CONTENTS

INTRODUCTION

6.1 This chapter of the ES has been written as part of a wider evaluation process that has been undertaken to identify the likely magnitude and significance of environmental effects arising as a result of changes in traffic movements from a proposed development at Washington Sandpit, Hamper's Lane, Storrington.

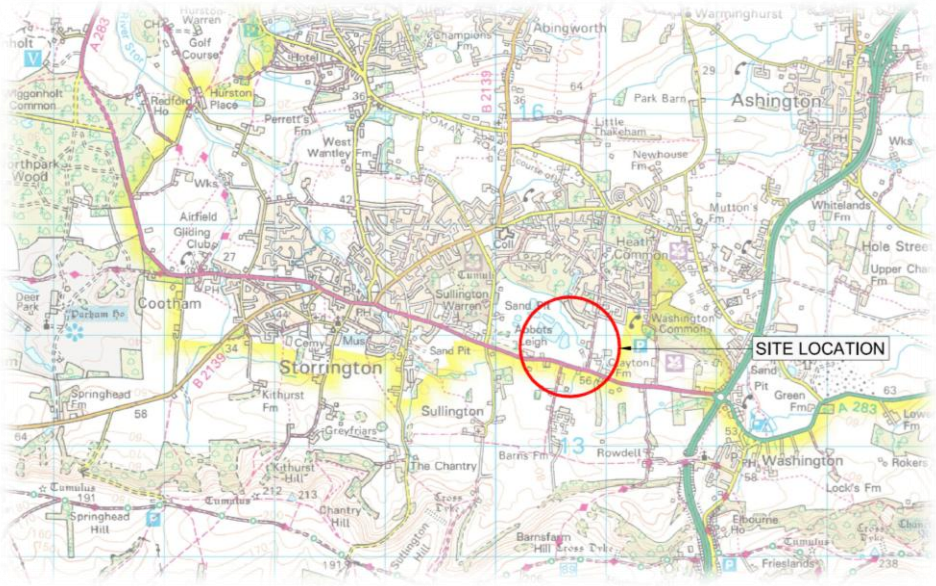
6.2 The existing planning permission (DC/2500/08(SR)) limits extraction of minerals beyond 31st December 2013 and thereafter for the site to be restored using overburden already stored within the site. However, a Section 73 planning application was submitted in August 2013 that sought to vary conditions attached to the consent in order to enable the continued extraction of mineral reserves for a further two year period. At the time of writing, the Section 73 planning application remained undetermined.

6.3 The development proposals considered by this ES incorporate the above extension of mineral extraction allied with a revised and improved restoration scheme that will require importation of infill material. Both activities are anticipated to occur concurrently and as such the assessment considers the cumulative effect of the developments on the adjoining public highway network.

Site Location & Planning History

6.4 The application site area comprises approximately 6.5 hectares of land that has been actively worked for the extraction of sand since the late 1940's. It is located adjacent to the A283-Storrington Road, some 1.3 kilometres west of the A24-London Road and 2.0 kilometres east of Storrington Town Centre. The broad location of the application site is shown below, for convenience.

Figure 6-1 Site Location



6.5 At the local level, the application site may best be described as forming a broadly rectangular parcel of land with its southern boundary defined by the A283-Storrington Road (and highway verge). The eastern site boundary abuts the privately owned and maintained carriageway named as Hamper's Lane, whilst the western boundary adjoins a much larger mineral extraction site known as Sandgate Park, operated by CEMEX. The northern site boundary is defined by a local recreation ground and a mix of open grassed and wooded areas.

6.6 The application area and existing quarry operations are shown in the below plan, used previously in support of recent planning applications for the site.

Figure 6-2 Site Boundary

6.7 Vehicular access to the application is currently via a private haul road that connects onto Hamper's Lane some 8 metres north of the priority T-junction that is created where Hamper's Lane connects onto the A283-Storrington Road. Some 1.3 kilometres east of the application site, the A283-Storrington Road becomes a designated lorry route. At this location, access is also provided onto the A24-London Road: another designated lorry route.

6.8 The location of the quarry therefore lends itself to providing proximate access onto those roads considered most suitable for lorry traffic.

ASSESSMENT METHODOLOGY

6.9 This sub-section has been prepared with reference to the requirements and best practice methods advocated by the following documents:

- Circular 02/99 Environmental Impact Assessment;
- Guidance on Transport Assessment (Department for Transport, March 2007); and
- Guidelines for the Environmental Assessment of Road Traffic (IEA, 1993).

6.10 On this basis, the scope and the methods used in the Environmental Impact Assessment (EIA) process are defined below.

Consultation Process

6.11 In accordance with the requirements of EIA the assessment of impacts has been undertaken with due consultation with the local planning and highways authorities.

6.12 In this way, a pre-application meeting was held on site on 29th May 2013 between SLR Consulting and West Sussex County Council (WSCC), as the Minerals and Waste Planning Authority, where it was agreed that an Environmental Impact Assessment would be voluntarily submitted. WSCC subsequently wrote to SLR on 12th June 2013 summarising various aspects that would need to be considered. This did not identify transport as a major point of consideration.

6.13 Notwithstanding this, SLR contacted WSCC, as Highway Authority, by email on 3rd of June in order to agree a suitable scope for the collection of traffic data. WSCC replied on the date with confirmation that the suggested design of traffic surveys was acceptable to them. SLR then set out the suggested approach and methodologies that would be taken within this assessment, undercover of an email dated 5th August 2013. A final response was provided by return under cover of an email dated 28th August 2013 confirming that the suggested parameters were acceptable.

6.14 Copies of the above scoping correspondence are contained at Appendix 6-1.

Assessment of the Site's Travel Credentials

6.15 Review of the provision and quality of existing transport infrastructure for all modes of travel has been undertaken in order to assess the accessibility of the Site against what might be considered to be a realistic standard of provision for the scale and type of development proposed.

6.16 The accessibility of the Site by non-car modes of travel has been assessed against the following three criteria:-

- The proximity of the nearest serviced interchanges to the Site and the opportunities for interconnecting links between the site and these interchanges;
- The frequency of services available from the transport interchanges; and
- The destinations served.

6.17 The accessibility of the Site by car has been considered by reference to its geographical location in the context of infrastructure serving the immediate locality, as well as the wider area.

Assessment of the Likely Traffic Effects

Study Area

6.18 The potential effects of development traffic have been considered in terms of the potential change in the current operation of the highway network and the following study area has thus been determined in agreement with the highway authority, for the purposes of the assessment.

- Site Access onto Hamper's Lane;
- Hamper's Lane / A283-Storrington Road; and
- A283-Storrington Road / A24 London Road (Washington Roundabout).

6.19 The geometric characteristics and general maintenance of the wider road network are discussed later in this report at the section entitled 'Baseline Conditions'.

Ascertaining Traffic Conditions

6.20 The EIA has sought to quantify existing levels of traffic on the specified study area road network and an allowance of local growth applied to provide an indication of baseline traffic conditions in the year of opening (2014) and final year of operation (2019). In this respect an adjustment factor has been derived using TEMPRO local growth factors of National Traffic Model (NTM).

6.21 Future development traffic levels have been derived by first-principles calculation based on the annual tonnage inputs, typical vehicle payloads and the average number of working days per year. The resultant trip generation has then be distributed throughout the study area highway network in line with traffic flow observations, in agreement with the highway authority.

Ascertaining Changes in Highway Capacity

6.22 In agreement with the Highway Authority the assessment has considered the capacity operation of the Hamper's Lane junction onto the A283-Storrington Road using the industry-standard tool, PICADY. For clarity, the capacity modelling has been undertaken assuming consented road improvements have taken place.

6.23 The EIA has considered that a junction is nearing its operational capacity when the Ratio of Flow to Capacity (RFC), described later in this section, exceeds the commonly applied threshold of 0.85. Thereafter, the risk of occasional queuing increases until the RFC reaches a value of '1', and thereafter it is taken that the junction will always operate beyond capacity in the modelled scenarios. Analysis of vehicle delays are also given, particularly in the context of delay faced by westbound vehicles travelling on the A283-Storrington Road.

6.24 Beyond the Hamper's Lane junction, the impacts of the scheme are considered to be diluted by larger background traffic flows to such a degree that their significance is reduced to a level that can be considered to be immaterial. This is supported by traffic flow analysis presented later in this Chapter under the section entitled 'Effects of Development'.

Consideration of Likely Highway Safety Effects

6.25 The potential highway safety effects of the calculated development traffic flows has been undertaken with regard to the existing pattern of accidents, giving particularly regard to the *Institute of Highways and Transport* (IHT) Risk Assessment Matrix.

6.26 Based on the above, an evaluation has been undertaken to establish if the calculated development traffic flows, when considered cumulatively, would lead to an abnormal or unacceptable safety risk. Where any adverse safety impacts are considered likely, appropriate mitigation measures have been identified.

Consideration of Likely Environmental Effects

6.27 The need to consider environmental impacts beyond the highway capacity and safety effects has been determined by reference to the guidelines for the Environmental Assessment of Road Traffic (IEA, 1993). This suggests two broad rules to define the need to undertake full environmental impact analysis, which are as follows.

(1) Highway links where traffic flows will increase by more than 30% (or where the number of HGVs will increase by more than 30%); or

(2) Sensitive areas where traffic flows will increase by 10% or more.

6.28 In the event that the EIA concludes the resultant traffic increases exceed either of the above criteria, the significance of and exposure to the environmental effects of traffic is considered. This would be undertaken in compliance with IEA guidance, as outlined below.

Table 6-1
Sensitive Receptors (IEA Guidance)

Impacts from changes in traffic levels	Affected parties
Night -time noise	People at home
Vibration	People in work places
Driver severance & delay	Sensitive groups including children, elderly and disabled
Pedestrian severance &delay	Sensitive locations, e.g. hospitals, churches, schools, historic buildings
Accidents & safety	People walking
Hazardous & dangerous loads	People cycling
Dust & dirt	Open spaces, recreational sites, shopping areas Sites of ecological / nature conservation value Sites of tourist / visitor attraction

DEVELOPMENT PROPOSALS

Application Details

6.29 The proposed development is described in detail at Section 3.0 of this ES. However, in the context of transport and highways the salient features are summarised as follows:-

- The application site has been actively worked for sand since 1948. The current planning permission (ref: DC/2500/08(SR)) is due to expire on 31st December 2013, despite there being adequate reserves remaining to work the site for a further two years.

- In order to ensure that all of the available minerals are recovered and to prevent sterilisation of the site, planning is sought to allow the continued excavation of sand allied to an improved restoration scheme.

- Existing mineral reserves are thought to comprise between 80-100,000 tonnes and it is proposed that all reserves would be extracted and exported over a two-year time extension. In the interests of rigour, this assessment assumes the higher figure of 100,000 tonnes of material shall be exported (i.e. 50,000 tonnes per annum)

- The improved restoration of the site shall require the importation of 261,500 cubic metres of infill material over a five-year period. For the purpose of ensuring a rigorous assessment, however, net importation is assumed to be 270,000 cubic metres, which equates to some 54,000 cubic metres per annum.

- All minerals would be exported by road, in line with historic operations, using the existing road infrastructure. All vehicles would travel from/to the east of the site along the A283 towards the A24 Washington Roundabout. No goods vehicles would be permitted to travel west of the site, towards Storrington Town Centre.

- Material would be transported in 4-axle 'tipper' lorries carrying typical payloads of around 16-18 tonnes/9 cubic metres. The below photograph provides an example of the sort of vehicle anticipated to be used for the movement of material away from the site.

Figure 6-3 Example HGV

Image source: http://www.trucklocator.co.uk/trucks-for-sale/COR0011646_01l.jpg

- Operating times would mirror those conditioned to the existing planning permission, these being 08:00 to 18:00hrs Monday to Friday, and 08:00 to 13:00hrs on Saturdays. No operations shall occur on Bank Holidays, or on Sundays.

Access Arrangements

6.30 Under the proposals, vehicular access would continue to be made via the established access onto Hamper's Lane. This has been the historic means of access to the quarry for a number of years and its operation in both capacity and safety terms has been proven to be within acceptable limits.

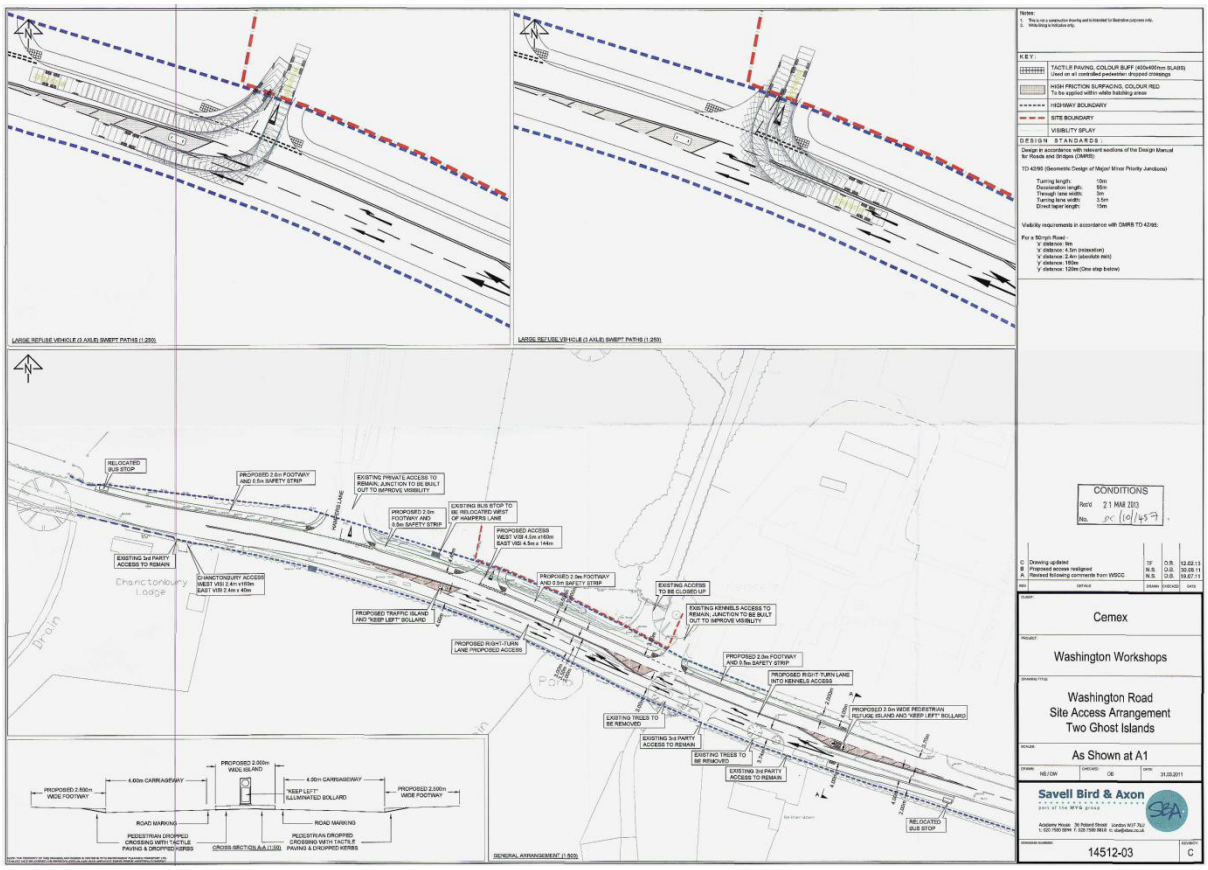
6.31 Notwithstanding this, the recently permitted (ref: DC/10/1457) residential development located on land immediately east of the application site includes changes to the A283-Storrington Road that will alter the access arrangements, particularly in the context of movements from Hamper's Lane onto the A283-Storrington Road.

6.32 Amongst other things, the planned improvements comprise the realignment of the A283-Storrington Road to occupy land currently used as highway verge, to the south. The result of this, in the context of the development proposals, is to increase the available visibility from Hamper's Lane along the A283-Storrington Road. It also increases the separation between the A283-Storrington Road and the existing site access from 8 metres to around 15 metres. This change will ensure that vehicles exiting the quarry will be allowed to wait at the give-way lane of Hamper's Lane without the risk of impeding traffic entering onto Hamper's Lane from the A283-Storrington Road.

6.33 The approved highway improvements[1] are shown below, for context.

[1] The costs of the planned improvements i.e. foot paths etc. and the realignment of the A283 are being met by the developer re- DC/10/1457

Figure 6-4 Approved Highway Improvements



6.34 In view of the fact the above improvements are consented under planning permission DC/10/1457, and knowing that a reserved matters planning application has been submitted, it is considered likely that the road improvements are likely to be constructed within the life of the proposed 2-year extension of quarrying operations. Hence, the improvements are considered as the baseline highway network.

Traffic Effects

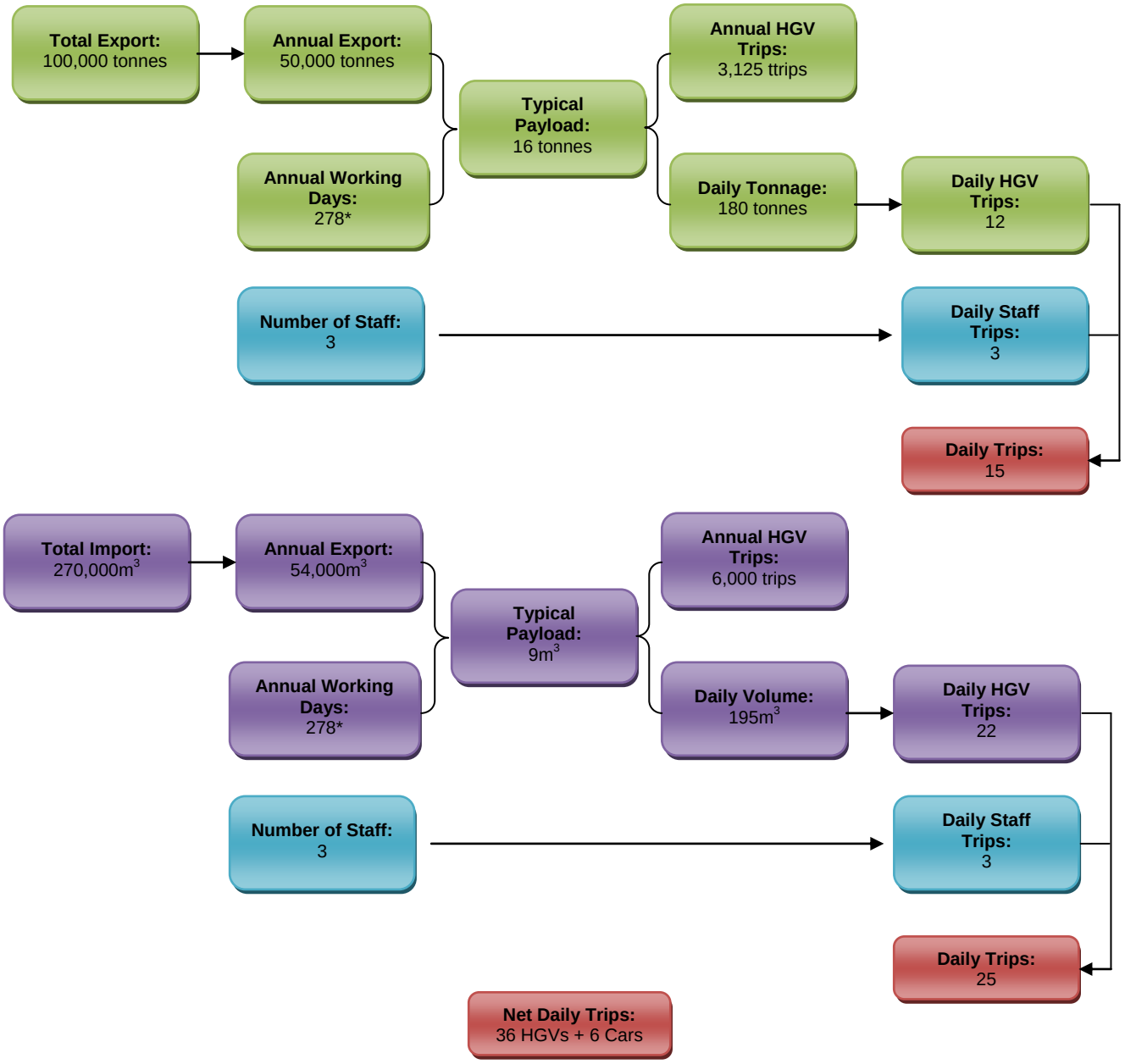
6.35 The trip generation effects of the proposed development relate to the exportation of up to 100,000 tonnes of sand over a two-year and the concurrent restoration of the site, requiring an assumed 270,000 cubic metres over a five-year period. In view of this, peak traffic generation shall occur when restoration activities occur alongside exportation of sand. In the third to fifth year of operations, however, the trip generation will reduce to include only activities associated with the restoration of the site. Hence, for the sake of robustness, both scenarios are considered within the ES Chapter.

6.36 By virtue of the expiration of the existing planning permission, the resultant traffic movements are assessed as being new to the highway network. However, it should be noted that the minerals that are to be removed from the site over the 2-year period were previously approved for export under

previous planning permission. Hence, the associated vehicular movements should have occurred previously, adding to the historic trip generation of the quarry.

6.37 Notwithstanding this point, the trip generation of the proposed development is determined below using first-principles assumptions, in line with best practice guidance[2].

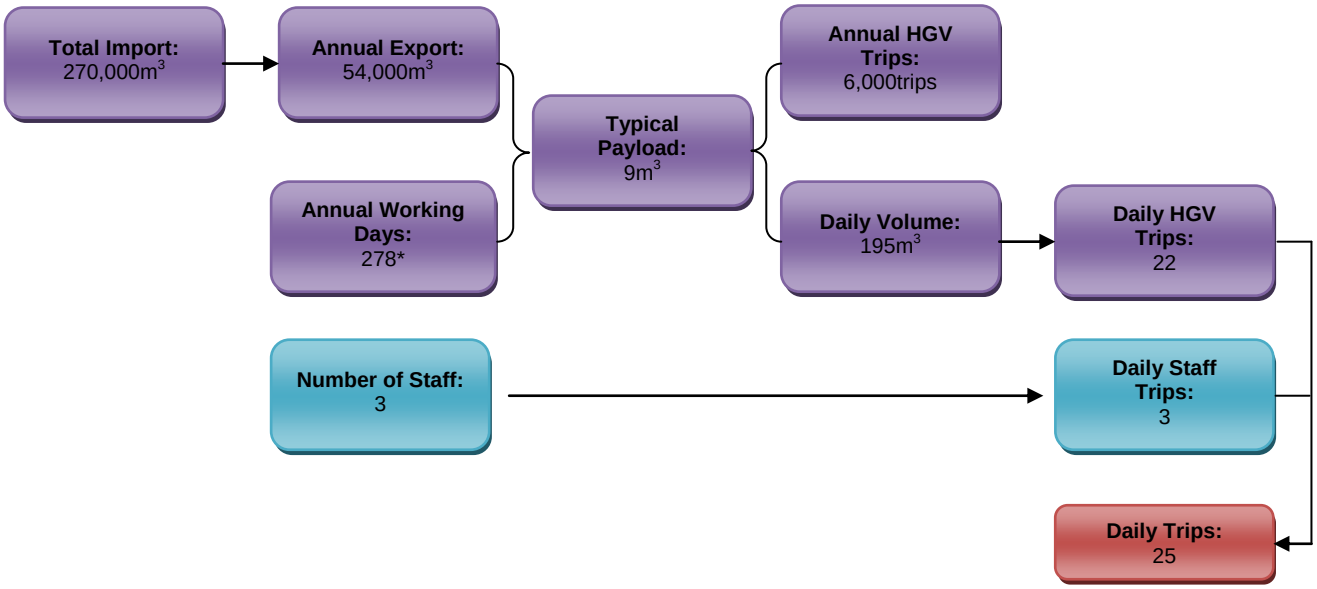
Figure 6-5 Average Whole Day Trip Generation (One-Way) – Restoration + Exports



[2] Guidance on Transport Assessment, Department for Transport (March 2007).

*Operating days calculated as 5.5 days per week x 52 weeks in the year, minus 8 bank holidays.

Figure 6-6 Average Whole Day Trip Generation (One-Way) – Restoration Only



*Operating days calculated as 5.5 days per week x 52 weeks in the year, minus 8 bank holidays.

6.38 It should be noted that the reduced hours of operation on a Saturday would yield half the number of goods vehicles per day, although staff numbers would remain the same.

6.39 Taking into account the hours of operation identified above and reflecting the commercial incentives to stagger deliveries throughout the day, the following arrival/departure profile has been established. It is noteworthy that, due to statistical rounding, the sum of the hourly trip generations indicates a higher daily total than is shown above in the above Figures. Hence, the below tables should only be referenced in the context of the hourly demand.

Table 6-2
Two-Way Trip Generation Profile – Restoration+Exports

		Hour Commencing											
		07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Weekday	HGVs	-	5	10	10	10	10	10	10	10	10	5	-
	Staff	6	-	-	-	-	-	-	-	-	-	-	6
Saturday	HGVs	-	5	10	10	10	5	-	-	-	-	-	-
	Staff	6	-	-	-	-	-	6	-	-	-	-	-

Table 6-3
Two-Way Trip Generation Profile – Restoration Only

		Hour Commencing											
		07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Weekday	HGVs	-	3	6	6	6	6	6	6	6	6	3	-
	Staff	3	-	-	-	-	-	-	-	-	-	-	3
Saturday	HGVs	-	3	6	6	6	6	-	-	-	-	-	-
	Staff	3	-	-	-	-	-	3	-	-	-	-	-

6.40 Based on the above, the over-whelming majority of traffic (75%) occurs outside of the busiest times on the highway network and, even within the traditional peak periods, the hourly trip generation is equivalent to just one HGV movement every 12 minutes in the two-year period when extraction occurs concurrent with restoration activities. Thereafter, the trip generation during peak periods is just one HGV movement every 20 minutes.

6.41 Such increases are not normally sufficiently large to cause a material or discernible change to the operation of the public highway network. However, the magnitude and severity of impacts is considered later in this Chapter.

BASELINE CONDITIONS

Introduction

6.42 This section of the ES Chapter describes the accessibility credentials of the application site and in so doing reviews the provision and quality of the existing transport infrastructure for all modes of travel. The aim is to assess the accessibility of the site against what might be considered to a realistic standard of provision for the scale and type of the proposed development.

Highway Infrastructure (Geometric Appraisal)

6.43 The application site is connected to a well formed network of roads that facilitate the movement of significant volumes of traffic throughout the region. For the purpose of this report and in agreement with the local highway authority, the study area highway network comprises the following junctions and interconnecting links:

- Site Access onto Hamper's Lane;
- Hamper's Lane onto the A283-Storrington Road; and
- The A283/A24-London Road (Washington Roundabout).

6.44 All of the roads within the study network fall within the jurisdiction of West Sussex County Council, as the local highway authority, save for Hamper's Lane which is a privately owned and maintained road.

6.45 As discussed previously, the consented residential development permitted under reference DC/10/1457 includes a number of highway improvements in the vicinity of the Hamper's Lane junction onto the A283-Storrington Road. Given that the residential scheme has outline planning permission and is currently the subject of a reserved matters application, there is reasonable prospect that the highway improvements will be constructed within the period being sought for continued operation of the application site. Hence, the highway improvements shown previously at Figure 6-4 are considered to be incorporated within the baseline highway network.

Site Access / Hamper's Lane

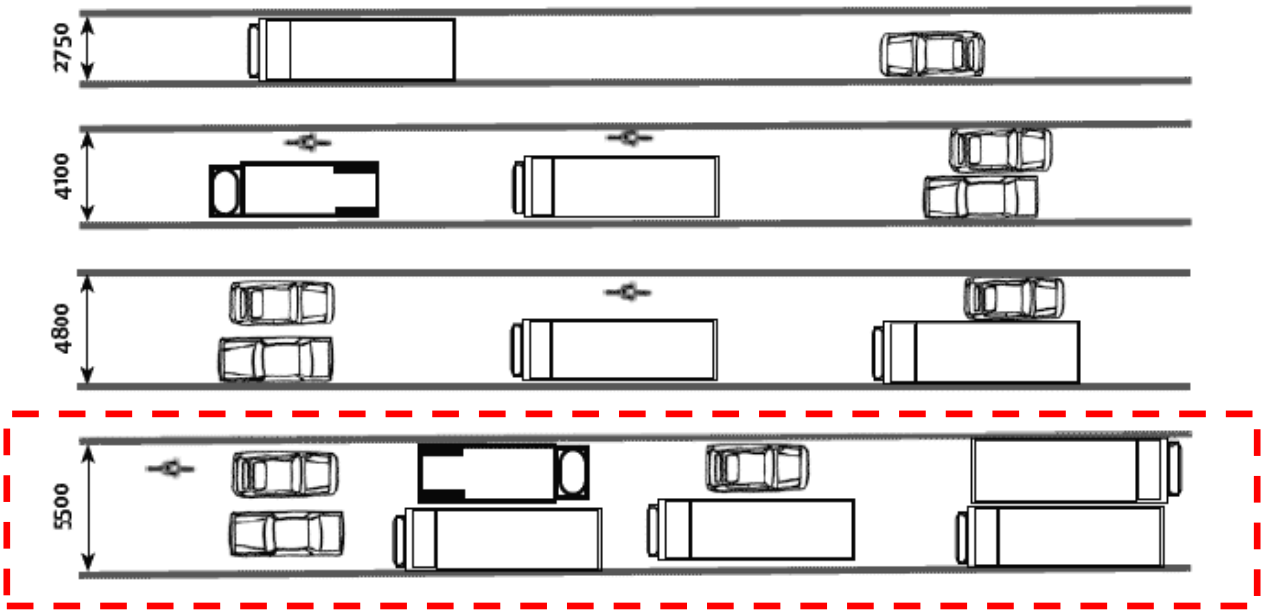
6.46 Vehicular access to the site is via an existing gated access onto Hamper's Lane, set back some 8 metres from the priority T-junction that is created where the privately owned and maintained Hamper's Lane connects onto the A283-Storrington Road. Under the consented highway improvements, the junction separation would almost double, ensuring that goods vehicles exiting the quarry could wait at the give-way markings onto the A283-Storrington Road without the risk of blocking vehicles turn right from the A283 onto Hamper's Lane.

6.47 The gated access road into the quarry connects onto Hamper's Lane at a skewed angle, easing the entry and exit path towards the A283-Storrington Road – vehicles do not turn left from the access onto Hamper's Lane and

road signage is provided at the junction warning of the inadequacy of Hamper's Lane as a road for goods vehicles.

6.48 The access road from the quarry is typically some 5.5 metres wide which is sufficient to enable two goods vehicles to pass concurrently, as identified in Manual for Streets (see below extract of Figure 7.1). The road surface appears to be provided as reinforced concrete slab that is in an acceptable state of repair, with no major pot-holes. This surface is provided up to the limit of adopted highway whereafter the road becomes a traditional metalled surface.

Figure 6-7 Extract of Figure 7.1 of Manual for Streets



6.49 Traffic approaching the junction with Hamper's Lane have restricted visibility to the north (along Hamper's Lane) due to the presence of overgrown vegetation located within the protruding verge. However, given that on-site observations suggest that vehicles travelling along Hamper's Lane travel at slow speed (circa 20mph, in line with the posted advisory speed limit), it is considered that an appropriate inter-visibility may be achieved by trimming back of the vegetation located within the protruding verge.

6.50 Notwithstanding the above, the applicant has not experienced any adverse safety issues at the junction during times when the quarry has been operational and indeed this is borne out by the accident data that is reviewed later in this report at the Section entitled *'Highway Infrastructure (Safety Risks)'*.

6.51 Consequently, it is concluded that the existing junction is suitable for the purpose of accommodating the proposed development, as evidenced by the current and historic use of the site. Notwithstanding this, the increased separation distance from the A283-Storrington Road that will be afforded once the consented highway improvements incorporated under planning

permission DC/10/1457, is considered to be an improvement. Allied with possible trimming back of vegetation within the verge, the junction is considered to be acceptable.

Hamper's Lane / A283-Storrington Road

6.52 Hamper's Lane connects onto the A283-Storrington Road at a priority T-junction. At this location, the A283-Storrington Road is currently a single-lane two-way carriageway road that runs broadly on an east to west alignment. The carriageway is typically some 8.5 metres wide with grassed verges behind single height kerbs. In proximity of the junction, the verge on the southern side of the road is around 3.5 metres and widens to the east to some 7.5 metres.

6.53 Solid white line road markings are provided to dissuade westbound traffic from over-taking in this location whilst eastbound traffic is separated from broke white line markings. The speed limit of the road is 50mph at the site access and this increased to the national speed limit (60mph) some 275 metres east of Hamper's Lane.

6.54 Visibility from the existing junction is provided in compliance with the Design Manual for Roads & Bridges (DMRB) recommendations for a 50mph road when looking east. Indeed, the recommended stopping sight distance is 150 metres from a 2.4 metre set-back which is achievable when looking west (towards Storrington) and is exceed when looking east (towards the A24 Washington Roundabout). Allied to this, the accident history of the junction (reviewed later at Section 3.4 of the report) does not identify any unacceptable safety risk in this location, indicating that visibility is appropriate at this location.

6.55 The existing junction is pictured below, for context.

Photograph 1 – Hamper's Lane / A283-Storrington Road (Existing)

6.56 The above junction will be altered under plans approved for the nearby residential scheme. The A283-Storrington Road will be realigned such that is occupies the wide highway verge on the southern side of the carriageway, resulting in the Hamper's Lane junction bring brought forward. Despite the fact that the existing visibility splay is commensurate with the speed of the road, the improvements will serve to increase visibility further.

6.57 The junction will also be provided with raised pedestrian footpaths on the northern side of the carriageway to connect the relocated bus stop to the residential development. Pedestrian movements over the junction will be accommodated by dropped kerb crossings with tactile paving. Inter-visibility between site traffic and pedestrian movements over the junction is considered to be acceptable in the context of the speed at which vehicles will be travelling. Moreover, it should be noted that the drivers of site vehicles will be travelling to and from the site several times a day and so will be aware of the potential for pedestrians to cross the road.

6.58 The approved highway improvements in vicinity are shown below, for context.

Figure 6-8 Hamper's Lane / A283-Storrington Road (Future)

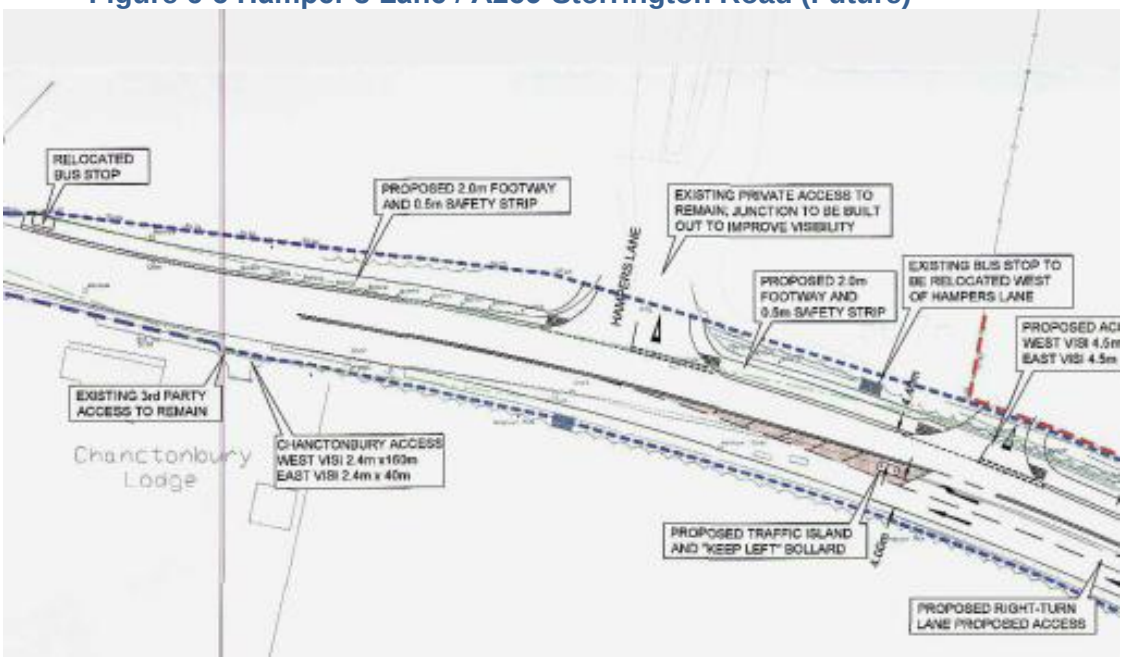
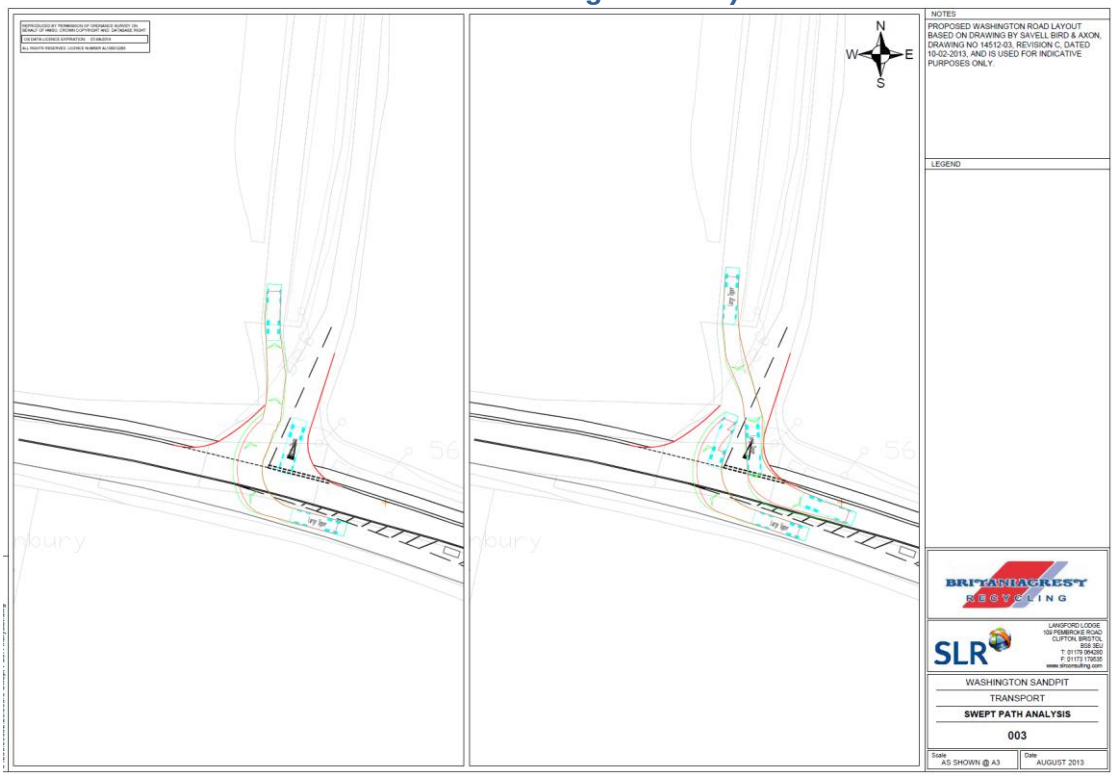


Image is zoomed area of plan extracted at Figure 6-.4

6.59 The highway improvements also afford another minor benefit in so much that the increased separation distance that will be provided between the site access and A283-Storrington Road will ensure that tipper lorries waiting to turn onto the A283-Storrington Road will not prevent access to inbound tipper lorries turning right from the main road. This is demonstrated in the below Figure, with the results of a swept-path analysis undertaken using a tipper lorry vehicle.

Figure 6-9 Swept-Path Analysis (Improved Hamper's Lane/A283-Storrington Road)



6.60 In view of the above, the existing junction is considered to be acceptable for the purpose of accommodating the proposed development and indeed this is evidenced by the existing and historical use of the site for this purpose. Notwithstanding this, planned changes to the junction will provide some enhancements that can be considered to further improve the operation of the junction.

A283-Storrington Road / A24-London Road (Washington Rdbt)

6.61 Located some 1.3 kilometres east of the junction with Hamper's Lane, the A283-Storrington Road connects onto the A24-London Road at a four-arm standard roundabout. The junction is provided with an Inscribed Circle Diameter (ICD) of circa 75 metres, with a kerbed central island of 60 metres diameter. The circulatory carriageway is circa 7.5 metres wide and operates as two lanes. The limited detritus located on the edges of the carriageway suggests that full use is made of the circulatory carriageway and the side road approaches to the junction.

6.62 The A24-London Road approaches the junction broadly from the north and the south as a two-lane dual carriageway road. The A24 approaches accommodate the predominant traffic flow at the junction. Rumble strips are provided on northbound approach to the junction over a distance of 400 metres commencing 50 metres prior to the give-way markings. This is supplemented by 'SLOW' road markings located within each lane and

'REDUCE SPEED NOW' road signage. The east and west approaches from the A283 are flared two-lane approaches.

6.63 The junction is illuminated to modern standards and the general geometry of the roundabout appears to be compliant with DMRB, including lane widths and deflection.

6.64 The A24 and the eastern arm of the A283 are designated lorry routes and are therefore, by definition, amongst the most suitable routes in the County to accommodate heavy goods vehicle traffic. In this respect, therefore, the relative proximity of the application site offers excellent connectivity to the types of roads where the goods vehicle traffic, as generated by the proposal, is encouraged to occur.

6.65 The junction is pictured below for context.

Photograph 2 – Washington Roundabout (view looking west from A283)

Conclusions of Highway Geometry

6.66 In view of the above, it is concluded that the physical design properties of the study area highway network are suitable for the purposes of accommodating the movement of the types of vehicles that would be used in connection with the proposed restoration. Indeed, the existing highway network is already used by such vehicles and the local planning and highway authorities have, by virtue of previous planning permissions, accepted that the local roads can

accommodate the additional goods vehicles associated with quarrying activities at the site.

6.67 Hence, in view that the impeding improvements to the A283-Storrington Road will increase visibility from the junction with Hamper's Lane and allow a goods vehicle to exit onto the A283 whilst a similar vehicle turns from the A283, the future highway network will be better than was the case when earlier planning permissions were granted.

Highway Infrastructure (Traffic Demand)

6.68 Traffic flows on the above study area highway network were recorded independently and, in agreement with the highway authority, comprised the following:-

- Automatic Traffic Counts (ATC) over the A283-Storrington Road, located a short distance east of the junction with Hamper's Lane; and
- Manual Traffic Count (MTC) at the Hamper's Lane junction onto the A283-Storrington Road, incorporating the site access.

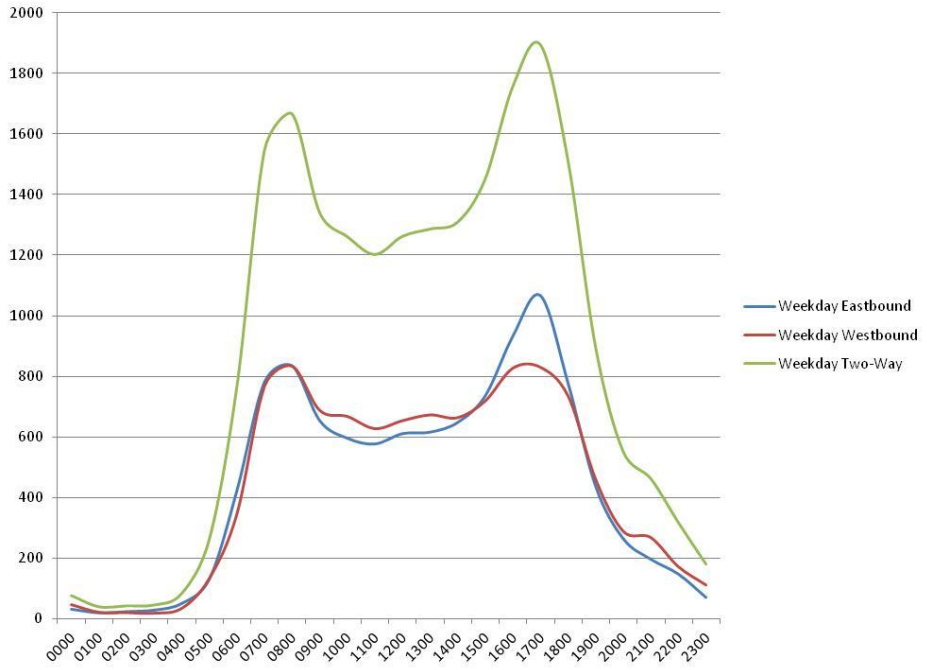
6.69 The above ATC surveys were undertaken over a seven day period commencing 6th July 2013, whereas the MTC was undertaken over a 12 hour period (7am to 7pm) on 9th July 2013 exclusively. It is noteworthy that the above surveys were undertaken during a neutral period that was void of any Bank or School Summer Holidays, in line with best practice guidance given by the Department for Transport (DfT).

6.70 The traffic survey results are contained in Appendix 6-2 for reference, with the resultant weekday peak hour traffic movements shown in the diagrams contained in Appendix 6-3.

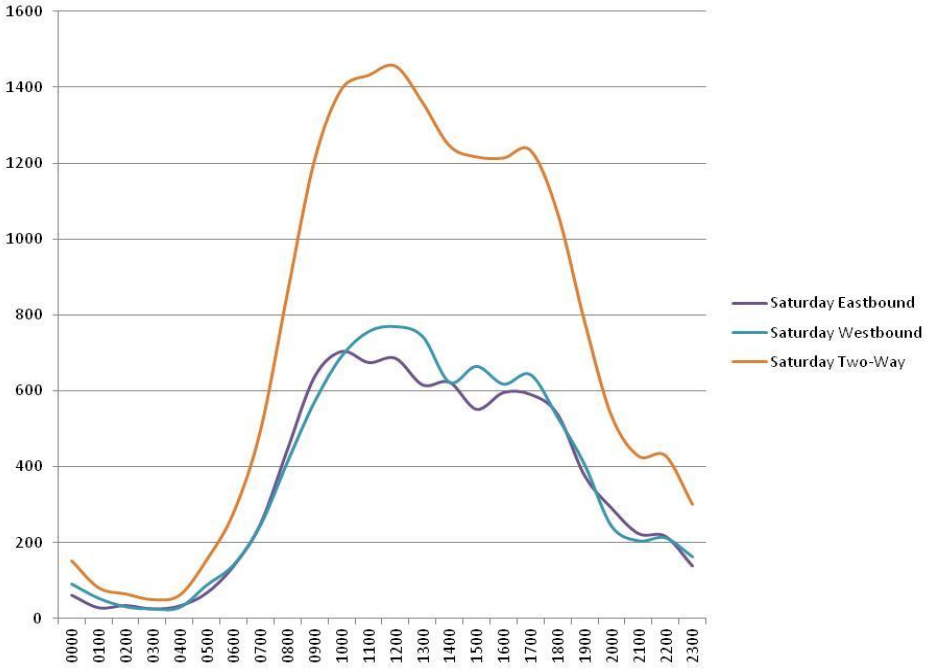
6.71 Review of the ATC data, shown graphically below, indicates two pronounced peaks exist during a typical weekday that correlate with the traditional peak periods of 08:00 to 09:00hrs and 17:00 to 19:00hrs. The weekday data indicates that traffic volumes in each direction on the A283-Storrington Road are broadly balanced throughout the day but particularly during the morning peak period.

6.72 The Saturday observations indicate traffic volumes that are typically around 30-70% less than the weekday equivalent flows, which is to be expected given the absence of travel-to-work and travel-to-school trips. The profile indicates a surge in demand occurring throughout the morning and tailing off throughout the afternoon and into the evening. This suggests that people broadly depart around the same sort of time in the morning but their return journeys correlate less well. This indicates a balance of routine trips (such as shopping trips involving short journeys and stays) and longer day trips that might involve a destination located further afield and/or with a longer stay involved.

Graph 6-1
Observed Weekday Traffic Demand Profile



Graph 6-2
Observed Saturday Traffic Demand Profile



6.73 In order to identify peak scenarios on which to consider the highway capacity and safety effects of the proposed development, the EIA has taken the observed peak demand at the Hamper's Lane junction onto the A283-Storrington Road as this is the part of the study area highway network that

would be most sensitive to any changes in traffic demand. In this way, the MTC survey results undertaken at the junction have been used to determine peak demand at the junction.

6.74 On this basis, the weekday morning peak has been determined to be 07:45 to 08:45hrs whilst the evening peak demand occurs at 16:30 to 17:30hrs. These times have been adopted as the baseline flows for the purposes of considering peak hour capacity in the highway network, later in this Chapter.

Traffic Growth

6.75 In order to project future traffic volumes, the existing volumes are traditionally "grown", or *factored* up, to replicate ambient "background" traffic growth up to a specified future year scenario. In the case of this assessment, the final year of construction has been assessed as 2015, when restoration activities shall occur concurrently with extractive processes. A future year assessment has also been undertaken assuming a horizon year of 2019 to coincide with the final year of operations.

6.76 On this basis, traffic growth factors have been applied to the surveyed traffic flows using uplift factors derived from NTM AF09 data, having been adjusted using TEMPRO local factors for all roads in the Storrington sub region. The resultant growth factors are shown in the table below.

Table 6-4
Tempro Traffic Growth

	Construction Year (2013 to 2015)	Horizon Year (2013 to 2019)
AM Peak	1.0338	1.0831
PM Peak	1.0369	1.0894

6.77 The resultant 'baseline' traffic flows are shown on the diagrams in Appendix 6-4. The development trip generation identified earlier in this Chapter under the heading of 'Development Proposals' has been applied to the baseline flows in order to indicate a 'with development' traffic scenario and these are shown in the drawings contained at Appendix 6-5.

Highway Infrastructure (Capacity)

6.78 In Agreement with the Highway Authority, capacity analysis has been undertaken for the Hamper's Lane junction onto Storrington Road, using the industry-standard analysis software, PICADY.

6.79 The PICADY software uses accepted empirical formulae derived from known relationships between junction geometry and traffic demand to determine the operating capacity of a junction. The program provides numerous measurements within its output but those that are most indicative of the

overall level of operation are the Ratio of Flow to Capacity (RFC) and the inclusive vehicle delay.

6.80 The RFC is provided as an indicator of a junction's performance against capacity shown on a numerical scale where '1' represents capacity. Therefore, where an RFC of less than '1' is returned, the junction is calculated to be within capacity. Conversely, where an RFC of greater than '1' is calculated, junction capacity is calculated to be breached.

6.81 The detailed results of the baseline capacity analyses are provided in Appendix 6-6, whereas the most pertinent outputs are summarised within the Tables below.

Table 6-5
Baseline Operation – AM Peak

Movement	2015		2019	
	RFC	Delay (Mins/Veh)	RFC	Delay (Mins/Veh)
Hamper's Lane Left Turn	0.061	0.12	0.065	0.12
Hamper's Lane Right Turn	0.022	0.31	0.025	0.34
A283-Storrington Road	0.025	0.13	0.028	0.13

Table 6-6
PM Baseline Operation – AM Peak

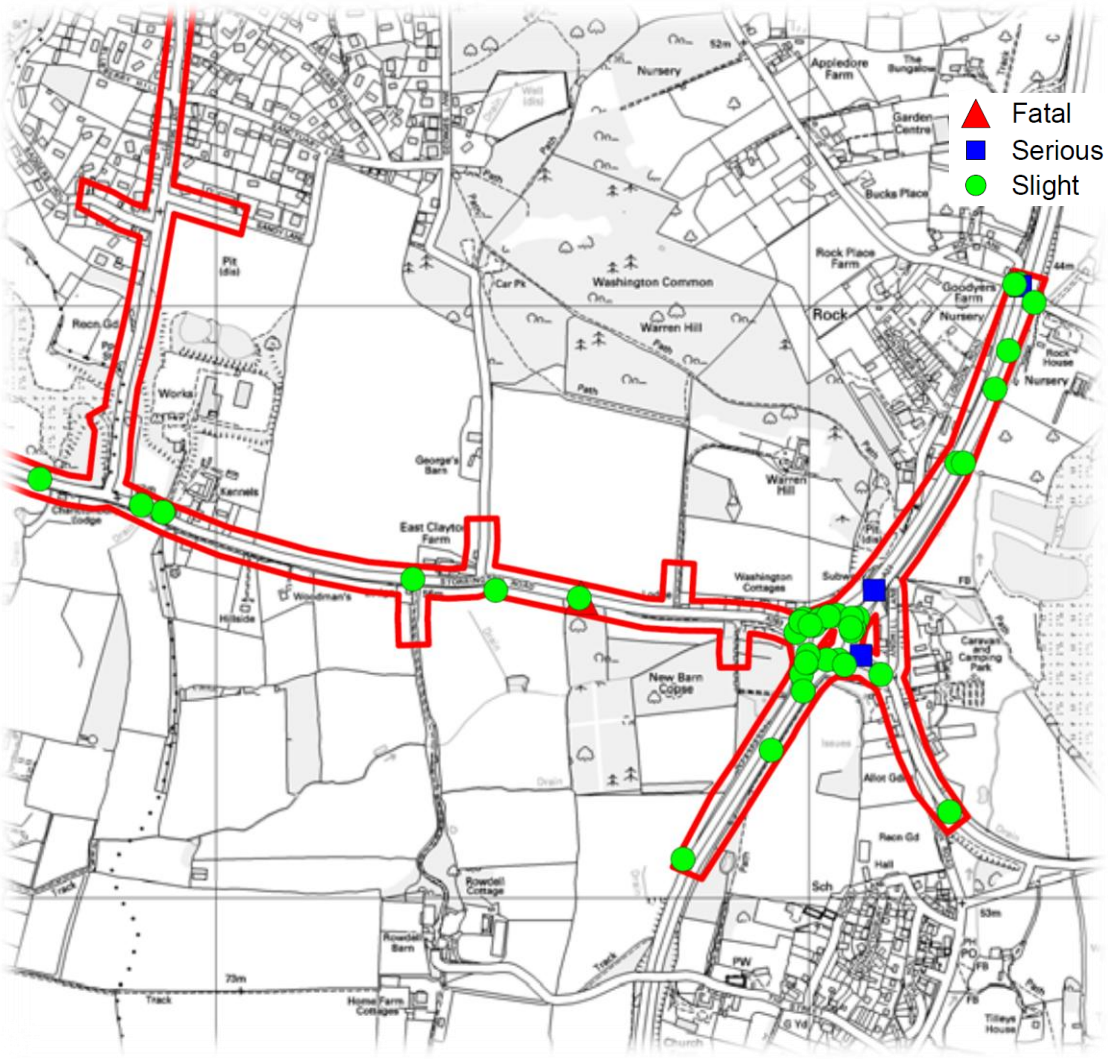
Movement	2015		2019	
	RFC	Delay (Mins/Veh)	RFC	Delay (Mins/Veh)
Hamper's Lane Left Turn	0.082	0.11	0.085	0.11
Hamper's Lane Right Turn	0.032	0.28	0.036	0.31
A283-Storrington Road	0.104	0.14	0.111	0.14

6.82 Review of the above outputs indicates that the A327/B3016 junction is anticipated to operate significantly below traditionally accepted thresholds of capacity in both weekday peak hours, in both baseline scenarios. Indeed, the maximum RFC is shown to be just 0.111 which is suggestive of the junction operating with around 90% reserve capacity.

Highway Infrastructure (Safety Risks)

6.83 Personal Injury Accident (PIA) data has been obtained from the Sussex Safer Roads Partnership for the most recent five-year period available at the time of the request: this being 1st June 2008 to 31st May 2013. The raw data is provided at Appendix 6-7 whilst the below Figure shows the location and severity of incidents within the study network.

Figure 6-10 PIA Plot



Background Analysis

6.84 The data indicates a total of 34 accidents occurred within the study area highway network over the specified period. Of these, the overwhelming number (31) accidents resulted in injuries classified as “slight”, with two resulting in “serious” injuries and one “fatality”. It should be noted at this stage that the fatality occurred as a result of an intoxicated pedestrian walking within the carriageway of the A283-Storrington Road during hours of darkness. The accident was therefore entirely unrelated to highway geometry and can be excluded from this analysis.

6.85 Throughout the study area road network the typical frequency of accidents was 6.8 accidents per annum although, as the table below indicates, with what appears to be higher rates of accidents between 2010 and 2012. The

2013 data is incomplete but the pro-rata increase suggests an annual accident rate of around 4 incidents.

Table 6-7
PIA by Year & Severity

Year of Incident	Severity of Injury		
	Slight	Serious	Fatal
2008	3	0	0
2009	3	1	1
2010	9	0	0
2011	5	1	0
2012	9	0	0
2013	2	0	0

6.86 Further analysis of the accidents was undertaken in order to assess the main contributory factors that may have led to the accidents occurring. The results are summarised in the below.

Table 6-8
PIA Contributory Factors by Year

Contributory Factor	Year of Incident						
	2008	2009	2010	2011	2012	2013	Total
Rear-end Collision	3	2	5	5	5	0	20
Influence of Alcohol	0	1	0	0	0	0	1
Isolated Incident	0	1	0	1	0	0	2
Medical Reasons	0	1	1	0	0	0	2
Poor Lane Behaviour	0	0	2	0	1	1	4
Failure to Give-Way	0	0	1	0	1	1	3
Animal in Road	0	0	0	0	1	0	1
Reaction to Emergency Vehicle	0	0	0	0	1	0	1
Total	**3**	**5**	**9**	**6**	**9**	**2**	

6.87 The above data indicates that the main feature involved rear-end collisions, accounting for almost 60% of all accidents. These kinds of accidents are common at most forms of junctions and the risk of such accidents is expected to increase as traffic demand increases. Two other features of note include the aspect of drivers failing to give-way to on-coming traffic or poor lane discipline, both of which may be attributable to the layout of the highway. Together, these accounted for a further 21% of accidents.

6.88 Hence, those accidents that may be attributable to the layout or operation of the highway network account for around 80% of all accidents occurring over the specified period. The balance of accidents occur for a variety of reasons, including drivers reacting to stray animals in the road or the sudden

occurrence of a medical condition that affected the driver's ability to control their vehicle.

6.89 Taking into context the volume of traffic on the highway network, one would anticipate that the concentration of accidents would occur at the busiest intersections on the network. Indeed, this is borne out within the data which shows the overwhelming number of accidents (65%) occurring at the A24 Washington Roundabout.

6.90 The distribution of accidents is shown below against injury severity. It should be noted that no accidents were reported to have occurred at the junction where the site access connects onto Hamper's Lane. In the context of the Hamper's Lane junction onto the A283-Storrington Road, the only incident occurred as a result of the driver suffering a temporary black-out leading to the vehicle striking the nearside kerb and colliding with the bus shelter.

Table 6-9
PIA Locations & Severity of Injury

	Severity of Injury			
Jct. Name	Slight	Serious	Fatal	Total
A283/ Hampers Lane	1	0	0	1
A283/Kennels	1	0	0	1
A283/Farm Track	1	0	0	1
A283/Georges Lane	1	0	0	1
A283/A24 Roundabout	2	0	0	2
Northern A24 Roundabout Approach	5	1	0	6
Eastern A283 Roundabout Approach	4	1	0	5
Southern A24 Roundabout Approach	5	0	0	5
Western A283 Roundabout Approach	6	0	0	6
A283/Sandhill Lane	1	0	0	1
Away from influence of Junction	3	0	1	4

IHT Risk Assessment Matrix

6.91 A risk assessment matrix is commonly used to evaluate and quantify the risk of conflicts and collisions occurring. In simple terms, the "risk" of an accident occurring is related to the "likelihood" that a conflict will arise and the resultant severity of the conflict. The "likelihood" is related to various factors, including vehicle demand, the speed of traffic and the geometric properties of the highway. The severity of a collision is determined by impact speeds, the types of vehicles involved in the collision and the protection afforded to victims. The resultant "risks" are categorised within the standard matrix below as "low", "medium", "high" or "very high".

Figure 6-11 IHT Risk Assessment Matrix

		Incident frequency			
		> Once a year (Frequent)	Between 1-3 years (Occasional)	Between 4-7 years (Rare)	Between 8-20 years (Very rare)
Severity	Fatal	*Very high*	*High*	*High*	*Medium*
	Serious	*High*	*High*	*Medium*	*Medium*
	Slight	*High*	*Medium*	*Medium*	*Low*
	Damage	*Medium*	*Medium*	*Low*	*Low*

6.92 Typically it is accepted that a “low” risk is immaterial and consideration of mitigation would not be required. Where “medium” risk ratings are indicated, mitigation is not pre-requisite but practical solutions should be considered where possible. “High” risk ratings indicate that mitigation would be “desirable” whereas a “very high” risk would require immediate intervention.

6.93 In the context of the study highway network, the worst case safety “risk” occurs at the A24 Washington Roundabout, as previously specified. Relating the frequency and severity of incidents against the above matrix indicates that there is a “high” risk of “slight” injuries and a “medium” risk of serious injury accidents.

6.94 In view of the very small trip generation that would be associated with the proposed development it is improbable that the development would cause the risk of accidents to be reclassified and hence the effect of the development in safety terms would be immaterial.

EFFECTS OF DEVELOPMENT

Introduction

6.95 Despite the fact that the hourly trip generation identified previously at Section 2.0 of this report are clearly low in the context of highway capacity and safety, this section of the report sets out the relative increase in trips above baseline traffic levels, incorporating the permitted residential development allowed under reference DC/10/1457. Using this evidence, the report determines the likely significance of the environmental effects of traffic.

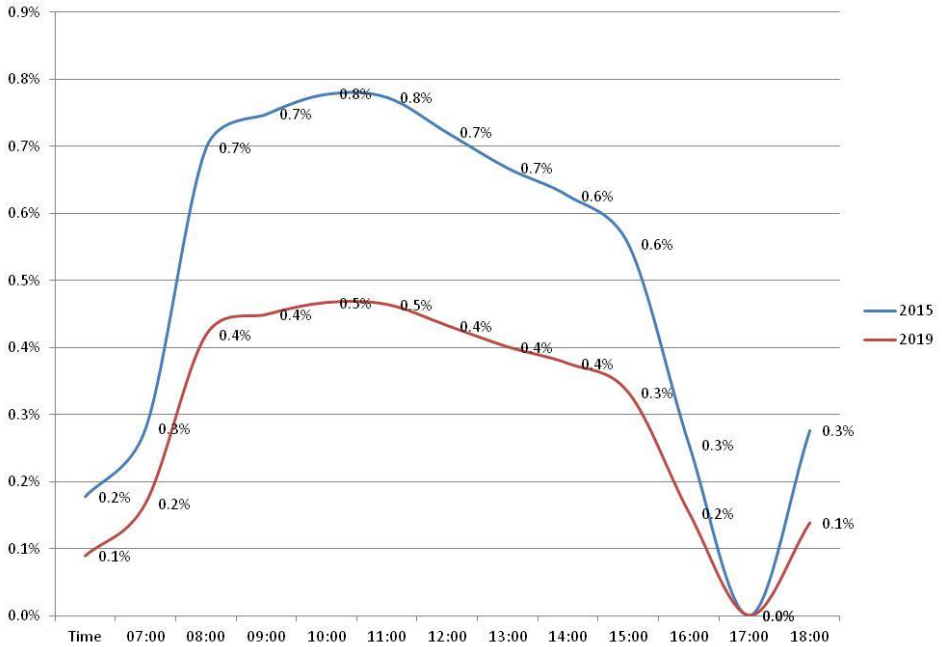
Traffic Effects

6.96 The effect of the development in respect of traffic flows has been qualified previously within this Chapter of the ES, under the title 'Development Proposals'.

6.97 In accordance with the guidelines for Environmental Assessment of Road Traffic (IEA, 1993), the daily profile of development related traffic demand has been evaluated in the context of ambient flow conditions in order to identify the period when the absolute level of impact is at its greatest and to illustrate the impact during those periods when the greatest level of change is likely to occur.

6.98 In this way, the effect of the proposed development traffic flows has been overlain onto the observed traffic flows for robustness. The resultant analysis is shown in the Graph below.

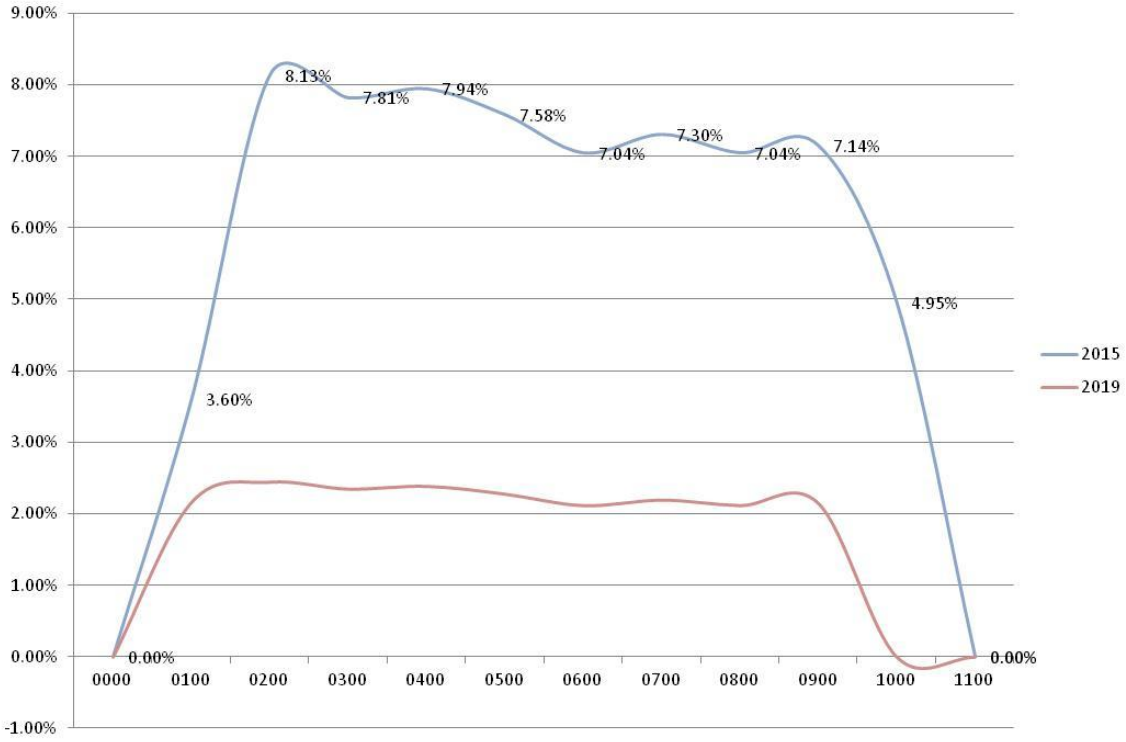
Graph 6-3
Relative Impact – Total Traffic



6.99 Based on the above results, the greatest impact of development traffic would occur in the 2015 scenario at 10:00hours, with a peak increase in traffic flow of 0.8%. At the same time, the impact in 2019 is calculated as 0.5%.

6.100 The relative increase in goods vehicle traffic is shown in the below graph. It indicates that there would be a peak increase of 190% on the A327 south of the junction with Welsh Drive at 14:00hrs, and an increase of 25% occurring north of the same junction. However, it is noted that this increase is on a relatively low baseline and, as discussed below, there are no sensitive receptors within the study area.

Graph 6-4
Relative Impact – HGV Traffic



6.101 Guidance on the significance of the change in traffic flows is given by the Environmental Assessment of Road Traffic, which asserts that projected changes in total traffic of less than 10% would create no discernible environmental impact. Where the impacts are greater than this, however, the guidance advocates the use of two broad criteria to define where impacts may be considered to be discernible and which would identify a need to undertake more detailed consideration of the environmental effects of traffic. The thresholds are as follows:-

1. Highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%); or
2. Sensitive areas where traffic flows will increase by 10% or more.

6.102 There is no area within the immediate locality that is considered to be sensitive in the context of IEA Guidance but, nevertheless, the above

analysis confirms that the effect of such movements would be significantly below the 10% threshold on all highway links for which traffic flows have been recorded.

6.103 Consequently, it is concluded that the proposed development would not result in any discernible impact in this location, and it therefore follows that any environmental impacts would be both insignificant and immaterial.

Highway Capacity Effects

6.104 Capacity analysis has been undertaken of the junction incorporating Hamper's Lane and the A283-Storrington Road under the heading of 'Highway Infrastructure (Capacity)', which concluded there to be ample reserve capacity in the junction.

6.105 In order to assess the effects of the additional traffic movements on junction capacity, the established models have been updated by input of the 'with development' scenario traffic flows and the detailed results are provided at Appendix 6-6. The below tables summarise the salient outputs.

Table 6-10
Baseline Operation – AM Peak

Movement	2015		2019	
	RFC	Delay (Mins/Veh)	RFC	Delay (Mins/Veh)
Hamper's Lane Left Turn	0.083	0.13	0.079	0.13
Hamper's Lane Right Turn	0.022	0.31	0.025	0.34
A283-Storrington Road	0.050	0.17	0.044	0.16

Table 6-11
PM Baseline Operation – PM Peak

Movement	2015		2019	
	RFC	Delay (Mins/Veh)	RFC	Delay (Mins/Veh)
Hamper's Lane Left Turn	0.100	0.12	0.102	0.12
Hamper's Lane Right Turn	0.058	0.29	0.050	0.31
A283-Storrington Road	0.109	0.14	0.111	0.14

6.106 Review of the above outputs indicates that junction is anticipated to operate well below traditionally accepted thresholds of capacity in both weekday peak hours, in both scenarios. Indeed, the maximum RFC is shown to be just 0.111, which remains unchanged from the baseline scenario: the effect of development being limited to those movements that operate with lower RFC values.

6.107 In respect the effect of delay to vehicles, the above results indicate that the development would increase delay to vehicles by a maximum of 2.4 seconds (0.04 change x 60 seconds = 2.4) in the weekday morning peak and by less than 1 second in the evening peak hour. Such changes would be entirely indiscernible to existing road users and the effect of development is therefore immaterial.

Highway Safety Effects

6.108 In view of the magnitude in the change in traffic and in combination with the fact that the highway network would continue to operate at broadly the same level compared to the baseline scenario, it is concluded that there would be no material or significant worsening of highway safety risks as a result of the proposed development.

6.109 Consequently, the proposed development is considered to be acceptable in the context of highway safety.

RESIDUAL IMPACTS

6.110 Taking into account all the factors assessed in this section, a final analysis of the impacts resulting from the proposed development has been undertaken and is summarised in the table below.

Table 6-12
Summary of Impacts

Potential Impact	Impact Duration	Significance	Mitigation	Residual Impact
Construction Impacts	Temporary	Nil	Nil	Nil
Highway and Junction Capacity	Permanent	Minor Adverse	Nil	Nil
Driver Delay	Permanent	Minor Adverse	Nil	Nil
Road Safety	Permanent	Minor Adverse	Nil	Nil
Pedestrian / Cyclist Amenity	Permanent	Minor Adverse	Nil	Nil
Detritus on Highway Network	Permanent	Moderate Adverse	Good management practice	Nil
Public Rights of Way	Permanent	Minor Adverse	Nil	Nil

6.111 In view of the above, it is concluded that the proposed development would result in a minor adverse effect from a transportation perspective. However, the effects of the development are considered to give rise to an insignificant impact given that all changes could be accommodated without material detriment to the environment.

SUMMARY & CONCLUSIONS

Chapter Summary

6.112 This Chapter of the ES has been written in order to assess the environmental impacts associated with a proposed continuation of mineral extraction and a revised restoration of the existing Washington Sandpit, Hamper's Lane, Storrington. The findings of the assessment may be summarised as follows:-

- The Site currently has a temporary planning consent to extract material until December 2013. The development considered by this comprises the continuation extractive activities until December 2015 with concurrent restoration until 2015, requiring the importation of and assumed 270,000 cubic metres of material.

- The geometry and safety risks associated with the existing highway network have been appraised and the Chapter has concluded that there is no deficiency in the layout of the highway that is contributing to an adverse safety risk. Nor is there any evidence that suggests that the operation is materially contributing to the safety performance of the network.

- In line with scoping discussions, the trip generation of the construction and operational phases of development have been considered against a baseline scenario that omits the trip generation of the existing facility. The trip generation has been calculated on a first principles basis to reflect the average situation throughout the year.

- The relative increase in traffic has been considered in the context of IEA Guidance and it has been concluded that any change is immaterial in the context of the environmental effects of transport, and that this is particularly the case given that there are no sensitive receptors within the study area.

- A review of accidents was undertaken for a five-year study period which confirmed no unacceptable safety risk on any part of the highway network.

- Capacity analyses were undertaken of the Hamper's Lane / A283-Storrington Road junction and this indicates that the junction will operate with around 90% reserve capacity in the 2019 baseline scenario, and that this would broadly remain the same with the development in place.

Chapter Conclusion

6.113 It is the conclusion of this ES Chapter that the proposed development could be adequately accommodated without any material detriment to the operation of the highway network or the environment.

CLOSURE

6.114 This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

6.115 This report is for the exclusive use of 'Britaniacrest Recycling Ltd'; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

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