



Alan Bullock  
Senior Analyst  
The Quadrant: MK  
Elder Gate  
Milton Keynes  
MK9 1EN

31<sup>st</sup> August 2016

Ian Williams  
Office of Rail and Road  
1 Kemble St  
London  
WC2B 4AN

## Changes to ESTA boundaries in Scotland and Western Routes

Dear Ian

### 1. Purpose

Consistent with Paragraph 11 of the Traction Electricity Rules (TERs)<sup>1</sup>, we are writing to formally seek ORR's approval of our proposal to amend Appendix 5 (Geographic Areas) to the TERs to change ESTA boundaries in Scotland and Western Routes.

### 2. Background

On 26 July 2016, Network Rail wrote to the Traction Electricity Steering Group (TESG) setting out our Proposed Rules Change to reflect the newly electrified lines in Scotland and Western Routes. We did not consider the Proposed Rules Change to be controversial, and deemed it to be the only viable option for ESTA configuration. Please see Annex A for more information.

### 3. Consultation Process

The consultation closed on 26 August 2016. We received one response from SSWT who confirmed that it had no objections to the Proposed Rules Change<sup>2</sup>. As such, we propose to make the changes that we had originally suggested. As outlined in the TERs, any Proposed Rules Change that relate to; i) amending Appendix 3 (Distribution System Loss Factors) or ii) amending Appendix 5 (Geographic Areas) are not required to undergo the usual voting procedure to either endorse or reject the Proposed Rules Change. As such, this Proposed Rules Change is exempt from the voting process under Paragraph 11.8 of the TERs, and is now therefore being submitted to ORR for approval.

### 4. Next steps

Network Rail is content for the requested Proposed Rules Change to Appendix 5 of the TERs to come into effect within 14 days of any ORR decision. We have also provided a mark-up of our proposed changes to the current TERs, which is attached to this letter.

If you have any questions with regards to any of the issues raised in this letter, please contact me on 07747-480179 or Alan.Bullock@networkrail.co.uk. This letter will also be available to download from our OTM webpage shortly.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Alan Bullock'.

**Alan Bullock**  
Senior Analyst

---

<sup>1</sup> <http://www.networkrail.co.uk/using-our-network/on-train-metering/>

<sup>2</sup> <http://www.networkrail.co.uk/South-West-Trains-response-ESTA-boundaries-in-Scotland-and-Western-routes.pdf>

## Annex A – Contents of Letter to TESG

### 1. Structure

This letter is structured as follows:

- Background;
- Scotland electrification and current ESTA configuration;
- Scotland Proposed change;
- Western electrification and current ESTA configuration;
- Western Proposed change;
- Western Temporary ESTA;
- Conclusion;
- Annex B – ESTA diagrams;

### 2. Background

ESTAs are used to charge train operators for Electric Current for Traction (EC4T). In particular, the year-end volume reconciliation and (for CP5) delivery costs for the year-end cost-reconciliation are calculated by ESTA; and the uplift on metered consumption to reflect transmission losses varies by ESTA. ESTAs are primarily defined by the physical electrical boundaries between Grid Supply Points (GSP).

On the AC overhead line system GSPs are bounded by insulated areas known as ‘neutral sections’. It is possible, through switching, to extend feeding areas to cover maintenance and/or operational outages of adjacent GSPs. Most GSPs have two separate circuits which effectively back each other up. Where possible, ESTA boundaries are located between two double circuit GSPs. There are currently 16 AC only ESTAs.

The DC systems are continuous at the DC third rail so it is not possible to specify boundaries by way of neutral sections. For this reason the DC systems are not split across GSP boundaries. There are currently two DC only ESTAs: one for the south of England (ESTA U) and one in Merseyside (ESTA M). There are also two ESTAs (R and T) where both AC and DC power is provided and billed.

#### 2.1 Transmission Losses

Currently, operators who are charged by way of metered data are charged an uplift on their metered consumption, to recover the cost of electrical losses between the GSP meter and the train meter and this is known as the distribution system loss factor (DSL<sub>F</sub>). The DSL<sub>F</sub>s vary by ESTA and are fixed for CP5. They are published in Appendix 3 of the Traction Electricity Rules (TER)<sup>3</sup>.

#### 2.2 Delivery Charges

Delivery charges recover the costs incurred by Network Rail in respect of the delivery of traction electricity from the power station to Network Rail through transmission and distribution networks for each GSP. These charges are also differentiated by ESTA because delivery charges vary by GSP. The charges relating to each GSP are grouped according to ESTAs, giving a reasonable compromise between data processing and localised charging.

#### 2.3 Physical ESTA changes

ESTA boundary changes are normally required if a new GSP is introduced in such a way as to change the location of the boundary neutral section. This would reflect a physical alteration to the EC4T network, most likely as a result of new electrification. These changes may be permanent or temporary. To ensure operators are correctly charged for their EC4T usage, any changes to the ESTA boundaries within the billing system need to be synchronised with the physical changes, which could occur at any time during a control period.

#### 2.4 ESTA descriptions

ESTA definitions are currently set out in Appendix 5 of the TER<sup>2</sup>. Any contractual changes to the descriptions of ESTAs may be formally amended through the change provisions for the TER, which are to be included in the TER.

### 3. Scotland Electrification and Current ESTA Configuration

#### 3.1 Background

There is a rolling programme of electrification in Scotland throughout CP5 and into CP6 as follows:

- 2014 – Springburn to Cumbernauld and Rutherglen to Coatbridge (Completed)
- 2016 – Glasgow to Edinburgh & Stirling via Falkirk
- 2018 – Stirling to Alloa
- CP6 – East Kilbride line

This consultation covers the changes to be implemented in 2016 and 2018, i.e. Glasgow to Edinburgh & Stirling via Falkirk and Stirling to Alloa. Any CP6 alterations will be consulted on nearer to implementation when the feeding arrangements are more clearly known.

#### 3.2 Current ESTA Configuration

The current contractual definitions (set out in Appendix 5 of the TER) state that

ESTA S Scotland Glasgow	Comprises the electrified routes in Scotland between the neutral sections at Coatbridge, Rutherglen, Bishopston, Lochwinnoch and Carstairs and Auchengray (between Edinburgh and Carstairs).
-------------------------	--

<sup>3</sup>: <http://www.networkrail.co.uk/using-our-network/on-train-metering/>

ESTA E Scotland North & West	Comprises the electrified routes in Scotland on the North Clyde bounded by the neutral sections at Barnhill, Coatbridge, Rutherglen and Haymarket; the routes from Bishopston neutral section to Gourock and Wemyss Bay and the routes from Lochwinnoch neutral section to Ayr and Largs.
------------------------------	---

The DSLFs are the same for both of these ESTAs at 4.23%  
The current ESTA configuration is illustrated in Figure 1 in Annex A.

#### 4. Scotland Proposed Changes

A new GSP is being constructed at Greenhill, west of Falkirk, which will supply most of the new electrification between Glasgow Queen Street and Haymarket. It will be bounded at either end by ESTA E and so it is proposed to add these new electrified sections to ESTA E. The introduction of Greenhill GSP also means that the feeding of the Springburn to Cumbernauld route will be altered to be fed from the new GSP instead of from Gowkthrapple in ESTA S. It is expected this will be around February/March 2017 but the exact date of the change is not yet known so the billing system changes will be coordinated with the electrification change.

Stirling to Alloa will also be supplied from Greenhill so it too will be added to ESTA E.

The proposed ESTA configuration is illustrated in Figure 2 in Annex A.

The only other option would be to create a new ESTA but as there is only one new GSP being added, it is not appropriate to do that at this stage.

There are no DSLF financial impacts as the loss factors are the same in both ESTAs E & S. Distribution & Transmission costs will increase in ESTA E due to the new Greenhill GSP but this will be offset by the increased consumption of the new services.

The contractual ESTA descriptions will change as follows:

ESTA S Scotland Glasgow	Comprises the electrified routes in Scotland between the neutral sections at Gunnie, Rutherglen, Bishopston, Lochwinnoch, Carstairs and Auchengray (between Edinburgh and Carstairs).
ESTA E Scotland North & West	Comprises the electrified routes in Scotland in the North Clyde and Falkirk/Stirling areas bounded by the neutral sections at Rutherglen, Gunnie and Haymarket; the routes from Bishopston neutral section to Gourock and Wemyss Bay and the routes from Lochwinnoch neutral section to Ayr and Largs.

#### 5. Western Electrification and Current ESTA Configuration

##### 5.1 Background

Extensive new electrification is under construction between London, Bristol and ultimately to Swansea over the remaining years of CP5 and into CP6 as well as the integration of the new Crossrail tunnel section. New GSPs are being established at Kensal Green (Paddington to Maidenhead plus Crossrail tunnel back-up), Didcot (Maidenhead to Oxford & Wooton Bassett) and Thingley Junction (near Chippenham for the Wooton Bassett to Bristol area)

New GSPs are also under construction at Imperial Park near Wentloog in South Wales, which would feed to near Bristol Parkway, and at Pudding Mill Lane (Stratford) which will feed the Crossrail tunnel section and part of the Great Eastern main line but these changes will be outlined at a later date.

North Hyde GSP, which currently feeds Paddington to Heathrow, will be retained to provide inter terminal services if the main line is not open.

##### 5.2 Current ESTA Configuration

The current contractual definitions (set out in Appendix 5 of the TER) state that

ESTA V Great Western	Comprises the electrified route from Paddington to Heathrow Airport
----------------------	---

The DSLF for ESTA V is 3.86%

The current ESTA configuration is illustrated in Figure 3 in Annex A.

#### 6. Western Proposed Changes

With only 3 main GSPs serving London to Bristol, it is proposed that ESTA V is extended from Airport Junction to cover all the new ac electrification out to Bristol Parkway (Stoke Gifford / Filton neutral sections). A new ESTA will also be needed to capture the consumption in the Crossrail central tunnel section and also in the Crossrail Old Oak Common Depot.

It also proposed that a new ESTA is established for South Wales to cover the Bristol Parkway (Stoke Gifford / Filton) to Swansea route but also to allow potential future expansion to the Welsh Valley lines.

There were some concerns about being able to tag Crossrail train metered data correctly with there being a neutral section so close to the Crossrail tunnel portal. However, Crossrail have stated that they have a very accurate positioning system in the tunnel section which will be used to stop the trains at stations and this will also be used to tag metered data with position information.

The contractual ESTA descriptions will change as follows:

ESTA V Western	Comprises the electrified routes from Paddington to Oxford, Newbury and Bristol Temple Meads and between the neutral sections at Westbourne Park (Crossrail tunnel), Old Oak Common Crossrail Depot, Acton Wells Junction (ESTA T) and Stoke Gifford / Filton (South Wales)
ESTA Y Crossrail	Comprises the electrified routes between the neutral sections at Westbourne Park (Western) and Pudding Mill Lane (Great Eastern) and also within the Old Oak Common Crossrail Depot.
ESTA K South Wales	Comprises the electrified routes from Swansea to the neutral sections at Stoke Gifford / Filton (Western).

It is proposed to use the ESTA V DSLF for all the extended ESTA V and for new ESTAs (Y and K). Work is currently underway to update the DSLF models. If these produce significantly different values then we would propose a modification at that time.

The proposed ESTA configuration is illustrated in Figure 4 in Annex A.

## **7. Temporary Western ESTA**

Between now and late 2017, the lines between Reading and Didcot will be operated as an unconnected (island) electrified section for testing new electric rolling stock, some of which is operating as unmetered during the testing phase. It is proposed that this section is given a temporary ESTA code (I or possibly the number 1) to avoid any consumption changes to the existing unmetered operations in ESTA V (Heathrow Express) for as long as possible.

Once the route becomes one electric network, i.e. the electrification from Airport Junction meets that from the Reading direction, then the ESTA code will be changed to V.

## **8. Conclusion**

Most of the Scotland changes can be implemented immediately apart from the Springburn to Cumbernauld section which will need to wait for the physical change to occur next year. For Great Western, the changes can also be made now. If you would like to discuss any of the issues in this letter and its annexes, please contact Alan Bullock. (Alan.Bullock@networkrail.co.uk).

Yours sincerely



**Alan Bullock**  
Senior Analyst

Fig 1: Existing Scotland ESTAs

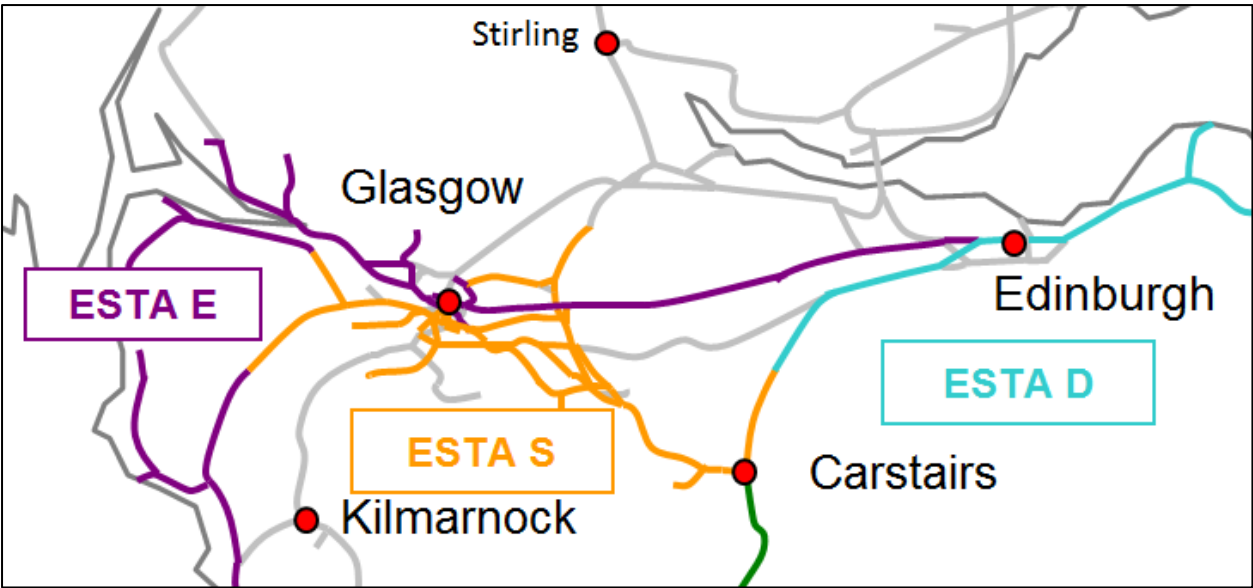
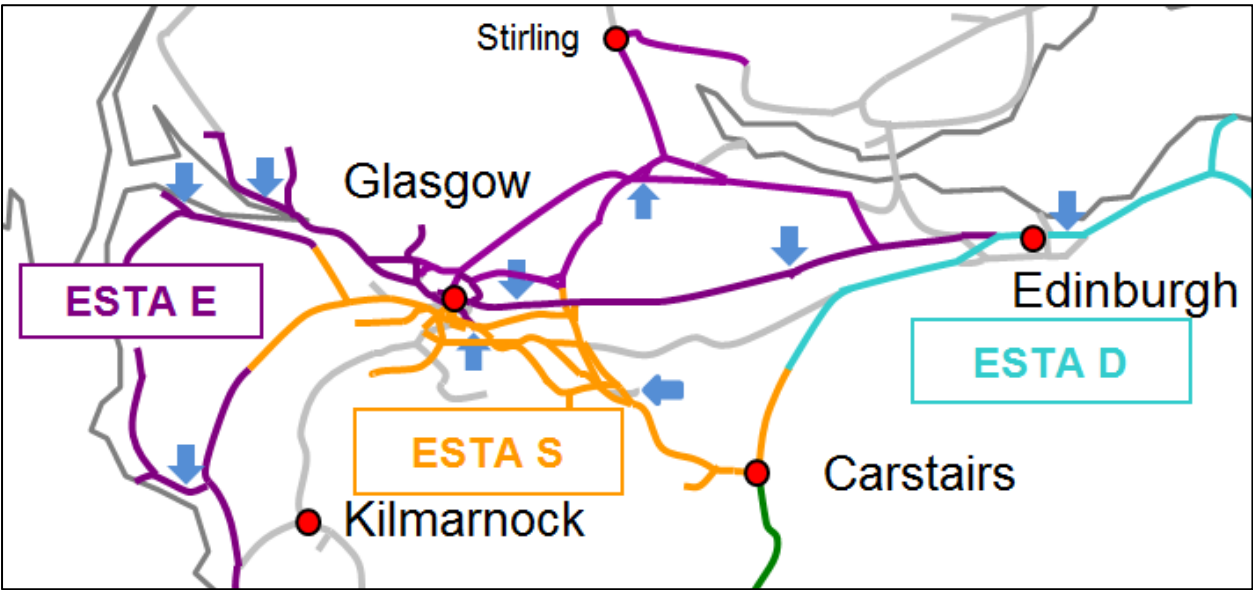


Fig 2: Proposed Scotland ESTAs (blue arrows indicate Grid Supply Points)



Continued on next page

Fig 3: Existing Great Western ESTA

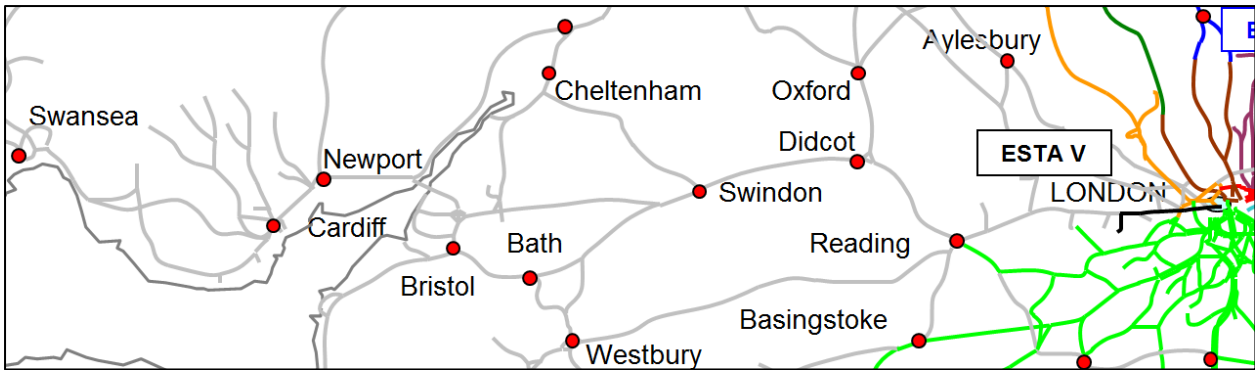


Fig 4: Proposed ESTAs – Western (black), Crossrail (Yellow) and South Wales (Green)

