

Technical Appendix

Lairdmannoch Energy Park

Technical Appendix 11-1: Abnormal Loads Assessment

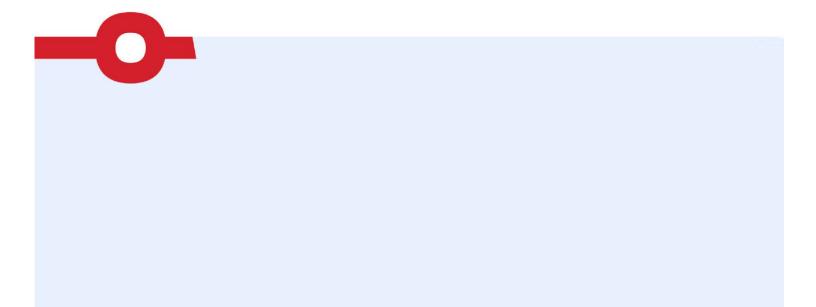
Lairdmannoch Energy Park Limited



May 2025



ABNORMAL LOADS ASSESSMENT





LAIRDMANNOCH ENERGY PARK

ABNORMAL LOADS ASSESSMENT

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2	Author	R Donnelly	Senior Engineer	30/04/2025		
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1. INTRODUCTION

1.1 General

1.1.1 SYSTRA Ltd (SYSTRA) has been commissioned by Lairdmannoch Energy Park Limited to undertake an assessment of an identified abnormal load route to the Lairdmannoch Energy Park Farm Proposed Development Site. The site is centred on National Grid Reference (NGR) (approximate) NX 66233 62404 with all infrastructure located approximately 7km from the town of Gatehouse of Fleet. The approximate site entry location is indicated by **Figure 1** below.

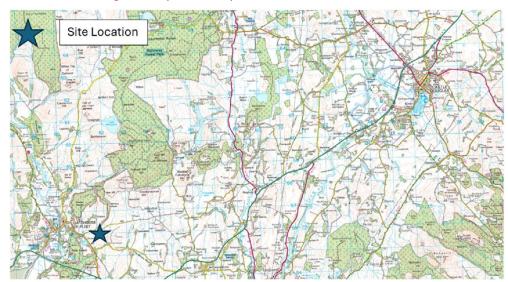


Figure 1. Proposed Development Access Location

1.1.2 The Proposed Development Site access entrance is approximately 22km southeast of Newton Stewart and 21km southwest of Castle Douglas. The Proposed Development Site is bound by the B727 and agricultural land whilst the A75 trunk road lies approximately 2.0km to the south.

1.2 Turbine Transport Requirements

1.2.1 The candidate turbine for the Lairdmannoch Energy Park is still under consideration. However, for the purposes of this assessment a turbine blade, that covers a number of turbine models, has been assessed as the "worst-case" design components.

Blade Transporter

1.2.2 The turbine blade is 80m in length (when transported) and would be loaded onto a specialised blade trailer. For the purposes of assessment, it has been assumed that the Turbine Delivery Vehicle (TDV) would compose of a tractor unit and a Noteboom Super Wing Carrier Trailer.





- 1.2.3 The Super Wing Trailer incorporates pendle axles which allow for a secondary rear wheel angle of up to 55 degrees. The Super Wing trailer can be extended to 64.3m in length.
- 1.2.4 A drawing of the blade transporter is provided within **Appendix A** and at **Figure 2** below.

55 237 (33,44) 57.79 (33,52) (36,53)

Figure 2. Turbine Delivery Vehicle

- 1.2.5 At this stage in the design process, the haulier of the wind turbine components is not yet known, nor the exact specifics of the vehicles that they will use. However, from experience of previous developments, and from the details of the components to be moved, it is possible to estimate (with some degree of accuracy) the specifics of the design vehicles that will be used to allow a detailed and accurate route assessment to be undertaken.
- 1.2.6 SYSTRA has used the Autodesk (CAD) extension package AutoTrack to undertake swept path analysis (SPA) for the identified Pinch Points (PP) on the delivery route. The trailer units associated with the design vehicle for the transportation of the blades are extendable so on delivery of the abnormal load, the trailer can be reduced in length. In these circumstances, the AutoTracking and route assessment has only been undertaken for the delivery route to the site.

1.3 Abnormal Loads Route

- 1.3.1 It is anticipated that the port of Entry (PoE) for the turbine components will be King George V Docks, Glasgow located approximately 110km to the north of the Proposed Development Site (as the crow flies). The facility is currently used for the transportation of renewable components on a regular basis.
- 1.3.2 The turbine components will leave the King George V Docks, traverse a series of roundabouts before joining the M8 and traveling east and joining the M74 heading south towards Carlisle. Due to the size of the vehicles and turbine components, it is not possible to join the A75 at Gretna. The vehicles will continue further south and join the M6 before turning around and head back north using the Rosehill Roundabout south of Carlisle. This route has been used many times before. The entire abnormal loads route is indicated by Figure 3 below.



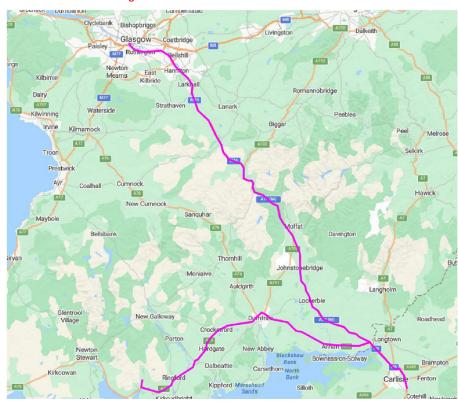


Figure 3. Abnormal Loads Route

1.3.3 The route segment has been identified as being generally suitable for abnormal load vehicles travelling to the Proposed Development Site. The identified abnormal load route sections are set out in **Table 1**.



Table 1. Abnormal Load - Route Sections

SECTION	CUMULATIVE DISTANCE (MILES)
The vehicles will leave the King George V docks and travel west on Kings Inch Drive, traversing 3 No. roundabouts.	0.5
The vehicles will take a left and head south onto the M8 eastbound slip road for 0.5 miles before joining the M8 and continuing east where the transport vehicles will merge onto the M74 and head south towards Carlisle.	100
Transport vehicles will exit the M6 southbound and traverse the Rosehill Roundabout, rejoining the M6 northbound, continuing for 11.0 miles, before exiting onto the A75 westbound at Gretna.	111
Transport vehicles will follow the A75 west for 21 miles bypassing Annan until the A75/A780 intersection roundabout, continuing north on the A75.	132
The vehicles will continue the A75 westbound for 33 miles, bypassing Dumfries and Castle Douglas traversing a series of roundabouts.	165
The vehicles will then exit the A75 heading northwest on the B727 for 1.4 miles until reaching the Proposed Development Site entrance.	166.4

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2. **SWEPT PATH ASSESSMENT**

2.1 **Pinch Points**

2.1.1 In total, there are 18 Pinch Points on the identified route on the public road network. The location of the Pinch Points that have been identified and assessed are indicated by Figures 4 to 9 below.



Figure 4. PP1 – PP5







Figure 6. PP7 – PP10



Figure 7. PP11 - P13





Figure 8. PP14 - P16

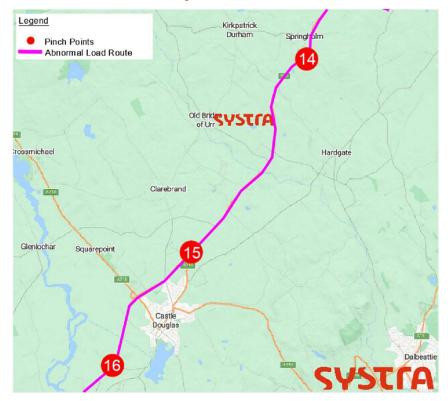


Figure 9. PP17 – P18 Proposed Development Site Access





- 2.1.2 A swept path exercise has been undertaken for each pinch point. The swept path plans are contained within **Appendix A**. The plans indicate areas of overrun and over-sail, as well as highlighting potential clashes with street furniture and requirements for third-party land.
- 2.1.3 **Table 2** summarises the findings at each location for the transportation of the blade component.

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Table 2. Pinch Point Summary

	Table 2. Pinch Point Summary					
PP	LOCATION	LAT	LONG	STREET FURNITURE REMOVAL	TEMPORARY PAVING / GRADING WORKS	3RD PARTY LAND REQUIREMENTS
01	Kings Inch Drive Roundabout / King George V Dock Exit	55.8709	-4.3560	• None	 Loads to use existing overrun area through roundabout. 	• None
02	Kings Inch Drive Roundabout / IKEA Entrance	55.8724	-4.3598	2 No. Road signs1 No. lighting column	• None	• None
03	Kings Inch Drive / Marlinford Road	55.8728	-4.3624	• None	• None	None
04	Kings Inch Drive / Old Govan Road Junction	55.8731	-4.3654	 2 No. lighting columns 1 No. Road sign 6 No. traffic signals 1 No. bollard Section of Pedestrian guard rail 	 Temporary hardstanding overrun area required in central reserve, splitter island and southwestern verge 	• None
05	M8 Eastbound On-Slip	55.8674	-4.3636	Section of VRS	• None	None
06	Rosehill Roundabout, M6 Junction 42	54.8959	-2.8860	 7 No. lighting columns 7 No. Road signs 16 No. bollard Section of VRS 	• None	• None
07	A75 / A780 Roundabout (East)	55.0689	-3.5568	1 No. lighting column	• None	• None
08	A75 / A709 Roundabout	55.0788	-3.5712	1 No. lighting column2 No. Road signs	Loads to use existing overrun area.	 Potential third-party agreement required for over-sail with southern landowner.
09	A75 / A701 Roundabout	55.0859	-3.5949	2 No. lighting columns1 No. Road sign	Loads to use existing overrun area.	 Potential third-party agreement required for over-sail with southern landowners at entry and exit to the roundabout.
10	A75 / A76 Glasgow Road Roundabout	55.0784	-3.6259	2 No. lighting columns2 No. Road signs	 Temporary hardstanding overrun area required at east entry of roundabout. 	 Potential third-party agreement required for over-sail with southern landowner at entry to the roundabout.
11	A75 / A780 Roundabout (West)	55.0650	-3.6473	• 1 No. Road sign	 Loads to use existing overrun area through roundabout. 	• None
12	A75 Garroch Roundabout	55.0612	-3.6555	• 1 No. Road sign	• None	 Potential third-party agreement required for over-sail with northern landowner at entry to the roundabout.
13	A75 Drummore Roundabout	55.0558	-3.7190	• 2 No. Road signs	 Loads to use existing overrun area through roundabout. 	• None
14	A75 Springholm Village	55.0047	-3.8700	• None	• None	 Potential third-party agreements required north and south of carriageway to accommodate over-sail. Land checks required.
15	A75 / A745 Roundabout	54.9580	-3.9181	3 No. Road signs1 No. lighting column	 Loads to use existing overrun area through roundabout. 	• None
16	A75 / B736 Roundabout	54.9303	-3.9516	1 No. lighting column2 No. Road signs	 Loads to use existing overrun area through roundabout. 	• None

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PP	LOCATION	LAT	LONG	STREET FURNITURE REMOVAL	TEMPORARY PAVING / GRADING WORKS	3RD PARTY LAND REQUIREMENTS
17	A75 / B727 Junction	54.8619	-4.1574	4 No. Road signs	 Temporary hardstanding overrun area required at central reserve and splitter island 	• None
18	B727 / Proposed Development Site Access	54.8794	-4.1710	1 No Access gateSection of fence line	 Temporary hardstanding overrun area required east of access junction 	Third-party agreement required for over-run with eastern landowner at entry to junction.

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3. ASSESSMENT OUTCOMES AND CONCLUSIONS

3.1 Horizontal Feasibility

- 3.1.1 The abnormal load assessment has identified that the route from the King George V docks to the site via the M6 & A75 is technically feasible in terms of horizontal geometry but is potentially dependent upon third-party land agreements. It is noted that this report has focussed on the horizontal alignment of the route. No vertical checks have been undertaken at this point, but no major impediments have been identified at this stage and no weight restrictions have been identified on the route at this stage.
- 3.1.2 The most challenging pinch points are likely to be Pinch Point 5 at Kings Inch Drive and joining the M8 on-slip, Pinch Point 17 when leaving the A75 onto the B727 and Pinch Point 18 when entering the Proposed Development Site access on the B727. The Pinch Points are indicated by **Figures 10, 11 & 12** below.



Figure 10. Pinch Point 5, Kings Inch Drive.



Figure 11. Pinch Point 17 – A75 / B727 Junction



Figure 12. Pinch Point 18 – B727 right turn onto Proposed Development Site access.



3.2 Identification of Bridge Structures

3.2.1 SYSTRA has identified several major structures along the proposed delivery route. As these structures are on the M6 & A75 and are frequently travelled by abnormal load vehicles it is anticipated that these structures are suitable but further checks will be required post-consent.

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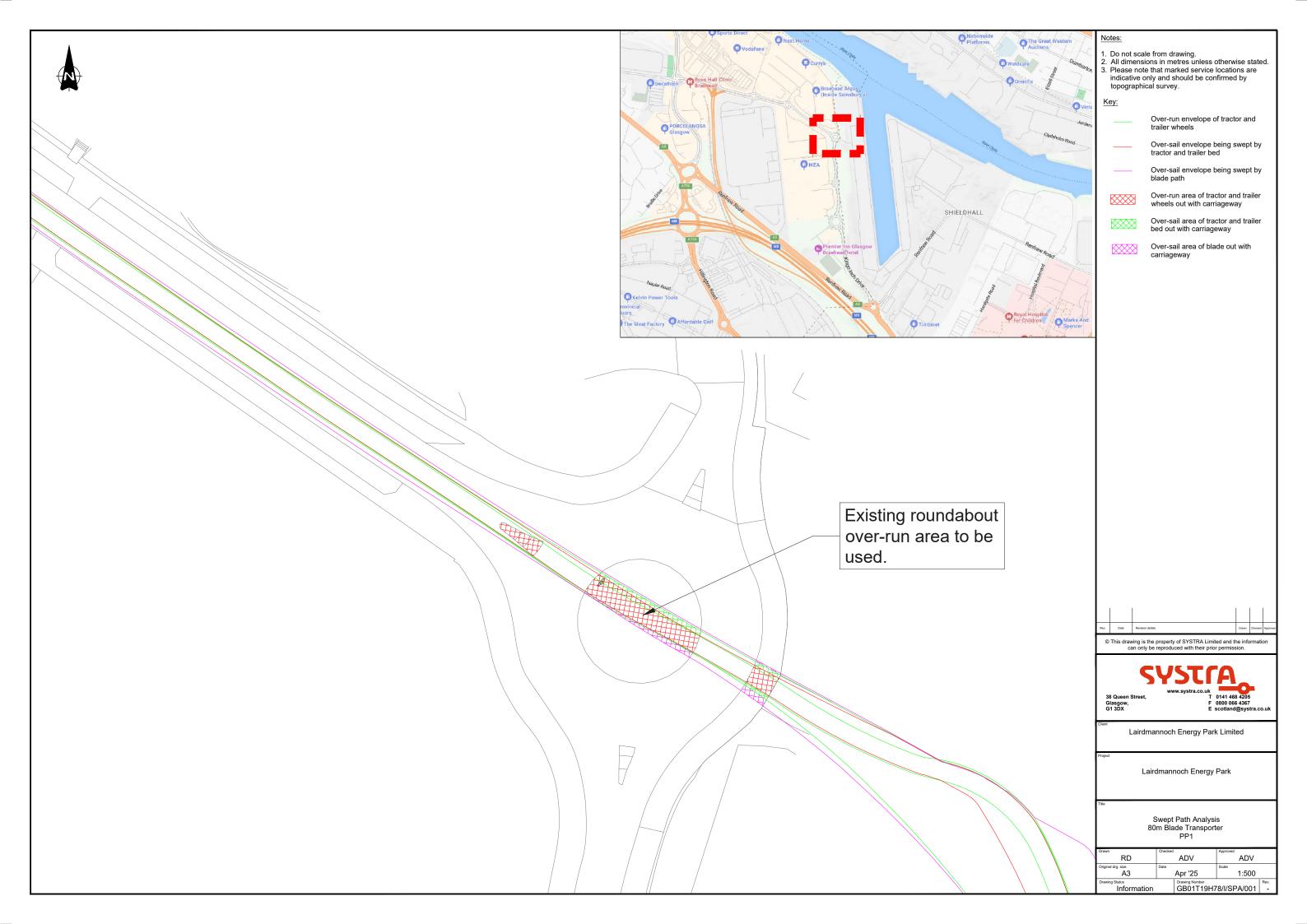
3.3 Summary

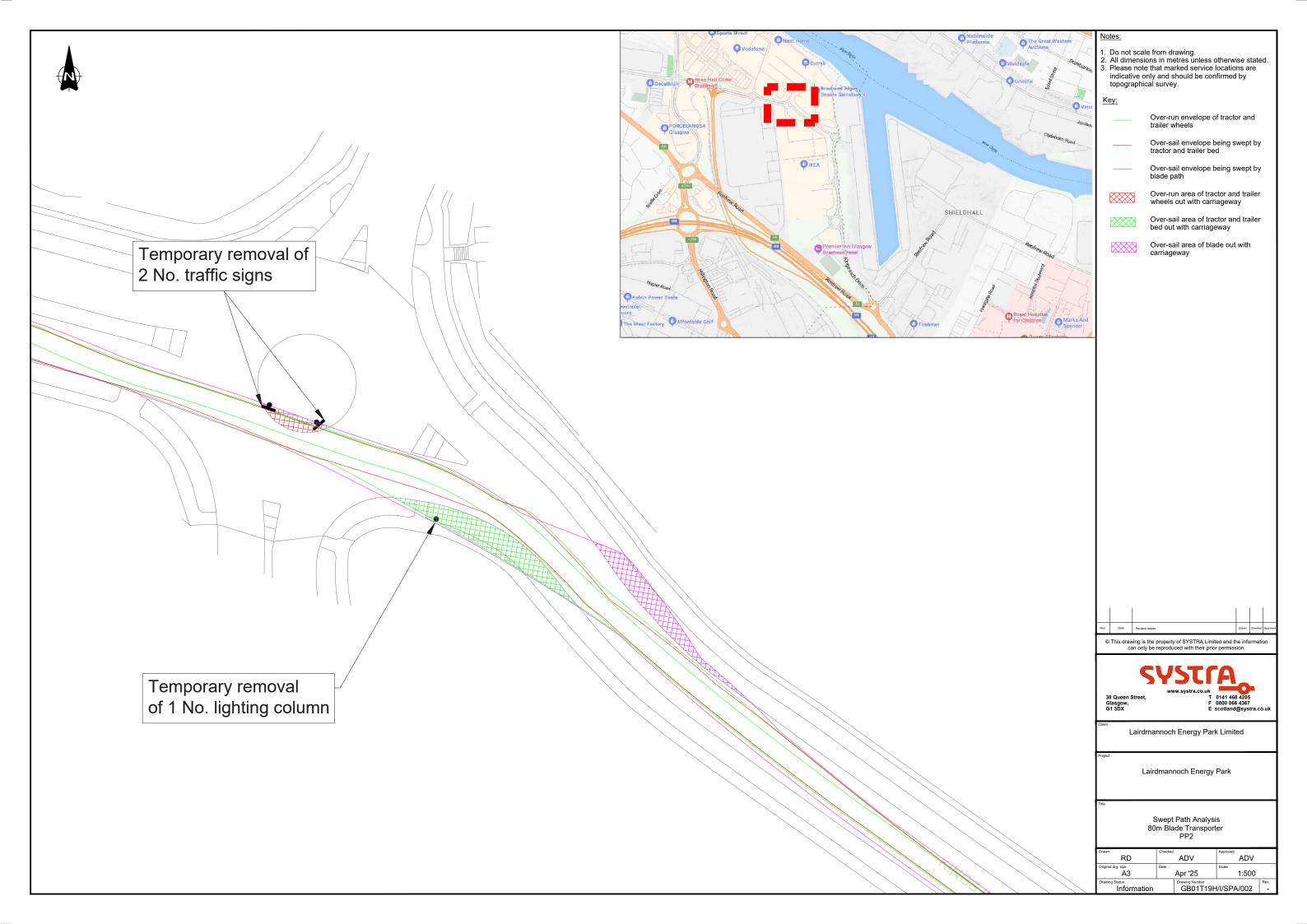
- If the necessary mitigation measures are achievable then the route can be navigated by vehicles carrying wind turbine components to the proposed site subject to confirmation of structural checks.
- O Police escort or Pilot car will be required to accompany abnormal loads in order to assist with traffic control and the control of oncoming traffic.
- It is recommended to have adequate warning signs implemented to warn other road users at critical points along the route.
- All hedges, shrubs, bushes, trees, and overhanging branches along the nominated routes must be trimmed from within carriageway verges.
- Specific street furniture has been nominated in this report for removal to facilitate over-sailed and 'swept' areas.
- Full carriageway widths must be available along the entirety of the route. Measures to remove parked vehicles must therefore be in place.
- Measures to assist the vehicle negotiating the kerbed changes in level at footways, roundabouts, pedestrian refuges etc. will be required; and
- Steel road plates may be required at locations where the vehicle overruns utility boxes or footways.

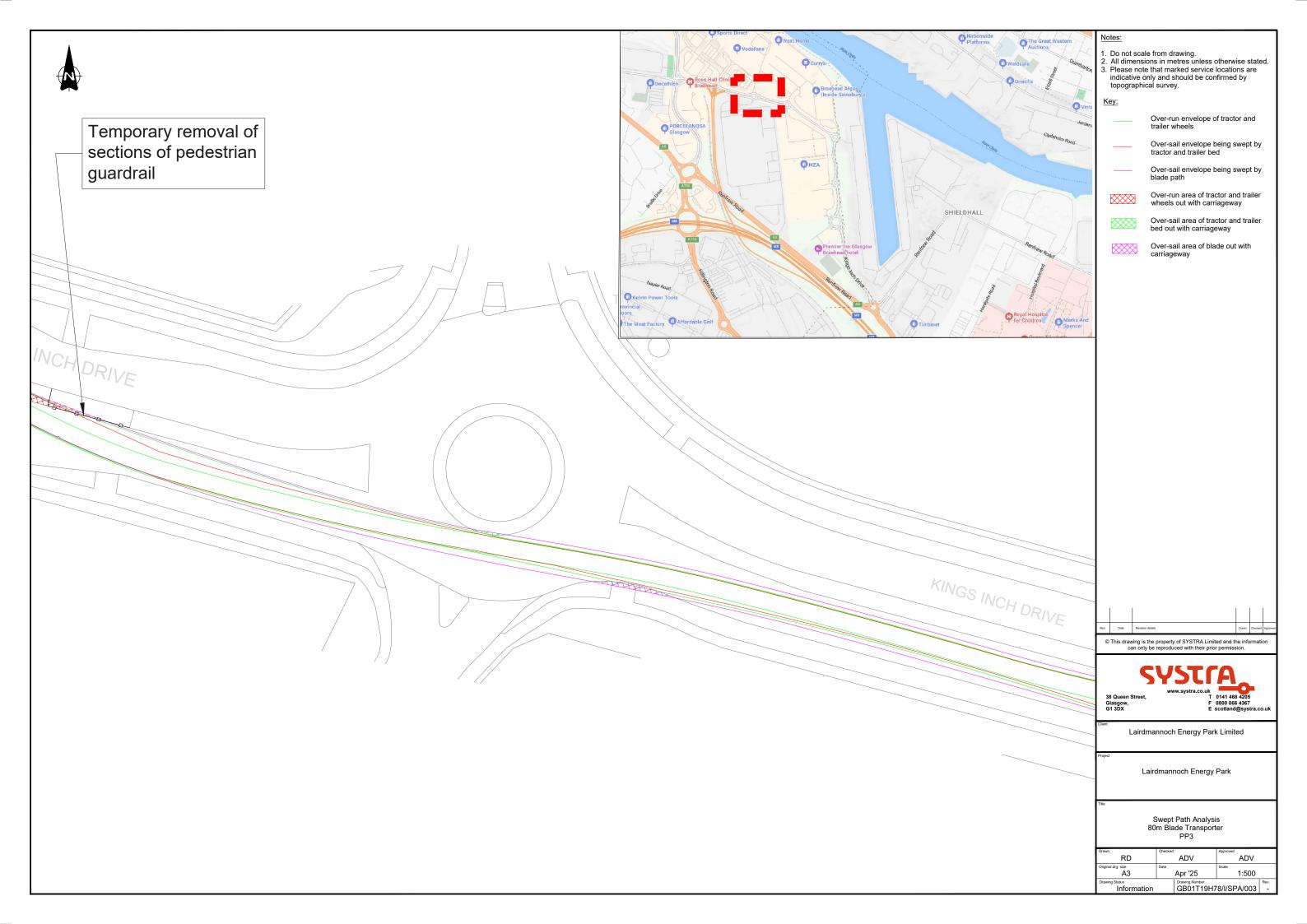


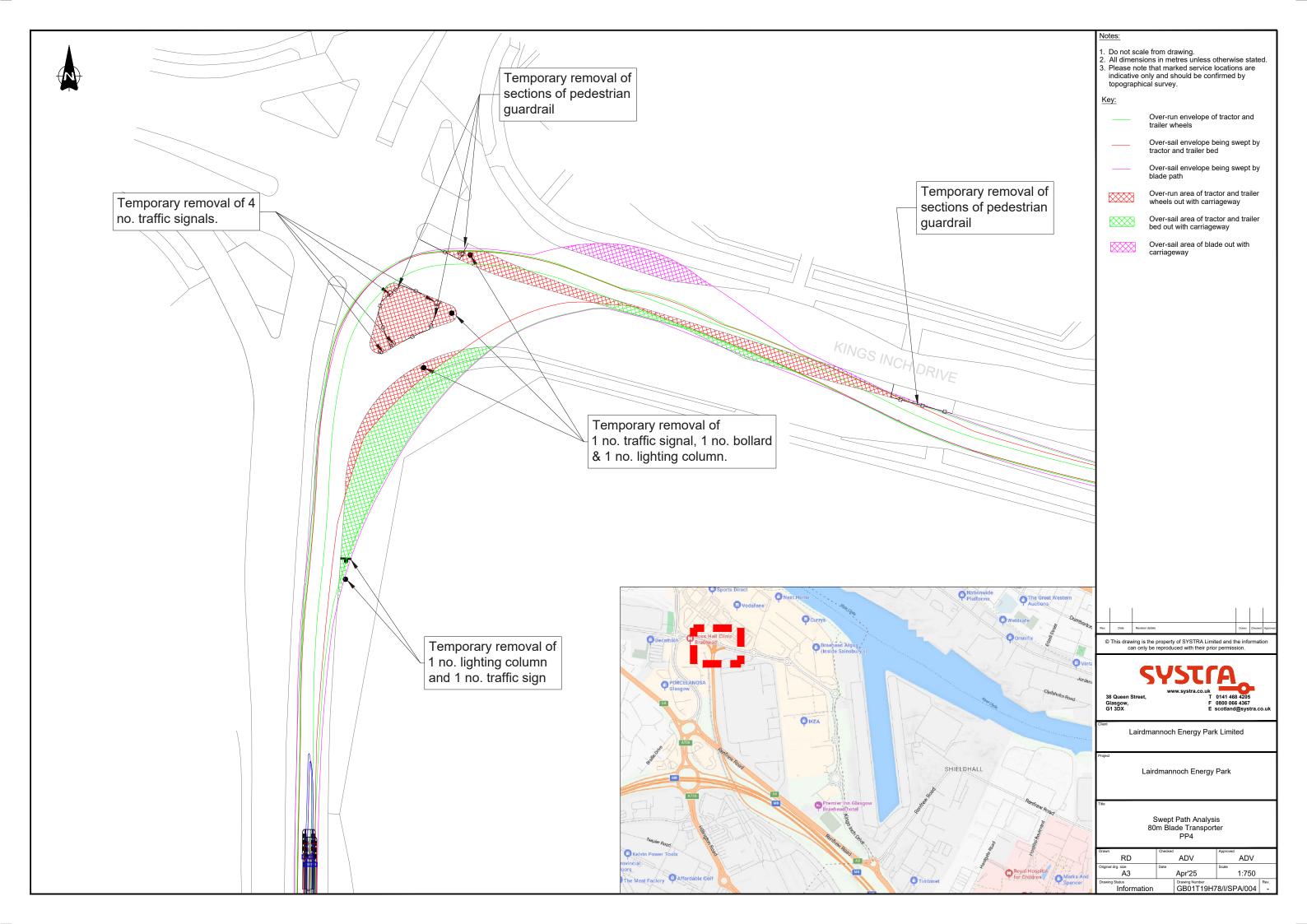
Appendix A – TDV Drawing and Swept Path Assessment

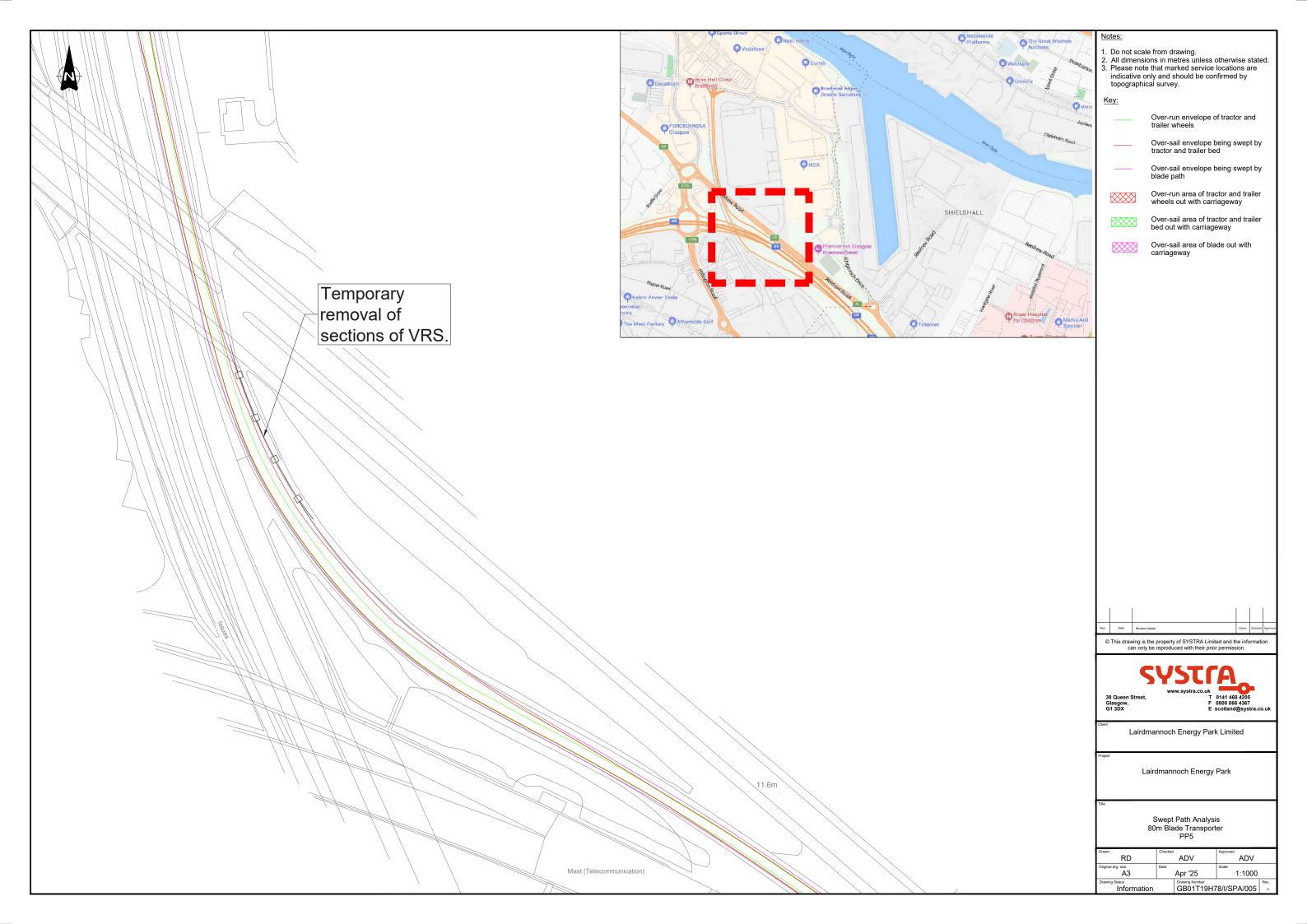
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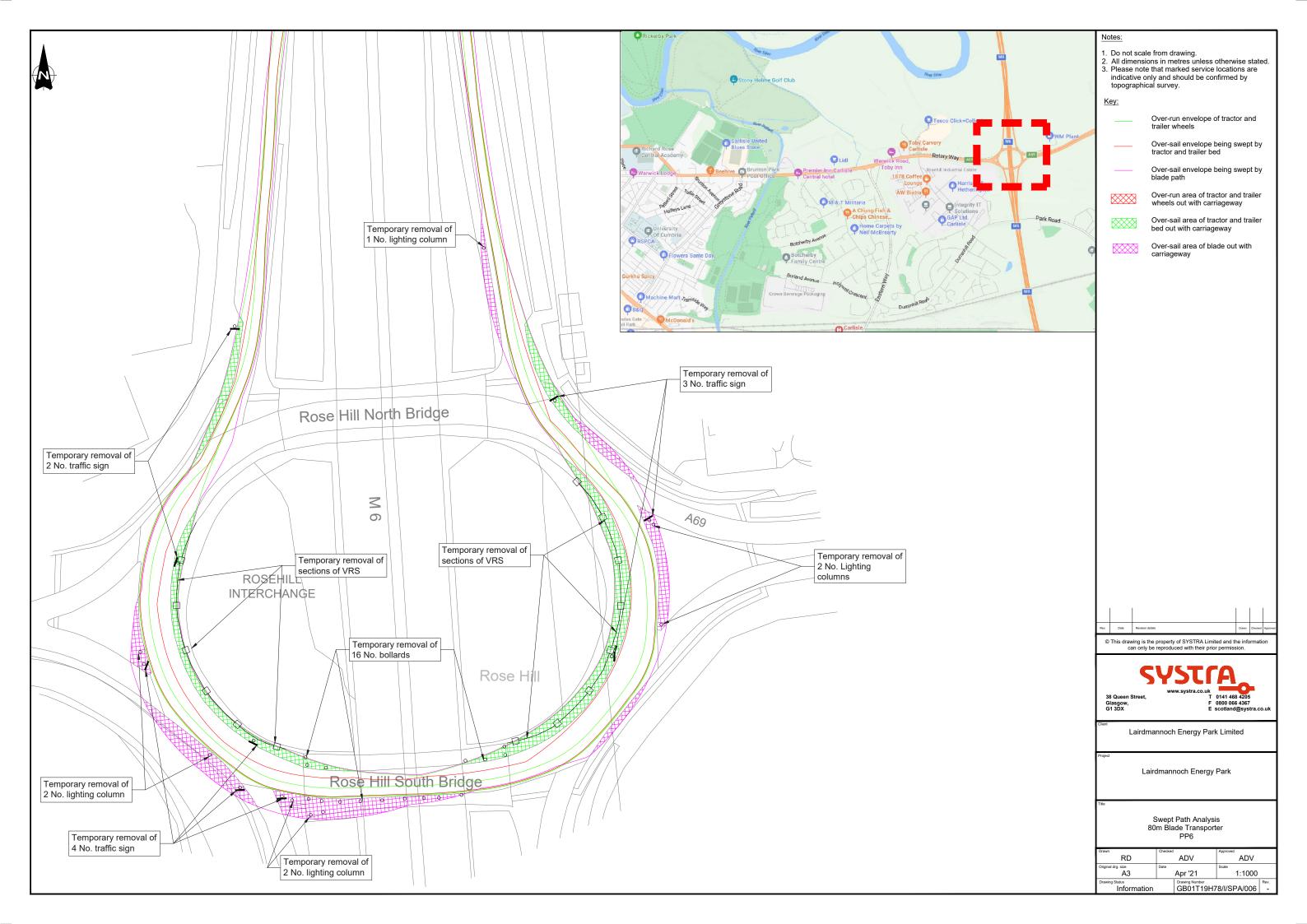


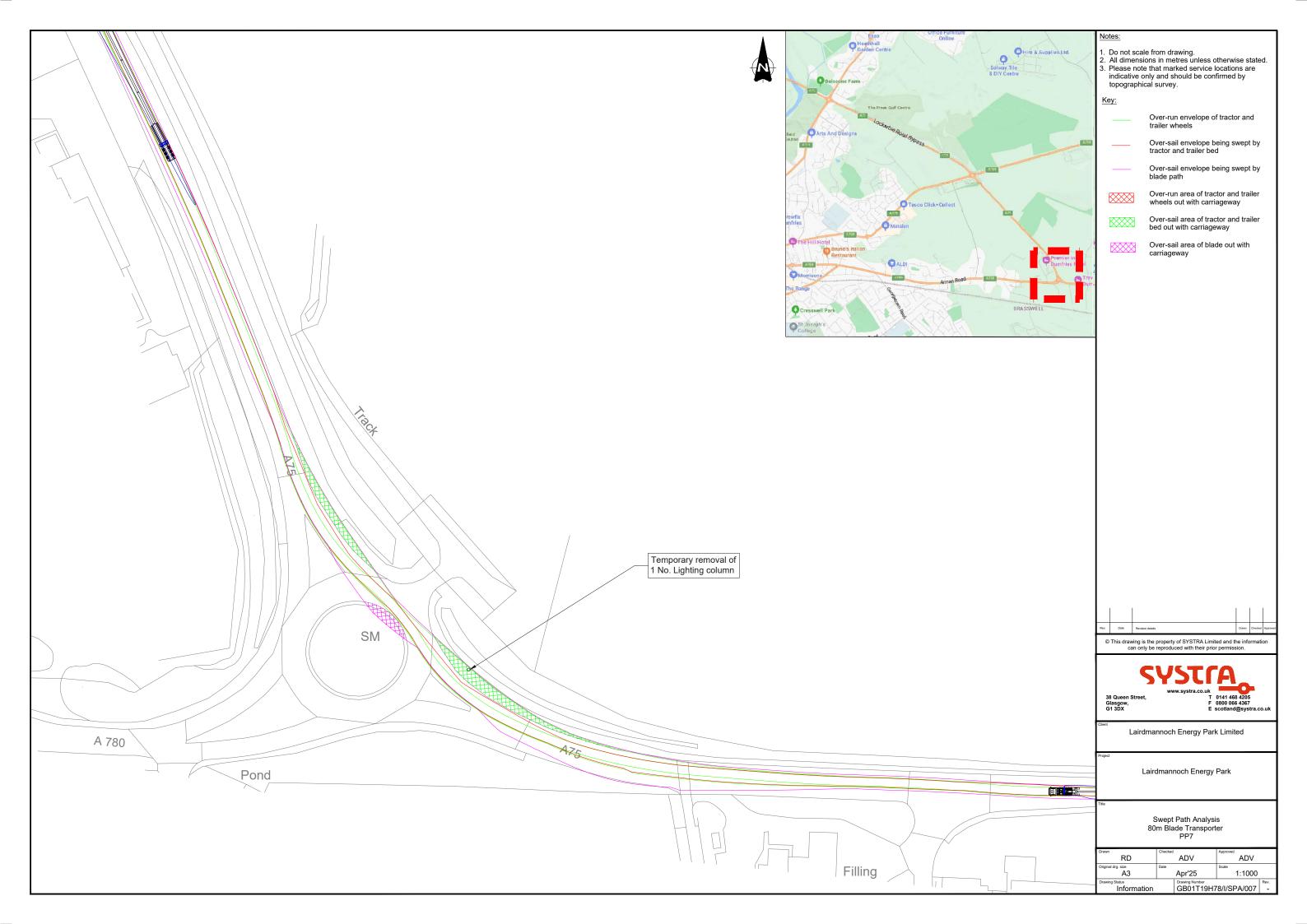


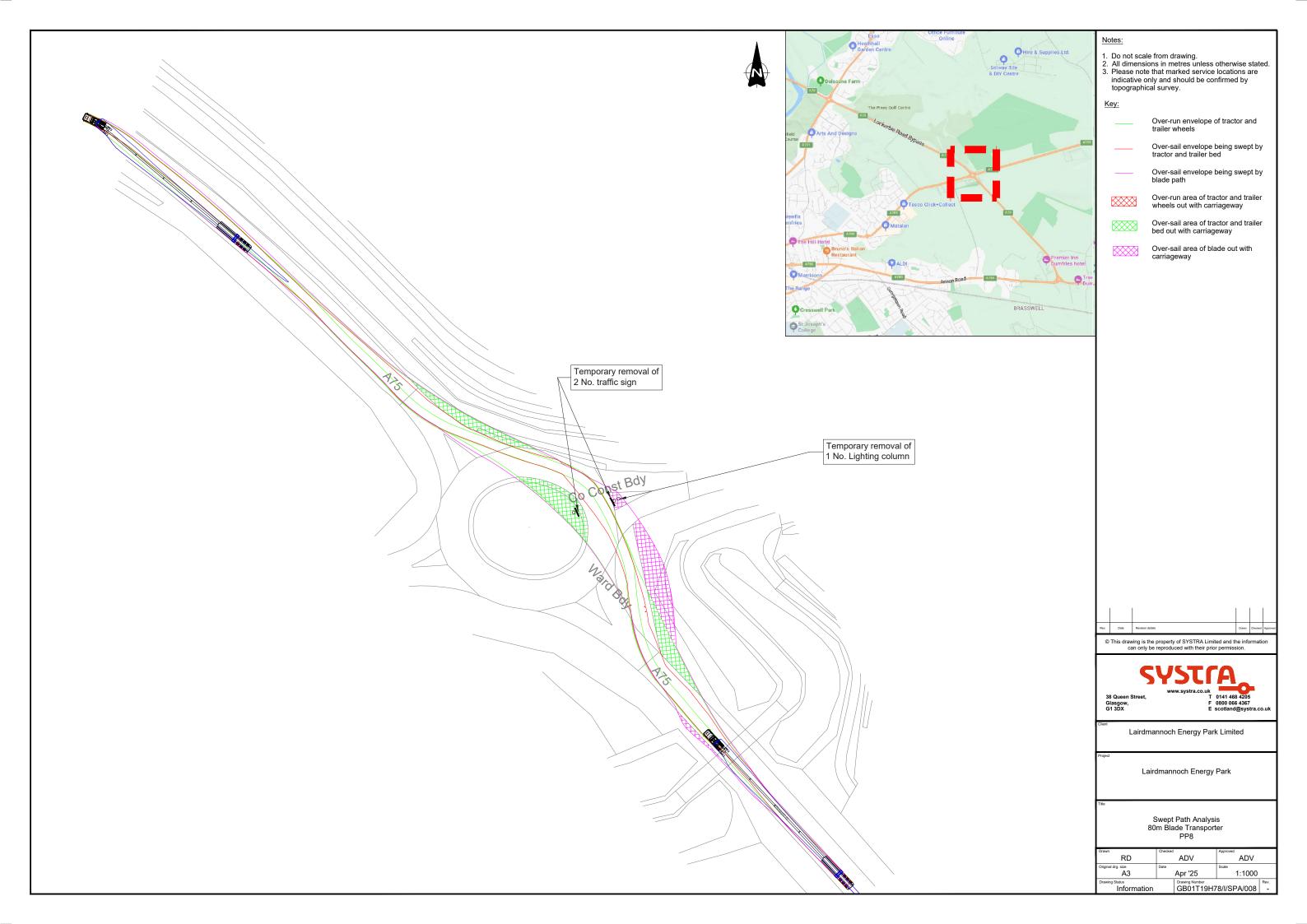


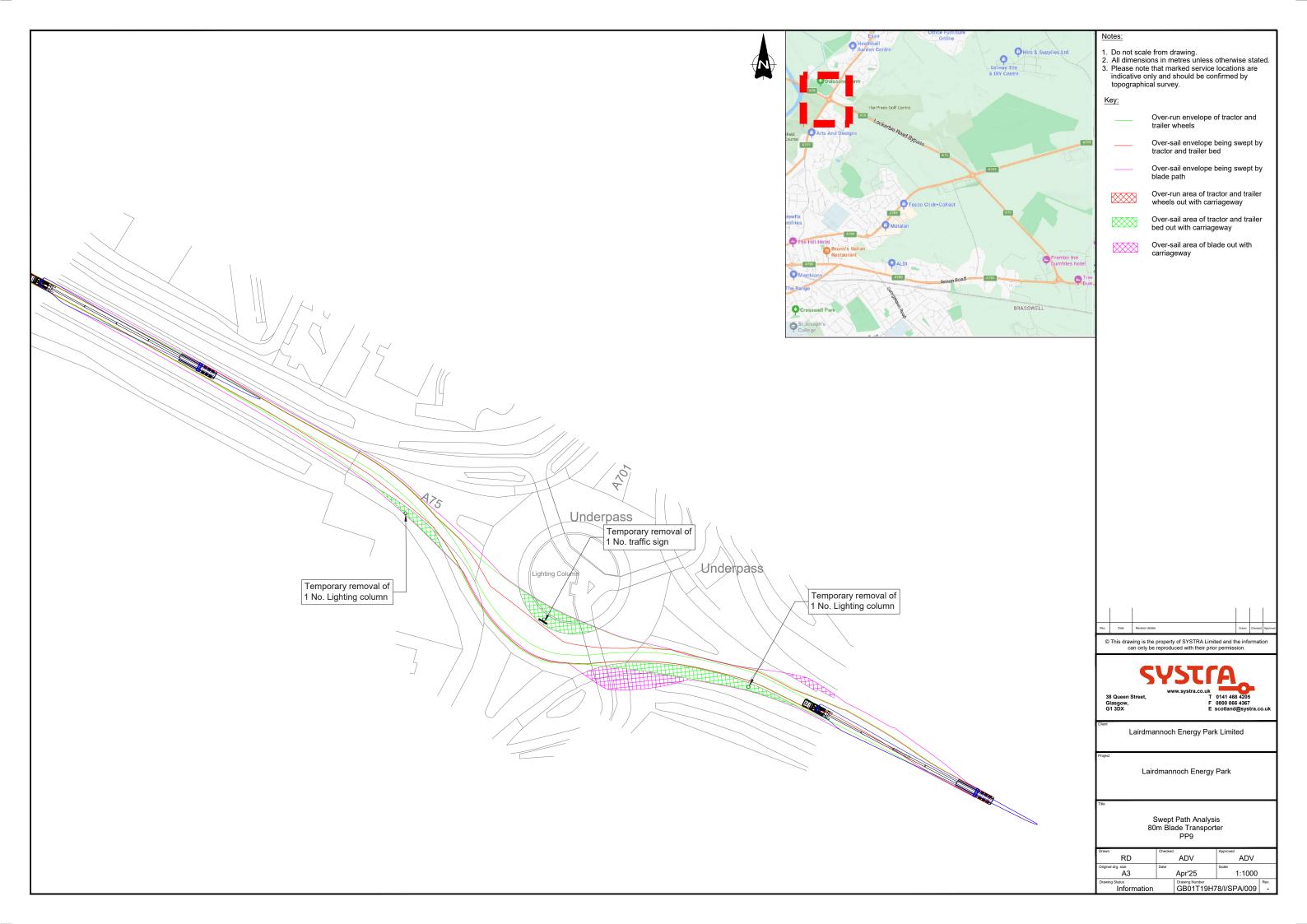


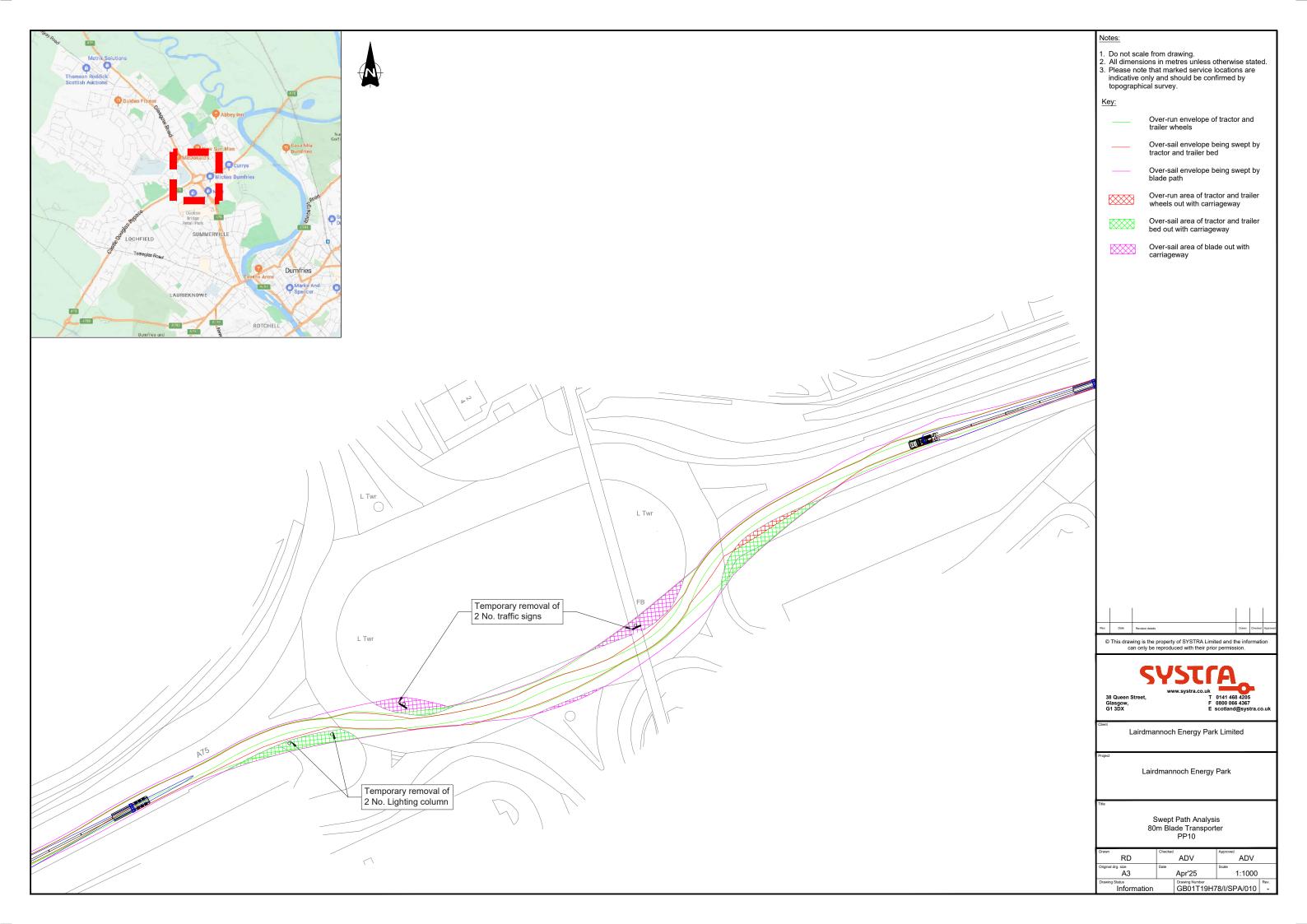


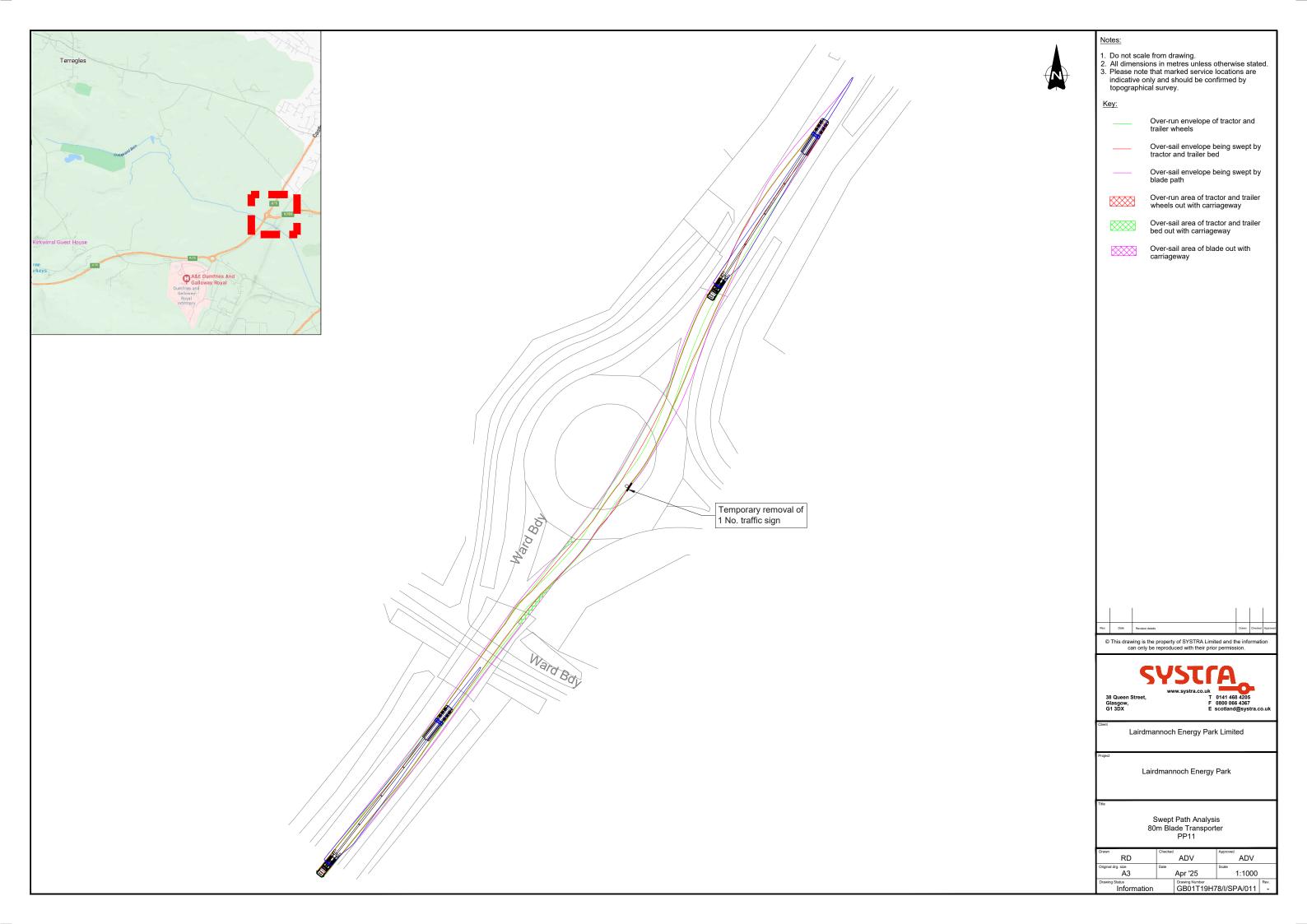


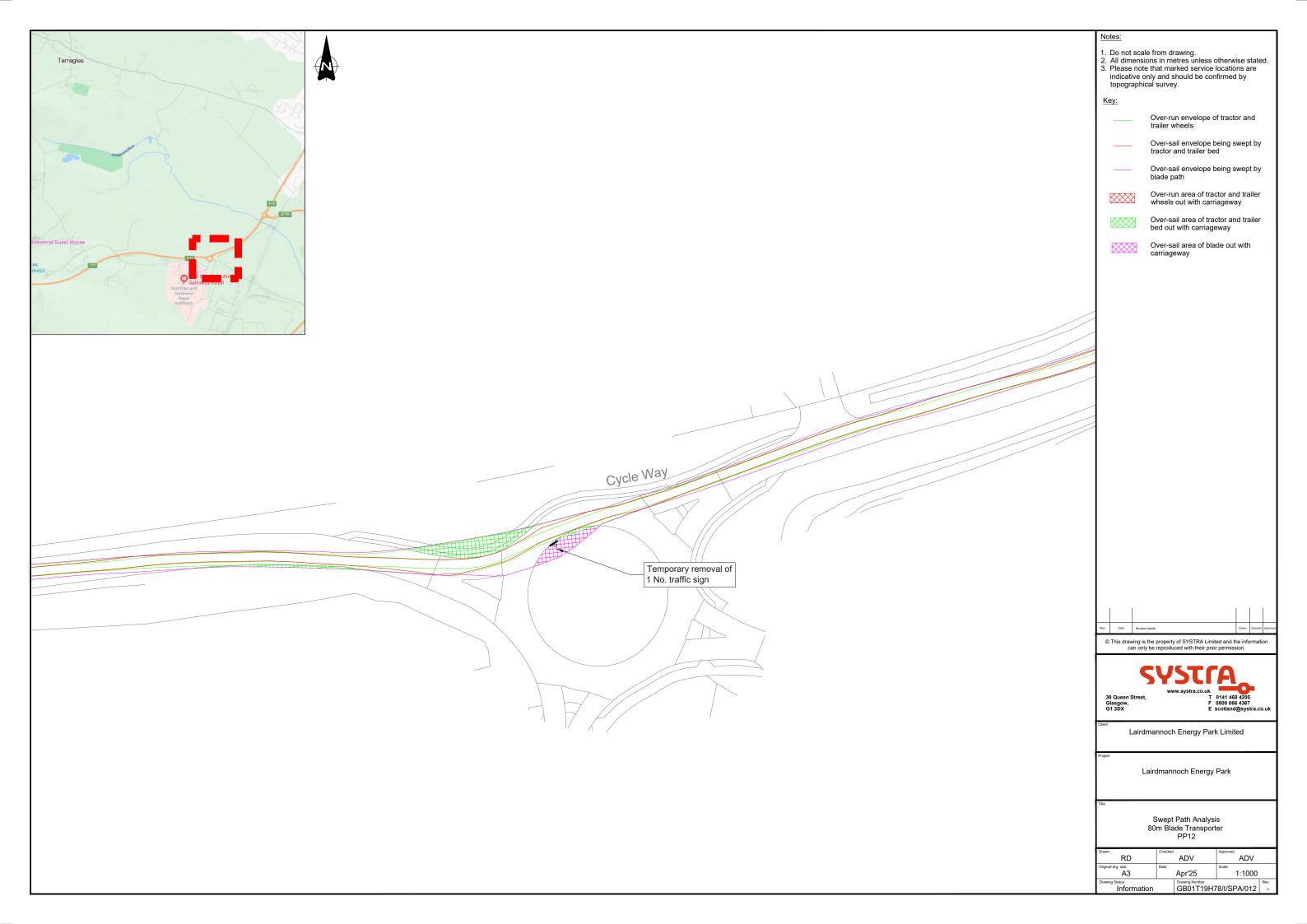


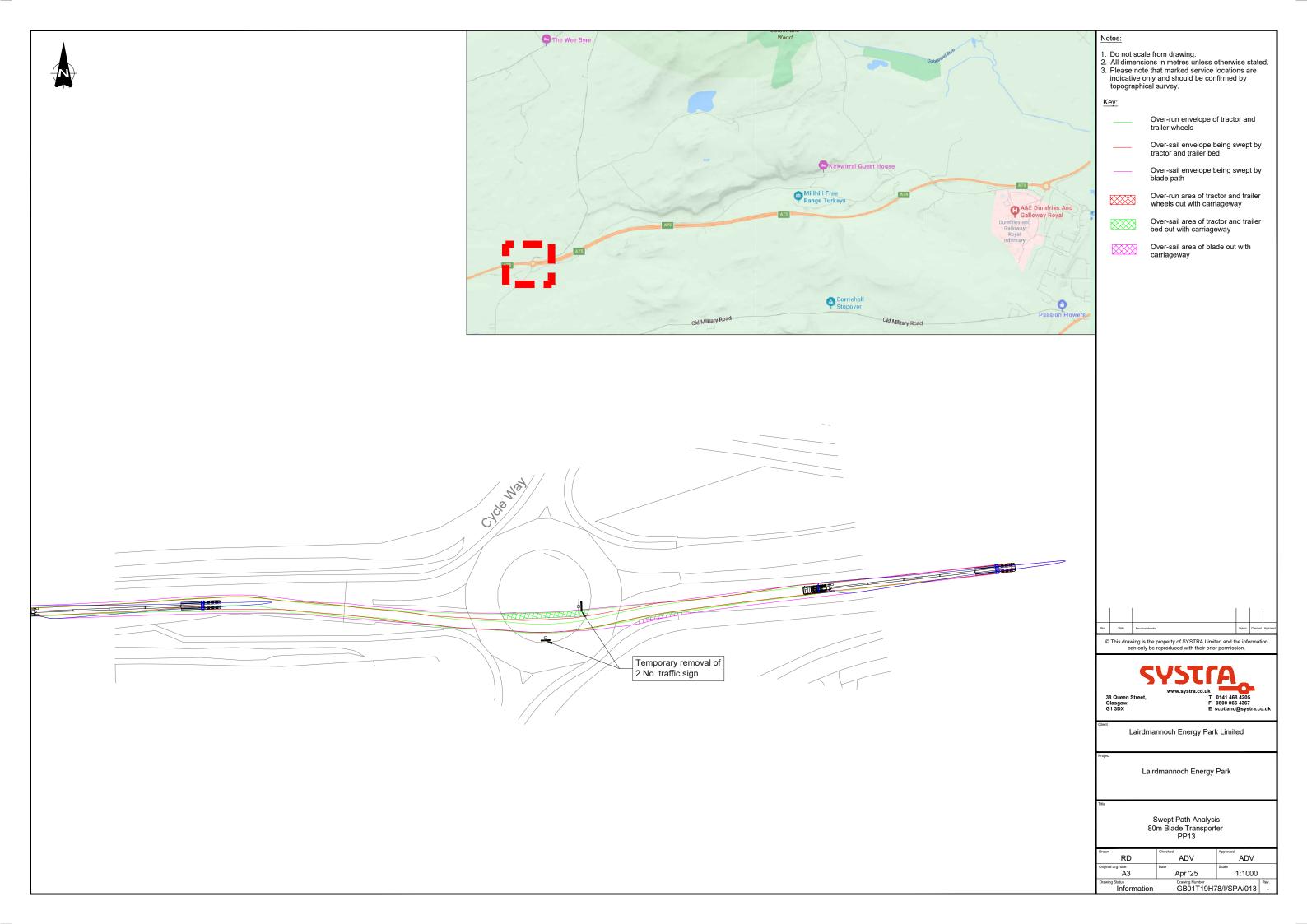


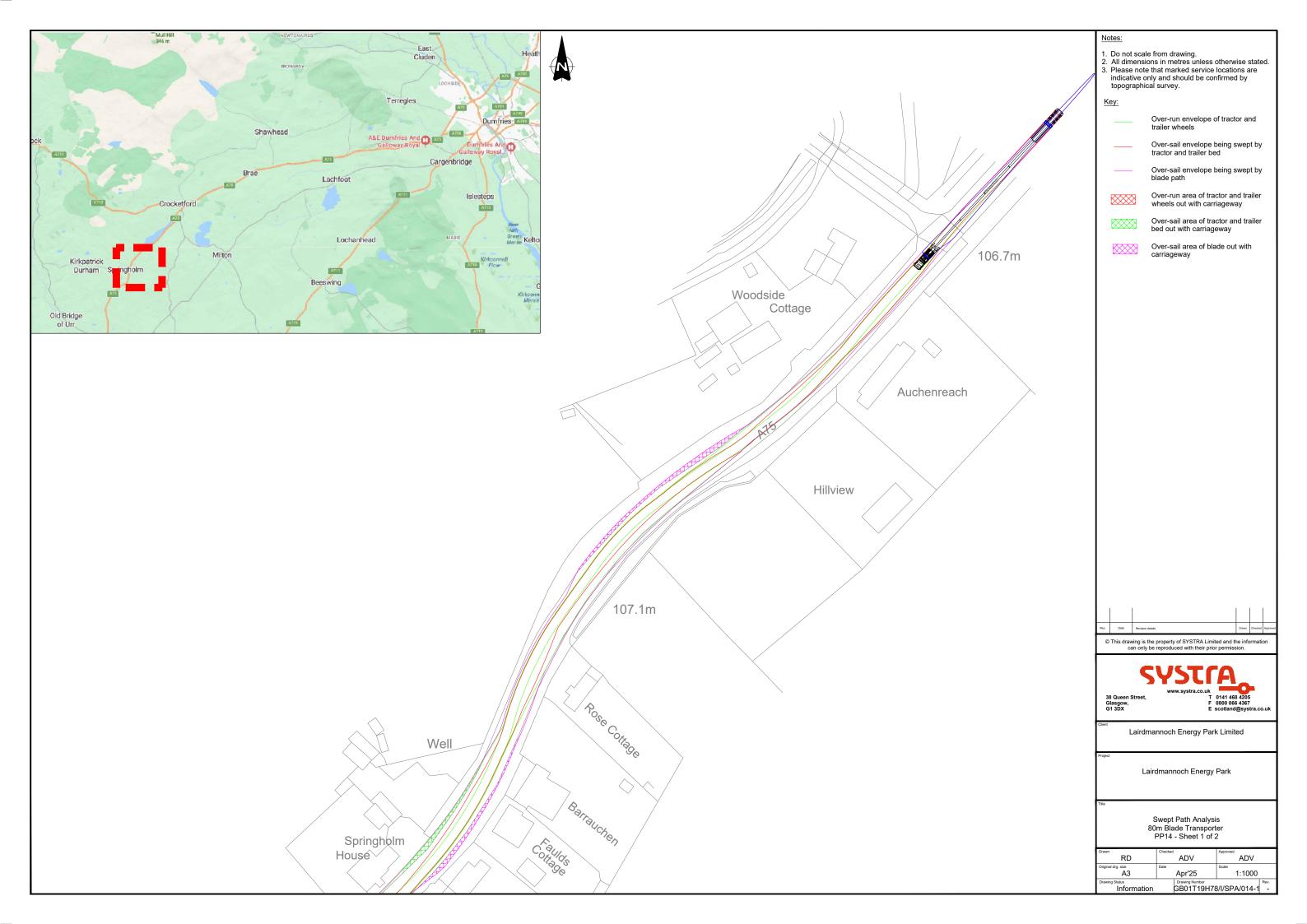




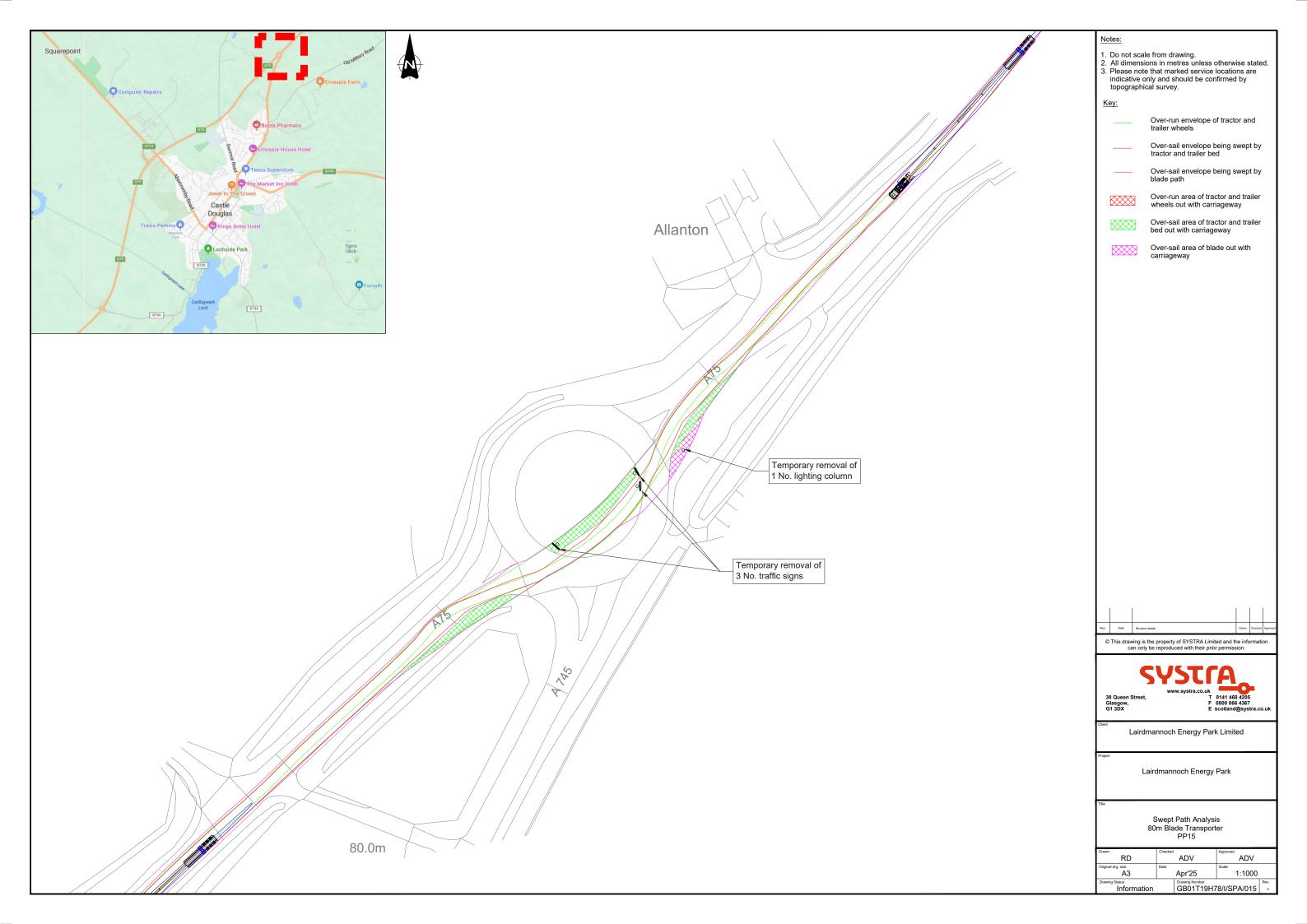


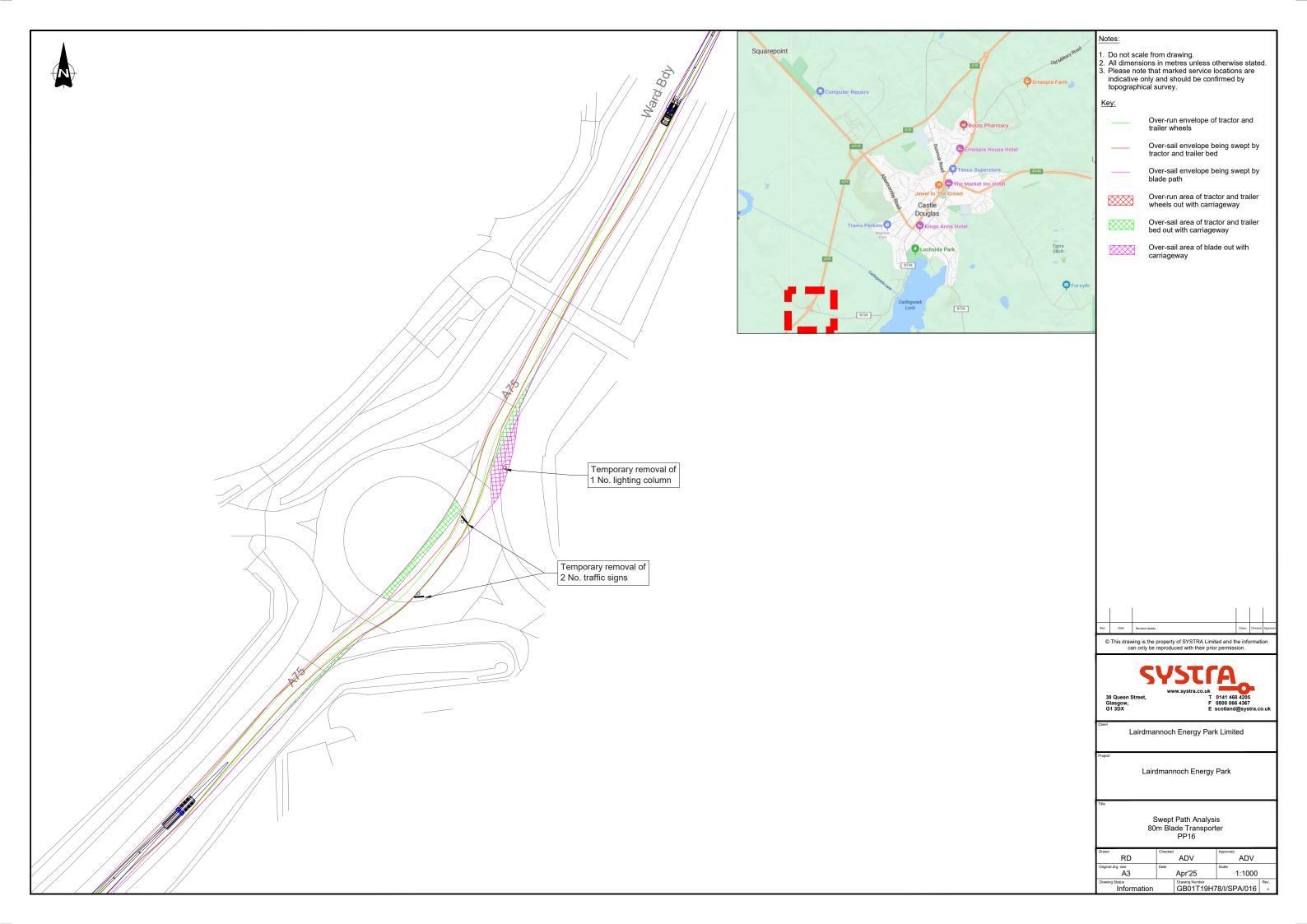


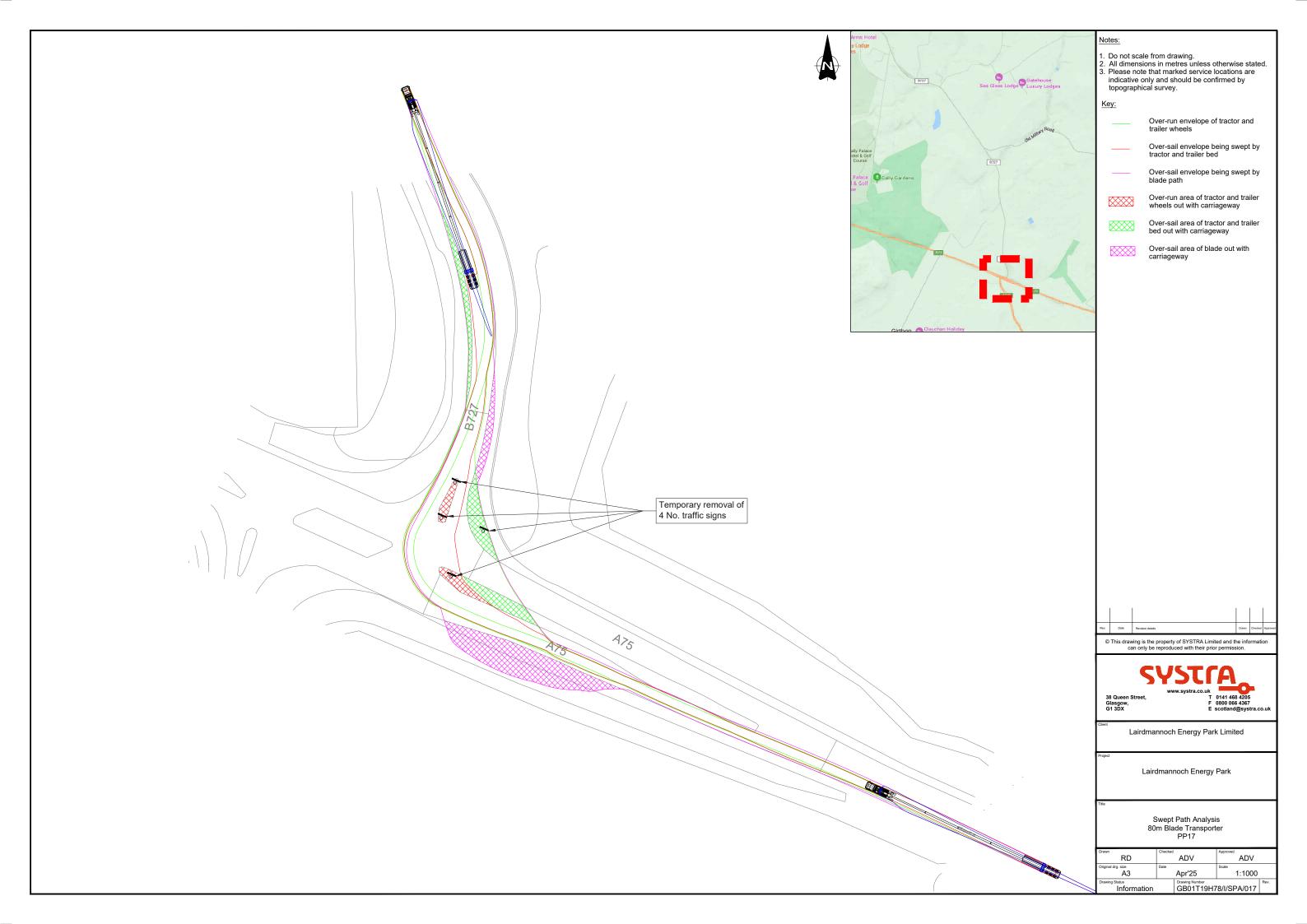


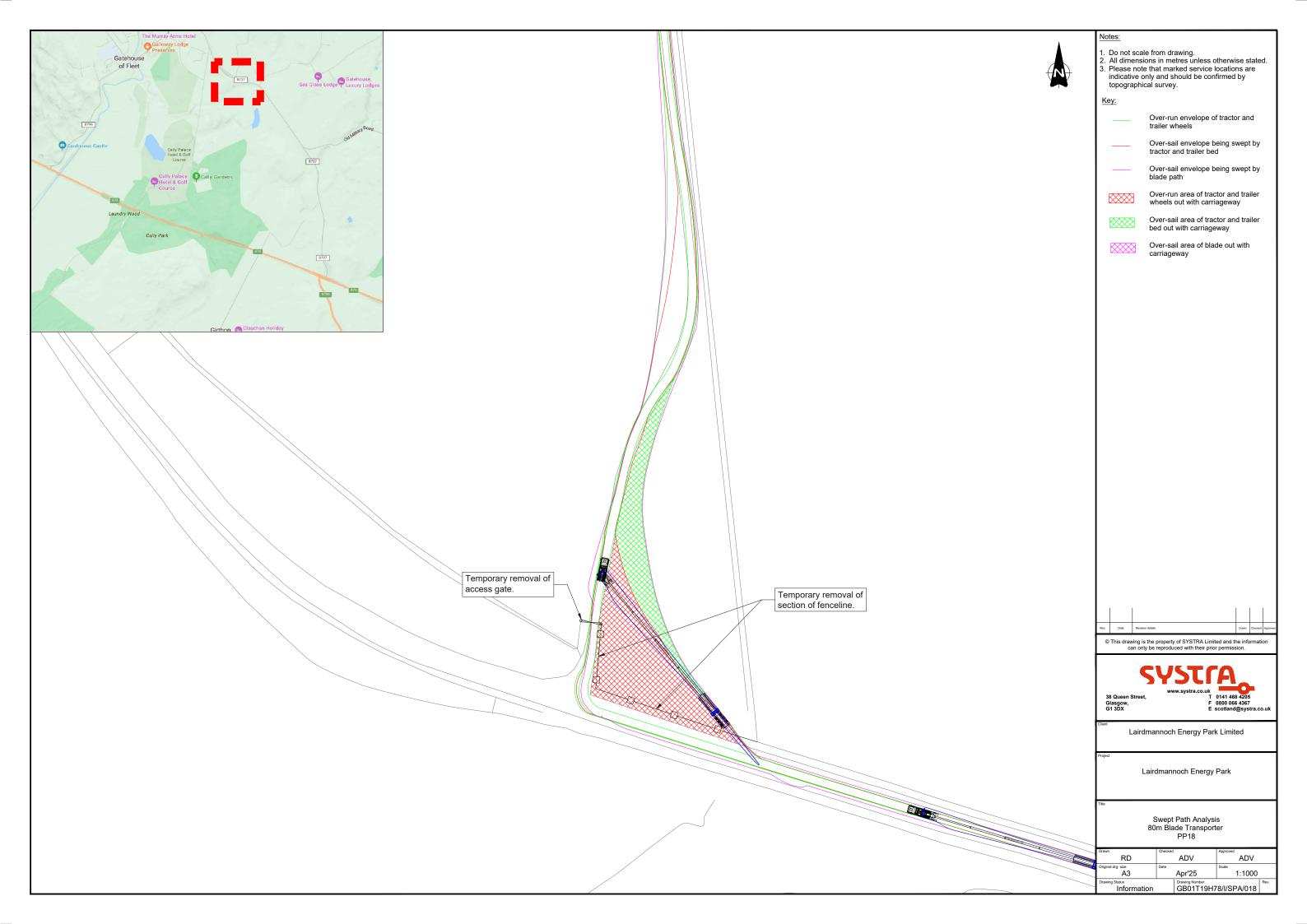












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The Centrum Business Centre Limited, 38 Queen Street, Glasgow, G1 3DX $\,$

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100 Wellington Street, Leeds, LS1 1BA T: +44 (0)113 360 4842

London

One Carey Lane, London, England EC2V 8AE T: +44 (0)20 3855 0079

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