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Technical Appendix 14-1 Turbine Delivery Route Works Report

EIAR - Volume 3

Knockanarragh Wind Farm

6 March 2024

Making Sustainability Happen

Revision	Date	Prepared By	Checked By	Authorised By
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Revision Record

Basis of Report

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Executive Summary

This report presents a summary of the remedial works to be carried out along the Turbine Delivery Route (TDR) to facilitate the delivery of the Wind Turbine Components (WTC) to the site of the proposed Knockanarragh Wind Farm without any obstructions from street furniture, natural elements and utilities along the route. A total of 13 nodes have been identified and swept paths run at these locations. Where potential obstructions are foreseen at nodes, mitigatory measures are proposed in the form of temporary removals, relocations and trimming to achieve oversail and passage of WTCs. Aerial photographs and street view images showing possible obstructions have been obtained from Google Maps.

The swept paths and comments shown below are for a 55m trailer carrying an 81m length turbine blade. Other trailer lengths are available.

Longer trailer lengths will result in smaller areas required around the outside of bends for the blade tip to oversail but will require larger areas on the inside of bends to allow the trailer body to pass.

Shorter trailer lengths will result in larger areas required around the outside of bends for the blade tip to oversail but will require smaller areas on the inside of bends to allow the trailer body to pass.

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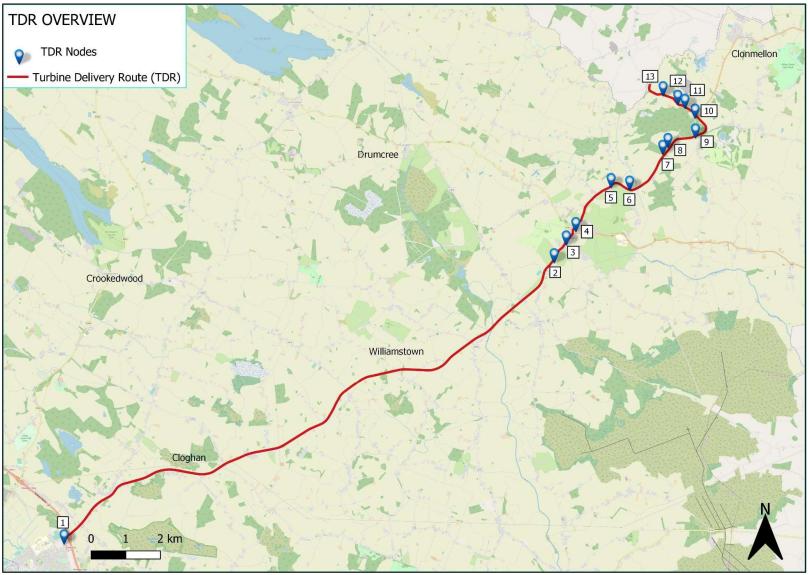
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Appendix 1 - Drawings

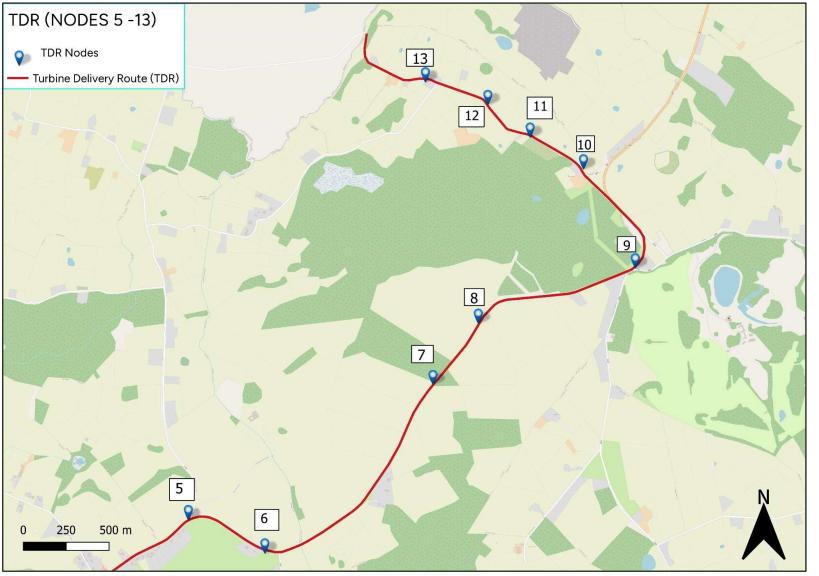
Acronyms and Abbreviations

TDR	Turbine Delivery Route
SPA	Swept Path Analysis
WTC	Wind Turbine Components









1.0 NODE 1: N4/N52 Delvin Road Roundabout



Figure 1-1: TDR works on N4 Westbound Slip Road Approach

- Trimming of Trees and Hedges as necessary.
- Temporary removal of traffic signs as necessary.
- Temporary surface to be provided to allow for overrun of roundabout.
- Existing ground level to be checked for oversail clearance.

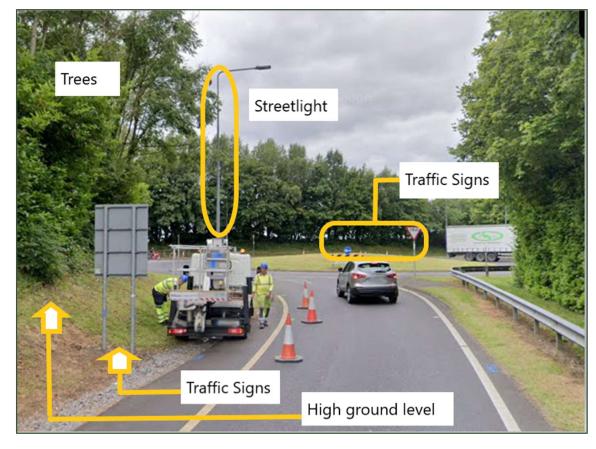




Figure 1-2: TDR works on N52 Northbound Approach (from Mullingar)

- Trimming of Trees and Hedges as necessary.
- Temporary removal of streetlight if required.
- Temporary removal of road signs on splitter island.
- Provision of temporary surface on roundabout.

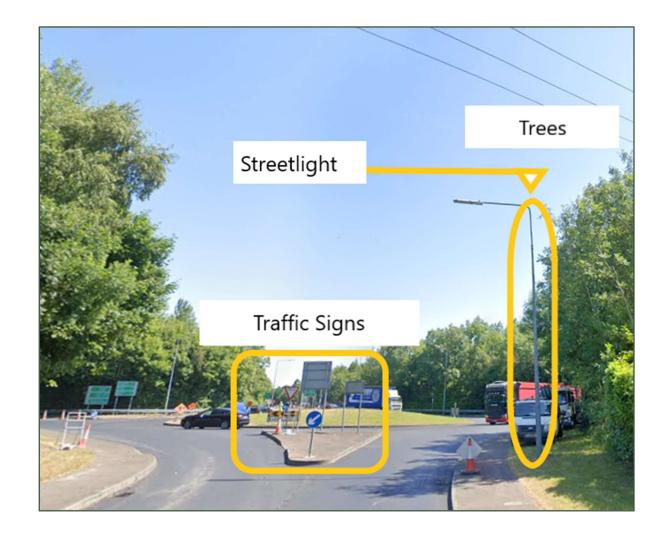


Figure 1-3: TDR Works on N4 Westbound On-Slip

- Temporary removal of traffic signs.
- Footway overrun.
- Trimming of trees as necessary.



Figure 1-4: TDR Works on N4/ N52 Delvin Road Roundabout - Central Island

• New roadways across central island.





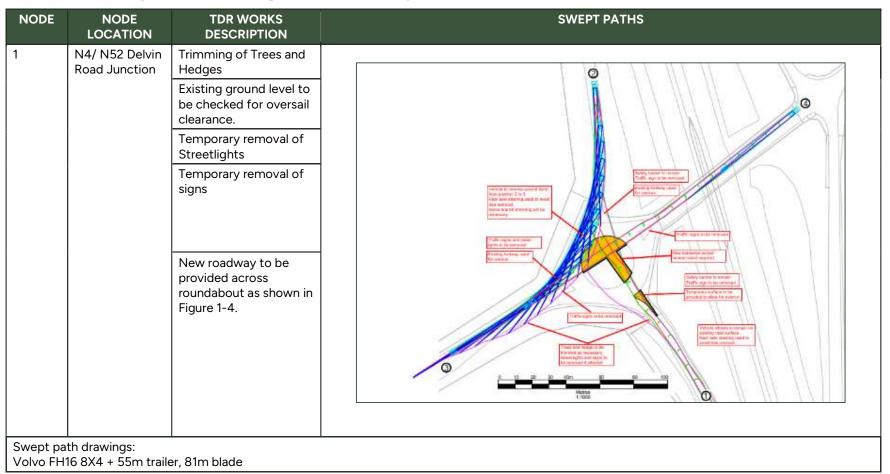


Table 1: Summary of Works along Turbine Delivery Route (Node 1)

2.0 NODE 2: Along N52 Delvin Road





Figure 2-1: TDR Works along N52 Delvin Road

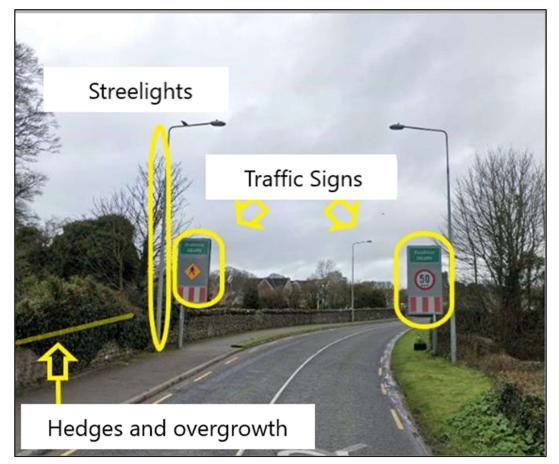
• Possible temporary removal of street lighting





Figure 2-2: TDR Works on N4/ N52 Junction

- Trimming of Hedges and overgrowth to wall and height of wall checked for oversail.
- Temporary removal of street lighting west side of road to be removed, east side of road to be checked during test run.
- Temporary removal of traffic signs including post on west side of road, post on east side of road to be checked during test run.



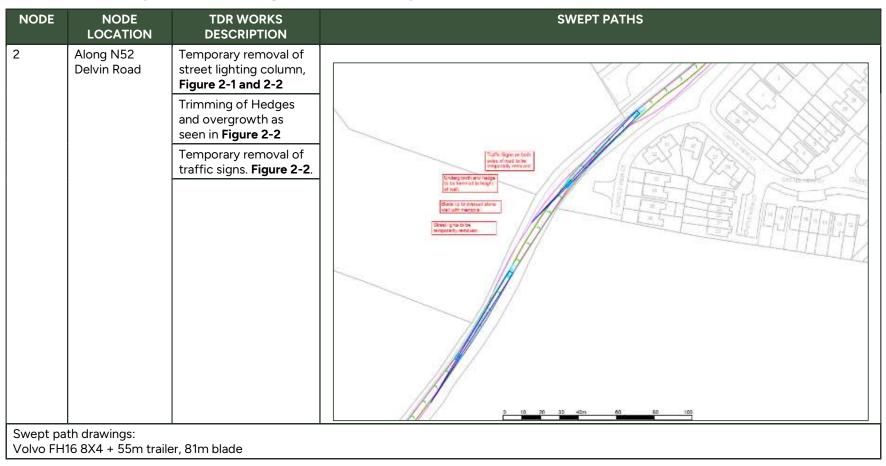


Table 2: Summary of Works along Turbine Delivery Route (Node 2)



3.0 NODE 3: Along N52 Main Street, Delvin

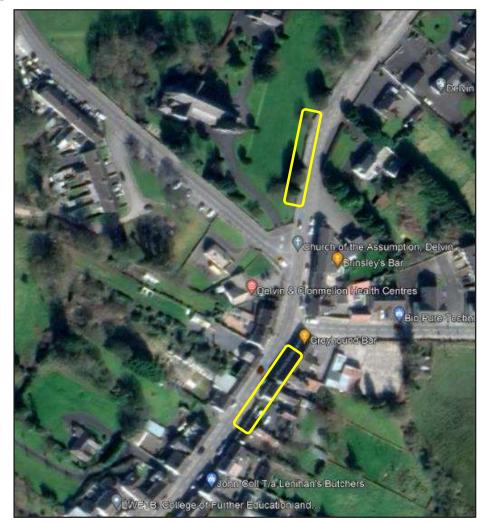


Figure 3-1: TDR Works along Main Street Close to N51 Athboy Road

- Temporary Removal of Flagpole / hanging basket holder.
- Check pub signs during test run and temporarily remove if necessary.
- Reposition telegraph pole and streetlight to back of footway.
- Reposition to back of footway or temporary removal of street lighting.
- Temporary removal of finger post signs at junction.

All works to be confirmed by vehicle test run.

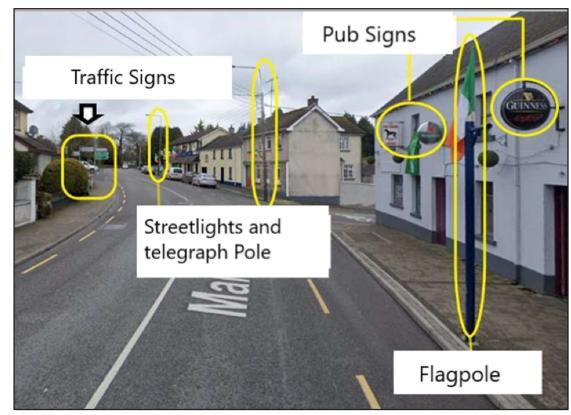
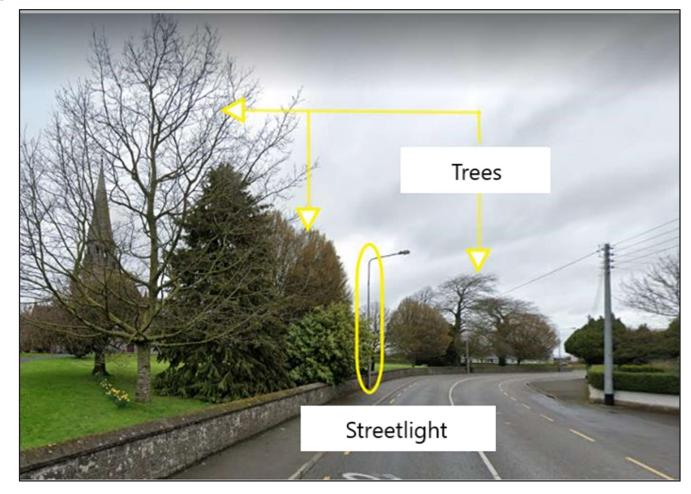




Figure 3-2: TDR works along Main Street beside Church of Assumption Perimeter Fence

- Trimming of trees to boundary (Tie back if possible).
- Trimming of trees in distance to boundary.
- Temporary removal of street lighting.



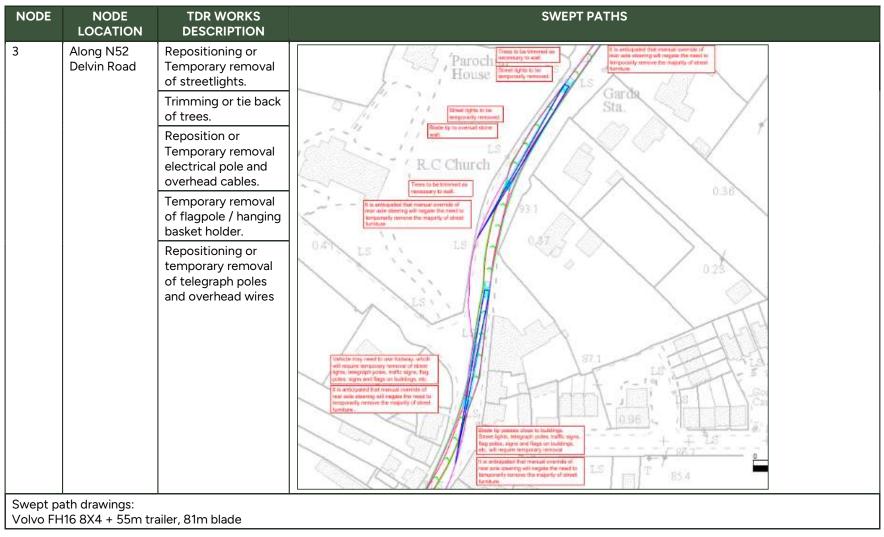


Table 3: Summary of Works along Turbine Delivery Route (Node 3)

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4.0 NODE 4: N52 Clonmellon Road North of Delvin Along N52

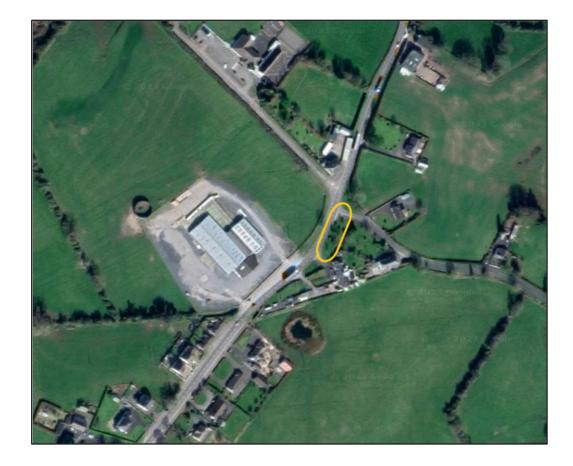
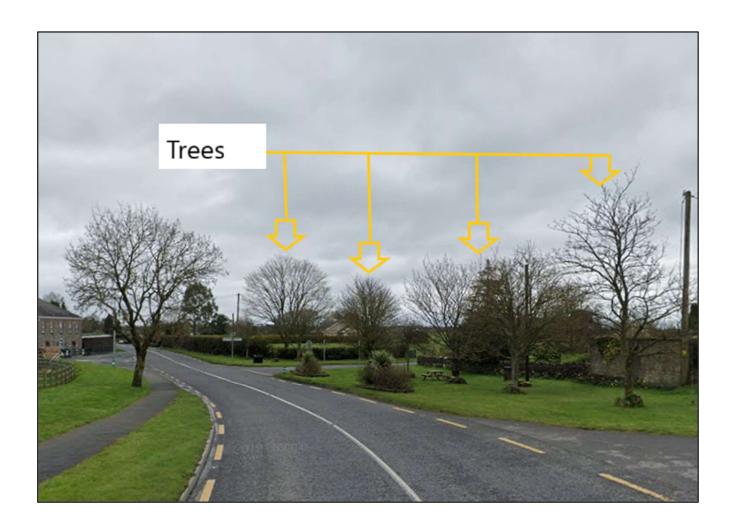




Figure 4-1: TDR Works Close to N52/ Moore's Road Staggered Junction

• Trees on verge to be trimmed as necessary.



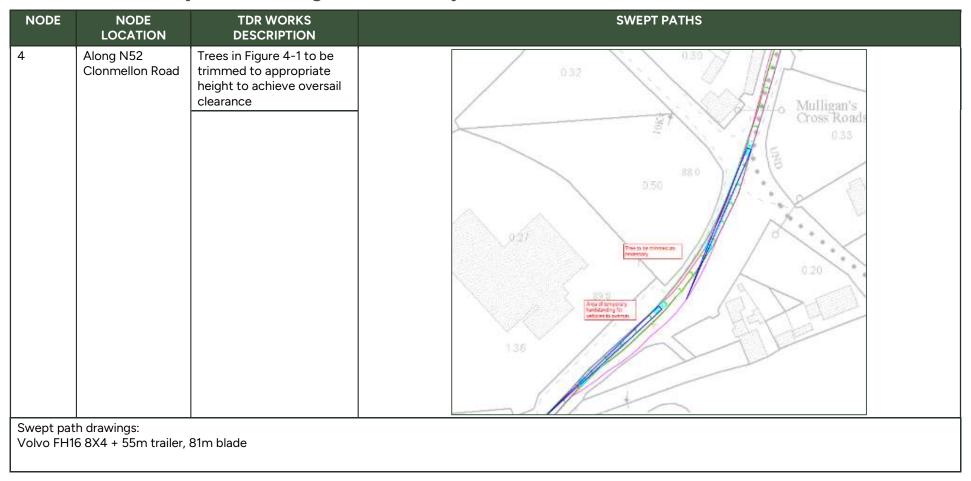


Table 4: Summary of Works along Turbine Delivery Route (Node 4)

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5.0 NODE 5: N52 Bend at Robinstown Little

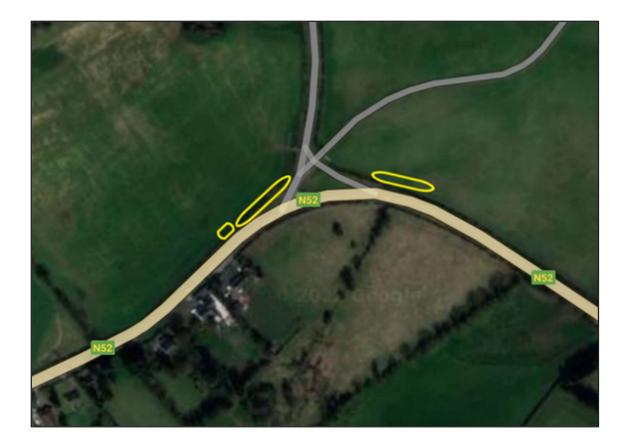




Figure 5-1: TDR works along N52 after Bend at Robinstown Little Junction

• Temporary removal of two Traffic signs

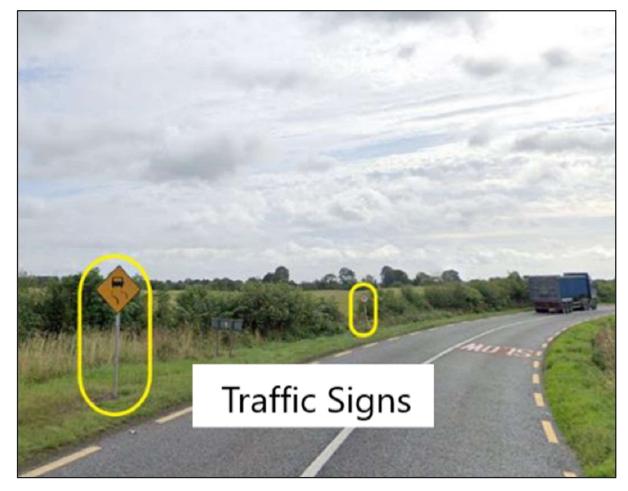
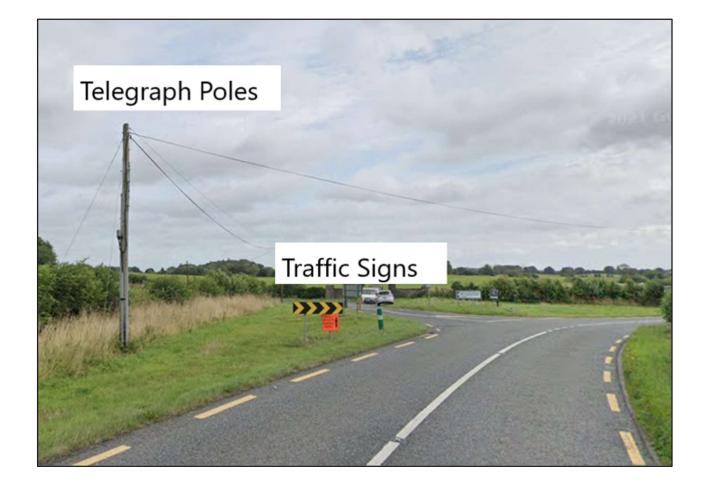


Figure 5-2: TDR works at N52/L1532 Junction in Robinstown Little

- Temporary removal of two Traffic signs
- Telegraph pole may require temporary removal



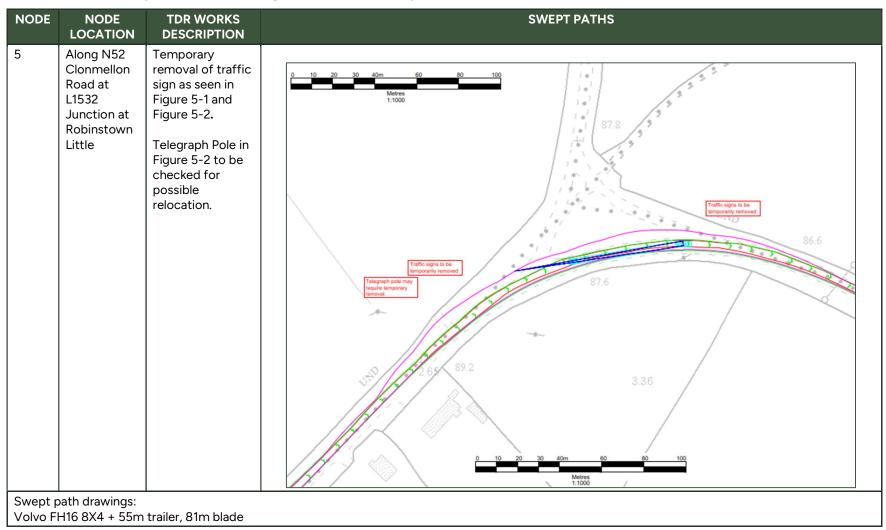


Table 5: Summary of Works along Turbine Delivery Route (Node 5)

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6.0 NODE 6: N52 Bend by Robinstown Little junction

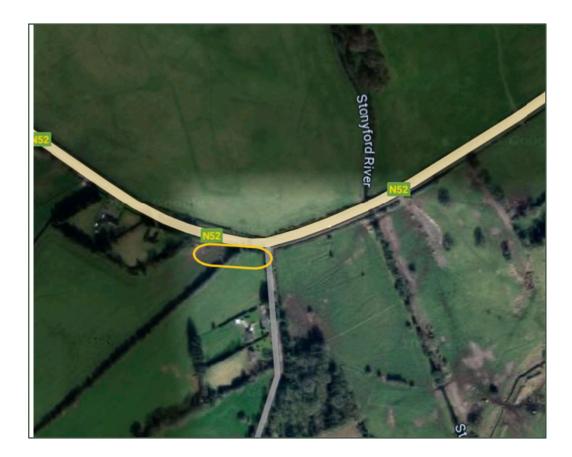
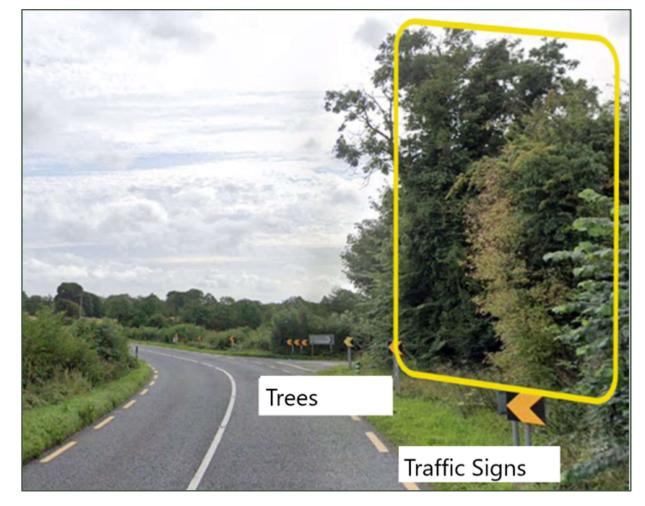




Figure 6-1: TDR works on along N52 Clonmellon Road

- Trimming of trees as necessary to achieve oversail clearance.
- Temporary removal of traffic signs





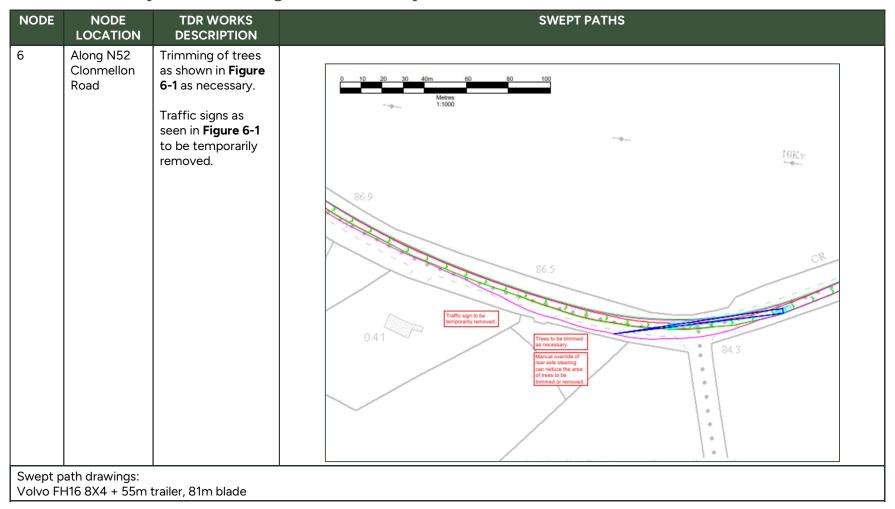


Table 6: Summary of Works along Turbine Delivery Route (Node 6)

7.0 NODE 7: N52 Access for Wind Farm Site





Figure 7-1: TDR Works on Existing Access Along N52

- Hedges within visibility splay to be trimmed.
- Trees to be trimmed to allow oversail of verge by the blade tip.



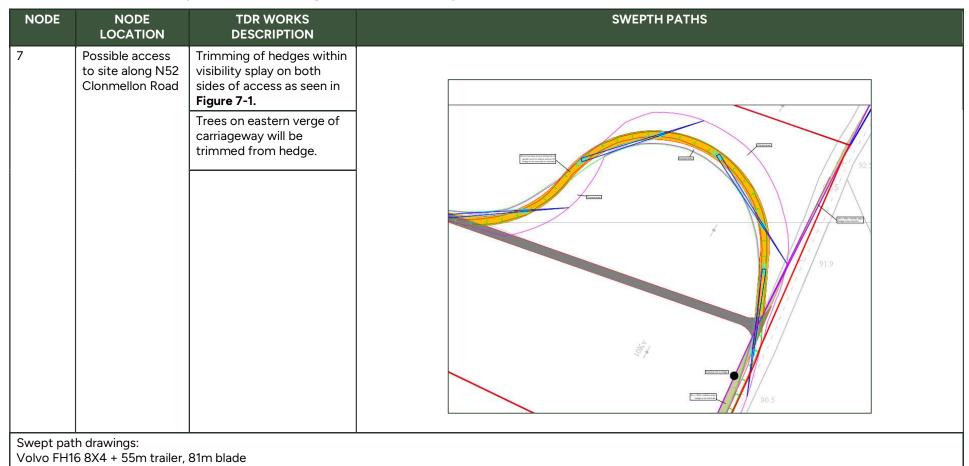


Table 7: Summary of Works along Turbine Delivery Route (Node 7)



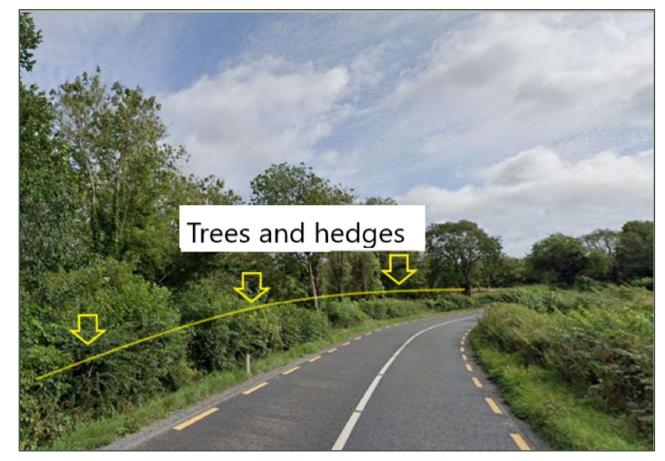
8.0 NODE 8: Bend along N52 Clonmellon Road





Figure 8-1: TDR Works on N52 Bend (Node 8)

• Trimming of hedges as necessary to allow oversail.





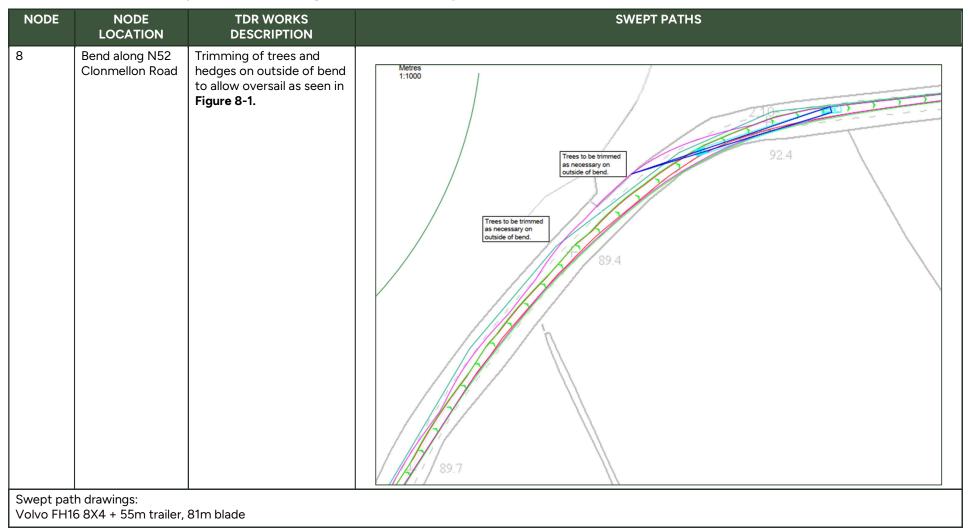


Table 8: Summary of Works along Turbine Delivery Route (Node 8)

9.0 NODE 9: Bend along N52 Clonmellon Road

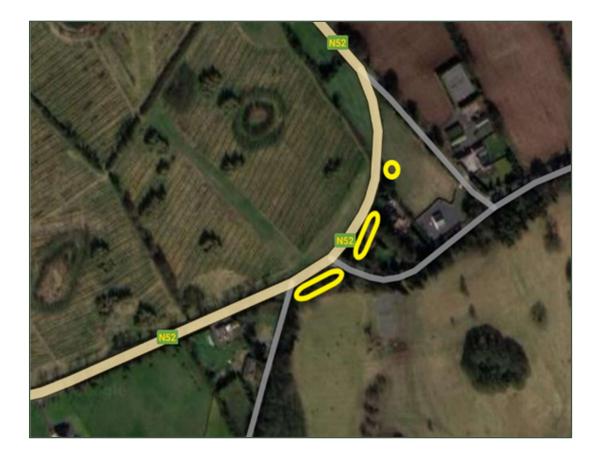




Figure 9-1: TDR Works on N52 Bend (Node 9)

- Trimming of trees as necessary on the outside of the bend. (or tie back of branches if possible)
- Temporary removal of six traffic signs.

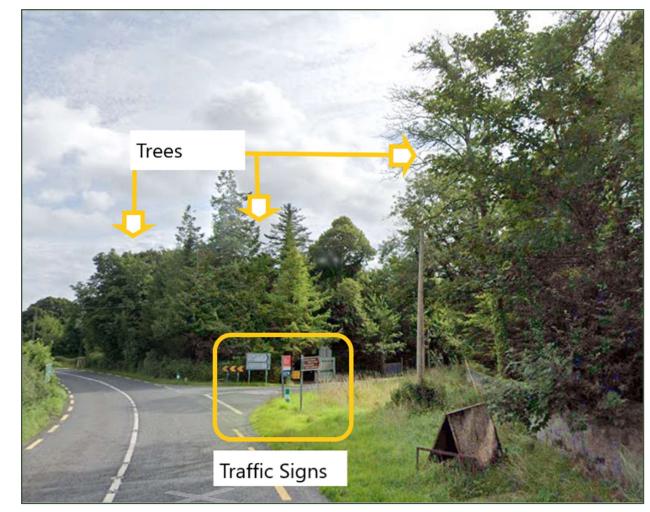


Figure 9-2: TDR Works on N52 Bend (Node 9)

- Relocation of telegraph poles on both sides of the road and overhead cables.
- Trees to be trimmed as necessary.
- Hedge on the inside of bend may require trimming.

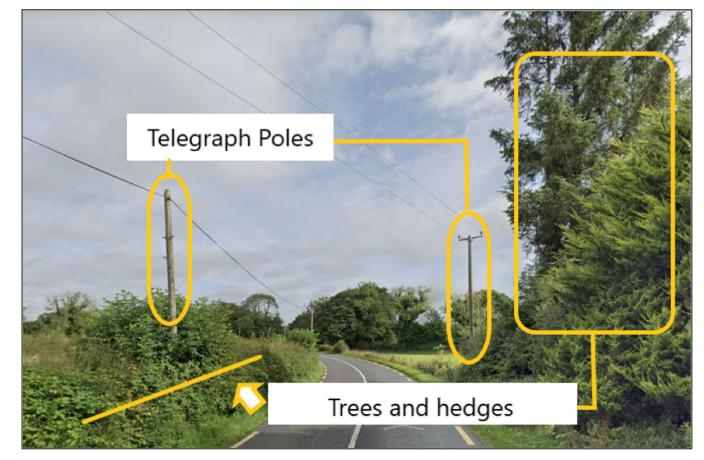
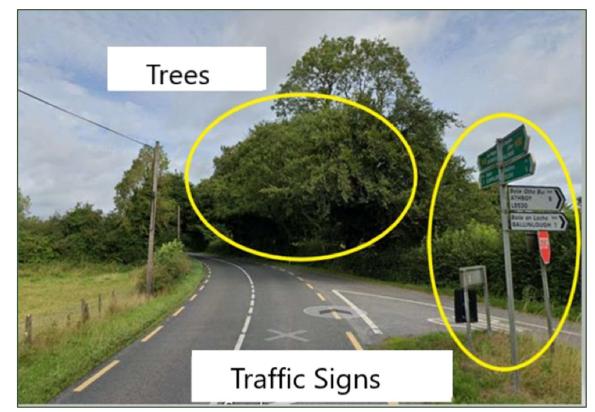


Figure 9-3: TDR Works on N52 Bend (Node 9)

- Raising of tree canopy to allow for unhindered passage of delivery vehicle.
- Temporary removal of directional signs.



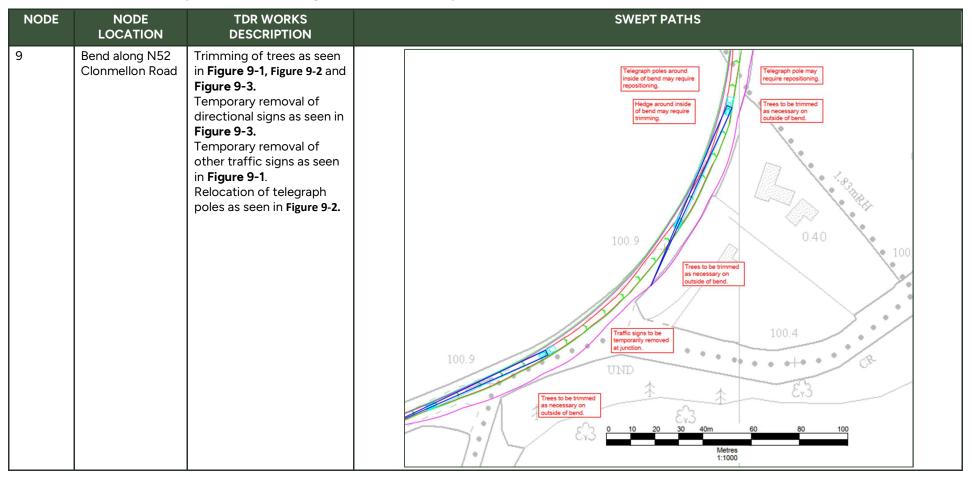
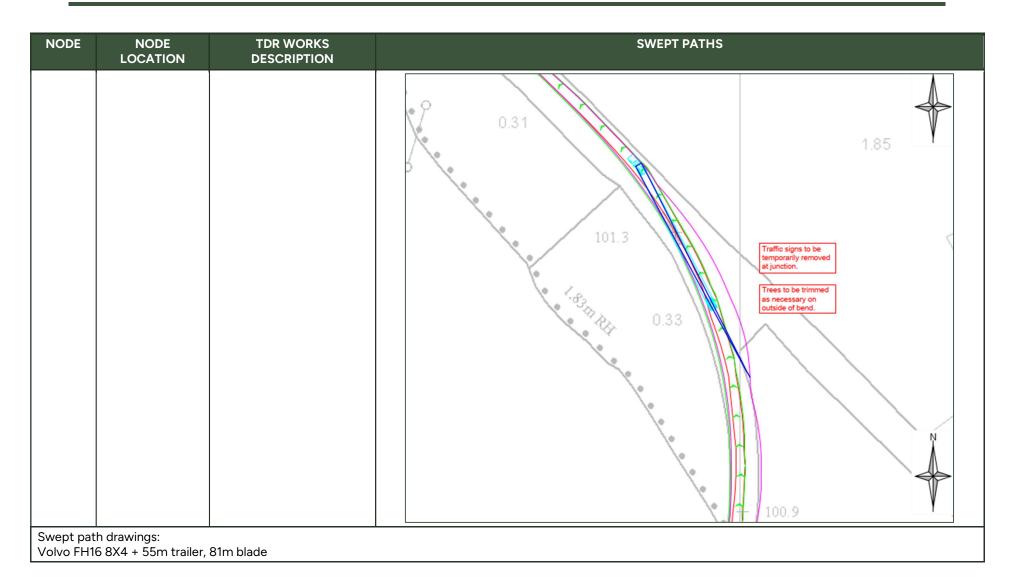


Table 9: Summary of Works along Turbine Delivery Route (Node 9)





10.0 NODE 10: Along L5542 Road





Figure 10-1: TDR Works on along L5542

- Raising of tree canopy to allow for unhindered passage of delivery vehicle.
- Existing road widened to accord with turbine manufacturer's transport requirement.
- Trees and hedges to be trimmed as necessary.



Figure 10-2: TDR Works on along L5542

- Trees to be trimmed as necessary.
- Raising of tree canopy to allow for unhindered passage of delivery vehicle.
- Telegraph poles to be relocated as necessary.

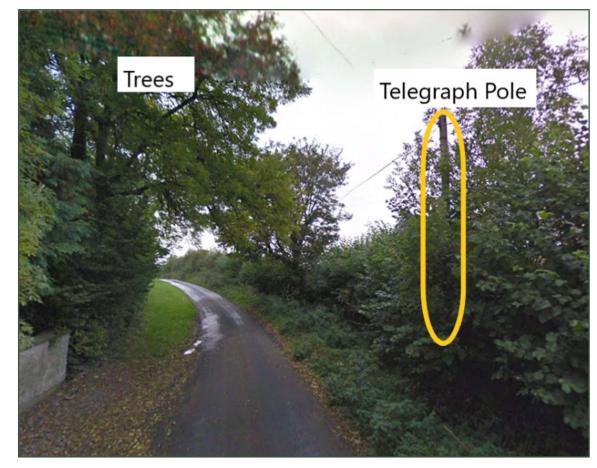


Figure 10-3: TDR Works on along L5542

- Overhead wires to be checked for clearance and repositioned or raised as appropriate.
- Existing road widened to accord with turbine manufacturer's transport requirement.
- Raising of tree canopy to allow for unhindered passage of delivery vehicle.





NODE	NODE LOCATION	TDR WORKS DESCRIPTION	SWEPT PATHS
10	Along L5542 Road	 Raising of tree canopy as seen in Figure 10-1 and Figure 10-2. Trimming of trees as seen in Figure 10 1 and Figure 10 2. Overhead cables along route as seen in Figure 10-3 to be checked for oversail clearance. 	Fond 0.75 0.22 0.24 0.22 0.28 0.24 0.22 0.28 0.47 0.49
Swept pa Volvo FH	th drawings: 16 8X4 + 55m traile	r, 81m blade	

Table 10: Summary of Works along Turbine Delivery Route (Node 10)

11.0 NODE 11: L5542 Site Access South

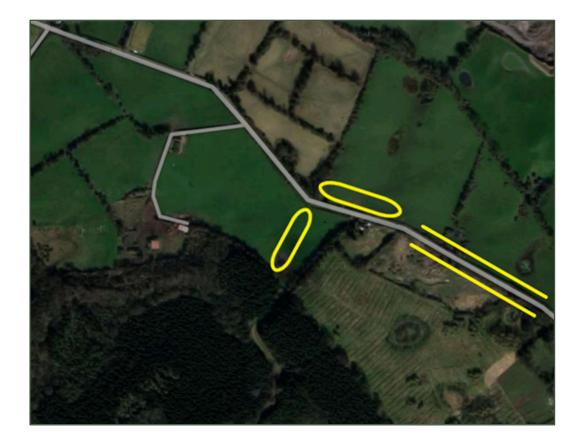




Figure 11-1: TDR Works on Approach to L5542 South Access

• Existing road widened to accord with turbine manufacturer's transport requirement.

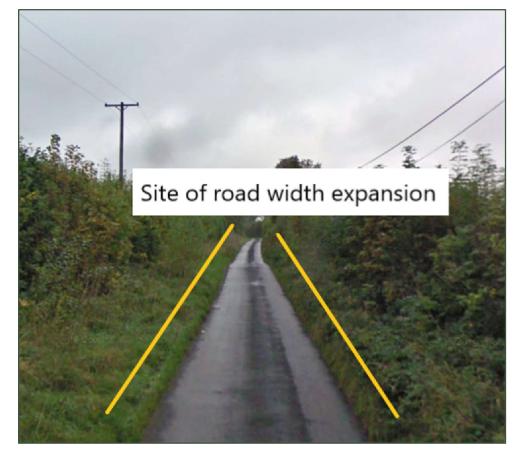


Figure 11-2: TDR Works at L5542 South Access

• Blade tip to be raised to oversail hedges on both sides of the road.

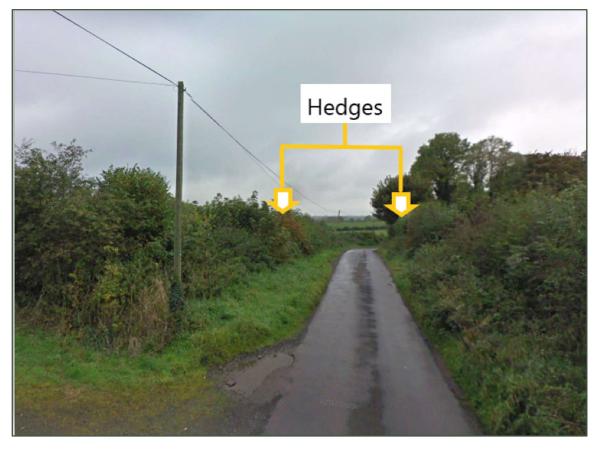




Figure 11-3: TDR Works along L5542 after South Access

• Blade tip to be raised to oversail hedges on both sides of the road.



NODE	NODE LOCATION	TDR WORKS DESCRIPTION	SWEPT PATHS
11	Along L5542 Road North Access	Road width to be widened throughout to accord with turbine manufacturer's transport requirements. Blade tips will be raised to oversail hedges at access. Tree canopies to be raised as necessary to allow passage of WTC delivery.	CARNYBI O 40 O 40
	th drawings: 16 8X4 + 55m tr	ailer, 81m blade	

Table 11: Summary of Works along Turbine Delivery Route (Node 11)



12.0 NODE 12: L5542 Bends

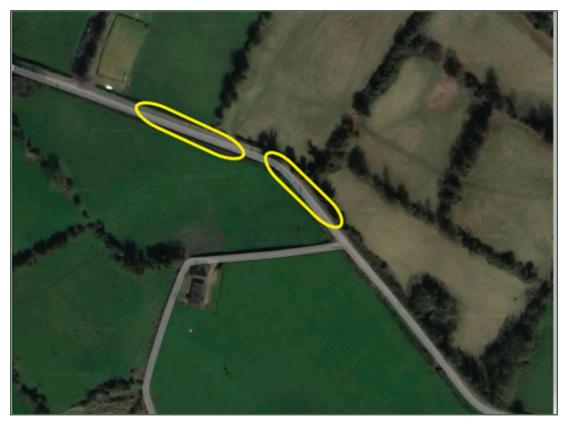




Figure 12-1: TDR Works on L5542 Bend

Where new road leaves the existing road.

- Telegraph poles to be relocated as necessary.
- Wall to be demolished and re-built to suit new access.
- Gaps to be created in hedge.
- Existing road widened to accord with turbine manufacturer's transport requirement.
- New roadway across field to avoid corner.

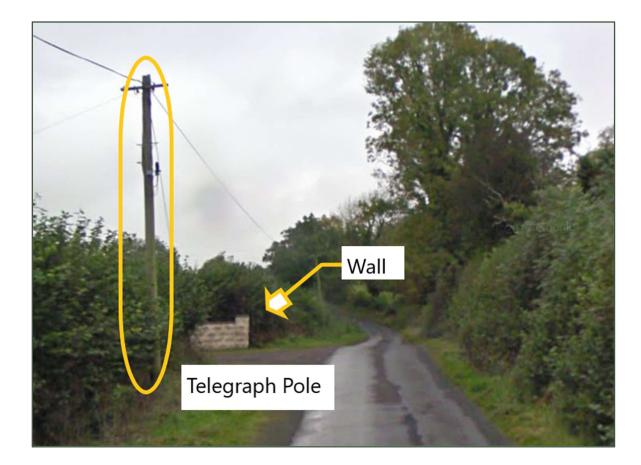
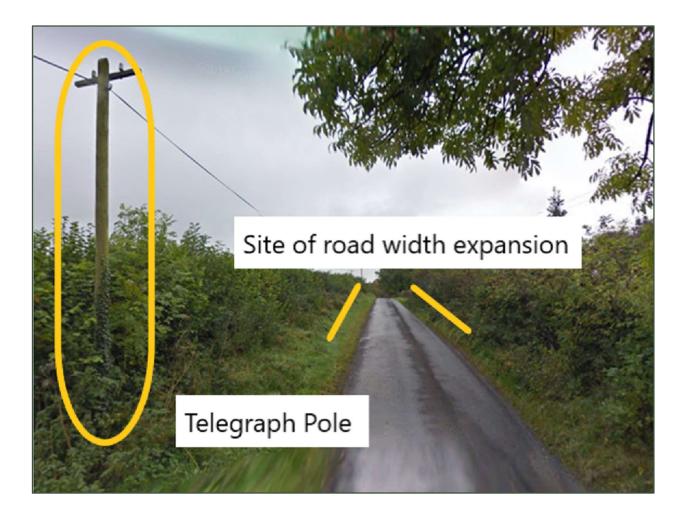


Figure 12-2: TDR Works on L5542 Bends

Where new road re-joins the existing road.

• Overhead cables and telegraph poles may need to be repositioned.





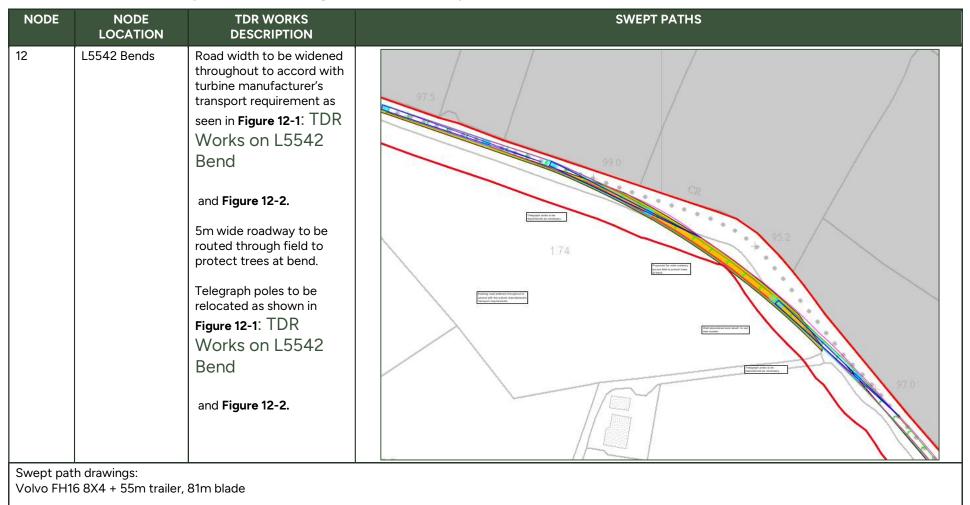


Table 12: Summary of Works along Turbine Delivery Route (Node 12)

13.0 NODE 13 – Site Access North





Figure 13-1: TDR Works along L5542 Site Access North

- New road to continue into area of trees ahead to avoid bend.
- Trees and hedges to be removed and trimmed as necessary.
- Telegraph poles to be relocated as necessary.
- Building to be demolished and re-built to suit new access.
- Existing road widened to accord with turbine manufacturer's transport requirement.

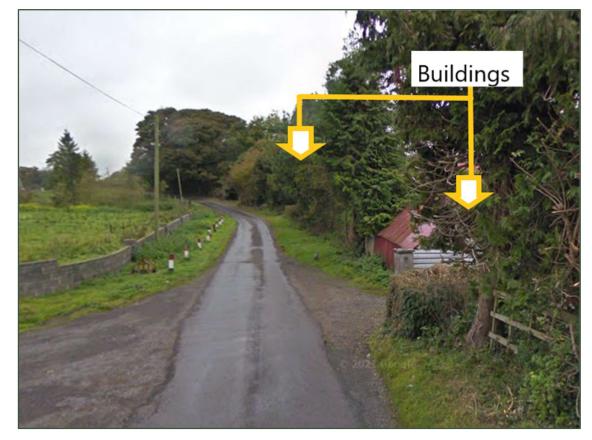


Figure 13-2: TDR Works along L5542 Site Access North

- New road to be built in field.
- Hedge to remain wherever possible but trimmed to enable blade tip to oversail.



NODE	NODE LOCATION	TDR WORKS DESCRIPTION	SWEPT PATHS
13	L5542 Site Access North	New access road to be constructed for turbine deliveries to avoid bend. Blade tip to oversail existing building as shown in Figure 13-1 and oversail hedges and public road as shown in Figure 13-2 . Access to be wide enough to accommodate passage of two vehicles.	1.57 Romad School S
	th drawings: 16 8X4 + 55m trailei	r, 81m blade	

Table 13: Summary of Works along Turbine Delivery Route (Node 13)

14.0 Summary Table of Works

NODE	NODE LOCATION	DESCRIPTION	TEMPORARY WORKS
1	N4/ N52 Delvin Road Junction Movement shown on Drawing 405- 02036-00812-N1 R0	Trimming of trees and hedges Existing ground level to be checked for oversail clearance. Temporary removal of Streetlights Temporary removal of signs	 Development within the road required: The central island of the roundabout will need to be flattened temporarily and reinstated once deliveries are complete. Overrun areas required. Trimming of vegetation required. traffic signs and streetlights need to be temporarily removed and reinstated upon completion.
2	Along N52 Delvin Road Movement shown on Drawing 405- 02036-00812-N2 RO	The vehicle is shown as being able to pass through the bend as it enters the village without requiring any land for the blade tip to oversail. The verge on the eastern side of the road is not shown, but it is clear that it will be oversailed. However, given the width of the footway and space on the western side there is no need to provide any hardstanding. The only works necessary will be the temporary removal of gateway signs as they are too high to be oversailed. Streetlights can remain on the eastern side; the western side will be subject to confirmation during the vehicle trial run. There is a lot of Ivy on the wall on the western side, this too might require removal or reducing its height, but again can be confirmed at vehicle trial run.	Temporary removal of gateway signs and streetlights Ivy / vegetation to be trimmed as necessary. Streetlight and signs to be reinstated upon completion of deliveries.
3	Along N52 Delvin Road Movement shown on Drawing 405-	Entering the first bend by the crossroads the blade tip will swing out and pass very close to the buildings including the pub. The streetlight outside the pub will need to be removed, along with possibly the signs on the pub building.	Streetlights will require temporary removal. Signs require, telegraph poles, flags on buildings will need to be removed temporarily.

NODE	NODE LOCATION	DESCRIPTION	TEMPORARY WORKS
	02036-00812-N3 R0	The telegraph pole on the inside of the bend should be able to remain but will need confirmation at trial run.	
		The reverse bend at the church will result in the blade tip swinging out and following the road boundary.	
		The streetlight will require temporary removal.	
		It may be possible to tie back the conifer and other shrubs that overhang the wall, rather than trimming its branches. Another tree may need branches trimmed back	
4	Along N52 Clonmellon Road	The boundary where the low hedge on the eastern side of the road is not shown on the OS Mapping, therefore there is a risk the blade tip will oversail this boundary (to be confirmed at trial run stage).	Tree trimming required.
	Movement shown on Drawing 405-	However, the hedge is low and will not require any trimming (the blade tip will be over 2m in the air).	
	02036-00812-N4 R0	The branches of this tree on the western verge are likely to require trimming.	
5	Along N52 Clonmellon Road	Entering the bend, the telegraph poles on the outside of the bend are likely to require removal as this area is oversailed by the blade tip.	Removal of a telegraph poles
	by Robinstown Little Junction	Continuing around the bend the traffic signs will all be oversailed by the blade tip, however these may not require removal as they should be low enough to allow the blade tip to pass over the top of them, (to be	
	Movement shown on Drawing 405- 02036-00812-N5 R0	confirmed at the vehicle trial run).	
6	Along N52 Clonmellon Road	As the vehicle travels around the bend the blade tip will oversail the verge on the outside of the bend.	Based on trimming only required.
	Movement shown on Drawing 405-	The second field immediately before the junction is bounded by trees and shrubs, these will need to have branches trimmed and a few may need to	

Technical Appendix 14-1 Turbine Delivery Route Works Report

NODE	NODE LOCATION	DESCRIPTION	TEMPORARY WORKS
	02036-00812-N6 R0	have their height lowered to allow the blade tip to pass over the top of them.	
		The traffic signs are all low enough to allow the blade tip to pass over the top of them.	
		On the inside of the bend there is a low hedge, this may need flailing back to allow the trailer body to pass.	
7	Access to site along N52 Clonmellon Road	The access is designed with a slow turn in the location of the existing field access to avoid removing the hedge along the eastern side of the N52 and limit the length of the hedge to be removed along the western side of the N52.	Based on the fact that this is an access point. NODE 7 drawing to be revised.
	Movement shown on Drawing 405- 02036-008112-N7	The slow turn for the abnormal load vehicles ensures that the blade tip does not touch the more mature trees along the eastern side of the road. However, some trimming of branches may be inevitable.	Revision requires boundary hedge to be trimmed, but not removed.
	4	The slow turn will require a large turning circle in the field, this will be for the use of the abnormal load deliveries only. Normal construction traffic will use a standard layout junction provided at the same location.	
8	Bend along N52 Clonmellon Road	As the vehicle travels around the bend the blade tip will oversail the western verge and hedge. Within the hedge there are a small number of trees that will require trimming.	Based on tree removal.
	Movement shown on Drawing 405- 02036-00812-N8 R0	The hedge itself will require minimal work; it appears to be low enough to allow the blade tip to pass over the top of it.	
9	Bend along N52 Clonmellon Road	As the vehicle travels around the bend the trailer will cut in and cross the verge on the inside of the bend and the blade tip will swing out over the	Traffic signs will need to be removed.
		verge on the outside of the bend.	Possible tree trimming
	Movement shown on Drawing 405-		Signs to be reinstated upon completion of deliveries.

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NODE	NODE LOCATION	DESCRIPTION	TEMPORARY WORKS
	02036-00812-N9 R0	The first part of the bend, between the two junctions, the blade tip will pass close to the boundary, however at this location the verge is clear and there are no trees that overhang the boundary.	
		The traffic sign and wall are both low enough for the blade tip to pass over them. The sign and the hedge on the inside of the bend will be checked during the vehicle trial run.	
		After the second junction, the blade tip skirts the boundary, here there are trees that overhang the boundary.	
		It may be possible to tie back the conifer branches, however the other trees will need to be trimmed to the boundary. The hedge and traffic signs appear to be low enough to be passed over by the blade tip.	
		The sign, telegraph pole and hedge along the inside of the bend will need to be trimmed and repositioned as determined during the vehicle trial run.	
		There is a short gap with a low maintained hedge for the residential property then there are trees again. Before an open field	
		the telegraph poles and hedge along the inside of the bend will need to be trimmed and repositioned as determined during the vehicle trial run.	
		Across the open field the boundary is a simple fence, that will be oversailed by the blade tip, there is an overhead power pole that will need to be repositioned.	
		The telegraph poles and hedge along the inside of the bend will need to be trimmed and repositioned as determined during the vehicle trial run.	
		At the end of the field the blade tip over sails the boundary into an area with trees and some trimming of branches will be required.	
		The finger post traffic sign may not be low enough, so is likely to require temporary removal, however the other signs should be ok.	
		The sign, telegraph poles and hedge along the inside of the bend will need to be trimmed and repositioned as determined during the vehicle trial run.	

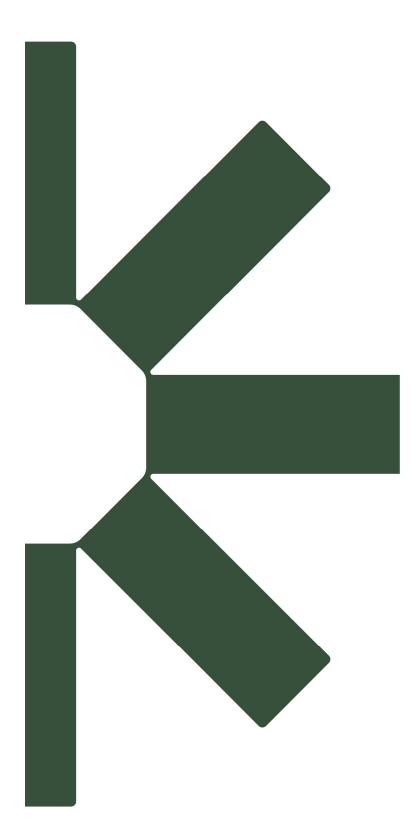
NODE	NODE LOCATION	DESCRIPTION	TEMPORARY WORKS
10	Along L5542 Road	Throughout, branches will need to be trimmed to ensure that there is enough headroom for the taller vehicles to pass through.	A few trees needing to be removed and telegraph poles repositioned. The road needs to be raised.
	Movement shown on Drawing 405- 02036-00812- N10 4	Opposite the first junction the blade tip will swing across to the southern boundary, branches will need to be trimmed as necessary, though this could just be limiting the height to allow the blade tip to pass over the top of the hedge.	
		The trailer will brush against the conifer at the second bend, branches will need to be tied back if possible.	
		On the outside of the bend trees and the hedge will need to be trimmed as necessary with a few trees needing to be removed.	
		There are telegraph poles in the hedge to the north side of the road, which may require removal.	
		The hedge along the north side of the road will need to be trimmed as necessary with a few trees needing to be removed or reduced in height.	
		The tree canopy overhanging the road needs to be raised.	
		Permanent road widening.	
11	Along L5542 Road South Access	After the vehicle passes through the first bend, the blade tip will swing out and pass over the existing hedge. The hedge will require to be trimmed so that the blade can pass over the top of it.	Telegraph poles in the hedge will require repositioning at two locations.
	Movement shown	Telegraph poles in the hedge will require repositioning.	Oversail at this location. Approach to oversail tbc.
	on Drawing 405- 02036-00812-N11 4	After the bend, vehicles need to enter the site to the south, due to a cottage the turn is quite sharp, and the blade tip will swing out over the hedge to the north of the lane. The hedge will require to be trimmed so that the blade can pass over the top of it.	
		Telegraph poles in the hedge will require repositioning.	
12	L5542 Bends	In this location a bypass road is proposed to avoid the bend, this is to avoid removing mature trees on the outside of the bend.	Crossing the field/ enter and exit the field. Telegraph poles to be repositioned. Include cable.

NODE	NODE LOCATION	DESCRIPTION	TEMPORARY WORKS
	Movement shown on Drawing 405- 02036-00812-N12	As the vehicle enters the bypass road the blade tip will swing out towards the hedge, however nothing more than trimming should be required.	
	4	The new roadway is accessed via an existing entrance, the stone wall will need to be removed to create the access.	
		Where the roadway rejoins the road, a gap will need to be created in the hedge.	
		Overhead cables and telegraph poles will need to be repositioned.	
13	L5542 Site Access	Some tarmac road widening is required as indicated in orange.	Site Access – to be included in red line.
	North Movement shown on Drawing 405- 02036-00812-N13 4	The blade tip should be high enough to over sail the red tin garage building, but the conifer tree adjacent to it will need to be removed, along with the other trees that front the road (some of these may have already been felled).	
		The Streetview image is dated 2009, and at that time the red tin building was in poor condition, along with some of the other buildings, if it is still like this then it may be prudent to offer to rebuild them than work around them (after the deliveries have been made).	
		The road is widened right up to two stone buildings, the trees around the first one will need to go, whereas at the second building the road passes into the woods. Heading into the woods this tree is probably likely to need to go, this would be the most significant in this area, but it will depend on where its trunk is as it may be possible to pass it by just raising of the canopy.	
		The road will be designed as straight as possible and so that it passes the end the old school building similar to how it passes the previous buildings, the trees between the building and the road will need to be removed.	
		The new road will be designed to be in the field behind the existing hedge.	
		A lot of overhead services will need to be removed or repositioned, including a small transformer.	

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NODE	NODE LOCATION	DESCRIPTION	TEMPORARY WORKS
		The blade tip will brush up against the hedge / trees on the south side of the road, some branch trimming may be necessary, but no trees will need removal.	





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