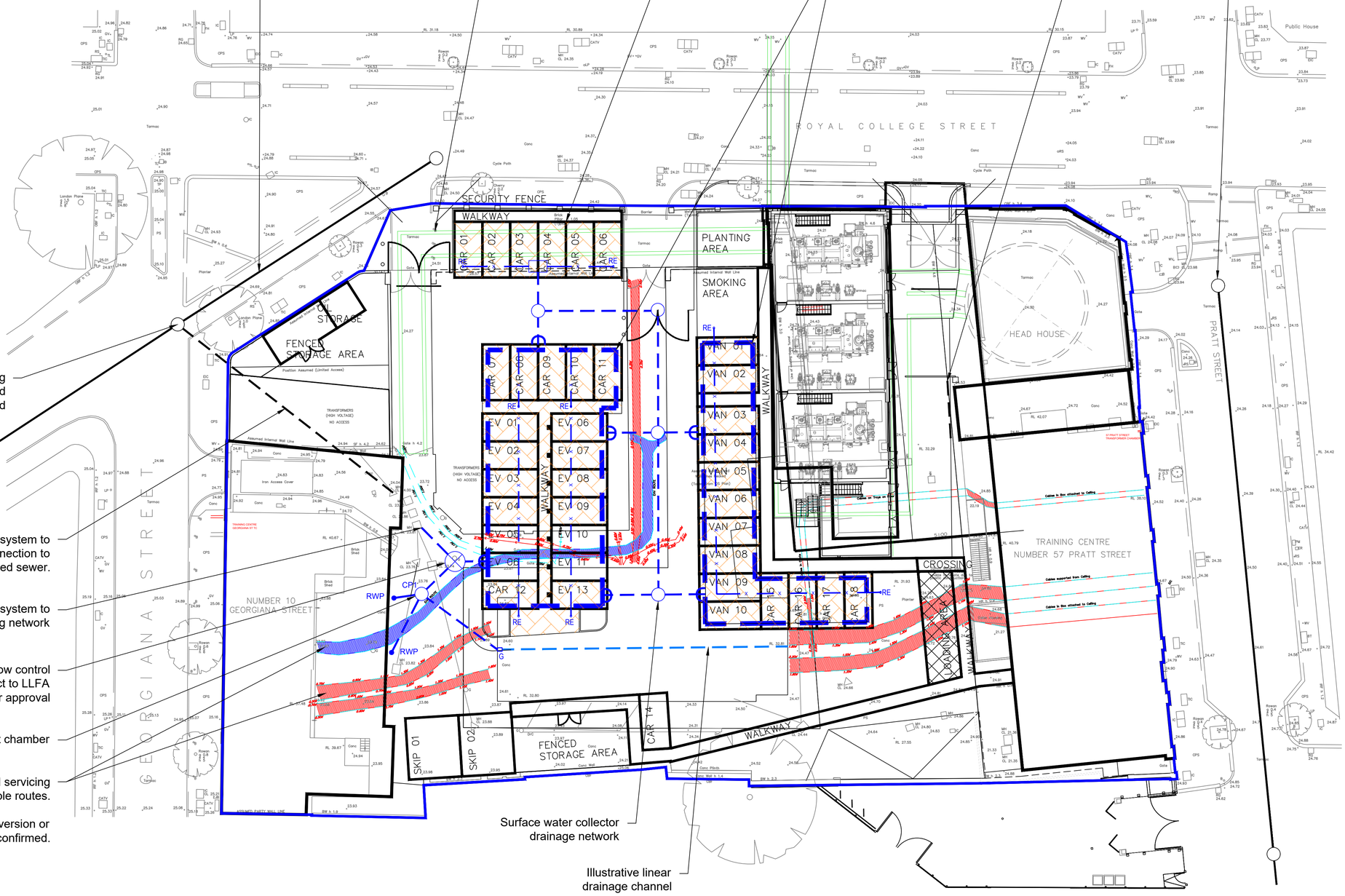
Illustrative catchpit chamber

Existing underground servicing and power cable routes.

Confirmation of diversion or removal to be confirmed.

Surface water collector drainage network

Illustrative linear drainage channel



GENERAL NOTES

1. All Clancy Consulting drawings are to be read in conjunction with all other relevant drawings and specifications. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings, Clancy Consulting should be informed prior to construction.
2. Do not scale from any Clancy drawing, in either paper or digital form. use written dimensions only. all dimensions and levels are in metres unless otherwise stated.
3. Until technical approval has been obtained from the relevant authorities, it shall be understood that all drawings issued are preliminary and not for construction.
4. All levels to be confirmed on site prior to construction, following full topographical survey, drainage level survey information and current existing services plans and maps.
5. Any discrepancies must be reported to Clancy Consulting prior to the commencement or continuance of any further works.

CONSTRUCTION DESIGN & MANAGEMENT NOTES

1. CCL are project 'designers' as defined in the CDM regulations.
2. The contractor shall plan and implement his temporary support and building methodology so as to ensure the permanent works are built as designed and detailed.
3. CCL have assumed a competent and experienced contractor will be employed.
4. Party wall awards to be submitted by the contract administrator to the relevant adjoining properties. The contractor is to comply with the party wall award requirements.
5. The contractor is responsible for verifying all site levels and setting out dimensions, including 'as built' positions of temporary works, before commencing the works. The contractor must carry out an exact site survey to confirm all final levels and setting out. Any discrepancies that may exist between drawings and any other related document should be notified to the contract administrator immediately.
6. All work to be carried out to the satisfaction of the contract administrator.
7. The contractor is advised to visit the site to satisfy himself regarding the practicability of the works.

KEY

- Indicative Surface Water Pipe
- Indicative Surface Water Manhole
- Indicative Permeable Paving
- Indicative Attenuation Crates
- Indicative Manifold Arrangement
- Indicative Flow Control Chamber
- Indicative Existing Thames Water Combined Sewer
- Indicative Existing Thames Water Combined Manhole
- Indicative Cable Culvert
- Indicative Rodding Eye (RE)
- Indicative Rainwater Pipe (RWP)
- Indicative Gully (G)
- Indicative Linear Drainage Channel
- Indicative Perforated Pipe
- Existing underground servicing and power cable routes.
- Existing underground servicing and power cable routes.

Rev	Date	Description	By	Check	App.
P2	14/02/24	Drainage Strategy Amended	JP	CAM	MLC
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Discipline: Civil Engineering

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Originator	Job Number	Discipline	Building/Zone
CCL	21/0644	CE	ALL

Type	Level	Drawing No.	Revision
DET	EXT	SK1000	P2

Birmingham 0121 200 2800 · Glasgow 0141 222 7201 · Liverpool 0151 227 5300 · London 020 3207 0970 · Manchester 0161 613 0000 · Newcastle 0191 221 0702 · Norwich 01603 395190 · Prestwick 01292 475375 · Reading 0118 947 7886