East Meath - North Dublin Grid Upgrade Construction Environmental Management Plan – Appendix B

Construction Traffic Management Plan

EirGrid

March 2024

Contents

Appendix B – Construction Traffic Management Plan

1. Introduction

1.1 Purpose

This Construction Traffic Management Plan (hereafter referred to as the CTMP) has been prepared to demonstrate that the residual impacts to the public road and active travel network during the Construction Phase of the East Meath – North Dublin Grid Upgrade (hereafter referred to as the Proposed Development) which have been identified can be minimised, and that transport related activities are carried out as safely as possible and with the minimum disruption to other road users. The CTMP has also been prepared for the purpose of identifying feasible, appropriate, and safe methods of access for construction traffic to the Proposed Development.

1.2 Objectives

The objectives of the CTMP are to:

- Outline minimum road safety measures to be undertaken, including site access / egress locations, during the works;
- Provide measures that respond to all road user needs including public transport, pedestrians, cyclists and vehicular traffic;
- Ensure disruption is minimised, with access to homes, education sites, health / medical care facilities, public transport stops / hubs, active travel routes, local services, retail centres, local amenities schools, places of worship, and businesses maintained, as is reasonably practicable in delivering the Proposed Development;
- Demonstrate to stakeholders, the appointed contractor and suppliers, the need to adhere to the relevant guidance documentation for such works; and
- Identify objectives and measures for inclusion in the management, design, and construction of the Proposed Development to control the traffic impacts of construction insofar as it may affect the environment, local residents and the public in the vicinity of the construction works.

1.3 Scope

This CTMP which is appended to the Construction Environmental Management Plan (CEMP), illustrates a preliminary traffic management design for the transportation of construction materials, equipment, and personnel along the public road network to facilitate the construction of the Proposed Development. Light vehicles, such as cars and vans, are used by operatives travelling to and from the works areas. Heavy Goods Vehicles (HGVs), for the most part, will deliver general construction materials, such as concrete, to, from and around the working areas.

EirGrid will put in place robust procedures to inform and supervise all those working on the Proposed Development, including its supply chain of contractors, to make sure that the control measures set out in the CTMP are fully applied during the Construction Phase. The main responsibility for implementing these control measures will fall to the principal contractor appointed for the Proposed Development.

The appointed contractor will develop the CTMP in the event that An Bord Pleanála grants approval for the Proposed Development. The CTMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by An Bord Pleanála.

The CTMP should be read in conjunction with the Temporary Traffic Management Plan included in Appendix A of this CTMP (hereafter referred to as the TTMP).

2. Proposed Construction Activities

2.1 Overview

Activities to be carried out during the Construction Phase as part of the Proposed Development are outlined in the TTMP (Appendix A). Passing Bay construction, Joint Bay construction, and cable installation operations are expected to be the key activities for the Proposed Development, and will include, excavation, installing, disposal, import and haulage. The Construction Phase of the Proposed Development will require movements of materials to, from and around the works areas. Most of the materials leaving the working areas will consist of subsoil export.

To facilitate construction, the Proposed Development has been divided into 30 Temporary Traffic Management (TTM) Sections, as described in the TTMP and Section 4.5.4 in Chapter 4 (Proposed Development Description) in Volume 2 of the Environmental Impact Assessment Report (EIAR) (included in this planning application pack). The location of each section along the Proposed Development is presented in Table 2.1 and shown in Figure14.1 in Volume 4 of the EIAR.

Table 2.1: TTM Sections

Section Number	Section Name	Length (m)	Start Chainage	End Chainage	Roads
1.01	Woodland	3,635	0	3,635	N/A
1.02	R156	7,185	3,635	10,820	R156
1.03	R157	1,530	10,820	12,350	R157
1.04	M3	873	12,350	13,223	N/A
1.05	R147	327	13,223	13,550	R147
1.06	L5026	1,610	13,550	15,160	L5026
1.07	L1010 West	695	15,160	15,855	L1010
1.08	Pinkeen River	605	15,855	16,460	N/A
1.09	L1010 East	340	16,460	16,800	L1010
1.10	Nuttstown Road	1,410	16,800	18,210	Nuttstown Road
1.11	Ward River	70	18,210	18,280	N/A
1.12	Priestown Road	915	18,280	19,195	Priestown Road
1.13	Priest Town	195	19,195	19,390	N/A
1.14	Kilbride Road North	1,115	19,390	20,505	Kilbride Road
1.15	Kilbride Off-road	80	20,505	20,585	N/A
1.16	Kilbride Road South	695	20,585	21,280	Kilbride Road
1.17	Hollywood	1,346	21,280	22,626	N/A
1.18	M2 HDD South	684	22,626	23,310	R121
1.19	M2 HDD	360	23,310	23,670	N/A
1.20	M2 HDD North	950	23,670	24,620	R121
1.21	The Ward Cross / R121	1,575	24,620	26,195	R121
1.22	Ward River	70	26,195	26,265	N/A
1.23	R121	805	26,265	27,070	R121
1.24	R122	1,250	27,070	28,320	R122
1.25	Kilreesk Lane	50	28,320	28,370	Kilreesk Lane
1.26	Kingstown	790	28,370	29,160	N/A
1.27	R108	1,640	29,160	30,800	R108
1.28	Naul Road	2,450	30,800	33,250	Naul Road
1.29	Stockhole Lane West	810	33,250	34,060	Stockhole Lane
1.30	M1 East	3,706	34,060	37,766	N/A

2.2 Construction Programme

A programme for construction of the Proposed Development is provided in Section 2.4 of the CEMP. The total Construction Phase duration for the overall Proposed Development is estimated at approximately 42 months. However, construction activities in individual sections will have shorter durations. The programme identifies the approximate duration of works at each TTM Section. The appointed contractor will be responsible for determining the final programme.

To achieve the overall programme duration, it will be necessary to work on more than one section at any one time.

The staging of construction and associated TTM measures has considered the receiving environment when developing the schedule of works.

2.3 Temporary Traffic Management

If An Bord Pleanála grants approval for the Proposed Development, TTM designs (drawings and method statements) will be prepared by the appointed contractor in compliance with the following requirements to facilitate the safe and efficient construction of the Proposed Development:

- Traffic Signs Manual – Chapter 8 – Temporary Traffic Measures and Signs for Roadworks, Department of Transport (DoT 2019);
- Guidance for the Control and Management of Traffic at Road Works, Department of Transport (DoT), Health and Safety Authority, National Roads Authority and Local Government Management Services Board(DoT et al. 2010);
- Guidelines for Managing Openings in Public Roads (Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads (DoT 2017); and
- Guidelines for Working on Roads, Health and Safety Authority (Health and Safety Authority (HSA) 2009).

These guideline documents should typically be read in conjunction with primary Number 10 of 2005 - Safety, Health, and Welfare at Work Act 2005 (as amended) and S.I. No. 291 of 2013 - Safety, Health and Welfare at Work (Construction) Regulations 2013, as amended by S.I. No. 528/2021 - Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021.

TTM is outlined in Section 4 in the TTMP (See Appendix A). These provisions have been developed using works areas for the purpose of safety, to minimise disruption and to facilitate the smooth operation of construction activities. The roads and streets along the Proposed Development will remain open to general traffic, wherever practicable, during the Construction Phase. However, lane closures, road closures and diversions will be necessary to facilitate construction. Traffic management provisions for each TTM Section are included in Table 2.2.

Table 2.2: Summary of Lane and Road Closures due to Proposed Temporary Traffic Management

TTM Sections	Length (km)	Road	Joint Bay	Position	Road Width (m)	Phase 1 (Joint Bay and Passing Bay Installation) and Phase 3 (Cable Installation and Jointing)		Phase 2 (Excavation and Duct Installation)		Diversion Route Length (km)
						Traffic Measures	Approximate Duration – Phase 1 / Phase 3 (days)	Traffic Measure	Approximate Duration (days)	
1.02	7.2	R156 Regional Road (west of R157 Regional Road)	JB5	In-road	6.5	Passing Bay – two lane closures	23 / 47	Full road closure	134	24.1
			JB6	In-verge	6.5	Single lane closure	10 / 45			
			JB7	In-verge	7.0	n/a	12 / 47			
			JB8	In-verge	6.7	Single lane closure	22 / 46			
			JB9	In-road	6.5	Full Road closure	5 / 51			
			JB10	In-road	7.0	Passing Bay – two lane closures	13 / 42			
			JB11	In-road	6.3	Full Road Closure	7 / 42			
			JB12	In-verge	6.9	Single lane closure	12 / 48			
			JB13	In-verge	6.5	Single lane closure	14 / 46			
			JB14	In-verge	8.0	n/a	15 / 47			
1.03	1.5	R157 Regional Road (south-west of M3 Motorway Junction 5 (J5))	JB15	In-verge	15.0	Hard shoulder closure	15 / 48	Hard Shoulder Closure	44	n/a
1.05	0.3	R147 Regional Road (north-west of M3 Motorway J5)	n/a	n/a	14.5	n/a	n/a	Two lane closures	9	n/a
1.06	1.6	L5026 Pace (east of R147 Regional Road)	JB18	In-road	12.0	Two lane closure	7 / 48	Full road closure	50	3.3
			JB19	In-road	3.6	Full road closure	5 / 48			
1.07	0.7	L1010 (south of Newbridge)	JB20	In-road	5.0	Full road closure	9 / 46	Full road closure	19	20.9
1.09	0.3	L1010 (west of Nuttstown Crossroads)	JB22	In-road	5.3	Full road closure	5 / 50	Full road closure	11	21.3
1.10	1.4	Nuttstown Road (west of Belgree Court)	JB23	In-road	5.3	Full road closure	7 / 48	Full road closure	42	20.2
1.12	0.9	Priestown Road (west of Kilbride Road)	JB24	In-road	5.5	Passing Bay – two lane closures	15 / 49	Full road closure	26	20.7

TTM Sections	Length (km)	Road	Joint Bay	Position	Road Width (m)	Phase 1 (Joint Bay and Passing Bay Installation) and Phase 3 (Cable Installation and Jointing)		Phase 2 (Excavation and Duct Installation)		Diversion Route Length (km)
						Traffic Measures	Approximate Duration – Phase 1 / Phase 3 (days)	Traffic Measure	Approximate Duration (days)	
			JB25	In-road	5.3	Passing Bay – two lane closures	15 / 46			
1.14	1.1	L1007 Kilbride Road (south of Priestown Road)	JB26	In-verge	5.8	Single Lane Closure	14 / 56	Full road closure	34	13.8
1.16	0.7	L1007 Kilbride Road (north of Kilmartin Lane)	JB27	In-road	5.7	Passing Bay – two lane closures	17 / 56	Full road closure	20	14.2
1.18	0.7	R121 Regional Road (north-east of Kilnamonagh)	n/a	n/a	5.8	n/a	n/a	Full road closure	20	6.5
1.20	0.9	R121 Regional Road (west of R135 Regional Road)	JB32	In-road	6.5	Full road closure	7 / 47	Full road closure	36	6.3
1.21	1.6	R121 Regional Road (east of R135 Regional Road)	JB33	In-road	5.9	Passing Bay – two lane closures	15 / 45	Full road closure	50	8.5
			JB34	In-road	4.8	Passing Bay – two lane closures	18 / 48			
1.23	0.8	R121 Regional Road (west of R122 Regional Road)	JB35	In-road	5.3	Passing Bay – two lane closures	15 / 45	Full road closure	24	9.2
1.24	1.2	R122 Regional Road (south of R121 Regional Road)	JB36	In-verge	6.5	n/a	12 / 49	Full road closure	37	8.7
			JB37	In-verge	5.8	Single Lane Closure	15 / 42			
1.25	0.05	L3030 Kilreesk Lane	n/a	n/a	6.5	n/a	n/a	Full road closure	2	2.5
1.27	1.6	R108 Regional Road (west of Naul Road)	JB39	In-road	7.4	Passing Bay – two lane closures	15 / 46	Single lane closure	55	11.7
			JB40	In-road	7.4	Passing Bay – two lane closures	15 / 44			
1.28	2.5	L2020 / L72746 Naul Road (east of R108 Regional Road)	JB41	In-road	7.4	Passing Bay – two lane closures	15 / 45	Single lane closure	56	10.9
			JB42	In-road	8.0	Passing Bay – two lane closures	14 / 46			
			JB43	In-road	7.5	Passing Bay – two lane closures	13 / 45			

TTM Sections	Length (km)	Road	Joint Bay	Position	Road Width (m)	Phase 1 (Joint Bay and Passing Bay Installation) and Phase 3 (Cable Installation and Jointing)		Phase 2 (Excavation and Duct Installation)		Diversion Route Length (km)
						Traffic Measures	Approximate Duration – Phase 1 / Phase 3 (days)	Traffic Measure	Approximate Duration (days)	
			JB44	In-verge	7.5	n/a	14 / 45			
1.29	0.8	L2753 Stockhole Lane (east of R132 Regional Road)	JB45	In-road	7.6	Passing Bay – two lane closures	15 / 48	Single lane closure	28	11.7

2.4 Anticipated Construction Traffic

2.4.1 Construction Activities

Traffic will be generated during the Construction Phase of the Proposed Development. Construction traffic is expected to comprise of trips for the following purposes:

- Journeys by construction personnel to and from the Temporary Construction Compounds (TCCs), Horizontal Directional Drilling (HDD) Compounds, and TTM Sections of the Proposed Development; and
- Delivery and removal of materials to and from the Proposed Development:
  - Clearance of existing material and waste;
  - Deliveries of construction material; and
  - Removal of construction waste material.

Construction activities associated with the Proposed Development typically follow a work sequence that is repeated in smaller works areas. The movement of construction vehicles to and from the Proposed Development is determined by this work sequence; materials either being 'removed from' or 'delivered to' site. There is also stationary dwell time, as material is being unloaded or loaded at either end of a journey. The construction vehicles expected for each construction activity are shown in Table 2.3.

Table 2.3: Anticipated Construction Machinery

Activity	Item of Plant (BS 5228-1) (BSI 2014) [NOTE]
Phase 0 – Site Establishment and Advanced Works	Tracked Excavator (C.2.14)
	Circular Bench Saw (C.4.71)
Phase 1 – Passing Bays	Tracked Excavator (C.2.14)
	Dumper (C.4.3)
	Asphalt Paver (& tipper lorry) (C.5.31)
	Hydraulic vibratory compacter (C.2.42)
	Vibratory Roller (C.5.25)
Phase 1 – Joint Bays	Tracked Excavator (C.2.14)
	Dumper (C.4.3)
	Asphalt Paver (& tipper lorry) (C.5.31)
Phase 2 – Trenching and Ducting	Road Planer (C.5.7)
	Tracked Excavator (C.2.14)
	Dumper (C.4.3)
	Asphalt Paver (& tipper lorry) (C.5.31)
	Lorry (C.2.34)
	Hydraulic vibratory compacter (C.2.42)
	Vibratory Roller (C.5.25)
Phase 3 – Installation and jointing of cables	Wheeled Loader (C.4.13)
	Lorry (C.2.34)
	Telescopic Handler (C.4.54)
HDD	Tracked Drilling Rig (C.3.15)
	Directional Drill (Generator) (C.2.44)
	Wheeled Backhoe Loader (C.4.66)
	Tracked Excavator (C.2.14)
	Vibratory Roller (C.5.25)
Construction Access Route	Lorry (C.2.34)
	Dozer (C.2.11)

Activity	Item of Plant (BS 5228-1) (BSI 2014) NOTE
TCCs	Tracked Excavator (C.2.14)
	Diesel Generator (C.4.76)
	Telescopic Handler (C.4.54)
	Dozer (C.2.11)
	Vibratory Roller (C.5.25)
Substation Works	Tracked Excavator (C.2.14)
	Diesel Generator (C.4.76)
	Vibratory Roller (C.5.25)
	Telescopic Handler (C.4.54)
NOTE: Source - British Standards Institution (BSI), British Standard (BS) 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Noise (hereafter referred to as BS 5228-1) (BSI 2014)	

Likely traffic generation associated with construction site activities is described further in Section 2.4.2 and Section 2.4.3.

2.4.2 Estimated Construction Vehicle Movements

An estimate of construction plant and equipment that will be necessary to construct the Proposed Development has been calculated across the construction programme. Of the plant and equipment in operation during construction, HGVs will use the public road network for delivery and removal of materials to and from the Proposed Development. The estimated peak construction traffic to be in operation at each TTM Section across the Proposed Development is shown in Table 2.4.

Table 2.4: Estimated Peak Daily Movements Across the Proposed Development

TTM Section	HGV Movements	LGV Movements	Total Movements	Number of Peak Days
1.01	75	134	209	2
1.02	107	117	224	2
1.03	55	7	62	2
1.04	77	5	82	2
1.05	14	1	15	13
1.06	64	9	73	6
1.07	22	5	27	3
1.08	64	7	71	2
1.09	24	2	26	16
1.10	37	6	43	3
1.11	20	3	23	4
1.12	71	7	78	6
1.13	13	3	16	3
1.14	31	4	35	2
1.15	40	0	40	40
1.16	62	6	68	3
1.17	52	153	205	2
1.18	14	1	15	16
1.19	94	9	103	5
1.20	23	2	25	18
1.21	86	8	94	6
1.22	14	1	15	13
1.23	49	10	59	1

TTM Section	HGV Movements	LGV Movements	Total Movements	Number of Peak Days
1.24	74	8	82	4
1.25	12	1	13	17
1.26	41	4	45	2
1.27	89	9	98	6
1.28	117	11	128	6
1.29	56	7	63	3
1.30	155	177	332	3

The construction period of the programme (as set out in Chapter 4 (Proposed Development Description) in Volume 2 of the EIAR, included in this planning application pack), where the highest number of HGVs are expected to be in operation is Year 1: Q3 (September 2026). Works will be ongoing at TTM Sections 1.01, 1.11, 1.12, 1.13, 1.14, 1.19, and 1.30 during this period. The maximum number of HGV movements is expected to be 273, as shown in Table 2.5. This represents the peak period for haulage activities on the public road network.

Table 2.5: Estimated Daily HGV Movements During the Period of Peak Haulage Activity

TTM Section	HGV Movements
1.01	65
1.11	17
1.12	11
1.13	11
1.14	11
1.19	58
1.30	99

A total of approximately 27 two-way HGV movements are therefore expected in a typical hour during peak haulage activity of the Proposed Development (assuming a 10-hour working day). HGV movements will be managed during the periods of 07:00hrs to 09:00hrs and 17:00hrs to 19:00hrs to minimise the impact of construction related traffic on peak-hour general traffic. Construction vehicles will be directed to access work sections via the Proposed Development and dedicated routes on the National and Regional Road Network where practicable, to minimise use of the Local Road Network. The routes are outlined in Section 2.4.4.3 of this CTMP.

2.4.3 Staff Journeys to and from the Proposed Development

Typical work hours (not including localised instances where night-time working is required) are envisaged between Monday to Friday 07:00 to 19:00 and Saturday from 08:00 to 14:00). Personnel numbers for the Proposed Development are outlined in Chapter 4 (Proposed Development Description) and in Chapter 14 (Traffic and Transport) in Volume 2 of the EIAR included in this planning application pack. Throughout the Construction Phase there will be some variation in the numbers of personnel working on-site. It is anticipated that there will be approximately 118 personnel, on average, directly employed across the Proposed Development, rising to 215 personnel at the peak.

The appointed contractor will prepare a Construction Stage Mobility Management Plan (CSMMP) to actively discourage personnel from using private vehicles to travel to the Proposed Development. The CSMMP will promote the use of public transport, cycling and walking by personnel. Private parking at the TCCs and HDD Compounds will be limited. Vehicle-sharing will be encouraged, where travel by private vehicle is a necessity (e.g., for transporting heavy equipment).

Transportation of construction personnel between TCCs, HDD Compounds and working areas along the public highway will primarily be in site / minibus vehicles.

With the M3 Parkway rail station located towards the western extent of the Proposed Development, providing services to / from Dublin, it could serve as a means of travel to the Proposed Development if a shuttle bus service was also provided between the here and TCCs, HHD Compounds and work fronts.

2.4.4 Construction Traffic Management Plan Contents

The appointed contractor will be responsible for developing a CTMP to effectively manage traffic and transport during the Construction Phase of the Proposed Development. The appointed contractor will address the following aspects, in addition to any other aspects identified by the appointed contractor during the preparation of the CTMP:

- Access and egress;
- TCCs and HDD Compounds;
- Routing of construction vehicles;
- Pedestrian (including able-bodied pedestrians, wheel-chair users, mobility impaired pedestrians, pushchair users etc.) and cyclist provisions;
- Public transport provisions;
- Parking and access;
- Lighting;
- CSMMP;
- Traffic management signage;
- Timings of material deliveries;
- Traffic management speed limits;
- Vehicle cleaning;
- Road cleaning;
- Road condition;
- Road closures and diversions;
- Enforcement of CTMP;
- Interface with other projects;
- Emergency procedures during construction; and
- Communication.

Further details on issues to be addressed are provided in Section 2.4.4.1 to Section 2.4.4.19.

2.4.4.1 Access and Egress

Access to TCCs, HDD Compounds, and working areas will be designed to safely accommodate the existing road and active travel users, and the type of construction traffic that will use these accesses during the Construction Phase.

The appointed contractor will provide advanced warning signs, in accordance with the Traffic Signs Manual (DoT 2019), on approach to the proposed access locations, and entry and exit points throughout the live working area.

During the Construction Phase, there will be some temporary disruption / alterations to access to premises in certain locations along the proposed cable route. Local arrangements will be made on a case-by-case basis to maintain continued access to homes and businesses affected by the works, at all times, where practicable. Details regarding temporary access provisions will be discussed with homes and businesses prior to construction starting in the area.

2.4.4.2 Temporary Construction Compounds

TCC and HDD Compound requirements to facilitate the Construction Phase of the Proposed Development are detailed in Section 4.5.6 of Chapter 4 (Proposed Development Description) in Volume 2 of the EIAR included in this planning application pack. The TCCs and HDD Compound locations have been selected due to the amount of available space, their relative locations near to the Proposed Development and access to the National and Regional Road network. The location of the TCCs in relation to the Proposed Development are shown in Section 4.5.6 of Chapter 4 (Proposed Development Description), in addition to Figure 4.1 in Volume 4 of the EIAR. The TCCs will be located within the Planning Application Boundary at the following sites:

- **TCC0:** Chainage 0, located off Redbog Road adjacent to Woodland Substation;
- **TCC1:** Chainage 3,550, located off the R156 Regional Road;
- **TCC2:** Chainage 10,600, located off the R156 Regional Road;
- **TCC3:** Chainage 21,600, located off the Ballymacarney Road;
- **TCC4:** Chainage 26,850, located off the R121 Regional Road;
- **TCC5:** Chainage 34,800, located off Stockhole Lane; and
- **TCC6:** Chainage 37,700, located off the Stockhole Lane adjacent to Belcamp Substation.

The TCCs will contain a site office, and welfare facilities for appointed contractor personnel. Limited car parking will be allowed at the TCCs, in line with the principles of the CSMMP. Materials such as topsoil, subsoil, concrete, rock etc., will be stored at the TCCs for reuse, as necessary. Items of plant and equipment will also be stored within the TCCs.

The temporary HDD Compounds will be sited at both the reception and launch locations at each HDD crossing. These HHD Compounds will not be used for the storage of materials for the wider route or for site offices but will be used to facilitate the works required adjacent to and under the motorways and railway. A laydown area is also required for each HDD crossing. The location of the temporary HDD Compounds in relation to the Proposed Development are shown in Chapter 4 (Proposed Development Description) in Volume 2 of the EIAR, and in Figure 4.1 in Volume 3 of the EIAR. The temporary HDD Compounds will be located within the Planning Application Boundary at the following locations:

- **M3 HDD Compound West (HDD 1a):** Chainage 12,850, located off Woodpark Road;
- **M3 HDD Compound East and Laydown Area (HDD 1b):** Chainage 13,050, located off the R147;
- **M2 HDD Compound South (HDD 2a):** Chainage 23,400, located off the R121;
- **M2 HDD Compound North and Laydown Area (HDD 2b):** Chainage 23,600, located off the R121;
- **M1 HDD Compound West (HDD 3a):** Chainage 34,250, located off Stockhole Lane; and
- **M1 HDD Compound East and Laydown Area (HDD 3b):** Chainage 34,450, located off Stockhole Lane.

The appointed contractor's CTMP will include measures for managing traffic accessing and egressing the TCCs and HDD Compounds.

2.4.4.3 Routing of Construction Vehicles

Access to and egress from the TCCs, HDD Compounds and TTM Sections is envisaged to be along dedicated construction access routes. Abnormal loads are anticipated for the delivery of some large components (e.g., cable drums) for which a separate Abnormal Load Route Assessment (ALRA) has been completed (refer to Appendix B of this CTMP).

It is assumed that all national roads and regional roads in the immediate vicinity of the Proposed Development would be used by construction vehicles. The following national roads are expected to be used as construction access routes during the Construction Phase of the Proposed Development:

- M1 Motorway;

- M2 Motorway;
- M3 Motorway; and
- M50 Motorway.

The following regional roads are expected to be used as construction access routes during the Construction Phase of the Proposed Development:

- R108;
- R121;
- R122;
- R125;
- R132;
- R135;
- R139;
- R147;
- R154;
- R156; and
- R157.

The following local roads are expected to be used as construction access routes during the Construction Phase of the Proposed Development:

- L1007 Kilbride Road;
- L1009 Kilbride Lane;
- L1010;
- L2020 Naul Road;
- L2051 Clonshaugh Road;
- L2055 Baskin Lane;
- L2753 Stockhole Lane;
- L3030 Kilreesk Lane;
- L3132 Saint Margaret's Bypass;
- L3080 Ratoath Road;
- L3125 Kilshane Road;
- L5026 Pace;
- L6207 The Red Road;
- L72746 Naul Road;
- Ballymacarney Road;
- Cherryhound Tyrrelstown Link Road;
- Nuttstown Road;
- Priestown Road; and
- Toberburr Road.

The assumed construction access routes for the Proposed Development are shown in Figure 14.2 in Volume 4 of the EIAR included in this planning application pack.

2.4.4.4 Pedestrian and Cyclist Provisions

The measures set out in Section 8.2.8 of the Traffic Signs Manual (DoT 2019) will be implemented, wherever practicable, to ensure the safety of all road users, in particular pedestrians (including able-bodied

pedestrians, wheel-chair users, mobility impaired pedestrians, pushchair users) and cyclists. Therefore, where footpaths or cycle tracks are affected by construction, a safe route will be provided past the work area, and where practicable, provisions for matching existing facilities for pedestrians and cyclists will be made.

2.4.4.5 Public Transport Provisions

Existing public transport routes will be maintained throughout the duration of the Construction Phase of the Proposed Development (notwithstanding the need for road closures / diversions as discussed in Section 2.4.4.15). Wherever practicable, bus services will be prioritised over general traffic. However, the temporary closure of sections of existing dedicated bus lanes will be required to facilitate the establishment of a suitable working area on the R147 Regional Road as part of the Proposed Development. Some existing bus stop locations will need to be temporarily relocated to accommodate the works. In such cases, bus stops will be safely accessible to all users and all temporary impacts on bus services will be determined in consultation with the relevant stakeholders.

To the north of the M3 Parkway railway station, between the M3 Motorway and R157 Regional Road, off-road TTM Section 1.04 will involve the use of HDD to route the proposed cables underneath the track. This section of track is railway siding beyond the current line terminus at M3 Parkway and combined with the use of trenchless techniques, and the scheduling of these works to occur when trains are not in service, will ensure that there will be no disruption to operational services.

Traffic required in and around this trenchless crossing will be managed in accordance with the CTMP.

2.4.4.6 Parking and Access

During the Construction Phase, there is likely to be some disruption to existing areas of on-road or off-road parking provision, whether formal or informal. When roads have lane or full closures, alternative access to premises in certain locations along the proposed cable route may be required. Local arrangements will be made on a case-by-case basis to maintain continued access to homes, education sites, health / medical care facilities, public transport stops / hubs, active travel routes, local services, retail centres, local amenities, schools, places of worship, and businesses affected by the works, where practicable. Details regarding temporary access provisions will be discussed with stakeholders prior to construction starting in the area. The duration of the works will vary from property to property, but access and egress will be maintained at all times.

2.4.4.7 Lighting

Temporary lighting may be required at times along the proposed cable route at certain locations during the Construction Phase, where necessary. Where it is necessary to disconnect public lighting during the construction works or to undertake works outside of daylight hours where the existing lighting is low, appropriate temporary lighting will be provided. Temporary lighting will also be installed at the TCCs and HDD Compounds for the duration of the Construction Phase.

The standard of temporary lighting installed during the Construction Phase will meet or exceed the standard of the existing carriageway and will be appropriate to the speed and volume of traffic during construction. Temporary construction lighting will generally be provided by tower mounted floodlights, which will be cowled and angled downwards to minimise spillage of light from the site.

2.4.4.8 Construction Stage Mobility Management Plan (CSMMP)

The appointed contractor will prepare a CSMMP. The CSMMP will be used to encourage personnel to commute by means other than private car. The CSMMP may comprise the following topics, as well as other relevant topics identified by the appointed contractor:

- Introduction;

- Objectives and targets;
- Strategy of travel;
- Construction phase specific measures;
- Access and surrounding road network;
- Opportunities for car sharing;
- Implementation and coordination;
- Monitoring; and
- Adherence to public health guidelines.

2.4.4.9 Traffic Management Signage

TTM signage will be put in place in accordance with the requirements of the Traffic Signs Manual, Chapter 8, Temporary Traffic Measures and Signs for Roadworks (DoT 2019) to warn road users of the works ahead and to advise of any changes to the carriageway layout. In addition to TTM signage, requirements may include:

- Provision of temporary signage indicating construction access routes and locations for the appointed contractor and associated suppliers; and
- Provision of general information signage to inform road users and local communities of the nature and locations of the works, including contact details.

2.4.4.10 Timings of Material Deliveries

The appointed contractor will seek to reduce the impact of material deliveries on local communities and residents adjacent to the Proposed Development during the Construction Phase, where practicable.

2.4.4.11 Traffic Management Speed Limits

Adherence to posted / legal speed limits will be emphasised to all personnel / suppliers by the appointed contractor during induction training. The use of special speed limits for construction traffic in sensitive areas will be considered, such as 30km/hr (kilometres per hour) at school locations. Recommended speed limits will only apply to construction traffic and not to general traffic. The sign posting of such speed limits is not expected in the interest of clarity for local road users.

2.4.4.12 Vehicles and Vehicle Cleaning

An Environmental Incident Response Plan (EIRP) has been prepared for the Proposed Development (see Appendix A of this CEMP). The EIRP will ensure that, in the unlikely event of an incident, response efforts are prompt, efficient, and suitable for the particular circumstances. The EIRP includes measures to address surface water related incidents such as accidental spillages of noxious substances (e.g., oil and significant releases of sediment or concrete washings). A Surface Water Management Plan (see Appendix D of this CEMP) details the control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase.

Vehicles and plant provided for use on the Proposed Development will be in good working order to ensure optimum fuel efficiency and will be regularly inspected to ensure that they are free from leaks and are promptly repaired when not in good working order. To minimise risks to workers, locals, and the environment the following methods / procedures will be followed:

- Spill kits will be carried on all vehicles;
- Vehicles and plant will not park near or over surface water drains or watercourses;
- Refuelling of vehicles and plant will be carried out on hardstanding surfaces, using drip trays to ensure no fuel can contaminate the ground outside of the bunded areas;
- For deliveries and dispensing activities, the appointed contractor will ensure that:

    - Site-specific procedures are in place for bulk deliveries;
    - Delivery points and vehicle routes are clearly marked; and
    - Emergency procedures are displayed, and a suitably sized spill kit is available at all delivery points, and staff are trained in these procedures and the use of spill kits.
- The appointed contractor will provide wheel washing facilities, and any other necessary measures to remove mud and organic material from vehicles, at the TCCs, HDD Compounds, and working areas, where necessary. These will be located at least 10m away from any surface water drains or watercourses;
- The cleaning of delivery trucks will be carried out at the TCCs and will not be undertaken at the works areas;
- The surface runoff from vehicle washing areas will be directed to an on-site treatment system where possible. This will also increase the potential for reusing the water. Such a treatment system would typically include:
    - A settlement lagoon to remove suspended solids such as mud and silt; and
    - Catchpits or silt traps on drains, ensuring that they are in place during cleaning and that they are emptied at regular intervals;
- The use of detergents in the cleaning process will be minimised, where required. Biodegradable and phosphate-free detergents will be used;
- Where detergents are used in the washing process, the wash water will be contained in a containment tank prior to disposal off site using a suitable licensed waste disposal operator, or if a foul or combined sewer is nearby, the surface runoff could be directed to it, with the permission of the sewerage undertaker; and
- To further minimise water used for washing vehicles, trigger-operated spray guns will be used, with an automatic water supply cut-off.

2.4.4.13 Road Cleaning

Roads being used for dedicated construction access routes will be regularly inspected for cleanliness. The appointed contractor will monitor for mud and debris on the roads as a result of the Construction Phase works and use a road sweeping vehicle for cleanliness, if needed. The use of road cleaning sweepers will be considered as a last resort with prevention being the main objective.

2.4.4.14 Road Condition

The extent of the lorry traffic movements and the nature of the payload may create problems of:

- Fugitive losses from wheels, trailers, or tailgates; and
- Localised areas of subgrade and wearing surface failure.

Activities which may reduce the impact on road conditions will be incorporated into the CTMP by the appointed contractor, where practicable:

- Loads of materials leaving each works area will be evaluated and covered if considered necessary to minimise potential dust impacts during transportation;
- All reasonable measures will be taken while transporting waste or any other materials likely to cause fugitive losses from a vehicle during transportation to and from the works areas, including but not limited to:
    - Covering of all waste or materials with suitably secured tarpaulin / covers to prevent loss; and
    - Utilisation of enclosed units to prevent loss.
- Pavement condition surveys will be undertaken along roads forming part of the construction access route during the Construction Phase, based on consultation with the relevant

stakeholders and professional judgement regarding the condition of the route, pre-construction. These surveys will record the baseline structural condition of the road being surveyed immediately prior to construction; and

- On-going visual inspections and monitoring will be undertaken of the construction access routes, throughout the course of construction of the Proposed Development to ensure any damage caused by construction traffic is recorded. Arrangements will then be made to repair any such damage to an appropriate standard in a timely manner such that any disruption is minimised.

Upon completion of construction of the Proposed Development, the surveys carried out pre-construction will be repeated, and a comparison of the pre-construction and post-construction surveys will be carried out.

2.4.4.15 Road Closures and Diversions

Road closures and diversions will need to be carried out during the Construction Phase of the Proposed Development. However, these measures will be minimised, wherever possible. Where necessary, road closures and diversions will take into consideration the impact on road users, residents, public services, businesses etc. Expected road closures and diversions have been outlined in the TTMP (see Appendix A) and will be carried out with regard to the Traffic Signs Manual (DoT 2019). All road closures and diversions will be determined in consultation with the local authorities, An Garda Síochána and other relevant stakeholders, as necessary. Access will be maintained for emergency vehicles along the Proposed Development, throughout the Construction Phase.

2.4.4.16 Enforcement of Construction Traffic Management Plan

The appointed contractor will develop the CTMP for use throughout the Construction Phase. All personnel and material suppliers will be required to adhere to the CTMP. The appointed contractor will agree and implement monitoring measures to confirm the effectiveness of the CTMP and compliance will be monitored by the relevant stakeholders. Regular inspections / spot checks will be carried out to ensure that all personnel and material suppliers follow the agreed measures adopted in the CTMP.

Should any unforeseen issues arise, they will be addressed by remedial actions and changes to the monitoring regime. Where required, any deviation to measures included within the finalised CTMP will be submitted to and agreed with the relevant authorities / stakeholders.

In the unlikely event that the construction traffic routing is not adhered to, or where other inappropriate driving by a driver associated with the Proposed Development is confirmed, this will be relayed to the relevant partner, subcontractor, or supplier to address the issue. This will help to reduce the risk of it happening again.

2.4.4.17 Interface with Other Projects

The likely timelines of the Proposed Development construction works have considered the potential for simultaneous construction of, and cumulative impacts with other infrastructure projects and developments which are proposed along, or in the vicinity of the Proposed Development. The likely significant cumulative impacts caused by the Proposed Development in combination with planned projects are identified and assessed in Chapter 20 (Cumulative Impacts and Environmental Interactions) in Volume 2 of the EIAR included in this planning application pack. Interface liaison will take place on a case-by-case basis, as will be set out in the Construction Contract, to ensure that there is coordination between projects, that construction access routes remain unobstructed by the Proposed Development works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately.

2.4.4.18 Emergency Procedures During Construction

The appointed contractor will ensure that unobstructed access is provided to all emergency vehicles along all routes and accesses. The Electricity Supply Board (ESB) will provide to the local authorities and emergency

services, contact details of the appointed contractor personnel responsible for construction traffic management.

In the case of a construction traffic related emergency, the following procedure will be followed:

- Emergency Services will be contacted immediately by dialling 112;
- Exact details of the emergency / incident will be given by the caller to the emergency line operator to allow them to assess the situation and respond in an adequate manner;
- The emergency will then be reported to the appointed contractor;
- All construction traffic will be notified of the incident (where such occurs off site);
- Where required, appointed first aiders will attend the emergency immediately; and
- The appointed contractor will ensure that the emergency services are directed to and arrive at the emergency location.

2.4.4.19 Communication

The appointed contractor will develop a communications management plan that will set out engagement methods for road users, local communities and affected landowners. The appointed contractor will, through the ESB, ensure that close communication with the relevant local authorities and the emergency services will be maintained throughout the Construction Phase. The appointed contractor will also ensure that the local community, landowners, and strategic stakeholders are appropriately informed of proposed traffic management measures in advance of their implementation. Contact information for key points of contact will be provided for members of the public to obtain additional information and to provide additional knowledge such as local events, such as sports fixtures, for example, which may conflict with proposed traffic management measures. The appointed contractor will liaise with landowners through the agreed Communications Plan, where access to their property is temporarily affected by works.

3. References

BSI (2014). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Noise

Department of Transport, Health and Safety Authority, National Roads Authority and Local Government Management Services Board (2010). Guidance for the Control and Management of Traffic at Road Works.

DoT *et al*. (2010). Guidance for the Control and Management of Traffic at Road Works

DoT (2017). Guidelines for Managing Openings in Public Roads (Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads).

DoT (2019). Traffic Signs Manual

HSA (2009). Guidelines for Working on Roads, Health and Safety Authority

Directives and Legislation

Number 10 of 2005 - Safety, Health, and Welfare at Work Act 2005 (as amended)

S.I. No. 291 of 2013 - Safety, Health and Welfare at Work (Construction) Regulations 2013

S.I. No. 528/2021 - Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021

Appendix A – Temporary Traffic Management Plan

East Meath-North Dublin Grid Upgrade

CP1021 - Temporary Traffic Management Plan

March 2024

EirGrid

Contents

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Executive Summary

This document reviews the required Temporary Traffic Management (TTM) during the implementation of proposed cable route as part of the East Meath-North Dublin Grid Upgrade Project (hereafter referred to as the "Project"). The Traffic Management Plan (TMP) identifies the relevant legislation and regulations and proposes the required control measures.

A TMP for the full route is provided, breaking the route down into 30 no. sections. The sections allow for refinement in the proposed TTM, with the aim to reduce impact to road users. The plan considers the spatial requirements for the construction and the application of relevant legislations and guidance.

The proposed construction sequence to support the Temporary Traffic measures for the in-carriageway sections of the cable route as follows:

- Phase 1 – Installation of passing bay and joint bay structure: The passing bays (where required) will be constructed at the joint bay locations. Following the completion of the passing bay, the installation of the joint bay will take place under the same phase.

- Phase 2 – Excavation and installation of cable ducts: A trench will be dug along the cable route, ducts will be installed, and the road surfacing will be restored.

- Phase 3 – Installation and jointing of cables: The cables will be installed at joint bay locations within the ducts. The cables will then be jointed (connected) at each joint bay location to allow the installation of a continuous circuit.

The scale and nature of the Temporary Traffic measures will likely vary from Phase to Phase because of the different effects. Works during Phases 1 and 3 are discrete locations along the cable route, whereas Phase 2 would potentially be a rolling working area as the trench will run the entire length of the Proposed Development.

In Phases 1 and 3, the proposed traffic management solutions as follows:

- Lanes closure: Where the road width at the location of the joint bay is greater than 10.5m, a passing bay would not be required and only lanes closure required.

- Passing bay with lanes closure: Where the road width is less than 10.5m and where there is suitable space to construct a passing bay, a passing bay with lanes closure will be used to facilitate a single traffic signalled lane at the joint bay; and

- Full road closure (with local access arrangements): Where the road width is less than 10.5m and where there is insufficient space to construct a passing bay, a road closure with local access arrangements would be required for the affected area with signposted diversions to maintain safe flow of traffic.

In Phase 2, the following proposed measures will be applied:

- Full road closure (with local access arrangements): Where the residual open carriageway is less than 2.5m the road will be required to be closed, with local access arrangements where necessary. Allowing vehicles to pass on a carriageway less than this width would pose an increase in risk to road users and the construction delivery teams. Please note that the length of road that will be closed will be minimised and made

appropriate to the area of the works. The closed section will be based on the nearest diversion point and the works required in that area.

- Lane Closure with Heavy Goods Vehicles (HGV) Diversion: Where the residual open carriageway is between 2.5m and 3m the road will be required to be closed to HGVs but open to Light Goods Vehicles (LGVs e.g., Ford Transit vans) and cars. All HGVs would be required to utilise the diversion route, this would require signage to mitigate the risk of HGVs passing the works sites.

- Lane Closure: Where the residual open carriageway is greater than 3m, it is proposed to keep the road open to all road users utilising automated stop / go traffic signals. Automated signalling to account for the traffic flow and demand will reduce waiting times. The lane closures would remain during the entirety of the section of works (i.e., out of hours included) to ensure safety to all road users and delivery teams.

Section 4 details the proposed Temporary Traffic measures that will likely be required for the Project. The cable route has been divided into a number of sections because of the different sections being in-carriageway, in-verge or off-road, the nature of the proposed works in the area, difference in road widths, etc.

Diversions have been identified and calculated on a like-for-like basis e.g., where a regional road is affected by the Proposed Development, the proposed diversion only uses regional roads and does not include local roads in the area. In some areas, this approach could significantly increase the length of the diversion.

Further details on the proposed Temporary Traffic measures are included in the main body of this report. The assessment of the effects of these measures are included in the Planning and Environmental Considerations Report (PECR) for the Project.

The Contractor will update this TMP with details of the plans and procedures for their specific activities on site, including method statements, within the requirements set out in this TMP unless otherwise agreed with the relevant local authority. Such plans and procedures should, where applicable, adhere to the requirements as delineated in this TMP.

As such, this TMP should be understood as being an iterative document; while significant and adequate information is included herein to ensure a comprehensive understanding of Traffic Management measures that are proposed in respect of the development. It is further acknowledged that these might be refined in ongoing collaboration with the Roads Authorities in the post-consent detailed design process, or in response to any Condition(s) of Approval from the Consenting Authority. It is possible that the Contractor will provide additional innovations to the approach to traffic management that will further minimise traffic disruption.

1. Introduction

1.1 Purpose and objectives

This TMP has been prepared to present the approach and application of traffic management and mitigation measures for the construction of the Project. It aims to ensure that adverse effects from the construction phase of the Project, on the road network and the local communities, are avoided or minimised.

The purpose of this TMP is to document and describe the main activities that will likely be undertaken to facilitate the Project and to provide a framework of Traffic Management measures that could be implemented prior to commencement of, and throughout the duration of the construction of the Project.

The Project will be undertaken by a Contractor appointed by ESB. The Contractor will be responsible for updating the TMP for approval by ESB and agreement with the planning authority (in this case, Fingal County Council and Meath County Council), prior to the commencement of works. In the event that planning approval is given, any condition(s) relating to a TMP which may be attached to such an approval, will be implemented in accordance with the requirements of the condition. The Contractor will update this TMP with details of the plans and procedures for their specific activities on site, including method statements. Such plans and procedures should, where applicable, adhere to the requirements as delineated in this TMP.

As such, this TMP should be understood as being an iterative document; while significant and adequate information is included herein to ensure a comprehensive understanding of Traffic Management measures that are proposed in respect of the development. It is further acknowledged that these might be refined in ongoing collaboration with the Roads Authorities in the post-consent detailed design process, or in response to any Condition(s) of Approval from the Consenting Authority. However, it is considered that this document is robust and appropriate for inclusion in the consent application. The plan has identified the underground cable (UGC) route as a key component of the Project which requires Traffic Management.

The cable commences at the Woodland Substation and finishes at the Belcamp Substation, a route of approximately 37.5km in total length. The works require the laying of 400 kV cables in roadways, verges and across private lands with cable joint bays at defined locations. There will potentially be a requirement for significant temporary works along the route including site and storage area setups as well as the crossing of motorways, railways, and watercourses.

The Contractor's Method Statements will be prepared in acknowledgment of this TMP. The updated TMP will set out the detailed approach and methodology which the Contractor will follow in scheduling and undertaking the work. The Method Statements will also incorporate the control measures detailed in the TMP in addition to specified conditions that may be prescribed in any approval from An Bord Pleanála for the Project and measures provided in the PECR.

The subsequent sections provide the basis for the management of traffic expected during construction of the Project, on the basis of the designs shown in the planning documents. The TMP shall be developed by the appointed Contractor during detailed design into a more detailed Construction Traffic Management Plan based on their specific design proposals.

The role of Project Supervisor Design Process (PSDP) may be taken over by the Contractor and as such a TMP for their proposed design should be prepared in accordance with this TMP but can be revised as necessary in consultation with Transport Infrastructure Ireland (TII), Fingal County Council and Meath County Council. The Temporary Traffic Management Designer should prepare Detailed Temporary Traffic Management Design for all

locations where works are planned on, or impact on, any public road. The Temporary Traffic Management Design will have overall responsibility for the Temporary Traffic Management Plan, appointed by the Contractor.

Prior to commencing the works, the safe works plan should be developed into an Operational Traffic Management Plan by the Project Supervisor Construction Stage (PSCS). The appointed PSCS/Contractor of the Project is required to carry out the Safety Audit on Operational Traffic Management Plans prior to commencing the works. The PSCS shall co-ordinate the implementation of the developed Traffic Management Plan during construction of the works.

The developed TMP requirements should include the provision of facilities for the safe passage of pedestrian and vehicular traffic and measures to keep the impact of the works on the roads, local communities, and road users, to a minimum. All Traffic Management controls proposed by the Contractor should be in accordance with the documents referenced. It is possible that the Contractor will provide additional innovations to the approach to Traffic Management that will further minimise traffic disruption. Such measures could include restrictions on the timing of proposed works in sensitive areas, additional use of roadside verges within the planning application boundary for the Proposed Development, etc. Discussions with the Local Authorities have determined that roadworks is currently sometimes undertaken at night-time to reduce the impact to road users. It is not currently proposed that night-time working would be undertaken from the Proposed Development, but it is an innovation that could be discussed with the Local Authorities to reduce the impacts.

1.2 Details of Proposed Development

The Proposed Development includes approximately 37.5 kilometres (km) of new 400 kilovolt (kV) underground cable circuit between the existing Woodland Substation in the townland of Woodland, near Batterstown, County Meath and the existing Belcamp Substation in the townlands of Clonshagh and Belcamp in Fingal, north County Dublin.

The Proposed Development will consist of the following principal elements:

A. Installation of an underground cable circuit, approximately 37.5km in length, connecting Woodland Substation (400kV) in the townland of Woodland in County Meath, and Belcamp Substation (220kV) in the townlands of Clonshagh and Belcamp in Fingal in North County Dublin. The development of the underground cable will include the following:
    - Construction of a trench of approximately 1.5m in width and approximately 1.3m in depth in the public road (approximately 26km) and approximately 1.8m in depth in private lands (approximately 11.5km) in which the underground cable is laid in flat formation, with associated route marker posts at field boundaries where the cable is laid in private land;
    - Construction of 49 Joint Bays (on average every 750m), each approximately 10m in length, 2.5m in width and 2.5m in depth, with adjacent communication chambers and link boxes, along the full alignment of the underground cable. Where the Joint Bays are located off-road, permanent hardstanding areas will be created around the Joint Bays;
    - The laying of communication links and fibre optic cables between both substations, running in the same trench as the underground cable;
    - The provision of seven Temporary Construction Compounds (approximately 1 hectare per compound);
    - The provision of a Temporary Horizontal Directional Drilling (HDD) Compound at both the reception and launch locations for three HDD motorway crossings (i.e., six temporary HDD Compounds in total), and associated laydown area for each HDD crossing (i.e., three laydown areas in total) - sizes for each of the six HDD Compounds (plus laydown area where applicable) ranging from approximately 0.15ha to 0.45ha;
    - The provision of temporary Passing Bays during construction at 14 Joint Bay locations, each approximately 95m in length and 5.5m in width;

- The laying of unbound temporary access tracks, 6m wide in private lands (approximately 12km in total length);
- The laying of 12 unbound, permanent access tracks, 4m wide in private land, and maintained by the Electricity Supply Board (ESB) (approximately 4km in total length);
- All associated water, rail, road, and utility underground crossings using either trenchless drilling or open cut techniques as appropriate for the particular crossing; and
- All associated and ancillary above and below-ground site development works, including works comprising or relating to permanent and temporary construction, roadworks, utility diversions and site and vegetation clearance.

B. Upgrades to the existing 400kV Woodland Substation in the townland of Woodland in County Meath. This will include:
   - Installation of a 400kV feeder bay and associated electrical shunt reactor (approximately 8m in height);
   - Installation of insulators, instrument transformers, overhead conductors, disconnectors, circuit breakers, surge arrestors (up to 12.6 m in height) in order to connect the bay to the busbar;
   - Installation of two gantries, 25m in height, with one 3m tall lightning rod on top of each gantry; and
   - All ancillary site development works including site preparation works, underground cabling, drainage and earthgrid, as required to facilitate the Proposed Development.

C. Upgrades to the existing 220kV Belcamp Substation in the townlands of Clonshagh and Belcamp, Fingal. This will include:
   - Construction of a new GIS steel framed and clad building (73m long, 17.8m wide by 16m high) to house new 400kV GIS Hall, plus eight lightning rods on the roof of the GIS Hall (each 3m in height);
   - Installation of 400kV switchgear to facilitate the connection of the new cable to the existing substation;
   - Installation of associated electrical shunt reactor (approximately 8m in height) with insulators, instrument transformers, overhead conductors, disconnectors, circuit breakers, surge arrestors (up to 12.8m in height) in order to connect the reactor to the cable;
   - Installation of two lightning masts (each 15m in height);
   - Installation of a new 400/220kV transformer adjacent to the new GIS Hall and connections to the existing 220kV substation via cable; and
   - All ancillary site development works including site preparation works, site clearance and levelling, vegetation clearance, reinstatement, and access tracks.

1.3 Challenges and considerations

The major challenge on the project is maintaining the flow of all public traffic during the works. This will be especially prevalent during the construction of the cable trench in the road network where lane and road closures will be required to allow construction to proceed while also protecting the workforce. This is the main reason that this TMP has been produced.

Linked to this will be to maintain access to all properties and businesses along the route during the construction works and especially with regards to the lane and road closures.

Due to the proposed construction methodology and the long distance within the road network there is an additional challenge of how long the works will take and the subsequent duration requirements for traffic management to be in place. This disruption will be mainly felt by the residents, local businesses and commuters who would normally use these routes daily.

2. Traffic Management Assessment

2.1 Guidance documentation

The Contractor should typically comply with the requirements of:

- Traffic Signs Manual – Chapter 8 – Temporary Traffic Measures and Signs for Roadworks, Department of Transport, Tourism and Sport, August 2019 (Department of Transport, Tourism and Sport, 2019);

- Guidance for the Control and Management of Traffic at Road Works, Department of Transport, Health and Safety Authority, National Roads Authority and Local Government Management Services Board, second edition 2010 (Department of Transport, Tourism and Sport, 2010);

- Guidelines for Managing Openings in Public Roads (Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads), Department of Transport, Tourism and Sport, second edition April 2017 (Department of Transport, Tourism and Sport, April 2017); and

- Guidelines for Working on Roads, Health and Safety Authority, 2009 (Health and Safety Authority, 2009)

These Guideline documents should typically be read in conjunction with primary Safety, Health and Welfare at Work legislation, including the Act 2005, the Construction Regulations 2013, and any amendment to them.

2.2 Design reference documentation

The assessment of the TTM is based on the following issued design reference documentation:

- Cable joint bay design as per ESB 400kV Joint Bay PE422-D7001-013-002 Rev 00 (Issued 10/03/10)
- Cable drum description/properties: 4.3m external diameter, 4.0m barrel length and 35.4t (As detailed by Jacobs Cable Designer)
- Passing bay proposed details 321084AJ-JAC-ZZ-XX-DR-C-0001.

It is assumed that the 400kV cables is the most onerous construction case with regards to the largest spatial requirements.

2.3 Temporary Traffic Management Process

TII Chapter 8 are the base standards that are used as part of the design of the construction space proofing for the passing bays at the joint bay locations. By using existing typical layouts from the standards, combined with route specific parameters, the traffic management solution can be detailed to provide space proofing diagrams. Figure 2-1 shows the TTM design process used as part of the Traffic Management assessment.

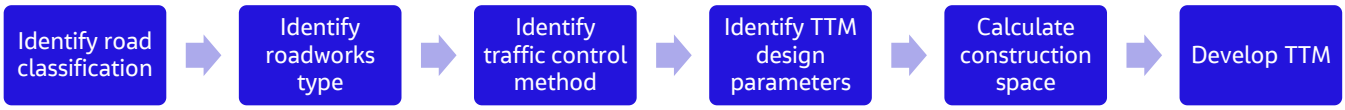

Figure 2-1 Temporary Traffic Management design process

2.3.1 Road Classification

Table 2-1 identifies the road classification dividing them into two levels; main and sub. Identifying the road classification is of particular importance as this defines the TTM parameters (i.e., extent of space required for the TTM).

Table 2-1 Road Classifications (Extract of TII Chapter 8 Table 8.2.1.1)

Level		Carriageway Type	Speed / Speed Limit (km/h)
Main	Sub		
Level 1	i	Single	≤ 30
	ii	Single	40
	iii	Single	50
	iv	Single	60
		Multi-Lane / Dual	≤ 60
Level 2	i	Single	80
	ii	Single	100
Level 3	i	Dual and Motorway	80
	ii	Dual and Motorway	≥ 100

The main levels are defined as follows:

a) Level 1 – Urban and Low Speed Roads

b) Level 2 – Rural Single Carriageway Roads

c) Level 3 – Dual Carriageways and Motorways

The proposed cable alignment is predominantly along Regional, 'R' roads, with a speed limit of 80km/hr. Most roads on the route are classed as Level 2(i). It is permissible to justify a lower-level classification provided permission from the relevant local authority for a temporary construction speed limit.

Clause 8.2.3.10 states "The speed limit chosen typically should not be more than two speed limit steps below the permanent posted speed limit and should be appropriate to the speed at which a vehicle could drive through the roadworks with reasonable safety." Therefore, in compliance with Clause 8.2.3.10, it is assumed the local authority would approve a reduced speed limit and that the classification of the roads can be reduced to Level 1 (iii).

2.3.2 Roadworks Type

The roadworks types are defined in Figure 2-2. The main construction works as part of the Project are assumed to require the conditions of that of Static Type A. The defining parameter being the requirement for full time where works are expected to be greater duration than 12hours.

TTM Type	Description	Traffic Flow Conditions	Visibility Conditions	Planned Duration
Static Type A	Works requiring full time Temporary Traffic Management (TTM)	All	All	Permitted for any duration but required for durations in excess of 12 hours
Static Type B	Works that normally involve the use of one or two vehicles in the operation. This type of work is typically maintenance and repair type operations, including maintenance of utilities or street furniture.	Unrestricted by either traffic volume or weather conditions	All	Permitted for a duration of up to 12 hours
Static Type C	Works at a discrete location that are of a short duration (excluding signage setup/removal).	Unrestricted by either traffic volume or weather conditions	Good	Permitted for a duration of up to 15 minutes
Semi Static Operation (SSO)	Works where the operations are mobile or making short duration stops continuously along a road where static warning signs are used. SSO is only suitable on Level 1 and 2 roads.	Unrestricted by either traffic volume or weather conditions	Good	Permitted for stop durations of up to 15 minutes
Mobile Lane Closure (MLC)	Works where the operations are mobile or making short duration stops continuously along a road where mobile warning signs and Impact Protection Vehicles (IPV) are used. MLC is only suitable on Level 3 roads.	Unrestricted by either traffic volume or weather conditions	Good	Permitted for stop durations of up to 15 minutes*

Note:
- Particular works may have several phases of TTM which may fall under different TTM types. For example, footway works may require different phases.
- * For MLC the permitted duration may be extended by agreement with the overseeing organisation.

Figure 2-2 TTM Roadworks Types (Extract of TII Chapter 8 Table 8.2.1.2)

2.3.3 Traffic control method

The Traffic Management utilises temporary traffic controls, including but not limited to traffic lights, road signs and traffic cones, to allow shuttle working at any given time. The key design parameters are shown in Figure 2-3. These include and are defined as:

- *Cumulative Distance*
    - Distance from the first sign (Roadworks Ahead) to the start of the taper.
- *Taper Length*
    - The required length for the reduction in width of a single lane or hard shoulder.
- *Longitudinal safety zone*
    - Measured from the end of the taper to the start of the works area. It provides a clear area for an errant vehicle to come to a stop before reaching the works area.
- *Lateral Safety Zone*
    - Measured from the trafficked edge of the cone or barrier to the edge of the works area. This area must be kept free of all operations, stationary vehicles, materials, and personnel thus ensuring a clear safe distance back from the edge of the live traffic.
- *Minimum lane width*
    - The minimum width of traffic lane to be maintained at all times for use by the road user. This may vary depending on the characteristics of the traffic being catered for.
    - Clause 8.4.3.2 states "the unobstructed road width which forms the traffic lane for one-way traffic should be an optimum width of 3.3m and maximum lane width of 4.3m".

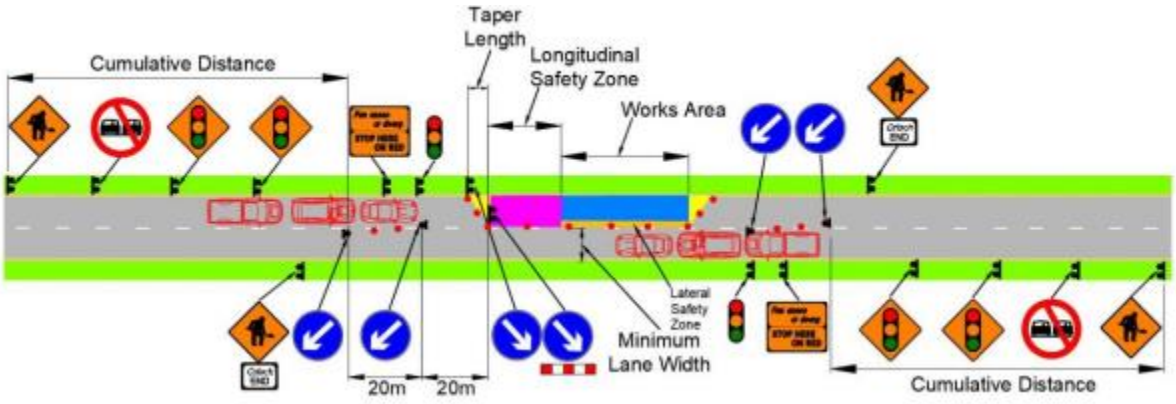

Figure 2-3 Temporary Traffic Signals Control for Shuttle Working (Extract of Figure 8.4.4.5 Chapter 8 TII)

Table 2-2 defines the key design parameters for each of the road levels. Please note that the majority of the roads are classified as Level 2 (i). With the introduction of a reduced speed limit and in compliance with Clause 8.2.3.10, the TTM is designed around the parameter of Level 1(iii).

Table 2-2 Restrictions (Department of Transport, Tourism and Sport, 2019)

Level		Carriageway Type	Speed / Speed Limit (km/h)	Min Lane Width (m)		Lane Taper Rate / Length (m)	Safety Zones	
Main	Sub			HGV	Light Vehicles		Longitudinal (m)	Lateral (m)
Level 1	i	Single	≤ 30	3	2.5	1 in 1	0.5	0.5
	ii	Single	40	3	2.5	1 in 1	0.5	0.5
	iii	Single	50	3	2.5	1 in 5*	5	0.5
	iv	Single	60	3	2.5	1 in 10*	15	0.5
		Multi-Lane / Dual	≤ 60					
Level 2	i	Single	80	3	2.5	1 in 40*	45	1.2
	ii	Single	100	3	2.5	1 in 60*	60	1.2
Level 3	i	Dual and Motorway	80	3.3. (Lane 1) 3 (Subsequent Lanes)		180	45	1.2
	ii	Dual and Motorway	≥ 100	3.3. (Lane 1) 3 (Subsequent Lanes)		180	60	1.2

* 45° taper is required at shuttle traffic-controlled layouts with cones at 1m centres.

As per the Clause 8.4.3.1, "for two-way traffic the minimum road width should be 5.0m for Level 1 roads and 6.0m for Level 2 roads". In this case, the key design parameters remain the same as for the shuttle working arrangement. It is important that advance warning signage is given to road users using signs Road Narrows on Left, on Right or on Both Sides as appropriate (Figure 2-4). If vehicles are required to traverse the existing centreline, then centreline coning should be provided.

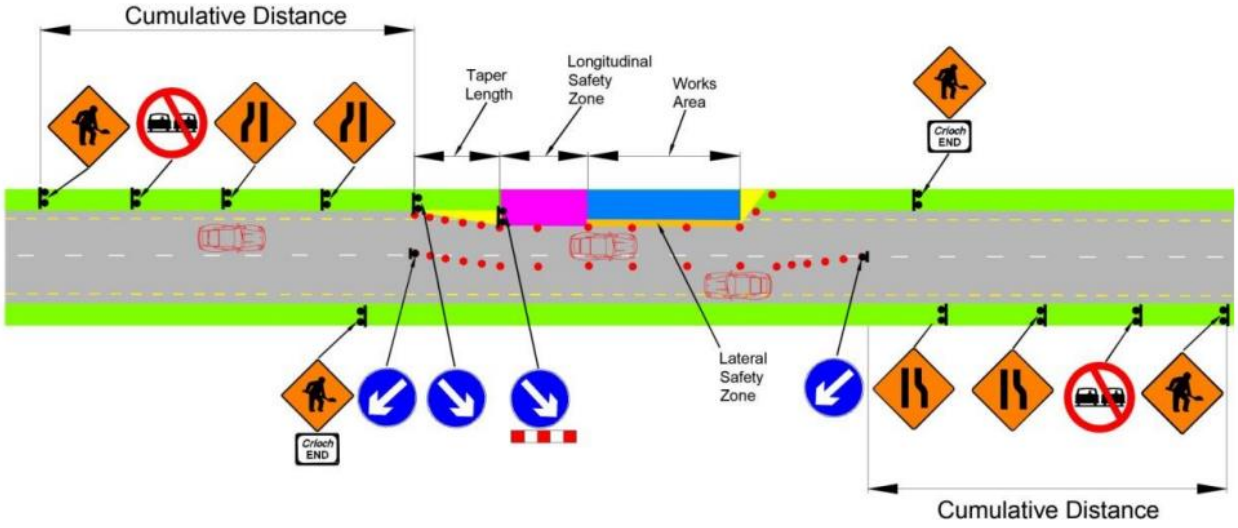

Figure 2-4 Temporary Traffic Signals Control for two-way Traffic (Extract of Figure 8.4.4.1 Chapter 8 TII)

2.3.4 TTM Design Parameters

Table 2-3 defines the minimum design parameters using the road classification and road works type. Table 2-3 demonstrates the refinement and reduction in required land take by introducing the construction speed restriction. The aim would be to introduce a temporary construction speed limit to allow the road to be classified as a Level 1(iii)

Table 2-3 Minimum Design Parameters (Extract Chapter 8 TII of Table 8.2.2.4 and 8.2.2.6)

	Level 1(iii)	Level 2(i)
Cumulative Distance	40m	480m
Lane Taper Rate	1 in 5	1 in 40
Longitudinal Safety Zone	5m	45m
Lateral Safety Zone	0.5m	1.2m

2.3.5 Construction Space

With regards to the allowance for the construction space, as per the Abnormal Load Assessment, it is assumed that an adapted low loader trailer will be used for the transportation and installation of the cable. It is assumed that a total vehicle length of 15m would be required.

Using the ESB Murphy's market engagement as the base case for the cable installation, shown in Figure 2-5, it is assumed that 7m distance from edge of drum barrel to edge of pit is required.

The required construction width of 6.5m assumed the joint bay is against the road kerb line. If the joint bay is unable to be positioned against the kerb line, the construction working room will increase and the size of the plan horizontal dimension of the passing bay will increase accordingly.

Therefore, the following key input parameters are used as part of the construction space parameters as follows:

- Length ~45m
    - Length of joint bay ~10m
    - Distance from drum to edge of joint bay ~7m
    - Length of delivery vehicle ~15m
    - Access space around the vehicle ~10m (Allowing for lubrication unit, vehicle parking, welfare etc.)
- Width ~min. 6.5m

With regards to the joint bays that are located in the verge or off-road, a temporary land-take as shown in Section 2.3.6.3 will be required. A suitable and stable platform designed to take the axle loadings is required to ensure the safety of the vehicles, site personnel and the public. It would not be recommended to negate the temporary land requirements and operate either on the existing ground or in the live carriageway.

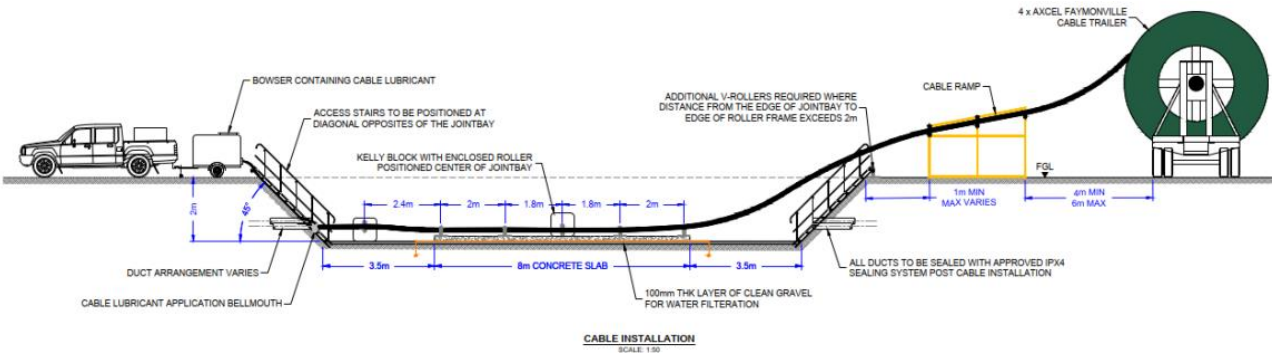

Figure 2-5 Murphy Cable Installation Diagram

2.3.6 Proposed Traffic Management Design

2.3.6.1 In-carriageway Joint Bay (Option 1) – Dual direction cable installation

Figure 2-6 shows the required construction space and associated passing bay if the location is to support cable pulling from both directions. A total of 95m passing bay is required to support this solution. Note a 0.5m walking space has been provided around the delivery vehicles to maintain the TII requirements for the lateral and longitudinal safety zone.

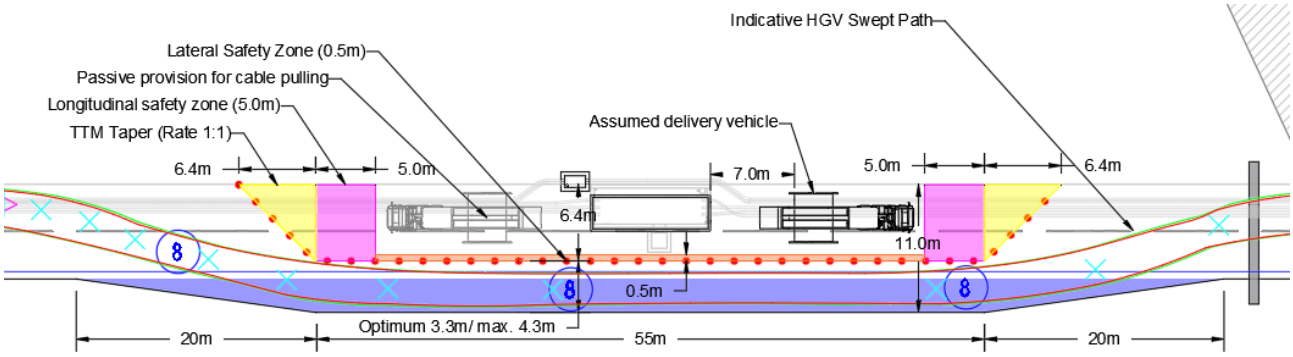

Figure 2-6 'In-carriageway' Joint Bay (Option 1)

2.3.6.2 In-carriageway Joint Bay (Option 2) – Single direction cable installation

Figure 2-7 shows the required construction space and associated passing bay if the location is to support cable pulling from one direction. A total of 85m is required to support this solution. As per the ESB market engagement, provision has been provided for a lubrication and jointing unit on the opposite side of the delivery vehicle.

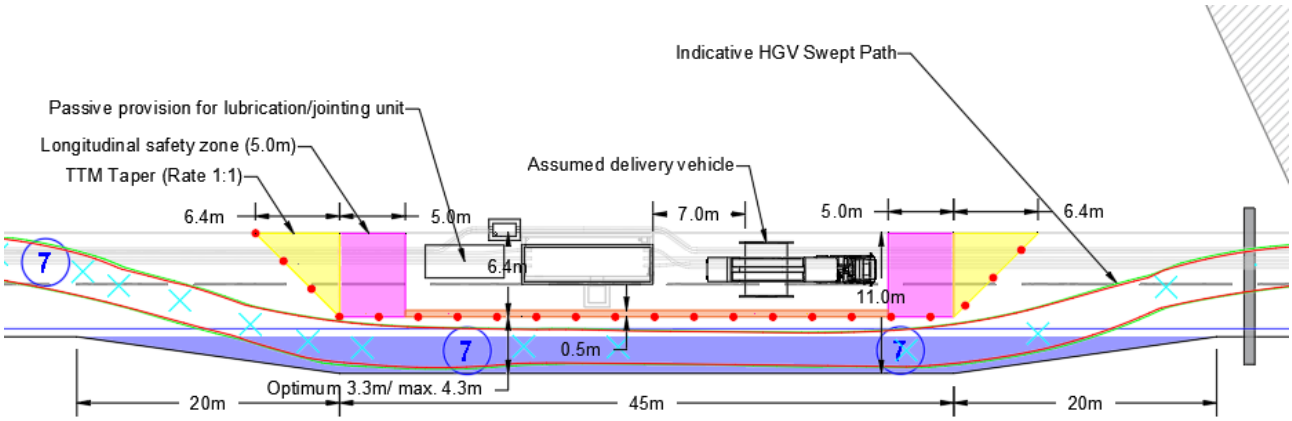

Figure 2-7 'In-carriageway' Joint Bay (Option 2)

2.3.6.3 Off-road / in-verge Joint Bay

Figure 2-8 shows the required construction space with passing bay for off-road or in-verge Joint Bays. To ensure the safety and stability of all construction vehicles, a temporary access platform will be installed. Without a suitably designed construction platform this could present difficulties installing the cable and further health and safety issues, including vehicles instability, lack of traction, over-turning or utility damage.

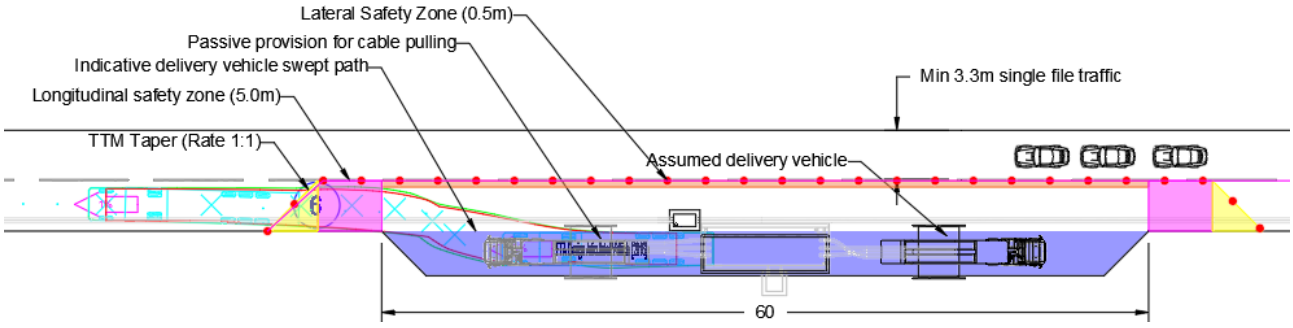

Figure 2-8 Off-road joint bay

2.3.7 Additional Considerations

2.3.7.1 Construction traffic

Construction traffic mainly consists of the movement of excavated materials and the delivery of equipment and materials. A summary of the proposed machinery – both LGV (less than 3.5t) and HGV (over 3.5t) – for this project is provided in Section 4.3. Where possible, HGV traffic should be directed away from residential communities in the vicinity of the works areas in order to minimise the impact on these communities.

The Contractor should commit to ensuring that the adverse effects of construction traffic are minimised, as far as reasonably practicable. It is the Contractor's responsibility to liaise with the relevant authorities prior to construction, including TII, DAA, Fingal County Council, Meath County Council, and the emergency services in order to prepare a comprehensive Construction Traffic Management Plan.

Regarding the timing of material deliveries, the Contractor may schedule the deliveries in such a way that construction activities requiring a greater number of HGVs do not overlap with concentrated delivery activities. In addition, where possible deliveries should be coordinated to avoid coinciding with major events that have potential to generate higher than usual traffic volumes. It is also the Contractor's responsibility to liaise with Fingal County Council, Meath County Council, and the management of other adjacent construction projects to coordinate deliveries appropriately if their construction periods coincide.

The construction activities necessitate the movement of the workforce who are to deliver the Project. Due to the rural nature of the sites and the lack of alternative options, it is envisaged that all staff will most likely travel to the site via private vehicles. However, in order to minimise private car movements, the Contractor should prepare appropriate workforce travel plans to reduce the impact of workforce travel on local residents and businesses, where reasonably practicable. The Contractor may plan for construction workers to park their personal vehicles at parking spaces available at each of the construction compounds and then they can travel to their work areas in the minimum number of vehicles required; the plan should take into account that construction staff should not park on public roads other than within the work areas.

Pre- and post-condition surveys should be carried out by the Contractor on all roads where works will be carried out. Following the works, all excavated areas shall be reinstated as per the Guidelines for Managing Openings in Public Roads (Department of Transport, Tourism and Sport, 2019). The Contractor should also carry out road sweeping to remove project related debris and materials. During road sweeping, an appropriate TTM and Method Statement should be provided by the Contractor in order to ensure safety of staff and road users.

2.3.7.2 Safety measures

A balance between health and safety for road users, workforce, and local community is required to ensure that all personnel are suitably accounted for. The Contractor should develop a Safe System of Work (SSoW) and ensure a suitable TMP is appropriately implemented and effective in all lighting and weather conditions.

The Table below summarises some of the various safety measures that are being included within the traffic management arrangements to protect various groups.

Table 2-4 Safety measures

Customer Group	Safety Measure
Workforce / Road Users / Walkers, Cyclists, and Horse-riders (WCH)	Communication and advance notification of diversions and roadworks through media, social media, existing or portable Variable Message Signs (VMS) assist road user groups with planning their journeys. Clear signage and physical barriers for Walkers, Cyclists, and Horse-riders (WCHs) should be considered to reduce risk of incursion within work zones or live traffic lanes.
	Lane widths and restrictions, length of traffic management and potential diversion routes have been considered as stated within this Traffic Management Plan. However, the Contractor must ensure implementation of the above Traffic Management to ensure safety during construction works.
	Lane closures and narrow lanes have been considered when works are being carried out adjacent to the live carriageway to provide the lateral safety zones.
	Carriageway closures and suitable diversion routes have been considered when activities such as the demolition of old culverts, installation of new culverts etc is being carried out, to protect all customer groups.
	The maintenance of existing lighting and consideration of appropriate area or task lighting is important for the existing operational network, diversion routes, WCH routes and for the work zones. This is particularly relevant during winter months and during periods of inclement weather and poor visibility.
Workforce / Road Users / WCH / Local Community	Space restrictions will mean adequate safe working zones need to be maintained throughout the construction phases, with a strong emphasis on creating a safe working environment by enforcing health and safety rules and ensuring these rules are upheld. Review of construction methodology and sequence to identify and establish sufficient working space to carry out activities safely with the appropriate plant and equipment and maintaining safe means of access and egress is essential.
Road user	To ensure consistency in the visibility of road markings the Designer shall remark existing road markings that are retained.
WCH	Primary consideration should be given to the safety of WCH users including pedestrians, for the construction works that will be carried out within all areas. WCH diversion routes will be considered to ensure that this group can traverse the working area safely. The provision of temporary signalised crossing points and ramps should be considered to provide grade separation at areas of high volume WCH traffic.

2.3.7.3 Adjacent roadworks

In order to define a list of all works affecting the road network in the vicinity of the scheme or the associated diversion routes, the project team should set up regular liaison meetings with TII, DAA, Fingal County Council and Meath County Council, to ensure that there are no clashes during full road closures and the impact to the road users is minimised across all networks.

2.3.7.4 Significant events and seasonal traffic

A schedule of Bank Holidays is provided below which indicates when Traffic Management restrictions are to be minimised where possible.

Table 2-5 Bank Holidays (Subject to change)

Bank Holidays	Dates
New Year's Day	01 January (or First Monday of the Month if fallen on weekend)
St Brigid's Day	First Monday in February
St. Patrick's Day	17 March
Good Friday	Friday preceding Easter Sunday (Note this is a bank holiday and not a public holiday)
Easter Monday	Monday (following Easter Sunday)
Early May Bank Holiday	First Monday of May
June Bank Holiday	First Monday of June
August Bank Holiday	First Monday of August
October Bank Holiday	Last Monday of October
Christmas Day	25 December
St Stephen's Day	26 December

During the main period of construction works, it is not envisaged that Traffic Management arrangements would be removed and reinstalled at Bank Holidays. This could result in creating unsafe environments, as well as be cost prohibitive, time consuming and disruptive to the local stakeholders.

To minimise the impact of Traffic Management during Bank Holidays, the construction programme should avoid the need to change road layouts unless there is a measurable benefit to the local stakeholders. Lane and full road closures should be avoided during these periods as far as reasonably practicable. To alleviate the local stakeholders' perception of no work taking place, construction works should continue during these periods.

In addition, the following events have been identified as also having an impact on the Project.

- The seasonal effects of tourism/public holidays
- Reductions in school/work trips during holiday periods
- The effect of annual leave on the volume of commuting trips during the summer months
- Changes in the level of retail activity; and
- Sporting, cultural or community events held on the public road.

Dates for each significant events throughout the construction period should be determined during detailed planning and prior to the start of construction works where possible. The Contractor should ensure that any closures during the construction shall have a minimal impact on public events.

The Contractor, as part of their stakeholder engagement plan, should liaise with the relevant authorities to assess the impact of the various annual events and consider using portable Variable Message Signs (VMS) to alert the road users to the potential of increased traffic flows.

2.3.8 Road closures applications

Applications for Temporary Road Closures should typically be made on Fingal County Council and Meath County Council accordingly. The Contractor is responsible for obtaining Road Closures as necessary to fulfil the contractual obligations. To comply with statutory requirements, an application for a Temporary Road Closure should be submitted a minimum of 8 weeks in advance. The Gardaí should also be informed in writing. Particular attention should be given to notifying local stakeholders in advance.

2.3.9 Road opening license

All road openings shall be carried out in accordance with the latest version of the document "Guidelines for Managing Openings in Public Roads (Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads) (Department of Transport, Tourism and Sport, April 2017) .

In order to carry out an excavation in a public road, a Road Opening License is required; all Road Opening Licenses should typically be applied through the MapRoad Roadworks Licensing (MRL) system which is managed and facilitated by the Road Management Office (RMO). It is Contractor's responsibility to obtain the Road Opening Licenses.

2.3.10 Public notices

The Contractor should liaise with the Roads Authority in respect of any temporary full road closures, lane closures, and other traffic management controls required to be carried out to ensure the safety of the workforce and the public for the period of the works. The advertising of such notices on the local radio, local press, council websites, and leaflet drops should be considered to warn motorists, local businesses and residents of the changes involved and new road layouts to be expected.

2.3.11 Incident management

In accordance with the Clause 4.3.9 of the Guidance for the Control and Management of Traffic at Road Works (Department of Transport, Tourism and Sport, 2010), the requirement of the Incident Management Plan is established early in the design process and would usually include the provision of an incident management system to record and report all site incidents and those that are related to Traffic Management.

The Incident Management Plan should be established and developed by the Contractor. The purpose of this plan is to set out the broad principles of partnership working between the PSCS, Contractor, Temporary Traffic Operations Supervisor and Emergency Responders in terms of carrying out roles and responsibilities of each party for incident management during the construction of the scheme, focusing on incident identification, response, and recovery.

The incident management system should include, but not limited to, an operational structure with a formal reporting system and review meetings, the name of the person with responsibility for record keeping and an outline contingency plan.

During the works, consideration should be given to the possibility of altering or removing the Traffic Management measures in order to deal with exceptional circumstances, such as high traffic volumes, adverse weather conditions and emergency access.

2.3.12 Communication plan

It is recommended that a Communication Plan should be developed to deliver up to date information about progress and forthcoming full road and lane closures to the public.

The Communication Plan should be developed prior to the start of works to include identification of target audiences, key messages, and communication channels. It should typically set out the processes and procedures for communications including reactive communications to deal with incidents and emergencies on the network.

Proposed communication actions prior to traffic management and associated construction works should typically include:

- Placing of the "Roadworks Ahead" warning signs which should be the first temporary sign visible to the road user on the approach to any roadworks

- The local Authority typically should update in writing key stakeholders on timelines and progress as per the Temporary Closing of Roads Regulations, 1956 - S.I. No. 30/1956

- In advance of the works, plans would be communicated through various sources, such as websites, news articles and road signage along the relevant stretch highlighting timelines for works to all affected residents, landowners, and business owners.

- The works should be included on the TII roadworks website as this is potentially the first source of information looked at by the public

Proposed communication actions during construction works:

- Roadside signage can be used to inform the road user of changes to traffic management, construction works, operations and possible delays

- Communication and distribution of newsletters to stakeholders (including all affected residents, landowners, and business owners) to share the progress on the Project

- Regular communications to emergency services and breakdown services to ensure they are aware of the changing road network as the scheme evolves

- Publicity of scheme details for road users at leisure venues, petrol filling stations, local supermarkets and other regularly visited domestic type stores

- Continued use of the TII and Councils Website

- Press releases to the broadcast media

- Twitter and other social media to share works and delays as well as weekly update roadworks emails

- Weekly traffic management liaison meetings with relevant stakeholders

It is recommended that all local residents and businesses are included within a single Project-wide Communication plan to ensure timely, efficient, and effective communication to all parties.

In the preparation of the Construction Stage TMP and during the implementation of the works, the Contractor should typically liaise with the following parties:

- Meath County Council Roads Department

- Fingal County Council Roads Department

- Garda Síochána, ambulance and fire services

- Dublin Airport Authority

- Private and Public Bus Services

The Contractor should typically take into account the impact of the construction works on general traffic, businesses, and local property owners and coordinate the implementation of the developed TMP throughout the duration of the works.

2.3.13 Working hours

Typically, workings hours during construction are expected to be:

- Weekdays 0700hrs to 1900hrs
- Saturday 0800hrs to 1400hrs

At specific locations where impact to local receptors (i.e., residents, wildlife etc) is anticipated, there may be a requirement for 24hour working. The ability to work 24hrs would minimise impact during construction of the scheme and facilitate more efficient operations. This would typically be facilitated by two 12hour work shifts.

The ability for 24hour working would not affect the proposed Traffic Management, but rather reduce the implementation duration, reducing in turn disruption to the road network. This would only be recommended under a full road closure scenario. A full environmental impact assessment will be required if this strategy is to be taken forward, as well as necessary consents to the extra disruption caused to neighbouring properties by working overnight.

2.3.14 Access and Egress

Access to temporary Construction Compounds, HDD compounds, and working areas will be designed to safely accommodate the existing road and active travel users, and the type of construction traffic that will use these accesses during the Construction Phase.

The appointed contractor will provide advanced warning signs, in accordance with the Traffic Signs Manual (Department of Transport, Tourism and Sport, 2019), on approach to the proposed access locations, and entry and exit points throughout the live working area.

During the Construction Phase, there will be some temporary disruption / alterations to access to premises in certain locations along the proposed cable route. Local arrangements will be made on a case-by-case basis to maintain continued access to homes and businesses affected by the works, at all times, where practicable. Details regarding temporary access provisions will be discussed with homes and businesses prior to construction starting in the area.

3. Construction Methodology

3.1 Sequence of Works

The proposed construction sequence to support the TTM for the 'in-carriageway' sections of the cable route as follows:

- Phase 1 – Installation of passing bay and joint bay structure
    - Early installation of the passing bay would support the excavation and installation of the ducts, facilitating lorry holding areas and safely parking awaiting delivery vehicles in strategic positions.
- Phase 2 – Excavation and installation of cable ducts
    - Assumed to be aligned to the road corridor boundary.
- Phase 3 – Installation and jointing of cables
    - All assumptions associated with the installation of the cables are detailed within the Abnormal Load Assessment.

The following aspects are excluded from this Traffic Management report:

- Construction compounds
- Localised utility diversions
- Off-road access points
- HDD access points
- Demobilisation (Note: it is assumed at this stage, Phase 1 TTM will be required for demobilisation at passing bay locations)

3.2 Construction Space

3.2.1 Phase 1 – Installation of Passing Bay and Joint Bays

3.2.1.1 'In-carriageway' Joint Bay

Phase 1 of the works would most likely include the construction of the passing bays (where required) at the joint bay locations. This provides a strategic advantage for the remainder of the Project as small areas are developed that could support the construction process. On completion of the passing bay, it would be proposed that the joint bays are installed under the same phase.

Figure 3-1 and Figure 3-2 show the plan of the expected site setup during Phase 1. It would be proposed that a localised lane closure would be required to support the installation of both the passing bay and joint bay structure. Although the passing bay would be offline to the live carriageway, suitable precautions will be required for delivery vehicles and material handling.

If these two separate activities are completed independently, the proposed traffic management would remain the same. Please note, the demobilisation of the Project and the associated removal of the passing bays will likely require the same traffic management as that required in the installation case.

Following review of the required passing bay and construction space proofing, the key parameters of the joint bay as follows:

- Total road width - approximately 10.5m
    - Width of the construction works – a minimum of ~6.5m
    - Open lane width - 3.3m-4.3m

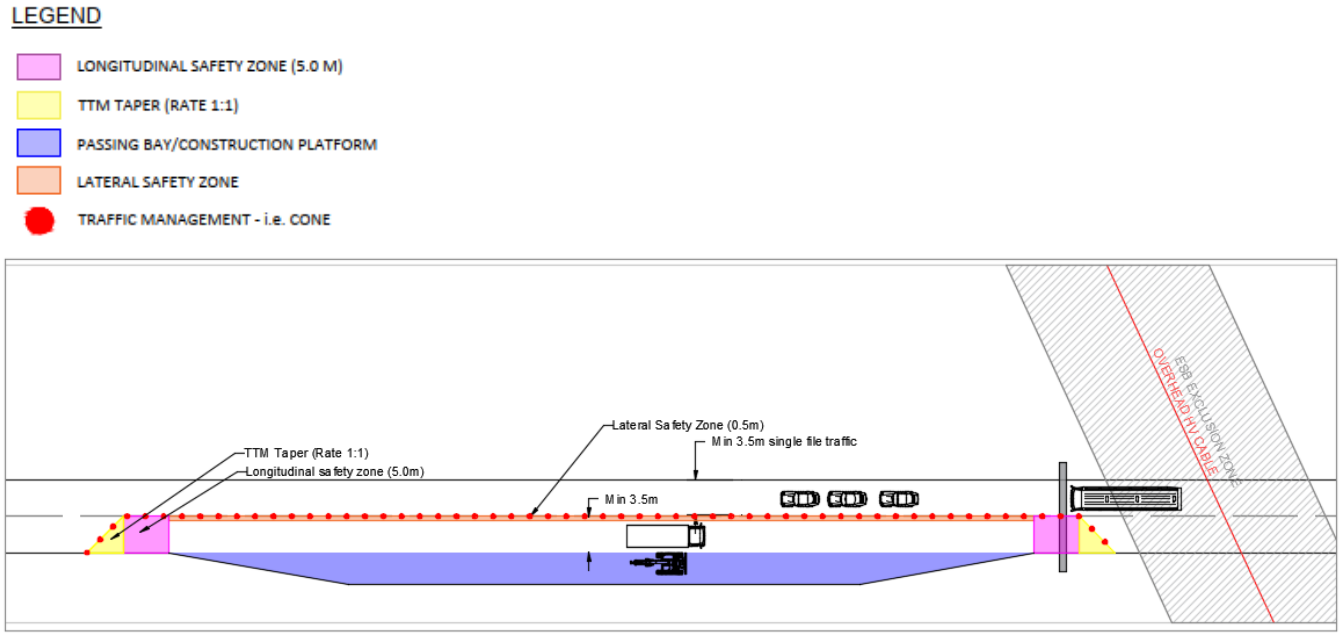

Figure 3-1 Passing Bay Construction

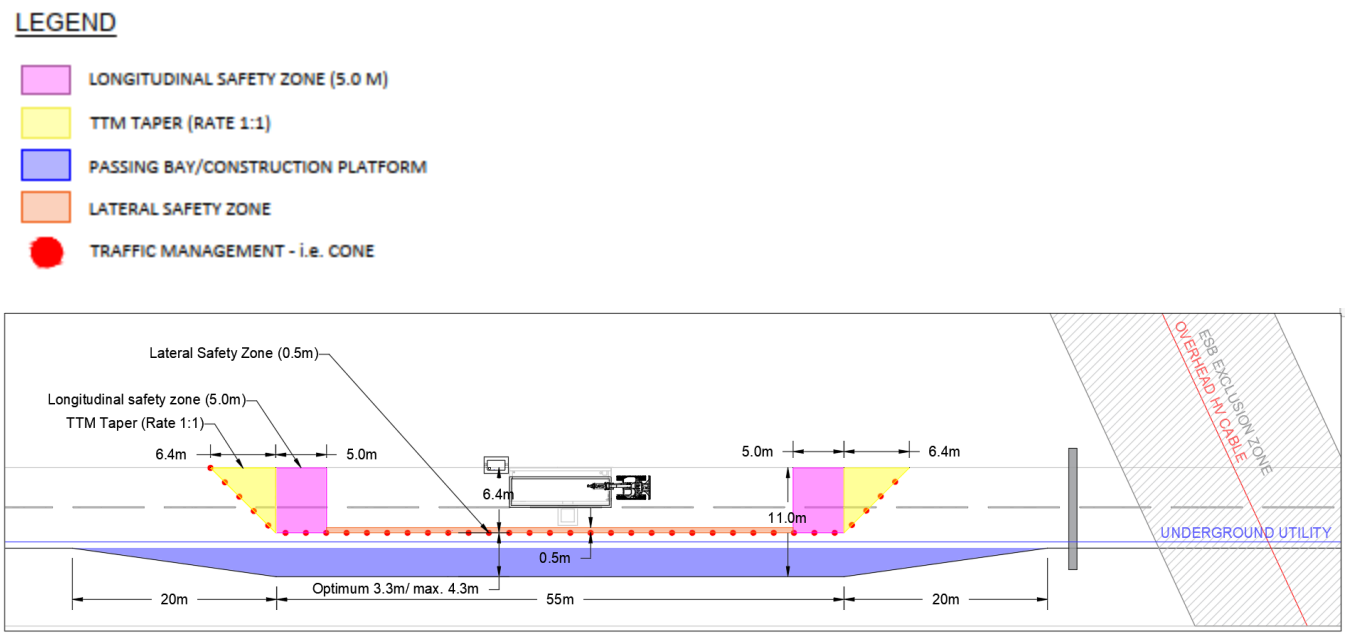

Figure 3-2 'In-carriageway' Joint Bay Construction

Figure 3-3 shows the installation of the joint bay and the required construction space. Approximately 7.0m width of construction space would be required for the installation of the joint bays. This required 7.0m is calculated assuming the alignment of the joint bay with the road boundary. It should be noted that the delivery vehicle for the precast joint bay would only temporarily be in position for approximately two hours.

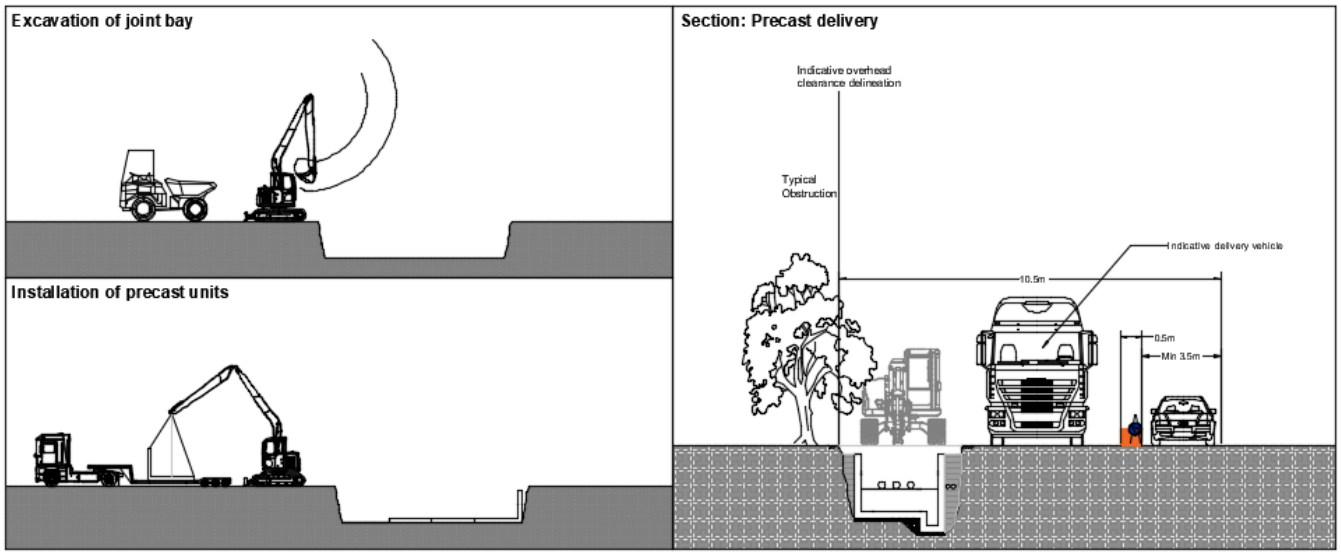

Figure 3-3 'In-carriageway' Joint Bay Construction (Sections)

3.2.1.2 'In-verge' Joint Bay

There are instances along the route where joint bays may be located adjacent to the road in the verge. A suitable construction platform will be required for the safe delivery of materials and installation of the permanent works. It is recommended a suitable platform is designed and tested to ensure the stability of all plant, equipment, and delivery vehicles.

Figure 3-4 shows the proposed construction platform and associated TTM.

Following review of the required construction platform and construction space proofing, the key parameters of the joint bay as follows:

- Total road width - approximately 7.5m
    - Width of the construction works – a minimum of 4.5m
    - Open lane width – 3.3m-4.3m

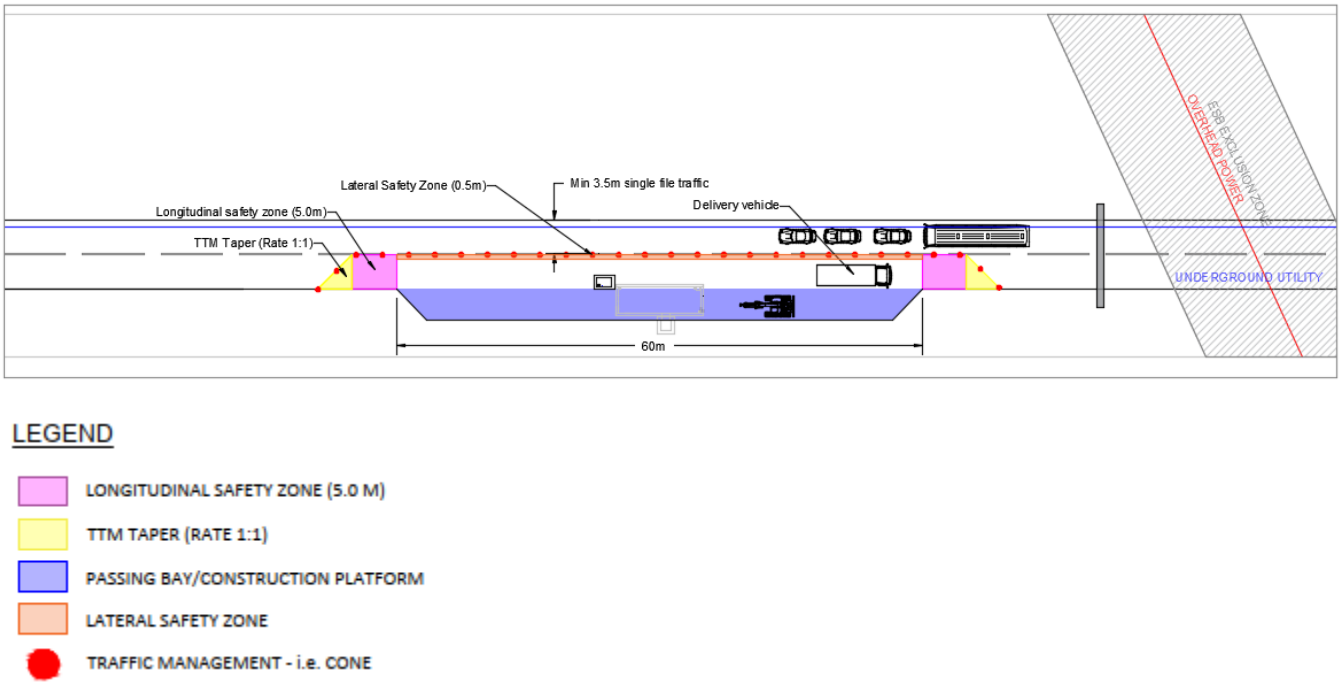

Figure 3-4 'In-Verge' Joint Bay Construction

3.2.2 Phase 2 – Excavation and installation of cable ducts

To minimise disruption to road users, it would be preferable to work in a linear corridor approach as shown in Figure 3-5. This approach would not be the considerably constrained, as this will create a narrow corridor with live adjacent lanes in operation. This method would have the least impact to the road network.

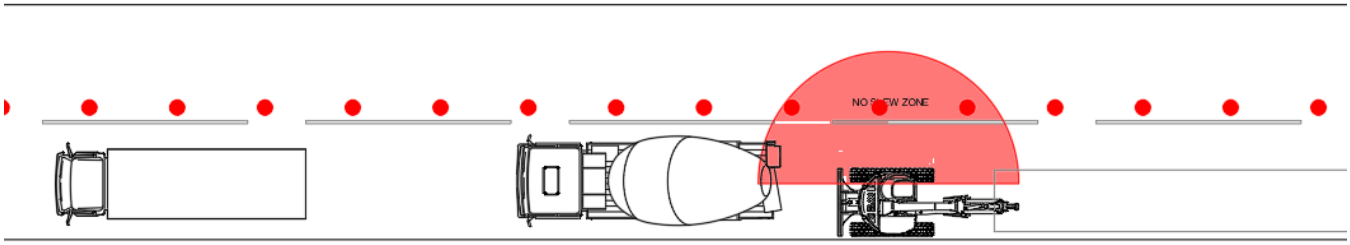

Figure 3-5 Duct installation

Following review of the required construction space proofing, the key parameters to maintain the road open with a lane closure as follows:

- Total road width - approximately 7.5m
    - Width of the construction works – a minimum of 4.2m
    - Open lane width – 3.3m-4.3m

Figure 3-6 shows the construction space proofing for the installation of the ducts and the associated backfill. A minimum construction space width of 4.2m would be required. It should be noted this is considerably constrained and would likely result in reduced output.

In the event that there is an obstruction preventing the excavator slew, a Safe System of Work will likely be identified by the Contractor.

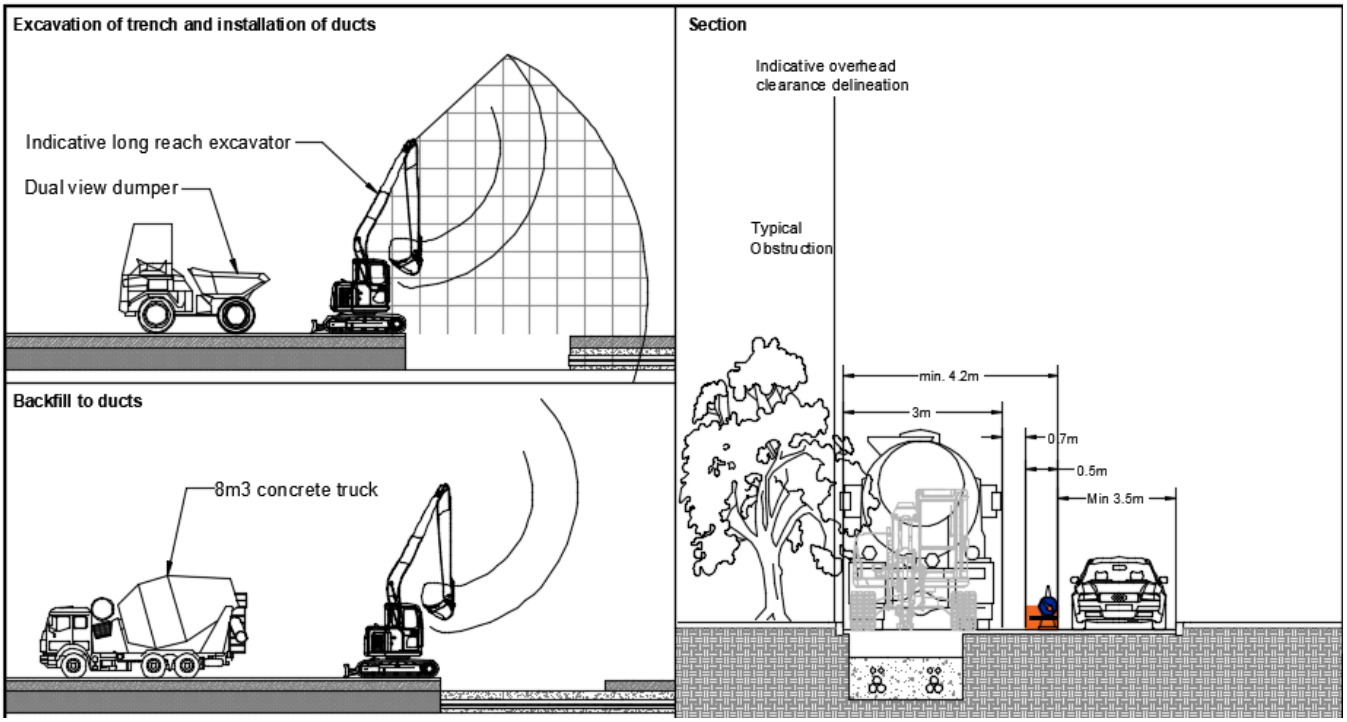

Figure 3-6 Duct Installation (Sections)

Figure 3-7 shows the potential strategic use of the passing bay as a staging area (for example a lorry holding bay). It would be recommended that the Contractor considers the early implementation of the passing bay at the joint bay locations.

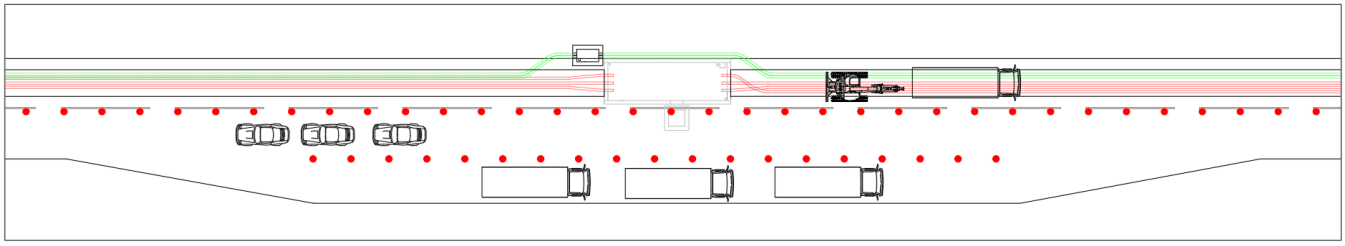

Figure 3-7 Strategic use of passing bay

3.2.3 Phase 3 – Installation, jointing and testing of the cables

3.2.3.1 'In-carriageway' Joint Bay

At 'in-carriageway' locations the proposed traffic management is shown in Figure 3-8. The passing bay will facilitate the safe passage of public vehicles whilst the demarcated zone will provide suitable construction space for installation operations.

Figure 3-9 shows a section of the cable installation and anticipated spatial requirements. This is shown to support the required construction space in Figure 3-8.

Note the passing bay shown facilitates dual cable installation, refinement for single cable direction would likely be defined at detailed design stage.

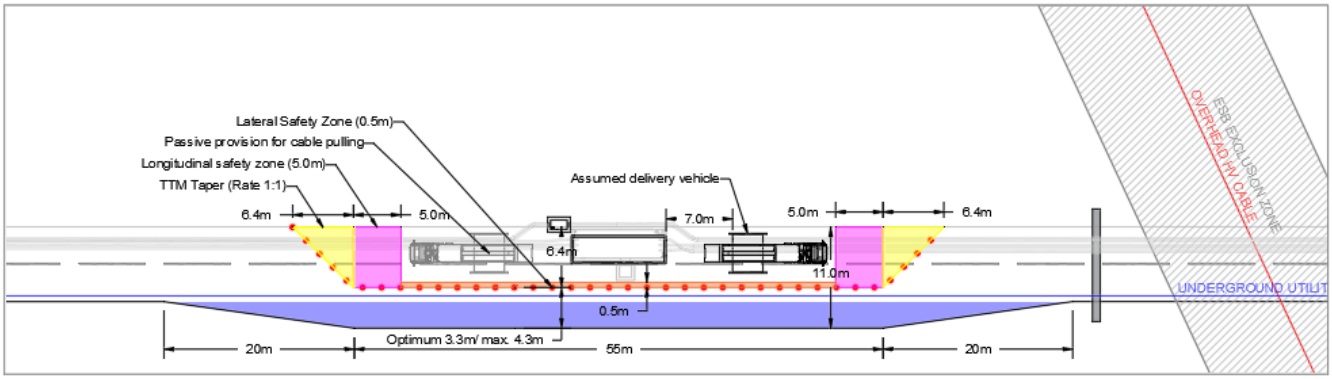

Figure 3-8 'In-carriageway' cable installation - Plan

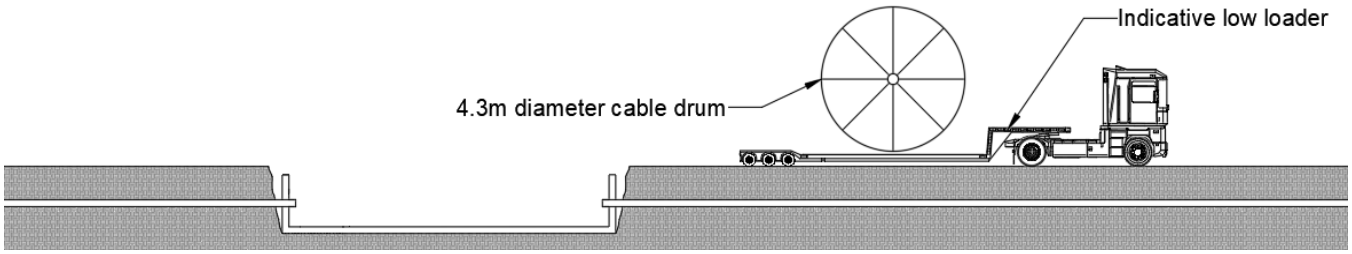

Figure 3-9 'In- carriageway' cable installation - sections

3.2.3.2 'In-verge' Joint Bay

At 'in-verge' joint bay locations, the proposed traffic management is shown in Figure 3-10. Although the operations are out of the live traffic flow, the works are still in proximity and consideration to the safety of site staff is required. A lateral safety zone of 0.5m will be required from the working area and suitable access to the construction platform will be required. Due to the slow-moving vehicles, there will be a likely requirement for TTM to ensure the safety of all road users.

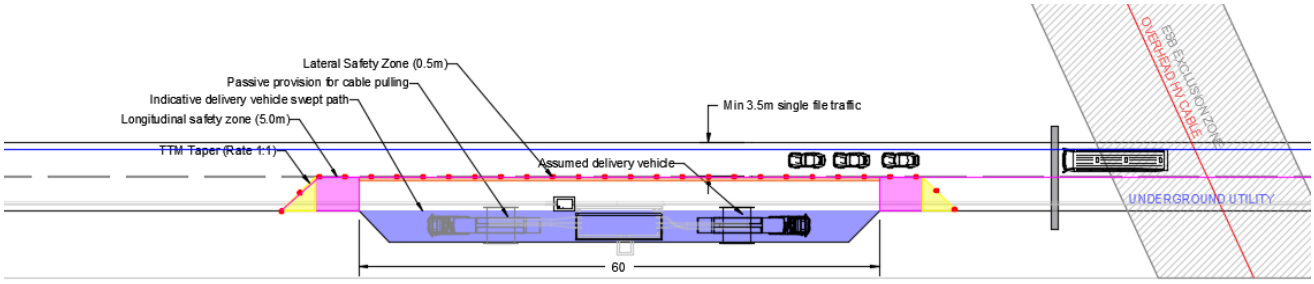

Figure 3-10 'In-verge' cable installation - plan

4. Traffic Management Plan

4.1 Proposed Traffic Management Plan

The subsequent sections detail the proposed Traffic Management sections (Table 4-1). Each section builds on the elements discussed in the previous sections and aims to offer a safe solution to all road users in compliance to the relevant guidance and legislative documents.

Table 4-1 Traffic Management Sections

TTM Sections	Name of Section	Length (m)	Start Ch	End Ch	Council Authority	Type	No. of Joint Bays
1.01	Woodland	3635	0	3635	Meath	Off-road	4
1.02	R156	7185	3635	10820	Meath	In-carriageway	10
1.03	R157	1530	10820	12350	Meath	In-verge	1
1.04	M3	873	12350	13223	Meath	Off-road	2
1.05	R147	327	13223	13550	Meath	In-carriageway	0
1.06	L5026	1610	13550	15160	Meath	In-carriageway	2
1.07	L1010 West	695	15160	15855	Meath	In-carriageway	1
1.08	Pinkeen River	605	15855	16460	Meath	Off-road	1
1.09	L1010 East	340	16460	16800	Meath	In-carriageway	1
1.10	Nuttstown Road	1410	16800	18210	Meath	In-carriageway	1
1.11	Ward River	70	18210	18280	Meath	Off-road	0
1.12	Priestown Road	915	18280	19195	Meath	In-carriageway	2
1.13	Priest Town	195	19195	19390	Meath	Off-road	0
1.14	Kilbride Road North	1115	19390	20505	Meath	In-carriageway	1
1.15	Kilbride Off-road	80	20505	20585	Meath	Off-road	0
1.16	Kilbride Road South	695	20585	21280	Meath / Fingal	In-carriageway	1
1.17	Hollywood	1346	21280	22626	Fingal	Off-road	3
1.18	M2 HDD South	684	22626	23310	Fingal	In-carriageway	0
1.19	M2 HDD	360	23310	23670	Fingal	Off-road	1
1.20	M2 HDD North	950	23670	24620	Fingal	In-carriageway	1
1.21	The Ward Cross / R121	1575	24620	26195	Fingal	In-carriageway	2
1.22	Ward River	70	26195	26265	Fingal	Off-road	0
1.23	R121	805	26265	27070	Fingal	In-carriageway	1
1.24	R122	1250	27070	28320	Fingal	In-carriageway	2
1.25	Kilreesk Lane	50	28320	28370	Fingal	In-carriageway	0
1.26	Kingstown	790	28370	29160	Fingal	Off-road	1
1.27	R108	1640	29160	30800	Fingal	In-carriageway	2
1.28	Naul Road	2450	30800	33250	Fingal	In-carriageway	4

TTM Sections	Name of Section	Length (m)	Start Ch	End Ch	Council Authority	Type	No. of Joint Bays
1.29	Stockhole Lane West	810	33250	34060	Fingal	In-carriageway	1
1.30	M1 East	3706	34060	37766	Fingal	Off-road	4

4.1.1 Phase 1 Proposed Traffic Management

The decision flow chart for Phase 1 is shown in Figure 4-1. The following traffic management solutions are suggested at this stage:

- 'In-carriageway' Joint Bays
    - Lanes closure
        - Where the road width at the location of the joint bay is greater than 10.5m, a passing bay would not be required and only lanes closure required.
    - Passing bay with lanes closure
        - Where the road width is less than 10.5m and where there is suitable space to construct a passing bay as shown in Figure 3-2, the proposed TTM is a passing bay with lanes closure to facilitate a single traffic signalled lane at the joint bay.
    - Full road closure (with local access arrangements)
        - Where the road width is less than 10.5m and where there is insufficient space to construct a passing bay as shown in Figure 3-2, the proposed TTM is a full road closure with local access arrangements
- 'In-verge' Joint Bays
    - Construction Platform with suitable access TTM
        - Where the road width at the location of the joint bay is greater than 7.5m, a temporary vehicular access platform will be required as shown in Figure 3-4, however no lane restrictions would be required. TTM to protect the workforce and maintain access via the platform would be required.
    - Construction Platform with single lane closure
        - Where the road width at the location of the joint bay is less than 7.5m, a construction platform will be required as shown in Figure 3-4 with a single lane restriction.

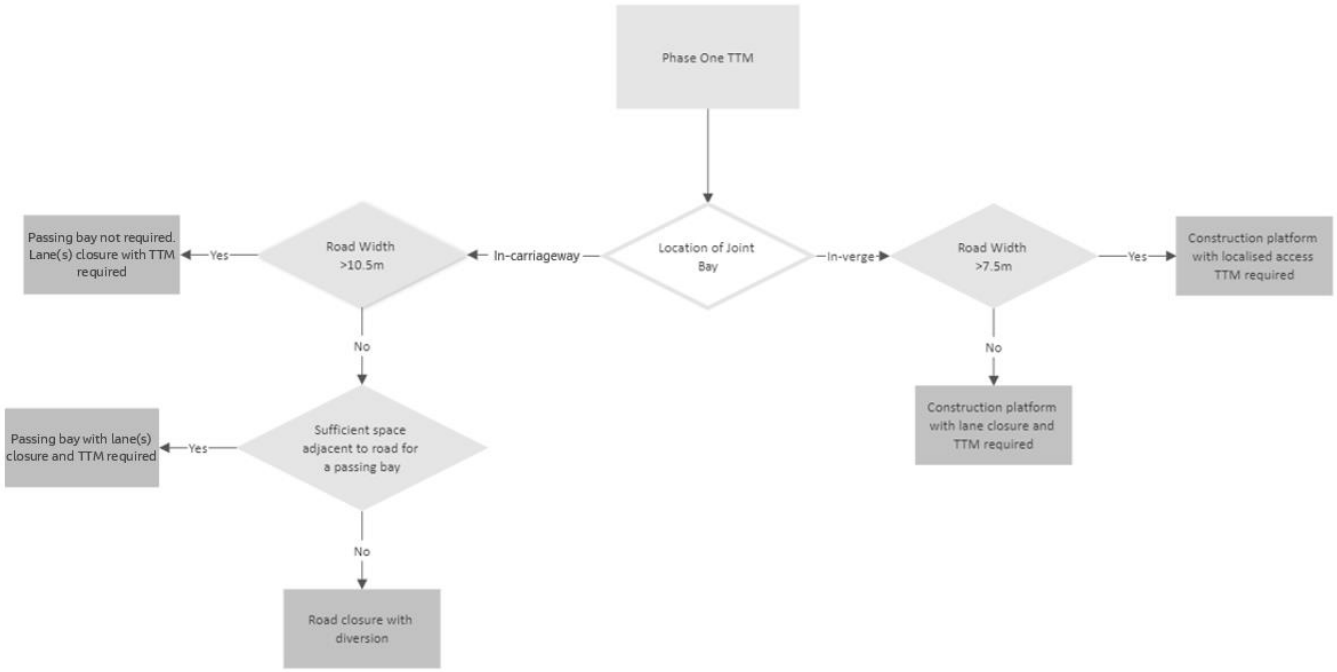

Figure 4-1 Phase 1 – TTM Decision Flowchart

The proposed traffic management for Phase 1 is shown in Table 4-2.

Table 4-2 Proposed Traffic Management – Phase 1

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 1
1.01	N/A	JB1	812	Off-road	N/A	Not required
		JB2	1560	Off-road	N/A	Not required
		JB3	2384	Off-road	N/A	Not required
		JB4	3080	Off-road	N/A	Not required
1.02	R156	JB5	3807	In-carriageway	6.5	Passing bay – two lanes closure
		JB6	4587	In-verge	6.5	Temporary construction platform – single lane closure
		JB7	5390	In-verge	7.0	Temporary construction platform
		JB8	6022	In-verge	6.7	Temporary construction platform – single lane closure
		JB9	6821	In-carriageway	6.5	Full road closure
		JB10	7646	In-carriageway	7.0	Passing bay – two lanes closure both PB and JB are on the same side of the road
		JB11	8358	In-carriageway	6.3	Full road closure
		JB12	9088	In-verge	6.9	Temporary construction platform – single lane closure

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 1
		JB13	9936	In-verge	6.5	Temporary construction platform – single lane closure
		JB14	10771	In-verge	8.0	Temporary construction platform
1.03	R157	JB15	11577	In-verge	15	Temporary construction platform – adjacent hard shoulder closure
1.04	N/A	JB16	12417	Off-road	N/A	Not required
		JB17	13163	Off-road	N/A	Not required
1.06	L5026	JB18	13764	In-carriageway	12	Two lanes closure
		JB19	14549	In-carriageway	3.6	Full road closure
1.07	L1010 West	JB20	15327	In-carriageway	5.0	Full road closure
1.08	N/A	JB21	15920	Off-road	N/A	Not required
1.09	L1010 East	JB22	16719	In-carriageway	5.3	Full road closure
1.10	Nuttstown Road	JB23	17518	In-carriageway	5.3	Full road closure
1.12	Priestown Road	JB24	18366	In-carriageway	5.5	Passing bay – two lanes closure
		JB25	19037	In-carriageway	5.3	Passing bay – two lanes closure
1.14	Kilbride Road North	JB26	19749	In-verge	5.8	Temporary construction platform – single lane closure
1.16	Kilbride Road South	JB27	20613	In-carriageway	5.7	Passing bay - two lanes closure
1.17	N/A	JB28	21393	Off-road	N/A	Not required
		JB29	22036	Off-road	N/A	Not required
		JB30	22593	Off-road	N/A	Not required
1.19	N/A	JB31	23349	Off-road	N/A	Not required
1.20	M2 HDD North	JB32	24215	In-carriageway	6.5	Full road closure
1.21	The Ward Cross / R121	JB33	25100	In-carriageway	5.9	Passing bay – two lanes closure
		JB34	25875	In-carriageway	4.8	Passing bay – two lanes closure
1.23	R121	JB35	26481	In-carriageway	5.3	Passing bay – two lanes closure
1.24	R122	JB36	27111	In-verge	6.5	Temporary construction platform
		JB37	27929	In-verge	5.8	Temporary construction platform – single lane closure
1.26	N/A	JB38	28767	Off-road	N/A	Not required
1.27	R108	JB39	29484	In-carriageway	7.4	Passing bay – two lanes closure
		JB40	30187	In-carriageway	7.4	Passing bay – two lanes closure
1.28	Naul Road	JB41	30940	In-carriageway	7.4	Passing bay – two lanes closure
		JB42	31651	In-carriageway	8.0	Passing bay – two lanes closure

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 1
		JB43	32531	In-carriageway	7.5	Passing bay – two lanes closure
		JB44	33088	In-verge	7.5	Temporary construction platform
1.29	Stockhole Lane West	JB45	33838	In-carriageway	7.6	Passing bay – two lanes closure
1.30	N/A	JB46	34657	Off-road	N/A	Not required
		JB47	35424	Off-road	N/A	Not required
		JB48	36172	Off-road	N/A	Not required
		JB49	36960	Off-road	N/A	Not required

4.1.2 Phase 2 Proposed Traffic Management

The decision flow chart for Phase 2 is shown in Figure 4-2. The following traffic management solutions are suggested at this stage:

- Full road closure (with local access arrangements)
    - Where the residual open carriageway is less than 2.5m the road will be required to be closed, with local access arrangements where necessary. Allowing vehicles to pass on a carriageway less than this width would pose considerable risk to road users and the delivery teams. Refer to Clause 8.4.3.1 and 8.4.3.2 TII Chapter 8 (Department of Transport, Tourism and Sport, 2019)
- Lane Closure with HGV Diversion
    - Where the residual open carriageway is between 2.5m and 3m the road will be required to be closed to HGVs but open to LGVs / cars. All HGVs would be required to utilise the diversion route, this would require VMS and signage to mitigate the risk of HGVs passing the works sites. Refer to Clause 8.4.3.1 TII Chapter 8 (Department of Transport, Tourism and Sport, 2019)
- Lane Closure
    - Where the residual open carriageway is greater than 3m, it is proposed to keep the road open to all road users utilising automated stop / go signals. Consideration to use automated signalling to account for the predominant flow direction. These would remain during the entirety of the section of works (i.e., out of hours included) to ensure safety to all road users and delivery teams. Refer to Clause 8.4.3.1 and 8.4.3.2 TII Chapter 8 (Department of Transport, Tourism and Sport, 2019)

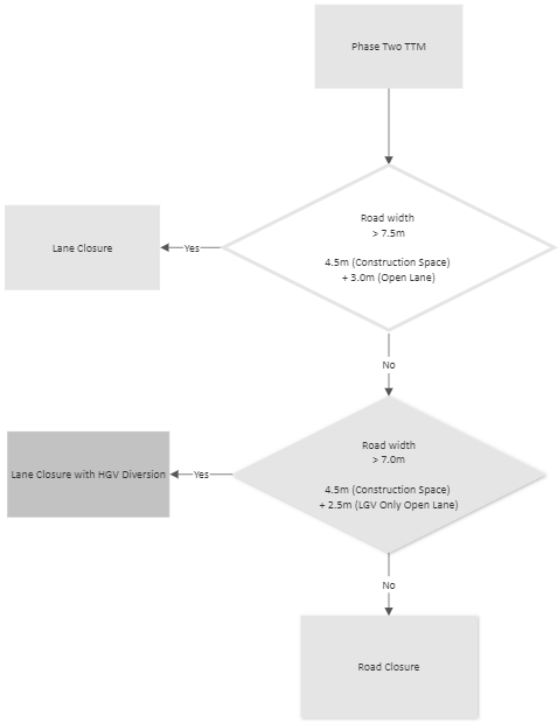

Figure 4-2 Phase 2 – TTM Decision Flowchart

The proposed traffic management for Phase 2 is shown in Table 4-3. For clarity off road sections have been omitted.

Table 4-3 Proposed Traffic Management – Phase 2

TTM Sections	Name of Section	Length (km)	Average Road Width (m)	Phase Two TTM	Diversion Length (km)	Diversion Council Authority
1.02	R156	7.2	6.5	Full Road Closure	24.1	Meath
1.03	R157	1.5	14.5	Hard Shoulder Closure	N/A	N/A
1.05	R147	0.3	14.5	Two lanes closure	N/A	N/A
1.06	L5026	1.6	5.0	Full Road Closure	3.3	Meath
1.07	L1010 West	0.7	5.3	Full Road Closure	20.9	Meath
1.09	L1010 East	0.3	5.3	Full Road Closure	21.3	Meath
1.10	Nuttstown Road	1.4	5.5	Full Road Closure	20.2	Meath
1.12	Priestown Road	0.9	5.3	Full Road Closure	20.7	Meath
1.14	Kilbride Road North	1.1	5.7	Full Road Closure	13.8	Meath / Fingal
1.16	Kilbride Road South	0.7	5.7	Full Road Closure	14.2	Meath / Fingal
1.18	M2 HDD South	0.7	5.8	Full Road Closure	6.5	Fingal
1.20	M2 HDD North	0.9	6.0	Full Road Closure	6.3	Fingal
1.21	The Ward Cross / R121	1.6	5.5	Full Road Closure	8.5	Fingal

TTM Sections	Name of Section	Length (km)	Average Road Width (m)	Phase Two TTM	Diversion Length (km)	Diversion Council Authority
1.23	R121	0.8	5.3	Full Road Closure	9.2	Fingal
1.24	R122	1.2	5.0	Full Road Closure	8.7	Fingal
1.25	Kilreesk Lane	0.1	6.5	Full Road Closure	2.5	Fingal
1.27	R108	1.6	7.5	Single Lane Closure	11.7	Fingal
1.28	Naul Road	2.5	7.5	Single Lane Closure	10.9	Fingal
1.29	Stockhole Lane West	0.8	7.5	Single Lane Closure	11.7	Fingal

4.1.3 Phase 3 Proposed Traffic Management

The decision flow chart for Phase 3 is shown in Figure 4-3. The following traffic management solutions are suggested at this stage:

- 'In-carriageway' Joint Bays
    - Lanes closure
        - Where the road width at the location of the joint bay is greater than 10.5m, a passing bay would not be required and only lanes closure required.
    - Passing bay with lanes closure
        - Where the road width is less than 10.5m and where there is suitable space to construct a passing bay as shown in Figure 3-8, the proposed TTM is a passing bay with lanes closure to ffacilitate a single traffic signalled lane at the joint bay.
    - Full road closure (with local access arrangements)
        - Where the road width is less than 10.5m and where there is insufficient space to construct a passing bay as shown in Figure 3-8, the proposed TTM is a full road closure with local access arrangements.
- 'In-verge' Joint Bays
    - Construction Platform with suitable access TTM
        - Where the road width at the location of the joint bay is greater than 7.5m, a temporary vehicular access platform will be required as shown in Figure 3-10, however no lane restrictions would be required. TTM to protect the workforce and maintain access via the platform would be required.
    - Construction Platform with single lane closure
        - Where the road width at the location of the joint bay is less than 7.5m, a construction platform will be required as shown in Figure 3-10 with a single lane restriction.

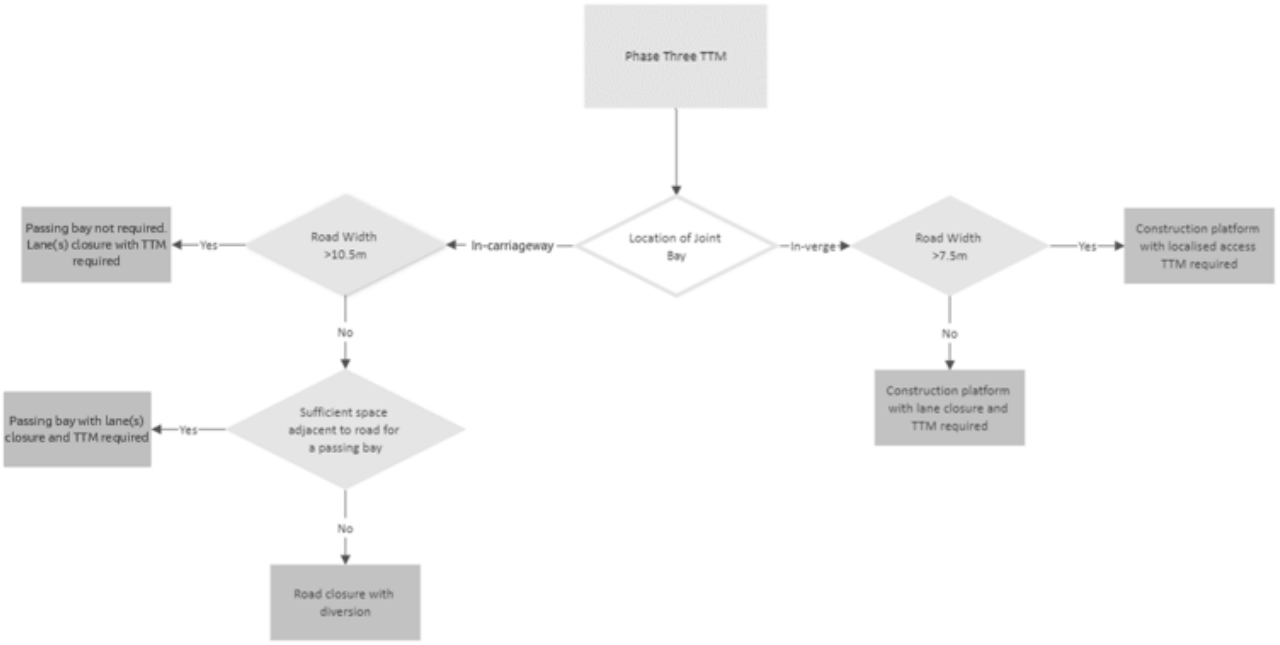

Figure 4-3 Phase 3 – TTM Decision Flowchart

The proposed traffic management for Phase 3 is shown in Table 4-4.

Table 4-4 Proposed Traffic Management – Phase 3

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 3
1.01	N/A	JB1	812	Off-road	N/A	Not required
		JB2	1560	Off-road	N/A	Not required
		JB3	2384	Off-road	N/A	Not required
		JB4	3080	Off-road	N/A	Not required
1.02	R156	JB5	3807	In-carriageway	6.5	Passing bay – two lanes closure
		JB6	4587	In-verge	6.5	Temporary construction platform – single lane closure
		JB7	5390	In-verge	7.0	Temporary construction platform
		JB8	6022	In-verge	6.7	Temporary construction platform – single lane closure
		JB9	6821	In-carriageway	6.5	Road closure
		JB10	7646	In-carriageway	7.0	Passing bay – two lanes closure both PB and JB are on the same side of the road
		JB11	8358	In-carriageway	6.3	Road closure
		JB12	9088	In-verge	6.9	Temporary construction platform – single lane closure

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 3
		JB13	9936	In-verge	6.5	Temporary construction platform – single lane closure
		JB14	10771	In-verge	8.0	Temporary construction platform
1.03	R157	JB15	11577	In-verge	15	Temporary construction platform – adjacent hard shoulder closure
1.04	N/A	JB16	12417	Off-road	N/A	Not required
		JB17	13163	Off-road	N/A	Not required
1.06	L5026	JB18	13764	In-carriageway	12	Two lanes closure
		JB19	14549	In-carriageway	3.6	Road closure
1.07	L1010 West	JB20	15327	In-carriageway	5.0	Road closure
1.08	N/A	JB21	15920	Off-road	N/A	Not required
1.09	L1010 East	JB22	16719	In-carriageway	5.3	Road closure
1.10	Nuttstown Road	JB23	17518	In-carriageway	5.3	Road closure
1.12	Priestown Road	JB24	18366	In-carriageway	5.5	Passing bay – two lanes closure
		JB25	19037	In-carriageway	5.3	Passing bay – two lanes closure
1.14	Kilbride Road North	JB26	19749	In-verge	5.8	Temporary construction platform – single lane closure
1.16	Kilbride Road South	JB27	20613	In-carriageway	5.7	Passing bay - two lanes closure
1.17	N/A	JB28	21393	Off-road	N/A	Not required
		JB29	22036	Off-road	N/A	Not required
		JB30	22593	Off-road	N/A	Not required
1.19	N/A	JB31	23349	Off-road	N/A	Not required
1.20	M2 HDD North	JB32	24215	In-carriageway	6.5	Road closure
1.21	The Ward Cross / R121	JB33	25100	In-carriageway	5.9	Passing bay – two lanes closure
		JB34	25875	In-carriageway	4.8	Passing bay – two lanes closure
1.23	R121	JB35	26481	In-carriageway	5.3	Passing bay – two lanes closure
1.24	R122	JB36	27111	In-verge	6.5	Temporary construction platform
		JB37	27929	In-verge	5.8	Temporary construction platform – single lane closure
1.26	N/A	JB38	28767	Off-road	N/A	Not required
1.27	R108	JB39	29484	In-carriageway	7.4	Passing bay – two lanes closure
		JB40	30187	In-carriageway	7.4	Passing bay – two lanes closure
1.28	Naul Road	JB41	30940	In-carriageway	7.4	Passing bay – two lanes closure
		JB42	31651	In-carriageway	8.0	Passing bay – two lanes closure

TTM Sections	Road	Joint Bay	Chainage (m)	Position	Road Width (m)	TTM Phase 3
		JB43	32531	In-carriageway	7.5	Passing bay – two lanes closure
		JB44	33088	In-verge	7.5	Temporary construction platform
1.29	Stockhole Lane West	JB45	33838	In-carriageway	7.6	Passing bay – two lanes closure
1.30	N/A	JB46	34657	Off-road	N/A	Not required
		JB47	35424	Off-road	N/A	Not required
		JB48	36172	Off-road	N/A	Not required
		JB49	36960	Off-road	N/A	Not required

4.2 TTM Sections

The following sub-sections show the TTM sections along the alignment. The varying colours in the figures refer to the following:

- Blue; Off-road / in-verge cable route
- Red; In carriageway cable route
- Orange; Assumed traffic diversion

4.2.1 Section 1.01 – Woodland

Figure 4-4 the TTM section from Woodland Substation to R156. This section is off-road and therefore the temporary traffic management is not assessed.

Figure 4-4 Section 1.01

Table 4-5 Proposed Traffic Management - Section 1.01

Location	Off-road
Section Length	3.6km
Diversion Length	N/A
No. of JB	4

4.2.2 Section1.02 – R156

Figure 4-5 shows the TTM section that runs along R156. This in-carriageway section is on a regional road and has 10no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

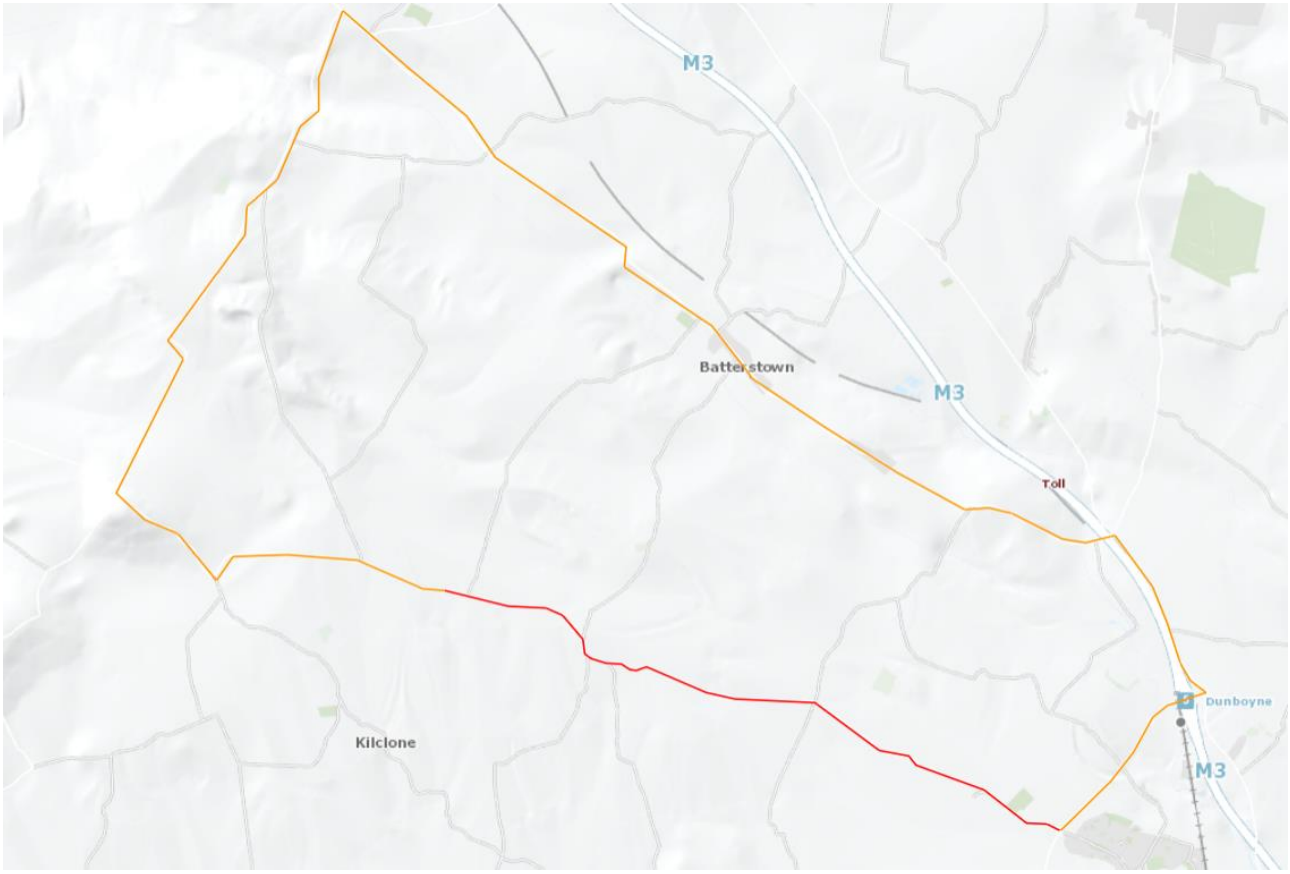

Figure 4-5 Section 1.02

Table 4-6 shows a summary of the route section.

Table 4-6 Proposed Traffic Management - Section 1.02

Location	In-carriageway (R156)
Section Length	7.2km
Diversion Length	24.1km
No. of JB	10

4.2.3 Section 1.03 – R157

Figure 4-6 shows the TTM section that runs along R157. This in-verge section is on a regional road and has 1no. joint bay along the alignment.

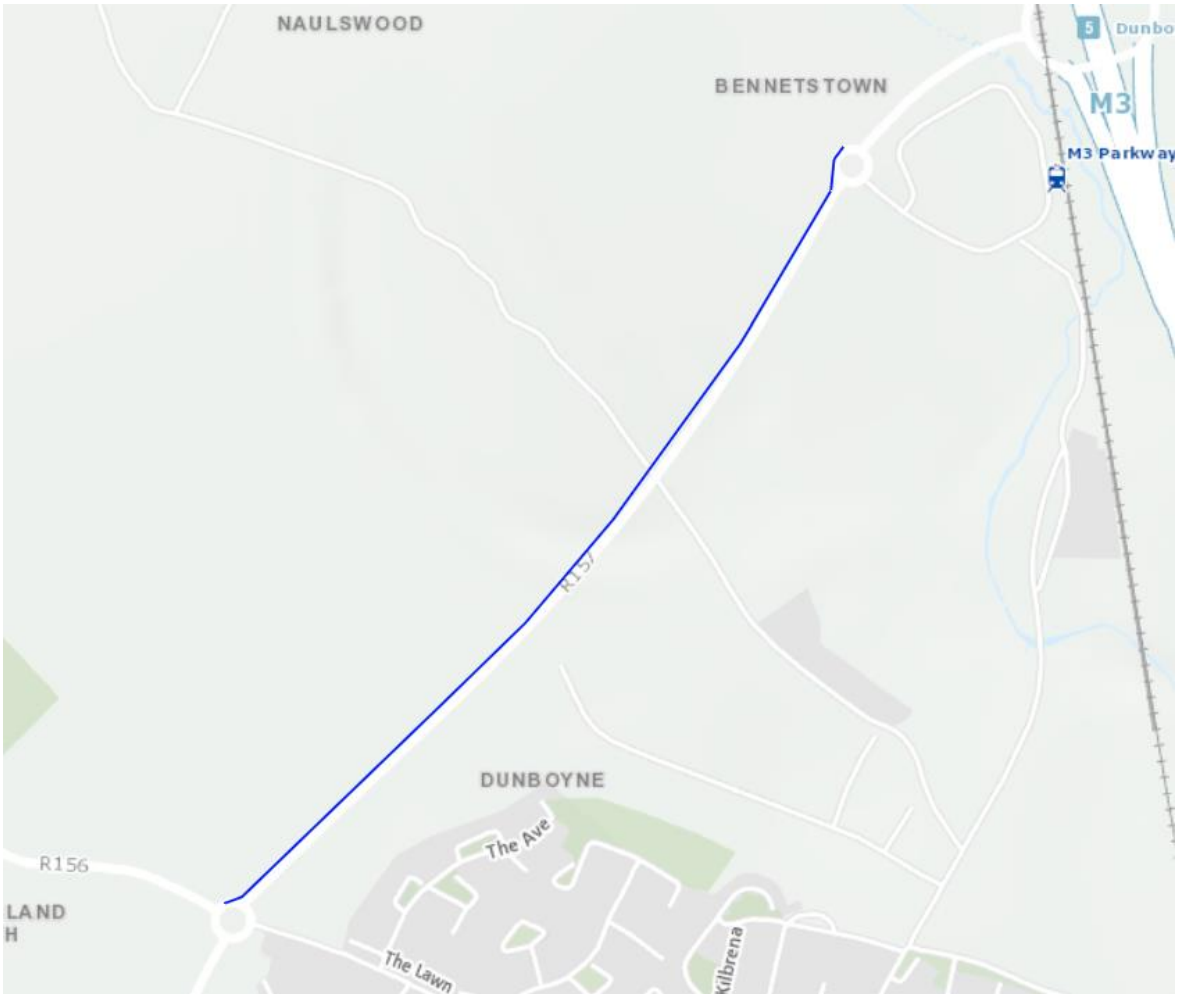

Figure 4-6 Section 1.03

Table 4-7 shows a summary of the route section.

Table 4-7 Proposed Traffic Management - Section 1.03

Location	In-verge (R157)
Section Length	1.5km
Diversion Length	N/A
No. of JB	1

4.2.4 Section 1.04 – M3

Figure 4-7 shows the section from the M3 Parkway Roundabout to R147. This section is off-road and therefore the temporary traffic management is not assessed.

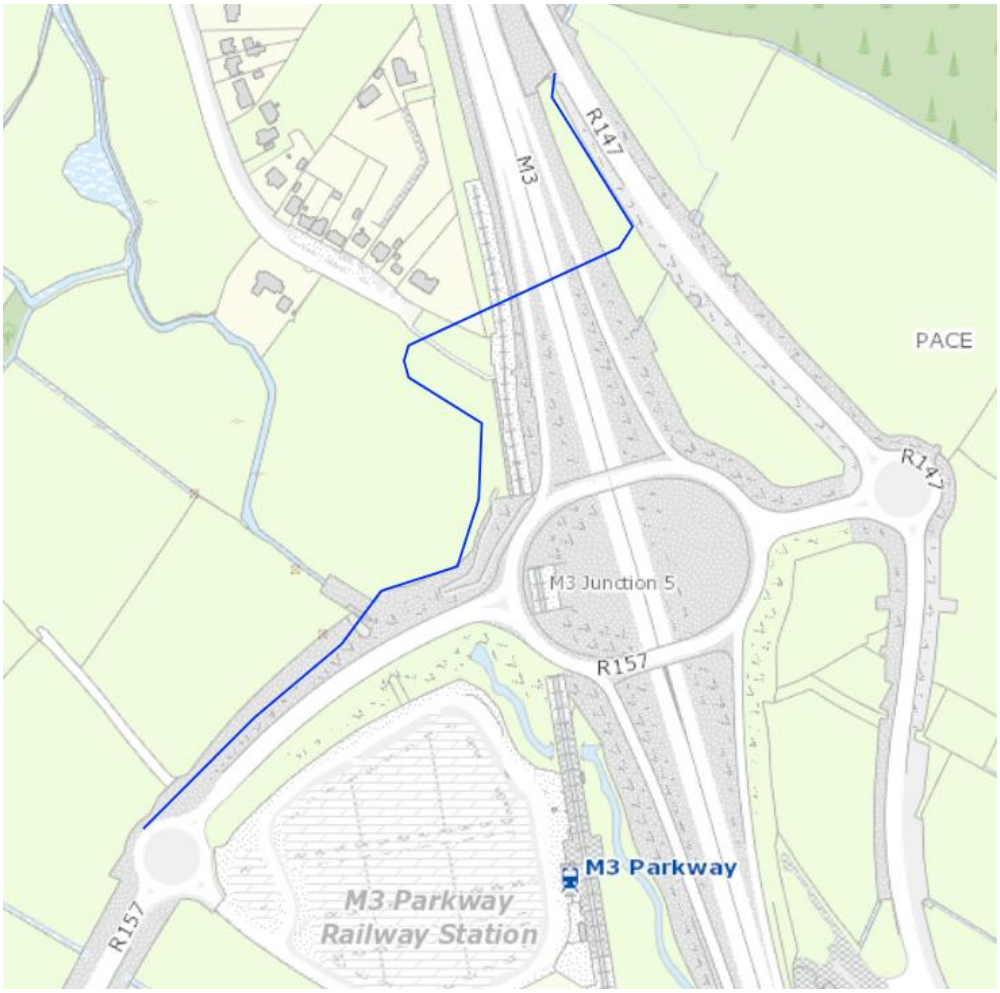

Figure 4-7 Section 1.04

Table 4-8 shows a summary of the route section.

Table 4-8 Proposed Traffic Management - Section 1.04

Location	Off-road
Section Length	0.9km
Diversion Length	N/A
No. of JB	2

4.2.5 Section 1.05 – R147

Figure 4-8 shows the section that runs along R147. This in-carriageway section is on a regional road and has no joint bays along the alignment. The residual open carriageway is greater than 3m and therefore it is proposed to keep the road open to all road users during the works phase.

Figure 4-8 Section 1.05

Table 4-9 shows a summary of the route section.

Table 4-9 Proposed Traffic Management - Section 1.05

Location	In-carriageway (R147)
Section Length	0.3km
Diversion Length	N/A
No. of JB	0

4.2.6 Section 1.06 – L5026

Figure 4-9 shows the section that runs along L5026. This in-carriageway section is on a local road and has 2no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

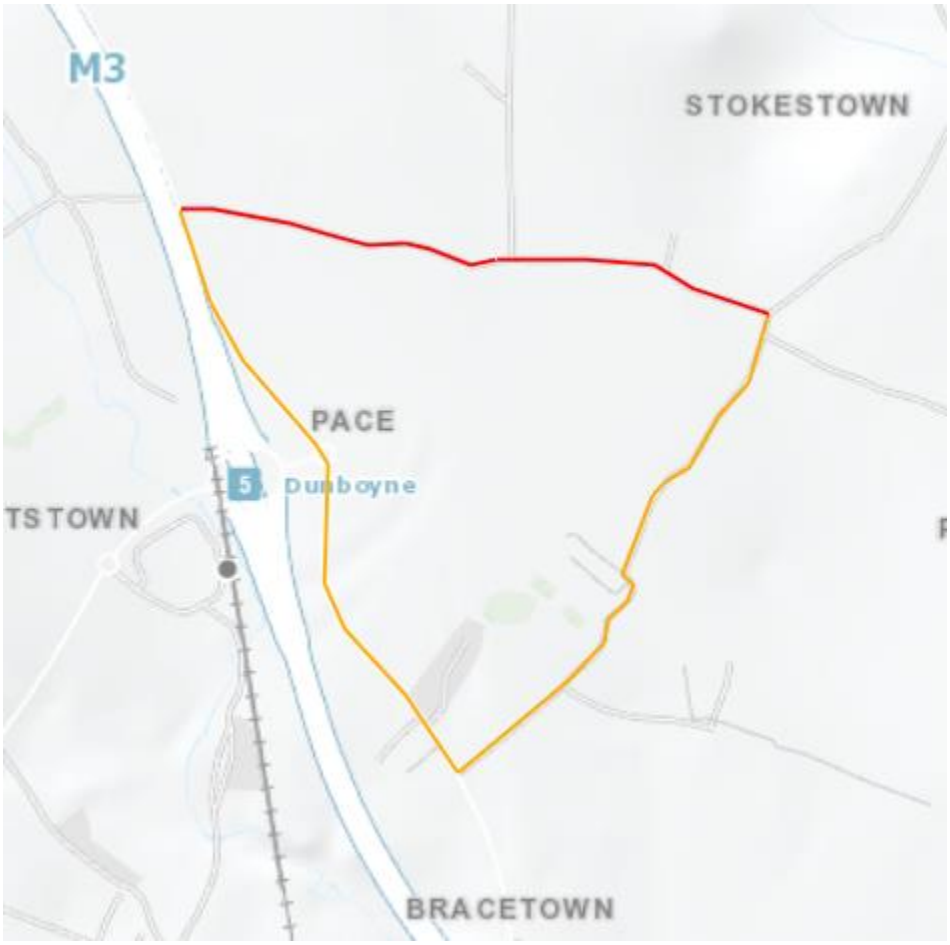

Figure 4-9 Section 1.06

Table 4-10 shows a summary of the route section.

Table 4-10 Proposed Traffic Management - Section 1.06

Location	In-carriageway (L5026)
Section Length	1.6km
Diversion Length	3.3km
No. of JB	2

4.2.7 Section 1.07 – L1010 West

Figure 4-10 shows the section that runs along L1010 to the West of Pinkeen River. This in-carriageway section is on a local road and has 1no. joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

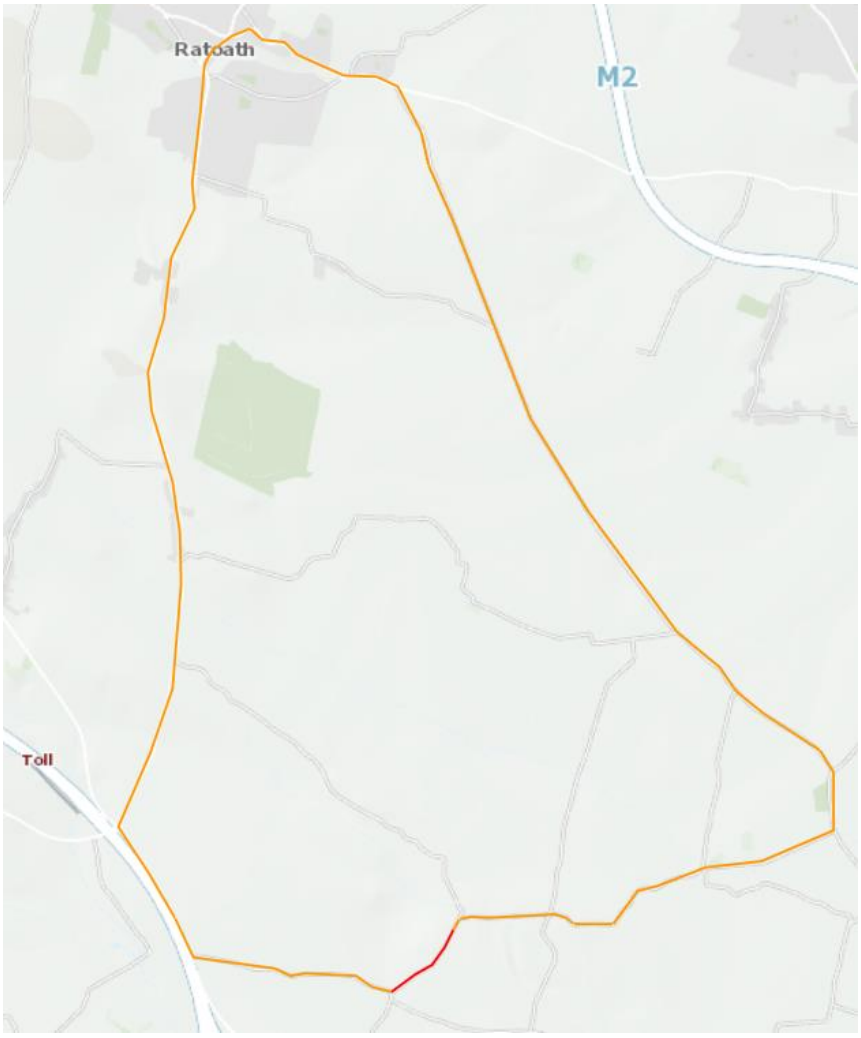

Figure 4-10 Section 1.07

Table 4-11 shows a summary of the route section.

Table 4-11 Proposed Traffic Management - Section 1.07

Location	In-carriageway (L1010)
Section Length	0.7km
Diversion Length	20.9km
No. of JB	1

4.2.8 Section 1.08 – Pinkeen River

Figure 4-11 shows the section that crosses the Pinkeen River. This section is off-road and therefore the temporary traffic management is not assessed.

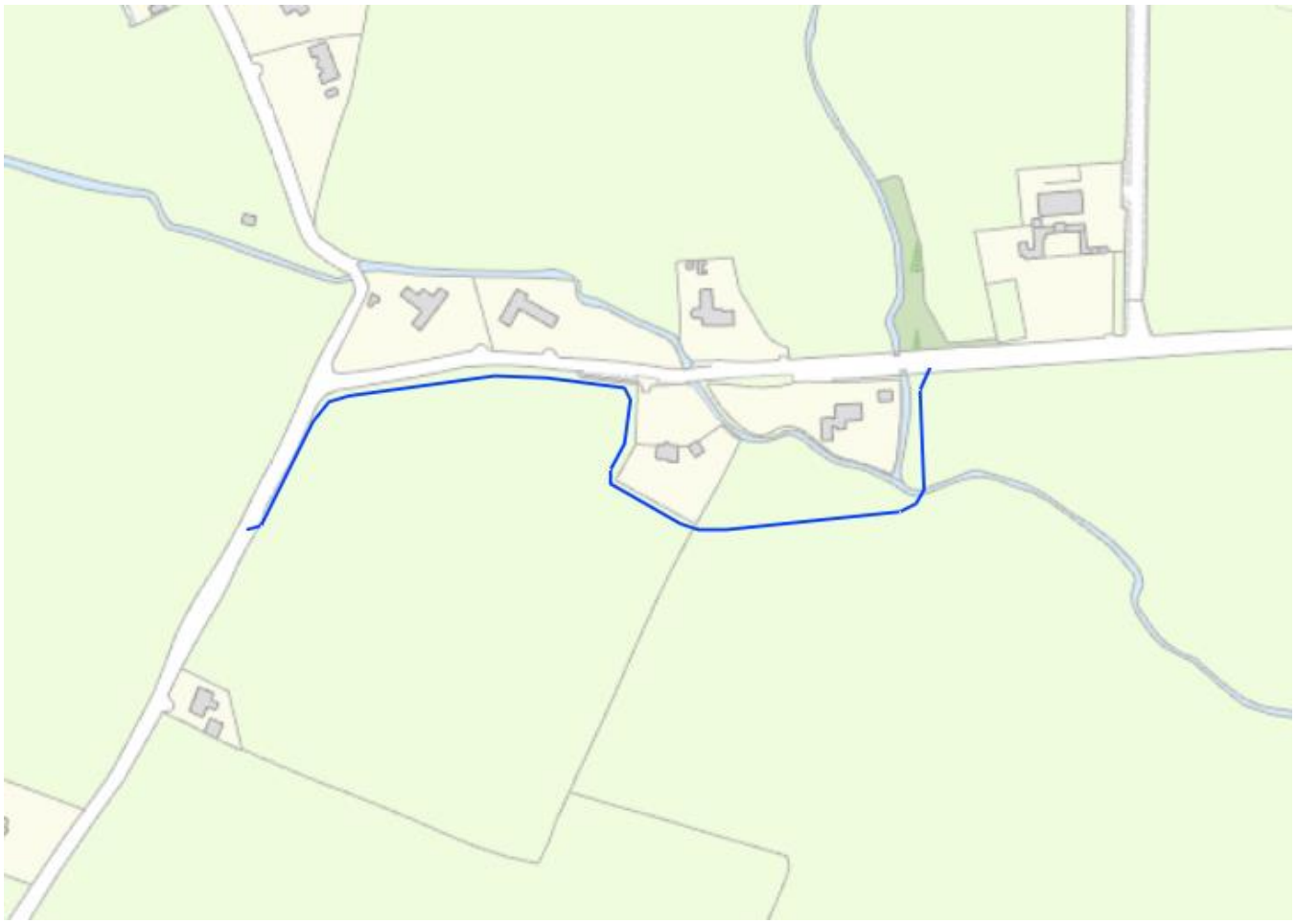

Figure 4-11 Section 1.08

Table 4-12 shows a summary of the route section.

Table 4-12 Proposed Traffic Management - Section 1.08

Location	Off-road
Section Length	0.6km
Diversion Length	N/A
No. of JB	1

4.2.9 Section 1.09 – L1010 East

Figure 4-12 shows the section that runs along L1010 to the East of Pinkeen River. This in-carriageway section is on a local road and has 1no. joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-12 Section 1.09

Table 4-13 shows a summary of the route section.

Table 4-13 Proposed Traffic Management - Section 1.09

Location	In-carriageway (L1010)
Section Length	0.3km
Diversion Length	21.3km
No. of JB	1

4.2.10 Section 1.10 – Nuttstown Road

Figure 4-13 shows the section that runs along Nuttstown Road. This in-carriageway section is on a local road and has 1no. joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

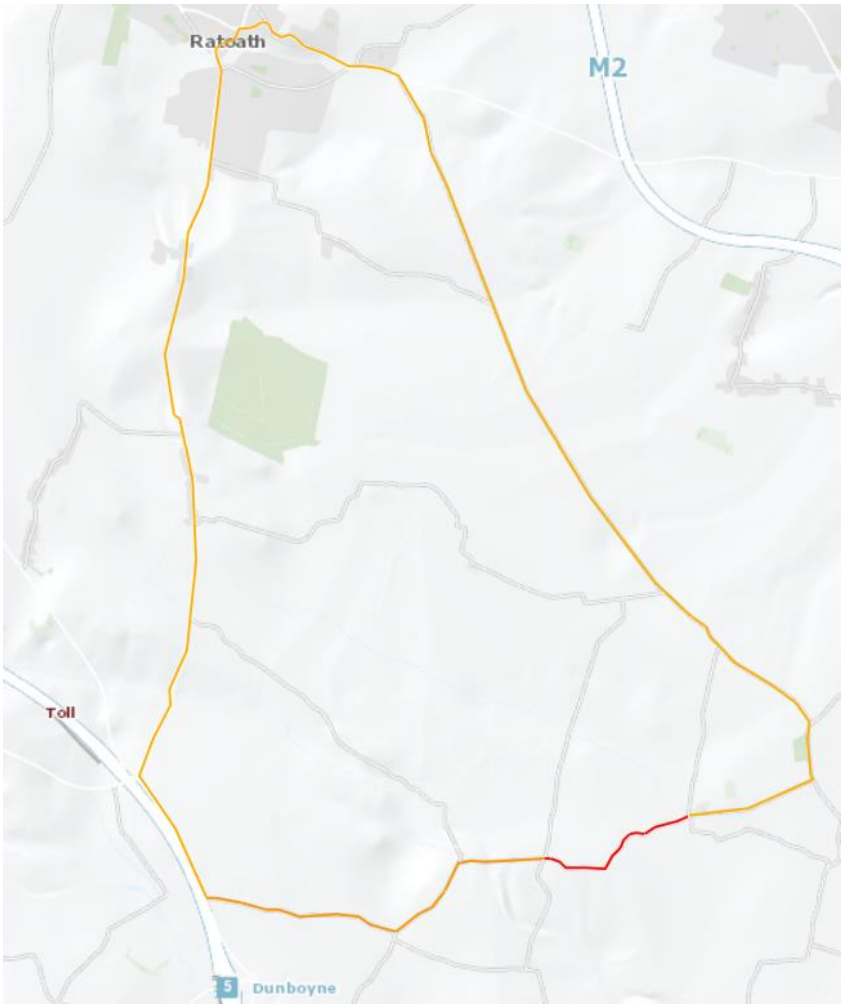

Figure 4-13 Section 1.10

Table 4-14 shows a summary of the route section.

Table 4-14 Proposed Traffic Management - Section 1.10

Location	In-carriageway (Nuttstown Road)
Section Length	1.4km
Diversion Length	20.2km
No. of JB	1

4.2.11 Section 1.11 – Ward River Crossing I

Figure 4-14 shows the section that crosses the Ward River. This section is off-road and therefore the temporary traffic management is not assessed.

Figure 4-14 Section 1.11

Table 4-15 shows a summary of the route section.

Table 4-15 Proposed Traffic Management - Section 1.11

Location	Off-road
Section Length	0.07km
Diversion Length	N/A
No. of JB	0

4.2.12 Section 1.12 – Priestown Road

Figure 4-15 shows the section that runs along Priestown Road. This in-carriageway section is on a local road and has 2no. joint bays along the alignment. There are no alternative diversion routes suitable during the works phase.

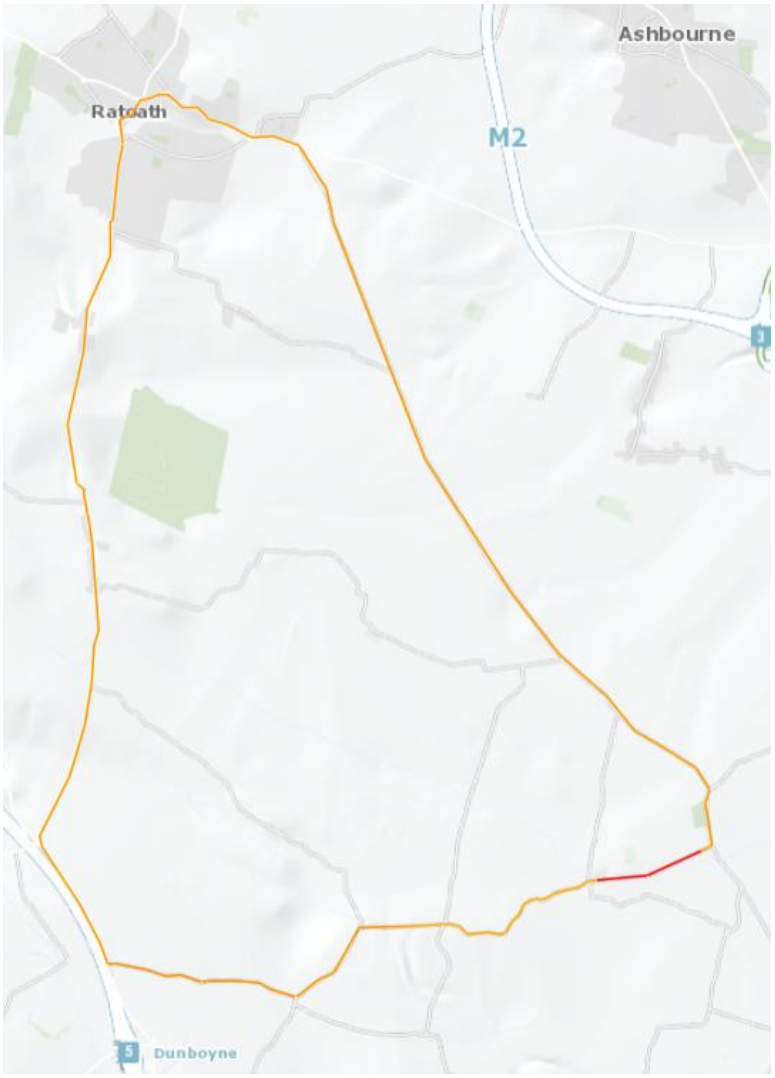

Figure 4-15 Section 1.12

Table 4-16 shows a summary of the route section.

Table 4-16 Proposed Traffic Management - Section 1.12

Location	In-carriageway (Priestown Road)
Section Length	0.9km
Diversion Length	20.7km
No. of JB	2

4.2.13 Section.1.13 – Priest Town

Figure 4-16 shows the section that runs through Priest Town. This section is off-road and therefore the temporary traffic management is not assessed.

Figure 4-16 Section 1.13

Table 4-17 shows a summary of the route section.

Table 4-17 Proposed Traffic Management - Section 1.13

Location	Off-road
Section Length	0.2km
Diversion Length	N/A
No. of JB	0

4.2.14 Section 1.14 – Kilbride Road North

Figure 4-17 shows the section that runs along Kilbride Road. This in-carriageway section is on a local road and has 1no. joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

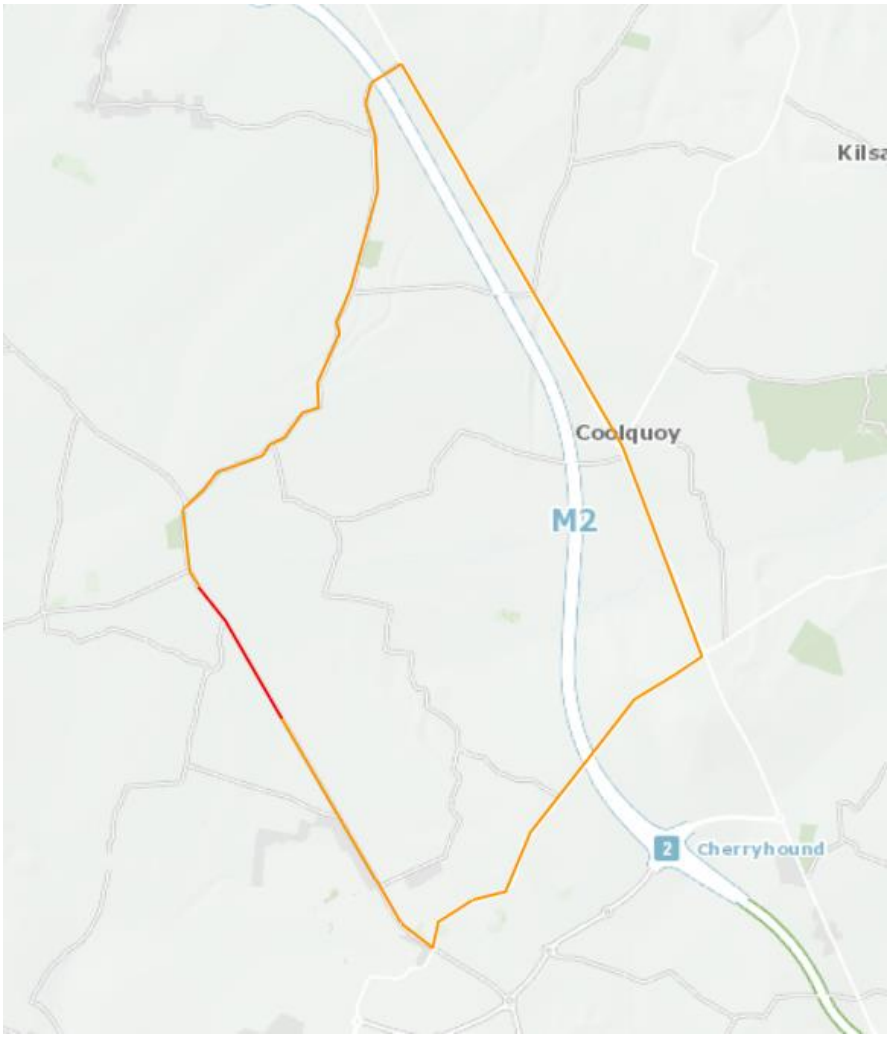

Figure 4-17 Section 1.14

Table 4-18 shows a summary of the route section.

Table 4-18 Proposed Traffic Management - Section 1.14

Location	In-carriageway (Kilbride Road North)
Section Length	1.1km
Diversion Length	13.8km
No. of JB	1

4.2.15 Section 1.15 – Kilbride Off-road

Figure 4-18 shows the section that crosses the watercourse close to Kilbride Road. This section is off-road and therefore the temporary traffic management is not assessed.

Figure 4-18 Section 1.15

Table 4-19 shows a summary of the route section.

Table 4-19 Proposed Traffic Management - Section 1.15

Location	Off-road
Section Length	0.08km
Diversion Length	N/A
No. of JB	0

4.2.16 Section 1.16 – Kilbride Road South

Figure 4-19 shows the section that runs along Kilbride Road. This in-carriageway section is on a local road and has 1no. joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

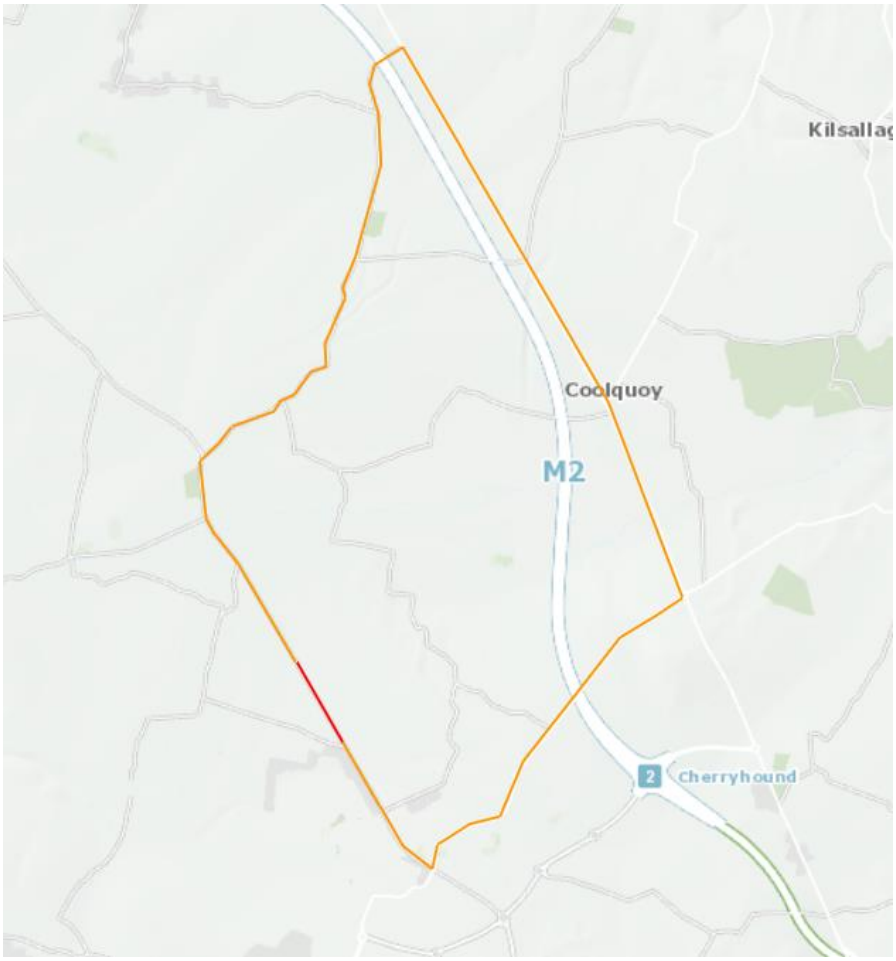

Figure 4-19 Section 1.16

Table 4-20 shows a summary of the route section.

Table 4-20 Proposed Traffic Management - Section 1.16

Location	In-carriageway (Kilbride Road North)
Section Length	0.7km
Diversion Length	14.2km
No. of JB	1

4.2.17 Section 1.17 – Hollywood

Figure 4-20 shows the section that runs through Hollywood. This section is off-road and therefore the temporary traffic management is not assessed.

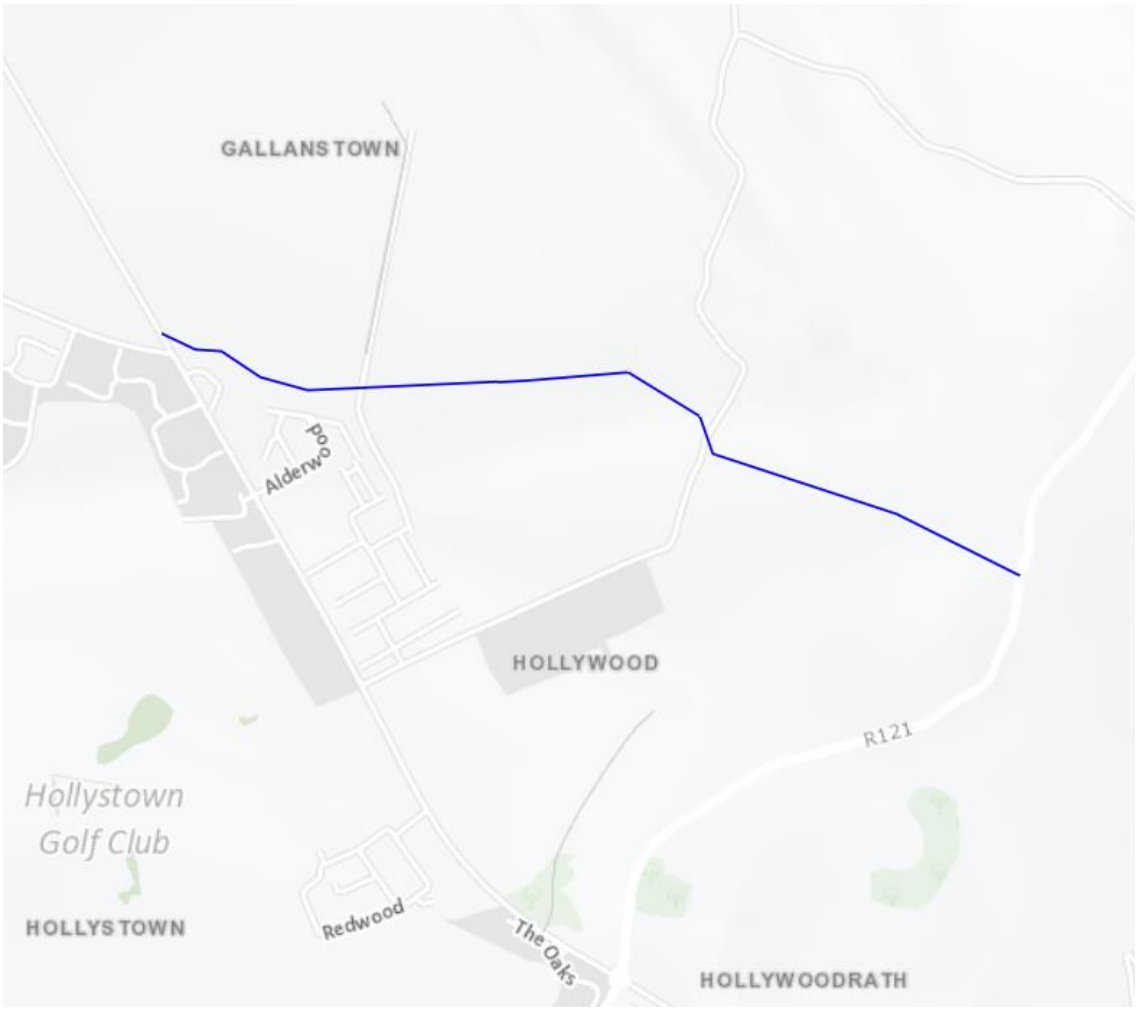

Figure 4-20 Section 1.17

Table 4-21 shows a summary of the route section.

Table 4-21 Proposed Traffic Management - Section 1.17

Location	Off-road
Section Length	1.4km
Diversion Length	N/A
No. of JB	3

4.2.18 Section 1.18 - M2 HDD South

Figure 4-21 shows the section that runs along R121. This in-carriageway section is on a regional road and has no joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-21 Section 1.18

Table 4-22 shows a summary of the route section.

Table 4-22 Proposed Traffic Management - Section 1.18

Location	In-carriageway (R121)
Section Length	0.7km
Diversion Length	6.5km
No. of JB	0

4.2.19 Section 1.19 – M2 HDD

Figure 4-22 shows the section that crosses the M2 motorway. This section is off-road and therefore the temporary traffic management is not assessed.

Figure 4-22 Section 1.19

Table 4-23 shows a summary of the route section.

Table 4-23 Proposed Traffic Management - Section 1.19

Location	Off-road
Section Length	0.4km
Diversion Length	N/A
No. of JB	1

4.2.20 Section 1.20 – M2 HDD North

Figure 4-23 shows the section that runs along R121. This in-carriageway section is on a regional road and has 1no. joint bay along the alignment. There are no alternative diversion routes suitable during the works phase.

Figure 4-23 Section 1.20

Table 4-24 shows a summary of the route section.

Table 4-24 Proposed Traffic Management - Section 1.20

Location	In-carriageway (R121)
Section Length	0.9km
Diversion Length	6.3km
No. of JB	1

4.2.21 Section 1.21 – The Ward Cross / R121

Figure 4-24 shows the section that runs along R121. This in-carriageway section is on a regional road and has 2no. joint bays along the alignment. There is no alternative diversion route suitable during the works phase.

Figure 4-24 Section 1.21

Table 4-25 shows a summary of the route section.

Table 4-25 Proposed Traffic Management - Section 1.21

Location	In-carriageway (R121)
Section Length	1.6km
Diversion Length	8.5km
No. of JB	2

4.2.22 Section 1.22 – Ward River Crossing II

Figure 4-25 shows the section that crosses Ward River. This section is off-road and therefore the temporary traffic management is not assessed.

Figure 4-25 Section 1.22

Table 4-26 shows a summary of the route section.

Table 4-26 Proposed Traffic Management - Section 1.22

Location	Off-road
Section Length	0.07km
Diversion Length	N/A
No. of JB	0

4.2.23 Section 1.23 – R121

Figure 4-26 shows the section that runs along R121. This in-carriageway section is on a regional road and has 1no. joint bay along the alignment. There is no alternative diversion route suitable during the works phase.

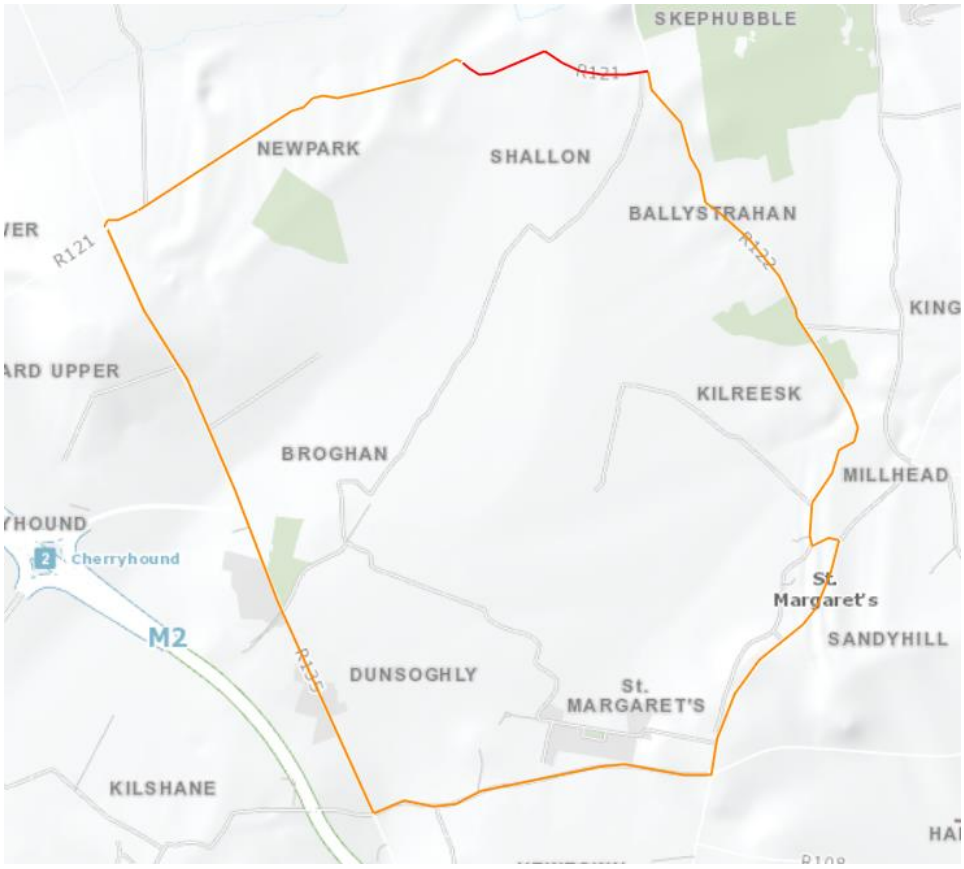

Figure 4-26 Section 1.23

Table 4-27 shows a summary of the route section.

Table 4-27 Proposed Traffic Management - Section 1.23

Location	In-carriageway (R121)
Section Length	0.8km
Diversion Length	9.2km
No. of JB	1

4.2.24 Section 1.24 – R122

Figure 4-27 shows the section that runs along R122. This in-carriageway section is on a regional road and has 2no. joint bays along the alignment. There is no alternative diversion route suitable during the works phase.

Figure 4-27 Section 1.24

Table 4-28 shows a summary of the route section.

Table 4-28 Proposed Traffic Management - Section 1.24

Location	In-carriageway (R122)
Section Length	1.2km
Diversion Length	8.7km
No. of JB	2

4.2.25 Section 1.25 – Kilreesk Lane

Figure 4-28 shows the section that runs along Kilreesk Lane. This in-carriageway section is on a local road and has no joint bay along the alignment. There is no alternative diversion route suitable during the works phase.

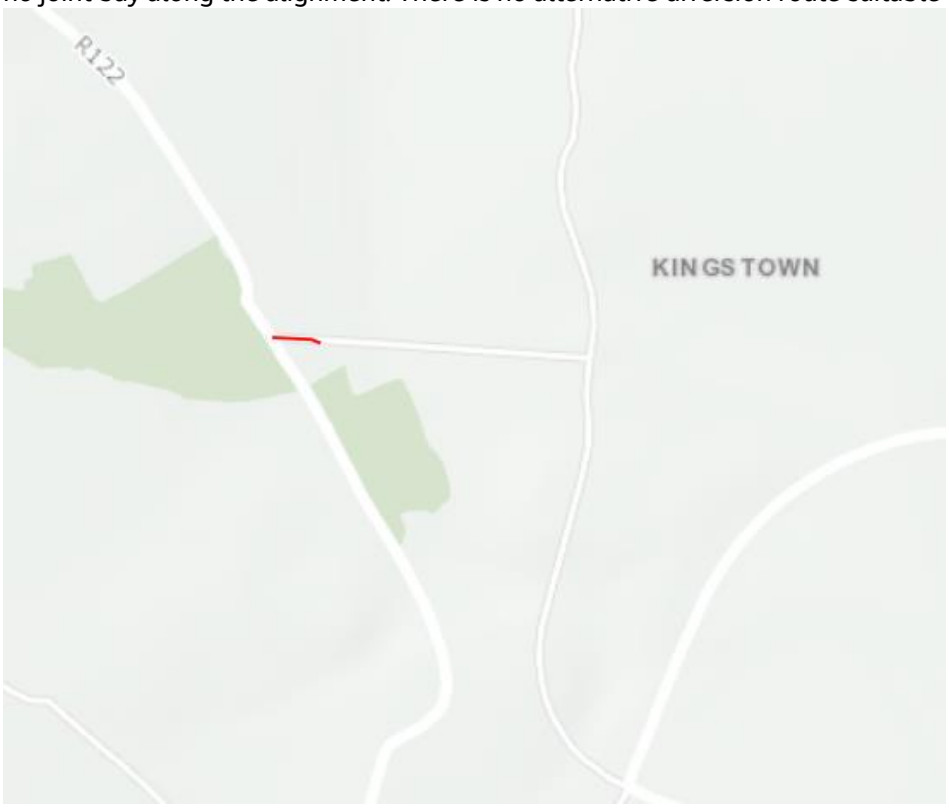

Figure 4-28 Section 1.25

Table 4-29 shows a summary of the route section.

Table 4-29 Proposed Traffic Management - Section 1.25

Location	In-carriageway (Kilreesk Lane)
Section Length	0.05km
Diversion Length	2.5km
No. of JB	0

4.2.26 Section 1.26 – Kingstown

Figure 4-29 shows the section that runs through Kingstown. This section is off-road and therefore the temporary traffic management is not assessed.

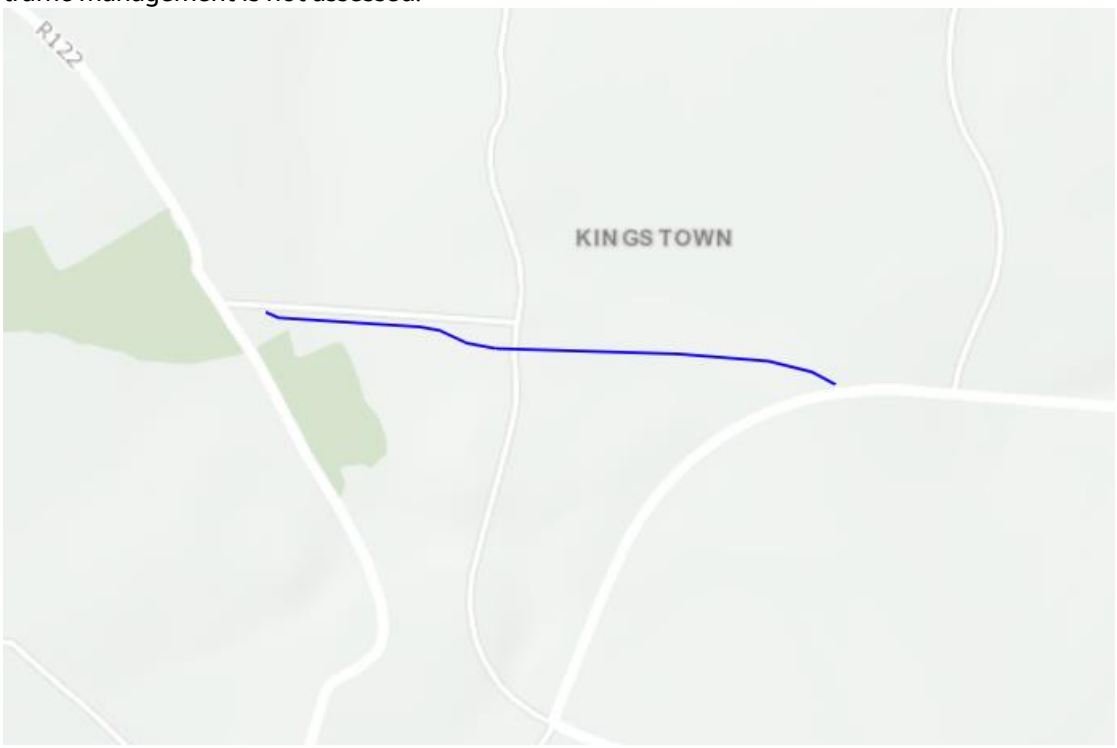

Figure 4-29 Section 1.26

Table 4-30 shows a summary of the route section.

Table 4-30 Proposed Traffic Management - Section 1.26

Location	Off-road
Section Length	0.8km
Diversion Length	N/A
No. of JB	1

4.2.27 Section 1.27 – R108

Figure 4-30 shows the section that runs along R108. This in-carriageway section is on a regional road and has 2no. joint bays along the alignment. There is no alternative diversion route suitable during the works phase.

Figure 4-30 Section 1.27

Table 4-31 shows a summary of the route section.

Table 4-31 Proposed Traffic Management - Section 1.27

Location	In-carriageway (R108)
Section Length	1.6km
Diversion Length	11.7km
No. of JB	2

4.2.28 Section 1.28 – Naul Road

Figure 4-31 shows the section that runs along Naul Road. This in-carriageway section is on a regional road and has 4no. joint bays along the alignment. There is no alternative diversion route suitable during the works phase.

Figure 4-31 Section 1.28

Table 4-32 shows a summary of the route section.

Table 4-32 Proposed Traffic Management - Section 1.28

Location	In-carriageway (Naul Road)
Section Length	2.5km
Diversion Length	10.9km
No. of JB	4

4.2.29 Section 1.29 – Stockhole Lane West

Figure 4-32 shows the section that runs along Stockhole Lane. This in-carriageway section is on a regional road and has 1no. joint bay along the alignment. There is no alternative diversion route suitable during the works phase.

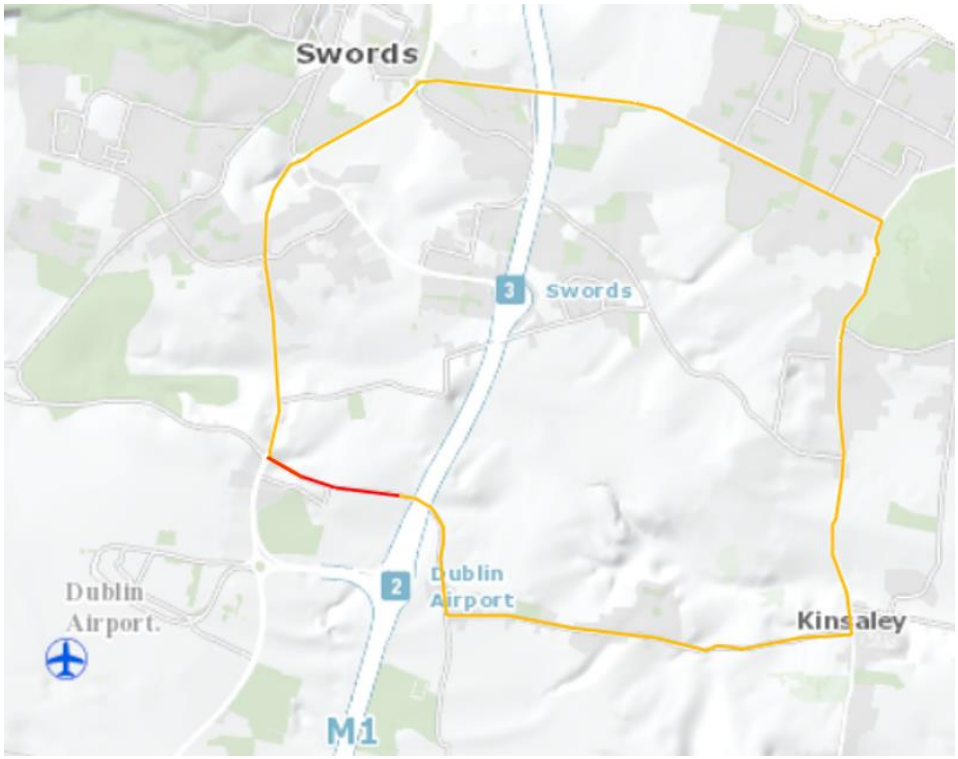

Figure 4-32 Section 1.29

Table 4-33 shows a summary of the route section.

Table 4-33 Proposed Traffic Management - Section 1.29

Location	In-carriageway (Stockhole Lane)
Section Length	0.8km
Diversion Length	11.7km
No. of JB	1

4.2.30 Section 1.30 – M1 East

Figure 4-33 shows the section than runs from M1 to Belcamp Substation. This section is off-road and therefore the temporary traffic management is not assessed.

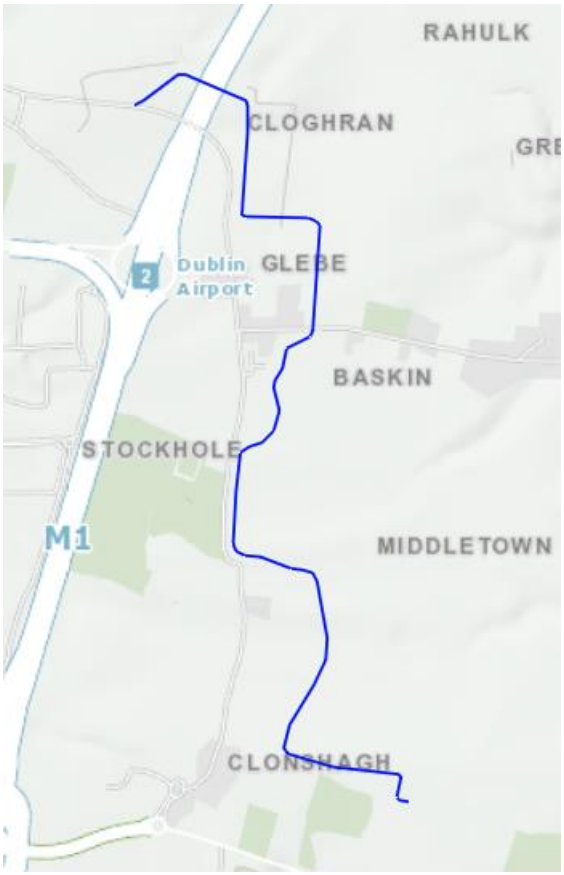

Figure 4-33 Section 1.30

Table 4-34 shows a summary of the route section.

Table 4-34 Proposed Traffic Management - Section 1.30

Location	Off-road
Section Length	3.7km
Diversion Length	N/A
No. of JB	4

4.3 Proposed Construction Machinery

It is expected as part of the installation of the cable into the roads, standard construction machinery will be utilised with minimal reliance on specialist equipment. It would not be foreseeable for the requirement of custom machinery.

Table 4-35 provides a summary of the proposed machinery, itemised by Project activity. The associated quantity is indicative and allocated per gang. The number of working gangs is dictated by the proposed scheme implementation period. Consideration to small tools has not been assessed.

- Phase 1 – Installation of passing bay and joint bay structure
- Phase 2 – Excavation and installation of cable ducts
- Phase 3 – Installation and jointing of cables

Table 4-35 Proposed Machinery

Phase	Activity	Proposed Machinery	Task	Approximate Quantity
All phases	**Site Setup/ Support**	Traffic Management Lorry	Setup and removal of designed traffic management scheme.	2no.
		Site Vehicles	Required for personnel access from compound to sites.	Various
		Welfare Units	Required for on-site working, minimising travel times.	1no.
		HIAB Lorry	Delivery of various tools, equipment and material within the compound.	1no.
		HGV Recovery Vehicle	Required for any breakdowns within traffic management zone or contractors' equipment.	1no.
		LGV Recovery Vehicle	Required for any breakdowns within traffic management zone or contractors' equipment.	1no.
		Towable CCTV Unit	Required for safety and protection of road users and workers.	2no.
		Towable Tower lights	Required for safety and protection of road users and workers.	4no.
Phase 1 – Installation of passing bays and joint bays	**Passing Bay**	10t long reach excavator	Excavation with obstruction within slew zone.	1no.
		9t dual view dumper	Removal of excavation material	3no.
		8-wheel tipper	Removal of excavation material	2no.
		Remote controlled compaction equipment	Compaction of fill within excavated trench.	1no.
		Asphalt Tipper	Delivery of asphalt road surfacing material.	1no.
		Asphalt Paver	Laying of road surface.	1no.
		Roller	Compaction of road surface	1no.

Phase	Activity	Proposed Machinery	Task	Approximate Quantity
		Articulated Lorry	Delivery of plant and materials to the works site	Various
	Joint Bay	10t long reach excavator	Excavation with obstruction within slew zone.	1no.
		9t dual view dumper	Removal of excavation material	3no.
		8-wheel tipper	Removal of excavation material	2no.
		Articulated Lorry	Delivery of plant and materials to the works site	Various
Phase 2 - Excavation and installation of ducts	**Excavation**	Road Planner	Removal of asphalt road surface for re-use.	1no.
		10t long reach excavator	Excavation with obstruction within slew zone.	1no.
		8t excavator	Excavation with no obstructions.	1no.
		9t dual view dumper	Removal of excavation material	3no.
		8-wheel tipper	Removal of excavation material	2no.
	Duct/jointing bay Installation	Articulated Lorry	Delivery of plant and materials to the works site	Various
		8t excavator	Lifting and installation of ducts/jointing bays	1no.
	Backfilling	Concrete Delivery Vehicle	Delivery of concrete – suggested 8m^3 vehicles.	Various
		10t long reach excavator	Moving concrete from vehicle into trench	1no.
		8t excavator	Loading dumper with material from stockpile for backfill.	1no.
		9t dual view dumper	Moving material from stockpile location to backfill location.	2no.
		Remote controlled compaction equipment	Compaction of fill within excavated trench.	1no.
	Road Reinstatement	Asphalt Tipper	Delivery of asphalt road surfacing material.	1no.
		Asphalt Paver	Laying of road surface.	1no.
		Roller	Compaction of road surface	1no.
Phase 3 – Installation and jointing of Cables	**Cable installation**	Oversized vehicle	Delivery of cables to jointing bays.	Various
		Articulated Lorry	Delivery of plant and materials to the works site	Various
		Cable Winch(s) and pulling equipment	Installation of cables through ducting.	1no.

Please note that the quantity of vehicles is not the same as vehicle loads/movements. It is the expected quantity of plant associated with each activity.

4.4 Risks and assumptions

Table 4-36 highlights the assumptions and risks with regards to the proposed traffic management requirements and the associated indicative high-level programme.

Table 4-36 Risks & Assumptions

No.	Assumption		Hazard	Mitigation
1	Consent and License Approval	It is assumed that the relevant authorities will permit the detailed traffic management along designed route. The aspect of road user safety is highlighted but the duration of impact and disruption is not accounted for at this stage.	Consent for the required traffic management is not permitted and an alternative solution is required.	Engagement with consenting authorities required.
2	Cable Alignment	It is assumed that the cable is aligned to one side of the road to minimise the working zone and the associated road network. The alignment is unlikely to be aligned to a curb line due to the likely presence of utility services, tree roots. The alignment will also need to account for cable radius in reference to the position of the carriageway.	The alignment of the cable Option away from the outer edge of the carriageway will increase the working zone, in turn reducing the open carriageway. This will increase the likelihood of a road closure.	Further detailed design of the cable alignment and associated profile.
3	Diversion Routes	It is assumed, in accordance with 8.2.4.6 of Chapter 8 that the any diversion route should have the same characteristics of the road that is closed. In effect, the closure of a regional road will require the diversion to follow a regional road.	Extensive diversions highlighted in section 4.2.	In accordance with 8.2.4.6 (c) the shortest possible route should be used. To maintain safety of all road users, alternative solutions need to ensure compliance with 8.2.4.7, stating use of junction improvement, signal alterations, road markings or convoys may be permissible.
4	Ground Conditions	It is assumed that the ground is suitable for re-use and that the ground is of suitable for basic shoring/trenching techniques.	Extreme ground conditions (i.e., rock, weak or high-water table) requiring specialist remediation requirements. Increase in imported backfill requirement's	Detailed ground investigation to identify the suitably of the ground.
5	Uncontaminated Ground	It is assumed the ground is uncontaminated and that all removed subsoil can be re-used, subject to chemical and physical testing.	Excessive contaminated ground, requiring suitable stockpiling and remediation.	Detailed ground investigation to identify the risk of ground contamination.
6	Utilities	It is assumed that the location of services is accounted for in the design and do not hinder the installation process.	Alignment in close proximity to sensitive/high risk services that require specialist support and delay progress.	Requirement for GPR surveys identify existing services and any detectable watercourse crossings. Required for inclusion within the design assessment.

5. Recommendations

To enable successful implementation of the proposed scheme, the following aspects are recommended to improve programme and budget assurance:

1) Agreement of cable alignment

   As advised in Section 4.4 the cable alignment is key to providing an accurate assessment of the required traffic management scheme. The current proposed traffic management plan is a best-case scenario and relies on the cable alignment being tight to the nearside curb line. If the cable alignment is to move away from the curb line, this will increase the working room, in turn reducing the live carriageway width. This effect will most likely increase the number of road closures required.

2) Procurement of specific oversized load vehicles

   Use of specialist equipment with up-front investment will reduce site operations and increase efficiency when installing the cables. This could be with the side loader or the turntable option. These vehicles have the ability to be used on subsequent projects.

3) GPR Survey

   Following the site review, it is evident there are a significant number of utilities in the road network, at locations along the route with substation bases. It was identified predominantly water and gas networks along the route. Any interface with existing services with hinder progress and will likely cause delay. There may also be considerable safety implication working alongside such services (i.e., medium pressure gas main). These should be identified through GPR surveys to allow a full constructability assessment.

4) Early engagement with consenting authorities

   Early engagement with the consenting authorities will support the permitting of the abnormal load and provide assurance to the programme. The engagement will highlight areas of concern and provide the client/contractor the ability to address these.

6. References

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Appendix B – East Meath-North Dublin Grid Upgrade - Abnormal Load Assessment

East Meath-North Dublin Grid Upgrade – Abnormal Load Assessment

Document no: 321084AJ-JAC-XX-XX-FN-Z-0008
Revision no: P02

Eirgrid Plc
EirGrid

East Meath-North Dublin Grid Upgrade
6 March 2024

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1. Introduction

1.1 Scope

This report assesses the deliverability and logistics associated with the installation and jointing of the cables on the East Meath-North Dublin Grid Upgrade project best performing option. Specifically, this assessment considers the required logistics to transport the cable drums and the 400kV transformer from the designated Port to the project work site.

This assessment is to be reviewed in conjunction with the report of the independent abnormal load specialist (see Appendix A) who have undertaken visual analysis along the route and identified potential risks and opportunities associated with the movement of the cable drums.

1.2 Design Information

1.2.1 Cable Drums

The logistics assessment of the cable drum transportation is based on the following:

- Cable joint bay design as per ESB 400kV Joint Bay PE422-D7001-013-002 Rev 00 (Issued 10/03/10)
- Cable drum description/properties: 4.3m external diameter, 4.0m barrel length and 35.4t (As detailed by Jacobs Cable Designer)
- Passing bay proposed details 321084AJ-JAC-ZZ-XX-DR-C-0001.
- Communication cables are assumed to be delivered and installed with readily available equipment. It is assumed that the 400kV cables is the onerous case.

1.2.2 400kV Transformer

The logistics assessment of the 400kV transformer transportation is based on the following:

- Transformer design as per Transformer 500 MVA – 371.9/220/10.5 kV (2163190-101 Rev A) received from EirGrid on 02/01/2024.
- Transformer dimensions – 12.8m long, 4.4m tall (excluding bushings) and 4.5m wide.
- Transformer weight – 227,500kg excluding oil.

2. Abnormal Load Requirements

2.1 County Councils

According to the Irish County Councils requirements, a load is considered abnormal when the weight or any dimensions exceeds the maximum permitted for the particular type of vehicle as defined in the S.I. No. 5/2003 - Road Traffic (Construction and Use of Vehicles) Regulations 2003 (Irish Statute Book, 2003). Specifically, a load is considered abnormal when:

- Length - exceeds 16.5m in the case of an articulated vehicle, or
- Width - exceeds 2.75m, or
- Height - exceeds 4.65m (subject to Regulation 2(2) of S.I. No. 366/2008 - Road Traffic (Construction and Use of Vehicles) (Amendment) Regulations 2008) (Irish Statute Book, 2008)), or
- Weight of any axle exceeds the limits stated in S.I. No 5 of 2003.

Application for permit is required in order to authorise transporting abnormal loads on public roads maintained by the Councils. Applicants are required to give 4 working days' notice to Councils prior to the date of the proposed journey to allow for processing of permit.

Applicants shall also give notice in writing, not less than 4 working days before applying for a Permit, to the Commissioner of Garda Síochána enclosing a copy of the application.

The applicant must also contact TII's Motorway Traffic Control Centre a minimum of 72 hours in advance of the journey, where the load width is greater than 3m, to obtain clearance to travel on the Motorway/National Dual Carriageway Network. The Motorway Traffic Control Centre will confirm if any roadworks is planned along the route that will impact the abnormal load journey.

2.2 City Council - Dublin

According to Dublin City Council requirements, a load is considered abnormal if its weight or any of its dimensions exceeds the following limits.

- Length - exceeds 16.5 metres
- Width - exceeds 2.9 metres
- Weight - exceeds 44.0 tons

Application for permit is required in order to authorise transporting abnormal loads on public roads maintained by the Dublin City Council.

The application must be submitted to Dublin City Council at least 30 working days prior to the date of the proposed journey. The permit expires three months after the date of issue, and as there are no automatic renewals, an application must be submitted every time a new permit is required.

Applicants shall also give notice in writing to the Commissioner of Garda Síochána and the local authorities for any other areas of Dublin, e.g., Fingal, Dun Laoghaire – Rathdown, and South Dublin County Council, through which the abnormal load will be transported.

2.3 Garda Síochána

In accordance with S.I. No. 147/2009 - Road Traffic (Specialised Vehicle Permits) Regulations 2009 (Irish Statute Book, 2009), and S.I. No. 461/2010 - Road Traffic (Specialised Vehicle Permits) (Amendment) Regulations 2010 (Irish Statute Book, 2010), Garda Síochána administrated a permit system and list of Designated Routes for the movement of loads not exceeding 27.4 metres in length and 4.3 metres in width on the major inter-urban routes and to Cork, Rosslare and Ringaskiddy Ports.

As per Garda Síochána requirements, an abnormal load must comply with the weight and height restrictions specified by the S.I. No. 5/2003 - Road Traffic (Construction and Use of Vehicles) Regulations 2003 and the S.I. No. 366/2008 - Road Traffic (Construction and Use of Vehicles) (Amendment) Regulations 2008, respectively.

A Permit for Specialised Vehicles application must be submitted to and signed by the Garda Síochána Permits Officer in order to grant permission for the movement of abnormal loads as defined by the above Regulations, on inter-urban routes specified in the Schedule of Designated Roads. The application for a permit shall be submitted at least 5 working days prior to the date of the proposed journey.

Each vehicle, which operates under this system, travelling on:

- National Primary or National Secondary route shall have an escort vehicle to the front with a flashing amber light(s) and a 'Wide Load' sign visibly displayed
- Dual carriageway or Motorway shall have an escort vehicle to the back with a flashing amber light(s) and a 'Wide Load' sign visibly displayed

Loads in excess of 4.65 meters in height, 4.3 meters in width and 27.4 metres in length are not covered under the remit of this Permit and independent authorisation from the Local Authority concerned and/or Minister for Transport is required.

2.4 Dublin Tunnel

According to the Dublin Tunnel requirements, a load is considered abnormal if any of its dimensions exceeds the following limits:

- Width - exceeds 2.9 metres
- Length - exceeds 25.0 metres

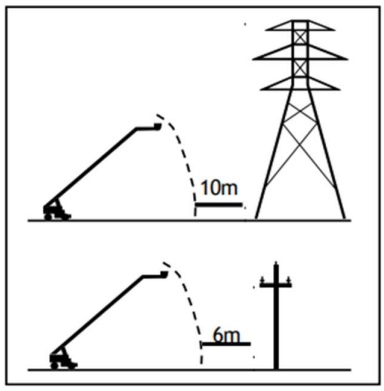
The Dublin Tunnel is subject to a maximum permitted vehicle height of 4.65 meters.

A minimum of 48 hours' notice is required in order to authorise transporting abnormal loads through the Dublin Tunnel. Abnormal loads will only be allowed for movement between 2200hrs and 0500hrs. Hauliers are required to provide their own escort vehicle(s), which will be accompanied by a Dublin Tunnel Authorized Officer.

2.5 ESB Networks

The Road Traffic (Construction and Use of Vehicles) (Amendment) Regulations 2008 defines a high load as any load that is higher than 4.65 metres at its highest point. ESB Networks standard clearances for electricity lines on designated local high load routes that cross public roads are designed to enable loads up to 4.65 metres high to pass safely. It is the responsibility of high load transporters to plan and implement a safe system of work.

According to the ESB Networks Code of Practice (CoP) for Avoiding Danger from Overhead Electricity Lines (ESB Networks, 2019), a lateral area near an overhead electricity line must also be isolated from the work site by physical barriers. The dimensions of this hazard zone are related to the voltage of the overhead line. For 110kV and above, the minimum horizontal safe distance between the plant /machinery and the overhead line is 10 meters plus the falling distance of the fully extended boom (Figure 2-1).



The diagram illustrates the two minimum safe distances

- 10m plus falling distance of fully extended boom (for 110kV and above)
- 6m plus falling distance of fully extended boom (for LV, 10kV, 20kV and 38kV)

Figure 2-1 Plant and machinery minimum safe distance (ESB)

In addition, ESB Networks CoP defines an exclusion zone around a live overhead electricity line which must never be breached in order to avoid electrical arcing or flashover. The dimensions of this exclusion zone for operating plant and machinery are determined by the voltage of the overhead electricity line; for 400kV, the exclusion zone must be eight meters (Figure 2-2).

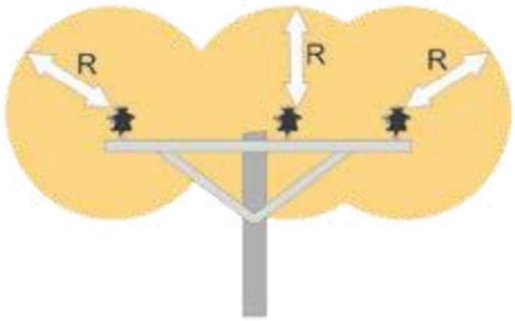


Figure 2-2 ESB Networks overhead electricity lines exclusion zone (ESB)

A road transport operator must notify ESB Networks of their intention to move a high load under or close to ESB Networks overhead electricity lines or equipment, providing accurate information on the high load. A road transport operator shall also comply with all precautions and control measures advised by ESB Networks and with all directions given by any ESB Networks staff that escort the high load.

3. Logistics Strategy

This section considers the key decisions that will influence the logistics and handling methodology, including; port selection, movement sequence and transportation method. Each option within this section has significant advantages and disadvantages and will require the client and contractor to identify key implementation drivers to support the decision-making process. As the project develops, a preferential option will be developed.

Two key logistical hubs, Dublin and Belview port, are identified for the purposes of delivery of the cable drums and 400kV transformer to Ireland. Following Policy updates from Dublin port, it is unlikely that the port will accept project cargo. Therefore, Belview port is the single option considered for this abnormal load assessment. There are alternative ports available however the distances are significantly greater and will likely increase the overall project duration and cost. Section 3.1 explains further the port options and the expected transportation routes.

Following delivery of the cable drums to the chosen port, there are two cable drum handling methods; direct delivery from the port to work site or delivery to interim storage and a second movement to the works site. It is assumed that the 400kV transformer will be delivered directly from the port to Belcamp substation.

Figure 3-1 and Figure 3-2 provide a visualisation of the two options available, each blue dot indicates an abnormal load movement. Please note that the removal of the empty cable drum will remain as an abnormal load due to its height and width.

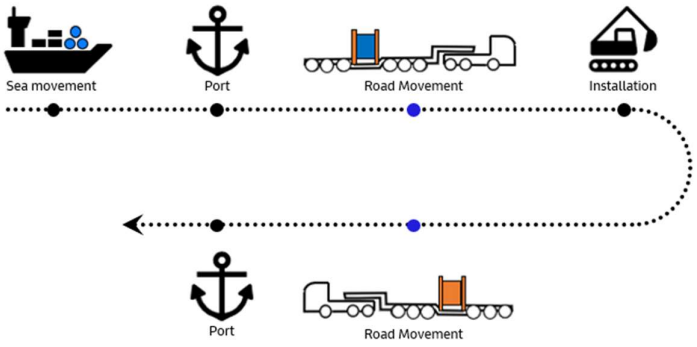


Figure 3-1 Logistics Options – Direct Delivery

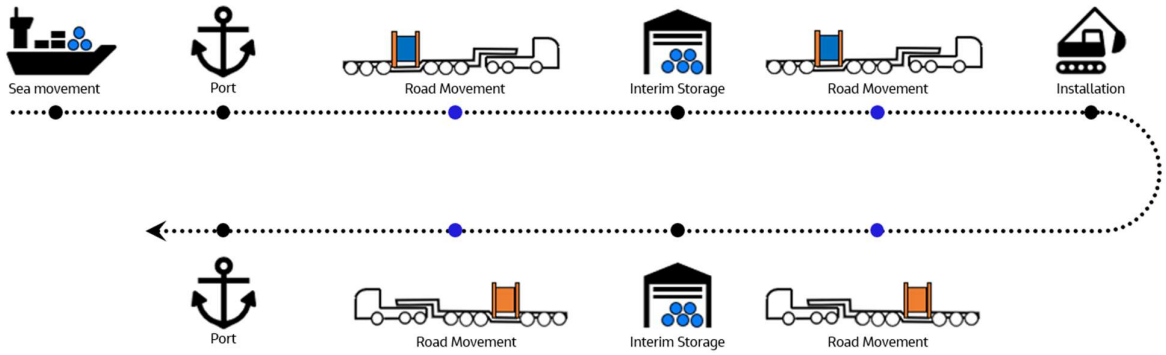


Figure 3-2 Logistics Options – Two-stage Delivery

The direct delivery option requires less abnormal load permits and associated escorts; however, this could present a supply and efficiency risk. The two-stage delivery option provides better material supply assurance, however both options present inherent risks and opportunities that would need to be agreed between the client and the contractors. Table 3.1 provides a high-level comparison of the two distinct handling options.

Table 3.1 Logistics Option Comparison

Delivery Option	Minimum Abnormal Load Movements	Advantages	Disadvantages
Direct delivery i.e. Port to Joint Bay	Port – Site – Port (2no.)	Reduced number of abnormal load movements Reduced transportation risk – singular movement to site Reduced reliance on escort vehicles	Transportation and cable installation solution to be integrated Increased number of specialist transportation vehicles Increased port storage
Two-stage delivery i.e. Port to Compound, Compound to Joint Bay	Port – Compound – Site – Compound – Port (4no.)	Greater site flexibility, ability to create capacity in compounds to mitigate external factors (i.e. port loading) Local specialist vehicles movements, long distance movements with traditional low loaders	Increased number of vehicle movements and associated risk of damage Increased requirement for lifting and handling equipment (i.e. cranes) Increased reliance on escort vehicles

3.1 Port Options

3.1.1 Option 1 – Belview Port

Belview Port is part of the Port of Waterford, approximately 170km South of the project area. All abnormal loads travelling from Belview Port to the project area would require oversize load permits from Kilkenny, Carlow, Kildare, Dublin and Meath (Figure 3-3). If the M50 is utilised for transportation along the route, South Dublin and Fingal would be required to issue permits. As advised by the abnormal load specialist, all overbridges along the route have clearance for loads up to 5.0m.

Following consultation with the abnormal load specialist, it was advised that although Belview Port is in greater distance from the project area than Dublin Port, there are considerable benefits. The key benefits as follows;

- Minimal time restriction on vehicle movements

  All vehicles will be permitted to use the port location on a 24-hour basis. It would not be recommended to move vehicles during daytime due to the disruption to local traffic. The 24-hour basis of the port does permit vehicles to attend the Port earlier than 2200hrs and load the cable drums within the port maximising the period of movement.

- No requirement for Garda escort vehicles

  Due to the location of Port, there is a negligible requirement for Garda escort, therefore removing interface and resource demands, providing greater assurance to the delivery programme.

Figure 3-3 Logistics Option 1 - Belview Port

3.1.2 Option 2 – Dublin Port

Dublin Port is the closest to the project area, with a distance of 35km to Woodland Station and 10km to Belcamp Substation. Road access is supported via the M50 with access points to various key points along the route utilising the M1, N2, N3 and M3. All vehicle movements out of the port are between 2200hrs and 0500hrs. As identified in Section 2.4, the Dublin Tunnel is subject to a maximum height of which the cable drum surpasses this limit. Therefore, a suitable overground diversion will be required to avoid the Dublin Tunnel (Figure 3-4). All loads will typically be under Garda escort, increasing external interface and the associated cost impact.

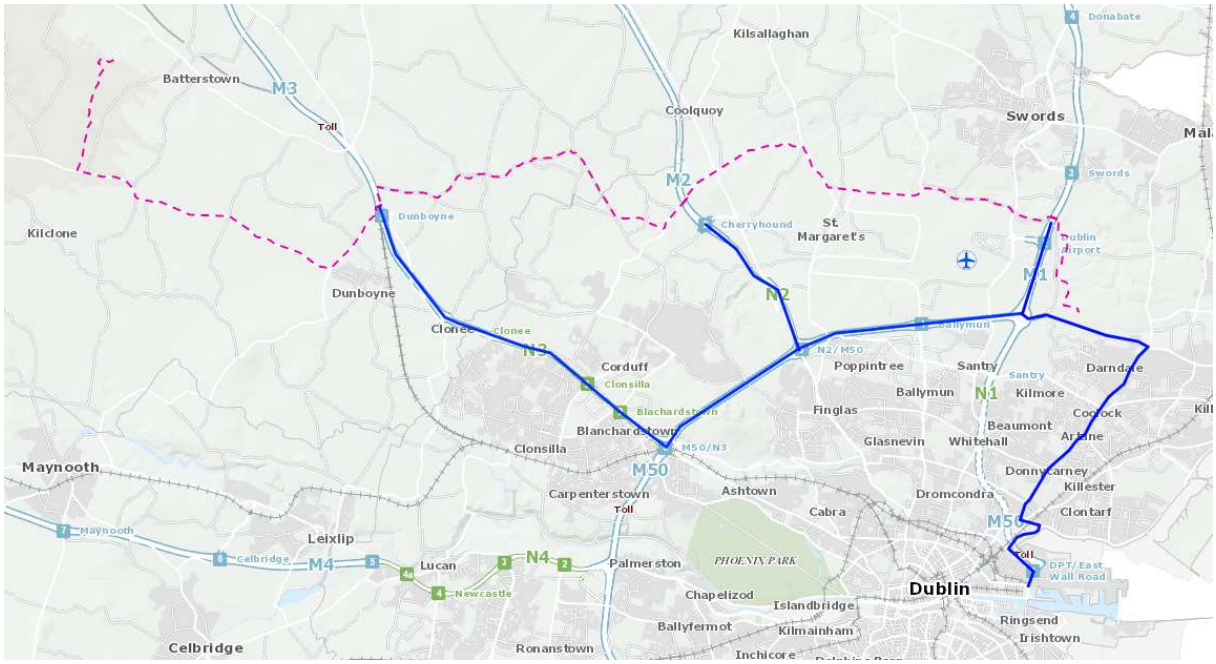


Figure 3-4 Logistics Option 2 - Dublin Port, Potential Overground Route

All vehicle movements out of Dublin port will require oversize load permits from Dublin City, Fingal and Meath. There is no impact to overbridges along this route, on the assumption the cable drum diameter does not increase.

As identified in Section 3, following Policy updates from Dublin port, it is unlikely that this port will accept project cargo. Therefore, Belview port is the single option considered for this abnormal load assessment.

3.2 Delivery Strategy

3.2.1 Option 1 – Direct Delivery of Cable Drums

3.2.1.1 Option 1.1 - Low loader with mobile crane

This option utilises a truck with a low loader trailer to be loaded at the port. The vehicle will then travel to the specific joint bay under the support of escort vehicles. Once at the joint bay the low loader will be off-loaded using a mobile crane, rigged in the closed section of road. During offloading, the low loader will be parked in the passing bay, utilising a statics type C road closure (i.e. less than 15mins). The crane will lift the cable drum onto an un-winding rig to secure the cable drum. Once in position, the low loader will then leave the working area and the road re-open under the temporary traffic management conditions. The site setup is shown in Figure 3-5.

Offloading the cable drum onto an unwinding machine (see Appendix B for further details) would be recommended as opposed to simple jack system. The route is not flat and there are sections on inclines. The use of the unwinding machine will prevent the drum from coming free and posing a risk to site operatives and the public. Great control can be applied to the unwinding through using a turn assist and braking system to ensure the integrity of the cable.

The option utilises readily available equipment and machinery without the requirement for custom fabrication or procurement of assets. The mobile crane will require an abnormal load permit to travel to the worksite and will be supported by approximately 3no. articulated lorries with the ballast on board.

Figure 3-5 shows the required exclusions to ensure the safety of the machinery and those working on site. This creates considerable constraint as a significant number of roads are lined with overhead LV infrastructure. In addition, ground pressure from mobile crane should be considered in order to avoid potential damage to existing underground utilities.

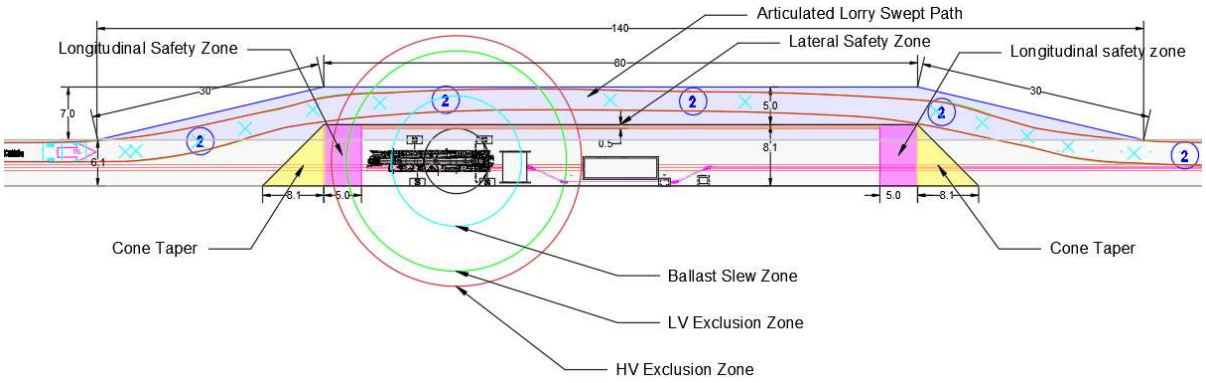


Figure 3-5 Site Layout - Low loader with mobile crane

To provide a safe working area for the installation team, a passing bay of 140m in length would be required. This accounts for a lateral safety zone, longitudinal safety zone and a cone taper zone. It is assumed that the space proofing to the left of the bay is the same as that to the right of the passing bay.

Although this option negates the requirement for specialist equipment, it requires considerable site setup and careful assessment to ensure the stability of the crane. This does minimise the quantity of abnormal loads and associated escort vehicles for moving the cable drums. Of the four options, this would be one of the least favourable due to the risk and required quantity of space.

3.2.1.2 Option 1.2 - Bespoke turntable trailer

As with the other direct delivery options the process will commence at the port with the drum being loaded to the trailer to be transported to the required joint bay under the support of escort vehicles.

As described by the title this solution utilises a purpose-built turn table fitted to the trailer which is used to mount the cable drum and allow it to be rotated through 90 degrees (See Figure 3-7). When loaded for

transport the drum can be loaded with its longest dimension parallel to the carriageway providing the benefit of a reduction to the overall width of the load during transport.

When the delivery vehicle arrives at the specific joint bay location it will park on the existing carriageway then utilising the turn table the drum will be rotated through 90 degrees which will then enable the drum to be unwound directly off the back of the trailer into the joint bay. During this operation it is possible to maintain one way traffic via the passing bay which will be controlled with appropriate traffic management. The delivery vehicle will remain on site until the drum has been emptied then will leave the site transporting the empty drum to be off loaded at the designated area, see Figure 3-6 for the indicative site layout. Note the traffic management for the working area is the same as Option 1.1.

This option does utilise specialist equipment however offers several benefits. If the equipment is purchased, it may be required on future project of a similar nature; the benefit of such investment of an asset may be recoverable transfer. Another benefit of this option is that as previously stated it allows the width of the load to be reduced which will improve navigating the route especially on the narrower sections of highway. This option further negates the need for any lifting equipment at the joint bay locations due to unwinding off the back of the trailer. This not only reduces craneage costs, working platforms and the risk profile of the task but also allows for traffic flows to be maintained throughout the works. Whilst this option will still require abnormal load permits for the delivery vehicle this will have considerably less vehicle movements than the option with the crane.

The disadvantage of this option is that only one cable drum can be transported per vehicle at a time and the next cable drum cannot be collected from the port until the empty drum has been offloaded in the designated area.

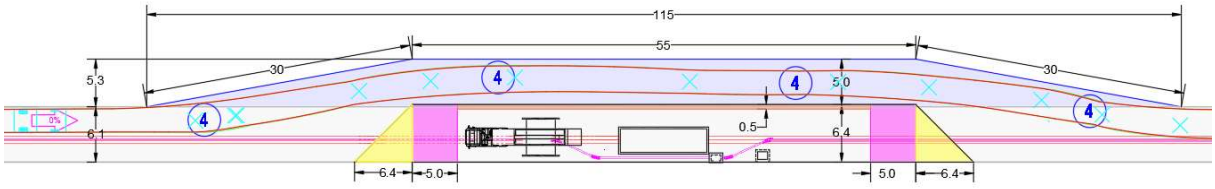


Figure 3-6 Site Layout - Bespoke turntable trailer

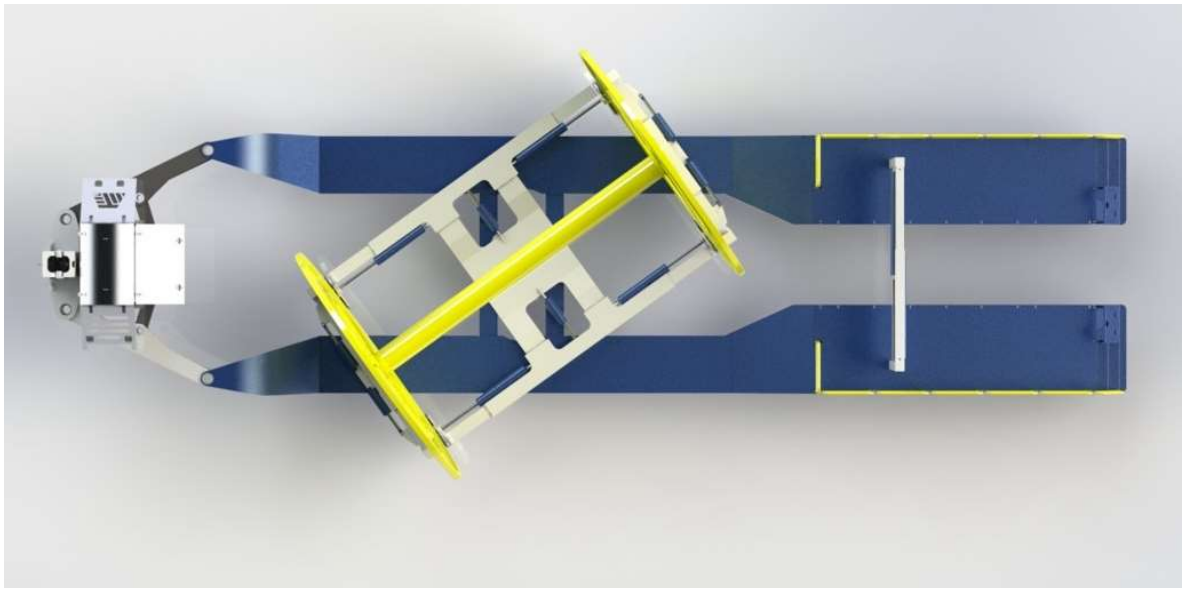


Figure 3-7 Plan view of specialist trailer

3.2.1.3 Option 1.3 - Side-loader trailer

This option starts by having the side loader trailer loaded with a cable drum at the port. This option has a lot of similarity to Option 1.1, however utilises purpose-built equipment and rather than requiring separate cranage this option utilises a self-offloading trailer i.e. a trailer mounted crane a system often used for self-offloading shipping container trucks, as shown in Figure 3-8.

This option requires the drum to be transported with the drum's largest dimension perpendicular to the carriageway making the overall transport width wider than Option 1.2. Once at the specific joint bay location the vehicle will be required to park in the passing bay utilising a statics type C road closure (i.e. less than 15mins). The trailer will then self-offload using the trailer mounted crane and will lift the cable drum onto an un-winding rig to secure the cable drum. Once in position, the low loader will then leave the working area and the road re-open under the temporary traffic management conditions. The site setup for delivery and installation is shown in Figure 3-9 and Figure 3-10. The traffic management arrangement for the work area for installation is the same as Option 1.1 and 1.2 however, can be reduced in size slightly. Once the cable drum has been emptied the delivery vehicle will return to site to reload the empty drum and transport to the designated area, again because the trailer is self-offloading this will not require any further craneage at the designated area.

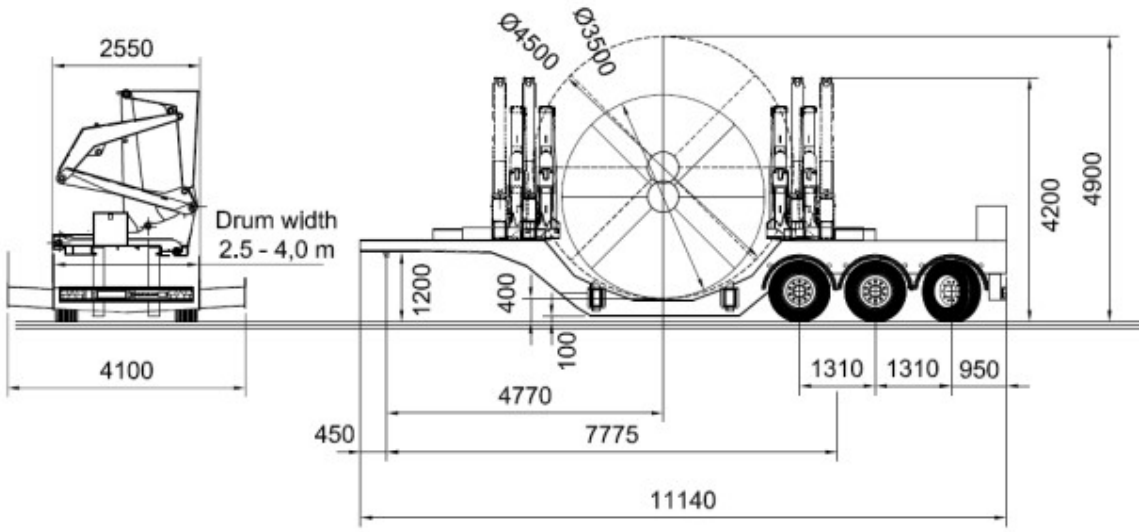


Figure 3-8 Hammar Side Loader

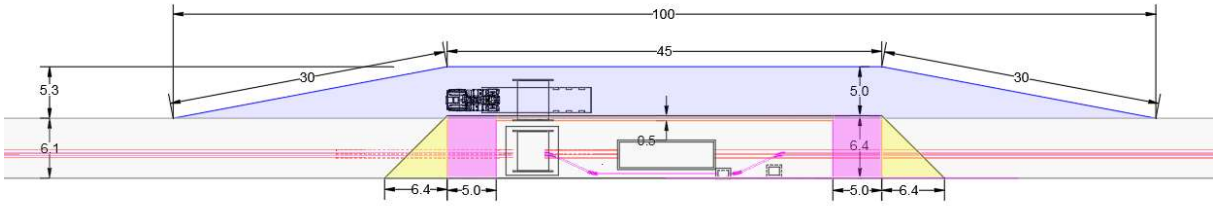


Figure 3-9 Site Layout – Side-loader trailer (Delivery)

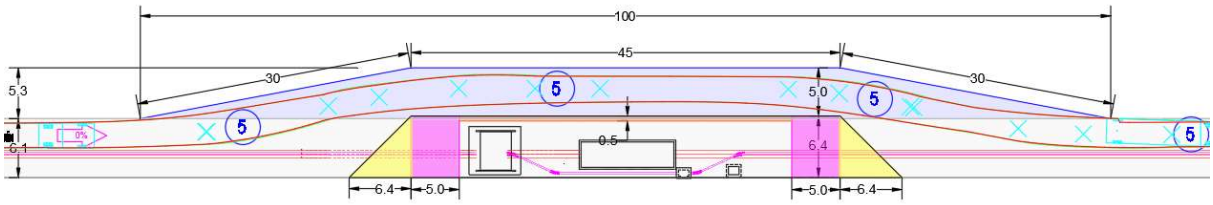


Figure 3-10 Site Layout – Side-loader trailer (Installation)

The benefits of this option include, similarly to Option 1.2, the specialist equipment purchased could be used on future project of a similar nature, it eliminates use of separate craneage so reduces the requirement for working platforms subject to the load requirements of the side loader trailer. It also has a reduced number of vehicle movements to Option 1.1 relating to the crane set up.

Disadvantages are that during the offloading process the road will have to be closed, due to the vehicle and trailer leaving site it will need a location it can park up in close proximity to each joint bay, ready for collection of the empty drum.

3.2.2 Option 2 – Two Stage Delivery of Cable Drums

3.2.2.1 Option 2.1 - Low loader with secondary trailer

The two-stage delivery approach required a series of storage compounds to be set up at strategic locations along the route which would need establishing first, allowing the drums to be transported from the port and distributed to the storage compounds. This would most likely be done using a method similar to Option 1.1 utilising low loaders and mobile or crawler cranes.

This option utilises an adjustable cable drum trailer towed by an articulated tractor unit from the storage locations. This would require the cable drum to be loaded onto the trailer at the storage areas using a mobile or a crawler crane and then be transported to the specific joint bays. Once at the works location the vehicle would park in the carriageway and the cable would be unwound from the trailer into the joint bay. The site setup for delivery and installation is shown in Figure 3-11. Similar traffic management as per the previous options would be required due to the vehicle remaining on site for the installation. The length of the TM would be longer than the options where the vehicle is taken off site after offloading. This option does not require a road closure and can maintain one way traffic under the appropriate traffic management. Once the cable drum is empty it would be removed from the joint bay back to the designated area using the trailer.

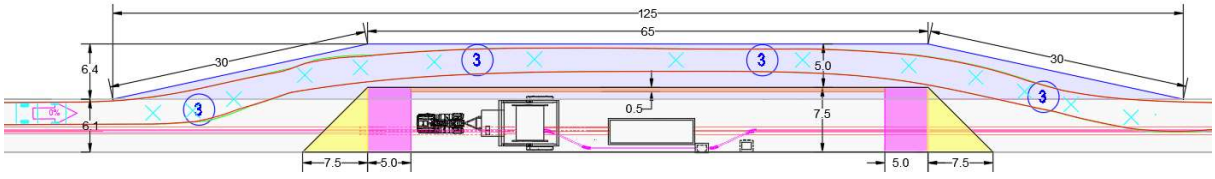


Figure 3-11 Site Layout - Low Loader with secondary trailer

Benefits of this is that on site it requires no lifting at each joint bay so experiences the same benefits as Option 1.2.

Disadvantages include the transport width is wider than the options that allow for the drum to be rotated. Also, the cost of setting up the storage compounds, double handling of the drums and additional craneage required at each location needs to be considered. Due to the nature of the cable trailer, it can only travel up to 10km/hr so could impact on the time take to deliver the drum to the joint bays.

3.3 Compound Strategy

To support the abnormal load assessment, a key component is the compound strategy. Both Dublin and Belview Port have secure compound storage, albeit at a premium. If an interim compound solution is required, i.e. a two stage deliver process, the positioning of the compounds will be key for success. As part of the excavation and duct installation assessment, it would be recommended there would be between five and six compounds. Considering proportionate spacing along the cable route, it would be recommended that each compound would support approximately 7km of route.

Assuming each compound supports 7km of route, a total of 30no. cable drums would require storage. This would require approximately 500m2 of storage space, further space would be required for delivery vehicles (with adequate swept path clearance), offloading machinery (i.e. crawler cranes), welfare, plant storage, offices and car parking. Approximately 10,000m2 would be required at each compound to support both the cable installation and earthworks aspects of the project.

At this stage of the project, a total of 5no. construction compounds have been identified along the route (Figure 3-12), for which the landowner support has been confirmed. The size of these compounds is sufficient to store the cable drums as well as satisfy the rest of the space requirements mentioned above.

Figure 3-12 Locations of the Construction Compounds

3.4 Summary – Cable Drum Logistics

In summary, there are several options available to the client and contractor, this includes choice of port, delivery option and vehicle type for the delivery of cable drums. The vehicle selection affects the installation methodology of the cable and the abnormal load requirements. An integrated vehicle approach will avoid multiple vehicle movements and will reduce the quantum of handling, in turn reducing the risk to the integrity of the cable. Table 3.2 provides a comparison of the various options, an approximate cost, and a high-level rating. All costs are subject to change and contractual agreement between supply and purchasing parties.

In consultation with the abnormal load specialist, there is currently no requirement for significant enabling works along the transport routes identified on the provision that the assumed vehicle transport does not significantly differ. Expected enabling works for all options would include adjustment of overhead cable and localised tree/vegetation pruning.

Table 3.2 Logistics Option Comparison

Delivery Option	Methodology	Approximate Construction Zone Length/width	Approximate Passing Bay Length/Area	Approximate Cost	Minimum Abnormal Load Movements	Preference Rating
Option 1 Direct delivery i.e. Port to Cable Joint Bay	Low loader with crane offload at joint bay	70m/7.5m	140m/770m^2	Low loader trailer €180,000 plus truck Site and port/compound mobile crane required	Port – Site – Port 2no.	Low
	Side-loader trailer	35m/6m	115m/380m^2	Side Loader trailer €310,000 plus truck Unwinder - €170,000	Port – Site – Port 2no.	Moderate-high
	Bespoke turntable trailer	45m/6m	100m/450m^2	Bespoke turntable trailer €450,000 plus truck Mobile crane in compound/port required	Port – Site – Port 2no.	High
Option 2 Two-stage delivery i.e. Port to Compound, Compound to Joint Bay	Low loader to Compound, Secondary towed cable drum trailer	55m/7m	125m/600m^2	Low loader trailer €180,000 plus truck Secondary trailer €180,000 plus truck	Port – Compound – Site – Compound – Port 4no.	Low-Moderate

3.5 400kV Transformer Delivery Strategy

The 400kV transformer is likely to be delivered directly from the port to Belcamp Substation. The transformer would be lifted via a crane onto the specialist multi-axle vehicle trailer at the port and the vehicle would transport the transformer to the station where it would be lifted from the trailer into position in the proposed substation works.

The vehicle to be used is a multi-axle trailer and tractor unit, adopting a conventional approach for abnormal deliveries of this nature. The trailer is comprised of several modular platform vehicles, which are typically available in 2, 3, 4 and 6-axle versions. The vehicle is illustrated in Figure 3-13 below.

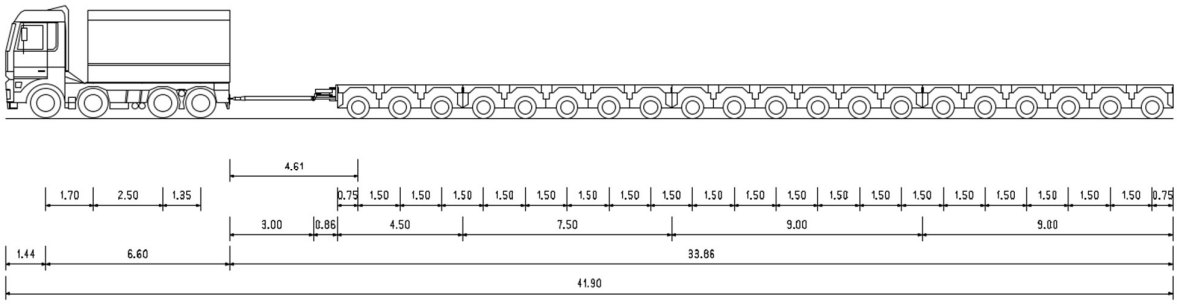


Figure 3-13 400kV transformer specialist delivery vehicle

Considering the overall length of the tractor and trailer unit, which is approximately 40 metres in length, this load is not expected to be covered under the remit of the permitting process administered by Garda Síochána and independent authorisation from the relevant local authorities and/or Minister for Transport is likely to be required.

The delivery route for the 400kV transformer is highly uncertain at this stage given the port will be largely dependent on shipping logistics at the time of transformer manufacture. Therefore, for assessment purposes, it is assumed that Belview Port will be used, and a similar route to cable drum delivery will be adopted. This

route will follow the motorway network from the port to Belcamp Substation and the final section of the route from the M1 motorway to Belcamp Substation following the R139. This section of the route offers a suitable road alignment and standard for the delivery of the transformer. Localised temporary traffic management may be required to facilitate the turn into the substation access road, and it is also recommended that ESB and/or the appointed contractor assesses the load capacity of the bridge on the access road to ensure that the live loads associated with the transformer delivery are within the permissible limits, as defined by the asset owner.

4. Temporary Traffic Management

4.1 Overview

The subsequent sections provide the basis for the management of traffic expected during construction of the CP1021 project, on the basis of the designs shown in the planning documents. The Traffic Management Plan shall be developed by the appointed Contractor during detailed design into a more detailed Construction Stage Traffic Management Plan based on their specific design proposals. The role of Project Supervisor Design Process (PSDP) may be taken over by the Contractor and as such a Traffic Management Plan for their proposed design must be prepared in consultation with Transport Infrastructure Ireland (TII) and the relevant County Councils. The Temporary Traffic Management Designer shall prepare Detailed Temporary Traffic Management Designs for all locations where works are planned on, or impact on, any public road.

Prior to commencing the works, the plan must be developed into an Operational Traffic Management Plan by the Project Supervisor Construction Stage (PSCS). The appointed PSCS/Contractor of the project is required to carry out the Safety Audit on Operational Traffic Management Plans prior to commencing the works. The PSCS shall co-ordinate the implementation of the developed Traffic Management Plan during construction of the works.

The developed Traffic Management Plan requirements will include the provision of facilities for the safe passage of pedestrian and vehicular traffic and measures to keep the impact of the works on the roads, and local communities and road users, to a minimum. All traffic management controls proposed by the Contractor must be in accordance with the documents referenced herein.

4.2 Guidance documentation

The Contractor shall comply with the requirements of:

- Traffic Signs Manual – Chapter 8 – Temporary Traffic Measures and Signs for Roadworks, Department of Transport, Tourism and Sport, 2019
- Guidance for the Control and Management of Traffic at Road Works, Department of Transport, Health and Safety Authority, National Roads Authority and Local Government Management Services Board, second edition 2010
- Guidelines for Managing Openings in Public Roads (Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads), Department of Transport, Tourism and Sport, second edition April 2017
- Guidelines for Working on Roads, Health and Safety Authority, 2009

These Guideline documents shall be read in conjunction with primary Safety, Health and Welfare at Work legislation, including the Act 2005, the Construction Regulations 2013, and any amendment to them.

4.3 Cable Drum Movement Traffic Management

Following consultation with the abnormal load specialist, during the movement of the cable drums from the Ports to the compounds or cable joint bays, it is likely that escort vehicles will be required. The escort vehicles will support the oversized load vehicle by ensuring a suitable safe zone by adjusting the position, speed, or direction of traffic by other road users. The escort vehicles act primarily in the safety function, to ensure the safety of all road users but also to support the oversized load vehicle with overcoming particular obstructions.

At this stage it is not foreseen that specific road closures will be required, but rather the loads will be supported by escort vehicles. The requirement and number of escort vehicles and Garda support is at the discretion of the Permits Officer for each Council or consenting authority along the route. Without engagement at this stage, the quantity of escort vehicles cannot be confirmed, however, it is expected to be between 2-4 vehicles per load. On agreement of the final cable drum and specific oversized load vehicle, the consenting authorities can be engaged and the exact requirements for the oversized load permit can be jointly agreed.

5. Risks and Opportunities

This section provides an assessment of the potential risks and opportunities associated with the movement of the cable drum. Each identified risk and opportunity consider the overall logistics strategy. This is separate to the hazard risk register which is captured in a separate document. Table 5.1 provides the identified deliverability risks, Table 5.2 identifies the deliverability opportunities. As the detailed design progresses, this will need to be reviewed and updated.

Table 5.1 Deliverability Risks

#	Risk	Description	Potential mitigations
1	**Design and construction programme – interface between cable manufacturer, logistics and civils contractor**	The design, construction and cable manufacture/installation programmes are highly interdependent. Cable installer and civils may not be same contracting organisation, creating interfaces that could be difficult to project manage	A baseline programme to understand these interfaces (including EirGrid governance/design/long lead in items) could be developed and QSRA applied to understand risks. Procurement strategy should reflect risks
2	**Third party approvals of abnormal load permits**	Extensive approval process for abnormal load permits complicated by potential high numbers of movements	Early engagement with issuing authority (Garda and Local Authorities). 'Season ticket' strategy if possible to reduce admin. Digital solutions by cable installer/contractor
3	**Physical obstructions (overheads, low structures)**	Low overhead structures preventing movement of cable drum, requiring excessive diversions	Overhead infrastructure survey including vertical clearances.
4	**Poor ground conditions not able to support crane/ weak structures limiting maximum axle loading**	Insufficient capacity in existing structures to support vehicles. Inadequate ground to support crane/winching operations	Survey to identify structures along transportation route. Identify structures at risk and assess load capacity. Review of GI survey data with geotechnical temporary works engineer
5	**Insufficient working space/turning clearances**	Insufficient space to manoeuvre all construction vehicles to facilitate the movement and installation of the cables.	Swept path analysis with selection of haulage and logistics vehicles to identify constraints. Diversions and alternatives likely to be required.
6	**Extensive cable logistics enabling works in cost/schedule or planning**	Enabling works may be required to facilitate the offload of the cable drums. This could include; crane platforms, road widenings, utility diversions etc.	Development of cable bay strategy to support logistics assessments

Table 5.2 Deliverability Opportunities

#	Opportunity	Description
1	**Investment in specialist equipment to integrate lifting and installation**	Use of specialist equipment with up-front investment will reduce site operations and increase efficiency when installing the cables. This could be with the side loader or the turntable option. These vehicles have the ability to be used on subsequent projects.
2	**Early submission of trial abnormal load permits**	The abnormal load specialist is able to submit oversized load permits to the relevant authorities at an early design stage to understand the likelihood of permission being granted. There would be no requirement to transport the load, but rather provide assurance that the proposed solution is transportable.
3	**Early engagement with Port authorities**	Early engagement with the port authorities will support the logistics assessment and provide reassurance to cost and programme. This will further support the business case for the quantity of specialist transportation vehicles and compound strategy. If the port authorities provide strict operating time frames, this will provide less flexibility to the contractor and increase risk to the programme.
4	**Early engagement with consenting authorities**	Early engagement with the consenting authorities will support the permitting of the abnormal load and provide assurance to the programme. The engagement will highlight areas of concern and provide the client/contractor the ability to address these.
5	**Primary initial route overhead cable survey**	It has been identified the risk of low cables along the route. An early assessment of the low cables will provide key information and allow scoping and planning as to the extent of alterations required.

6. Conclusion

In order to facilitate the 400kV transformer delivery and the transportation and installation of cable drums on the CP1021 project, specialist engagement has been undertaken with the abnormal load supplier and suitable vehicles for transportation solutions have been identified. It must be noted that an element of enabling works will be required, this is expected to be vegetation trimming (within the permissible environmental timeframes) and raising any low overhead cables. There is no requirement to undertake significant diversions during the transportation of the cable drums.

Following the logistics assessment of the cable transportation, it is concluded that the two-stage delivery, i.e. Port to Compound, Compound to Joint Bay, is the assumed delivery option for determining traffic movements and informing the environmental assessment at this stage of the project.

It is expected that the 400kV transformer will be delivered directly from the port to Belcamp substation, using a specialist multi-axle trailer. It is assumed that Belview Port will be used, following a similar route for cable drum delivery. The route to Belcamp substation largely follows the motorway network and is not anticipated to pose any significant challenges for an abnormal load delivery of this nature.

It is recommended that the Client and Contractor commence early engagement with the relevant consenting authorities to ensure that permits are able to be issued during the implementation phase. It is evident that investment in specialist vehicles is required to support the installation of the cables at the joint bay site. The market engagement requires further development with regards to proposed installation equipment suitable for the corridor nature of the work. It is evident that specialist logistics trailers will need to be procured for this project and other projects planned by ESB/EirGrid.

7. References

Department of Transport, Tourism and Sport. (2010). *Guidance for the Control and Management of Traffic at Roadworks.* Department of Transport.

Department of Transport, Tourism and Sport. (2017). *Guidelines for Managing Openings in Public Roads.* Department of Transport.

Department of Transport, Tourism and Sport. (2019). *Chapter 8 Temporary Measure and Signs for Road Works.* Department of Transport.

ESB Networks. (2019). *ESB Networks Code of Practice for Avoiding Danger from Overhead Electricity Lines*.

Health and Safety Authority. (2009). *Guidelines for working on roads.*

Irish Statute Book. (2003). *S.I. No. 5/2003 - Road Traffic (Construction and Use of Vehicles) Regulations 2003*.

Irish Statute Book. (2008). *S.I. No. 366/2008 - Road Traffic (Construction and Use of Vehicles) (Amendment) Regulations 2008*.

Irish Statute Book. (2009). *S.I. No. 147/2009 - Road Traffic (Specialised Vehicle Permits) Regulations 2009*.

Irish Statute Book. (2010). *S.I. No. 461/2010 - Road Traffic (Specialised Vehicle Permits) (Amendment) Regulations 2010*.

Appendix A. Aylward Abnormal Load Report

AYLWARD

Jacobs

Client: Jacobs

Project: Belcamp to Woodlands cable route

Date: 03-08-2023

Rev	Status	Prepared By	Reviewed By	Approved By	Issue Date
00	Issue for Review	Marc Aylward			03/08/2023
01					
02					

Contents:

1. Purpose of Report

This report is being compiled to plan out a safe passage for the transport of abnormal loads between the Port of Waterford and the storage locations located between Belcamp substation and Woodlands substation.
It also outlines the basic schedule of offloading and installation of the modules.
The report will outline the route used, special observations, key personnel and equipment so as everyone involved understands their role and procedures in place.

2. Site Address

Loading: Port of Waterford, Bellview, Co. Kilkenny
Offloading: North Dublin area – to be identified

3. Key Personnel – Client & Aylward Heavy Haulage

Marc Aylward – AHH +353 87 7600777
Elliott Neale – Jacobs + 447960436577

4. Cargo Details / Loading procedure

To be identified

Specific lashing points to be identified and adequate lashing equipment to be used.
No lashing equipment to come into contact with finished product, rubber or soft packing to be positioned between lashings and module if required.

- Aylward personnel will assist in the placing of items on the trailers and will advise loading chief when centred.
- Rubber mating to be placed under all steel items or timber cribbing if deemed necessary.
- Lashing will be by chain and ratchet for large items and cargo straps for smaller items.
- Loader to provide access to lashing points, mewp or ladder.
- No cargo to be transported before being lashed to the trailers.
- Always wear PPE on site, i.e. Safety Boots, High Visibility Top & Hard Hat at a minimum.
- Always adhere to the speed limit.
- Proceed around site on specified routes identified by road markings & signs.

5. Vehicle Specification

Tractor units: 6 x 4 units > 120t
8 x 4 units > 250t

Trailers: 3/4 axle wafer low loaders
3/4 axle cable drum trailers

6. Special Observations for Abnormal Load Movements

Specific county council route details to be confirmed once permits are in place.

Normal travel hours

Kilkenny CC: No travel restrictions
Carlow CC: No travel restrictions
Kildare CC: No travel restrictions
South Dublin CC: 23:00 – 06:00
Fingal CC: 23:00 – 06:00

Although some councils do not enforce travel time restrictions, we will normally not drive during school drop off / collection times to avoid any unnecessary delays.

7. Special Observations for Escort vehicles

Warning vehicle(s)/Escort(s) if required should comply with European Best Practice Guidelines for Abnormal Road Transports (Chapter 7 / Annex 7).

2 x Private escort vehicles per convoy of 2.
Two-way radio communication between all vehicles.
Handheld two-way radio to accompany driver when outside of vehicle.

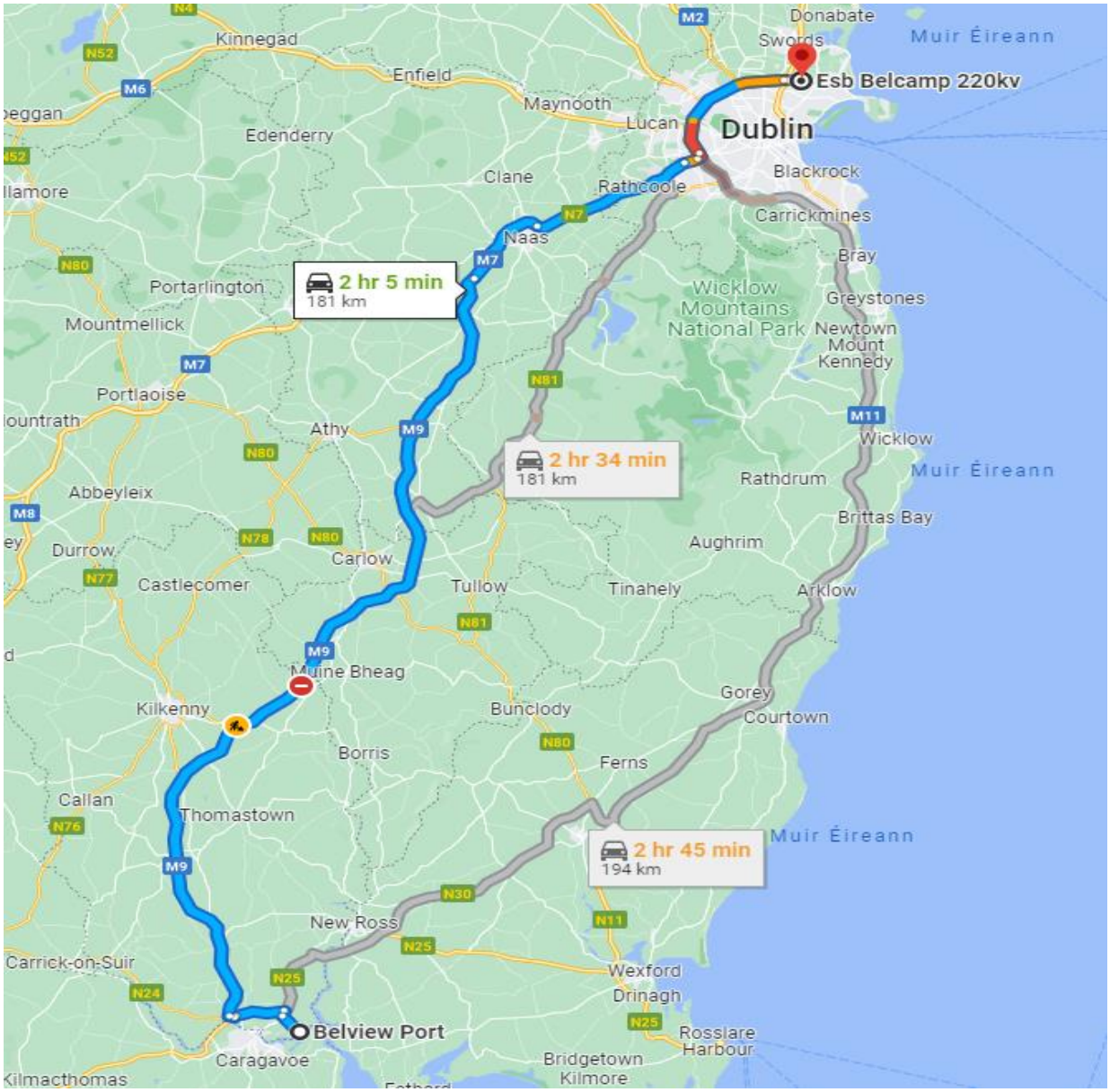
2x vehicles to be in front on single carriageways
1x vehicle in front and 1 x at rear on dual carriageway / motorway.

Cargo measuring 3.5m + to be accompanied by Police escort on National and regional roads in Fingal CC area.

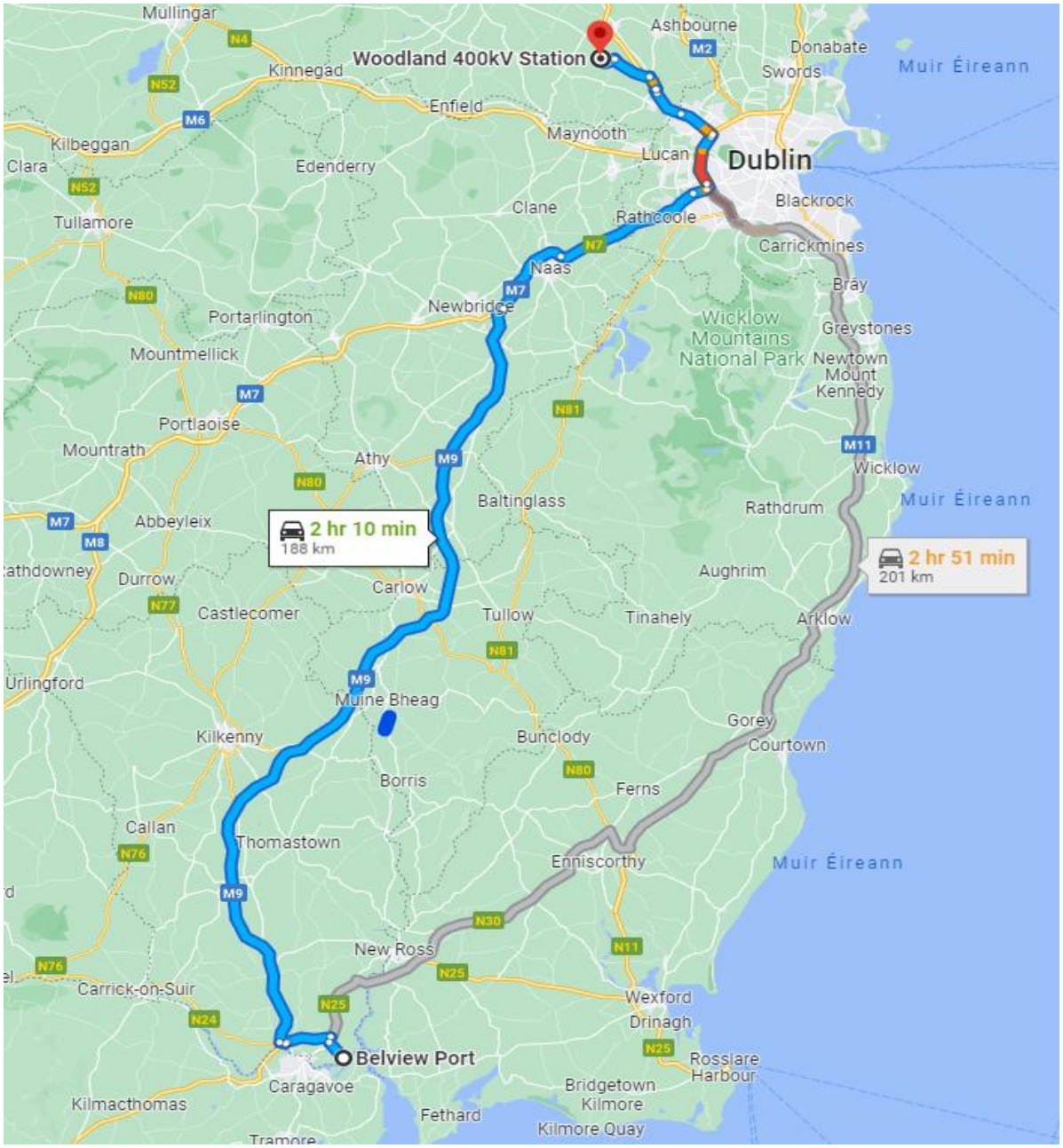
Cargo measuring 4.3m + to be accompanied by Garda escort on Motorway network in Fingal CC area and South Dublin CC area.

This would be normal practice but will be clarified on receipt of permits.

8. Route Details



Bellview Port – N29 – N25 – N9 – M9 – M7 – N7 – M50 – R139 – **Belcamp 220kv**



Bellview Port – N29 – N25 – N9 – M9 – M7 – N7 – M50 – N3 – M3 – R147 – R154 – L6207 **– Belcamp 220kv**

Local access routes

JB 1 to JB17 – Access via M3 – R157 – R156

JB18 to JB25 – Access via M3 – R157 – L5026 – L1010

JB26 to JB35 – Access via N2 – R121

JB35 to JB44 – Access via M1 – R132 – L2020 – R108 – R122

JB44 to JB46 – Access via M1 – R132 – Stockhole Lane

JB47 to JB49 – Access via M50 – R139 – Belcamp 220kv

https://earth.google.com/web/@53.46747412,-6.53012717,91.79657773a,11711.30497401d,34.99988302y,0h,0t,0r

9. General & Specific Route Observations

	Location	Observation	Comment
1.	JB18	Traffic Island	Remove sign / Kerb timbers placed
2.	JB18 to JB25	Heavy foliage	Tree / Hedge trimming required
3.	Roundabout on R121	Traffic Island	Remove signage / Wrongside
4.	JB30 to JB35	Heavy foliage	Tree / Hedge trimming required
5.			
6.			
7.			
8.			

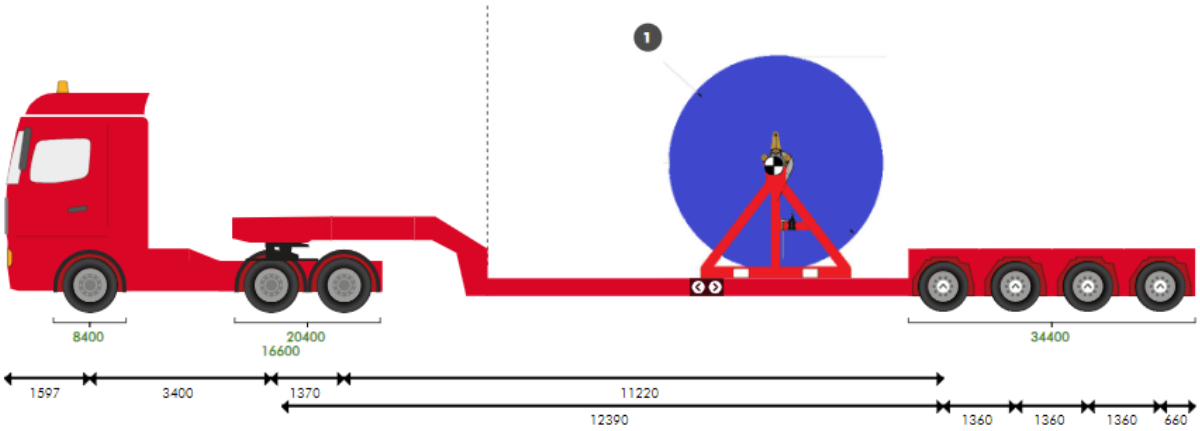
10. Site Access & Restrictions

Access through site to be identified on site visits.

11. Site Photographs

To be identified

12. Drawings



VEHICLE SPECIFICATIONS

Company	Aylward Heavy Haulage
Length Incl. Load	22,327 mm
Total Mass	63,200 kg

TRACTOR

General

Id	202 LS 620
Name	Aylward

Dimensions

Front Overhang	1,597 mm
FTKP	5,197 mm

Front Axles

Amount	1
Empty	6,421 kg
Capacity	10,000 kg
Empty Combination	6,900 kg
Load Mass	1,500 kg
Actual Load	8,400 kg
Load Axle 1	8,396 kg

Rear Axles

Amount	2
Empty	5,739 kg
Capacity	26,000 kg
Empty Combination	9,266 kg
Load Mass	11,134 kg
Actual Load	20,400 kg
Load Axle 2	10,199 kg
Load Axle 3	10,199 kg

TRAILER

General

Id	EURO-96-04(P)
Name	AHH25

Axles

Amount	4
Capacity	56,000 kg
Empty (retracted)	12,000 kg
Empty (extended)	11,500 kg
Empty Combination	12,034 kg
Load Mass	22,366 kg
Actual Load	34,400 kg
Per axle	8,600 kg

Kingpin weight

Capacity	50,000 kg
Empty	4,000 kg
Empty Combination	3,966 kg
Load Mass	12,634 kg
Actual Load	16,600 kg

Dimensions

Front Overhang	800 mm
Neck	3,860 mm
KPTR-min	17,130 mm
KPTR-max	24,880 mm
Extended	0 mm

LOAD 1

Id	Cable drum - 35t
Name	Cable drum - 35t
Mass	35,000 kg
Length	4,200 mm
Height	4,200 mm
Centre of gravity	2,100 mm
Load Position	3,261 mm

13. Schedule of Deliveries

TBC

14. Conclusions & Actions Required

In general, the route is straightforward without any major street furniture removal requirements.

Once storage locations have been identified, we can take a closer look at the routes from there.

One major obstacle will be dealing with abnormal load movements within Fingal CC area, where they insist on Garda (Police) escorts with most oversize loads. These will come at a huge additional cost to the project. Perhaps as the job progresses we could arrange a sit down with the local council and discuss potential options around escorts and travel times.

END OF REPORT

Prepared by: Marc Aylward

Signed by: *Marc Aylward*

Position: Transport planner

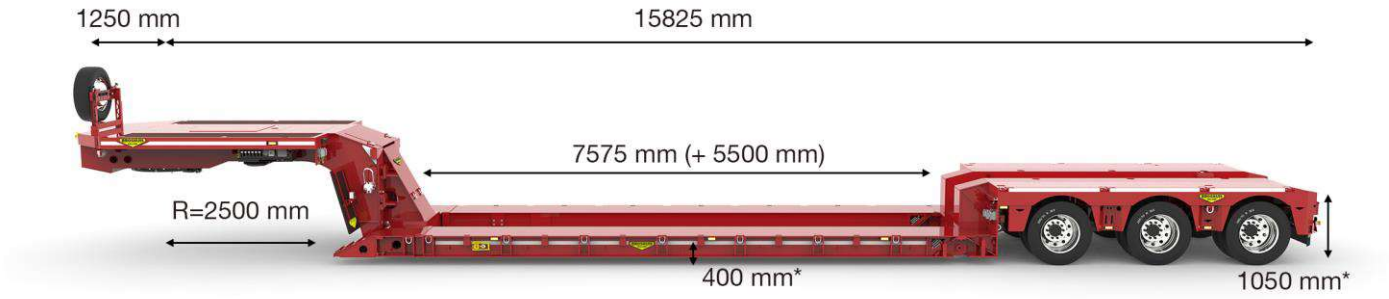
Date: 03/08/2023

Appendix B. Supplier Datasheet

Broshuis Low Loader

Trailer specifications

Dimensions and weights



Weights in kg	Netherlands		Germany		England	
	C & U	Special types	C & U	Special types	C & U	Special types
Maximum fifth wheel load	35000	35000	35000	35000	35000	35000
Maximum bogie load	27000	30000	24000	30000	24000	37500
Gross load capacity	62000	65000	59000	65000	59000	72500
Tare weight, app.	21500	21500	21500	21500	21500	21500
Net load capacity, app.	40500	43500	37500	43500	37500	51000

Your benefits

Premium quality

Optional complete metalized

Low tare weight

Transport of 30 ft and 40 ft containers

Neck

- Single beam hydraulic pivoting and detachable neck. Maximum fitfth wheel load is 35 T.
- Fifth wheel height 1320 mm
- Neck width 2530 mm
- Rear swing cleareance 2500 mm
- Hard wood floor of 28 mm thick
- 3,5" Kingpin, fitted under a ball bearing turntable. The turntable is connected to two double action hydraulic steering rams. Holder is suitable for mounting a 2" kingpin
- A air stinger is provided with 2 separate operable cilinders to support the neck whilst removing the gooseneck.
- 10T certified lashing rings (max. Load 5T) . According NEN12640
  TÜV Certificate
- 32 mm holes in the side rave, to use as lashing point
- Divided at the side raves of the neck, dim. 96x66x6mm, suitable for stakes of 81x51mm
- Spare wheel carrier at front of the gooseneck. Suitable for one spare wheel.
- Alu cover plate placed in the floor between the beams of the neck

Floor

- 1x extendible
- Bed height 390 mm (loaded). Beam height 300 mm
- With main beams of high tensile steel
- Split at front side of the bed
- Width of loading area 2750 mm
- No floor fitted between the beams to increase loading area. The under flange is prepared for a detachble floor
- Preparation for swing-out outriggers in the outer spine
- All air and service lines are located in an energy chain within the central main beam. Resulting in improved ground clearance and reduced maintenance
- Retaining nuts M24 fitted to the inner beam suitable for 8 T lashing rings.
- 13.4T certified lashing rings divided in the side rave of the loading floor, placed every approx. 1.2 meter, according EN12650 with TÜV Certificate

Axle bogie

- Gigant 12T axles
- Axle quantity: 3
- The axles are fitted with hydraulic suspension, the hydraulic cilinders are fitted in front of the axle for maximum protection. Left and right side can be adjusted separetly.
- Broshuis hydraulic steering system, consists of two fully independent circuits.
  - Butterfly section, with adjustable conical bearing, resulting in extremely low maintenance,
  - Adjustable steering rods, to correct axle alignment tracking to compensate for wear during the life of the trailer.
  - Air, electrical and hydraulic service lines are housed inside the central spine(s) in an energy chain
- All axles are hydraulic steered
- Distance between axles is 1360 mm
- 10T certified lashing rings. According to EN12640, TÜV Certificate
- 32 mm holes in the side rave, to use as lashing point
- Width of loading area 2750 mm
- A raise and lower valve is fitted to the hydraulic suspension for ease of loading or unloading. The left and right floor height can be operated seperatly. 2 LED indicators are installed to set the correct floor height. Operation from the neck.
- Manual override steering with 3kW electrical pump
- Electrical hydraulic override steering system, to allow the axles to steer independently of the tractor unit, by means of buttons. Butterfly section, with adjustable conical bearing, extremely low maintenance - adjustable steering rods, to correct axle alignment tracking to compensate for wear during the life of the trailer. Air, electrical and hydraulic service lines are housed inside the central spine(s) in an energy chain
- Two air line Wabco brake system, EC-approved design with an automatic load sensing device. Spring type chambers fitted to two axles for the hand brake. Incl. EBS
- An hydraulic pressure gauge is connected to the suspension for determing the axle loads
- Tyre brand to choice of Broshuis (Continental, Goodyear or comparable). 285/70 R19.5
- A troughs in the centre of the lower deck for an excavator arm, width 724 mm

Lights

- Lights are complete in LED
- 2 pairs of 3-chambers rear lights and Led side-marker-lights. Conform EU-specifications
- One fog light
- One rear flashing beacon connection at the rear side
- On each side at the neck and axle bogie a connector fitted with holder for extendible marker board lights
- Connector for over width marker board lights: 3 pin plug

Accessories

- Spare wheel 1x
- EBS connector
- Connectors at the front: Dual 7 pin SAE plugs
- Air couplings palm type

- A 35mm2 cable between truck and trailer for the use of any electrical power supply
- 24V power connector NATO
- Mudguard under the light bar
- The chassis is equipped with white reflective tape on sides and red reflective tape on the back

Paintwork

- Finished in one colour. (non-metallic)
- After chassis assembly, the support brackets for valves, air tanks and pipe and wiring runs are fitted. The completed chassis is then shot blasted and immediately painted according to the Broshuis 2K paint system. The final fitting of all the components is carried out after the chassis has been through the preservation process
- Supplied Axles are painted black, for better rust prevention

Hammar Side Loader

Datum
Date
2022-09-02

Beteckning
Our ref.
Offer No.
225092

Er beteckning
Your ref.

Jacobs
Att: Elliot Neale
Cotton Centre,
Cottons Lane
London, SE1 2QG
United Kingdom

Dear Elliot,
Please find this offer for our Hammar DrumLoader with accessories for your consideration.

Drumloader

Item	**1**	HAMMAR 155 H-35 “Cable Drum solution”
Item	**2**	Radio Remote Control
Item	**3**	Central lubrication

Operation

Item	**4**	Separate engine on the HAMMAR

Others

Item	**5**	Handling of various drum sizes
Item	**6**	Top Spreader
Item	**7**	Spare wheel incl. winch
Item	**8**	20’ container handling
Item	**9**	Freight from Sweden to UK

Address
Hammar Maskin AB
Buagärde 36
SE-517 95 OLSFORS
Sweden

Phone
+46-(0)33 29 00 00
Fax
+46-(0)33 29 00 01

Web
www.hammar.eu
E-mail
info@hammar.eu

VAT No.
SE556282502501
Reg. No.
556282-5025

Item 1 **HAMMAR 155 H-35**

One HAMMAR 155 H with fix chassis and fix cranes for transport and handling of cable drums with maximum fixed diameter of 4,5m and maximum fixed width of 4,0m. Maximum weight of drums is 35t.
Size and weight of actual drums to be specified.
The HAMMAR has 3 axles and is suitable for a 3-axle tractor unit.

General about HAMMAR 155

The HAMMAR 155 model is based on our advanced high-performance model 151, with the difference that it incorporates our “MegaTransfer” ™ step over type stabiliser legs.
The stabiliser leg reaches over a normal width companion trailer or truck and rests on the ground on the other side. With its extreme outreach of 3,1m the HAMMAR becomes extremely stable in all type of handling.
This is a HAMMAR with great handling area and with a number of benefits such as being a master of transferring to and from other chassis

Advantages

- Stabiliser outreach 3,1 metres
- High lifting capacity
- Great handling area
- Extremely flexible supportlegs

The HAMMAR 155 H-35

- Capacity of handling and transporting cable drums up to Ø 4,5m and up to 4,0m width to and from ground and other trailers.
- Has a total height of 4,7m with a turntable height of 1200mm (1265+25mm rising) and with a cable drum of Ø 4,0m loaded.
- Have hydraulically extendable sideway beams for the cable drum to rest on. Normal vehicle width is 2550mm, with widening possibilities to maximum 4,0m. The beams are lockable in its inner position and in an outer transport positon.
  The beams on the lifting side are extendable 100mm extra and the drum stoppers are also foldable, all to make it safe and easy to load and unload. The distance between the beams lengthwise is 2,1m.
- Have a ground clearance, in the normal transport position, of approx. 100mm. Maximum ground clearance, with raised air suspension, is approx. 250mm

- Has two pair anchor lashings on the lover frame. LC 10 000 daN/pcs
- Is equipped with HAMMAR patent pending stabiliser legs reaching over trailers, truck frames or rail wagons and rests on the ground on the other side.
- Have two, fully hydraulic operated, extra support leg on the non-lifting side for extra stability.
- Have chain spreader to keep chains apart when handling the cable drums.
- Remote emergency shut down as standard
- is, on customer request, left or right-hand side lifting.
- is equipped with the HAMMAR Safety Lifting Hooks.

Weights	**Technical**
Max SWL (Safe Working Load)	**35.0** tonnes
Max bogie pressure	36.0 tonnes
Max King Pin pressure	18.0 tonnes
Unladen weight of HAMMAR 155 H	12.7 tonnes

The HAMMAR 151 H is equipped with:

Axles:	BPW 3 x 12 tonnes, third axle self steering and to be locked from inside the cabin when reversing. Installations in the tractor are not included.
Bogie:	BPW air suspension type SL 1310 + 1310 mm with raise and lowering function.
Tyres:	6 pcs 425/65R22.5 with coarse pattern (10t load).
Rims:	Steel.
King Pin:	2" JOST.
Brake system:	WABCO two circuit. EBS 4S/3M, with four sensors and three modulators. Power supply via ISO 7638. The EBS-system is featuring RSS - Roll Stability Support.
Parking brake:	Automatic with spring brakes, manually operated
Wheel brakes:	Disc brakes on all axles.
Landing leg:	JOST, with two speed operation, especially developed for trailers with air suspension. The feet allow a movement of 125 mm lengthwise.

Twistlocks:	4 pcs. HAMMAR/BLAIR
Directional valves	*Fully hydraulic operating system. The inlet section in the valves incorporate an emergency stop - the HAMMAR will be emergency stopped independently of the tractor unit. The accuracy of the hydraulic system enables a fast, safe and exact operation of the HAMMAR.*
Operating system:	Remote control by cable, joystick. Prepared for rpm-control of the truck engine. Installations in the tractor are not included.
Working lights:	One LED on each crane and 2 LED in the rear.
Support pads:	2 pair of composite support pads to be used under stabiliser foot to reduce ground pressure when needed.
Width marking:	Illuminated width markings front and rear, extendable out to 4,0m, designed to local legal requirements.
Flatbed cover:	I-beams and alloy checker plates on the low bed is fitted with a rubber mat to protect if cable is hanging down.
Camera system:	Rear camera is mounted and one camera is also mounted on the side for positioning the HAMMAR next to a cable drum. Operator will see when he is in right position to the cable drum from a display. Colour LCD display is supplied but mounting in your truck cab is not included.
UK Service:	HAMMAR has a well-trained and skilled Service Agent covering Great Britain. Service Agent has parts in stock and parts from Sweden HQ are supplied within 24 hours.

Weight: 13 000 kg

Price: SEK 3 322 000

Item 2 **Radio Remote Control**

Cordless radio remote, Scanreco, for all functions on the HAMMAR Sideloader. The portable transmitter is a one hand unit. The operator can overlook the operation from any position suitable. The transmitter has symbols that show each function. The control buttons have two modes -a light pressure gives "low speed", a harder provide "high speed" on the crane movements. It has a display where the shift position, battery voltage and legs-on-the-ground are being indicated.
Three rechargeable batteries (AA) and a 24V plug-in charger are included. The unit complies with all pertinent EU standards.
Our standard cable remote control, with joysticks, is also included in the delivery and can be plugged in within seconds, should the need arise.
Weight: 6 kg

Price: SEK 34 100

Item 3 **Central lubrication**

Complete installation of an automatic centralised lubrication system with an air pressure driven piston pump mounted on the HAMMAR supplying all grease points on the cranes, as well as on the trailer. Gives exact dosage and distribution of the lube with adjustable intervals. The grease reservoir is made of stainless steel. The system is controlled from a user interface mounted on the trailer. The control unit has LED-lights and surveys the pump function, the grease level in the reservoir and also has pressure alarm and low level alarm on lubricant level etc. At power brake (e.g. disconnecting the trailer) the lubrication program will always continue from previous position through memory storage.
Weight: 17 kg

Price: SEK 56 600

Item 4 **Separate engine on the HAMMAR**

One independent Power Pack for drive of the hydraulics on the HAMMAR. The engine is an environmentally sensitive Stage V engine complying with EU latest environmental requirements.

The engine is a four cylinder 2.5 litres common rail KOHLER turbo diesel, with a full **55.4 kW power** @ 2600 rpm and 300 Nm @ 1500 rpm.

The engine is directly driving a hydraulic pump. The Engine is protected from overheating or low oil pressure. **The cranes will have the same speed regardless of the weight lifted**.
The engine is protected against overheating and/or low oil pressure, and is equipped with pre heat injection, to facilitate cold starting. The engine works for surrounding temperature between -40 and 50+ ° C.

The following is included:
4-cylinder water cooled KOHLER common rail turbo diesel engine, twin flow hydraulic piston pump, return oil filter, hydraulic oil tank 160 l, fuel tank 90 l.

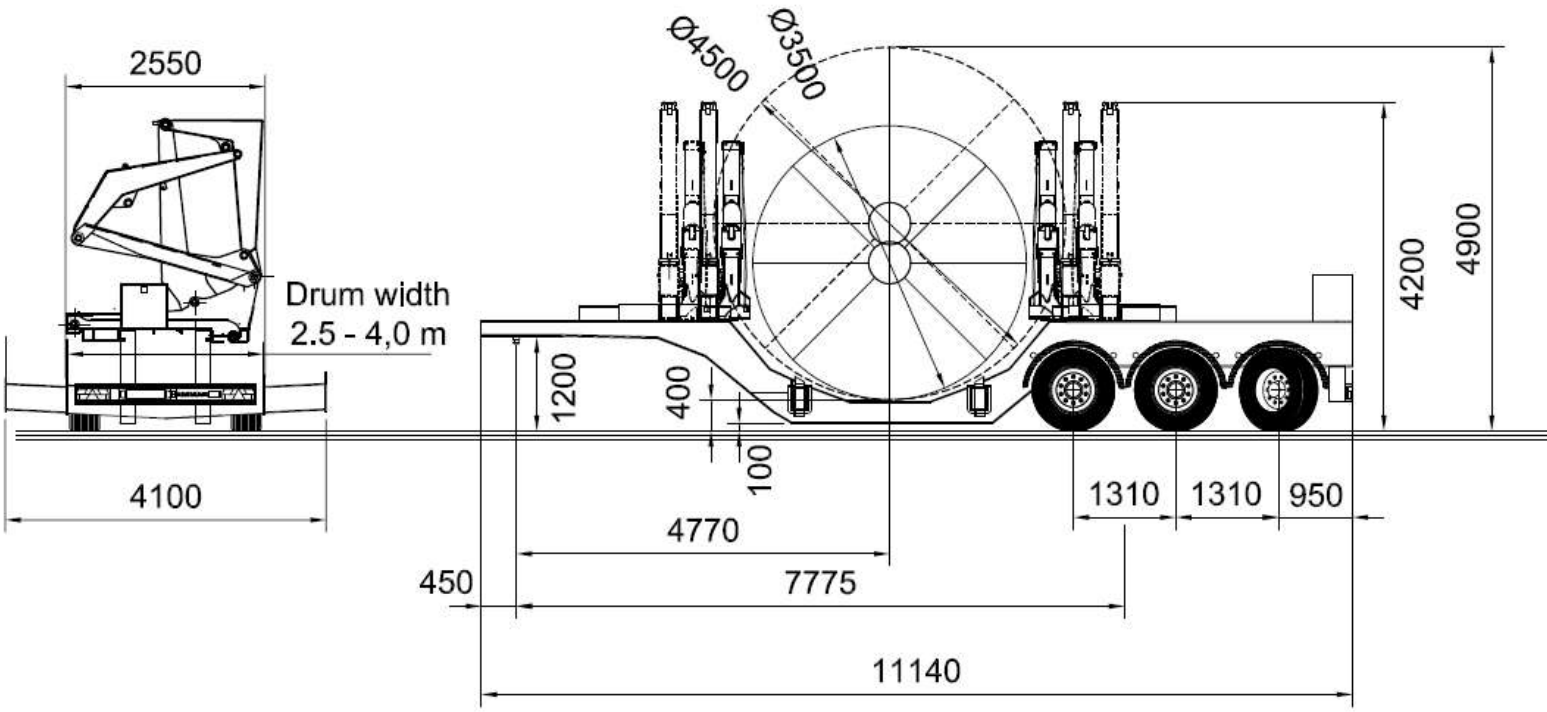
The power pack is completely mounted and built in a rigid frame and with hatches for easy access and service. The hydraulics can be stopped from the portable manoeuvre box. The engine is ADR-equipped.
Weight: 720 kg

Price: SEK 219 100

Item 5 **Handling of various drum sizes**

Capability for handling drums with a various diameter from 4,5m down to 3,5m by sliding the cranes.
This option requires the cranes to be fitted with a special sliding arrangement and an extra 200mm I-beam will be fitted on top if the existing chassis beam.
Please note this affects the total height of the sideloader without load.
Width of the drums can be 2,5m to 4,0m.
Weight: 700kg

Price: SEK 177 200



Item 6 Top Spreader for various drum sizes

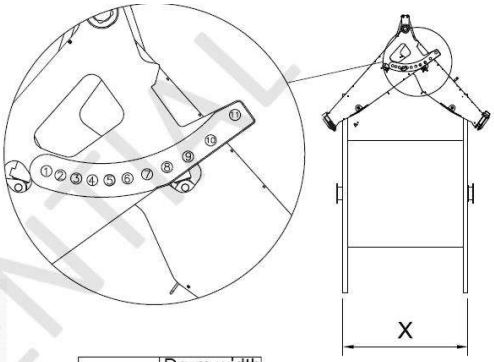
Top spreader for handling drums when container corner castings is not available on a drum or to be flexible in handling any drum by using the centre hollow beam same way as traditional crane lifting.
The spreader is hydraulically operated and can in folded position be placed on the trailer chassis between the cranes during transport. In operation the spreader is folded out over the drum and steel wire ropes are used to loop around the centre beam of the drum.
This new design of Top Spreader is capable of handling different sizes of drums by hydraulically fold/deploy over the drum depending on drum size.

Capacity:
Drum diameter = 3500mm to 4500mm
Drum width = 2270mm to 4000mm
Safe Working Load (SWL) = 35t
Weight: 1 300kg

Price: SEK 414 700

Lifting tool adjustable

Max load (max weight drum)(all sizes)	35T
Drum diameter	3.5-4.5m
Drum width	2270-4000mm (outer flange measurement)



Position	Drum width (X)mm
1	2270-2500
2	2500-2650
3	2650-2800
4	2800-2950
5	2950-3100
6	3100-3250
7	3250-3400
8	3400-3550
9	3550-3700
10	3700-3850
11	3850-4000

Item 7 **Spare wheel incl. winch**

One complete spare wheel 425/65R22.5 with coarse pattern on steel rim with winch mounted on the trailer chassis behind rear crane.
Weight: 181kg

Price: SEK 16 200

Item 8 **20' container handling**

Capability to handle and carry 20' ISO container and flats with the drumloader. Crane base and beam adjusted and fitted with twist locks, mounted on the side of the trailer. By sliding the cranes to 20' distance this option gives the possibility to load, unload and cart fully loaded 20' container for ie. Installation equipment used at sites.
Please note that this option requires that Item 5 is chosen.
Weight: 100kg

Price: SEK 28 500

Item 9 **Freight from Sweden to UK**

The HAMMAR delivered from factory in Sweden to port of Immingham.
Weight: 0kg

Price: SEK 45 000

Offer overview

Item	Description	Price (SEK)	Weight
Drumloader			
1	HAMMAR 155 H-35	3 322 000	13 000 kg
2	Radio Remote Control	34 100	6 kg
3	Central lubrication	56 600	17 kg
Operation			
4	Separate engine on the HAMMAR	219 100	720 kg
Other			
5	Handling of various drum sizes	177 200	700kg
6	Top Spreader	414 700	1 300 kg
7	Spare wheel incl. winch	16 200	67 kg
8	20’ container handling	28 500	100 kg
9	Freight from Sweden to UK	45 000	0kg

The HAMMAR is designed in close contact with our customers and users, which has resulted in a flexible and highly standardised product with low maintenance costs.

The HAMMAR is adapted to local road regulations, regarding lightning, reflectors, under run protection (rear and lateral), axle pressure and turning radius.

The cranes and the trailer are Swedish quality products. They are manufactured in our own factory in Sweden, using the highest quality Swedish steel, especially prepared to give the best function together.

The HAMMAR is delivered media blasted, primed and top coated. A two-component epoxy primer is used as a base. The top coating is a two-component polyurethane paint.
The cranes are black as standard and the wheels are silver-grey. The under-run protection is made from extruded aluminium, and is not painted. The trailer is painted in a solid colour of your choice. All parts are painted before assembly for the best result.

We educate and train, during one day, one or two operators at our, or the customer's, facilities. This is done in connection with the delivery, and it is a requirement for full validity of the warranty of the equipment.

Service and maintenance agreement is handled separately with our local Service Agent in UK and can be supplied upon your request.

All documents for homologation are included in the delivery.

Prices:	Per unit and in SEK.
Terms of payment:	30% down payment with the order, 70% before delivery from Hammar Maskin AB, Sweden.
Terms of delivery:	Ex Works, Olsfors, Sweden (INCO-terms 2010). Apart from this *Hammar General Terms and Conditions of Sale 2020-12-07* is valid.
Other terms:	In accordance with *Hammar General Terms and Conditions of Sale 2020-12-07*
Time of delivery:	At present, about 10 months from confirmed order and receipt of down payment.
Warranty:	36 months on cranes and chassis structure including all Hammar fabricated components.12 month on other ancillary equipment i.e. axles, suspension, engine, lighting etc. *Hammar General Terms and Conditions of Sale 2020-12-07* is valid.
Validity:	Our offer is valid one (1) month from the date of the offer.

If I can be of any further assistance, please feel free to contact me.

Yours faithfully,
HAMMAR MASKIN AB

Fred Sandberg

Custom Turn Table

Modern Transport Engineers Australia Pty Ltd

15 Millennium Place Tingalpa Qld 4173 Australia Phone 61-7 3393 5100
Mike Mobile 61 04 47 947444 mike@modtrans.com.au
admin@modtrans.com.au
www.modtrans.com.au
www.modtrans.co.nz

31st August 2022

Jacobs
City Walk
Leeds LS11 9DX
United Kingdom

Phone 1

Mobile +4475 66808278

Email: rafaela.konstanta@jacobs.com

Ref: A200220

Attention: Rafaela Konstanta

Dear Sirs

Further to your inquiry and our subsequent discussions our company is pleased to submit our quotation to you for the following trailer.

Three Rows of Eight Steering Drop-Bed Cable Trailer

Base Model Specifications:

- Special Drop-bed deck design
- Width 2950mm closed - Width 4270mm open.
- Widening by 4 hydraulic rams.
- Hydraulic suspension with NEW low maintenance quick change rams.
- MTE 17.5" ten stud 225PCD Axles, 12-1/4" x 5-1/2" brakes with outboard drums.
- Axle spacing 1830mm - 1830mm.
- Axle Retraction to all axles to facilitate maintenance.
- 215 x 17.5" 16ply tyres on steel wheels.
- Two Spare tyre carriers only vertical mount type.
- Hydraulically adjustable gooseneck.
- 3-1/2" king pin two positions on an oscillating skid plate.
- Hydraulic power source - truck.
- Hella LED lights to ADR 4198 with 1 Rotating light in ramp.
- Capacity GVW - 80,000kg.
- Tare weight from 14,500kg (approx.)
- Two chain bins on spine of trailer.
- Heavy duty Hydraulic landing legs.

Continuation sheet 2

- Fully Enclosed deck over suspension
- Signs supplied “Do not overtake” and “OVERSIZE”.
- Steering axle
- Swivel Frame for unwinding of cable drum
- 50HP Power Pack
- Remote control Proportional .
- Sandblasted, Etch primed and painted in Two-pack to your fleet colours.

Base price:

$658,650 .00 AUD
(Six hundred and fifty-eight thousand six hundred and fifty dollars) CNF AUD - plus GST
(Cost Including Freight landed) Melbourne, Sydney, Brisbane, Perth.

Extras:

Description	Qty.	Price Each (Excl. GST)	Total (Excl. GST)
Extra spare tyre and steel wheel.		$480	
Extra spare tyre and Alloy wheel.		$520	
Aluminium Wheels. (Polished and/or Machined Finish). (12.8kg wheel saves 280kg over trailer set).		$250	
MTE 50mm Drop in King pin		$240	
Gauges for load indication		$650	
3R8 Centralised greasing - brakes and suspension		$10,700	
3R8 Centralised greasing with Timer - brakes and suspension		$12,400	
3R8 Manual Greasing system 8 points per suspension out to a manual block.		$6,200	
Hubodometer.		$120	
Two Tone paint.		$1,550	

Total Price of Extras Taken: $

Terms:
(Quote is valid for 30 days from date of Quote)

10% deposit with confirmed order. Balance prior to the delivery date

Note: Ownership does not pass on until the goods are paid in full. Our company reserves the right to dispose of the said goods if the balance is not paid within 14 days of notified delivery date or completion. Please also note MTE late payment terms.

Delivery:
Delivery by water to Ireland after confirmed order and acceptance of our trading terms. A date will be finalised on order and shipping costs to be added.

Registration:
Registration and stamp duty is not included

Warranty:
As per our "On Highway Warranty Agreement"

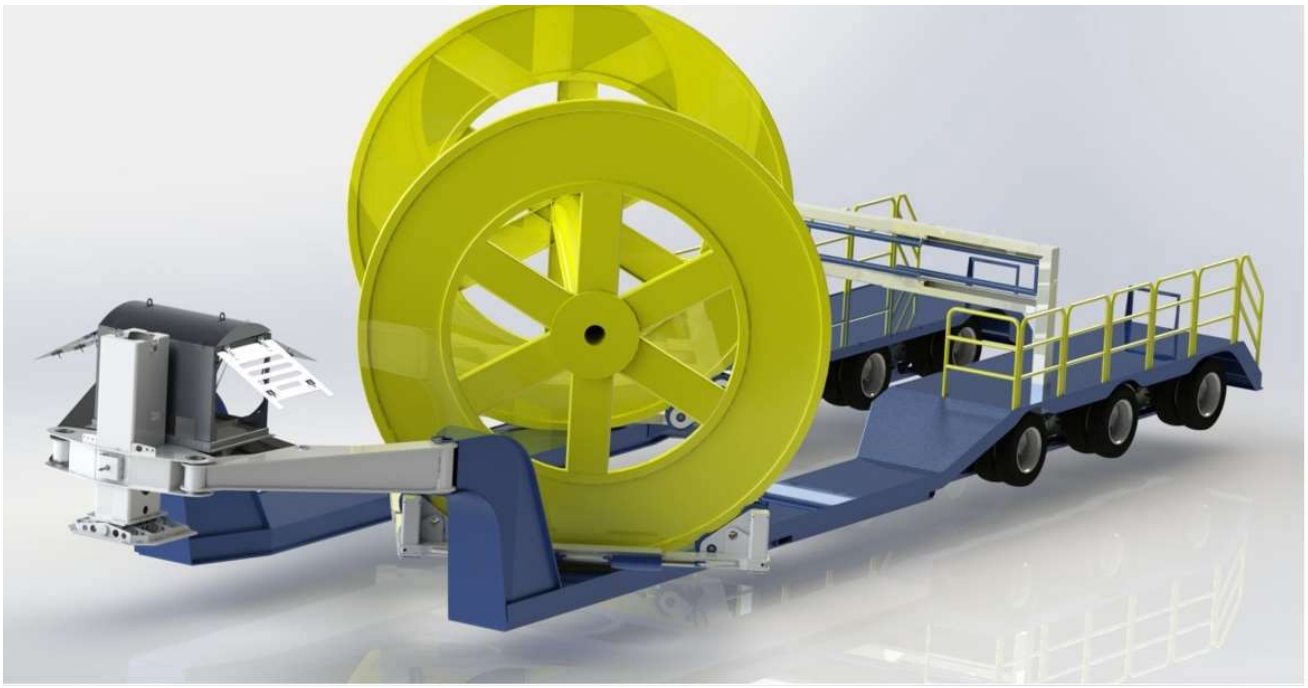
Kind Regards

Allen Caldwell \ National Manager
Modern Transport Engineers Australia Pty Ltd
15 Millennium Place Tingalpa QLD 4173

Modern Transport Engineers Australia Pty Ltd

Ph: 07 3393 5100
F: 07 3393 5122
M: 0424 301 921

al@modtrans.com.au | www.modtrans.com.au | www.mtwtruckandtrailerparts.com.au



A

Cable Unwinder

Technique for cable laying and overhead line construction

- Energy cable laying up to 680 kV
- Fibre optic, mini and micro cables
- Cable winding and length measuring
- Overhead line construction up to 110 kV
- Seminars and product instructions

Cable winding units stationary

Cable winding and unwinding stands, stationary or for mounting on lorries etc. For drums from 20-55 t. See accessories like drum drives, drum brakes etc. Techn. details see table below. Please ask for our more extensive offers.

- Possible configurations:
- Drum flange brakes, one or both sides, breaking force 12,5 resp. 25,0 kN at cable.
- With an additional pre- and emergency brake braking forces to 50,0 kN are possible.
- Drive of the brakes per manual hydraulic pump or by electro-hydraulic drive
- Drum drives one-side or double sides, pulling force 16,0 kN resp. 32,0 kN
- Adjustable on the site to any drum width.

Code	Type	Cap.	Drum-D	Int. width	kg
331736	KTU 20 ST	20 t	2000-3700	any adjustable	1.870,00
331738	KTU 20 ST	20 t	2800-4300	any adjustable	1.880,00
331740	KTU 25 ST	25 t	3600-5100	any adjustable	1.945,00
331750	KTU 55 ST	55 t	3600-5100	any adjustable	1.980,00
331752	KTU 55 ST	55 t	4300-6000	any adjustable	1.980,00

Vetter GmbH Kabelverlegetechnik • Industriestraße 28 • D-79807 Lottstetten
Tel.: +49 7745/9293-0 • Fax +49 7745/9293-499 • info@vetter-kabel.de • www.vetter-kabel.de

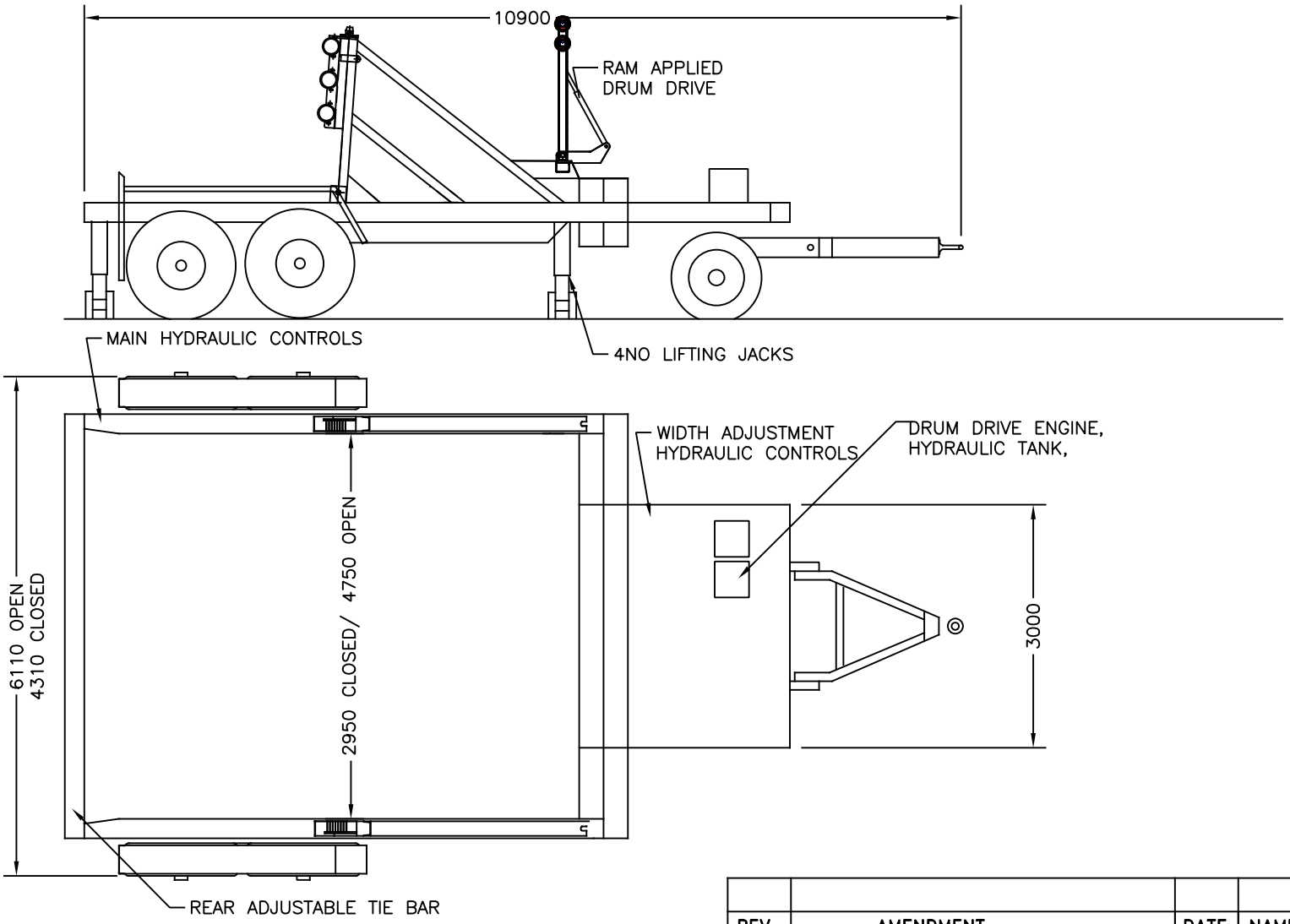
SEB Cable Drum Trailer

ALL DIMENSIONS IN mm U.O.S. | DO NOT SCALE DRAWING

NOTE:– TRAILER IS NOT ROAD LEGAL IN E.E.C COUNTRY'S !

SPECIFICATION

UNLADEN WEIGHT	:–	12750 KGS
GROSS WEIGHT	:–	52750 KGS
AXLE LOAD	:–	18000 KGS
BOGIE LOAD	:–	16750 KGS
PAYLOAD	:–	40000 KGS
O/ALL WIDTH	:–	4310 mm CLOSED
	:–	6110 mm OPEN
MAX DRUM DIA	:–	5000 mm
MIN DRUM DIA	:–	3300 mm
MAX DRUM WIDTH	:–	4600 mm
MIN DRUM WIDTH	:–	2800 mm
PINTLE DIA	:–	152 mm 40T MAX LOAD
REAR TYRES	:–	14.00x24
FRONT TYRES	:–	295x60 R22.5
TOW EYE	:–	76 mm NATO
BRAKES	:–	2 LINE AIR
LIGHTS	:–	SITE ONLY
SPEED	:–	10 km/hr
CONSTRUCTION	:–	ALL STEEL
DRUM LIFT	:–	DIESEL ENGINE POWERED HYDRAULIC C/W FLOW BALANCE VALVE LOCKED MECHANICALLY IN RAISED POSITION & STANDBY HAND PUMP
PAINT	:–	FULL GLOSS



REV	AMENDMENT	DATE	NAME

S.E.B. INTERNATIONAL LTD.
UNITY ROAD,LOWMOOR ROAD INDUSTRIAL ESTATE,
KIRKBY IN ASHFIELD,NOTTS.

TITLE G.A.CD900 AWT C/W DRUM DRIVE SYSTEM ADJUSTABLE WIDTH

NAME	A. SMITH	MAT'L	N/A	DRG No.
DATE	10/03/21	SCALE	N.T.S.	CD900AWT 4600mm

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