

COMMERCIAL IN CONFIDENCE

**SOUTHERN RAILWAY STREATHAM HILL
DEPOT DEVELOPMENT**

FNC 33873/32897R

Prepared for

London Borough Of Lambeth

COMMERCIAL IN CONFIDENCE

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SUMMARY

The London Borough of Lambeth has commissioned Frazer-Nash Consultancy to review some aspects of the infrastructure required by Southern Railways, for the normal operation of their fleet.

The nature of this work is to:

1. Review whether the work undertaken on the north siding at Streatham Hill is necessary in relation to the operation of the railway and can be considered to be required for the movement of traffic by rail;
2. Whether the Council can properly and reasonably require the removal of some of the items which form part of the development;
3. Would the removal of particular items jeopardise the functioning of the depot; and
4. To make recommendations for future actions by the Council as Local Planning Authority.

In formulating this report, we have:

1. Made comparisons with other stabling locations / facilities and any identified requirements that mandate canopies and weather protection;
2. Explored whether the Controlled Emission Toilet (CET) tank extraction facilities on the south side of the tracks might be used or the vehicles could be scheduled to be serviced at other existing facilities;
3. Investigated whether a more compact silo / sand conveying system might be feasible (exploring whether there are facilities on the south side that might be used);
4. Reviewed the legislative requirements for lighting and explored whether the installed lighting is in excess (exploring by comparison with practice elsewhere whether the lighting is required to be lit at all times).

It has been concluded that the CET extraction equipment, sanding equipment, platforms, canopies and lighting are required for the normal operation of Southern Railways. It would not be reasonable to require the removal of these items. This equipment enables Southern Railways to meet its franchise obligation. The water refilling function of the development was considered Permitted Development by the Planning Applications Committee therefore this function was not assessed as part of this report.

Following discussions and review, it has been concluded that although the canopies provide shelter (although limited), they primarily provide support for the services, with pipes running along the inside of canopy. This structure also provides a mounting for the light, which prevents light emission. The removal of the structure, without a practical alternative, would compromise the operation of the depot. The replacement or modification of the structure has been estimated at £7.3m. Therefore it is difficult, in my opinion, to change.

The lighting levels produced by the depot are comparable with other railway depots, which serve similar functions. The lighting levels recorded standing on top of the boundary wall between the depot and the Sternhold Avenue residential properties were very low (typically below 1 lux) due to recently fitted lighting barriers. This is considered well below recommended lighting levels adjoining residential properties.

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1. INTRODUCTION

1.1 REPORT PREPARED ON INSTRUCTIONS FROM

This report is prepared on instructions from:

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Instructions were given by letter reference 33873-001/46802/KEC/CJW dated 2nd of April 2007.

1.2 REPORT PREPARED BY

The report has been prepared by:

Christopher J. Watters, BEng (Hons), MIET, CEng
Frazer-Nash Consultancy Ltd.
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1.3 REPORT PREPARED

This report is issued as a final version dated February 2008.

1.4 AUTHORS QUALIFICATIONS

This report is written by Christopher Watters, an Engineering Honours Degree graduate and a Chartered Electrical Engineer. Christopher has over fifteen years engineering experience, primarily within the rail industry, including several years experience in rail fleet management and franchise requirements.

1.5 EQUIPMENT USED

During the course of this report, a Lux meter was used to measure illuminance. It is confirmed that this meter is calibrated and the certificate (No. 63798) is held within the Glasgow office.

2. THE REMIT

2.1 THE PARTIES

The main parties directly concerned with the investigation are:

London Borough of Lambeth
Southern Railways, the operator of Streatham Hill Depot.

2.2 THE INSTRUCTIONS

The London Borough of Lambeth, wish to instruct a rail consultant, not to give advice on the planning issues, but to advise on the following general matters:

1. The nature of the work undertaken and in particular whether the works are necessary in relation to the operation of the railway and can be considered to be required for the movement of traffic by rail;
2. Whether the Council can properly and reasonably require the removal of some of the items which form part of the development;
3. Would the removal of particular items jeopardise the functioning of the depot; and
4. To make recommendations for future actions by the Council as Local Planning Authority.

2.3 APPROACH TO THE INVESTIGATION

In formulating a response to the instructions, we have:

1. Made comparisons with other stabling locations / facilities and any identified requirements that mandate canopies and weather protection;
2. Explored whether the Controlled Emission Toilet (CET) tank extraction facilities on the south side of the tracks might be used or the vehicles could be scheduled to be serviced at other existing facilities;
3. Investigated whether a more compact silo / sand conveying system might be feasible (exploring whether there are facilities on the south side that might be used);
4. Reviewed the legislative requirements for lighting and exploring whether the installed lighting is in excess (explored by comparison with practice elsewhere whether the lighting is required to be lit at all times).

3. FRANCHISE REQUIREMENTS

As part of their franchise terms and conditions, the Franchisee (Southern) will be required to meet a set of safety and performance levels. This will include a Service Level Agreement (train timetable), as well as any legislative requirements. The Franchisee will be monitored against these conditions through a number of Key Performance Indicators, including industry punctuality measures and customer satisfaction.

Legislation requires the franchisee to comply with the “Railways and other Guided Transport Systems” (ROGS) regulations. Through this, the Train Operating Company (TOC) must demonstrate compliance Health and Safety regulations and Railway Group Standards, as well as being properly integrated into the railway system (compatibility). Hence the TOC will define a cascade of Safety Case documentation, starting with a Safety Management System (SMS). The key part of this for our purposes is the definition of a maintenance policy. Actual maintenance will then be completed to a predefined vehicle maintenance schedule (with maintenance periodicities or frequencies).

The function of the maintenance schedule is to define the level of maintenance activities required to meet both the SMS and performance requirements of the fleet.

In addition to the maintenance standard, the Franchisee will have in place a cleaning standard, to ensure that the fleet meets the appropriate cleanliness levels.

As the TOC will have a number of depots, they will define what work must be completed at each location, through the development of the maintenance and cleaning plan. This plan will drive the facilities requirement for each location.

The primary depots and stabling points have been reviewed detailed within Appendix B. It can be seen that the facilities differ within Southern depots in order to meet with the fleet stabling and maintenance and cleaning plan.

4. REVIEW OF STREATHAM HILL DEPOT

4.1 BACKGROUND TO DEPOT

As stated within Section 3, Streatham Hill is termed a cleaning depot, used for light maintenance and minor to major cleaning.

The area being reviewed at Streatham Hill depot is the North sidings. This area was constructed to relieve congestion in the cleaning shed, and includes cleaning platforms, CET tank extraction equipment, water and sanding facilities. The depot stables around 17 trains per night, including the class 319, 377 and 455 trains. The actual maintenance requirements of these trains differ and the general requirements are detailed within Appendix C. The layout of the depot is shown within Appendix A.

4.2 DEPOT STABLING

As with all depots, Southern have in place a stabling plan. This plan details where each train is stabled, on arrival at the depot, and aligned to the work required on the train. The plan will have some flexibility, aligned with the fleet availability (trains of each type available at each location). However small changes to the plan, can affect the fleet availability.

It was noted and confirmed by Southern that, overnight, they stable the class 377s mainly within the depot shed, on the South of the yard, with the class 455s on the North sidings. It can be seen from Appendix C that little work is required on the class 455s. Therefore the class 445s are generally stabled on sidings 1, 2 or 3, as they do not require access to CET equipment.

An indicative stabling plan on the depot was noted as follows:

South Siding (Depot)

Track No.	Trains	Total Vehicles
4	3 x CI377	12
5	2 x CI377	8
6	2 x CI377	8
7	2 x CI455	8
8	2 x CI377	8
Total	11	44

North Siding (Sternhold Avenue side of main line)

Track No.	Trains	Total Vehicles
1		
2	4 x CI455	16
3	2 x CI377	8
4		
5		
Total	6	24

The stabling plan was confirmed on an official visit to the depot on the 13th of June. In addition the depot movements were reviewed, covertly, on the 12th of June (from the overbridge between the depot and the station) to ensure consistency of operations.

These visits confirmed that the siding stabled 17 trains, (of 4-vehicle formation), at the depot overnight. The two class 377 stabled on 3 track, will require CET.

5. REVIEW OF WORK COMPLETED ON SIDINGS

5.1 INTRODUCTION

The purpose of sanding and Controller Emission Toilet (CET) tank extraction are detailed within Appendix D, "Review of work completed", along with the consequences of not completing the work.

In order to clearly define the scope of the work required on the sidings, this section reviews:

1. The activities required;
2. Why they are required;
3. Consequence of not completing; and
4. Frequency of activity.

Section 6 further reviews the actual facilities in place to allow this work to be completed.

5.2 REPLENISHMENT OF SAND

Sanding is used to improve the adhesion between the wheel and the rail whilst in traction and braking modes, in wet weather conditions or slippery conditions (such as leaves on the line). Sand can also act as an aid in braking from high speeds.

The sanding equipment is denoted as "safety critical" equipment and the Rail Group Standard Rule Book (GM/RT8000), module TW5, (section 28.1) defines that a train must not enter service if "the sanding equipment is defective or there is no sand in the sand box". In addition, it defines that if sand is not functioning in traffic (i.e. the equipment defect or sand box empty) and the driver believes they "may have difficulty stopping the train if it continues in service" then the train must be removed from service (section 1.2).

Checking and ensuring adequate sand provision for the train service is a Safety Management System requirement. If sanding levels and the sanding equipment is not tested, and no sand is available, the train will be removed from service, affecting Southern's overall performance.

From my own industry experience of the type of service that Southern operate, sand will need to be replenished every 5-14 days, dependent on weather. It is therefore prudent to check the sand level at a frequency of every 2 days.

All TOCs have a stabling plan and trains will circulate through a number of locations, with trains being stabled at differing locations each night. Some of these locations do not have sanding facilities (i.e. Hove). Consequently, to ensure that the sand level is always sufficient for service, Southern will define at which location work is required. Therefore the maintenance schedule defines that trains stabled at Streatham Hill, must

have the sand level checked. This allows the operational staff to know that 2 days later the train must be stabled within a depot with similar facilities to Streatham Hill, to allow the sand level to be checked again. Again this requirement will be aligned with the fleet stabling plan.

Consequently Southern must check sand levels and replenish as necessary each time the train is stabled at Streatham Hill Depot.

5.3 EXTRACTION OF SEWAGE FROM CET TANK

Sewage from the train toilets on the modern fleet is retained within the CET tank. Previously sewage was discharged on the track; however hygiene and ethical concerns within the rail industry now mandate the use of CET tanks.

The tank must be emptied at regular intervals. Not extracting sewage from the CET tank regularly affects the availability of the toilet, as the toilet automatically locks out of use when the tank is full.

The toilet is not defined as being a safety critical system and rail standards do not define that the toilet must be available at all times. However, it is standard TOC policy to ensure where toilets are provided, that they are functional.

The CET tank, with the type of duty cycle of the Southern Railway, and due to the size of the tank, is required to be emptied every 1 to 3 days. As discussed above Southern have in place a stabling plan, and trains will be stabled at different locations each night, and some do not have CET tank extraction equipment, (i.e. Hove). Therefore to ensure toilet availability it is prudent to empty the CET tank each time the train is stabled at Streatham Depot.

6. REVIEW OF FACILITIES

6.1 INTRODUCTION

In section 5, we have reviewed the on train equipment and their maintenance requirements. Within this section we will review the depot facilities, and the equipment being used to complete the activities. The objective of this section is to determine whether this equipment is required for the operation of the Southern fleet.

This section will review the following:

- Sanding equipment;
- CET equipment;
- Platforms;
- Depot Lighting; and
- Canopies.

It should be noted that these specific activities are being completed outdoors. There are no specific health and safety regulations for working on sidings, with the only requirement to provide a safe walking surface (not ballast) with adequate lighting. This requirement is reviewed below.

6.2 SAND EQUIPMENT

The main requirement of the sand replenishment equipment is to provide dry sand for the train sand box. Wet sand causes the train system to block and consequently fail, due to the fact that sand congeals when wet.

There are two main types of sand dispensing systems for the rail industry:

- a) Trackside systems - stationary, permanent systems designed for clean, convenient, spill-free sand dispensing for rail vehicles at depots. This contains a sand silo, associated pipe work and dispensing gun.
- b) Mobile sanding units – motorised truck or hand-guided trolley systems or 'backpack' type units for depots with limited space or which require flexibility.

The system used at Streatham Hill is the trackside system, as per item 'a' above. This is an efficient system, dispensing sand from transfers points from the sand silo, under pressure to the sand box using a petrol pump style nozzle, similar to filling a car with fuel (see image below).



When the sand box is full, sand flow automatically stops. This system is totally enclosed, quick, efficient and simple system to use, ensuring minimum spillage and protection from water ingress. Canopies are sometimes fitted to provide extra protection from water ingress. The mobile system as referenced above requires additional resource, as a result of the requirement to replenish the sand within the mobile tank.

As the system is fully enclosed it is possible to site trackside sand-dispensing equipment, such as the equipment seen at Streatham Hill, on an outdoor maintenance site without protective canopies, as shown in the images below. These images have been taken from the equipment supplier's publicity documentation.



As stated above, the sand is transferred under pressure using a silo system. The silo is required to store sand and is an important part of the system. Without an adequate sand storage facility it would not be possible to replenish sand, which would result in a train failure. The size of the silo is wholly dependant on the amount and frequency of sand being delivered to the depot, related to the usage. The silo at Streatham Hill depot has been sized to meet Southern servicing demands.

In my opinion Southern Railways have ensured through the installation of this equipment that sufficient sand is available, to meet their safety requirement for sand replenishment. The equipment used is of a high quality allowing speedy replenishment.

The removal of the sanding equipment would jeopardise Streatham Hill depot ability to complete this task and impact on staff utilisation (additional staff time required to replenish sand boxes). This would result in cancellations to Southern Railways service, due to trains not being available for service.

6.3 CET EQUIPMENT

The CET extraction equipment is relatively automatic. It is simply attached to the train, and switched on. Then the system will extract the sewage from the train, and stop after a pre-set time period. The system will only allow for one extraction hose, per installation, to be functioning at any one point in time.

With respect to protecting the equipment from water ingress (by fitting canopies), the equipment is very robust, and can be stored outside. This is standard practice throughout the rail industry. However extract hoses should always be placed in cleaning solution after use. This solution may overflow with rain water if no canopy exists, but this can easily be resolved by fitting a cover to the cleaning solution retainers.

The installation at Streatham Hill depot has CET extraction equipment situated on the North and South sidings of the depot.

In my opinion the equipment is required, as the availability of the equipment relieves congestion on the South sidings (the depot), thus reducing the number of train moves and shunts. Removal of the facilities would require a number of train movements between the sidings and the depot during the night. This operation in itself would result in substantial noise. Whilst it could be argued that not all CET extraction points are required on the North siding, if one point was required, the same infrastructure would be required. In addition, and as stated above, more extraction points limit the number of train movements and therefore noise.

As the systems are separate, the depot has the requirement for a pump house on both sidings. This allows the TOC additional capacity for CET extraction, allowing simultaneous extraction at both sidings, whilst allowing redundancy in the event of equipment failure, on one of the sidings. Having equipment at these sites (North and South sidings) prevent additional train movements.

If both systems were operated from the same pump house, Southern Railways would only be able to use one extraction hose at any one time. Therefore activities between the north and south sidings would need to be coordinated. This process would introduce additional time, and could affect the fleet toilet availability.

Consequently it can be summarised that CET equipment and the related infrastructure site on the southern sides is required to allow Streatham Hill Depot to complete this task. Removal of the equipment would jeopardise Southern Railways train service, by resulting in trains being returned to service without the sewage being extracted. This would result in toilets being locked out of service.

6.4 PLATFORMS

Platforms have been provided between the tracks on the siding, in order to provide a safe walking route for Drivers and Maintenance / Cleaning staff on the depot. There is a health and safety requirement to provide a safe walking surface therefore the platforms are considered necessary for the safe operation of the depot.

6.5 DEPOT LIGHTING

Lighting is provided to each track and siding platforms, either from lighting columns (for tracks 1 and 2) or lighting fitted within the canopies (as per tracks 3, 4 and 5). Lighting is provided for night time operation of the depot and also for security reasons, providing lighting for the CCTV cameras.

The lighting columns are positioned in eight locations to provide lighting for tracks 1 and 2. It is considered that the lighting columns and associated light levels are required for the safe operation of the railway depot by providing a safe well lit working environment. As the lighting columns provide this lighting for the depot it would not be reasonable to require the removal of the lighting columns.

The lighting on the canopy is provided by fluorescent lighting, at 1 meter intervals (as per figure 3 below), along the length of the canopy. This lighting is deemed to be required for the safe operation of the railway depot, by providing a safe well lit working environment which has adequate lighting available for staff working on tracks 3, 4 and 5.

The lighting levels have been reviewed to determine whether the installed lighting is in excess of the requirement. Lighting measurements have been measured in Lux, which is the measure of illuminance, and equal to one lumen per square metre.

The Health and Safety guidance for lighting at work (HSG 38) recommends lighting levels applicable for certain activities. An extract from this guidance note is provided within Appendix E. In my opinion a minimum lighting level of 50 Lux (with an average illuminance of 100 Lux) is required within the sidings to allow for the cleaning, CET extraction and sand replenishment activities referenced within Appendix C, but also for additional safety checks to be completed as required.

Light measurements taken were recorded between the hours of 23:00 and 00:30 on the night commencing the 13th of June. Measurements were taken using a calibrated Lux meter, measuring the light levels from the overhead canopies to the depot boundary wall, as shown on Appendix A. It should be noted that the distance between the boundary wall and the canopies tapers slightly, from 8 to 1.5 meters, moving from West to East of the depot (East being nearest that station).

The actual Lux level directly under the light had an average illuminance of 200 Lux. These readings are comparable with other railway depots with similar functions to Streatham Hill. However it was noted that the level of illumination altered greatly when moving away from the canopies. A number of readings were taken between platform 5 and the depot boundary wall (as per appendix A). The average readings taken were as follows:

- Under light canopy – 200 Lux
- 1.5M from canopy (towards the boundary wall) – 31 Lux
- 3M from canopy (towards the boundary wall) – 2.3 Lux

The light was seen to reduce substantially when walking away from the canopy; this can be seen in figure 1 below. The lighting levels at the boundary wall were also

measured. In most cases the measures were below 1 Lux (0 to 50m from the start of measuring point as shown on appendix A). It was noted that this figure increased slightly, along the length of the wall towards the East end of the depot (as per appendix A) and peaked at 10 Lux, at the closed point between the track and boundary wall.

Overall it was seen that the high lighting levels are largely concentrated within the intended area, which is directly under the canopy.



Figure 1 – Streatham Hill Depot Canopies – taken from West end of sidings at 23:00

Figure 1 gives a good representation of the effectiveness of the light barriers being used on the depot. To the left of this picture are the Houses on Sternhold Avenue.

Legislation (Clean Neighbourhoods and Environment Act 2005) now means artificial lighting is subject to the law of statutory nuisance. In this context Statutory Nuisance is defined as “artificial light emitted from premises so as to be prejudicial to health or a nuisance”.

The law defines the requirement for ‘best practical means’ to be used in the context of corporate/social responsibility and needs to be in balance with safety and security provided by the lighting function.

This legislation does not apply to artificial light emitted from:

- a. An airport;
- b. Harbour premises;
- c. Railway premises, not being relevant separate railway premises;
- d. Tramway premises;
- e. A bus station and any associated facilities;
- f. A public service vehicle operating centre;
- g. A goods vehicle operating centre;
- h. A lighthouse;
- i. A prison.

Railway premises” means any premises which fall within the definition of “light maintenance depot”, “network”, “station” or “track” in Section 83 of the Railways Act 1993.

Taking this into account, it is seen from the measurements above that Southern has put in place an effective lighting barrier to reduce nuisance lighting. In my opinion the lighting levels produced at Streatham Hill Railway Depot are comparable with other railway depots.

To put the measurements in context, the measurements taken along the boundary fence of the depot and within the gardens of the residential properties were generally less than 1 Lux, in comparison with the readings of 4.3 to 20 Lux measured from normal street lighting, at the front of the property.

As measured, the level of lighting under the canopies (200 Lux) is in excess of that required for fleet maintenance at the Depot and for a safe working environment (typically 50 Lux minimum and 100 Lux average, as defined within the HSE Guidance note “HSG 38 -0 Minimum Lighting recommendations” within appendix E). Therefore lower lighting levels could be considered without compromising the depots function or safety.

6.6 CANOPIES

Canopies have been installed above the platforms for two reasons, to provide weather protection, and to provide a location for the services.

Weather protection is provided by a 2.1m wide “v” shaped corrugated metal canopy running continuously for the 300m lengths of the three sidings. This narrow width and being angled upwards creates a gap of between 700 and 875mm between the train and the canopy, as shown within figure 4 below. This “v” shaped design reduces the ability of the canopy to fully protect staff on the platform.

For staff working within railway environments (i.e. depot sidings) there are no specific health and safety regulations regarding weather protection, with the only requirement to provide a safe walking surface (not ballast) with adequate lighting. There is also no need for weather protection during sand and CET operations as these are effectively closed systems. However it should be noted that additional safety features and low accident report is a benefit to any franchisee.

The primary purpose of the canopies is to provide a location for the services, which constitute the water, sewage, and sanding pipes, as well as a mounting for the strip lighting unit. The corrugated metal canopy forms part of a larger support structure comprising 3.1m high columns which holds among other things pipes for the transfer of sewage, water and sand services and the fluorescent strip lighting.

I believe an alternative to this structure exists by placing the majority of services (with the exception of the lighting which needs to remain above the platform) within the platform, and covering with light weight covers, allowing for access for maintenance or repair. This option has been discussed with Southern Railways; however Southern believe that the existing system is preferred due to the ease of maintenance and repair.

They state the cost to convert to an alternative system is in the region of 7.3 million pounds. I believe this alternative, while still a possibility, would have been more feasible at the beginning of the project prior to the construction of the platforms and would have been as effective as the existing arrangement in terms of maintenance and repair to the services and would have reduced the need for the canopies.

However, the extent and costs of the work is excessive, and therefore is considered, in my opinion unfeasible, as the removal of the canopies strip lighting, and the service pipes cables would jeopardise Southern Railways train service.

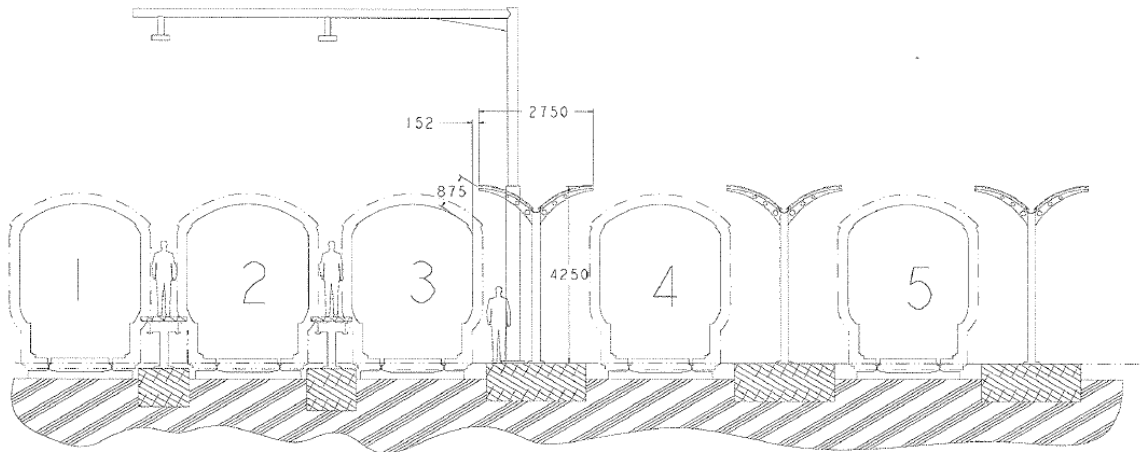


Figure 4 – View of siding – Showing gap between Canopy and Train.

7. DISCUSSION

7.1 COMPARISON TO OTHER DEPOTS

Comparison has been made with a number of depots as can be seen in Appendix B, and a number of depots have been identified with similar infrastructure.

Southern's maintenance depots (Brighton and Selhurst) have all the facilities as seen at Streatham Hill. Hove is used as a cleaning and stabling depot only, but has no CET tank extraction or Sand replenishment equipment.

The Streatham Hill activities are comparable to those of Clapham Junction and Fratton depots, as operated by South West Trains (SWT). Whilst these depots are fitted with CET extraction, they are not fitted with the canopies or sand guns, as seen within Southern depots.

South West Trains and First Capital Connect fleets are fitted with sanding equipment, and are checked at these locations. However, their current process involves manually refilling sand boxes, using option 2 details within section 5.2, which is normal practice across the rail industry.

It can be argued that Southern, through the introduction of the automatic sand gun system for replenishment of sand; have streamlined this process significantly to improve depot efficiency.

Bedford Cadwell depot, operated by First Capital Connect, was built in 2003 / 2004, and provides very similar facilities to Streatham. It is also based near a housing estate. The depot was developed and accepted following thorough consultation with the Borough Council and residents. The depot includes good sound and light barriers. The planning consultation included recommendations for lighting and noise monitoring of the depot. It is noted that First Capital Connect has had no registered residents' complaints.

Similar canopies are noted to be used within the Ardwick Maintenance Depot, in Manchester operated by Siemens. Although it should be noted that this depot is located within an industrial location, and that canopies are located within the middle of the depot, not on the perimeter, as in the case of Streatham Hill Depot.

7.2 NUISANCE LIGHTING

As detailed within section 6.6, light measurements were recorded within the depot. The measurement showed a range from 200 to 1 Lux moving from the canopies to the boundary wall respectively. Measurements were taken within 2 gardens neighbouring the depot. Measurements were taken from 165 Sternhold Avenue lower garden and upper balcony. Further measurements were taken from 203 Sternhold Avenue. Measurements from both properties produced very low levels with the highest measurement being 1.01 Lux, as taken from the balcony at 203 Sternhold Avenue. It should be noted that the reading within the neighbouring properties ranged between 0.26 and 1.01 Lux.

The measure shows relatively low levels at the boundary wall, and is not seen to be shining outside the area it is intended to illuminate, as defined within the Environment Act 2005. To put these measurements into context, street lighting measurements taken around the same time, were in the region of 4.3 to 20 Lux.

7.3 CANOPIES

As well as providing weather protection, are primarily used to provide a route for the water, sewage and sand pipes, and to support the strip lighting. As stated above the strip light illuminates the area around the platforms, and has been shaded in a manner to prevent light emission.

Southern Rail state that the pipes can not be routed underground due to the existing arrangement being preferred for maintenance and repair, and due to the difficulty of relocating underground. It is noted that the canopies provide limited weather protection for the staff and equipment during operations on site. However, this is considered non-essential for the normal operation of the depot.

Because of the benefits they bring, and the cost of replacing them, it is my opinion that no practical alternative to the present system exists.

7.4 NOISE LEVELS

Noise level measurements were taken separately by Lambeth council and are therefore not contained within the report.

8. CONCLUSIONS

It is considered that the following items are required to allow Southern to comply with their safety management system, and meet their performance requirements:

- Sanding equipment;
- CET extraction equipment;
- Platforms;
- Canopies;
- All lighting; and
- All pipes, cables and lighting services held in place by the canopies

It is my opinion that the sanding guns, CET equipment, platforms and lighting are required on the siding to allow Southern to operate their fleet safely and reliably. In addition, the canopies provide a safe inspection and maintenance arrangement and are required for the safe and reliable operation of the depot.

Removal of this equipment without practical alternatives would result in Southern being unable to meet their Service Level requirements, as per their franchise agreement.

9. DEFINITIONS AND ACRONYMS

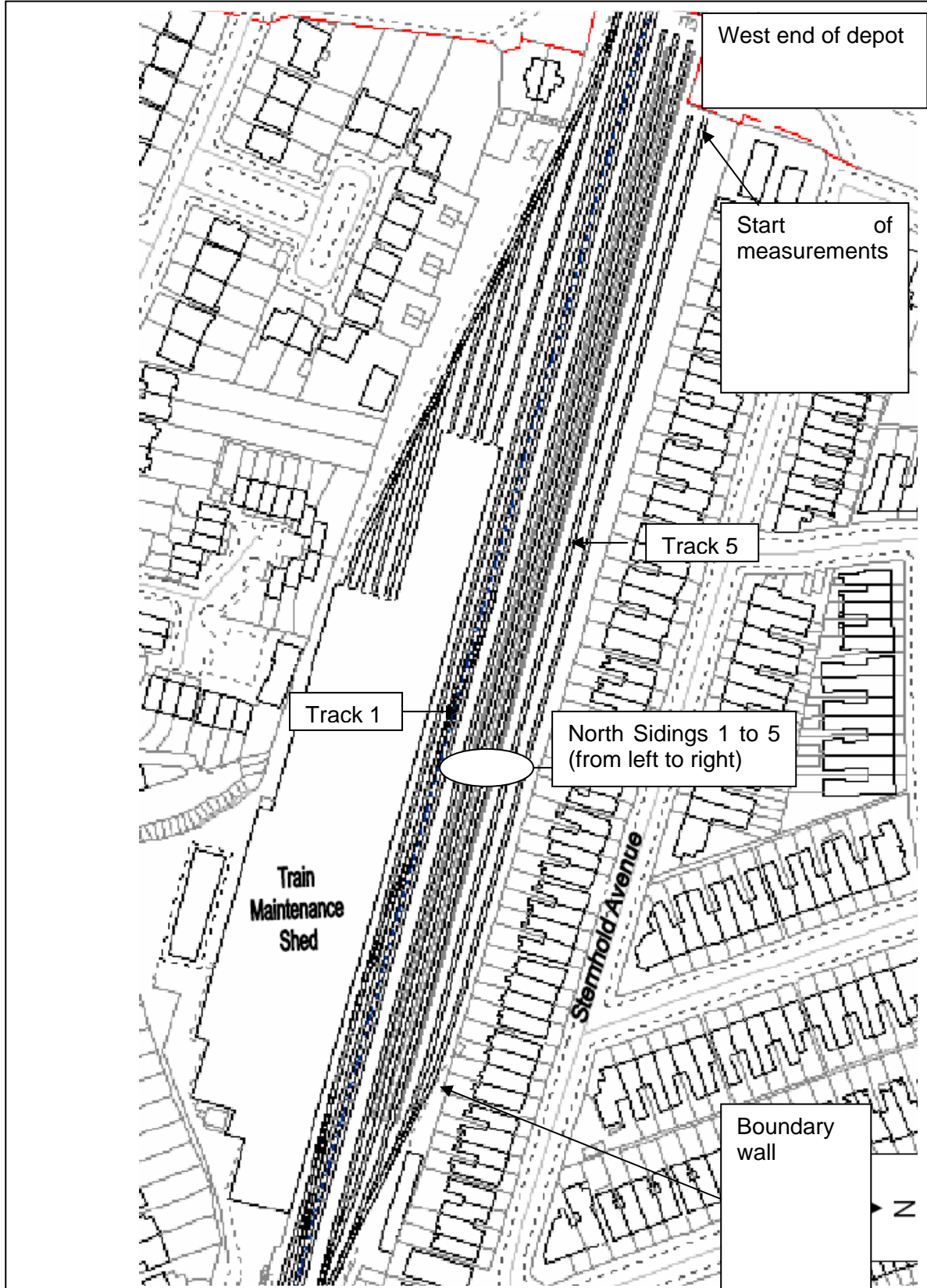
Definitions

Term	Definition
Train	A configuration of vehicle.
Vehicle / Coach	One rail carriage
North Sidings	The sidings based nearest Sternhold Avenue

Acronyms

Term	Definition
CET	Controlled Emission Toilet.
FCC	First Capital Connect
SWT	South West Trains

APPENDIX A – OVERVIEW OF DEPOT



APPENDIX B – DEPOT COMPARISON

Depot	Operator	Principal Depot Activity	Facilities				Comment
			CET Equip	Water Supply	Sand Guns	Canopies	
Brighton Lovers walk	Southern Railways	Train Maintenance	√	√	√	√	
Selhurst Depot	Southern Railways	Train Maintenance	√	√	√	√	
Hove Carriage Sidings	Southern Railways	Cleaning and Stabling		√			
Littlehampton Cleaning Depot	Southern Railways	Cleaning and Stabling	√	√		√	
Streatham Hill Cleaning Depot	Southern Railways	Cleaning and Stabling	√	√	√	√	
Clapham Cleaning Depot	South West Trains	Cleaning and Stabling	√	√			Sand supply topped up by hand.
Fratton Cleaning Depot	South West Trains	Cleaning and Stabling	√	√			Sand supply topped up by hand.
Hornsey Depot	First Capital Connect	Train Maintenance	√	√	√		No canopies fitted in depot, but very similar infrastructure and location.
Bedford Cadwell Depot	First Capital Connect	Train Maintenance	√	√	√		No canopies fitted in depot, but very similar infrastructure and location.
Ardwick Depot	Siemens	Train Maintenance	√	√	√	√	Although canopies are fitted, depot is located in an industrial site.

APPENDIX C – FLEET MAINTENANCE REQUIREMENT AT STREATHAM HILL DEPOT

Class	Activates completed on train			
	Cleaning (Minor / Major)	CET Extraction	Sanding replenishment	Average units stabled on depot at night
377	√	√	√	11 x 4 vehicles
455	√	X	√	6 x 4 vehicles
319	√	√	√	1 x 4 vehicles at w/end

APPENDIX D – REVIEW OF WORK COMPLETED

Activity	Purpose and Frequency	Frequency of Work	Consequence of not doing	Consequence to Southern Railways
Sanding equipment	The Sand provides additional adhesion between the Rail and wheel, when the train control system detects that a train wheel is locked or spinning (without moving) in braking or drive mode respectfully.	Check level every 2-days	With the present arrangement the sand box would typically provide 5-14 days sand dependent on weather. If not checked or topped up regularly, the sand supply on the train will be exhausted.	An empty sand box would require train to be removed from service.
CET Tank Sewage extraction	The sewage from the toilet and sink, flow directly into the CET (Controlled Emission Toilet) tank. Dependant on the size of the tank and passenger volumes the Tank requires to be emptied every 1-3 days. On a service like Southern with high passenger volumes, the operator will programme to empty the tanks every 2-days.	Extract 2-day	When the tank becomes full, the CET tank provides an indicator to the Toilet control systems, which automatically locks the toilet out of use.	High number of customer complaints and potential infringement of Franchise Agreement.

APPENDIX E – EXTRACT FROM HSE GUIDANCE HSG 38 -0 MINIMUM LIGHTING RECOMMENDATIONS

Activity	Typical locations / type of work	Average Illuminance (lux) lx.	Minimum Measured Illuminance (lux) lx.
Movement of people, machines and vehicles.	Lorry park, corridors, circulation routes.	20	5
Movement of people, machines and vehicles in hazardous areas; rough work not requiring any perception of detail.	Construction site clearance, excavation and soil work, loading bays, bottling and canning plants.	50	20
Work requiring limited perception of detail.	Kitchens, factories assembling large components, potteries.	100	50
Work requiring perception of detail.	Offices, sheet metal work, book binding.	200	100
Work requiring perception of fine detail.	Drawing offices, factories assembling electronic components, textile production.	500	200