Appendix 11.6 AECOM Transportation: Haulage Route Assessment

EirGrid 400/110kV Transformer; Proposed Haulage Route Assessment

Prepared by: .....
Paul Kelly
Graduate Consultant

Checked by: .....
Michael Dunne
Principal Consultant

Approved by: .....
Stephen Reid
Associate Director

EirGrid 400/110kV Transformer; Proposed Haulage Route Assessment

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Ground Floor
Grand Canal House
Grand Canal Street Upper
Dublin 4
T: 01 238 3100
F: 01 238 3199
Website: www.aecom.com

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Table of Contents

Introduction and Assessment Methodology

1 Introduction and Assessment Methodology

1.1 Introduction

EirGrid is the statutory Transmission System Operator in Ireland, and as such, have a legal obligation to keep Ireland's electricity grid up to date, operating safely and within capacity. As part of this obligation, reinforcing the transmission network in the Midlands and South East regions has been identified as a key requirement.

Reinforcement in this area will be delivered via the implementation of the 'Laois – Kilkenny Reinforcement Project'. An integral part of this reinforcement project is the construction of a new 400/110 kV substation, the proposed location of which is in Coolnabacky, just north of Timahoe in Co Laois.

The project also involves the implementation of an 110kV extension to an existing 38kV substation in Ballyragget, Co Kilkenny. A new 110kV overhead line between the proposed substation and the existing substation in Ballyragget will also be established. The proposed substation is intended to serve the counties of Laois, Kildare, Kilkenny, Wicklow and Carlow.

Figure 1.1 below shows the proposed location of the new substation and the existing and proposed network of powerlines in the vicinity.

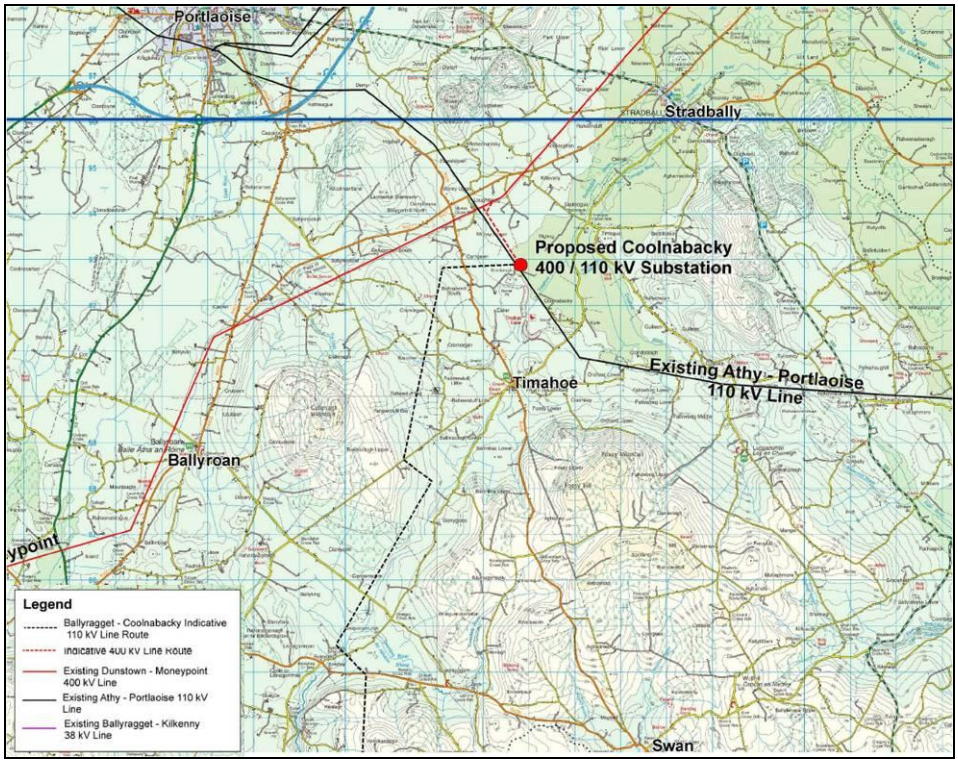


Figure 1.1: Site Location of Proposed Substation

Central to this development and a key component of the reinforcement project as a whole will be the installation of a new 440kV transformer at the proposed substation site. As a highly specialised and extremely large piece of equipment, delivery of this transformer to site will be seen as major milestone in the implementation of the project. The transformer has a volume of 136m³ at 8.4m long, 3.6m wide and 4.5m high. It weighs approximately 222 tonnes and will enter Ireland via Dublin Port. The transportation of such a load to site requires the use of highly specialised equipment, using a designated route on closed roads and under escort from An Garda Síochána.

The purpose of this report is to:

1. Outline the route which will be taken;
2. Locate possible issues on the route by use of Irish Grid co-ordinates; and
3. Identify any hazards at these locations and recommend possible remedial action.

1.2 Route Selection and Assessment Methodology

The selection of a suitable route was constrained by the criteria mentioned above and also by the resident local authorities through which the route would be running, primarily issues will relate to the administrative area of Dublin City Council where the route runs through a large built-up urban area. Dublin City Council (DCC) has strict guidelines in relation to the transportation of abnormal loads through the City. Depending on specific load characteristics there are several possible routes for haulage of outsized and abnormal loads from Dublin Port to sites outside of the City, these are as follows:

i. Via the City Quays and the N4 to the M50;
ii. Via East Wall Road – Alfie Byrne Road – Howth Road – Collins Avenue – Malahide Road and the R139 (former N32) to the M50; or
iii. As per option ii above, but due to overhead height restrictions on Clontarf Road and Howth Road, the alternative route is via Clontarf Road – Windmill Road (Raheny) and onto Collins Avenue via the Howth Road.

After an initial desk study of the potential routes and following consultation with James Moore of Dublin City Council, the most suitable haulage route was identified as option iii (shown in Figure 1.2 below). This was mainly due to bridge height restrictions on other routes and the weight of the load to be transported.

Figure 1.2: Designated DCC Abnormal Load Haulage Route (option iii)

1.3 Route Option iii

The route originates in Dublin Port as it is the point of entry into Ireland for the transformer. From here it will leave the Port via Tolka Quay / Promenade Road, and continue onto East Wall Road before turning right onto Alfie Byrne Road. At the end of Alfie Byrne Road the route swings right where it joins the Clontarf Road and continues along the seafront to the junction of Watermill Road where it turns left. From here it continues uphill along Watermill Road until it meets the R105 Howth Road. It then journeys southbound to Collins Avenue after which the route reverts northbound along the R107 Malahide Road. This road is followed until it reaches Clarehall where the R139 (former N32) is taken westbound as far as the M1/M50 Turnapin interchange (M1 Junction 3) for access to the M50 southbound.

Once on the M50 the route continues southbound to Junction 9 (Red Cow) passing through both Fingal County Council and South Dublin County Council administrative areas. This junction facilitates access to the southbound carriageway of the N7 / M7, which will be followed southbound through both County Kildare and County Laois to Junction 16 (Portlaoise East) where the route will exit the M7.

After exiting the M7, the R425 is taken as this will facilitate a diversion around the southeast side of Portlaoise town. The route continues along the R425 until it connects with the R426. It then follows the R426 to a location just north of Timahoe, here the transformer will be unloaded and prepared for direct transportation to site (see Figure 1.3 below). The total haulage route is approximately 124km in length and will be divided into three sections for assessment purposes:

1. Dublin Port to M50 *(21 km)*
2. M50 to M7 junction16 *(91 km)*
3. M7 southbound off-ramp at junction 16 to site *(12km)*

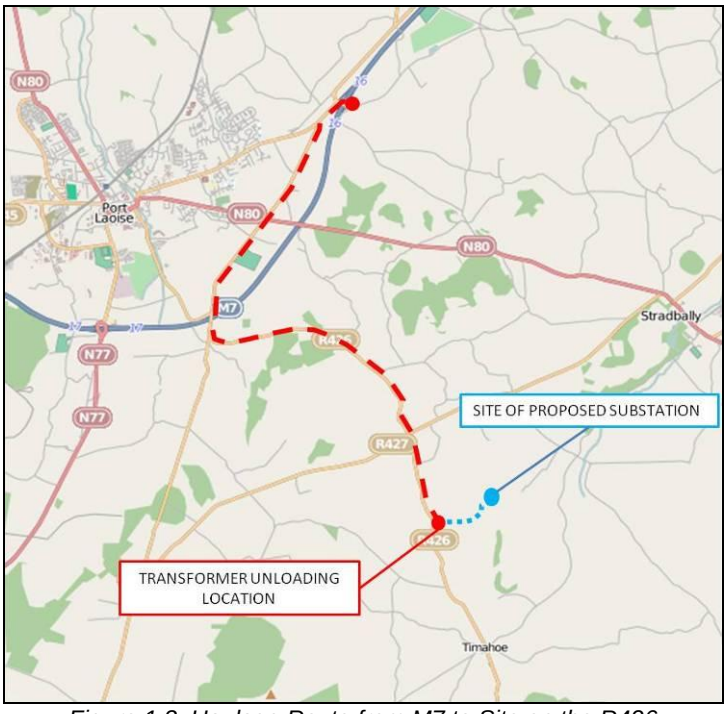


Figure 1.3: Haulage Route from M7 to Site on the R426

The suitability of the designated route was examined by means of a route assessment carried out by AECOM on the 7th of February 2012 which involved the driving the exact route set out in option iii above. The characteristics of the route were noted and photographs taken where it was deemed necessary. A video recording was taken of sections 1 and 3 on the route to provide extra clarity for the client. It was anticipated section 2 of the route (M50 and N7 / M7) would be relatively hazard free and as such would not require a video recording. The weather conditions during the route survey were dry and visibility was clear.

1.4 Report Structure

The following report has been structured in such a way that the identification of issues is presented in a logical and straight forward format. As previously mentioned, the route has been divided into three distinct sections which will be examined separately. Within each section, hazards are identified, locations noted with reference to grid co-ordinates and the location marked on an adjacent map for verification purposes. Suggested remedial measures are also proposed for said issues where applicable.

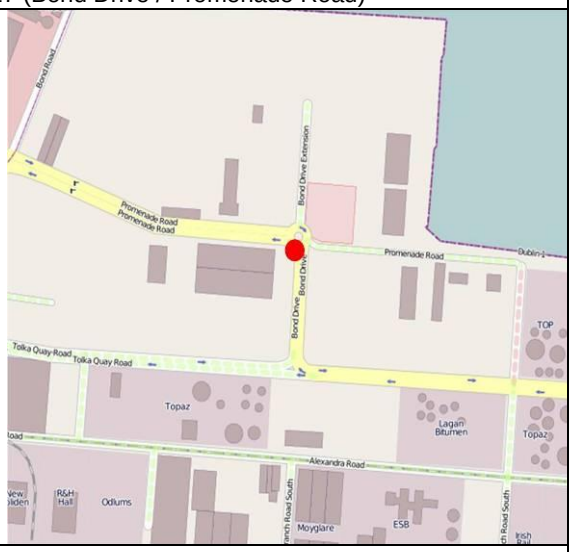
Appendix A of the report provides an indexed list of all issues highlighted in section 2 of the report (Table A1) as well as a list of all local authorities through whose jurisdiction the haulage route will travel (Table A2). Table A3 summarises all structures which will be crossed and which may require structural assessments to be carried out.

Findings of Route Assessment

2 Findings of Route Assessment

2.1 Route Section 1; Dublin Port to M50

Issue 2.1.1

Location Co-Ordinates	53.353523, -6.213927 (Bond Drive / Promenade Road)
	
Possible Issue or Hazard	Turning left at roundabout
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. Two lane entry and exit widths should ensure junction is negotiated successfully.

Issue 2.1.2

Location Co-Ordinates	53.352498, -6.224828 (East Wall Road / Tolka Quay Road)
	
Possible Issue or Hazard	Signal heads mounted on overhead gantry pole.
Remedial Action	Overhead clearance should not be an issue here, however care should be taken when approaching signals nonetheless. If possible, right lane only to be used as signal pole crosses most of the two inside lanes.

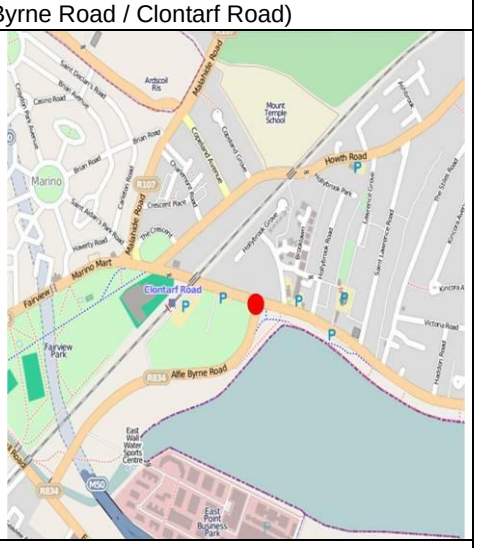
Issue 2.1.3

Location Co-Ordinates	53.352498, -6.224828 (Promenade Road / East Wall Road)
	
Possible Issue or Hazard	Turning right onto East Wall Road
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. If required there is scope to mount the traffic island in the foreground of the above image though this should not be necessary.

Issue 2.1.4

Location Co-Ordinates	53.358261, -6.233883 (McCormack Bridge, Alfie Byrne Road)
	
Possible Issue or Hazard	Structural integrity of McCormack Bridge over Tolka River.
Remedial Action	Up to date structural assessment of Tolka River Bridge may be required prior to journey being undertaken.

Issue 2.1.5

Location Co-Ordinates	53.363166, -6.221952 (Alfie Byrne Road / Clontarf Road)
	
Possible Issue or Hazard	Turning right at onto Clontarf Road.
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. Temporary removal of two lit traffic bollards on central traffic island will facilitate overrun of said island, thereby increasing junction turning radius.

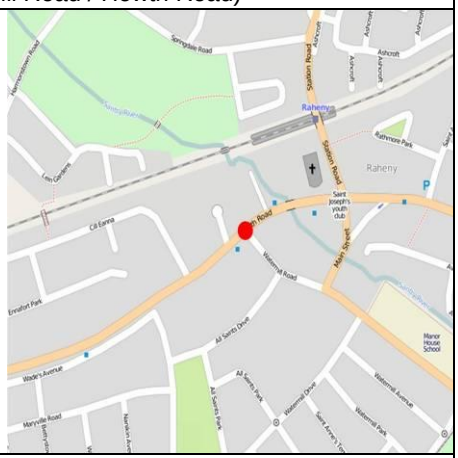
Issue 2.1.6

Location Co-Ordinates	53.374112, -6.164703 (Clontarf Road / Watermill Road)
	
Possible Issue or Hazard	Turning left onto Watermill Road.
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. Manoeuvre made easier as there is no central island on the Clontarf Rd approaching arm.

Issue 2.1.7

Location Co-Ordinates	53.379194, -6.17702 (Northern End of Watermill Road)
 	
Possible Issue or Hazard	Parked cars along Watermill Road.
Remedial Action	Care to be taken along this section of Watermill Road due to car parking on both sides of road. If possible, liaise with local authority (Dublin City Council) prior to undertaking journey and request a restriction on car parking at time of transportation.

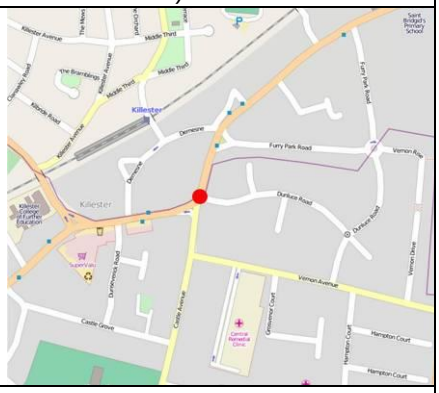
Issue 2.1.8

Location Co-Ordinates	53.379821, -6.178286 (Watermill Road / Howth Road)
 	
Possible Issue or Hazard	Turning left onto the R105 Howth Road
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. As can be seen above there is very wide footpath on the left which offers good opportunities for overrun following the temporary removal of traffic signage. Central island present upon entry to Howth Road which will probably require the temporary removal of two lit traffic bollards to facilitate this manoeuvre.

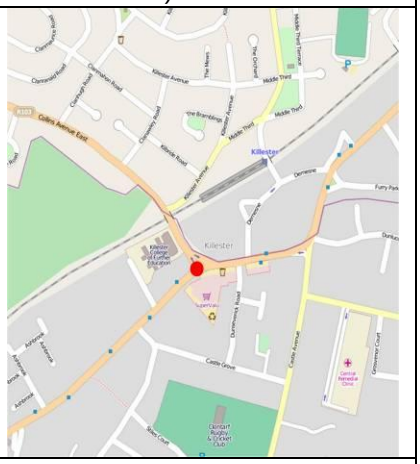
Issue 2.1.9

Location Co-Ordinates	53.375418, -6.195109 to 53.370989, -6.206181 (Howth Road)
	
Possible Issue or Hazard	Overhead wires.
Remedial Action	Fully extended 3.9m surveying staff is shown in above image for scale. There appears to be sufficient clearance for transformer, bearing in mind that the trailer of the transportation unit can be lowered if necessary, but care should be exercised as there are numerous instances of low overhead wires along this residential part of Howth Road between the co-ordinates mentioned above. Another example of these overhanging wires is shown below in Photo 2.1.
Photo 2.1: Overhead Wires on Howth Road between Sybill Hill and Collins Avenue junctions	

Issue 2.1.10

Location Co-Ordinates	53.371488, -6.202716 (Howth Road / Dunluce Rd)
	
Possible Issue or Hazard	Narrow approach and central refuge island with pedestrian guard rails upon exit.
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. Remove lit traffic bollards on central island on entry of bend to facilitate overrun of island if necessary. Photo 2.2 below shows the junction from the reverse angle and displays a relatively wide exit through the junction which is facilitated by the presence of a bus lane.
Photo 2.2: Howth Road / Dunluce Road junction looking northeast	

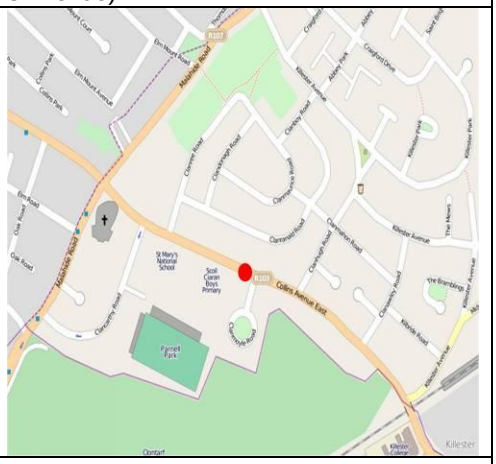
Issue 2.1.11

Location Co-Ordinates	53.370944, -6.206642 (Howth Rd / Collins Avenue)
	
Possible Issue or Hazard	Turning right onto the R103 Collins Avenue
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. Though the actual carriageway width upon entry is narrow, there is plenty of scope for the removal of traffic bollards and subsequent overunning of the central island to create a sufficiently large turning radius for the transportation unit. There is also a large overrun area available on the left on entry to the junction also which could also be utilised if necessary, see Photo 2.3 below.
Photo 2.3: Overrun area upon entry to Collins Ave from Howth Road	

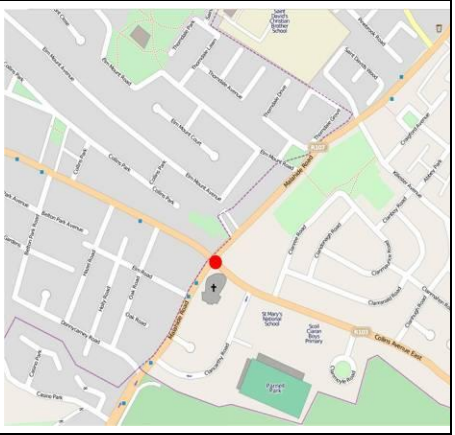
Issue 2.1.12

Location Co-Ordinates	53.371898,-6.207812 (Collins Avenue east)
	
Possible Issue or Hazard	Structural integrity of railway overbridge (OBB9A) Dublin – Belfast line
Remedial Action	Irish Rail to check structural integrity of railway overbridge

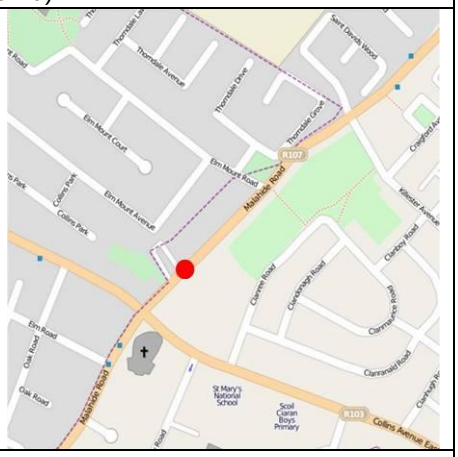
Issue 2.1.13

Location Co-Ordinates	53.374093,-6.213423 (Collins Avenue)
	
Possible Issue or Hazard	Overhead lines just west of Collins Avenue – Clanmoyle Road junction.
Remedial Action	Overhead wires of a similar height to those on Howth Road. The image above shows a 3.9m surveying staff fully extended for reference. It is most likely there is sufficient headroom and lines appeared to be quite slack so additional headroom could be achieved by utilising temporary poles to push the lines further clear of the transformer.

Issue 2.1.14

Location Co-Ordinates	53.375456,-6.218659 (Collins Avenue / Malahide Rd)
	
Possible Issue or Hazard	Turning right onto R107 Malahide Road
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. There is good scope for successful negotiation of this junction. As it can be seen there is no central island or obstruction upon entry to the Malahide Road and also there is no obstruction upon exiting Collins Avenue either. Best practice dictates however, that Autotrack sweptpath analysis be carried out nonetheless.

Issue 2.1.15

Location Co-Ordinates	53.376109,-6.217704 (Malahide Rd)
	
Possible Issue or Hazard	Overhead lines
Remedial Action	Low hanging overhead lines. Lines are quite slack so it should not be an issue to lift them out of the way temporarily using poles as the transportation unit is passing beneath. Care should be exercised when passing this location nonetheless.

Issue 2.1.16

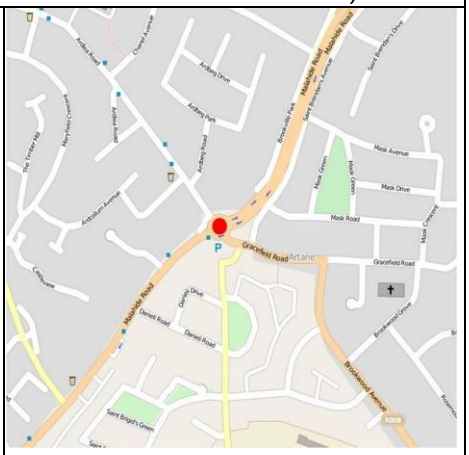
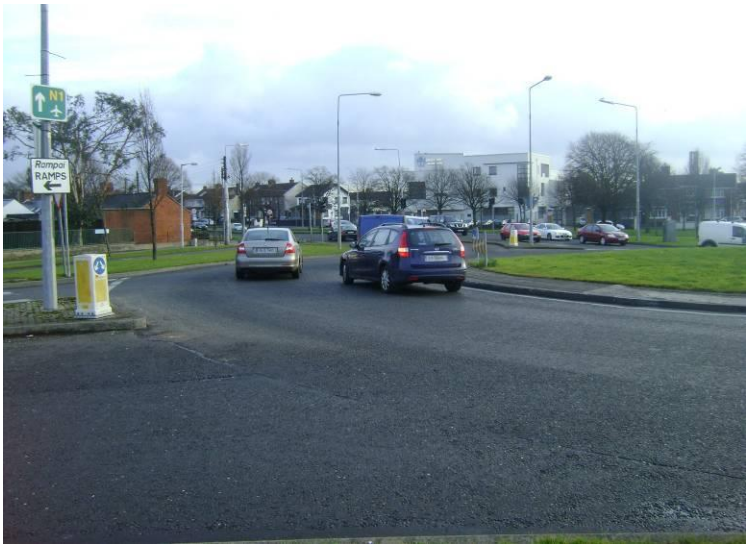
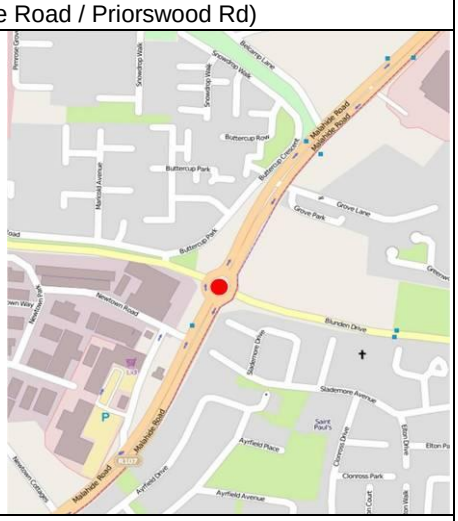
Location Co-Ordinates	53.383008,-6.205387 (Malahide Rd / Gracefield Rd / Ardlea Rd)
	
Possible Issue or Hazard	Artane Roundabout
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. The Artane roundabout is the first major roundabout encountered on the haulage route. The image above shows the northbound approach from which the transportation unit will be approaching. Entry width is good, however, the deflection angle upon entry means entirely avoiding the central island will probably not be possible. As the island is not particularly high or steeply banked on the sides the most prudent options would be lay down a track for the right hand side of the vehicle to travel along while the left hand side stays on the road. This method of crossing will require the temporary removal of three sets of chevron boards and three supplementary keep left signs. Photo 2.4 below shows a generous width on the circulating carriageway. Photo 2.5 shows the side profile of the central island (looking east) which should not be particularly difficult to cross with the transportation unit.

Photo 2.4: Looking north towards exit of Artane Roundabout	
Photo 2.5: Looking east across Artane Roundabout.	

Malahide Road becomes dual carriageway northbound after Artane Roundabout.

Issue 2.1.17

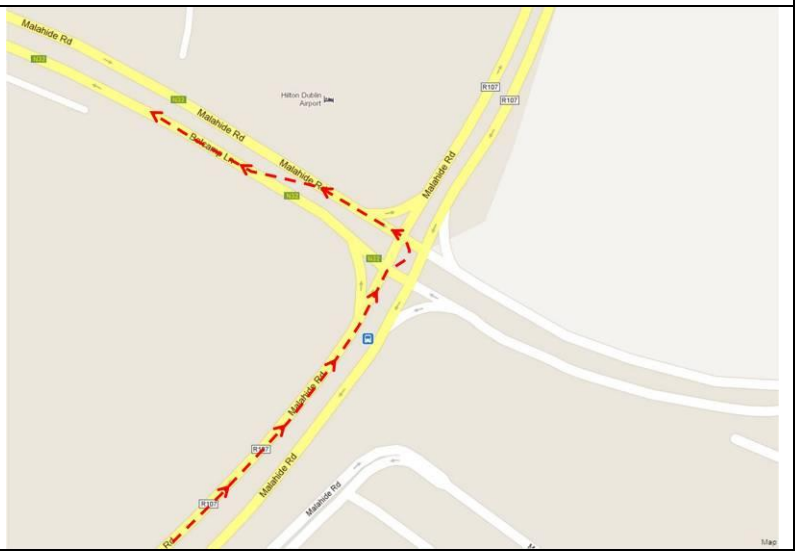
Location Co-Ordinates	53.397507,-6.186719 (Malahide Road / Priorswood Rd)
	
Possible Issue or Hazard	Darndale Roundabout
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. The Darndale Roundabout is the second major roundabout encountered along the Malahide Road. It has an extremely wide approach and allied to this the relatively low deflection angle upon entry and three lane circulating carriageway mean that this roundabout may be negotiated without the need to impinge on the central island. Photo 2.6 below shows the exit of the roundabout looking south, it can be seen that the roundabout is also dual carriageway upon exit.
Photo 2.6: Looking south from northbound exit	

Issue 2.1.18

Location Co-Ordinates	53.401764,-6.181253 (Malahide Rd approaching Clarehall junction)
 	
Possible Issue or Hazard	Overhead traffic monitoring cameras.
Remedial Action	Overhead elements circled in image above (looking south on northbound carriageway) encroaching on one / two outside lanes. Every attempt should be made to keep as close to the inside edge of the carriageway as possible to avoid conflict with overhead cameras.

Issue 2.1.19

Location Co-Ordinates	53.402867,-6.179933 (Malahide Rd / R139 junction at Clarehall)
 	
Possible Issue or Hazard	Turning left off Malahide Road onto R139.
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. The left turn filter lane here is quite wide and as such may facilitate the passing of the transportation unit. The transportation unit will use the outermost lanes on the northbound approach and aim to approach the filter lane in as straight a formation as possible. After passing through here the median between the eastbound / westbound carriageways on the R139 may be mounted to allow the transportation unit to straighten and continue along the R139 westbound. If this approach does not work, an alternative method of negotiating the junction may be to approach on the outermost lane of the northbound carriageway and in order to increase the turning radius of the corner, exit on the eastbound carriageway of the R139 before mounting the median further down to return to the westbound carriageway of the R139, see Figure 2.1 below. Autotrack sweptpath analysis of the junction will determine which method is most likely to be used.

Photo 2.7: Looking east along R139 towards exit of Clarehall Junction	
Figure 2.1: Alternative option to negotiating R139 / R107 junction	

Issue 2.1.20

Location Co-Ordinates	53.410645,-6.217468 (R139 Belcamp Lane)
	
Possible Issue or Hazard	R139 Roundabout at Bewleys Hotel
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. The Roundabout at the Bewleys Hotel is the last major roundabout encountered on Section1 of the route. Similar to the Darndale Roundabout, it has a low deflection angle upon entry and exit and hence facilitates relatively easy access to and exit from the roundabout. The entry, exit and circulating carriageway are all two lanes in width (see Photos 2.8 and 2.9 below). It can also be seen in Photo 2.8 below that there is an overrun strip running along the inside edge of the central island which will facilitate the mounting of the island if necessary. If this is required it will also require the temporary removal of two chevron boards and two keep left signs. Autotrack sweptpath analysis of the junction will establish if this is necessary.
Photo 2.8: Two lanes on circulating carriageway	

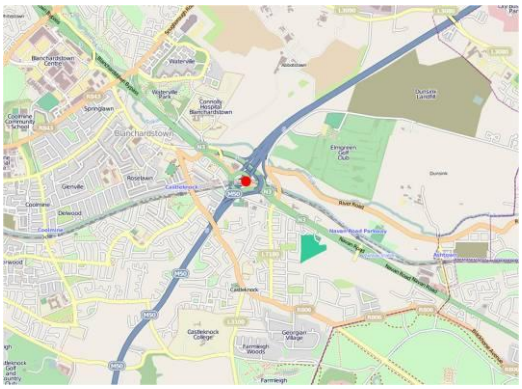
Photo 2.9: Looking south upon exit of Bewleys Roundabout	

Upon negotiation of the roundabout outlined in issue 2.1.19 above, the M50 is then accessed via the Turnapin interchange, M1 Junction 3. This signifies the conclusion of section 1 of the route.

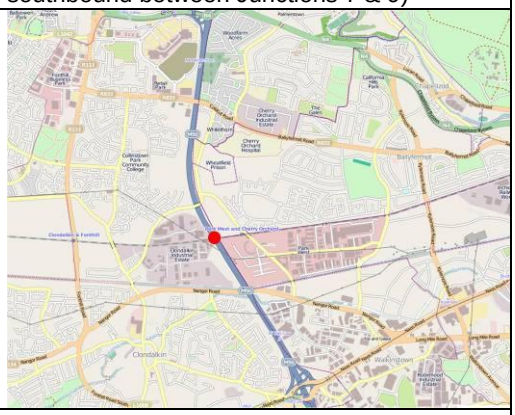
2.2 Route Section 2; M50 to M7 junction 16

Section 2 of the route is approximately 91km in length and runs from the M50 / M1 interchange to junction 16 on the southbound carriageway of the M7 east of Portlaoise.

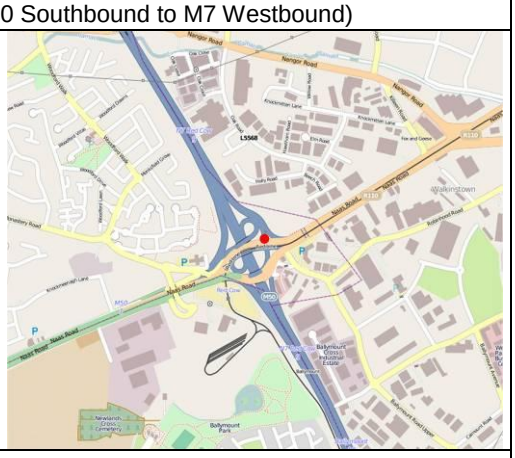
Issue 2.2.1

Location Co-Ordinates	53.382413,-6.362962 (M50 junction 6, southbound beneath Sligo railway line)
	
Possible Issue or Hazard	Overhead clearance
Remedial Action	Vertical overhead clearance here is approximately 6m so it should not be an issue, however it is advised that care is taken on approach nonetheless.

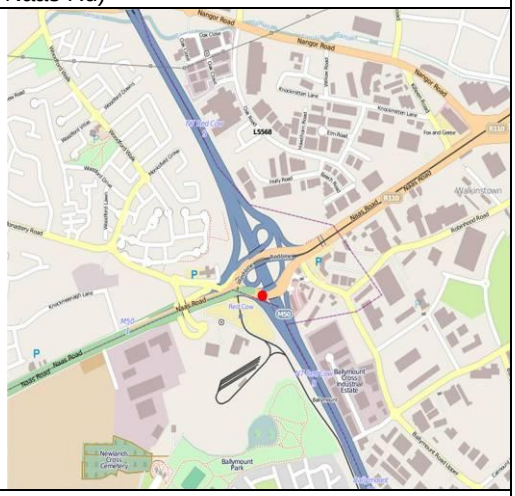
Issue 2.2.2

Location Co-Ordinates	53.33359,-6.383142 (M50 southbound between Junctions 7 & 9)
	
Possible Issue or Hazard	Structural integrity of railway overbridge (OBC10A) Dublin – Cork line
Remedial Action	Irish Rail require structural integrity of railway overbridge to be confirmed via an independent structural assessment.

Issue 2.2.3

Location Co-Ordinates	53.319172,-6.367006 (M50 Southbound to M7 Westbound)
	
Possible Issue or Hazard	Overhead clearance
Remedial Action	Overhead clearance for all bridges on the M50 is a minimum of 5.4m. It is highly recommended nonetheless that great care is taken on approach.

Issue 2.2.4

Location Co-Ordinates	53.317685,-6.368777 (N7 Naas Rd)
	
Possible Issue or Hazard	Overhead gantry sign
Remedial Action	Care should be taken when approaching all gantry signage around the Red Cow interchange. Overhead clearance should be sufficient, but passing underneath should be avoided where possible nonetheless.

Issue 2.2.5

Location Co-Ordinates	53.312929,-6.390567 (N7 Naas Rd Approaching Newlands Cross)
	
Possible Issue or Hazard	Overhead signal heads.
Remedial Action	Overhead clearance should not be an issue here but care should be exercised and the two outside lanes of the carriageway should be straddled to avoid conflict.

Issue 2.2.6

Location Co-Ordinates	53.312673,-6.391339 (N7 Naas Rd)
	
Possible Issue or Hazard	Overhead traffic monitoring cameras
Remedial Action	Use of the inside lane to be avoided here to prevent possible conflict with overhead traffic monitoring cameras.

It should be noted that the section of the N7 Naas Road between the L1019 junction and Boot Road is subject to reconfiguration as part of the Newlands Cross grade separation scheme, this should be taken into account when programming the

transportation. For information, an indicative layout of the proposed upgrades is shown below in Figure 2.1. Work is due to start on the scheme in mid-2013 with a 21 month project programme.

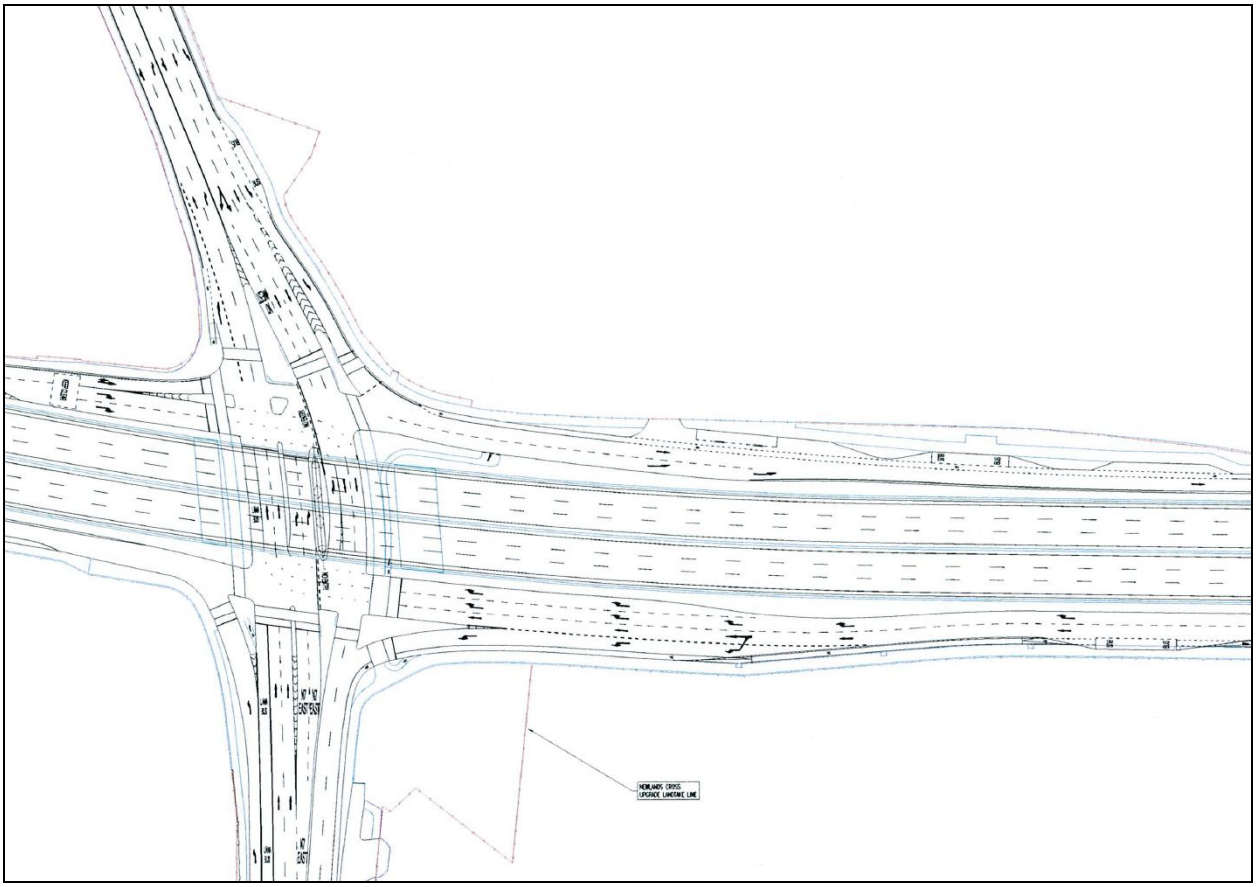
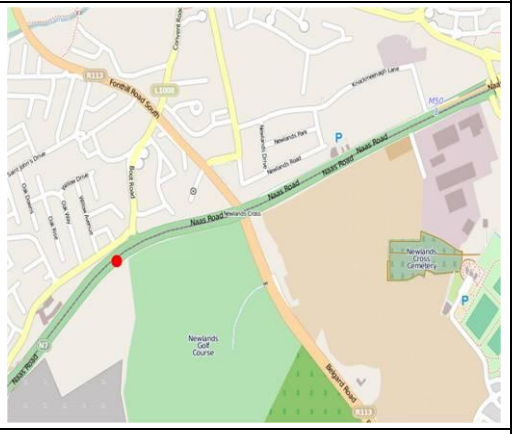
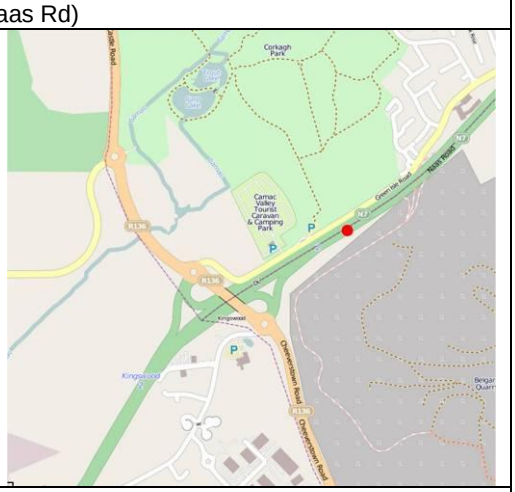


Figure 2.1: Indicative layout of proposed Newlands Cross grade separation

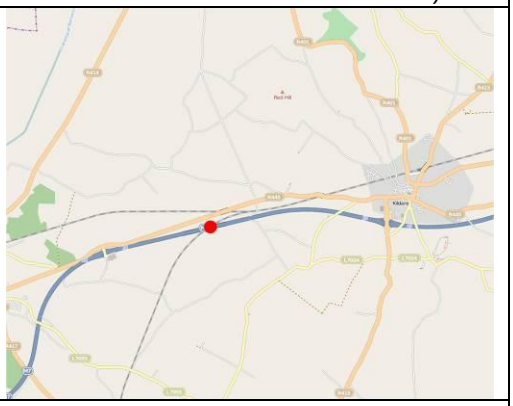
Issue 2.2.7

Location Co-Ordinates	53.310609,-6.400158 (N7 Naas Rd)
	
Possible Issue or Hazard	Overhead VMS sign
Remedial Action	Use of the inside lane to be avoided here to prevent possible conflict with overhead VMS sign

Issue 2.2.8

Location Co-Ordinates	53.30675,-6.40696 (N7 Naas Rd)
	
Possible Issue or Hazard	Overhead Signage
Remedial Action	Care should be exercised when approaching all overhead signage along the Naas Road section of the N7/M7. Overhead clearance should be sufficient, however it would prudent to avoid it where possible by using the outermost lanes on the southbound carriageway.

Issue 2.2.9

Location Co-Ordinates	53.150991,-6.979837 (M7 southbound between Junctions 13 & 14)
	
Possible Issue or Hazard	Structural integrity of railway overbridge (OBW2) – Carlow branch line near Cherryville
Remedial Action	Irish Rail require structural integrity of railway overbridge to be confirmed via an independent structural assessment.

Upon leaving the three lane section of the N7 (Naas Road) and accessing the M7 motorway there are no discernable obstacles, however care should be exercised along the whole route. It was observed that on the underside of a number of bridges along the M7, the overhead clearance was reduced where the bridge deck approached its abutment. While this is not a major issue, when passing under all bridges, the centre of the carriageway should be used by straddling both lanes. This concludes the issues encountered along section 2 of the route.

2.3 Route Section 3: M7 Southbound; Junction 16 Off-ramp to Timahoe

Issue 2.3.1

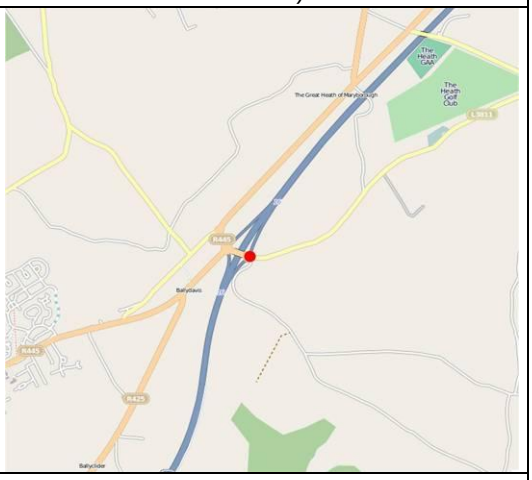
Location Co-Ordinates	53.049804,-7.238274 (Exit of Junction16 westbound)
	
Possible Issue or Hazard	Roundabout at M7 Junction 16 interchange
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. Entry to junction is relatively wide at two lanes but it is required to turn right here to access the M7 overbridge and as such it is envisaged the central island will need to be mounted. Circulating carriageway widths are shown in photos 2.10 and 2.11 below. Photo 2.12 shows that the central island has a relatively flat profile and as such mounting should not be an issue when the necessary removal of two chevron boards and two keep left signs is facilitated. Autotrack analysis will show how much of the central island needs to be mounted to accommodate this manoeuvre.

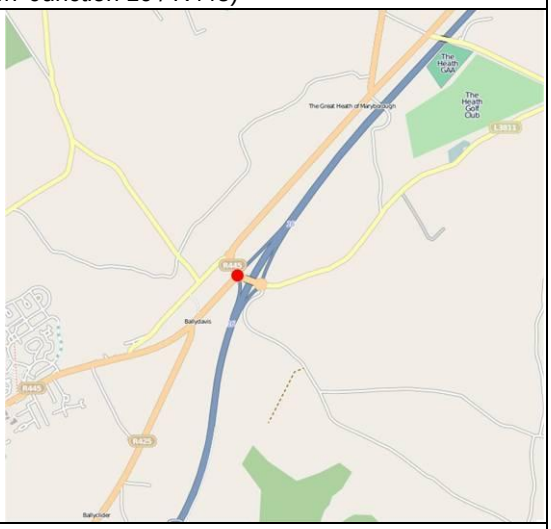
Photo 2.10: Profile and circulating width of roundabout	
Photo 2.11: Profile and circulating width of roundabout	

Photo 2.12: Relatively flat profile of roundabout central island	

Issue 2.3.2

Location Co-Ordinates	53.050191,-7.239776 (M7 Junction 16 overbridge)
	
Possible Issue or Hazard	Structural integrity of M7 overbridge.
Remedial Action	Possible structural integrity issues with M7 overbridge. A structural assessment may be required prior to transportation of transformer being undertaken to ensure it is structurally sound.

Issue 2.3.3

Location Co-Ordinates	53.050385,-7.24102 (M7 Junction 16 / R445)
	
Possible Issue or Hazard	Roundabout at M7 Junction 16 interchange
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. As can be seen above, the roundabout has a low entry angle and a two lane circulating carriageway which will facilitate easier access to the roundabout itself. The exit arm of the roundabout can be seen in Photo 2.13 below. The exit angle is sharper than the entry angle but the generous circulating width should accommodate the exit of the transportation unit without the need to overrun the central island upon entry. Autotrack analysis should be carried out here nonetheless.
Photo 2.13: View of exiting arm from roundabout at top of M7 northbound off-ramp	

Issue 2.3.4

Location Co-Ordinates	53.047057,-7.246106 (R425 / R445 Junction)
	
Possible Issue or Hazard	Turning left onto R425
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. The image above shows the R445 / R425 junction looking southwest from the R445. The junction has a relatively wide approach along the R445 and the turning radius is relatively large which means access should not be too difficult. It should be possible to negotiate this junction without mounting the central island, Autotrack sweptpath analysis will be necessary to confirm this however.
Photo 2.14: Looking northeast towards the R445/R425 junction from the R425	

Issue 2.3.5

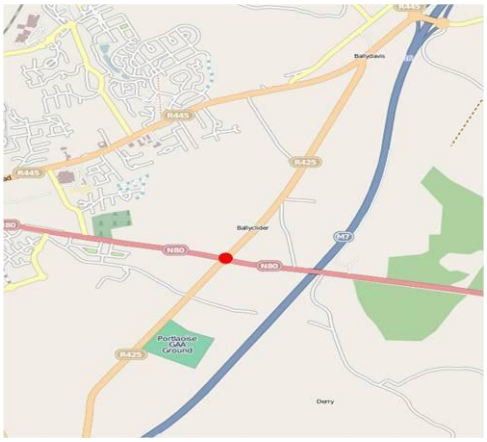
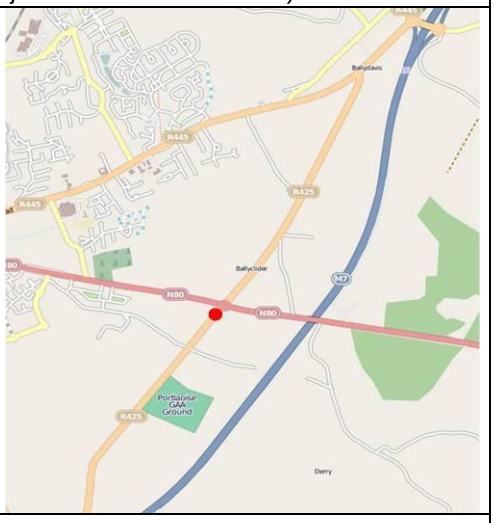
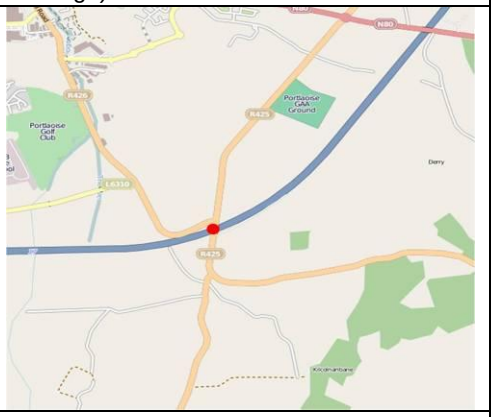
Location Co-Ordinates	53.031497,-7.259967 (R425 / N80 Junction)
	
Possible Issue or Hazard	Roundabout at junction of R425 and N80
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. The above image shows the southbound approach to the R425 / N80 junction. It can be seen it is only a single lane approach and the deflection angle upon entry is higher than those encountered at previous roundabouts. It has a relatively wide circulating carriageway but is technically still one lane, see Photo 2.16 below. It is anticipated the central island will need to be mounted here to successfully negotiate the junction. Temporary removal of one set of chevron boards and keep left arrow will be required to facilitate this. Autotrack analysis will determine to what degree the island must be encroached upon.
Photo 2.15: View of deflection upon entry to roundabout	

Photo 2.16: Circulating carriageway width	
Photo 2.17: Looking southwest towards R425 exiting arm	

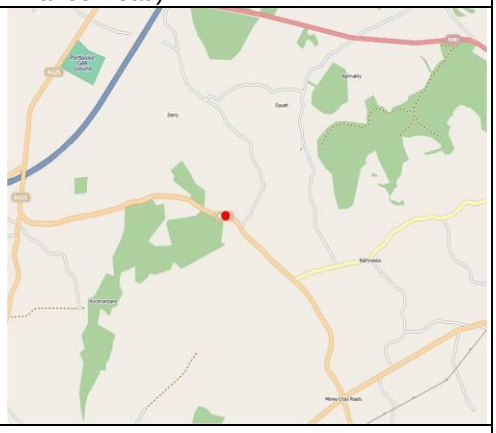
Issue 2.3.6

Location Co-Ordinates	53.031175,-7.260418 (R425 just south of N80 Junction)
	
Possible Issue or Hazard	Overhead powerlines
Remedial Action	Upon exit of R425 / N80 junction, low hanging powerlines are immediately confronted. Shown in the image above are the powerlines with a 3.9m surveying staff fully extended used for scaling purposes. The transformer should have sufficient clearance beneath but extreme care should be taken in this area nonetheless.

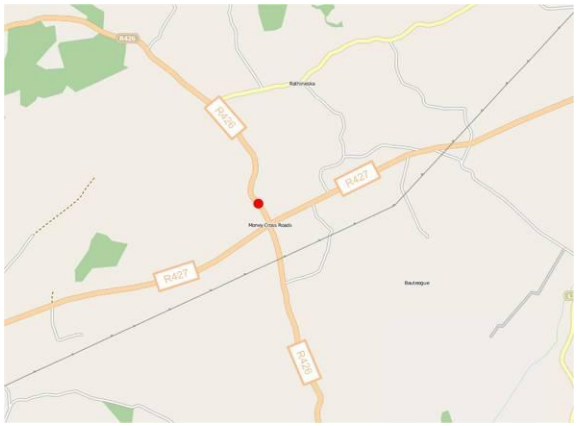
Issue 2.3.7

Location Co-Ordinates	53.015106,-7.274323 (M7 overbridge)
	
Possible Issue or Hazard	Structural integrity of M7 overbridge
Remedial Action	Structural assessment of M7 overbridge may be required to confirm its structural integrity before transformer can be carried across it.

Issue 2.3.8

Location Co-Ordinates	53.01153,-7.242823 (R426 Timahoe Road)
	
Possible Issue or Hazard	Road alignment constraint
Remedial Action	In general the R425 and R426 are typical single carriageway country roads. This location is the only major “pinch point” on the road where a wall on the southbound side of the road kicks out into the road edge. It is situated at the same location as minor deflections in the horizontal and vertical alignment of the road. It does not render the route impassable but care should exercised when passing, paying particular attention to the small wall on the inside of the bend.

Issue 2.3.9

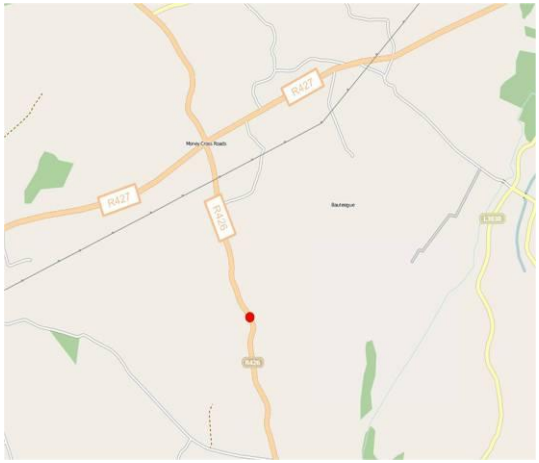
Location Co-Ordinates	Varies, photo at 52.996448,-7.224026 (R426 Timahoe Road)
	
Possible Issue or Hazard	Overhanging trees
Remedial Action	There are several overhanging trees along the R425 / R426 typical of the one shown above. Most are quite high and should not cause any obstruction but care should be taken when passing underneath nonetheless.

Issue 2.3.10

Location Co-Ordinates	52.993607,-7.22394
	
Possible Issue or Hazard	R426 / R427 staggered junction
Remedial Action	Carry out Autotrack sweptpath analysis on junction prior to journey being undertaken. Photos 2.18 and 2.19 below show this junction from various angles. Directly crossing this junction would not normally be hazardous, however the inclusion of two concrete islands and signage on each approach has caused it to become more awkward. The image above shows the southbound approach to the junction, the best way of negotiating this would be to use the northbound side of the R426 approach (in above image) and exit on the southbound side thereby negating the stagger as much as possible. Autotrack sweptpath analysis of the junction will confirm whether this is possible.
Photo 2.18: Close up of R426 southbound approach to junction	

Photo 2.19: R426 northbound approach to junction	

Issue 2.3.11

Location Co-Ordinates	52.980535,-7.217159 (R426 Timahoe Road)
	
Possible Issue or Hazard	Termination of route
Remedial Action	Haulage route terminates here. Transformer will require unloading before final transportation to site.

Summary and Conclusion

3 Summary and Conclusion

3.1 Route Summary

In all, the haulage route totals approximately 124km. The majority of the route (91km) is high quality dual carriageway or motorway along the M50 and N7 / M7. On this part of the route there are no significant discernable obstacles or alignment constraints and progress will be straight forward.

It can be seen above in section 2 of this report that the vast majority of issues along the route are off the motorway and on single carriageway roads. It is to be expected that exiting Dublin City from Dublin Port will be the most arduous part of the operation. The most common issues encountered are overhead powerlines, refuge islands at junctions, and roundabouts.

Section 3 of the route does not reveal any direct obstacles or obstructions other than overhead powerlines upon initial entry to the R425 after the N80 junction and the R426 / R427 junction prior to reaching the unloading location for the transformer.

3.2 Conclusion

In summary, transporting the transformer on this route should not prove insurmountable. As we have established, section 1 of the route within Dublin City is the most difficult section of the route.

Having said this, DCC have designated this route because they consider it to be the one which will most readily accommodate the transportation unit required for this project.

There has been precedent set as this route has been used for the haulage of abnormal loads in the past. Any potential issues are further mitigated by the fact that the appointed haulage contractor is based in Dublin and hence has a good knowledge of the area.

In addition to this they specialise in the haulage of abnormal loads and have used this route for this purpose in the past.

It is imperative that Autotrack analysis is carried out on all the junctions identified as requiring it in section 2 of this report.

As well as liaising with DCC and An Garda Síochána, all local authority areas through which the route will be travelling will need to be informed of the plans in advance, and these are noted in Table A2 of Appendix A, as well as the NRA who will require notice that parts of the National Strategic Network will also be utilised ie. the M50 and M7.

Irish Rail must also be informed as the route passes over several railway line bridges as identified in section 2 of the report above and Table A3 of Appendix A.

The combination of all these factors should ensure that the transportation of this transformer will be done in a timely and safe manner to the satisfaction of the client and all other parties.

Appendix A

Appendix A

Table A1: Index of Issues		
Issue No.	**Issue**	**Co-ordinates**
2.1.1	Roundabout	53.353523, -6.213927
2.1.2	Overhead Signals	53.352498, -6.224828
2.1.3	Signalised Junction	53.352498, -6.224828
2.1.4	Structural Integrity of Bridge	53.358261, -6.233883
2.1.5	Signalised Junction	53.363166, -6.221952
2.1.6	Signalised Junction	53.374112, -6.164703
2.1.7	Car Parking	53.379194, -6.17702
2.1.8	Priority Junction	53.379821, -6.178286
2.1.9	Overhead Lines	53.375418, -6.195109 to 53.370989, -6.206181
2.1.10	Priority Junction	53.371488, -6.202716
2.1.11	Priority Junction	53.370944, -6.206642
2.1.12	Structural Integrity of Bridge	53.371898,-6.207812
2.1.13	Overhead Lines	53.374093,-6.213423
2.1.14	Signalised Junction	53.375456,-6.218659
2.1.15	Overhead Lines	53.376109,-6.217704
2.1.16	Roundabout	53.383008,-6.205387
2.1.17	Roundabout	53.397507,-6.186719
2.1.18	Overhead Monitoring Cameras	53.401764,-6.181253
2.1.19	Signalised Junction	53.402867,-6.179933
2.1.20	Roundabout	53.410645,-6.217468
2.2.1	Overhead Clearance	53.382413,-6.362962
2.2.2	Structural Integrity of Bridge	53.33359,-6.383142
2.2.3	Overhead Clearance	53.319172,-6.367006
2.2.4	Overhead Signage	53.317685,-6.368777
2.2.5	Overhead Signals	53.312929,-6.390567
2.2.6	Overhead Monitoring Cameras	53.312673,-6.391339
2.2.7	Overhead VMS	53.310609,-6.400158
2.2.8	Overhead Signage	53.30675,-6.40696

Table A1: Index of Issues		
2.2.9	Structural Integrity of Bridge	53.150991,-6.979837
2.3.1	Roundabout	53.049804,-7.238274
2.3.2	Structural Integrity of Bridge	53.050191,-7.239776
2.3.3	Roundabout	53.050385,-7.24102
2.3.4	Priority Junction	53.047057,-7.246106
2.3.5	Roundabout	53.031497,-7.259967
2.3.6	Overhead Lines	53.031175,-7.260418
2.3.7	Structural Integrity of Bridge	53.015106,-7.274323
2.3.8	Road Alignment Constraint	53.01153,-7.242823
2.3.9	Overhanging Trees	52.996448,-7.224026
2.3.10	Priority Junction	52.993607,-7.22394
2.3.11	Route Termination	52.980535,-7.217159

Table A2: Index of Relevant Local Authorities / Agencies	
Local Authority / Agency	**Jurisdiction**
Irish Rail	Railway Over / Under Bridges
National Roads Authority	National Strategic Road Network
Dublin City Council	Dublin City
South Dublin County Council	Clondalkin – Rathcoole (N7, from Red Cow Interchange to Naas)
Kildare County Council	County Kildare
Laois County Council	County Laois

Table A3: Index of Structures to be Crossed		
Location (Co-ordinates)	**Crossing**	**Under the Auspice of**
John McCormick Bridge, Alfie Byrne Road (53.358261, -6.233883)	Over Tolka River	DCC
Collins Avenue East (53.371898,-6.207812)	Over Belfast Railway Line	Irish Rail
M50 Southbound between Junctions 7 and 9 (53.33359,-6.383142)	Over Cork Railway Line	NRA / South Dublin County Council
M7 Southbound between Junctions 13 & 14 (53.150991,-6.979837)	Over Carlow Branch Railway Line	NRA / Kildare County Council
M7 overbridge at Junction 16 Interchange (53.050191,-7.239776)	Over M7	NRA / Laois County Council
M7 overbridge on R425 (53.015106,-7.274323)	Over M7	NRA / Laois County Council