Rampion Offshore Wind Farm

ES Section 29 – Transport

RSK Environmental Ltd **Document 6.1.29**

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E.ON Climate & Renewables UK Rampion Offshore Wind Limited

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29 TRANSPORT

29.1 Introduction

29.1.1 This section of the Environmental Statement (ES) provides an understanding of the baseline transport environment local to the proposed onshore cable route and onshore substation site for the Rampion Offshore Wind Farm (the Project). It includes traffic, access and routing, delivery of abnormal loads and considers the possible direct or indirect effects that construction and operation of the proposed development could have on this environment. The section also details methods by which these potential impacts can be mitigated.

29.2 Legislation and Policy Context

29.2.1 Transport is an important focus within a number of key national and local policies, which help to deliver sustainable development, protect road users and ensure mitigation is provided where necessary.

29.2.2 National Policy Statements (NPS) provide the primary basis on which the Secretary of State is required to make its decisions. *The Overarching National Policy Statement for Energy (EN-1)* contains generic requirements for assessment of impacts arising from traffic associated with the design, construction and operation of renewable energy infrastructure.

29.2.3 Paragraph 5.13.3 states: '*If a project is likely to have significant transport implications, the applicant's ES should include a transport assessment, using the NATA/WebTAG methodology stipulated in Department for Transport guidance, or any successor to such methodology*'.

29.2.4 Paragraph 5.13.4 states '*Where appropriate, the applicant should prepare a travel plan including demand management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by public transport, walking and cycling, to reduce the need for parking associated with the proposal and to mitigate transport impacts'*.

29.2.5 *The National Planning Policy Framework* (NPPF)(March 2012) provides national guidance on transport matters to guide the development of the Local Plan and Local Transport Plan.

29.2.6 The *Guidelines for the Environmental Assessment of Road Traffic* produced by the Institute of Environmental Assessment (IEA) in 1993 is adopted for the assessment of the environmental effect of road traffic associated with major new developments.

29.2.7 The following rules, taken from the IEA guidelines, have been used as a screening process to define the scale and extent of this assessment:

- Rule 1 – Include road links where traffic flows would increase by more than 30% (or the number of Heavy Goods Vehicles (HGVs) would increase by more than 30%); and

- Rule 2 – Include any other specifically sensitive areas where traffic flows would increase by 10% or more.

29.2.8 Further guidance is provided by the Department for Transport's publication *Guidance on Transport Assessment* (March 2007), which sets out the criteria for assessment of transport impacts of developments.

29.2.9 Locally, the 'West Sussex Transport Plan 2011—2026' identifies the principal transport policies for the area through which the onshore cable route will run. The document focuses on four key areas: promoting economic growth; tackling climate change; providing access to services, employment and housing; and improving safety, security and health.

29.2.10 As part of promoting economic growth, there is a requirement to maintain or improve the reliability of journey times on key routes. In the context of the proposed development, this will be done by "ensuring that new development has nil detriment on the level of service on the SRN [Strategic Road Network]". This will be achieved by minimising delays to traffic during construction while during operation the development will generate virtually no traffic.

29.2.11 The West Sussex Transport Plan includes commitments that contribute towards the Council's climate change strategy. West Sussex County Council aims to "maximise reuse and recycling of materials in construction". In the context of the cable route, as far as possible, material removed from the ground during trench construction will be replaced following laying of ducting and the ground re-grading. This will minimise the need to import or export fill material in the construction process. However, where horizontal directional drilling (HDD) methods of construction are used, or where contaminated material is identified, there will be a need to remove material off-site. No assessment has been made of contaminated material to establish whether any removal off site would be required and therefore no such allowance has been made in the assessment of traffic movements.

29.2.12 As part of the West Sussex Transport Plan, freight management will be one of the travel modes that contribute towards the main objectives. One of the key aspects in the Council's approach is "minimising construction traffic – identifying and assessing lorry routes for construction traffic". As part of the development proposals, potential construction access routes have been identified (see Section 29.5) and HGVs associated with the construction process are likely to be restricted to those routes, subject to agreement between the contractor and relevant highway authorities.

29.2.13 This will include addressing one of the identified issues in Adur to "minimise the impact of HGVs on the local community" by "encouraging HGVs to use the advisory lorry route network". Similarly in Horsham "in order to avoid congestion and maintain journey times HGVs are diverting onto unsuitable residential and rural roads, causing concerns over safety". Again, suitable construction access routes have been identified (see Section 29.5) which will "[encourage] HGVs to use the advisory lorry route network" wherever possible.

29.3 Assessment Methodology

Establishment of Baseline Environment

29.3.1 A desk-based assessment of the onshore components of the proposed development included a review of the strategic and local highway network, together with historic traffic data for these networks.

29.3.2 A preliminary assessment, including a site visit and highways network video recording, was undertaken in November 2010 to assess the suitability of the surrounding road network to accommodate construction traffic and abnormal loads associated with the proposed development.

Scoping and Consultation

29.3.3 As part of the scoping phase of the Environmental Impact Assessment (EIA), a Scoping Report (E.ON/RSK, 2010) was prepared to set out the proposed approach to the EIA in respect of the proposed development, including the identification of assessment methodologies for each of the EIA topic areas to be assessed. The Scoping Report was submitted to the Infrastructure Planning Commission (IPC) in September 2010. A Scoping Opinion (IPC, October 2010) was received from the IPC in October 2010 incorporating comments from a wide range of consultees. A copy of the Scoping Report and Scoping Opinion including consultee comments are included in Appendix 5.1 and 5.2.

29.3.4 The information and advice received during the scoping process with regard to onshore transport issues is summarised in Table 29.1.

Table 29.1: Relevant Scoping Responses

Date	Consultee	Summary Scoping Response	Sections Where Addressed
27/09/2010	Sompting Parish Council	The impact on using the A27 and/or A259 for construction and operational use should be considered.	Paragraphs 29.4.10 to 29.4.13, 29.5.59 to 29.5.62 and Table 29.9
12/10/2010	West Sussex County Council	Consideration to be given to the location of construction compounds and stores of materials and routes to these areas, particularly HGV access. Consents will be required for works in	Paragraphs 29.5.4 to 29.5.10

Date	Consultee	Summary Scoping Response	Sections Where Addressed
		public highways. Information relating to traffic generation, vehicle routing and other temporary/accommodation works within the limits of the public highway to be provided. Neighbouring Highways Authorities and the Highways Agency should also be consulted.	Paragraphs 29.5.22 to 29.5.53
12/10/2010	Brighton & Hove City Council	Traffic section should include more detail (i.e. quantify) the traffic generated during operation. As per government guidance the traffic assessment should take into account indicative thresholds with reference to freight, HGV movements, inadequate local transport infrastructure and proximity to an AQMA and further data on transport impacts should be provided.	Paragraphs 29.5.59 to 29.5.62, 29.5.4 to 29.5.19 and Table 29.9
October 2010	Infrastructure Planning Commission (IPC)	The assessment of the vehicles associated with the construction of the offshore development including both delivery vehicles and personnel vehicles, abnormal loads, if applicable, and traffic associated with maintenance will need to be considered in the ES. Assumptions made to derive the traffic forecasts will need to be clearly explained.	Paragraphs 29.5.4 to 29.5.53 and Table 29.9

29.3.5 The proposals have been discussed with the relevant highway authorities, these being the Highways Agency, which is responsible for the A27 trunk road, and West Sussex County Council, which is responsible for all other roads in the vicinity of the onshore works.

29.3.6 A meeting was held on 9 November 2010 with various representatives from both authorities, during which the proposals were presented followed by a question and answer session. Several queries that were unanswerable at the meeting were formally responded to on 11 January 2011.

29.3.7 Both authorities noted the significance of the proposed onshore works and the potential disruption to the highway network, subject to construction methods. The key aspects requested to be considered within the assessment of traffic impact were the siting of compounds, materials storage, construction routes and frequency of movements. Further consultation will be necessary with their abnormal loads teams who will advise in relation to detailed routing of vehicles transporting large loads to the construction sites.

29.3.8 The scope of the assessment was modified accordingly to take account of the above consultee responses and the opinions of the IPC, the findings of which were reported in a Draft ES.

29.3.9 As detailed in Section 5 – EIA Methodology, an extensive programme of engagement has been undertaken with regard to the Project; details of which are provided in the Consultation Report (which accompanies the Development Consent Order (DCO) application). This included publication of the Draft ES as part of the Section 42 and Section 48 consultation.

29.3.10 Following a review of consultee feedback on the Draft ES, the following modifications were made to the Project and overall assessment scope:

- Details of access to the proposed substation for construction purposes have been reviewed; and
- Details of access and methodology at Tottington Mount have been reviewed.

29.3.11 Full details of the consultation process and associated outcomes are documented in Document 5.1 [Consultation Report].

Identification and Assessment of Impacts and Mitigation Measures

29.3.12 Assessment of the transport network is based on the information from the preliminary and desk-based assessments.

29.3.13 A judgement has been made on the importance and/or sensitivity of the receptor(s) involved, as indicated in Table 29.2.

Table 29.2: Importance/Sensitivity of the transport network

Receptor Sensitivity	Definitions
High	Receptors such as schools and hospitals Roads with significant restrictions on the numbers/types of vehicles predicted to run during construction/operation (e.g. significant width/height/weight restrictions) Roads with a high level of existing congestion/traffic Roads used by pedestrians and horses Roads or accesses with poor visibility Operational railway lines Closure of an 'A' road
Medium	Roads not designed for the traffic predicted to run during construction or operation, where some difficulties are predicted Closure of local road
Low	Roads with minor or no restrictions in relation to predicted traffic levels

29.3.14 A large magnitude change would be one that is likely to cause a direct adverse permanent or long-term impact on the integrity/value of the receptor, whereas a small change would be one that is likely to have a minor adverse impact on a receptor, but from which recovery is expected in the short term.

29.3.15 Table 29.3 gives examples of levels of magnitudes of change on traffic and transportation.

Table 29.3: Magnitudes of Impact on Traffic and Transportation

Magnitude	Definitions
Large	A permanent increase in traffic flows that leads to severe congestion or severe inconvenience to other road users
Medium	A temporary increase in traffic flows that leads to severe congestion or to severe impacts on other road users A permanent increase in traffic flow leading to some congestion or other impacts
Small	A permanent or temporary increase in traffic flows with minor impacts to roads
Negligible	No (or very minimal) detectable effects
Beneficial	A reduction in traffic flows with beneficial impacts.

Significance of Residual Effects

29.3.16 An assessment has been made of the significance of residual effects, i.e. those impacts that are predicted to remain after the mitigation measures outlined in this ES have been implemented.

29.3.17 The categories used when classifying overall significance are indicated in Table 29.4.

Table 29.4: Significance of Effects on the Transport Network

		Sensitivity		
		High	**Medium**	**Low**
Magnitude of Change	**Major**	Highly Significant	Moderately Significant	Slightly Significant
	Moderate	Moderately Significant	Slightly Significant	Not Significant
	Minor	Slightly Significant	Not Significant	Not Significant
	Negligible	Not Significant	Not Significant	Not Significant

29.4 Baseline Conditions

Site Description

29.4.1 The onshore elements of the proposed development will include the construction of a cable route from the offshore cable landfall to a new substation in the vicinity of the existing National Grid Bolney substation. The cable will be buried along its entire length and will encompass a permanent easement width of 15m. For construction purposes, a nominal working width of 30m will be required for the majority of the cable route, with some larger working areas required in some key locations, while constraints may restrict the working width in other areas. Temporary site compounds will be required to store materials and heavy plant during construction.

29.4.2 The onshore cable route will cover a distance of approximately 26.4km measured from Mean High Water Springs (MHWS).The route will pass under the A259 Brighton Road and head northwards between East Worthing and Lancing, crossing the A27 and running eastwards to cross under the River Adur before leading in a generally northeasterly direction then northwards, east of the A2037 and A281, to the new substation, located in the vicinity of the existing Bolney substation.

29.4.3 The cable route crosses open land with numerous crossings of roads, including the A259, A27 trunk road, A283, A281, as well as various watercourses including the River Adur and a railway line. The topography of the route is significantly affected by the South Downs, while the remainder of the route is generally flat.

29.4.4 The study area for transport covers all road crossings of the route and the connecting links to the major road network for construction traffic and abnormal load routing purposes.

Local Highway Network

29.4.5 The extent of the onshore cable route, and the resultant construction works, results in a significant study area. This study focuses on the overall network to be used by construction traffic for all onshore activity, which includes a number of different routes owing to the number of potential access points along the construction site.

29.4.6 The road network surrounding the site is dominated by the A27 and A23 trunk roads, which are the responsibility of the Highways Agency. The A27 follows the south coast, primarily in dual carriageway form, connecting Chichester and Eastbourne, and locally serves Worthing and Brighton. The A23, again primarily in dual carriageway form, connects the A27 with the M25 and locally provides easy access to Crawley and Burgess Hill.

29.4.7 The A27 crosses the southern end of the site, offering connections into East Worthing, Sompting, Lancing and Shoreham-by-Sea. These connecting roads are characterised by single carriageways passing through urban areas with traffic signal controlled junctions, roundabouts or priority junctions. They are generally subject to a 30mph speed limit.

29.4.8 North of the A27, the A283 connects Shoreham-by-Sea to Upper Beeding and Steyning, from which the A2037 leads northwards to Henfield. At Henfield the A281 leads north to Cowfold and the A272, and leads east to the A23. These roads are characterised as single-carriageway rural strategic routes, passing through small towns and villages, providing connectivity to the trunk road network. They are generally subject to a 60mph speed limit, except where they pass through settlements where the limit typically reduces to 40mph.

29.4.9 Numerous minor roads and a few B classified roads provide local connectivity to the A road network. These roads are characterised as single-carriageway rural roads and lanes, passing through villages and hamlets, often winding and sometimes narrow. These roads are typically subject to a speed limit of 40mph.

Traffic Data

29.4.10 In light of the local road network, the likely routes that construction traffic will use, and the expected locations of major construction access, traffic data has been acquired for a variety of road links. The Highways Agency maintains continuous traffic counters across their network, providing an important source that can identify data trends on a daily, weekly, monthly and yearly basis. Similarly, West Sussex County Council holds traffic count data for a variety of locations within the study area.

29.4.11 The Highways Agency data for the A27 offers three useful locations in the context of the study area, indicating that two-way flows range from around 40,000 vehicles per day near the junction with the A24 to the west and up to 70,000 vehicles per day east of the A283.

29.4.12 The A283, just north of the A27, carries up to 22,000 vehicles per day, while the A2037 and A281 carry around 8,000 vehicles per day. The A272, which crosses the northern end of the study area, carries around 16,000 vehicles per day. Flows on the minor roads within the study area typically carry significantly less traffic per day.

29.4.13 Details of the traffic flows are provided at Appendix 29.1, while a profile of the level of traffic experienced throughout a weekday along the A27 is provided at Appendix 29.2 as an indication of the profile for the study area.

Sensitive Receptors

29.4.14 In order to establish the sensitive receptors along the routes to the construction site, a desktop study was undertaken, examining Ordnance Survey maps. This study identified a total of 10 schools close to the cable route construction path (see Section 28 – Onshore Socio-economics). The study also identified the operational railway line and the A27 trunk road, which is a heavily trafficked road, as sensitive receptors. Each of these receptor types is identified as being of 'high sensitivity' in Table 29.2.

29.5 Assessment of Impacts

Rochdale Envelope Principles

29.5.1 In line with the use of the "Rochdale Envelope" (see Section 5 – EIA Methodology), the assessment in this section has been based on a development scenario, which is considered to be the worst case in terms of impacts on the transport environment. Rochdale Envelope principles relating to impacts on the traffic environment relate primarily to volumes of development traffic and abnormal loads. Vehicle movements are listed in Table 29.5 to 29.8 below.

Impacts during Construction

29.5.2 The following transport related sources are typically associated with construction works and are considered relevant to this site as potentially resulting in significant impacts:

- Access to the construction site in terms of capacity and highway safety;
- Road crossings of the cable route, specifically where trench construction is required;
- Vehicles associated with construction of the development, including workers, trade vehicles, heavy goods vehicles and plant delivery; and
- Abnormal loads, including the impact on highway geometry and interruption to traffic flows on the network.

29.5.3 Details of the above sources relevant to this assessment are set out below.

<u>Cable Route Site Compounds</u>

29.5.4 A description of site compounds is given in Section 2b – Project Description (Onshore), which sets out that there will be a main compound and several satellite compounds.

29.5.5 In summary, the main compound would be used throughout the construction period, providing a central management point for the whole cable route construction. Satellite compounds would be used for section specific activities and would only be established for as long as that section was under construction. The exact locations of the compounds have not yet been identified as the principal contractor will have an input into the decision process. The final locations will be chosen to allow easy access to and from the cable route whilst also minimising impact on local residents, businesses and the environment, wherever possible.

29.5.6 The construction of the onshore cable route will cross two dual carriageways, a river and a railway line. These major crossings will each require directional drilling in order to minimise disruption to traffic and trains and avoid potentially difficult hydrological conditions. HDD will be used at the following locations:

- A259 Brighton Road – as part of the landfall works;
- Worthing to Brighton railway line;
- A27 Sompting Bypass; and
- River Adur.

29.5.7 Each of these construction sites will be accessed from either side as these identified crossings create a physical gap in the accessible route.

29.5.8 The eight cable route sections are outlined below and are illustrated at Appendix 29.3:

- Route section 1: Landfall to south of the railway;
- Route section 2: North of the railway to Sompting bypass;
- Route section 3: Sompting bypass to crossing 03-06. Crossing 03-06 is the top of a steep gradient at Steep Down that would be unsuitable for heavy plant to travel down/up and hence must be accessed from either side;
- Route section 4: Crossing 03-07 (the base of the steep gradient described above) to the River Adur;
- Route section 5: River Adur to crossing 10-12. Crossing 10-12 is the top of a steep gradient situated to the north of Tottington Mount that would be unsuitable for heavy plant to travel down/up and hence must be accessed from either side;
- Route section 6: Crossing 10-13 (the base of the steep gradient described above) to the A281;
- Route section 7: The A281 to the B2116; and

- Route section 8: The B2116 to the proposed onshore substation.

29.5.9 For the purposes of this assessment, each section has been assumed to be dependent on either the main compound or require a satellite compound as a worst case assumption. In practice, the contractor may choose to serve more than one section from a single compound should it be more efficient to do so. It has been assumed that satellite compounds will be shared with HDD compounds where possible.

29.5.10 The assessment has been based on a main compound being located just to the north of Tottington Mount, on Edburton Road, as a possible location, though the contractor will select their preferred location. As a worst case assumption, satellite compounds have been assessed as being located on minor roads in preference to major roads.

Cable Route Site Access

29.5.11 The route sections outlined above will each require access from the highway network for the delivery of plant and materials to points along the route and to site compounds, including the establishment of compounds. The route to each section and potential access points have been reviewed to identify the affected roads and to minimise the potential impact by using major roads wherever possible.

29.5.12 The precise locations and alignment of all side accesses (to provide access from the adopted highway to the working width) along the cable route have yet to be confirmed, with the exception of two side accesses that have been identified and agreed with Worthing Borough Council south of the railway line.

29.5.13 For the purposes of this assessment, it has been assumed that the working width will be accessed directly from adjacent roads and/or existing farm tracks, and that no widening or vegetation (tree/hedgerow) removal would be required as a result of the side accesses.

29.5.14 Should any further side accesses be identified once the construction contractor has been engaged that are not located on existing farm tracks, or require widening of existing farm tracks, the location of these accesses would be subject to agreement with relevant local authorities.

29.5.15 The worst case assumptions made in the assessment of construction traffic include the assignment of vehicles to specific routes in order to reach a potential site compound for each section. These routes are summarised below, while a plan illustrating the potentially affected roads is provided at Appendix 29.4

- Landfall / route section 1 – from A27, along A2025 Grinstead Lane, onto A259 Brighton Road, and/or onto Western Road;

- Route section 2 – from A27, onto B2222 Upper Brighton Road;

- Route section 3 – from A27, onto Lambleys Lane;
- Route section 4 – from A27, onto Coombes Road;
- Route section 5 – from A27, onto A283 Steyning Road;
- Route section 5 (Tottington Mount) – from A27, onto A283 Steyning Road, onto Upper Shoreham Road, onto Erringham Road, onto Mill Hill;
- Route section 6 – from A27, onto A283 Steyning Road, onto A2037 Henfield Road, onto Edburton Road;
- Route section 7 – from A23, onto B2118, onto B2116 Henfield Road; and
- Route section 8 – from A23, onto A272 Cowfold Road, onto Wineham Lane.

Onshore Substation Site Access and Site Compound

29.5.16 The proposed onshore substation is located east of the existing National Grid Bolney substation.

29.5.17 Construction of the proposed substation will require the establishment of a site compound for the duration of the works, which will include messing facilities, offices and areas for storage of materials and equipment. This site compound could be used as a satellite compound for route section 8.

29.5.18 The route from the A23 to the site area will be via the A272 and Wineham Line. A temporary construction access will be created from a new bellmouth with Wineham Lane into private land situated directly north of the National Grid boundary. The access will traverse east toward the Rampion substation and will be in place for the duration of the construction works (approximately 2 year period).

29.5.19 Creating the construction access would form part of the substation enabling works and will take approximately 4-6 weeks. During this time access would need to be via the existing farm track from Bob lane, which will eventually become the permanent operational access. Thus, Bob Lane will initially be used for the delivery of plant, cabins and materials to enable the works on the construction access. The construction works would be phased in this way to ensure that traffic movements along Bob lane would be minimised as far as possible until the new temporary construction access is in use.

Construction Methods

29.5.20 The working width crosses a number of roads between landfall and the substation. Construction of the cable route will necessitate the use of trench excavation for the majority of these roads while a small number of crossings will be undertaken using HDD methods.

29.5.21 The HDD methods avoid disruption to existing traffic movements and will therefore have no impact on road crossings. Trench excavation will typically be carried out in two sections across each road to allow continued movement of traffic. Safe working widths will be required when excavating in the highway and, where insufficient width is currently available, carriageway widening and/or temporary traffic management measures may be required.

Construction Traffic Generation

29.5.22 Construction of the onshore cable route is likely to last approximately 28 months with the landfall works expected to last appoximately 8 weeks. Construction of the onshore substation will take place over approximately 24 months. This construction period will include the following phases:

- Site mobilisation and establishment of site compounds;
- Establishment of access tracks;
- Cable landfall and substation foundation construction;
- Cable route trench construction and HDD;
- Erection of substation; and
- Cabling and site commissioning.

29.5.23 The following anticipated types of traffic would require access to the working width:

- Low-loaders and HGVs to deliver equipment and plant;
- Flat-bed lorries, to deliver substation and transformer components;
- Cranes;
- Fuel tankers to supply diesel to construction plant;
- HGVs with regular deliveries of construction materials, i.e. aggregates, cables, cable ducting, slurry; and
- Private car, light van or minibus transporting construction workers.

Heavy Goods Vehicles Trip Generation - Onshore Cable Route

29.5.24 Heavy goods vehicles will be required to deliver plant, ducting, cables and materials along the whole length of the working width with additional equipment required at HDD locations.

29.5.25 Each section will require the use of tracked mechanical excavators to construct the haul roads, excavate the trenches and backfill once ducts have been laid. The plant will be delivered using low-loaders at the various access points to the working width. Deliveries associated with site establishment will take place before trench excavation commences and will include items such as fencing, hazard signs and site staff welfare facilities.

29.5.26 Aggregate will need to be imported to each section to create a haul road capable of accommodating plant and delivery of materials along the working width. It has been estimated that 15,444m^3 will be required, which will be delivered using 20 tonne trucks with a capacity of 18m^3, equivalent to 858 deliveries.

29.5.27 Stabilised bedding will need to be imported to each of the trench operations. It has been estimated that 10,602m^3 will be required, which will be delivered using 20-tonne trucks with a capacity of 18m^3, equivalent to 589 deliveries.

29.5.28 Ducting for the trench construction arrives in pallets with a total load equivalent to 2.81km in length. The construction will require approximately 360km of ducting, therefore resulting in around 130 deliveries by articulated vehicles along the length of the working width.

29.5.29 Before backfilling with topsoil, the ducting will be covered by protective cover tiles that help protect the cable route. Around 232km of protective covers tiles will be required, which will be delivered in batches of 3,000, resulting in 77 deliveries spread along the length of the working width.

29.5.30 The cables that will be pulled through the ducts once installed arrive in lengths of between 600m and 1,000m, weighing up to 27 tonnes each. The construction will require around 361 deliveries spread along the length of the working width.

29.5.31 As set out in Section 2 – Project Description, each cable section is joined within a jointing bay that will buried underground. These jointing bays will be located at regular intervals along the working width. Each jointing bay will require three jointing kits, requiring a total of 420 kits. These will be delivered in batches of 20, resulting in around 21 deliveries spread along the length of the working width.

29.5.32 HDD construction will require the establishment of a site compound at either end of the route to be drilled. The entry point, known as the HDD rig site, will have a temporary footprint of approximately 2,500m^2 and will accommodate a number of modules for messing facilities, power supplies and mud plant, offices and storage for materials and equipment, including the drilling rig.

29.5.33 The actual drilling operation requires a number of materials and equipment. The drilling rig is a 32-tonne unit that will be delivered on a low loader, while also needing a crane with a capacity of 250 tonnes. The drill pipes required for a typical 500m length will weigh around 60 tonnes in total, requiring up to three deliveries on articulated vehicles. Each HDD site also requires around 200m^3 of slurry, comprising bentonite mud and water, which is equivalent to ten 20-tonne trucks. Ducting arrives in six reels of 100m lengths on each load, requiring up to four deliveries for each HDD site.

29.5.34 Once construction plant arrives on each site it will remain there until the specific task within that section is complete. There will be a requirement for fuel deliveries and maintenance to be carried out, which will be accommodated along the haul roads.

29.5.35 It is likely that once a specific task is complete within a section, plant may be relocated to another section, thereby reducing the volume of equipment required at any one time. The four large HDD activities will be undertaken at the front end of the construction programme as these are at challenging crossings. Trenching activities will follow and it is likely that more than one trenching team will work on the route at one time.

29.5.36 Table 29.5 outlines the estimated HGV trip generation according to each section of the route based upon its length and any requirements for HDD operations. It is estimated that approximately 2,124 HGV deliveries (excluding abnormal loads) would occur during the construction of the onshore cable route. The HGV figure predominantly consists of deliveries for cable, ducting and aggregates. For the purposes of the assessment, it is assumed that all deliveries will originate from the A27, east of Shoreham, as this provides the most likely origin for materials and plant. These flows are illustrated at Appendix 29.5.

Table 29.5: Cable Construction Programme and Associated Vehicle Movements

Section	Section length (km)	Trenching Operations				HDD Operations			XLPE cable	Misc. (Fuel, etc)	Total Deliveries per Section
		Haul Road Aggregate	uPVC ducting	Stabilised Bedding	Cover Tiles	Drill pipes	Slurry	HDPE ducting			
HDD – Landfall	0.5	12	0	6	1	3	10	4	7	1	44
Trenching – section 1	1.2	36	6	26	3	0	0	0	15	2	88
HDD – railway	0.5	12	0	0	0	3	10	4	7	1	37
Trenching – section 2	1.8	54	9	39	5	0	0	0	22	2	131
HDD – A27	0.5	12	0	0	0	3	10	4	7	1	37
Trenching – section 3	1.2	36	6	26	3	0	0	0	15	2	88
Trenching – section 4	5.9	175	28	126	17	0	0	0	72	8	426
HDD– River Adur/A283	0.5	12	0	0	0	3	10	4	7	1	37
Trenching – section 5	4.5	134	21	96	13	0	0	0	55	6	325
Trenching – section 6	5	149	24	107	14	0	0	0	61	7	362
Trenching – section 7	3.9	116	18	84	11	0	0	0	48	5	282
Trenching – section 8	3.7	110	18	79	10	0	0	0	45	5	267
Total Deliveries		858	130	589	77	12	40	16	361	41	2,124

Heavy Goods Vehicles (HGV) Trip Generation - Onshore Substation

29.5.37 Construction of the substation will require deliveries of plant, materials and equipment. It is expected that a tracked mechanical excavator and a grader, arriving on low loaders, and backhoe loaders will be required during construction, together with dump trucks and tractors and trailers. A large capacity crane will be required for installation of equipment, particularly the super grid transformers. Delivery of materials will predominantly comprise of aggregate, concrete, steel and general building materials.

29.5.38 Delivery of substation equipment will be accommodated on low-loaders with four being classed as abnormal loads. These abnormal loads are detailed later in this section.

29.5.39 Table 29.6 outlines the estimated HGV trip generation in line with the construction programme. It is estimated that approximately 6,426 HGV deliveries (excluding abnormal loads) would occur during the construction of the substation.

29.5.40 Table 29.6 identifies that the most intense period of construction would be during excavation and foundation construction phases. During this period, 30 deliveries by HGVs would typically occur during each day. Over the entire construction period it is expected that, even taking into account any daily fluctuations, the maximum number of HGV deliveries into the onshore substation site in any one day will not exceed 40 vehicles. These movements would be directed along the A272 and then to proceed along Wineham Lane to the construction site. These flows are included within the figures illustrated at Appendix 29.5.

Table 29.6: Estimated HGV Deliveries during Onshore Substation Construction

Phase	Approximate HGV Deliveries	Typical Daily Deliveries	Daily HGV movements (two-way)
Enabling works (via Bob Lane)	160	16	32
Site establishment	865	23	46
Site preparation	210	7	14
Excavation and foundations	1,051	30	60
Site building works	440	10	20
Other civils	563	11	22
Site surfacing	700	5	10
Electrical plant installation	482	17	34
Miscellaneous	1,955	10	20
TOTAL	6,426	-	

Construction Worker Trip Generation - Onshore Cable Route

29.5.41 The workforce numbers required for the onshore cable route construction can vary depending on the agreed construction programme and the chosen contractor. Therefore, at this stage, it is not possible to fully determine the number of workers likely to be on site during the construction period.

29.5.42 However, for each trenching section under construction it is expected that around 15 personnel would be required for trench operations and haul road construction, 5 personnel for jointing and 3 site management personnel. Multiple trenching operations occurring at any one time will require a similar number of personnel working at each site. Specialists may also be required on site, such as archaeologists or ecologists.

29.5.43 For certain activities, in particular cable delivery and cable pulling, additional workers will be required with around 20 extra personnel expected for 2 to 3 days at a time and will be required on site once every 3 weeks.

29.5.44 Specialist engineering activities, such as the HDD operations and final testing, will require up to an additional 10 workers occasionally. Final testing will take place at the Bolney end of the cable route. Table 29.7 presents the estimated workforce during the construction of the onshore cable route for each of the identified sections and HDD locations.

Table 29.7: Estimated Workforce during Onshore Cable Route Construction

Location	Max. Daily Personnel
Main site compound	10
–Per HDD operation	10
Per trenching operation	23

29.5.45 During the construction phase of the onshore cable route, a maximum of 23 workers are expected to be on any single works site of the route at any one time. As the worst case assessment given that little detail is currently available on the phasing of construction works along the cable route a total maximum of 226 personnel on site across the entire route has been assumed should multiple sections be constructed concurrently. Although it is thought more likely that the peak workforce on the cable route will be around 100 to 150 which would easily fall within this worst case.

29.5.46 Construction personnel for specialist projects such as this are often drawn from across the country and not necessarily from local labour sources. Therefore, a large proportion usually stays in local accommodation. Experience shows that workers will also often car-share owing to limited areas of parking at construction sites, which in this case can be further supported by workers staying in accommodation close together. Based on an average car occupancy of 2 workers per vehicle, an average of 24 construction worker trips will be made to each section of the site (excluding HDD operations) each day (12 inbound, 12 outbound). These trips are likely to be made in cars, light vans and 4x4s. For the purposes of the assessment, all workers are assumed to be living in Worthing and travel to their relevant site compound each day. The resulting flows, based on an average car occupancy of 2, are illustrated at Appendix 29.6.

Construction Worker Trip Generation - Onshore Substation

29.5.47 During the construction phase of the onshore substation, the maximum number of workers expected to be on site during the peak construction period is 250. Table 29.8 presents the estimated workforce during the construction of the onshore substation over a two-year period.

Table 29.8: Estimated Daily Workforce during Onshore Substation Construction

Month	Year 1	Year 2
1	61	31
2	194	44
3	194	44
4	194	44
5	194	63
6	194	238
7	207	250
8	207	219
9	134	134
10	134	61
11	61	31
12	61	16

29.5.48 From Table 29.8 it can be deduced that a maximum of 250 workers would arrive or depart the onshore substation construction site on a single day during peak construction activity. The average numbers of workers entering the site per day would range between 15 and 60 depending on the stage of construction. These figures, based on an average car occupancy of 2, are illustrated at Appendix 29.6.

Abnormal Load Trip Generation - Onshore Cable Route

29.5.49 An abnormal load movement is defined as a vehicle in excess of 18.65m in length or 2.9m in width or 44 tonnes in weight.

29.5.50 The delivery of cables will require abnormal loads owing to the size of the cable drums and their weight, which can be up to 27 tonnes including the cable itself. Combined with the low loader the overall weight can be 52 tonnes.

29.5.51 The cable drums need to be delivered to each section of the route, together with a crane to offload onto hardstanding areas at jointing locations. The low loader that will deliver each drum will typically be up to 16.5m in length and will need to negotiate the access routes to each section. This may require some minor modifications to the highway geometry in rural areas, such as increasing corner radii at minor junctions.

29.5.52 Table 29.5 indicates that around 360 cable deliveries may be required across the whole cable route, with the section experiencing the highest volume being section 4 with 72 deliveries.

Abnormal Load Trip Generation - Onshore Substation

29.5.53 The substation equipment will include four supergrid transformers (SGT), which on delivery will be 6.5m high, 6m wide and 16m long. These abnormal loads will be delivered via the A272 and proceed along Wineham Lane to the construction site. The standard minimum turning radius for these loads is 30m and therefore modifications will be necessary to the highway geometry where this cannot be achieved at present.

Cumulative Impact of Construction Traffic

29.5.54 A number of significant developments have been identified in the area surrounding the onshore cable route which are deemed by the local planning authorities to be of sufficient significance to be included as part of a cumulative impact. These are detailed as follows:

- ADC/0287/09 (Permitted) 197 dwellings, Upper Shoreham Road;
- ADC/0191/08 (Permitted) B1/B2/B8 2,108m^2, Lancing Business Park;
- AWDM/0364/11 (Pending) Worthing College, Warren Road;
- AWDM/0205/12 (Pending) Football training ground, Mash Barn Lane, Lancing; and
- Proposed Modifications – Bolney substation.

29.5.55 Table 29.9 summarises the peak increases in traffic during construction together with the cumulative effect from the above developments and describes their sensitivity in terms of the increase in traffic volumes. The cumulative baseline flows are illustrated in Appendix 29.7, while the total construction traffic flows, including the percentage impact, are illustrated at Appendix 29.8.

Table 29.9: Peak Increases in Traffic

Location	AADT	Assumed AADT HGV %	Cumulative Development	Rampion Construction Traffic (% Impact)	Rampion HGV Traffic (% Impact)	Sensitivity
A259 – between B2223 and Western Road	35,424	7.5%	175	58 (0.2%)	24 (0.9%)	Low
Western Road	11,815	7.5%	n/a	72 (0.6%)	38 (4.3%)	Low
A27 – west of Sompting Road	41,393	15%	528	448 (1.1%)	0 (0.0%)	Low
A27 – between A2025 and A283	57,432	15%	190	512 (0.9%)	122 (1.4%)	Low
A27 – east of A283	69,109	15%	48	318 (0.5%)	318 (3.1%)	Low
A283 – between A27 and A2037	21,811	7.5%	n/a	418 (1.9%)	78 (4.8%)	Low
Edburton Road	1,760	7.5%	n/a	94 (5.3%)	60 (45.5%)	Low
A2037 – between A283 and A281	8,059	7.5%	n/a	298 (3.7%)	0 (0.0%)	Low
A281 – between A2037 and A23	8,246	7.5%	n/a	0 (0.0%)	0 (0.0%)	Low
B2116 – between Wineham Lane and A23	3,808	7.5%	n/a	70 (1.8%)	46 (16.1%)	Low
Wineham Lane – between A272 and B2116	1,014	7.5%	98	398 (35.8%)	124 (163%)	Medium

Location	AADT	Assumed AADT HGV %	Cumulative Development	Rampion Construction Traffic (% Impact)	Rampion HGV Traffic (% Impact)	Sensitivity
A272 – between Wineham Lane and A23	16,132	7.5%	98	124 (0.8%)	124 (10.2%)	Low

29.5.56 Based on the derived sensitivities of the links identified in Table 29.9, only Edburton Road and Wineham Lane are considered to accommodate sufficient levels of additional traffic and/or HGVs to justify further assessment of impacts.

Upgrades to the Adopted Highway

29.5.57 It is proposed that deliveries will use the local highway network to arrive at site compounds and material storage areas. These will be located adjacent to or close as possible to the public highway. Limited improvements may be necessary to accommodate deliveries, particularly where large articulated vehicles are used on rural lanes and for the use of abnormal load vehicles.

Potential Effects

29.5.58 The increases in construction traffic have the potential to result in the following environmental impacts:

- **Traffic noise and vibration:** The potential traffic noise impact on residential receptors in the vicinity of the site would be temporary in nature and very small scale given the distance from receptors. This is considered further in Section 27 (Noise and Vibration).

- **Severance:** The effect of severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. It may result from the difficulty of crossing a heavily trafficked road, for example. The IEA guidelines suggest that only changes in traffic flows of 10% or more are likely to produce changes in severance. In this case, the threshold would only be exceeded along Wineham Lane. However, the affected sections of road are largely pedestrian free with only occasional pedestrian movements. This represents an impact of negligible magnitude on a receptor of medium sensitivity resulting in a not significant impact.

- **Congestion and driver delay:** Delays to non-development traffic can occur on the network due to additional traffic generated by a development. The Institute of Environmental Assessment (IEA) guidelines note that these additional delays are only likely to be significant when the traffic on the network in the study area is already at, or close to, the capacity of the system. Normal fluctuations in traffic flows are expected up to 10% and therefore only increases in traffic above this threshold are likely to cause additional congestion. In this case, the only link where this threshold is exceeded is Wineham Lane. However, the affected sections of road will continue to operate significantly below their theoretical link capacity and are therefore unlikely to result in congestion problems. This represents an impact of low magnitude on a receptor of medium sensitivity resulting in a not significant impact.

- **Increased risk of accidents:** Any increase in traffic numbers has the theoretical potential to increase the risk of accidents. Ordinarily, marginal increases in vehicle numbers would be considered to have a negligible effect on safety since the increases are within average day to day variations in traffic levels. However, there is potential for impacts on safety as a consequence of driver frustration related to the movement of abnormal loads. Furthermore, the design of temporary construction accesses needs to accommodate the easy movement of construction vehicles entering and exiting the construction site to avoid unsafe manoeuvring on the highway. This represents an impact of medium magnitude on a receptor of up to medium sensitivity resulting in a moderate significant impact.

- **Intimidation and pedestrian delay:** Changes in the volume, composition or speed of traffic may affect the ability of pedestrians to cross the road or affect the scale of fear and intimidation experienced by pedestrians. The IEA guidelines suggest that only changes in HGV traffic flows of 100% or more are likely to result in significant changes in fear and intimidation. In this case, the only links where this threshold is exceeded are Wineham Lane and Edburton Road. However, the affected sections of road are largely pedestrian free with only occasional pedestrian movements. This represents an impact of negligible magnitude on a receptor of up to medium sensitivity resulting in a not significant impact.

- **Dust and dirt:** HGVs have the potential to distribute dust and dirt from the construction site onto the local highway network. These effects would be most pronounced in the immediate vicinity of the site entrances. The potential for road soiling to occur would already be controlled by standard appropriate measures, such as wheel cleaning and road sweeping. This represents an impact of low magnitude on a receptor of up to medium sensitivity resulting in a not significant impact.

- **Hazardous loads:** It is not anticipated that the construction process will require carriage of material listed in The Carriage of Dangerous Goods in the UK. If these materials become needed during the course of construction, the legal requirements associated with their transit will be enforced.

Impacts During Operation

29.5.59 During the operation of the cable route periodic testing of the cable over-sheath (every 2–5 years), is likely to be required. This will require access to the link boxes (located in underground pits) along the cable route. This may require attendance by up to three vehicles per day, typically light vehicles such as vans, in any one location and they will use existing field accesses to reach relevant sections of the route.

29.5.60 The substation will be designed to be unmanned during operation. There will be some maintenance visits. This would constitute a very small number of light vehicles for maintenance of the substation. In addition, there may be the occasional HGV for replacement of equipment, when necessary.

29.5.61 These traffic movements would fall substantially below the IEA guidelines for significance and would be well within normal daily variations. Hence, traffic movements associated with the operational phase of the onshore works are considered to be 'not significant'.

29.5.62 Permanent vehicular access to the substation will be provided in the form of an access track from Bob Lane. The substation will be designed to be unmanned and thus the permanent access will be used for routine service and maintenance activities.

Impacts During Decommissioning

29.5.63 At decommissioning it is anticipated that the onshore cables will be left buried in situ, unless removed to be replaced by new cables to be run along the same route ducting as part of future developments or wind farm repowering. It is likely that ducting will remain in place; however, the cables may be pulled out of the ducts via the jointing bays. If the cables are removed, residual impacts on the physical environment would be of smaller scale than impacts described in this section for construction as works would only occur at specific locations.

29.5.64 No decision has been made regarding the final decommissioning policy for the proposed substation, as it is recognised that industry best practice, rules and legislation change over time and therefore the methodology cannot be finalised until immediately prior to decommissioning. The onshore substation may continue to be used as a substation site after the Project has been decommissioned. It is possible that the substation will be upgraded for use by future offshore renewable developments. The decommissioning methodology cannot be finalised until immediately prior to decommissioning. A transport assessment of the required works will be required to identify the impacts appropriate at that time.

29.6 Mitigation Measures

29.6.1 Appropriate mitigation measures for the reduction and potential elimination of the potential impacts are described below.

During Construction

Construction Access

29.6.2 The construction of the onshore cable route will require a number of temporary construction accesses, potential locations of which have been indicated earlier in this section. These will be designed to accommodate the swept path of all construction vehicles that need to enter the construction area for each specific section. This will avoid any potential delays to traffic on the highway network and reduce the risk of accidents due to vehicles manoeuvring.

29.6.3 The construction of the onshore substation will also require a construction access. A temporary construction access will be created from a new bellmouth with Wineham Lane into private land situated directly north of the National Grid boundary. This approach mitigates the requirement for HGVs traversing down Bob Lane during the construction period, except for the initial enabling works to create the temporary Wineham Lane construction access.

29.6.4 Details of the siting, design and layout of temporary construction accesses will be agreed with the relevant highway authority before works commence.

Construction Methods

29.6.5 The trenching operations that will occur across the majority of roads and accesses that the cable route encounters will include traffic management measures. It is likely that single-file working will be used and therefore temporary traffic lights or ‘Stop/Go’ boards will be utilised, depending on the volume of traffic on each road.

General Construction Traffic

29.6.6 A Travel Plan will be implemented, sitting with an overarching Traffic Management Plan, which would encourage the use of more sustainable forms of transport and, where this may not be possible, to increase car-sharing. Recommended initiatives include the use of minibuses to pick up construction workers from designated points around Worthing and Shoreham.

29.6.7 The Travel Plan will aim to minimise the use of private vehicles for travelling to the working width and, where such journeys are necessary, to reduce the number of vehicles by encouraging car sharing. Overall, the Travel Plan will minimise the number of vehicle trips associated with construction workers.

Abnormal Loads

29.6.8 Subject to approval with the relevant highways authorities, the abnormal load movements may be undertaken outside of peak traffic hours and, if required, could pull over to the side of the road at a suitably safe location to allow other road users to overtake, thereby minimising driver delay. Some minor roads may also need to be closed temporarily while an abnormal load passes along it due to the width of the load. Such mitigation will be agreed within a Traffic Management Plan with the relevant highway authorities prior to the works.

29.6.9 To accommodate the swept path of abnormal loads, some minor geometric improvements may be necessary at junctions. These are likely to be limited to minor roads in rural areas where verges are only grassed.

During Operation

Maintenance Traffic

29.6.10 The impact of operational traffic on the local road network is deemed to be not significant and therefore no mitigation measures are considered necessary.

Maintenance Access

29.6.11 The onshore cable route will require minimal maintenance with only occasional inspections of jointing boxes along the route. Access to these is expected to be via existing field accesses using 4x4 type vehicles.

29.6.12 The onshore substation will require permanent access, which will be designed to accommodate all likely maintenance vehicles. The access will be constructed at Bob Lane, using an existing farm track that will be improved to accommodate vehicles for routine maintenance and service activities.

During Decommissioning

29.6.13 As no decision has been made regarding the final decommissioning policy for the proposed substation, no mitigation can be identified at this stage. A transport assessment of the required works will be required to identify the impacts appropriate at that time. No mitigation will be necessary for the decommissioning of the cable route if it remains in situ.

29.7 Residual Effects

29.7.1 A detailed summary of residual effects (following implementation of the mitigation measures identified in the assessment) and their significance is provided in Table 29.10.

Table 29.10: Summary of Impacts, Mitigation Measures and Residual Effects

Aspect	Sensitivity of Receptor	Magnitude of Impact	Proposed Mitigation Measures	Residual Effect
Impacts During Construction				
Severance	Medium	Negligible	None required	Not significant
Congestion and driver delay	Medium	Low	Traffic Management Plan	Not significant
Pedestrian delay	Medium	Low	None required	Not significant
Road safety	Medium	Medium	Design of temporary accesses to accommodate all relevant types of construction vehicle and abnormal loads. Traffic Management Plan for abnormal load movements.	Not significant
Dust and dirt	Medium	Low	None required	Not significant
Impacts During Operation				
Road safety	Medium	Medium	Design of permanent substation access to accommodate all types of maintenance vehicle.	Not significant
Impacts During Decommissioning				
None identified	-	-	-	-

29.8 References

Department of Energy and Climate Change, July 2011, *Overarching National Policy Statement for Energy (EN-1)*.

Department for Communities and Local Government, March 2012, *National Planning Policy Framework*.

Institute of Environmental Assessment (IEA), 1993, *Guidelines for the Environmental Assessment of Road Traffic*.

Department for Transport, March 2007, *Guidance on Transport Assessment*.

West Sussex County Council, March 2011, 'West Sussex Transport Plan 2011–2026'.

Rampion Offshore Wind Farm

ES Section 29 – Traffic

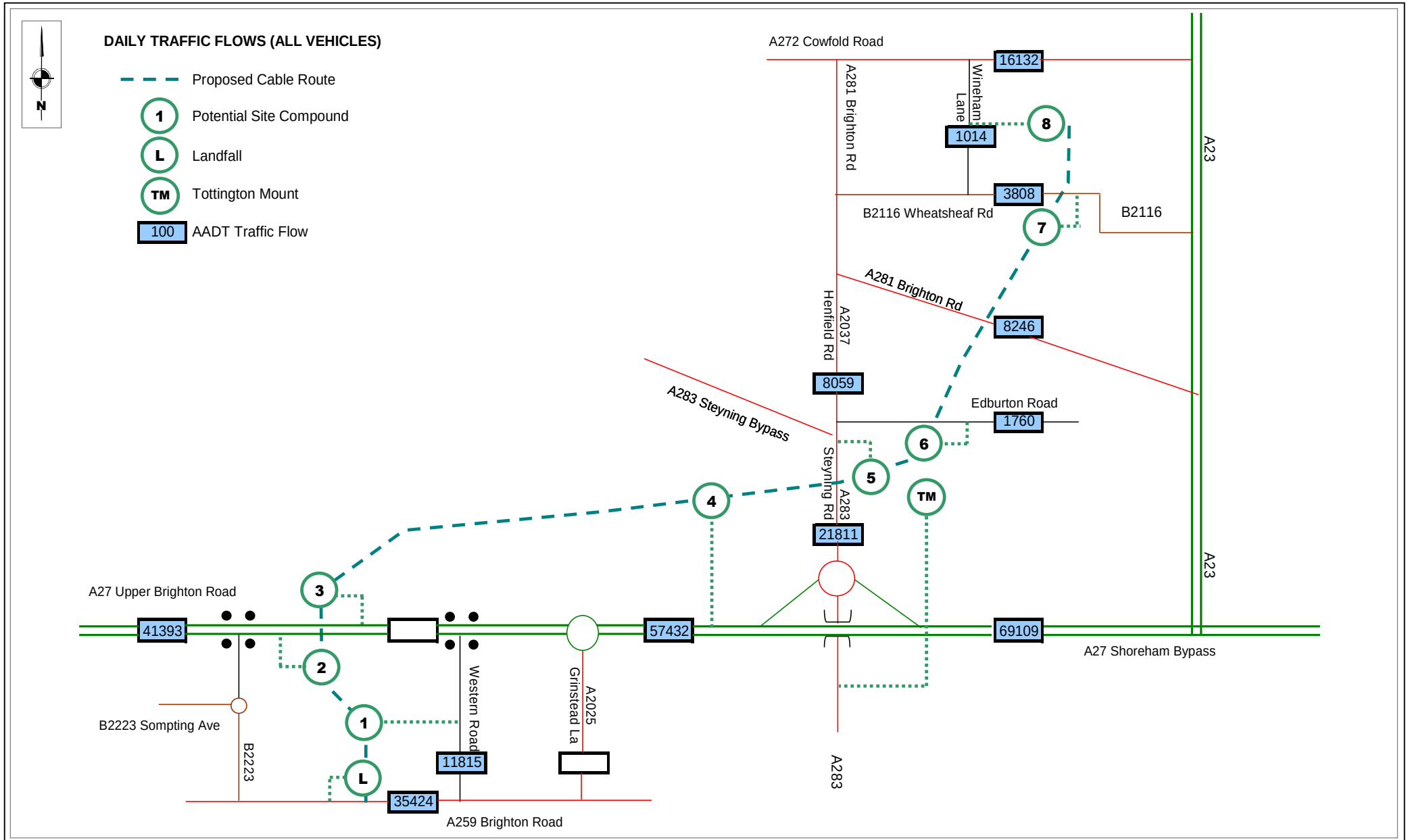
Appendices 29.1 – 29.8

Singleton Clamp Ltd **Document 6.3.29**

December 2012 **APFP Regulation 5(2)(a)**

Revision A

E.ON Climate & Renewables UK Rampion Offshore Wind Limited



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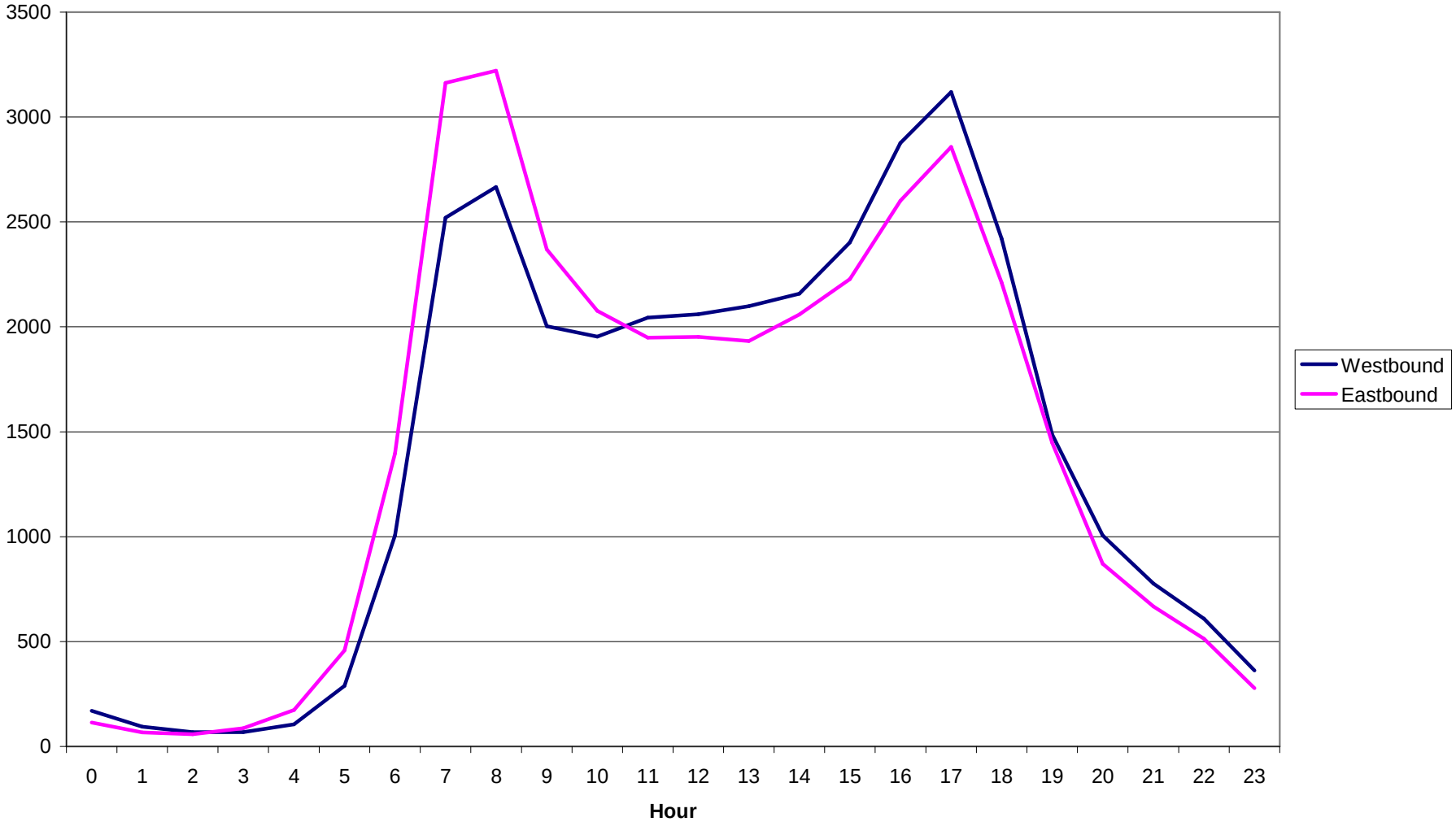
			Date: 30.10.2012	Checked: -			
			Approved/Unapproved: -	Status: PLANNING		Revision: -	

Average Weekday Flow - June 2010
(A27: Between A270 and A283)



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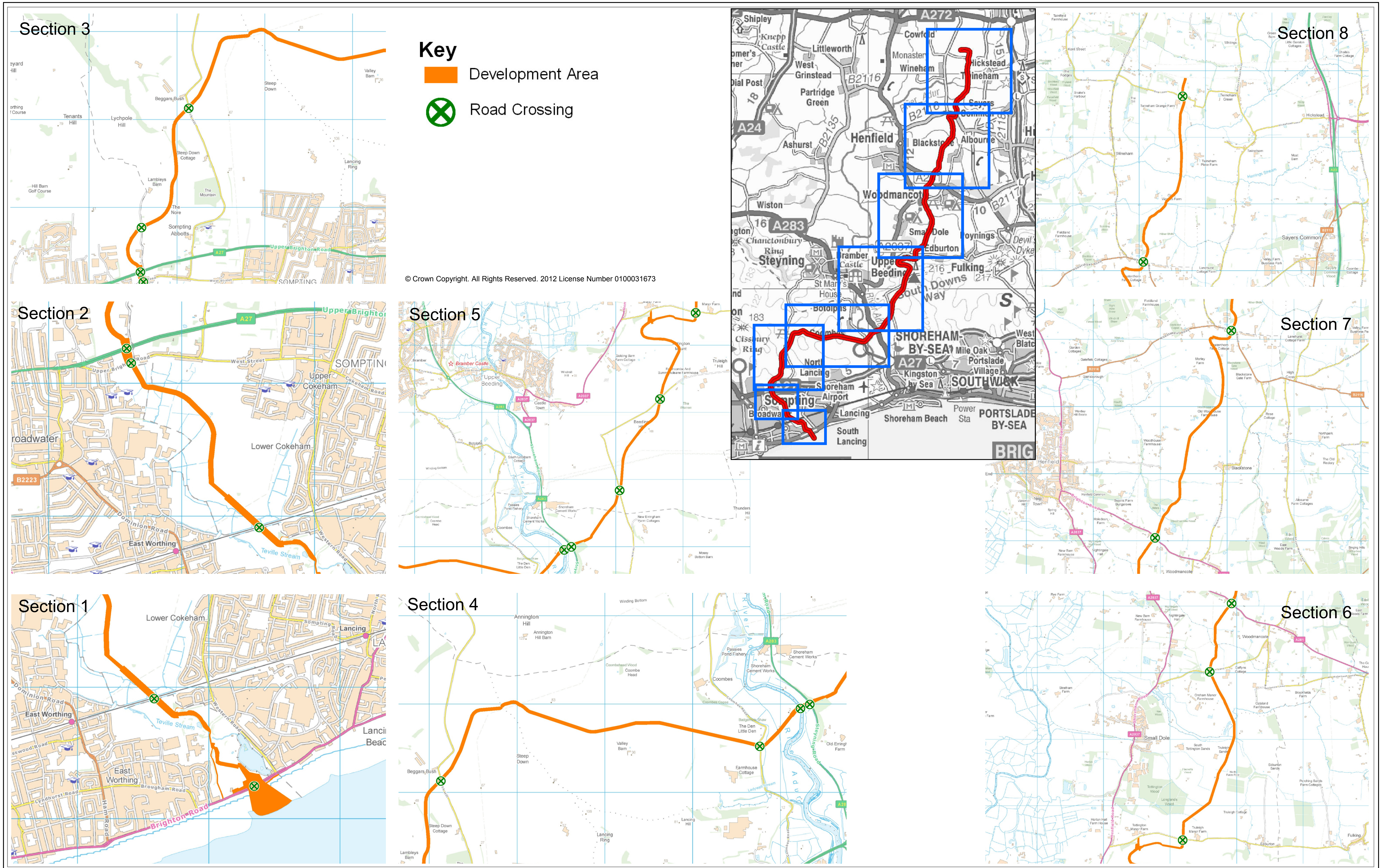

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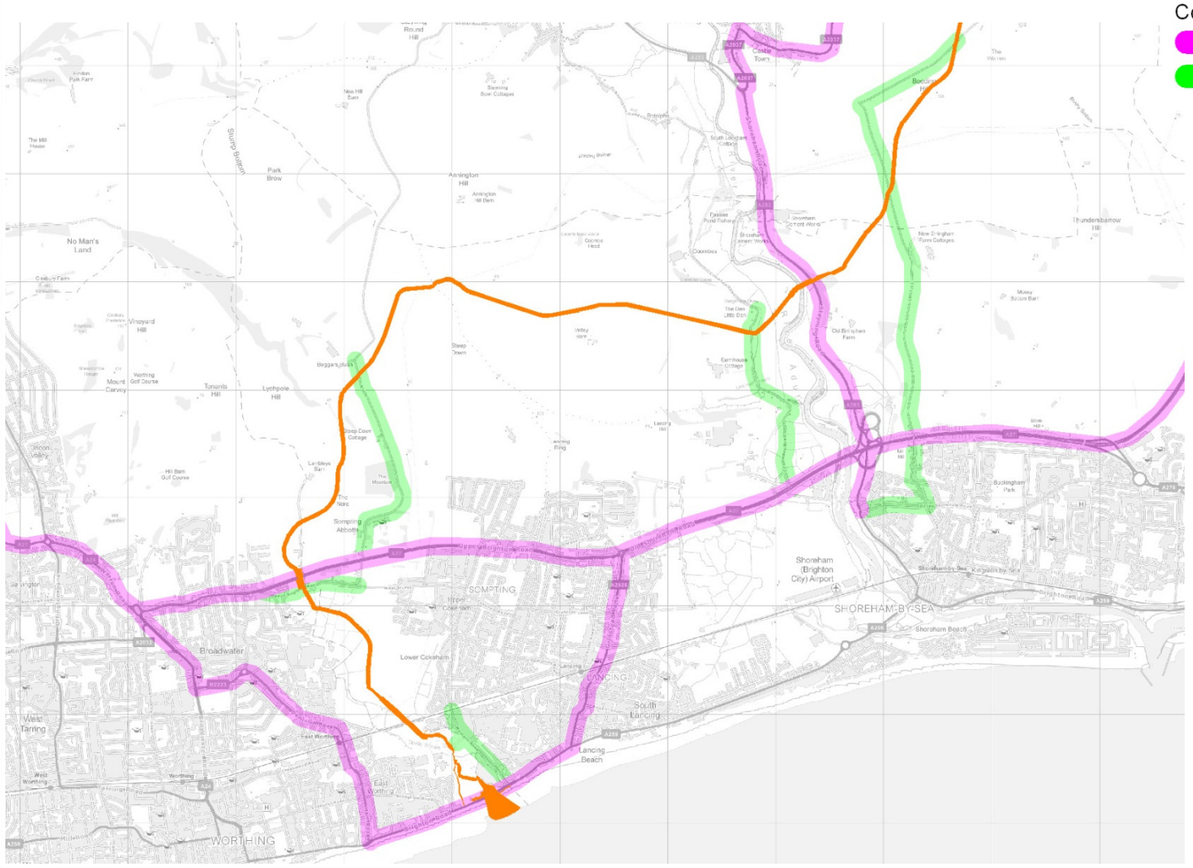
			Date: 07.11.2012	Checked: -	-	-	-	-	
			Approved/Unapproved: -	Status: PLANNING	-	-	-	-	Revision: -

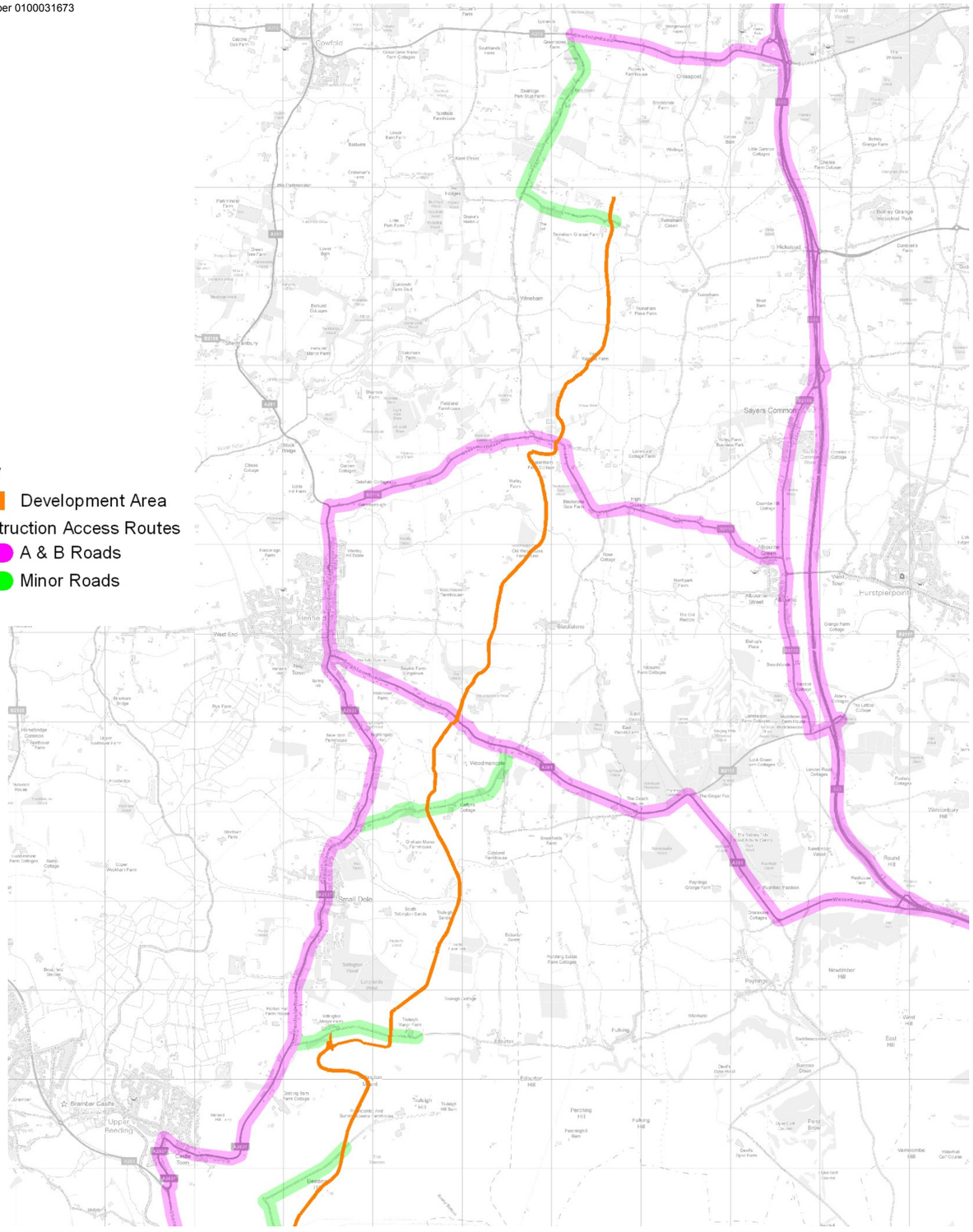
N

Construction Traffic Access Routes

All HGV traffic to be restricted to routes identified on this plan, unless otherwise agreed with West Sussex County Council.

Abnormal loads to be restricted to routes identified on this plan with specific routing and timing to be agreed with West Sussex County Council, the Highways Agency and the Police in advance of deliveries.





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Drawing Title	ONSHORE CABLE ROUTE – CONSTRUCTION TRAFFIC ACCESS ROUTES
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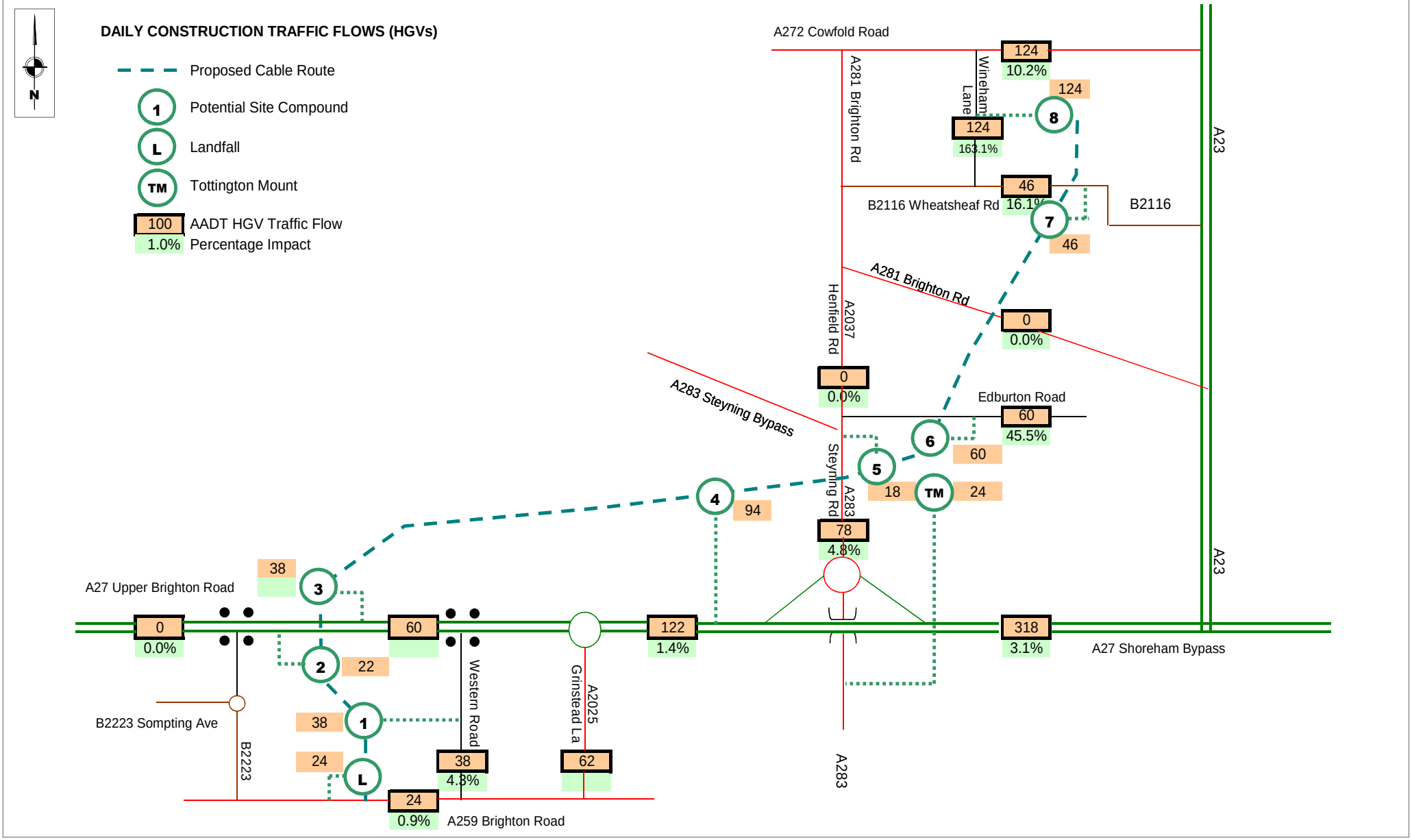
Drawing No. APPENDIX 29.4

Revision -



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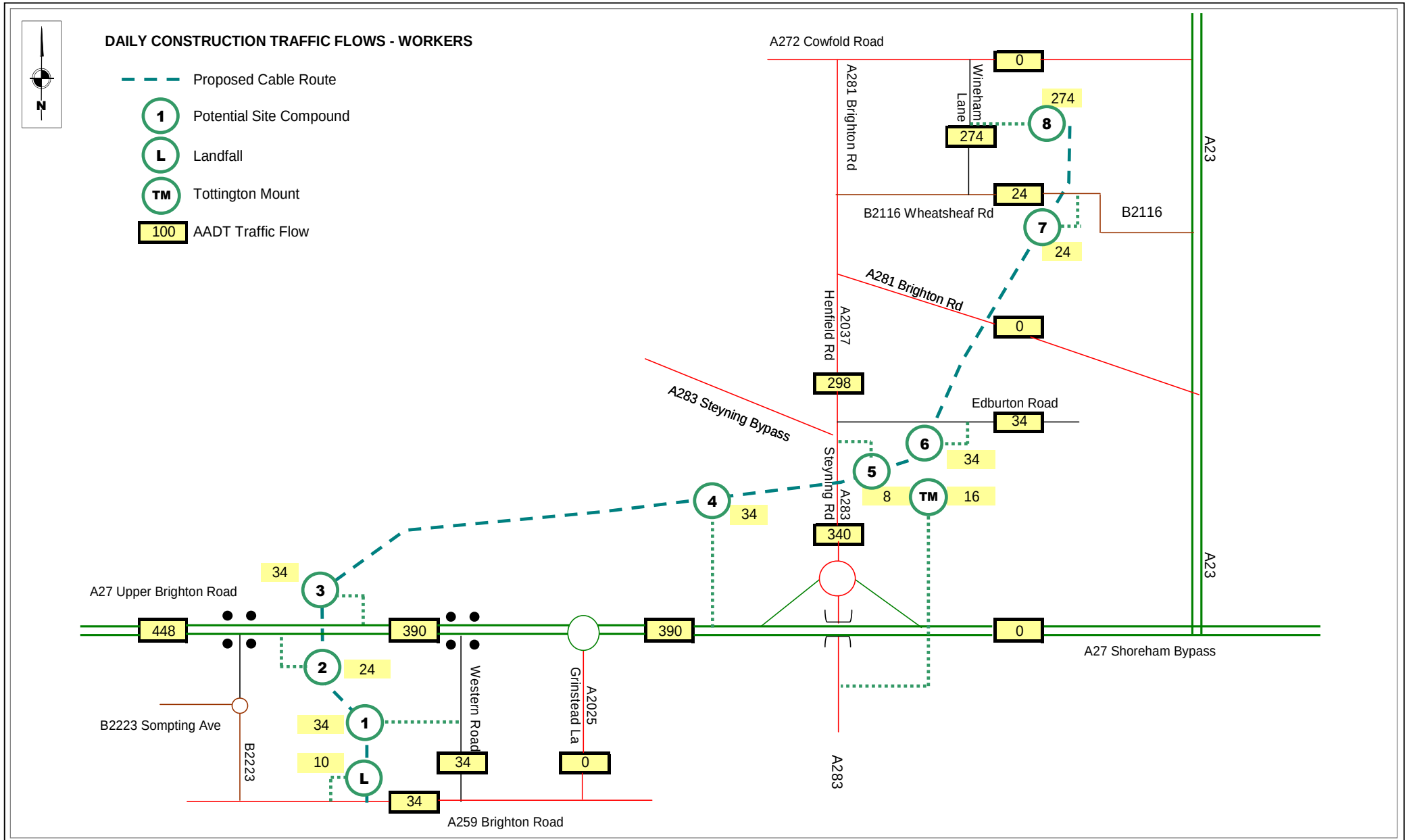

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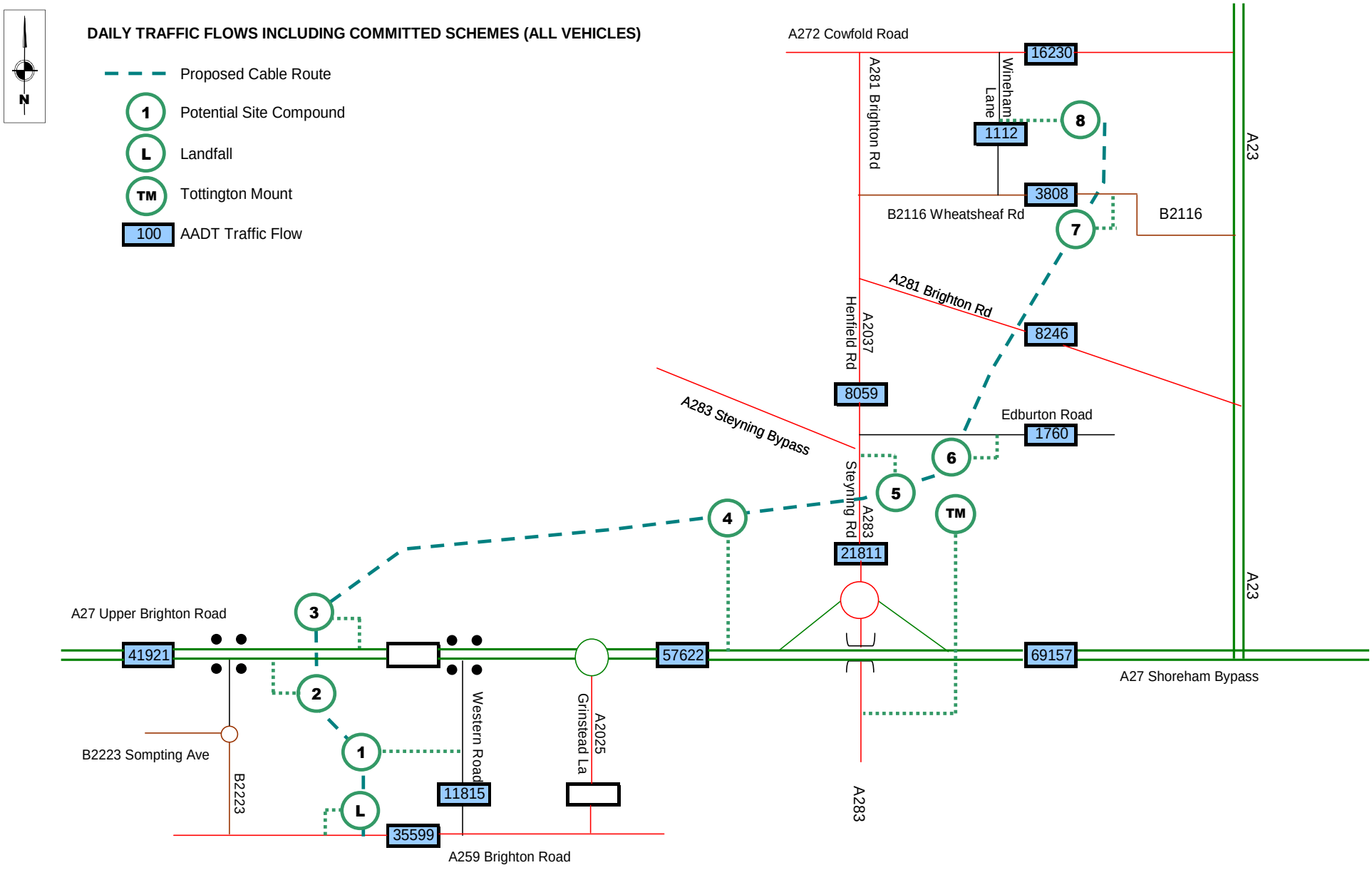

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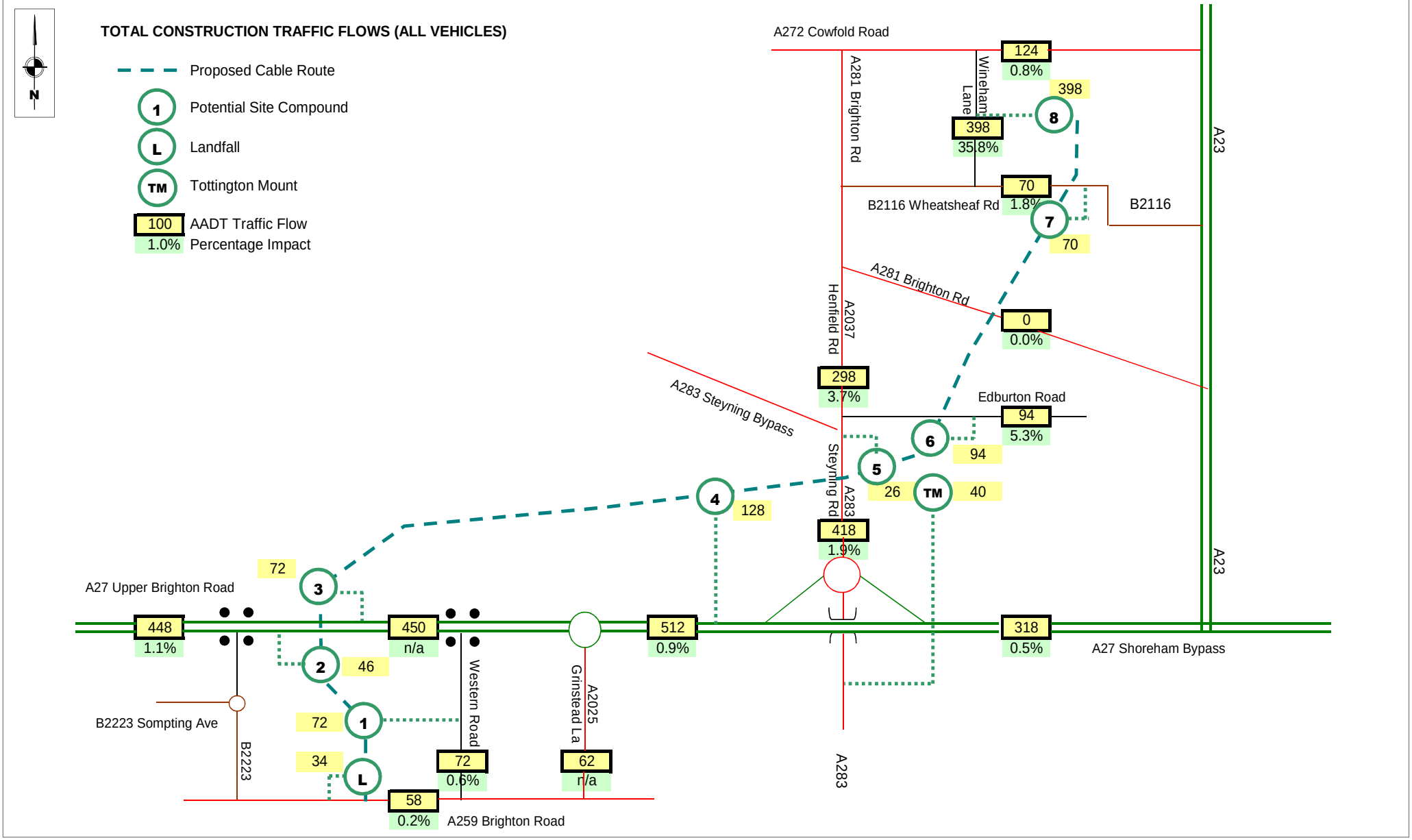

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