

Appendix A2 Abnormal Load Route Survey

Pell Frischmann

Melin Court Wind Farm

Abnormal Load Route Survey



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1 Introduction

1.1 Purpose of the Report

Pell Frischmann (PF) has been commissioned by Muirhall Energy Limited (Muirhall Energy) to undertake a survey of the approved delivery route for wind turbine Abnormal Indivisible Loads (AIL) associated with the construction and development of Melin Court Wind Farm, located to the east of Resolven.

This access review is based upon a desk based review of the access route to site and has not been informed by a site visit.

The Route Survey Report (RSR) has been prepared based upon the brief provided by Muirhall Energy. No liability is accepted for the use of information or details contained within this report by third parties.

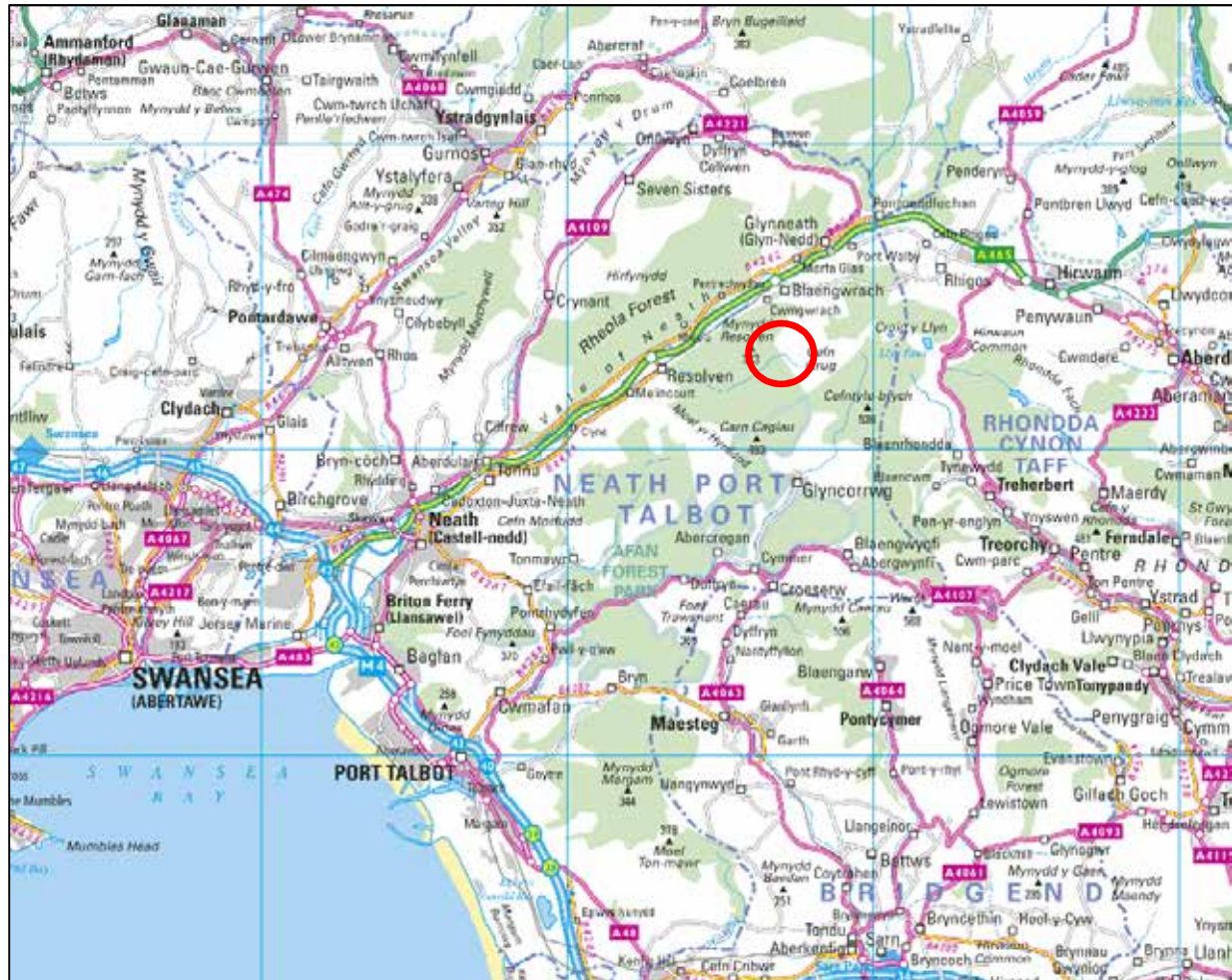
The RSR has been prepared to help inform Muirhall on the issues associated with the development of the site with regards to off-site transport and access for AIL traffic. The report identifies the likely issues associated with AIL deliveries and notes that detailed design work for the mitigation will be required.

2 Site Background

2.1 Site Location

The development site is located to the west of Resolven. Figure 1 illustrates the general site location.

Figure 1: Site Location Plan



2.2 Candidate Turbines

Muirhall Energy have indicated that they wish to consider the use of a Nordex N133 turbine at a tip height of 150m. Details of the N133 turbine have been obtained directly from Nordex. The details of the components are summarised in Table 1.

Table 1: Turbine Size Summary

Component	Length (m)	Width (m)	Height (m)	Weight (t)
Blade	64.800	4.210	3.180	17.580
Tower 1	20.050	4.300	4.020	66.300
Tower 2	24.030	4.020	4.020	48.700
Tower 3	34.240	4.020	3.260	50.400
Nacelle	12.770	4.330	4.030	64.330
Hub	5.260	4.650	4.000	60.740
Drive Train	6.560	3.200	3.220	72.330

The worst case loads for route assessment are:

- Blade;
- Tower Section 2 (combined with the flange width of Section 1); and
- Tower Section 3.

These sections will be used for the subsequent assessment of the proposed loads along the access route.

2.3 Proposed Delivery Equipment

To provide a robust assessment scenario based upon the known issues along the access route, it has been assumed that all blades would be carried on a Nooteboom Super Wing trailer to reduce the need for mitigation in constrained sections of the route.

Tower sections 1 and 2 would be carried in a 4+7 clamp adaptor style trailer, where as loads such as the hub, nacelle housing and tower section 3 would be carried on a six axle step frame trailer.

Figure 2: Super Wing Carrier Trailer



Figure 3: Tower Trailer



3 Access Route Review

3.1 Port of Entry

The proposed Port of Entry (POE) is Swansea. The port is the closest, suitable port to site and as such is in line with the Government's "Water Preferred" policy towards AIL movements. The port has been used by renewables deliveries in the past for a number of wind farms, including Mynydd y Betws, Pen y Cymoedd and Brechfa.

The port has sufficient quay and storage space and is well located for the strategic trunk road network (AIL access is taken from the east). The layout of the port is illustrated below in Figure 4.

Figure 4: Swansea Port Layout



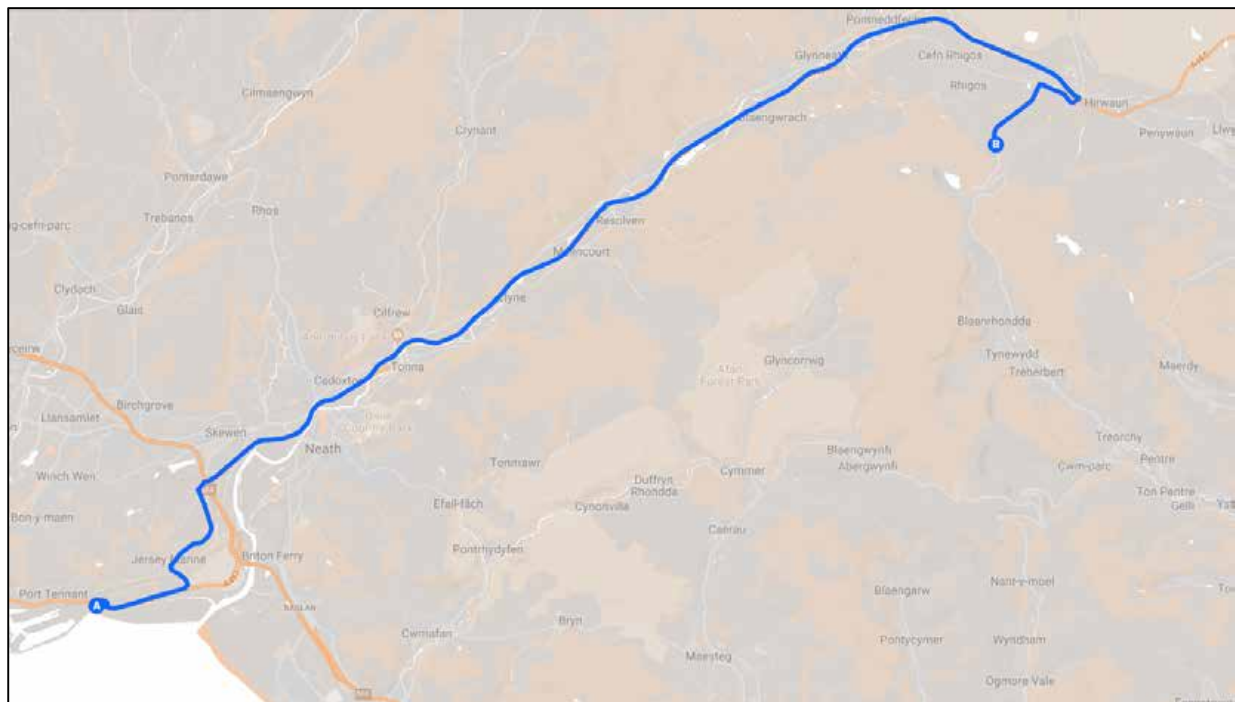
3.2 Proposed Access Route

The proposed delivery route would be the same as used for Pen y Cymoedd Wind Farm deliveries. The proposed access route to site is as follows:

- Loads would depart the port and access the A483 Fabian Way (Eastbound) using a contraflow manoeuvre;
- Loads would proceed eastbound and would join the M4 at Junction 42. They would then continue to Junction 43, where they would depart the motorway and would then join the A465 (Northbound);
- At the A465 / A4059 Roundabout, loads would turn right and would enter the A4061 (Southbound);
- Loads would then turn right at the Rhigos Road Roundabout and would continue southbound on the A4061;
- Loads will turn right onto the Pen y Cymoedd site access road, proceeding by private access track to the turbine locations.

The proposed route is illustrated in Figure 5.

Figure 5: Proposed Access Route



3.3 Route Constraints

The constraints noted on the site visit are detailed in Table 2. These cover all constraints from the port access gate through to the site access junction. No consideration of the transport issues within the port or within the development site have been undertaken and this includes the design of the site access junction.

Plans illustrating the location of the constraints and a detailed list of POI are provided in Appendix A.

Table 2: Constraint Points and Details

POI	Key Constraint	Details
1		Port Access Gate Loads will exit the port access gate and will then proceed to the junction with Fabian Way. A swept path assessment has been undertaken and indicates that minor vegetation trimming should be undertaken on the right verge of Baldwins Crescent to avoid scratching the components.
2		Fabian Way Access Junction Loads will turn right onto Fabian Way (eastbound). This will be undertaken using a contraflow manoeuvre of the junction under full police control. A swept path assessment has been undertaken and indicates that loads will over-sail the safety rail in the central reserve of Fabian Way. Blade loads should be set to enable the over-sail to occur.
3		A483 Ffordd Amazon Roundabout Loads will proceed ahead onto the A483 at the roundabout. A swept path assessment has been undertaken and indicates that the tower loads will negotiate the junction without the need for mitigation works. Blade loads will require a small area of over-run on the northern splitter island where one bollard should be removed. The kerb along the over-run surface should be protected by a tar wedge.

4		A483 / M4 Slip Junction Loads would proceed onto the slip road for the M4. A swept path assessment has been undertaken at this location and indicates that minor load over-sails will occur at various locations, but that no physical mitigation works are required.
5		M4 / A465 Roundabout Loads will turn right onto the A465. The tower loads will negotiate the junction without the need for any mitigation works. The swept path assessment however indicates that blade loads will require over-sail areas at the western splitter island where the clearances to a street lighting column will need to be reviewed. Clearances to two sets of road signs on the A465 exit lane are restricted and it is suggested that the signs are temporarily relocated to improve the exit from the junction.
6		A465 / B4434 Roundabout Loads will proceed ahead at the junction. A swept path assessment has been undertaken and indicates that the 30mph sign on the approach to the junction in the central reserve should be relocated to improve clearances. A load bearing surface is required on central island and one set of chevron signs should be removed. The island kerb should be protected by a tar wedge.

7		A465 / B4242 Roundabout Loads will proceed ahead at the junction. A swept path assessment has been undertaken and indicates that a load bearing surface is required on the central island and one set of chevron signs should be removed. The island kerb should be protected by a tar wedge. Vegetation trimming on the island may also be required.
8		A465 / A4061 Roundabout Loads will turn right onto the A4061 at the junction. The swept path assessment indicates that loads will require minor over-sail areas on the verges of the junction but that no mitigation works are required to accommodate these. Two areas of over-run surfacing and associated over-sail are however required on the junction island and two sets of chevron signs should be removed to accommodate these works. Tar wedges should be used to protect the kerbs.
9		A4061 Bend Loads will proceed around the bend. A swept path assessment has been undertaken and indicates that loads will over-sail and over-run into the inside verge where a load bearing surface will be required. It is recommended that Muirhall Energy undertake a highway boundary review at this location to ensure that this area of land is within the adopted road boundary. On the outside of the bend, clearances to a street sign and lighting column

		should be confirmed at the test run and vegetation trimmed.
10		A4061 / Rhigos Road Roundabout Loads will turn left at the junction. A swept path assessment has been undertaken and indicates that a land ownership review is required on the northeast and southeast verges of the junction where over-sail areas are required. Trimming of vegetation at both areas is required. On the southeast verge, one lighting column will require removal. A small area of over-run surfacing is also required, and an underground services check should be undertaken. The eastern splitter island will be over-sailed, whilst the southern island will be over-run and will require a load bearing surface. The road signage on both splitter islands will need to be removed. One chevron sign on the central island should be removed and vegetation trimmed.
11		A4061 Site Access Junction Loads will turn into the site access junction. This will need to be widened to accommodate the proposed loads. Agreement to enlarge the junction will be required.

3.4 Swept Path Assessment Results and Summary

The detailed swept path drawings for the locations assessed are provided in Appendix B for review. The drawings in Appendix B illustrate tracking undertaken for the worst case loads at each location.

The colours illustrated on the swept paths are:

- Grey / Black – OS / Topographical Base Mapping;
- Green – Vehicle body outline (body swept path);
- Red – Tracked pathway of the wheels (wheel swept path); and

- Purple – The over-sail tracked path of the load where it encroaches outwith the trailer (load swept path).

Where mitigation works are required, the extents of over-run and over-sail areas are illustrated on the swept path drawings.

Please note that where assessments have been undertaken using Ordnance Survey (OS) base mapping, there can be errors in this data source. Please note that PF cannot accept liability for errors on the data source, be that OS base mapping or client supplied data.

As a site visit was not undertaken, a test run is recommended to confirm the extents of the proposed mitigation works

3.5 Weight Review

A weight review should be undertaken via the ESDAL (Electronic Service Delivery for Abnormal Loads) contacts database using the Highways Agency website www.esdal.com, prior to loads being transported.

3.6 Land Ownership

The limits of road adoption can vary depending upon the location of the site and the history of the adopting agency. In general, the adopted area is that contained within a defined boundary where the local authority or trunk road agency holds the maintenance rights for the land from the original land owner. In urban areas, this usually defined as the area from the edge of the footway across the road to the opposing footway back edge.

In rural areas the area of adoption can be open to greater interpretation as defined boundaries may not be readily visible. In these locations, the general rule is that the area of adoption is between established fence / hedges lines or a maximum 2m from the road edge. This can vary between areas and every location can be different.

3.7 Access Junction Considerations

The access junction into the site will need to be widened to accommodate the proposed physical size of loads. The design changes to the junction will need to be discussed with the local highway authority and be built in accordance with the turbine supplier design criteria.

3.8 Summary Issues

It is strongly suggested that following a review of the report, Muirhall Energy should undertake the following prior to the delivery of the first abnormal loads, to ensure load and road user safety:

- That any necessary topographical surveys are undertaken and the swept path results repeated;
- A review of axle loading on structures along the entire access route with the various road agencies is undertaken prior to the loads being transported;
- A review of clear heights with utility providers and the transport agencies along the route to ensure that there is sufficient space to allow for loads plus sufficient flashover protection (to electrical installations);
- That any verge vegetation and tree canopies which may foul loads is trimmed prior to loads moving;
- That a review of potential roadworks and or closures is undertaken once the delivery schedule is established in draft form;
- That a test run is completed to confirm the route and review any vertical clearance issues; and
- That a condition survey is undertaken to ascertain the extents of road defects prior to loads commencing to protect Muirhall Energy from spurious damage claims.

4 Summary

4.1 Summary of Access Review

Pell Frischmann have been commissioned by Muirhall Energy to prepare a Route Survey Report to examine the issues associated with the transport of AIL turbine components from the Port of Swansea through to the development site at Melin Court.

This report identifies the key points and issues associated with the proposed route and outlines the issues that will need to be considered for successful delivery of components.

The access review has been based upon a worst case of Nordex N133 turbine sections and has been undertaken to eliminate, where at all possible, physical mitigation works.

The report is presented for consideration to Muirhall Energy. Various road modifications and interventions are required to successfully access the site. If these are undertaken, access to the consented wind farm site is considered feasible.

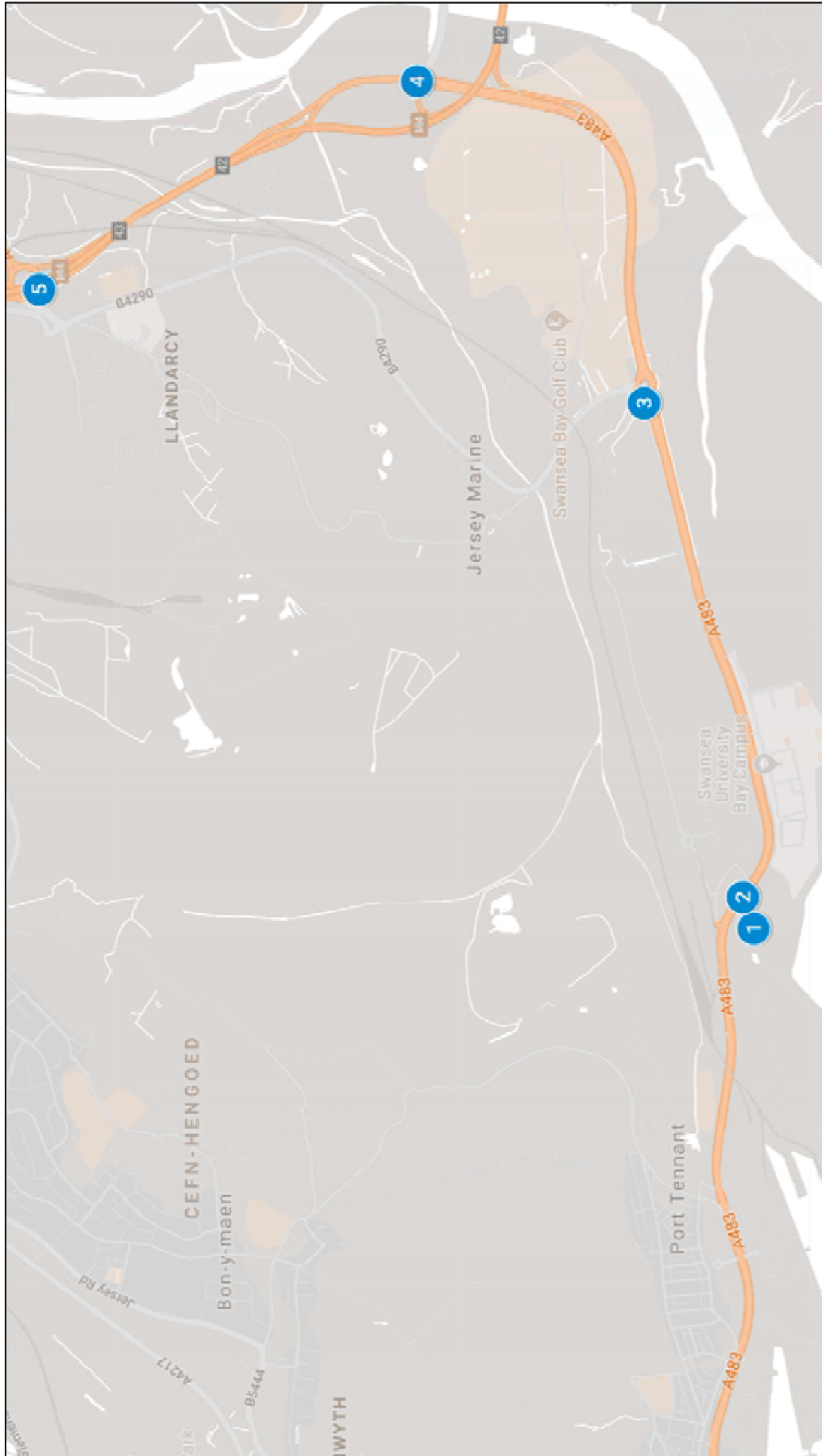
4.2 Further Actions

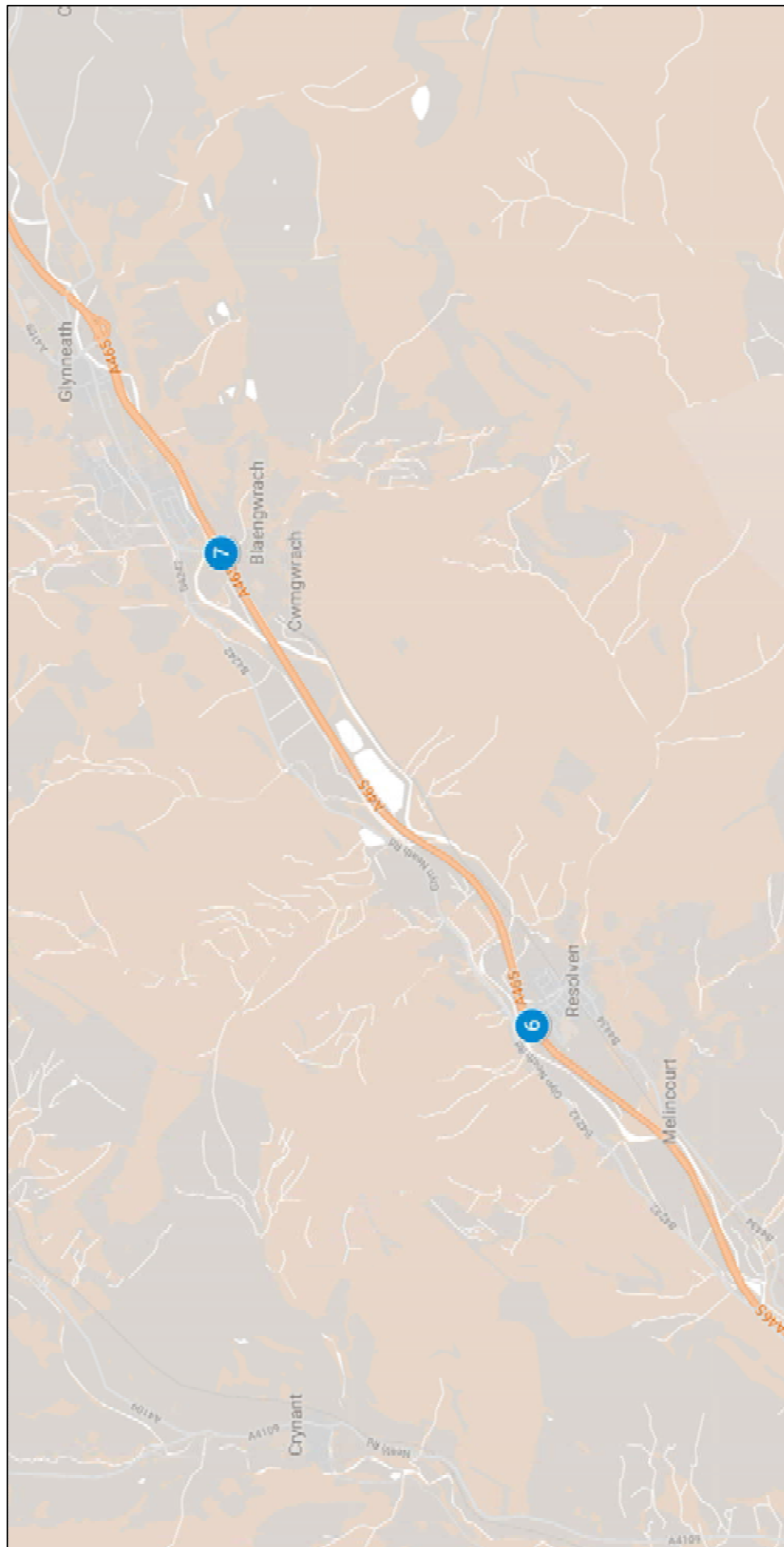
The following actions are recommended to pursue the transport and access issues further:

- Undertake the required topographical surveys and repeat the swept path assessments where required;
- Prepare detailed mitigation design proposals to help inform the land option / consultee discussions;
- Obtain the necessary land options (if required);
- Undertake discussion with the affected roads agencies;
- Obtain the necessary statutory licences to enable the mitigation measures; and
- Develop a detailed operational Transport Management plan to assist in transporting the proposed loads.

Appendix A

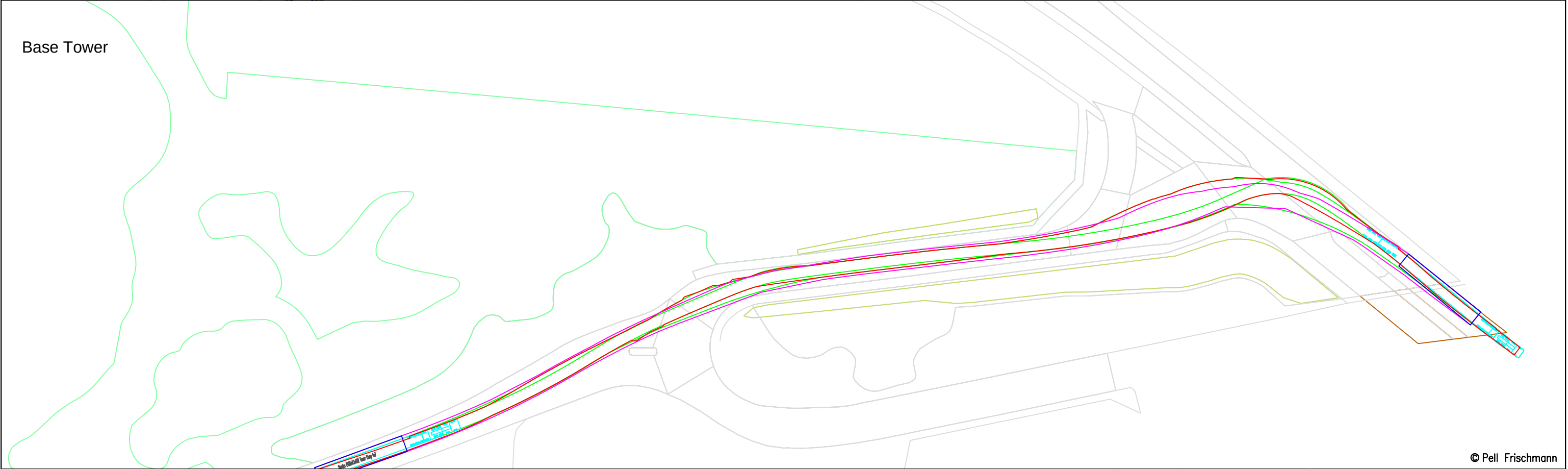
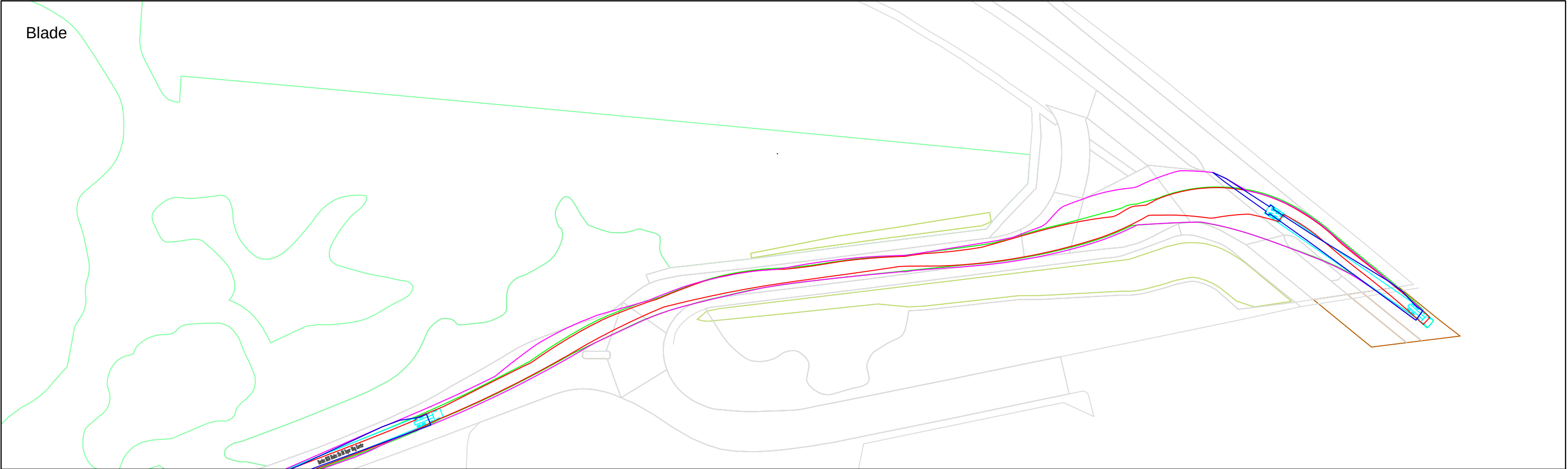
Points of Interest Locations





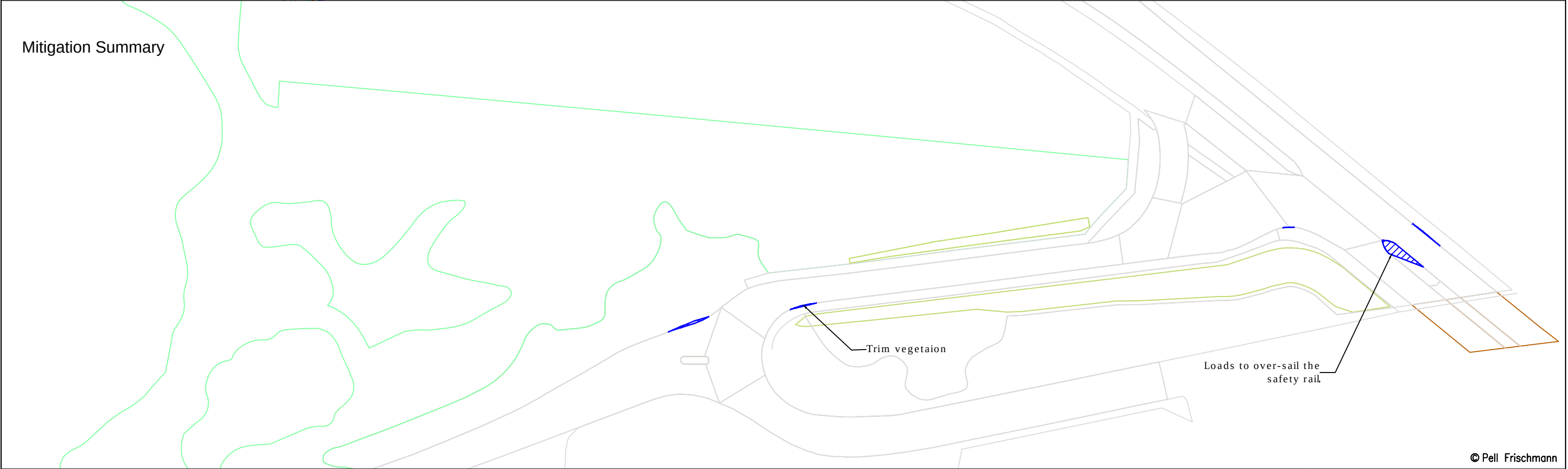
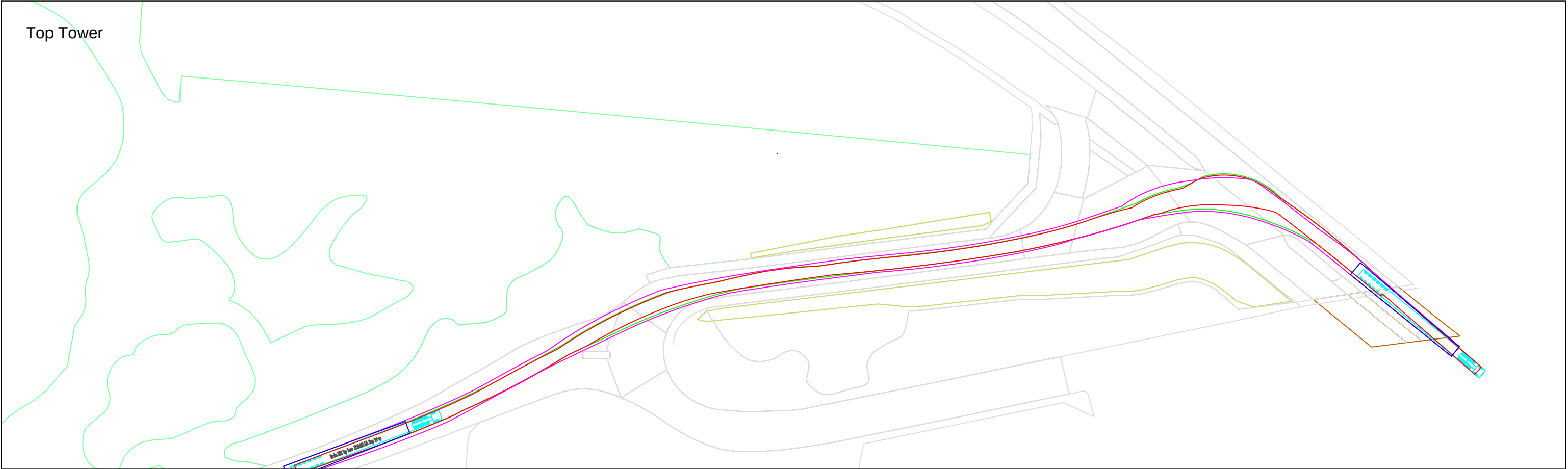
Appendix B

Swept Path Assessment Drawings



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							A		

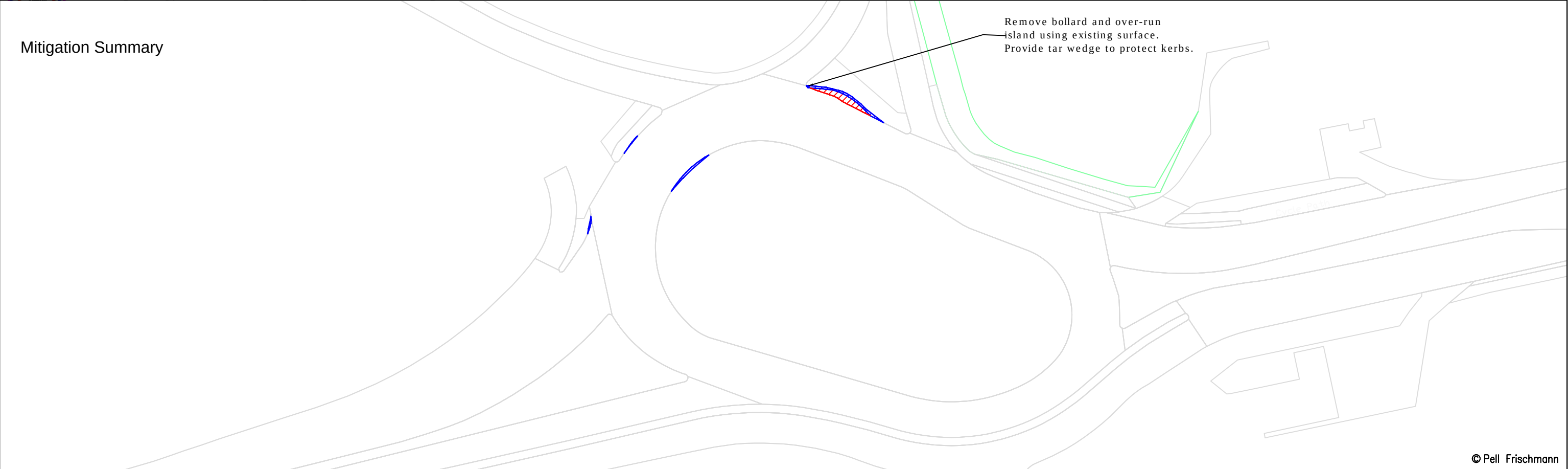
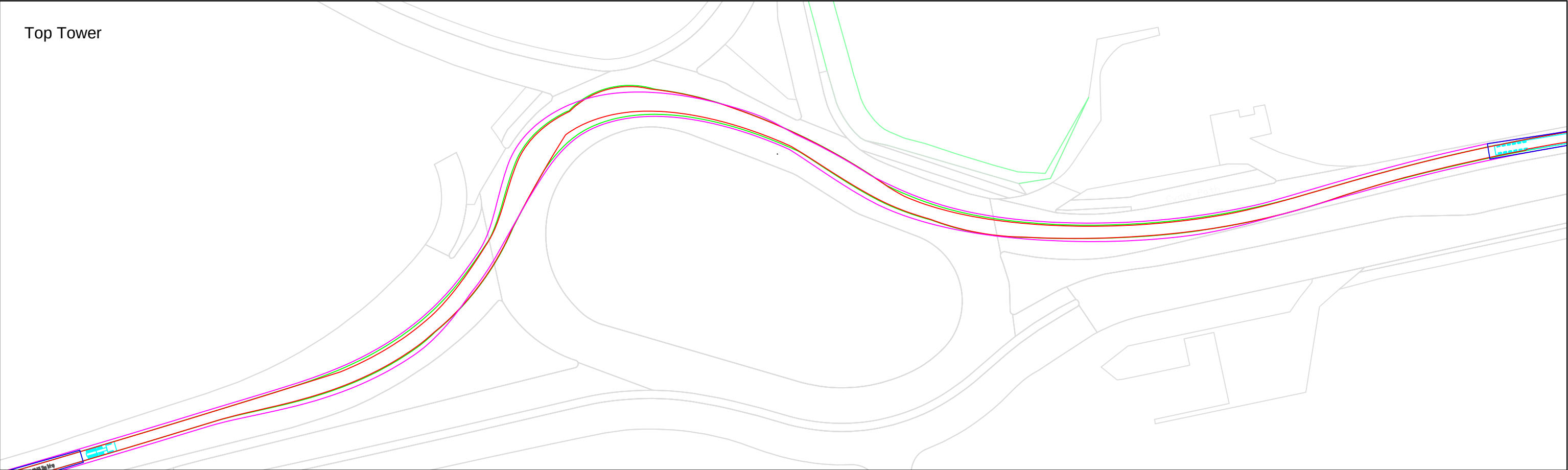


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			Drawing No.		Revision			
Key Wheel SPA Body SPA Load SPA Over–run Area Over–sail Area	SPA Location Port Access Gate / Fabian Way Junction		SPA/001-1				A	

A map titled "Blade" showing a route through a park area. The route is marked by a series of colored lines (blue, green, red, purple, brown) that start near a small building at the bottom left and curve around a large pond in the center. The map includes grey outlines of buildings and a "Cycle Path" label. The route lines are closely grouped, indicating a specific path through the landscape.

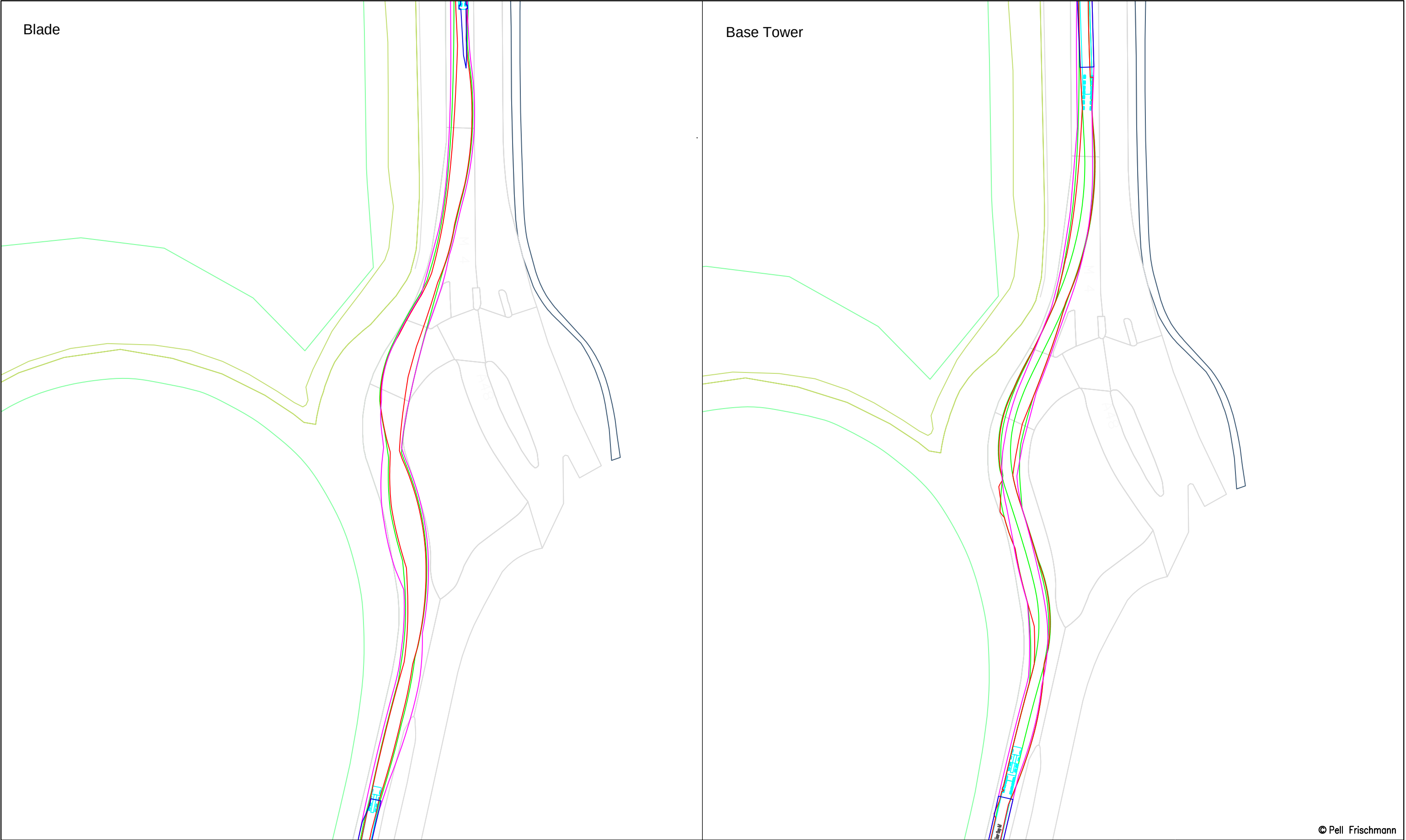
Base Tower

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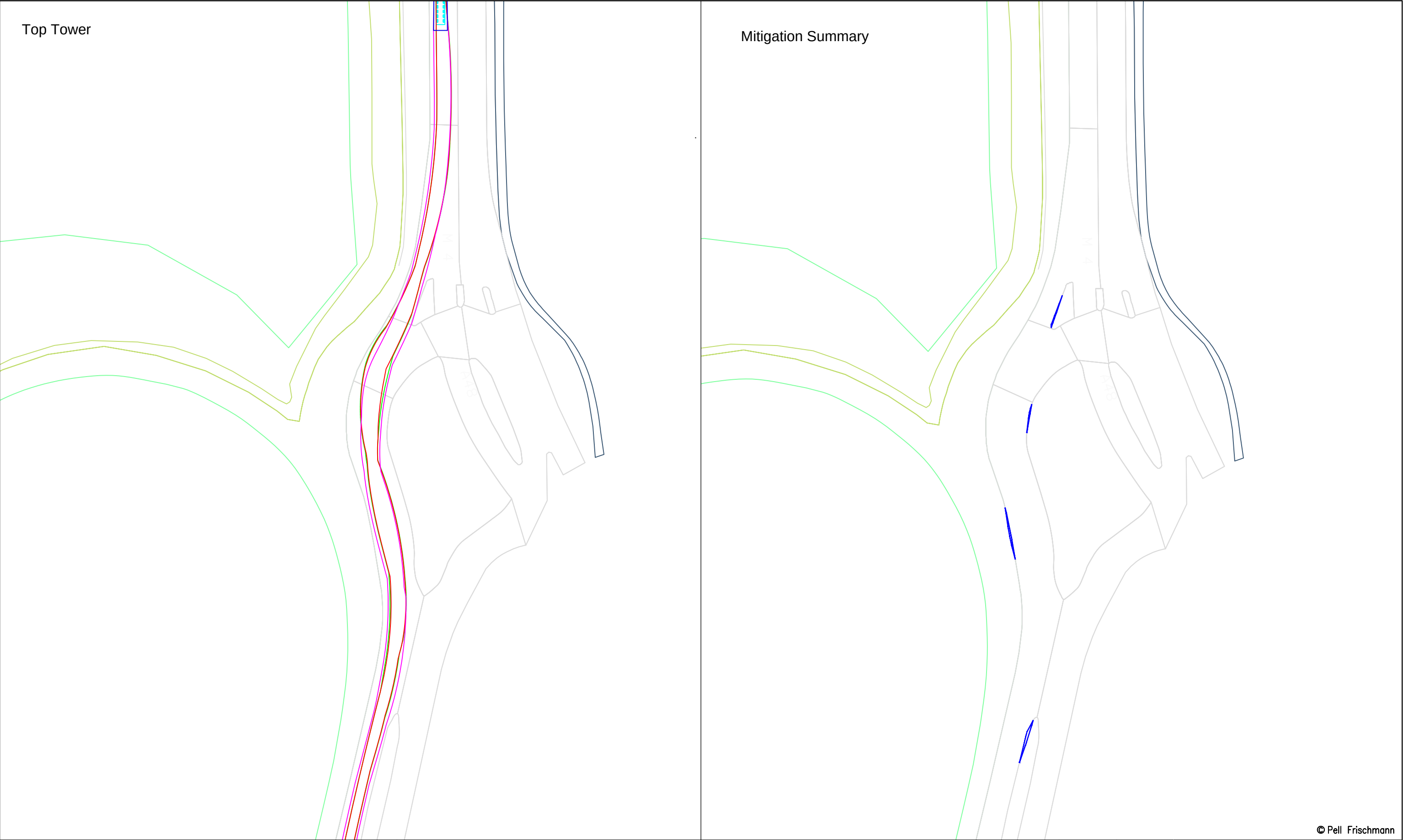
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	SPA Location	A483 / M4 Slip Junction		SPA/003					A



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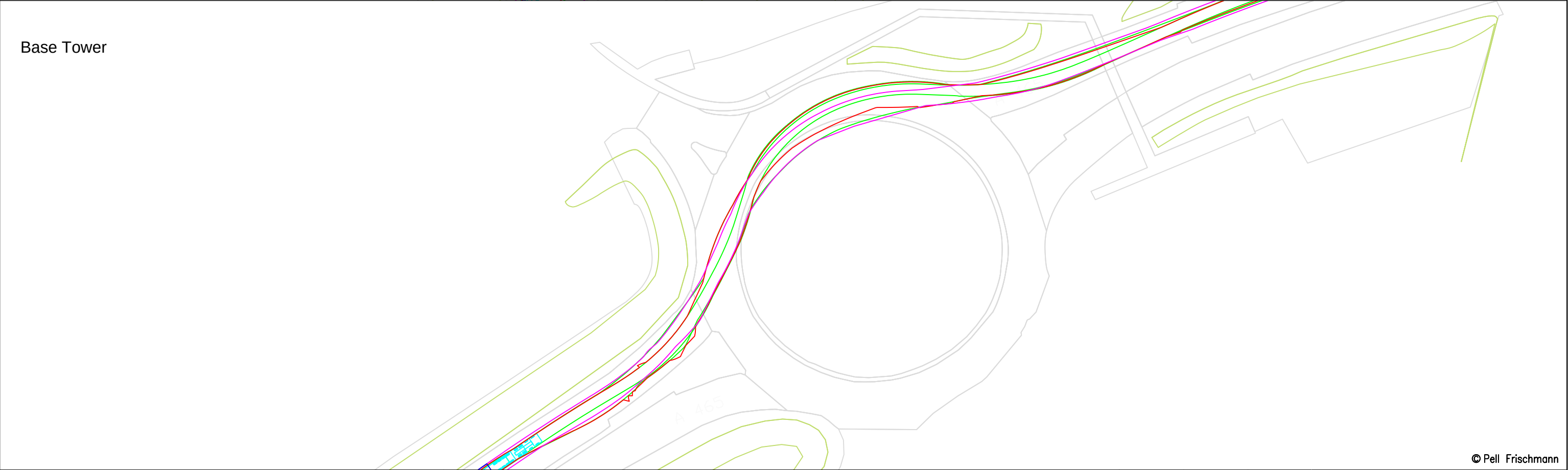
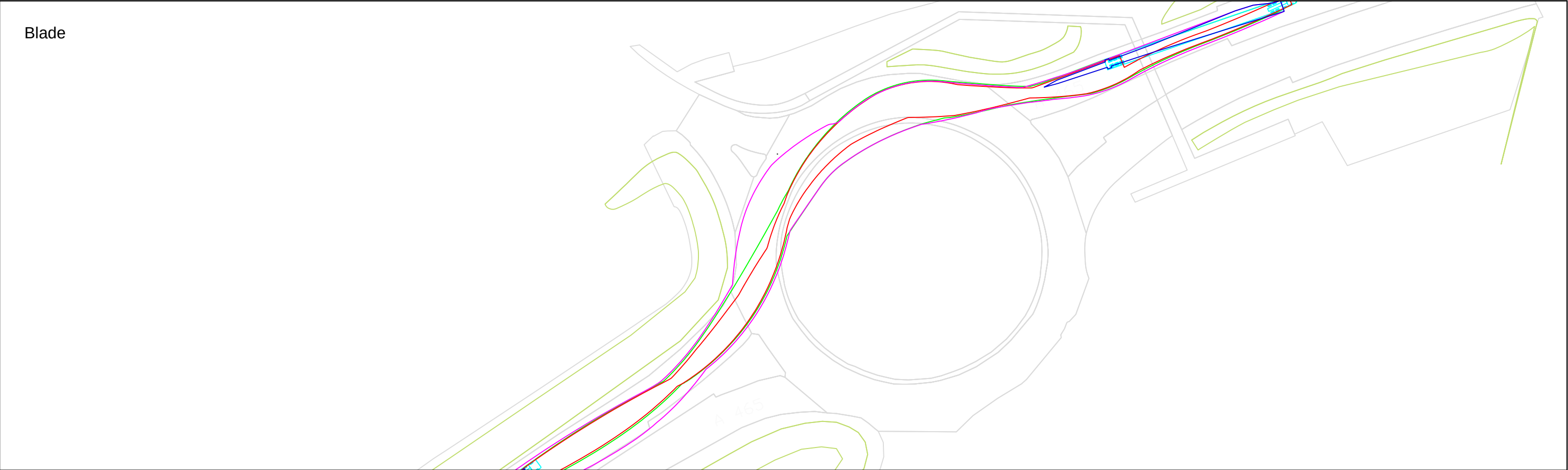
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						M4 / A465 Junction		A	



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Key	SPA Location	Drawing No.			Revision			
		SPA/005		A				
		A465 / B4434 Roundabout						

Top Tower

A 465

Mitigation Summary

Relocate 30mph speed limit sign.

Remove chevron signs and provide load bearing surface. Use tar wedge to protect the kerb.

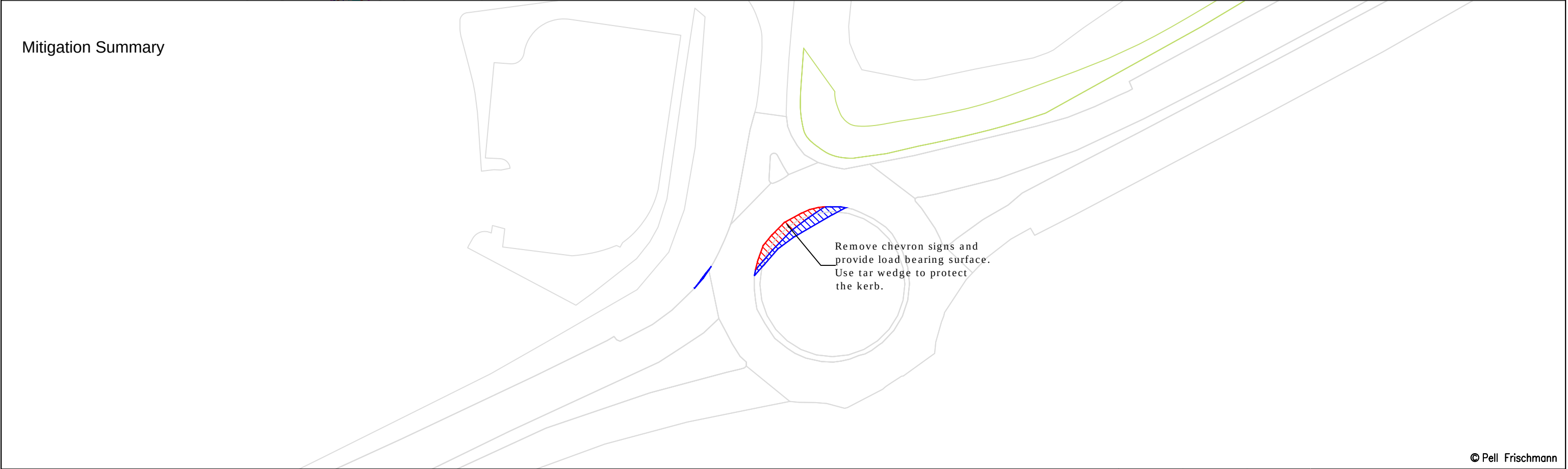
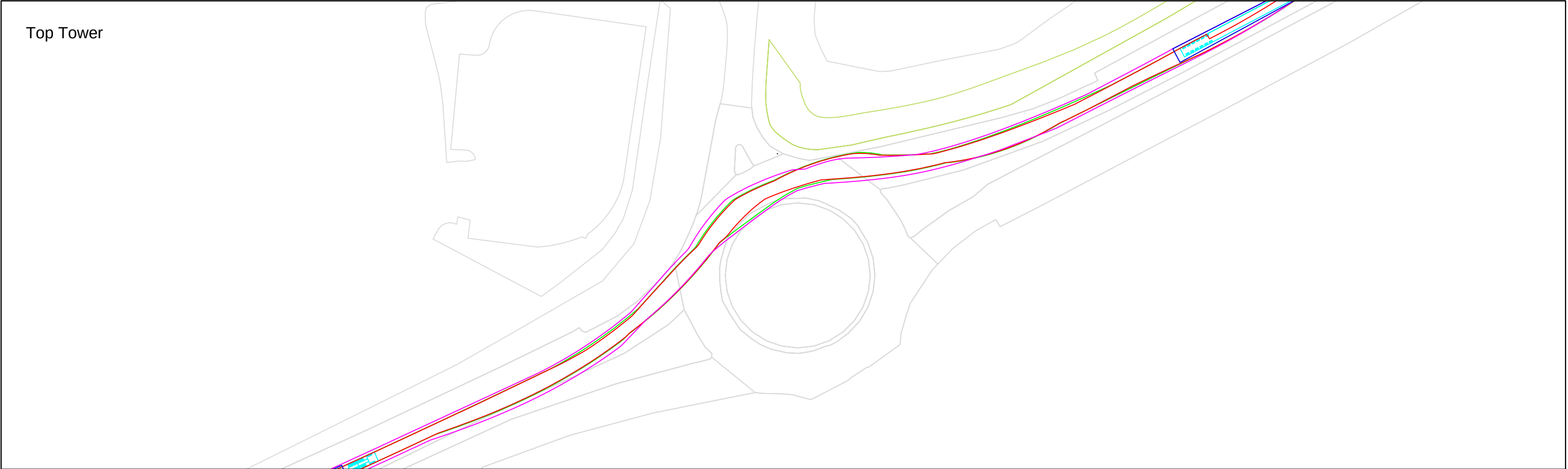
A 465

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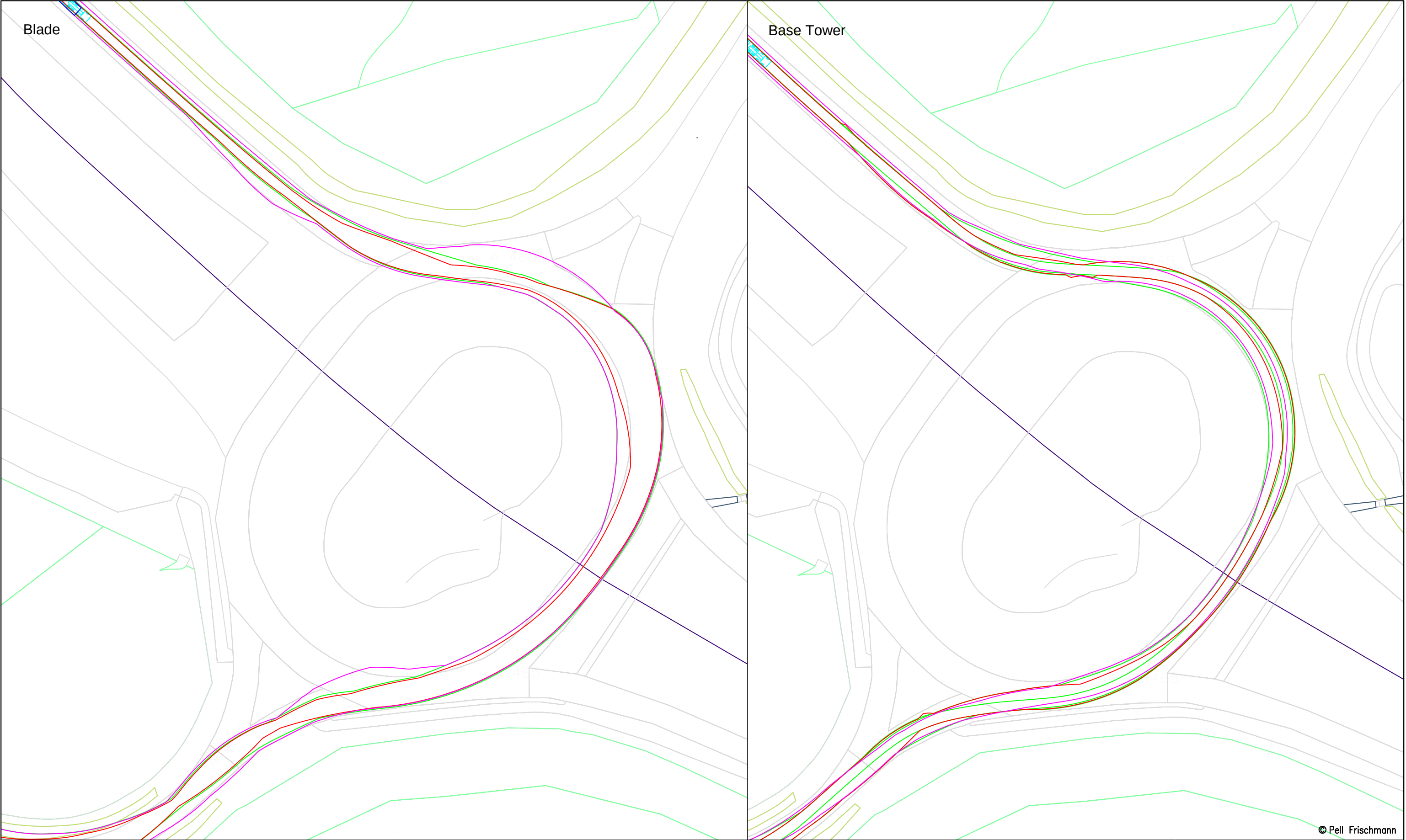
Blade

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		A465 / B4242 Roundabout	SPA/006				A	



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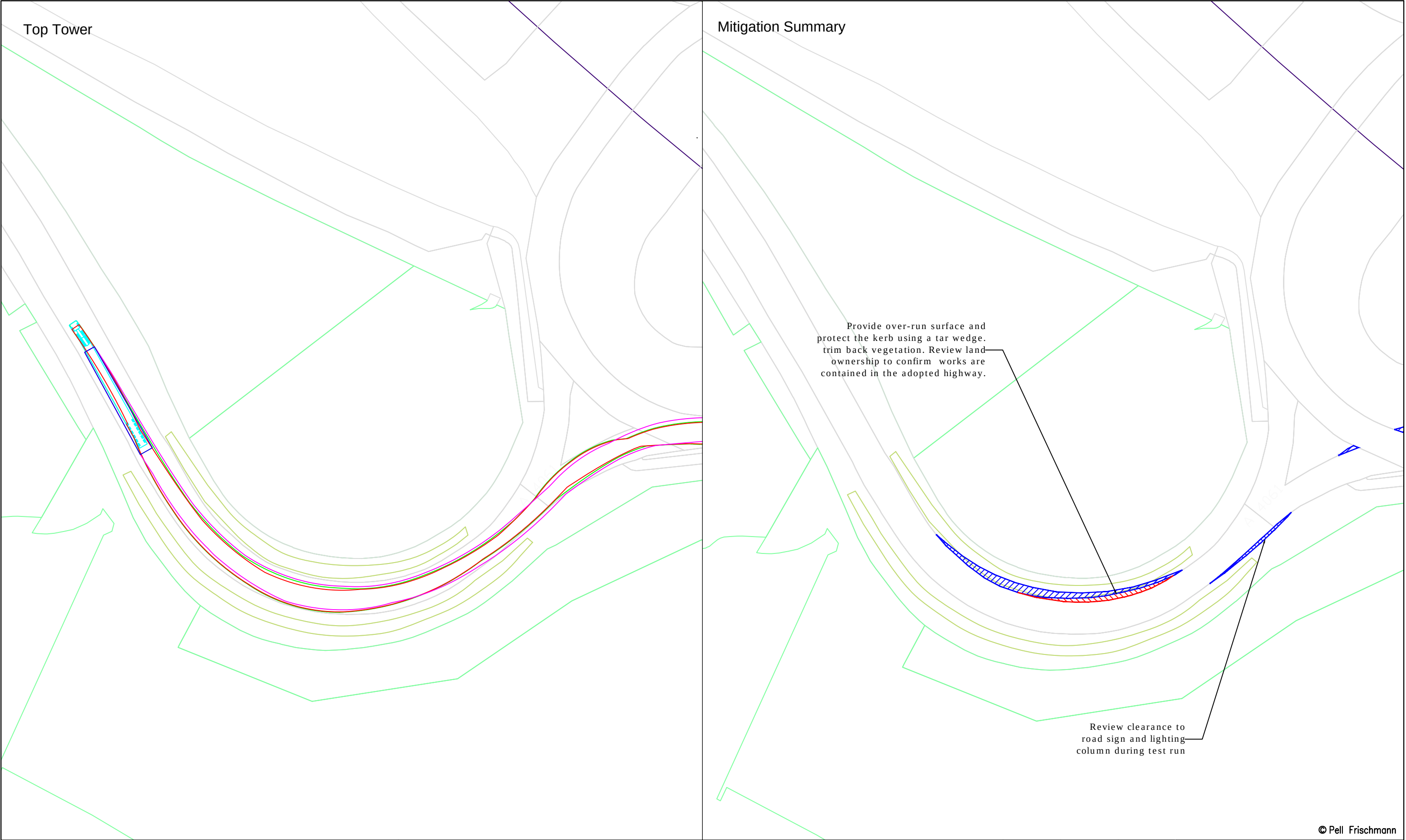


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			Drawn	GB	FEB 2019	1:1000 @ A3		
			Designed	–	FEB 2019	File No.		
			Checked	GB	FEB 2019	PF/ED/190222 Melin Court RSR		
Client	Muirhall Energy Limited	Drawing Title	Nordex N133 Swept Path Assessment	Point of Interest		007	Drawing Status	Information
				Drawing No.				
Key	Wheel SPA Body SPA Load SPA Over–run Area Over–sail Area	SPA Location	A465 / A4061 Roundabout	SPA/008				Revision
				A				

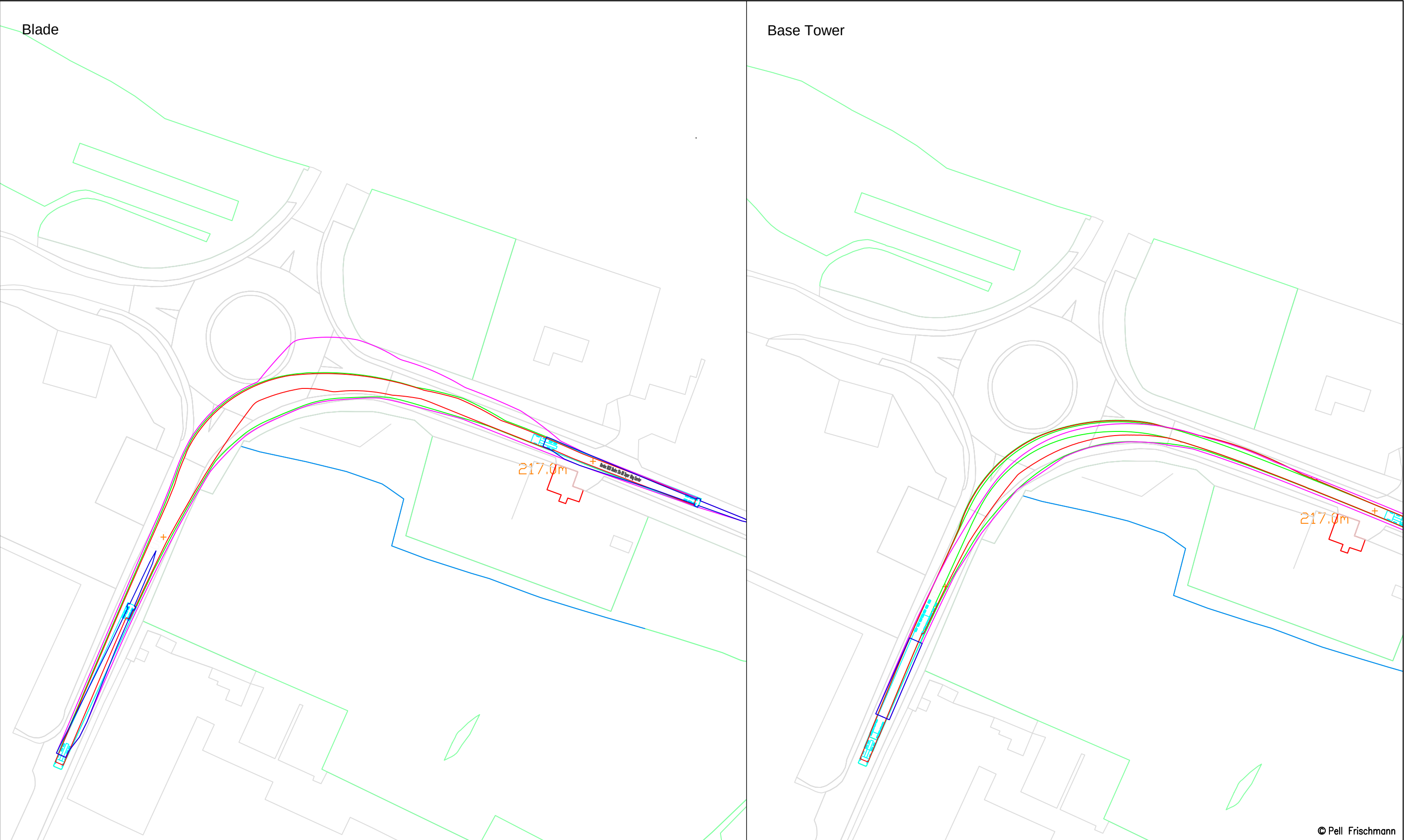


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			Drawn	GB	FEB 2019	1:1000 @ A3		
			Designed	–	FEB 2019	File No.		
			Checked	GB	FEB 2019	PF/ED/190222 Melin Court RSR		
Client	Muirhall Energy Limited	Drawing Title	Nordex N133 Swept Path Assessment			Drawing Status		Information
Key Wheel SPA Body SPA Load SPA Over–run Area Over–sail Area	SPA Location	A465 / A4061 Junction			Point of Interest		008	
					Drawing No.		Revision	
			SPA/007-1			A		



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		Melin Court Wind Farm		GB		FEB 2019	1:1000 @ A3	
		Drawing Title		Designed		FEB 2019	File No.	
		Nordex N133 Swept Path Assessment		Checked		FEB 2019	PF/ED/190222 Melin Court RSR	
Client		SPA Location		Point of Interest		009	Drawing Status	
Muirhall Energy Limited		A4061 Bend		Drawing No.		SPA/008-1	Information	
Key							Revision	
Wheel SPA							A	
Body SPA								
Load SPA								
Over-run Area								
Over-sail Area								



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			Drawn	GB	FEB 2019	1:1000 @ A3			
			Designed	–	FEB 2019	File No.			
			Checked	GB	FEB 2019	PF/ED/190222 Melin Court RSR			
Client	Muirhall Energy Limited	Drawing Title	Nordex N133 Swept Path Assessment		Point of Interest		010	Drawing Status	Information
			SPA Location		A4061 / Rhigos Road Roundabout				
Key	Wheel SPA Body SPA Load SPA Over-run Area Over-sail Area			Drawing No.				Revision	
				SPA/009					A



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			Drawn	GB	FEB 2019	1:1000 @ A3	
			Designed	–	FEB 2019	File No.	
			Checked	GB	FEB 2019	PF/ED/190222 Melin Court RSR	
Client	Muirhall Energy Limited	Drawing Title	Point of Interest		010	Drawing Status	
Key Wheel SPA Body SPA Load SPA Over-run Area Over-sail Area		Nordex N133 Swept Path Assessment	Drawing No.			Revision	
	SPA Location	A4061 / Rhigos Road Roundabout	SPA/009-1				A



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			Drawn	GB	FEB 2019	1:1000 @ A3			
			Designed	–	FEB 2019	File No.			
			Checked	GB	FEB 2019	PF/ED/190222 Melin Court RSR			
Client	Muirhall Energy Limited	Drawing Title	Nordex N133 Swept Path Assessment	Point of Interest		011		Drawing Status	Information
				Drawing No.		SPA/013			
Key	Wheel SPA Body SPA Load SPA Over–run Area Over–sail Area	SPA Location	A4061 Access Junction					Revision	
							A		



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			Drawn	GB	FEB 2019	1:1000 @ A3			
			Designed	–	FEB 2019	File No. PF/ED/190222 Melin Court RSR			
			Checked	GB	FEB 2019	Drawing Status			
Client	Muirhall Energy Limited	Drawing Title	Nordex N133 Swept Path Assessment		Point of Interest		011	Information	
Key	Wheel SPA Body SPA Load SPA Over–run Area Over–sail Area	SPA Location	A4061 Access Junction		Drawing No.			Revision	
			SPA/013-1			A			