



Highgate Disused Station R&E Fencing: Project Completion Report

Contract No.: 901

**Project Mobilisation Timeline: 1st July 2023 – 30th September 2023
(3 Months)**

Main Contactor: Cleshar Contract Services

Sub Contractor: 7 Star Construction Services

Client: London Underground





Contents

1. Introduction	3
2. Project Background	3
3. Duties	3
3.1. Fence Installation:	3
3.2. Communication and correspondence:	3
4. Project Timeline	4
4.1. Blue Section ~ 110Lnm (01.07.23 – 19.07.23)	4
4.1.1. Scope.....	4
4.1.2. Challenges	4
4.1.3. Management of Challenges faced.	5
4.2. Red Section ~ 40Lnm (19.07.23 – 28.07.23)	7
4.2.1. Scope.....	7
4.2.2. Challenges.....	7
4.2.3. Management of challenges faced.....	7
4.3. Yellow section ~ 150Lnm (29.07.23 – 29.08.23)	10
4.3.1. Scope.....	10
4.3.2. Challenges.....	10
4.3.3. Management of Challenges faced.	10
4.4. Orange section ~ 120Lnm (30.08.23 – 14.09.23)	14
4.4.1. Scope.....	14
4.4.2. Challenges.....	14
4.4.3. Management of challenges faced.	14
4.5. Black Section (Tunnels) ~ 25Lnm (15.09.23 – 20.09.23)	16
4.5.1. Scope.....	16
4.5.2. Challenges.....	16
4.5.3. Management of Challenges faced.	16
4.6. Purple section ~ 60Lnm (21.09.23 – 30.09.23)	17
4.6.1. Scope.....	17
4.6.2. Challenges.....	17
4.6.3. Management of Challenges faced.	17



1. Introduction

The purpose of this document is to provide a report on the flagship fencing project at Highgate station carried out by 7-star construction, in collaboration with Cleshar Contract Services. This document will report on the timeline of works carried out, quality of workmanship, challenges faced, and the approach taken by 7 Star to complete this project within the set timeline.

2. Project Background

The main objective of this project was to reinstate the existing boundary fencing around the perimeter of Highgate underground tube station. The fencing reinstatement works were deemed as a job of emergency level importance due to prevalent trespass entries, graffiti and arson attacks on the infrastructure within the station boundary. The expected outcome of the works was to install a new security fencing system in order to prevent further unauthorized entries or vandalism of the kind stated previously.

3. Duties

3.1. Fence Installation:

- Installation of c.500 linear meters of 3m high double skinned GPC 358 prison mesh fencing.
- Removal of all existing fencing composed of a variety of styles including concrete posts, chain-link fencing, rhomboidal mesh fencing, concrete panels and barbed wire.
- Excavated all post holes to required dimension of 350mm wide x 750mm deep.
- All panels double skinned to meet the job specific requirements of LU for added security against trespass attempts.
- Topping all panels of fencing with three strands of barbed wire to enhance security.
- Measured all material quantities required and managed transportation of all materials, tools and PPE to site.

3.2. Communication and correspondence:

- Engaged in communication and correspondence with all stakeholders & ensured all are informed about the projects progression and addressing any concerns, some of the stakeholders encountered have been listed below:
 - LU representatives (the client)
 - CCS personnel
 - Station managers
 - Health and Safety auditors
 - Neighbouring business owners
 - Residents
 - The general public

By effectively carrying out these duties, 7 Star Construction ensured that the project was executed efficiently, maintained a high standard of workmanship, and adhered to safety protocols and procedures throughout the entire project timeline.

4. Project Timeline

Since this project came with numerous logistical challenges it was decided to dissect the works into manageable sections, and in doing so, giving us more achievable milestones to aim for as shown in the mapped out fencing boundary below (*see Figure 1*).

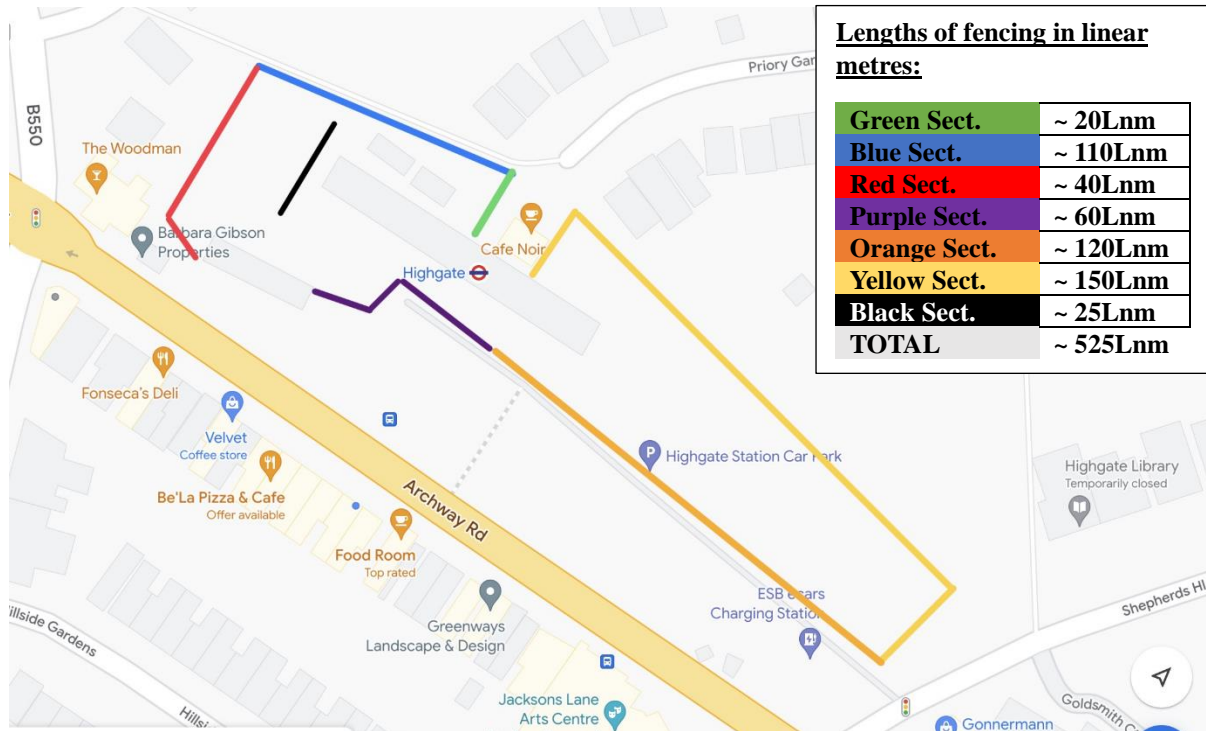


Figure 1 – Mapped out project boundary showing fencing work breakdown.

4.1. Blue Section ~ 110Lnm (01.07.23 – 19.07.23)

4.1.1. Scope

The works conducted along the blue section of the project is located along the narrow pedestrian pathway linking Wood Lane and Priory Gardens. The Length of this section is approximately 110 linear meters. The scope of work for this section included removal of existing chain link fencing and concrete posts and install new double skinned GPC 358 prison mesh fencing along with 1 new bespoke size gate installation.

4.1.2. Challenges

- **Steep Inclined Slope:** Fencing works were carried out along a extremely steep inclined pathway making it labour intensive to transport materials uphill, increasing difficulty of the work especially during wet weather conditions.
- **Pedestrian Traffic:** Pedestrian traffic along the pathway posed challenges and potential safety risks, particularly during peak rush hours.
- **Difficult excavations:** Excavations proved difficult in this section with presence of desiccated strata due to tree roots and a deep concrete underlay to the pedestrian pathway. Excavations were more regular also since posts had to be installed at closer centres to ensure steps in the fence panels maintained a significant height to enhance security.



Figure 2 - Existing Chain-link Fencing removed.



Figure 3 - Posts installed at 1m c/c to accommodate severe gradient.



Figure 4 - Breaking out concrete underlay to pathway obstructing post excavations.



Figure 5 - Installation of panels along the 'Blue' section

4.1.3. Management of Challenges faced.

- **Timing of work:** Work along the pedestrian pathway was scheduled during lower traffic hours in the daytime to minimise disruptions to pedestrians.
- **Chapter 8 Barriers:** Chapter 8 barriers were utilized to physically separate the working areas from the public, ensuring safety during construction.
- **Hot Works Safety:** Hot works (i.e., grinder cutting mesh panels) was avoided in proximity to pedestrians. A designated watchperson was assigned to observe the pathway and signal when it was to start or stop cutting. Furthermore, all necessary hot-works permits were issued and displayed weekly, a designated fire watchperson was always present and there was always a valid PAC tested fire point within 20 meters of any hot works taking place.



- **Temporary Pathway Closure:** When it came to barbed wire installation, authorization was obtained to temporarily shut the pedestrian pathway during off-peak travel hours through the great work of Steve Witherspoon (Northern Line Station Interface Manager). This measure greatly assisted in installing the barbed wire both safely and efficiently.

These strategies and safety measures helped manage the challenges posed by the steep slope and pedestrian traffic, ensuring that the work was completed safely and with minimal disruption to the public.



Figure 6 - External view of 3m inner skin installation.



Figure 7 - Use of chapter 8 barriers along public pathway during installation of double skin panels along the 'Blue' section.



Figure 8 - Double skinned panels finished with 3 strand barbed wire topping.



Figure 9 - Double skinned panels finished at the bottom of the pedestrian pathway.

4.2. Red Section ~ 40Lnm (19.07.23 – 28.07.23)

4.2.1. Scope

The works in this section were conducted along the boundary shared with The Woodman Pub Car Park. The length of this section was approximately 40 linear meters. The scope of work for this section involved removal of existing rhomboidal mesh fencing and installation of new double skinned GPC 358 prison mesh fencing and 1 new standard gate installation.

4.2.2. Challenges

- **Concrete Underlay to car park:** The presence of a deep C45 concrete underlay to the pub car park had to be broken out during post excavations.
- **Unstable ground:** There was an extreme sloping gradient on the disused station side of the boundary, which required some excavations to be dug almost 1200mm deep to ensure proper post placement in relation to the sloping ground.
- **Access difficulties:** Since the boundary formed part of the pub garden decking area, it meant working conditions were very tight to obstacles which needed to remain undisturbed.
- **Pub car park disruptions:** The pub car park was the only access to this section for deliveries, necessitating the minimisation of disruptions to customers and staff.

4.2.3. Management of challenges faced.

- **Ducts for post foundations:** Ducts were used for the post foundations, acting as permanent formwork for the postcrete. This ensured proper foundation formation in the presence of extreme uneven ground conditions.
- **Scheduling:** Noisy breaking out works were scheduled outside of peak customer hours to minimise disruption to the pub's operations and patrons.

- Collaboration:** Anticipated disruptions were discussed with the pub manager beforehand, demonstrating a proactive and collaborative approach to managing potential inconveniences.

These strategies helped mitigate the challenges posed by difficult ground conditions, access restrictions, and the need to minimise disruptions, ensuring that this section was completed successfully while maintaining a positive working relationship with The Woodman Pub and its stakeholders.



Figure 10 - Uneven ground conditions to working side of boundary.



Figure 11 – Using ducts as permanent formwork to enable curation of postcrete footings in difficult ground conditions.



Figure 12 - Removal of existing rhomboidal mesh panels to pub car park



Figure 13 - Example of the difficult digging conditions with minimal space to use hand tools effectively.



Figure 14 - New double skin prison mesh fencing installed and existing pub car park signage fixed back to new fence.



Figure 15 - Installation of double skin panels along pub car park boundary



Figure 16 - New standard single gate topped with anti-climb raptors installed to pub staff entrance to enhance security.



Figure 17 - Installation of double skin panels tight to decking of pub garden.

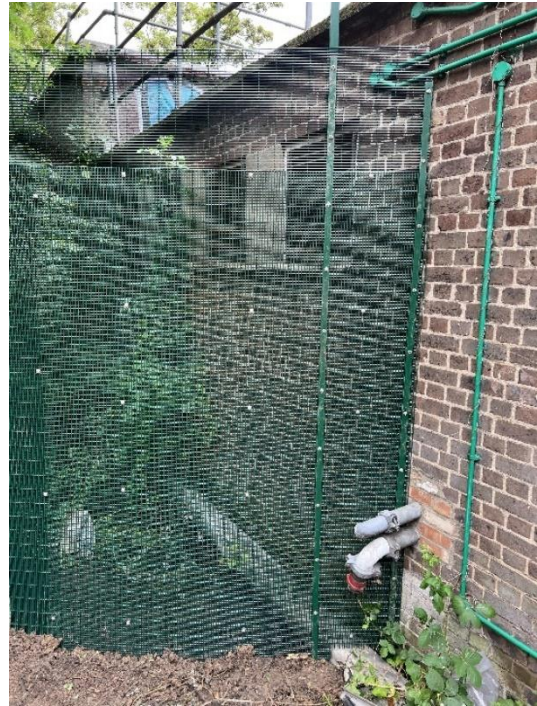


Figure 18 - Example of panels being trimmed around services using Unistrut's to stiffen cantilevered ends.

4.3. Yellow section ~ 150Lnm (29.07.23 – 29.08.23)

4.3.1. Scope

The works in this section were conducted along the residential boundary shared with No. 87 Priors Gardens and returns parallel with Shepherds Hill on approach towards the car park entrance. The length of this section summed to approximately 150 linear meters and the scope of work for this area involved removal of existing rhomboidal mesh fencing and installation of new double skinned GPC 358 prison mesh fencing.

4.3.2. Challenges

- **Terrain:** Terrain was mostly loose topsoil and clay which became very slippery after heavy rainfall.
- **Excavations:** All ground during excavation consisted of dry ballast in this area which require breaking out with a T1000 Hilti breaker with a spade point.
- **Access:** Only access points for materials were at the start and end of this section run, requiring materials to be loaded out and transported long distances on tricky terrain by hand.
- **Roots and Vegetation:** An abundance of tree roots and vegetation was present resulting in additional obstacles when transporting materials and excavating post holes.

4.3.3. Management of Challenges faced.

- **Vegetation Removal:** Vegetation teams from CCS were brought in to remove any large branches obstructing the line of the new fencing, ensuring a clear working area and to install barbed wire with ease at high level.
- **Strategic Post placement:** Excavations for the placement of fence posts were strategically positioned to avoid hitting large tree roots.



Despite the challenges posed by limited access and the presence of vegetation and tree roots, this section was successfully completed with careful planning and execution. This ensured that the new GPC 358 prison mesh fencing was installed along the boundary as required.



Figure 19 - Existing rhomboidal mesh panels and crank posts removed.



Figure 20 - Excavated piles of strong ballast strata.



Figure 21 - Posts and postcrete loaded out at each hole ready for installation.



Figure 22 - Installation of posts along the 'yellow' section



Figure 23 - Installation of single skin 3m fencing along boundary with No.87 Priory Gardens. Existing fencing left in-situ due to resident's outbuildings being fixed to said fence. Furthermore, it was a requirement of the resident to ensure that no vegetation was disturbed within their garden.



Figure 24 - Double skin resumed once fencing extended beyond the garden of No. 87 Priory Gardens.



Figure 25 - Removal of existing rhomboidal mesh panels and cranked steel posts.



Figure 26 - Installation of double skin panels continued



Figure 27 - Internal view of double skinned fencing along the 'yellow' section.



Figure 28 - Installation of 3-strand barbed wire to the rear of cafe Noir coffee shop at the priory gardens entrance to Highgate station.



Figure 29 - Reducing raised external ground levels to install new fence panels.



Figure 30 - Installation of final panels along the yellow run, severe sloping ground levels next to the entrance of the station car park.



4.4. Orange section ~ 120Lnm (30.08.23 – 14.09.23)

4.4.1. Scope

The work on this section was conducted along the boundary with Highgate Station carpark. The length of this section was approximately 120 linear meters. The scope of work for this section involved removal of existing concrete fence panels and installation of 3m high double skinned GPC 358 prison mesh fencing.

4.4.2. Challenges

- **Working proximity to Car Traffic:** Working near cars entering and exiting the car park, which required special attention to safety and traffic management.
- **Difficult Excavations:** Difficult excavations due to the presence of strong concrete underlay and tarmac within the car park which was to be retained and therefore subject to minimal disruption.
- **Labour intensive Panel Removal:** The labour-intensive process of removing heavy concrete panels, which had to be loaded onto a flatbed truck by hand and removed from site every day.

4.4.3. Management of challenges faced.

- **Chapter 8 Barriers:** Chapter 8 Barriers were used to create a physical barrier between the working area and vehicles entering and exiting the car park, enhancing safety for both workers and drivers.
- **Retaining the tarmac threshold:** It was decided that the best approach to retain a strong edging threshold between the tarmac and the boundary would be to leave the low level concrete panels in place along the full length of the station car park to retain sufficient support and haunching along the edge of the road.

These strategies and precautions helped manage the challenges related to car park traffic, difficult excavations, and the labour-intensive nature of panel removal, ensuring the successful installation of the new double skinned GPC 358 prison mesh fencing while maintaining safety and minimising disruptions to the car park.

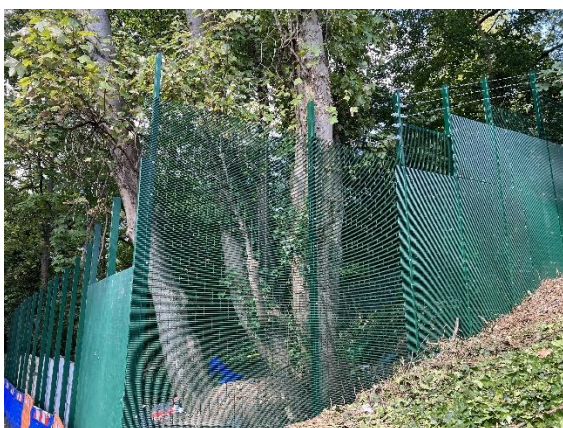


Figure 31 - Commencement of post installation along 'orange' section & completion of corner with 'yellow' section.



Figure 32 - Chapter 8 barriers sectioning off newly installed posts at the end of the shift.



Figure 33 - Excavations along car park boundary, postcrete loaded out, also showing existing concrete fencing to be removed.



Figure 34 - Car park boundary fencing single skinned and existing concrete panels removed.



Figure 35 - All redundant scrap and waste material piled in one location ready to be loaded onto the flatbed truck.

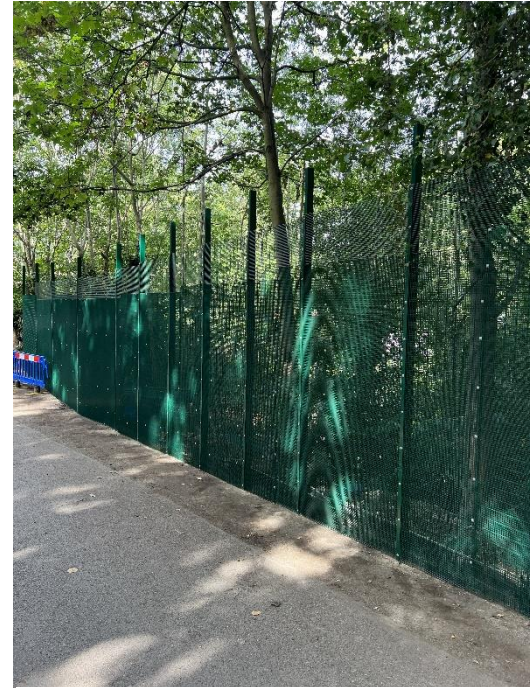


Figure 36 - New double skinned 358 prison mesh fencing installed along car park boundary.

4.5.Black Section (Tunnels) ~ 25Lnm (15.09.23 – 20.09.23)

4.5.1. Scope

The black section of works was the fencing carried out in front of the tunnels leading to Highgate depot. The length of this section was approximately 25 linear meters, and the scope of works was to install 3m high double skinned GCP 358 prison mesh fencing, 2No. standard sized gates and 2 No. Bollards as an added security measure to the gates.

4.5.2. Challenges

- **Excavation Difficulties:** Excavation challenges due to the presence of the disused tracks and sleepers between the tunnels where posts were to be installed.
- **Fixing double skin panels:** Difficulty faced in fixing the double skin component of the fencing because it was very tight to the wall. As a result, all doubled up panels had to be prefixed prior to fixing panels to the posts.

4.5.3. Management of Challenges faced.

- **Careful Excavation:** Excavation work was carried out with care, taking into account the presence of the disused tracks and sleepers to ensure safety and proper installation of the fence posts.
- **Prefabricated double skin panels:** To overcome the challenge of fixing double skin fencing, the panels were prefabricated and prepared in advance, allowing for direct attachment to posts in areas when getting behind the fence is too spatially restricted.

These strategies helped manage the difficulties posed by excavation challenges and the tight spacing for fixing double skin panels, ensuring the successful installation of the 3m high double skinned GCP 358 prison mesh fencing and associated gates and bollards in front of the tunnels leading to Highgate depot.

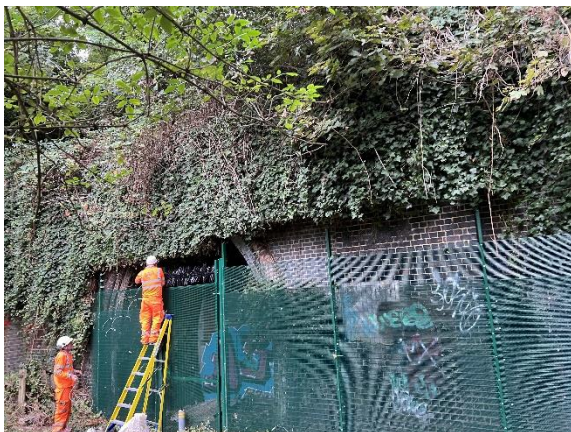


Figure 37- Installation of 3-strand barbed wire topping to fencing in front of the tunnels.



Figure 38 - Bollard in front of gate as an added layer of security.

4.6. Purple section ~ 60Lnm (21.09.23 – 30.09.23)

4.6.1. Scope

In this section work was conducted to remove and replace existing barbed wire and posts fixed to the parapet walls around the bottom end of Highgate station car park. This Section spanned to approximately 60m of fencing. The scope of work carried included resin fixing dog legged SHS (Square Hollow Section) posts to the parapet wall to ensure access to service cables was sustained in addition to enhanced security. The dog legged posts were also to be fixed with double skinned prison mesh and topped with 3-strand barbed wire.

4.6.2. Challenges

- **Minimising car park disruption:** All these works needed to be carried out within parking bays around the perimeter of the car park parapet wall.
- **Double skin installation:** Since there is a significant drop behind the parapet wall into the disused station it is not possible for anyone to get the double skin fixings on the outside of the panel due safety issues of working at height.

4.6.3. Management of Challenges faced.

- **Temporary car park space closures:** To ensure safety and an efficient system of work, It was authorised again due to the great work of Steve Witherspoon to close of a limited number of spaces along the parapet boundary during mobilisation of works along this section. This minimised the risk of any damage to cars whilst working in addition to creating a safer working environment with more space to carry out the fencing work.
- **Prefabricated double skin panels:** Panels were prefabricated with double skin prior to fixing them to the posts. This approach meant there was no requirement to work at height at all and completely mitigated any risks associated with working from heights.

By closing off the car park spaces and prefabricating the panels, the project was able to proceed efficiently while maintaining safety and minimising disruptions to both the car park and the public. The installation of the new infrastructure, including the double skinned prison mesh and barbed wire, was successfully completed as required.



Figure 39 - Dog legged SHS posts resin fixed to car park perimeter wall.



Figure 40 - Drilling 14mm holes for resin fixing.



Figure 41 - Carpark fencing double skinned.

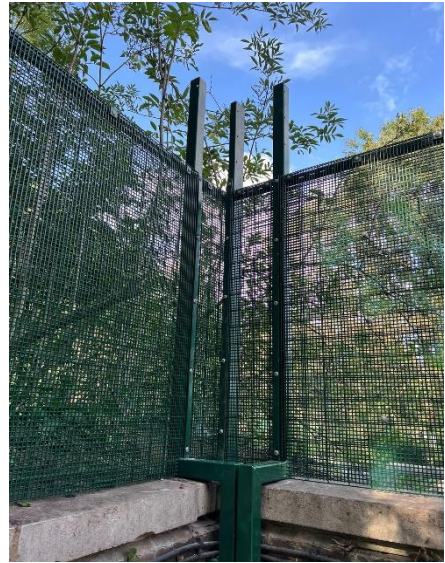


Figure 42 - Corner detail



Figure 43 - Carpark fencing topped with 3-strand barbed wire.



Figure 44 - Prefabricated double skin panels to avoid working at height.

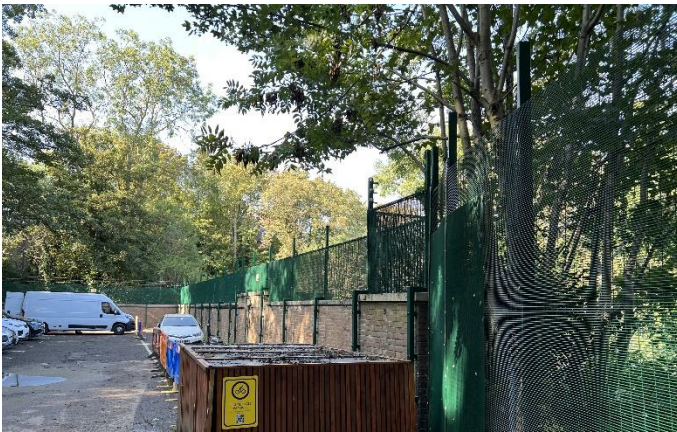


Figure 45 - Final section of fencing complete, adjoining the 'purple' and 'orange' sections.