

## **11 Transport Assessment**

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# 11 Transport Assessment

## 11.1 Introduction

This Transport Assessment (TA) has been undertaken to inform the Environmental Impact Assessment (EIA) process as part of the detailed planning application for the proposed Eastside development. This chapter assesses the likely effects of the development on both public and private transport, in order to ensure that any impacts arising as a result of the development are mitigated.

This chapter describes the findings of the TA, with all modelling and figures from the TA available in Appendix H.

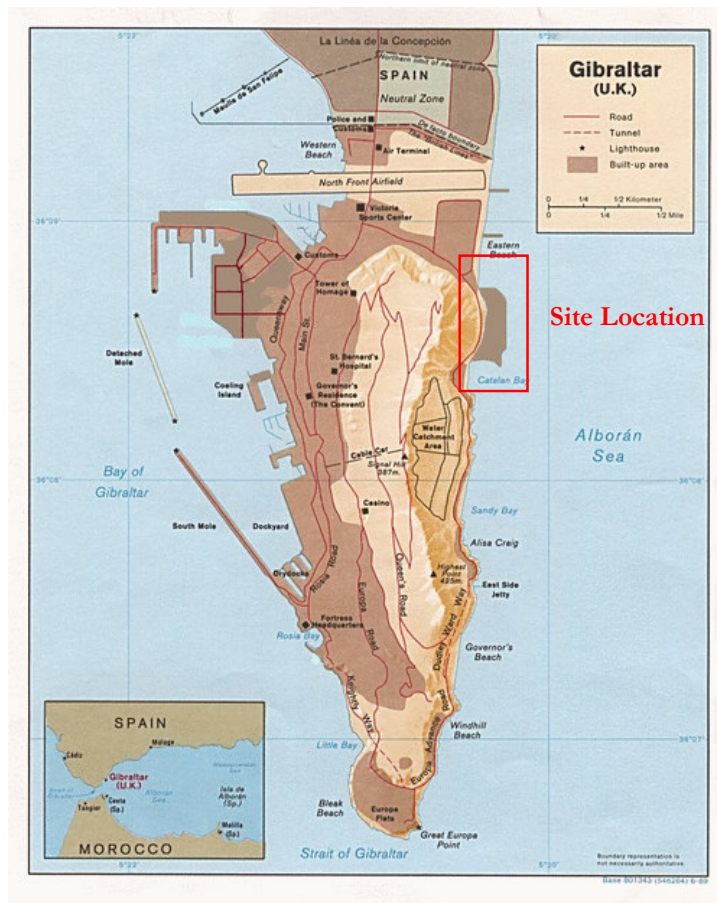
### 11.1.1 Eastside Development Proposals

This section describes the proposed Eastside development, including its land-uses and parking provision. The transport strategy for the proposed development is designed to minimise disruption to the existing road network by providing efficient access from the main road and to create effective parking and servicing facilities within the development.

### 11.1.2 Proposed Land Use

The proposed Eastside development would result in a large-scale prestigious mixed-use (with residential lead) complex on reclaimed land. The site location plan of the development is shown in Figure 11.1 below.

**Figure 11.1 Location of the Proposed Eastside Development**



The development would include a mixture of land-uses including residential, retail, leisure, commercial and hotel. Table 11.1 below summarises the land-use schedule on which the transport assessment has been based, and the associated parking to be provided. The development would be implemented continuously over the next 12 years or so, starting from the southern end and continuing northward.

**Table 11.1 Modelled Development Details**

Land Use	Allocated Units / Floorspace	Associated Parking
Residential	2,567 dwellings	1 space / dwelling + 68 additional spaces
Hotel	49,235 sq m	Shared-use of the public car park and kerbside parking
Retail	24,968 sq m	Shared-use of kerbside parking and public car park
Commercial/office	19,370 sq m	Reserved car park of 100 spaces.  30 reserved spaces within the residential parking.  Shared-use of kerbside parking and public car park
Public car park	-	500 spaces
Kerbside parking	-	170 spaces

### 11.1.3 *Scheme yield update*

The transport assessment has been based on the figures given above in Table 11.1, which reflect a design freeze. The scheme yield was amended marginally at a late stage in the reporting process.

The only effective difference between the amended scheme yield and that modelled is a reduction in the hotel Gross Floor Area. Given the timetabling of this submission, it was considered acceptable to continue using the original yield, as the transport assessment would be modelling a worse-case scenario.

The figures for the proposed latest scheme yield are given below in Table 11.2. The amended scheme shows a reduction in area in one of the apartment hotels of the development. There is also a reduction in gross residential floor-space, but as the residential aspect of the development was based on the number of residential parking spaces and these remain unchanged this will have no impact.

The latest scheme provides a 250 space public car park as part of the proposal. However, an additional 250 space public car park will be provided by the Government of Gibraltar (GoG) adjacent to the northern boundary of the site, at Eastern Beach. Thus, there will be no material difference to the parking provision in the transport assessment.

*Table 11.2 Application Development Details*

Land Use	Allocated Units / Floorspace	Associated Parking
Residential	2,567 dwellings	1 space / dwelling + 68 additional spaces
Hotel	31,364 sq m	Shared-use of the public car park and kerbside parking
Retail	25,000 sq m	Shared-use of kerbside parking and public car park
Commercial/office	19,190 sq m	Reserved car park of 100 spaces.  30 reserved spaces within the residential parking.  Shared-use of kerbside parking and public car park
Public car park	-	250 spaces
Kerbside parking	-	170 spaces

#### 11.1.4 *Proposed Access:*

##### *Vehicular Access*

Five accesses are proposed to the Eastside development, of which two would be sign-posted as the main accesses. This new road layout is presented on Figure 11.2 (bound at the back of this chapter). The two sign-posted main accesses would be at both the northern and southern ends of the site, with three further secondary access roads at intermediary points for access into the development.

The northern access road would join the existing Eastern Beach Road junction and this existing priority junction would be upgraded to a roundabout junction. Further information relating to the northern access roundabout is given below.

The current design illustrates that this southern access would not be placed on the main road; the new access would be provided from Catalan Bay Road on the eastern side, adjacent to the Sir Herbert Miles Road / Catalan Bay Road junction. This would potentially reduce disruption to the existing junction on the main road. There are other operational implications of this access to the Sir Herbert Miles Road / Catalan Bay Road junction and these will be assessed and discussed in Chapter 5 of the full TA in Appendix H.

For the purpose of this assessment the accesses have been numbered from one through to five, with the northern access roundabout as 'Access One' through to the southern access as 'Access Five'.

It is proposed that land reclamation and road construction would be completed prior to building construction. The construction programme would be continuous and occupation of each building is assumed to take place shortly after construction is complete. Adjacent vehicular access would be available for the associated operational traffic.

Once the site is fully operational, the northern access would be the main access, as this links to the town centre and Spanish border, from where most traffic would be arriving.

##### *Northern Access Roundabout*

Proposals currently exist for a new Airport Road, running broadly parallel to the existing Eastern Beach Road. It is understood that these proposals are at a very early stage of

development and given the lack of information and certainty surrounding the new road, its associated impacts on traffic flows and trip distribution patterns have not been considered.

Thus, this assessment only considers the local impacts of the development proposals and has not been prepared to form a sound basis for the parallel assessment of the proposed new Airport Road.

However, conceptual designs have been drafted by Gifford on behalf of GoG, which show this Airport Road in place. The roundabout to be assessed would essentially be a large roundabout, as shown in Figure 11.3, bound at the back of this chapter, but with the Airport Road arm essentially blocked off. This assessment tests the proposed northern roundabout with base and development flows.

*11.1.5 Proposed Access: Pedestrian*

Pedestrian access would be provided adjacent to all vehicular accesses.

*11.1.6 Proposed Car Park*

The proposed development is situated to the north of Catalan Bay. The existing parking area on the reclaimed land would become part of the Eastside development site. These parking grounds, together with some 100 spaces near the access to the development and Eastern Beach Road would be lost to the development. The affected existing parking is shown in pink in Figure 2.3 of the full TA in Appendix H. Removal of on-street parking would promote an enhanced vehicular access road to the site and be redeveloped to be used more effectively.

Current proposals for car parking for the residential part of the Eastside development are at 1 space / dwelling. There would also be 68 additional parking spaces available for visitors to the residential part of the development as referenced in Table 11.2. In addition to these provisions, there would also be two public car parks with a combined capacity of 500 spaces (250 spaces to the north of the site and 250 spaces in the south section of the site) to replace existing parking and to provide visitors' parking.

An additional 100 spaces would also be provided for commercial parking, with the suggested distribution of these shown in Table 11.3 below, as well as 30 spaces within the residential units being available to commercial parking.

***Table 11.3 Suggested Distribution of Commercial Parking***

<b>Development Plot</b>	<b>Number of spaces</b>
DP05	15
DP06	25
DP10	10
DP12	25
DP15	25

There would also be around 170 additional on-street parking bays for use by residents and visitors to the development. Parking provision for beach visitors would remain unaffected.

The proposed public car parking, though providing a similar level of potential capacity, would have an advantage over the existing parking. It would be a managed car park with marked spaces, which means that parking capacity would be achievable as visitors would be guided to park neatly to maximise potential. Spaces would also be more centrally located, allowing for a quicker turnover between a car leaving and another car arriving; thus, more

spaces would readily be available. The proposed parking would also include adequate parking spaces for disabled visitors.

#### 11.1.7 *Cycle and Motorcycle Parking*

There is not a defined policy on cycle parking requirements in Gibraltar, but consideration of the provision of cycle facilities would promote an environmentally friendly development. Cycle parking spaces may be provided for both the residential part of the development and further cycle parking for the commercial parts. These spaces could be shared with motorcycle / scooters, commonly used in Gibraltar.

Furthermore, it has been assumed that mopeds and motorcycles would be able to share the general car park and on-street parking; for the purposes of the assessment it has been considered that two mopeds/motorcycles could fit into one standard parking space as a minimum.

#### 11.1.8 *Servicing*

With such a large development, servicing at Eastside would be required for all parts of the development. A servicing area designed to accommodate a range of small to medium-sized delivery vehicles would need to be provided, especially near to the retail and restaurant spaces, and it should be incorporated into the masterplanning of the internal layout of the development.

## 11.2 **Assessment Methodology**

### 11.2.1 *Assessment Methodology*

The transport assessment methodology adopted in the preparation of this Transport Assessment (TA) involves a number of stages:

- Survey Situation – junction assessment with existing transport scenario;
- Baseline Situation – junction assessment with existing transport scenario with estimated additional beach trips;
- Development Trips – these are calculated from trip rates of similar land uses and applied to the baseline traffic;
- Construction Traffic – this is estimated from the construction programme, and the HGV trips are added to the base and development traffic for the relevant scenario;
- All junction assessments were undertaken using established Transport Research Laboratory (TRL) transport engineering software including Priority Intersection Capacity and Delay (PICADY) and Assessment of Roundabout Capacity and Delay (ARCADY), with the indicator of capacity given as Ratio to Flow Capacity (RFC); and
- As the survey data showed that the average highest flows around the site occurred between 16:00 – 19:00, the junction analyses (with development) were undertaken for an average hour between these times, for both average weekday and weekend.

### 11.2.2 *Assumptions*

The following sections (11.2.3 – 11.2.18) briefly describe the assumptions that were made to assess the impact of Eastside on the local road network.

### 11.2.3 *Construction Programme and Traffic*

The construction of Eastside will be a continuous process, although it is likely that the construction traffic would access the site at different locations during the two different Stages of the development.

During construction at the southern end of the development, traffic would access the site at a temporary haul route. Construction vehicles were estimated to be 260 one-way trips to the site per work day, using the construction programme (see Chapter 6 of the full TA in Appendix H) as reference. It was estimated that ten percent of these would visit the site during an average peak hour between 16:00 and 19:00. These were converted to Passenger

Car Units (PCUs) for the purposes of the assessment, using a factor of 2.5. All construction trips were assumed to arrive from the Spanish border, and were assumed to arrive on site by a temporary haul route via a priority junction, off Catalan Bay Road, into the site.

#### 11.2.4 *New Junctions*

Two new signed main accesses into the development are proposed. The northern access road would be the main access connecting to the existing Eastern Beach Road junction and this junction would be amended to a roundabout junction. Further discussion surrounding this junction can be found in Section 11.1.4.

Another new main access is proposed at the southern end of the development, which would also require junction layout changes. This junction would remain as a t-junction, with a right-hand turn only out of Catalan Bay Village Road onto Catalan Bay Road. There are also three additional secondary accesses proposed, between the southern and northern parts of the site. These would be right-hand turn exit only from the site and available before the start of the building construction. The proposed changes to the local road layout can be seen on Figure 11.2.

To assess these new access junctions, PICADY and ARCADY software are used. Figure 11.3 shows the preliminary design for the northern access roundabout, which complies with deflection standards, whilst Figure 5.1 in Appendix H shows the southern access. Design Manual for Roads and Bridges (DMRB)<sup>1</sup> was used as a basis for the outline design, taking into account the geometric constraints and existing road layout in the area.

#### 11.2.5 *Traffic Growth*

As little new development is proposed on Gibraltar due to the lack of space, and given that the population has remained relatively stable in recent years, no road traffic growth is assumed from the base to the development opening year.

#### 11.2.6 *Beach Trips*

As the traffic surveys were undertaken during the quieter autumn season, a lot of the beach traffic normally occupying three popular beaches on the east of Gibraltar (Sandy Bay, Catalan Bay and Eastern Beach) was not counted. To ensure that these trips were represented in the analysis, an estimation of beach visitation profiles was estimated using information provided by GoG, along with the availability of parking for the beaches, in order to estimate an arrival and departure profile. This was subsequently added to the surveyed traffic flow. Currently, beach visitors park in an ad hoc fashion on site and on nearby roads, with capacity for around 500 vehicles. These visitors would be able to park in the proposed car park with 500 spaces, within the development.

#### 11.2.7 *Both Worlds Residential Development*

The Both Worlds Development is proposed by ABCO Ltd at the southern end of Sandy Bay between the shoreline and Sir Herbert Miles Road. The development comprises some land reclamation and coastal protection works to facilitate the construction of 65 two-, three- and four-bed apartments, a swimming pool and 170 car parking spaces.

The junctions have been considered with these additional development trips in order to produce a robust case.

#### 11.2.8 *Base Scenarios Tested*

Two different base scenarios were considered during the assessment procedure:

- 1 Surveved traffic;
- 2 Base traffic – surveved traffic plus estimated peak beach traffic.

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<sup>1</sup> Volume 6 Section 2 Part 3 (Roundabout) and 6 (Priority Junction), Design Manual for Roads and Bridges

### 11.2.9 *Future Scenarios Tested*

Two different scenarios were considered during the assessment procedure:

- 1 2015 – Occupation of DPs 1 – 8, with construction traffic on-going;
- 2 2020 – Full occupation of the site.

### 11.2.10 *Trip Distribution*

To study the impact of the estimated development trips on the surrounding highway, these trips have been distributed into the highway network based on the existing pattern of traffic, as well as the building arrangement within the development.

Residents and visitors to the development would probably have a varied purpose of trips and may be attracted to different parts of Gibraltar or to Spain; this is taken into account in the forecast northern / southern access split and direction of the trips at the Sundial roundabout. The strategic distribution of road traffic as percentages can be seen in Figures 5.2 to 5.10 (see Appendix H) for the residents and visitors of each scenario respectively, including for the proposed development at Both Worlds.

The vast majority of trips were assumed to arrive from Devil's Tower Road. Dudley Ward Way Tunnel Road (between Sir Herbert Miles Road and Europa Advance Road) remains closed due to a rock fall in 2002.

The resident trip distribution was calculated by dividing the site into 5 land parcels per access and calculating the total number of apartments in each as a proportion of the site total. This figure then became proportions of the total to use the relevant access points. The combined traffic flows for future year scenarios, with the Eastside development completed as well as base and committed development flows, are shown diagrammatically in Figures 5.11 to 5.13 (see Appendix H) for weekdays during 2015 with construction and operational traffic and 2020 fully operational.

### 11.2.11 *Trip Generation and Trip Rates*

In order to study the traffic impact of the proposed Eastside development, the potential vehicle trip generation from the development will first need to be estimated. As the development site was previously undeveloped, used only for informal car parking and the tipping of rubble waste, the only existing trips generated are the beach-related trips and occasional delivery of rubble waste.

Since the delivery of rubble waste is insignificant compared to other road traffic volumes, these trips are not included in the site trip generation assessment. As such, all trips generated by the proposed development will therefore be assumed as a net increase in traffic volumes associated with the site.

As a starting point in the assessment of site trip generation, it would have been preferable to determine the person trip generation by applying known trip generation rates from similar developments in Gibraltar. However, GoG does not hold any such trip rate data.

Thus, with no trip generation data available in Gibraltar, the UK TRICS (Trip Rate Information Computer System) database has been interrogated to select appropriate trip rates to estimate potential trip generation. This is likely to give higher trip rates than those in Gibraltar, due to the level of vehicular access between parts of the UK. Higher trips rates will provide a robust assessment.

Where knowledge of local Gibraltar travel patterns and behaviours is known and/or substantiated by observations and/or guidance, the likely effects of these on UK-based trip rates and associated patterns have been considered and incorporated into the modelling accordingly.

Traffic generation of each land-use type is reviewed separately. For each of the land-uses, a number of sub-land use types and their lists of sites were reviewed. There are limited sites in



TRICS which possess similar characteristics of the development, thus sites were selected as the best matches available when compared with other generic similarities to the different parts of the development. Combined effects of the operations therein will be studied at the end of this chapter.

As referenced in Section 11.1, the scheme yield assessed in this section reflects that of the design freeze, which includes an area of the apartment hotels more recently excluded from the application yield. Otherwise, there are no other material differences.

#### 11.2.12 *TRICS Database*

The TRICS database contains data relating to various types of development across the U.K. (and also recently the Republic of Ireland).

With a development of such a scale and with a mixture of land-uses, it is acknowledged good practice not to use a single source in the existing database to determine the potential trip rates for an assessment if this can be avoided.

There are four main elements in the proposed development: hotel, residential, retail and commercial. Traffic generation patterns associated with the various elements vary and therefore they have been studied separately. Linkages between the different uses have been considered subsequently.

#### 11.2.13 *Residential Trips*

The privately owned flats and holiday accommodation sub-categories under the residential land-use main category were initially interrogated. However, having reviewed the sites, a 'normal' U.K. residential development is not considered comparable to a seaside home in Gibraltar, nor is a camping or caravan site.

Thus, as an alternative, the marina sites in the TRICS database were reviewed to ascertain whether any could be analogous in terms of providing residential accommodation. Although a marina does not currently form part of the development, the trips generated by residents may share some characteristics to that of a marina-based residential development due to the holiday nature and anticipated part-time occupancy rates.

There are approximately 29 sites under the marina category of the TRICS database. However, after reviewing the detail of the sites, most of these sites are relatively small in size or lack significant private housing, thus were not considered appropriate to represent the proposed Eastside development residential units.

The two sites considered the best matches to the proposed residential element within the development were Marina Village Hythe in Southampton and Brighton Marina Village. The key similarities of these sites to the proposed site were:

- They represent mixed-use marina sites which cover an extensive area;
- They both include residential properties within the site; and
- The Brighton site has a similar level of parking provision to the proposed development (no data was available for the Southampton site).

Both sites show a similar traffic arrival and departure pattern. As such, average trip rates (per hectare) are shown in Table 11.4 overleaf.

**Table 11.4 Average Trip Rates per Hectare**

Time Range	Trip Rate / Hectare		
	Arrival	Departure	Total
00:00-01:00	0.35	0.51	0.86
01:00-02:00	0.15	0.80	0.95
02:00-03:00	0.10	0.12	0.22
03:00-04:00	0.08	0.08	0.16
04:00-05:00	0.19	0.05	0.24
05:00-06:00	0.33	0.17	0.50
06:00-07:00	0.35	0.17	0.52
07:00-08:00	1.73	0.63	2.36
08:00-09:00	2.83	1.25	4.08
09:00-10:00	3.64	1.98	5.62
10:00-11:00	4.19	2.76	6.95
11:00-12:00	4.40	3.46	7.86
12:00-13:00	4.61	3.89	8.50
13:00-14:00	4.23	3.94	8.17
14:00-15:00	3.87	4.36	8.23
15:00-16:00	3.94	4.57	8.51
16:00-17:00	3.81	4.99	8.80
17:00-18:00	3.82	5.56	9.38
18:00-19:00	3.72	4.46	8.18
19:00-20:00	2.81	3.47	6.28
20:00-21:00	1.96	2.55	4.51
21:00-22:00	1.08	1.56	2.64
22:00-23:00	0.62	1.25	1.87
23:00-24:00	0.43	0.87	1.30

Traffic generation is relatively low in the morning at the typical peak period. Arrival rates increase after the morning peak period and maintain a similar level. Departure rates increase steadily during the day until 17:00 when both arrival and departure trips reach a peak. Traffic levels gradually quieten down after 18:00.

Trip generation profiles per hectare and per parking space show similar patterns. As trip rate per hectare varies with the density of the development, it could not accurately represent potential trips generated from this development. Hence, it is more realistic to adopt trip rates per parking space and apply these to the Eastside site. However, no information on parking provision for Marina Village Hythe is supplied on TRICS.

The Brighton Marina site has trip rates based on parking and hence has been adopted for traffic generation estimation. Tables 11.5 and 11.6 shows trip rates per car parking space for the Brighton site.

**Table 11.5 Trip Rates per Parking Space for Weekday**

Time Range	Trip Rate / Parking space		
	Arrival	Departure	Total
00:00-01:00	0.01	0.02	0.03
01:00-02:00	0	0.01	0.01
02:00-03:00	0	0.01	0.01
03:00-04:00	0	0	0
04:00-05:00	0.01	0	0.01
05:00-06:00	0.02	0.01	0.03
06:00-07:00	0.03	0.01	0.04
07:00-08:00	0.13	0.05	0.18
08:00-09:00	0.18	0.1	0.28
09:00-10:00	0.24	0.15	0.39
10:00-11:00	0.29	0.21	0.5
11:00-12:00	0.29	0.25	0.54
12:00-13:00	0.31	0.29	0.6
13:00-14:00	0.3	0.28	0.58
14:00-15:00	0.26	0.33	0.59
15:00-16:00	0.26	0.3	0.56
16:00-17:00	0.28	0.35	0.63
17:00-18:00	0.32	0.36	0.68
18:00-19:00	0.3	0.32	0.62
19:00-20:00	0.22	0.27	0.49
20:00-21:00	0.14	0.18	0.32
21:00-22:00	0.08	0.1	0.18
22:00-23:00	0.04	0.09	0.13
23:00-24:00	0.03	0.06	0.09

**Table 11.6 Trip Rates per Parking Space for Saturday**

Time Range	Trip Rate / Parking space		
	Arrival	Departure	Total
00:00-01:00	0.03	0.04	0.07
01:00-02:00	0.01	0.02	0.03
02:00-03:00	0.01	0.01	0.02
03:00-04:00	0.01	0.01	0.02
04:00-05:00	0.01	0	0.01
05:00-06:00	0.02	0.01	0.03
06:00-07:00	0.03	0.01	0.04
07:00-08:00	0.16	0.05	0.21
08:00-09:00	0.27	0.12	0.39
09:00-10:00	0.38	0.22	0.6
10:00-11:00	0.5	0.33	0.83
11:00-12:00	0.51	0.42	0.93
12:00-13:00	0.53	0.46	0.99
13:00-14:00	0.48	0.41	0.89
14:00-15:00	0.48	0.45	0.93
15:00-16:00	0.44	0.48	0.92
16:00-17:00	0.44	0.55	0.99
17:00-18:00	0.37	0.62	0.99
18:00-19:00	0.35	0.47	0.82
19:00-20:00	0.25	0.33	0.58
20:00-21:00	0.21	0.21	0.41
21:00-22:00	0.11	0.16	0.27
22:00-23:00	0.07	0.13	0.2
23:00-24:00	0.05	0.1	0.15

TRICS surveys for the Brighton Marina Village (BMV) were carried out prior to its full completion, thus the trip generation based on the TRICS database represents only part of the overall development. As mentioned, the trip rates associated with BMV represent a variety of land uses, including retail trip rates, and therefore the trip rates presented in TRICS would need to be adjusted accordingly.

#### *Brighton Marina Village – site visit*

After further consideration of the size and nature of the proposed development, BMV was considered to be the best match for Eastside. However, there were some uncertainties in the site information provided in the TRICS database, thus a site visit was undertaken to confirm if BMV continued to be suitable.

There were some differences between observation on site and information in the database, particularly in terms of available parking spaces and inclusion of other land-uses on site. The site visit report with details of these differences is presented in Appendix H.

BMV is a mixed-use marina development consisting of 800 residential properties, a cinema, hotel, fitness centre, bowling alley, supermarket, casino / nightclub, restaurants and 40 outlet shops. The marina also contains a boat yard and berthing facilities for approximately 1,500 boats.

The site visit took place between 09:30 and 11:30 on Wednesday 7th December 2005. Traffic activity on the marina was very low and the multi-storey car park was about 10% full. These observations are likely attributable to it being winter, a weekday morning when leisure facilities are not well used, and with shops tending to open only at around 10:30 a.m.

The biggest trip attractor at this time of the day appeared to be the supermarket, with the associated car park approximately 80% occupied. Parking for the residential areas remained at about 70% occupied, but relatively few residential-related vehicle movements were observed.

#### *Comparison with TRICS data*

The TRICS data for BMV is based on 14 different survey days, seven of which were undertaken in June 1985 and the other seven during April in 1990. The marina was only partially built on each of the two occasions, with the land-use and size of the marina likely to have changed over this time. The 1990 data, being closer to the 1992 completion date, have significantly higher overall trip rates. There is also a more significant peak for trips on weekends compared to weekdays. As such, this assessment has used 1990 trip data.

#### *Trip Rate Estimation*

As the size and the composition of land-uses at the proposed Eastside development are different from BMV, it is not appropriate to apply trip rates from BMV to the development as a whole. The retail outlet nature of BMV is not a suitable comparison for the retail in the proposed development; therefore, trip rates at BMV have been adjusted to deduct retail trips, with the remaining trips assumed to be residential trips from BMV and these have been applied to estimate residential trips for Eastside.

The trip rates for retail outlet units were again taken from the TRICS database to allow for deduction from the overall BMV trip rates. There are 7 factory outlet centre sites within the database; two of the sites were discounted given their small nature and with little parking.

After further consideration TRICS data for Festival Park (FP), Ebbw Vale in Wales, was selected to represent the trip generation for the retail part of Brighton Marina. There are similarities between the two retail complexes:

- FP has around 40 outlet shops and a restaurant with seating for 200, with a size similar to that at BMV; and
- Free parking for around 700 cars (at the time of survey) is provided for visitors at FP, a level of provision similar to BMV.

However, the principal reason for selecting FP was due to the fact that the trip generation per parking space was the lowest compared to the other sites. As retail trips were then

subtracted from the total BMV trips to obtain residential trips, lower retail trips have maximised the trip estimation for residential and thus continues to be conservative.

The calculated resultant trip rates per parking space from the BMV residential development are presented in Tables 11.7 and 11.8 for weekdays and weekends respectively. Saturday trip rates were relatively higher than Sunday and used to represent the weekend's trips as a worst case scenario.

**Table 11.7 Resultant Residential Trip Rates for Weekdays**

Time Range	Trip rate / Parking space		
	Arrival	Departure	Total
00:00-01:00	0.01	0.02	0.03
01:00-02:00	0.00	0.01	0.01
02:00-03:00	0.00	0.01	0.01
03:00-04:00	0.00	0.00	0.00
04:00-05:00	0.01	0.00	0.01
05:00-06:00	0.02	0.01	0.03
06:00-07:00	0.03	0.01	0.04
07:00-08:00	0.13	0.05	0.18
08:00-09:00	0.16	0.09	0.25
09:00-10:00	0.13	0.11	0.24
10:00-11:00	0.10	0.12	0.22
11:00-12:00	0.08	0.10	0.18
12:00-13:00	0.12	0.11	0.23
13:00-14:00	0.12	0.10	0.22
14:00-15:00	0.05	0.12	0.17
15:00-16:00	0.07	0.10	0.17
16:00-17:00	0.12	0.13	0.25
17:00-18:00	0.24	0.11	0.35
18:00-19:00	0.30	0.31	0.61
19:00-20:00	0.22	0.27	0.49
20:00-21:00	0.14	0.18	0.32
21:00-22:00	0.08	0.10	0.18
22:00-23:00	0.04	0.09	0.13
23:00-24:00	0.03	0.06	0.09

**Table 11.8 Resultant Residential Trip Rates for Weekends**

Time Range	Trip rate / Parking space		
	Arrival	Departure	Total
00:00-01:00	0.03	0.04	0.07
01:00-02:00	0.01	0.02	0.03
02:00-03:00	0.01	0.01	0.02
03:00-04:00	0.01	0.01	0.02
04:00-05:00	0.01	0.00	0.01
05:00-06:00	0.02	0.01	0.03
06:00-07:00	0.03	0.01	0.04
07:00-08:00	0.16	0.05	0.21
08:00-09:00	0.25	0.11	0.36
09:00-10:00	0.21	0.17	0.38
10:00-11:00	0.25	0.21	0.46
11:00-12:00	0.20	0.22	0.42
12:00-13:00	0.21	0.2	0.41
13:00-14:00	0.10	0.10	0.20
14:00-15:00	0.07	0.10	0.17
15:00-16:00	0.10	0.08	0.18
16:00-17:00	0.25	0.15	0.40
17:00-18:00	0.26	0.23	0.49
18:00-19:00	0.35	0.46	0.81
19:00-20:00	0.25	0.33	0.58
20:00-21:00	0.21	0.21	0.41
21:00-22:00	0.11	0.16	0.27
22:00-23:00	0.07	0.13	0.20
23:00-24:00	0.05	0.10	0.15

#### 11.2.14 Retail / Leisure Trips

TRICS data at FP or BMV could not be used for the retail and commercial parts of the Eastside development, as they are outlet stores by nature which differ to the Eastside development. Marina sites in the TRICS database were not considered suitable either as the shops, bars and facilities on site were all marina oriented.

Two sites in the mixed shopping centre sub-category were chosen from the main retail land-use category to represent the retail trip generation. These were selected as they are both 'edge of town centre' in a similar way to Eastside, and were the only sites in TRICS in this category that were larger than 10,000 sq metres. These sites were in East Sussex and County Antrim, with a Gross Floor Area (GFA) of 14,693 and 13,556 sq metres respectively. Unfortunately, there was no weekend survey for the East Sussex site, so the ratio was taken between the Antrim survey on the weekday and weekend, and applied to the combined trip rates for weekday.

Two business parks were used to represent the office/commercial aspect of the development. These sites were in Buckinghamshire and Oxfordshire, and were selected as they have minimal industrial aspect to their constituent developments, and with a GFA of 13,300 and 33,105 sq metres respectively were comparable in size to the commercial component of Eastside at 19,370 sq metres.

Appendix 6 presents TRICS output details on the above sites used for the retail and commercial sites. Tables 11.9 – 11.11 show the average trip rates per 100 sq m (gross floor area) for retail and office development on weekdays and retail only for weekends respectively. These trip rates will be applied to estimate the combined trips attracted to these uses.

**Table 11.9 Retail Trip Rates for Weekdays per 100 sq m GFA**

Time Range	Trip rate		
	Arrival	Departure	Total
00:00-01:00	0.919	0.783	1.702
01:00-02:00	1.654	1.123	2.777
02:00-03:00	1.961	1.253	3.214
03:00-04:00	2.329	1.851	4.180
04:00-05:00	2.520	2.092	4.612
05:00-06:00	2.428	2.460	4.888
06:00-07:00	2.312	2.545	4.857
07:00-08:00	2.283	2.326	4.609
08:00-09:00	2.241	2.223	4.464
09:00-10:00	2.188	2.453	4.641
10:00-11:00	2.025	2.120	4.145
11:00-12:00	1.777	1.851	3.628
12:00-13:00	1.547	1.604	3.151
13:00-14:00	0.775	1.409	2.184
14:00-15:00	0.919	0.783	1.702
15:00-16:00	1.654	1.123	2.777
16:00-17:00	1.961	1.253	3.214
17:00-18:00	2.329	1.851	4.180
18:00-19:00	2.520	2.092	4.612
19:00-20:00	2.428	2.460	4.888
20:00-21:00	2.312	2.545	4.857
21:00-22:00	2.283	2.326	4.609
22:00-23:00	2.241	2.223	4.464
23:00-24:00	2.188	2.453	4.641

**Table 11.10 Commercial Trip Rates for Weekday per 100 sq m GFA**

Time Range	Trip rate		
	Arrival	Departure	Total
00:00-01:00	0	0	0
01:00-02:00	0	0	0
02:00-03:00	0	0	0
03:00-04:00	0	0	0
04:00-05:00	0	0	0
05:00-06:00	0	0	0
06:00-07:00	0	0	0
07:00-08:00	0.737	0.074	0.811
08:00-09:00	1.948	0.199	2.147
09:00-10:00	1.194	0.323	1.517
10:00-11:00	0.327	0.176	0.503
11:00-12:00	0.267	0.263	0.530
12:00-13:00	0.517	0.871	1.388
13:00-14:00	0.776	0.627	1.403
14:00-15:00	0.338	0.390	0.728
15:00-16:00	0.218	0.559	0.777
16:00-17:00	0.176	1.078	1.254
17:00-18:00	0.192	1.532	1.724
18:00-19:00	0.069	0.628	0.697
19:00-20:00	0	0	0
20:00-21:00	0	0	0
21:00-22:00	0	0	0
22:00-23:00	0	0	0
23:00-24:00	0	0	0

**Table 11.11 Retail Trip Rates for Weekends per 100 sq m GFA**

Time Range	Trip rate		
	Arrival	Departure	Total
00:00-01:00	0	0	0
01:00-02:00	0	0	0
02:00-03:00	0	0	0
03:00-04:00	0	0	0
04:00-05:00	0	0	0
05:00-06:00	0	0	0
06:00-07:00	0	0	0
07:00-08:00	1.36	1.16	2.52
08:00-09:00	2.45	1.67	4.12
09:00-10:00	2.91	1.86	4.77
10:00-11:00	3.45	2.74	6.20
11:00-12:00	3.74	3.10	6.84
12:00-13:00	3.60	3.65	7.25
13:00-14:00	3.43	3.77	7.20
14:00-15:00	3.38	3.45	6.83
15:00-16:00	3.32	3.30	6.62
16:00-17:00	3.24	3.64	6.88
17:00-18:00	3.00	3.14	6.15
18:00-19:00	2.63	2.74	5.38
19:00-20:00	2.29	2.38	4.67
20:00-21:00	1.15	2.09	3.24
21:00-22:00	0	0	0
22:00-23:00	0	0	0
23:00-24:00	0	0	0

The beach trips estimated in Section 11.3.6 are assumed to remain the same and these vehicles are likely to park in the public car parks. The retail stores are provided with the residents, visitors to the development and beach-goers in mind. Thus, it is highly likely that a significant proportion of the trips attracted to the shops are either generated internally or linked to visitors' trips to the beach or other facilities. To avoid double counting, it is assumed that 50% of the retail generated trips would be either internal or linked.

Also, as many Gibraltarians live and work within proximity of each other, a large proportion typically have the scope to walk to work, as can be seen from the GoG Census 2001<sup>2</sup>. To represent this, a small factor of 5% was applied to the commercial trips to represent those people who would live and work on site.

#### 11.2.15 Hotel Trips

The Eastside hotel element is composed of a 300 room hotel with a GFA of 21,364 sq metres, and two serviced hotel apartments with a combined GFA of 27,871 sq metres. Due to the very different nature of the two components, different trip rates were applied to each.

For the hotel element, TRICS was again interrogated for analogous sites. Two hotel surveys were selected - the Hanover International Hotel in Cardiff and the De Vere Hotel in Cambridge. These were selected as they are at the larger end of the range of hotels on the TRICS database at 7,700 and 8,100 sq metres respectively, and are not considered to be 'budget' hotels. They both also occupy an 'edge of town centre' location, with the Hanover Hotel in Cardiff being in Atlantic Wharf, a redevelopment analogous to Eastside and only 5 minutes from Cardiff Bay. Both hotels welcome a mixture of tourist and business guests. Both sites are also served by local bus services. Table 11.12 gives the trip rates used for the standard hotel element of the development, based on the number of rooms.

For the apartment hotels, residential trip rates have been used as it was felt that trip arrival and departure patterns would be more analogous to a residential development, particularly those used as 'holiday' homes or weekend work bases (see Tables 11.7 and 11.8)

Table 11.12 shows the estimated trip rates associated with the hotel for both weekday and weekend.

**Table 11.12 Hotel Trip Rates for Weekends and Weekdays**

Time Range	Trip rate/parking space		
	Arrivals	Departures	Total
00:00-01:00	0	0	0
01:00-02:00	0	0	0
02:00-03:00	0	0	0
03:00-04:00	0	0	0
04:00-05:00	0	0	0
05:00-06:00	0	0	0
06:00-07:00	0	0	0
07:00-08:00	0.09	0.08	0.17
08:00-09:00	0.10	0.11	0.21
09:00-10:00	0.10	0.09	0.19
10:00-11:00	0.09	0.09	0.18
11:00-12:00	0.15	0.12	0.27
12:00-13:00	0.12	0.12	0.24
13:00-14:00	0.07	0.09	0.17
14:00-15:00	0.07	0.12	0.19
15:00-16:00	0.16	0.08	0.24
16:00-17:00	0.06	0.12	0.19
17:00-18:00	0.14	0.09	0.23
18:00-19:00	0.11	0.10	0.21
19:00-20:00	0	0	0
20:00-21:00	0	0	0
21:00-22:00	0	0	0
22:00-23:00	0	0	0
23:00-24:00	0	0	0

<sup>2</sup> [http://www.gibraltar.gov.gi/gov\\_depts/Statistics/Census\\_of\\_Gibraltar\\_2001.pdf](http://www.gibraltar.gov.gi/gov_depts/Statistics/Census_of_Gibraltar_2001.pdf)



#### 11.2.16 *Gibraltar 2001 Census – Private Vehicle Usage*

Gibraltar, along with many parts of Southern Europe, has very high usage of mopeds and motorbikes in comparison to the mainland UK. Typically, in the UK motorbike use (as main mode) is estimated at around 3% of total trips<sup>3</sup> whereas the Gibraltar 2001 Census<sup>4</sup> states that around 37% of private vehicles are motorbikes or mopeds, and that 40% of all vehicular journeys to work are undertaken by this mode.

Therefore, in order to ensure that the assessment remains site specific, vehicular trips have been differentiated between the types of vehicles, namely cars, motorbike/moped and goods vehicles. These vehicles are converted into PCUs to examine the actual impact on road usage.

Thus, for each of the land uses the trips were separated out in the following proportions:

- Cars – 58%, PCU factor of 1
- Motorbikes/Mopeds – 37%, PCU factor of 0.4
- Service Vehicles – 5%, PCU factor of 2

Beach trips were all assumed to be made by car to represent the existing trips.

Factoring in service vehicles ensures the assessment remains robust, as in reality they would avoid accessing the site during peak periods. 5% service vehicles during the peak has been assumed, against a surveyed backdrop of 1% of local general traffic.

To ensure the assessment remains robust, at this stage no reduction in trips was made to allow for cyclists or those using public transport as no objective quantification could be gauged of the regular use of these modes.

#### 11.2.17 *Development Generated Traffic Flows – Combined Effect*

The high quality of the Eastside development and the favourable taxation status of Gibraltar are both likely to attract many overseas investors to buy an investment or holiday home, so full occupancy is unlikely at any one time, even in high summer.

The analysis above is therefore a worst-case scenario and ensures a robust assessment. The analysis was based on the parking provision of 1 parking space per dwelling for the proposed residential element (and the additional parking provided for visitors) with the trips for commercial and retail based on GFA and those for hotel based on the number of rooms or apartments.

Average vehicle trip rates for the typical morning peak hour (08:00-09:00) and evening peak hour (17:00-18:00) would normally be applied for analysis of the traffic impact. However, taking into account the nature of a beach town, the daily profile shows that AM peaks are not as sensitive and daily peaks would tend to occur during 16:00 to 19:00. As traffic peaks at different times for different types of land-use, cumulative impact needs to be considered at a combined peak.

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<sup>3</sup> *Focus on Personal Travel*, (National Travel Survey 2002/ 2003) DfT, 2005 edition, Office of National Statistics

<sup>4</sup> [http://www.gibraltar.gov.gi/gov\\_depts/Statistics/Census\\_of\\_Gibraltar\\_2001.pdf](http://www.gibraltar.gov.gi/gov_depts/Statistics/Census_of_Gibraltar_2001.pdf)

As referenced during the analysis, the trip linking effect has been taken into account for retail and commercial trips to avoid over-estimation. Accordingly, trips estimated in thus far have been added to yield the total trip generation for the development as a whole.

Tables 11.13 – 11.14 below and overleaf show the estimated PCU trips for the proposed development for weekdays and weekends respectively, based on estimated demand to the site. Beach trips are also included as these trips would be accessing the car parks within the development.

**Table 11.13 Estimated Weekday PCU Trips Generated by the Whole Development**

Time Range	Estimated no. of trips		
	Arrival	Departure	Total
00:00-01:00	23	46	70
01:00-02:00	0	23	23
02:00-03:00	0	23	23
03:00-04:00	0	0	0
04:00-05:00	23	0	23
05:00-06:00	46	23	70
06:00-07:00	70	23	93
07:00-08:00	532	227	759
08:00-09:00	872	382	1253
09:00-10:00	717	457	1174
10:00-11:00	552	519	1071
11:00-12:00	537	518	1055
12:00-13:00	674	671	1345
13:00-14:00	926	631	1557
14:00-15:00	539	629	1168
15:00-16:00	695	597	1292
16:00-17:00	560	818	1378
17:00-18:00	878	952	1830
18:00-19:00	918	1170	2088
19:00-20:00	670	914	1584
20:00-21:00	405	642	1047
21:00-22:00	186	281	467
22:00-23:00	93	212	305
23:00-24:00	70	139	209

*Table 11.14 Estimated Weekend PCU Trips Generated by the Whole Development*

Time Range	Estimated no. of trips		
	Arrival	Departure	Total
00:00-01:00	68	91	159
01:00-02:00	23	46	68
02:00-03:00	23	23	46
03:00-04:00	23	23	46
04:00-05:00	23	0	23
05:00-06:00	46	23	68
06:00-07:00	68	23	91
07:00-08:00	529	247	776
08:00-09:00	869	441	1310
09:00-10:00	869	595	1464
10:00-11:00	1233	777	2010
11:00-12:00	902	842	1743
12:00-13:00	907	852	1759
13:00-14:00	772	665	1437
14:00-15:00	631	640	1271
15:00-16:00	607	568	1175
16:00-17:00	916	774	1690
17:00-18:00	1008	1144	2153
<b>18:00-19:00</b>	<b>1088</b>	<b>1548</b>	<b>2636</b>
19:00-20:00	806	1153	1959
20:00-21:00	597	735	1309
21:00-22:00	251	373	623
22:00-23:00	159	296	456
23:00-24:00	114	228	342

*11.2.18 Both Worlds Residential Development*

The Both Worlds Development is proposed by ABCO Ltd at the southern end of Sandy Bay between the shoreline and Sir Herbert Miles Road. The development comprises some land reclamation and coastal protection works to facilitate the construction of 65 two-, three- and four-bed apartments, a swimming pool and 170 car parking spaces.

The junctions have been considered with these additional development trips in order to produce a robust case.

The trip rates used for this development were those used for the residential component of Eastside, as presented in Tables 11.7 and 11.8, based on the proposed figure of 170 parking spaces. The potential trips generated by this development can be seen in Tables 11.15 and 11.16. To ensure a robust assessment, all Both World trips were assumed to be made by car.

*Table 11.15 Estimated Weekday Trips Generated by Both Worlds*

Time Range	Estimated no. of trips		
	Arrival	Departure	Total
00:00-01:00	2	3	5
01:00-02:00	0	2	2
02:00-03:00	0	2	2
03:00-04:00	0	0	0
04:00-05:00	2	0	2
05:00-06:00	3	2	5
06:00-07:00	5	2	7
07:00-08:00	22	9	31
08:00-09:00	27	15	43
09:00-10:00	22	19	41
10:00-11:00	17	20	37
11:00-12:00	14	17	31
12:00-13:00	20	19	39
13:00-14:00	20	17	37
14:00-15:00	9	20	29
15:00-16:00	12	17	29
16:00-17:00	20	22	43
17:00-18:00	41	19	60
<b>18:00-19:00</b>	<b>51</b>	<b>53</b>	<b>104</b>
19:00-20:00	37	46	83
20:00-21:00	24	31	54
21:00-22:00	14	17	31
22:00-23:00	7	15	22
23:00-24:00	5	10	15

*Table 11.16 Estimated Weekend Trips Generated by Both Worlds*

Time Range	Estimated no. of trips		
	Arrival	Departure	Total
00:00-01:00	5	7	12
01:00-02:00	2	3	5
02:00-03:00	2	2	3
03:00-04:00	2	2	3
04:00-05:00	2	0	2
05:00-06:00	3	2	5
06:00-07:00	5	2	7
07:00-08:00	27	9	36
08:00-09:00	43	19	61
09:00-10:00	36	29	65
10:00-11:00	43	36	78
11:00-12:00	34	37	71
12:00-13:00	36	34	70
13:00-14:00	17	17	34
14:00-15:00	12	17	29
15:00-16:00	17	14	31
16:00-17:00	43	26	68
17:00-18:00	44	39	83
<b>18:00-19:00</b>	<b>60</b>	<b>78</b>	<b>138</b>
19:00-20:00	43	56	99
20:00-21:00	36	36	70
21:00-22:00	19	27	46
22:00-23:00	12	22	34
23:00-24:00	9	17	26

### **11.3**      ***Baseline Conditions***

#### **11.3.1**      *Introduction*

This section introduces the existing transportation provisions in the area of the development site, as well as for Gibraltar as a whole. The existing highway layout, level of traffic and parking provision are reviewed. The travel patterns and all available transport modes in the area, with reference to the frequencies in the vicinity of the development (where relevant), are also studied.

Traffic surveys were undertaken over a three-day period between 30th September and 2nd October, 2005, Thursday to Saturday. Results are summarised as observed flow at different time periods. These are analysed within this chapter, to show existing travel patterns.

#### **11.3.2**      *Existing Highway*

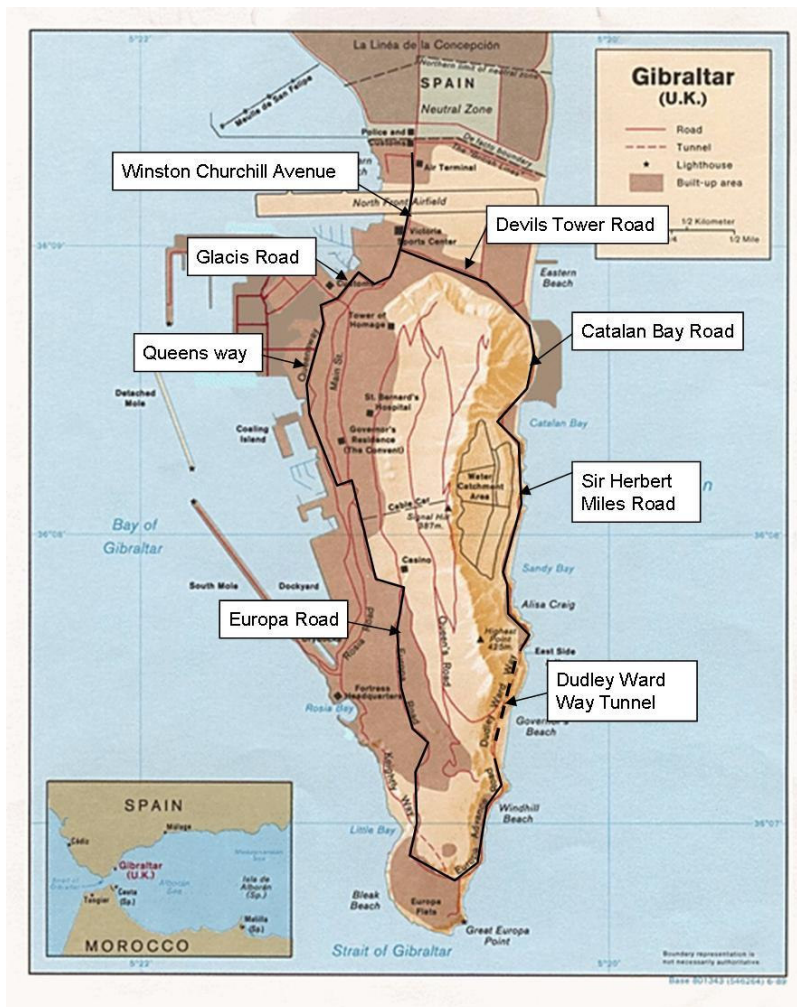
Gibraltar has a relatively simple road network with a strategic road running semi-circulatory around the Rock as the core of the highway, as shown in Figure 11.4. This route comprises Europa Road, Queens Way and Glacis Road in the west and Devil's Tower Road, Catalan Bay Road and Sir Herbert Miles Road in the east, connecting southwest and southeast via the north. The Dudley Ward Way Tunnel, between south of Sir Herbert Miles Road and Europa Advance Road, is currently closed as a result of rock falls in 2002. Access to the majority of the east coast is only via the north through Devil's Tower Road.

Winston Churchill Avenue links to this core of the highway network in a north-south direction. To the north it provides the only access by road across the airport runway and to the Spanish border. To the south it connects to the strategic main road to provide access to the centre of Gibraltar. As such, it is a key road.

Devil's Tower Road provides the main access from Winston Churchill Avenue and Glacis Road to the eastern side of Gibraltar. The Winston Churchill Avenue / Devil's Tower Road roundabout connects these three roads, connecting the Spanish border and Gibraltar town centre to the east coast of Gibraltar. The performance of the Winston Churchill Avenue roundabout (also known as Sundial Roundabout) will, therefore, be important in terms of access to and from the proposed development.

Winston Churchill Avenue crosses the main runway at Gibraltar airport, and the road is temporarily closed during plane take-off and landing. The closure is relatively infrequent, with queuing lasting around 20 minutes each time. This often results in the queue going beyond the Sundial Roundabout, affecting its operation.

Figure 11.4 - Strategic Roads in Gibraltar



11.3.3 Existing Traffic Level and Survey Results

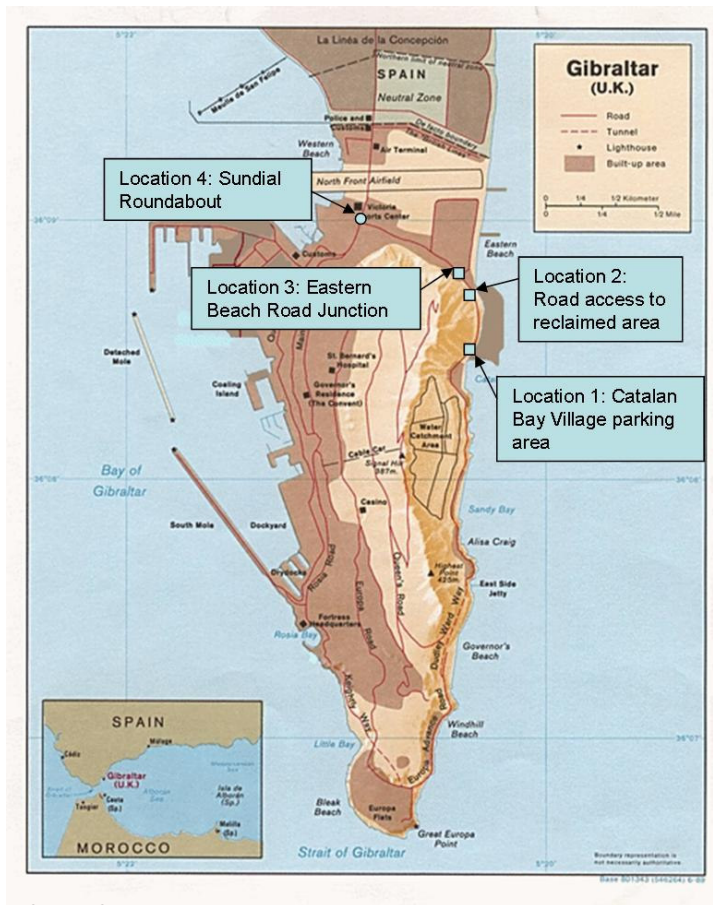
To determine the existing traffic conditions in the area, traffic surveys were arranged for both weekday and weekend periods. Following discussions with GoG, surveys were undertaken on 29th, 30th September and 1st October, 2005 – a consecutive three-day period of Thursday, Friday and Saturday. These were conducted between the hours of 07:30 and 19:00.

Survey Locations

The traffic surveys were undertaken at four locations as shown in Figure 11.5; all vehicle movements were noted at each location.

- *Location 1:* Junction with access to Catalan Bay, including access to the existing parking area on the reclaimed land, off Catalan Bay Road.
- *Location 2:* Also on Catalan Bay Road, north of Catalan Bay Village and the closed Dudley Ward Way tunnel, this location comprised two junctions leading to the same side road in the reclaimed area.
- *Location 3:* Devil's Tower Road/ Eastern Beach Road junction.
- *Location 4:* Winston Churchill Avenue/Devil's Tower Road roundabout (also known as Sundial Roundabout), which leads to the airport to the north and the city centre to the south.

**Figure 11.5 - Locations for Surveyed Junctions**



*Survey Outcome*

Survey results for the three days show similar flow patterns for each individual location. The peak hour, which is measured as the heaviest total flow for all traffic movements at all four locations, was determined for each survey day. Peak total flow on Thursday was observed between 18:00-19:00, Friday between 13:00-14:00 and Saturday between 17:00-18:00. The flows for these periods are presented in the summarised data.

Although each survey day was observed as having peak flow at a different hour, none of the peak hours has a significantly higher flow than the total traffic flow in the afternoon peak period. It was observed from the survey data that the total traffic for all four locations is still generally heavier in the afternoon, in particular between the hours of 16:00 and 19:00.

Also, each individual junction was observed as having the highest flow at a different time to the network peak hour flow. For example, Sundial Roundabout (location 4) has the highest

flow during the AM peak. There are also lower peaks throughout the day due to a number of reasons. These observations coincide with the information provided by GoG.

The data are summarised for all critical time periods to provide a better representation. The data are summarised in four different categories: the conventional AM (08:00-09:00) and PM (17:00-18:00) peak hours, average hourly flow during the busy afternoon period (16:00-19:00) and the peak hour for the particular day. Data are summarised as PCU, where PCU factors are applied to the different vehicle types.

The proportion of Heavy Goods Vehicle (HGV) traffic is extremely low, with less than 1% within the majority of the surveyed traffic movements; this may be explained by the lack of freight transport (such as that derived from shipping trade) and the existing roads not being suitable for HGVs. Most deliveries tend to be undertaken by Light Goods Vehicles (LGV) and Medium Goods Vehicles (MGV).

The summarised data is represented on network diagrams that are attached in Appendix H of the Environmental Statement (ES).

#### 11.3.4 *Existing Junction Assessment*

To determine the existing operational conditions of the area, it was first considered appropriate to analyse the performance of the Winston Churchill Avenue / Devil's Tower Road / Bayside Road Roundabout as it provides the main connections for access to the proposed development.

Two further local junctions have been analysed due to their proximity to the proposed development. These are:

- *Devil's Tower Road / Eastern Beach Road priority junction; and*
- *Sir Herbert Miles Road / Catalan Bay Road priority junction*

These two priority junctions currently provide direct access to local beaches and car parking along the eastern side of Gibraltar. Both will be affected by the proposed development. All three junctions have been surveyed as described in Section 11.3.3 above. New junctions will be dealt with in the next chapter.

As mentioned above, Winston Churchill Avenue is occasionally affected by the closure of the airport runway. This direct impact is not taken into account in the junction assessments presented below but measures will be set out in a later chapter to mitigate the impact.

#### *Data Collection and Analysis Software*

The industry-recognised PICADY and ARCADY software packages were used to perform the analysis.

Junction geometry was obtained from a 1:1000 scale drawing; photographs and notes from site visits undertaken between 29th September and 1st October 2005 were also used to provide further information such as road speeds and lane markings, as well as a general check of the geometry.

#### *Analysis of Survey Results*

Assessment seeks to replicate a worst-case scenario by taking the highest surveyed flow for each individual junction over the AM and PM peak period for each of the three days. Consequently, flows used do not represent a single day, but a combination of the days observed.

Table 11.17 provides a summary of the existing junction performance by 'ratio of flow to capacity' (RFC) for the modelled AM Peak (08:00-09:00) and PM Peak (17:00-18:00) periods on the day with the heaviest flow. Full result output is presented in Appendix 2.



**Table 11.17 Junction Analysis Result for Survey Traffic Flows**

Junction (Type)	Approach Arm or Turning Movement	RFC (%)	
		AM	PM
Winston Churchill Avenue / Devil's Tower Road (Sundial roundabout)	Winston Churchill Avenue - N. Arm	64.0	30.9
	Winston Churchill Avenue - S. Arm	33.7	44.5
	Devil's Tower Rd	25.3	30.5
Devil's Tower Road / Eastern Beach Road (Priority)	Eastern Beach Rd (Right-turn traffic)	7.8	36.2
	Eastern Beach Rd (Left -turn traffic)	0.5	7.3
	Devil's Tower Rd - N. Arm (Left turn to Eastern Beach Rd)	12.9	31.1
Sir Herbert Miles Road / Catalan Bay Road (Priority)	Catalan Bay Rd (Left turn to Sir Herbert Miles Rd)	5.2	5.3
	Catalan Bay Rd (Right turn to Catalan Bay Rd - N. Arm)	5.2	5.3
	Catalan Bay Rd - N.Arm (Straight to Sir Herbert Miles Road)	0.8	2.3
	Sir Herbert Miles Rd (Straight to Catalan Bay Rd - N. Arm)	0.8	2.3

Table 11.17 shows that the three junctions currently perform under capacity as expected. Winston Churchill Avenue (North Arm) experiences the highest RFC in the AM peak as would be expected, due to commuters travelling into the town centre; a similar trend is observed in the opposing direction in the PM peak.

As mentioned in Section 11.3.2, the assessment of the Sundial roundabout does not include the impact of the temporary closure at the airport runway. This currently leads to queues extending beyond the roundabout, but they tend to clear quickly once the route reopens and also tend to be infrequent.

### 11.3.5 Existing Surroundings

There are four beaches along the eastern coastline of Gibraltar, three of which are accessed from the north. These are Eastern Beach, Catalan Bay and Sandy Bay. The development site is located on reclaimed land between Catalan Bay and Eastern Beach. It is currently undeveloped but used to receive building and demolition rubble and for informal car parking.

The fourth beach is Governor's Beach, which can only be accessed from the south due to the closure of Dudley Ward Way Tunnel. As access to Governor's Beach is separate, trips associated with it would not enter into the traffic network within the vicinity of the proposed Eastside development.

Eastern Beach, Catalan Bay and Sandy Bay are particularly popular with the Gibraltarians from May to August. Though preferable to undertake the surveys during those months to capture the heaviest traffic of the year, the earliest opportunity to undertake the surveys was late September / early October hence between 29th September and 1st October 2005.

It was observed at the time of the survey that there continued to be people on the beaches, but not as many as would be expected during the busy months. Similarly, it is expected that a beachside development like the one being proposed would be particularly popular during the summer months and as such these would be the critical months in terms of traffic and resultant impacts.

Thus, the surveyed flow presented in Section 11.3.3 does not represent the traffic situation at the busiest period of the year. To avoid underestimation, additional trips to the three

beaches during the summer months have been estimated based on the information provided by GoG and the existing parking availability. Details of the estimation are presented in Section 11.3.6 below.

These additional beach trips, together with the surveyed flows, would replicate the estimated peak summer traffic condition in a worst-case scenario. For simplicity, the combined flow is referred to as the “base flow” throughout the report.

### 11.3.6 *Existing Parking and Associated Beach Trips* *Parking Provision*

At present, visitors going to Eastern Beach, Catalan Bay and Sandy Bay can park their cars either on-street along the nearby roads or on the available open area near the beaches. Neither of these parking areas are properly marked nor designed for car parking. There is little sign of parking controls present on the nearby roads.

Site observations have identified that there are various locations for parking near the three beaches which could potentially accommodate approximately 730 cars. About 55% of these parking spaces are on-street, around 235 are along Eastern Beach Road and Devil’s Tower Road, and another 110 spaces are on-street parking near Sandy Bay. The remainder are within the open spaces near the beach.

Figure 2.3 (see Appendix H) gives an approximate indication of the parking provision in the area, though it is noted that none of these spaces are properly marked as parking spaces. It is assumed that all vehicles attracted to the beach would park in one of these spaces as there are no other obvious alternatives.

#### *Beach Trip Patterns*

Assuming that all the parking areas and on-street parking become occupied, this would constitute an additional 730 cars on the road network. It is, however, highly unlikely that all cars would arrive and depart in the same hour, thus to study the impact of these trips to the existing road network it is important to consider the arrival and departure pattern of these areas.

Since arrival and departure data of the parking areas are not available for peak times of the year, parking occupancy profiles during a weekday and a weekend for the three beaches have been estimated; this is based on the following information obtained from GoG.

The parking occupancy is largely dependant on the arrival and departure rate, as well as the duration of the stay. Arrival rates for weekday and weekend vary but the departure rate is also largely dependant on the time of sunset at the three beaches and there is little effect arising from any specific day of the week.

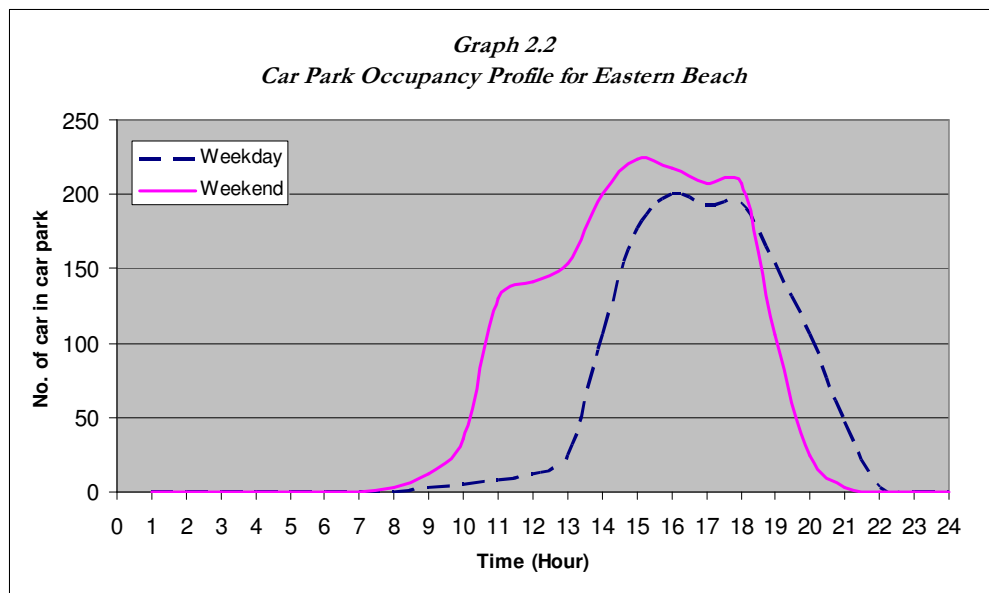
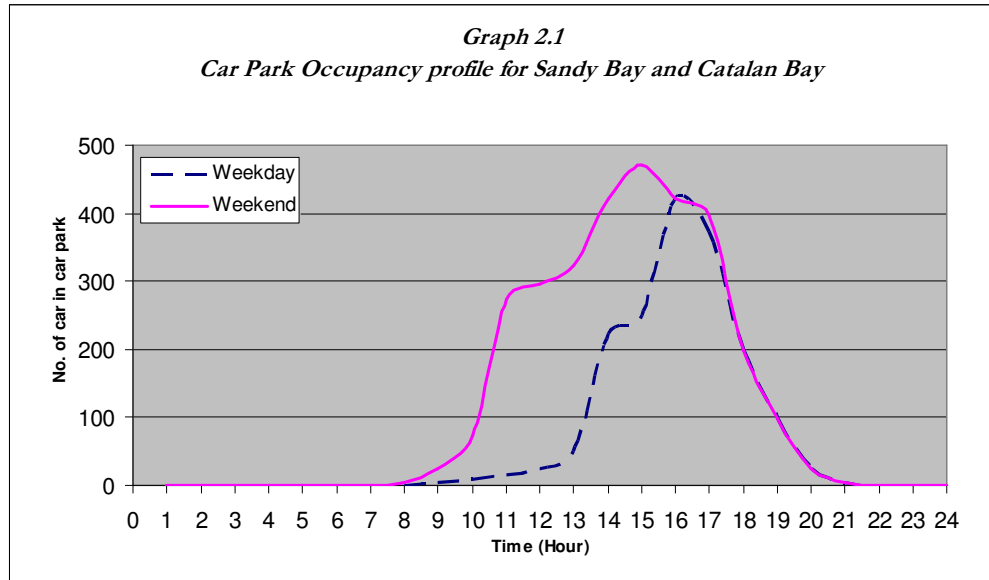
On a normal weekday, there is a peak arrival at around 13:30 for all three beaches. Nearly all visitors going to Catalan Bay and Sandy Bay would arrive by 15:30. As the Rock blocks the sunlight when the sun begins to set, visitors generally leave Catalan Bay and Sandy Bay between 17:00 and 19:00. As Eastern Beach is not affected by the mountain shade, Eastern Beach is the only beach with late arrivals between 17:00 and 18:00; visitors also tend to leave marginally later, between 18:00 and 20:30.

During weekends visitors tend to arrive earlier with the first peak arrival at 10:00. Some local shops open only half day during the weekend and hence the second arrival peak around 13:30 to 15:00 when the shops close for the day; there is again a further lesser peak at around 17:00 to 18:00 on Eastern Beach. Visitors generally leave at similar times as during the weekdays due to the sunset time.

#### *Car Park Occupancy Profiles*

Based on the information given, car park occupancy profiles are estimated and are shown in Graph 2.1 and Graph 2.2. As the arrival and departure pattern on Catalan Bay and Sandy Bay

is similar, parking areas near to the two beaches share the same occupancy profile. A slightly different profile was developed for parking near to the Eastern Beach.



*Beach Trip Estimation*

As mentioned above, there are approximately 235 spaces near Eastern Beach. For the purpose of this analysis, these are assumed to be used solely by Eastern Beach visitors, with any remaining untaken spaces assumed to be used by either Sandy Bay or Catalan Bay visitors. The occupancy profiles are applied to these available spaces in order to estimate the arrival and departure trips.

It is also assumed that during the peak summer period, there is a maximum of 85% occupancy at any one time during weekdays and 95% during weekends for parking at each of the beaches. 100% occupancy is not assumed at weekends, mainly due to the nature of this parking area. Most parking spaces are not marked, particularly on the open space parking ground and as such, cars are able to park anywhere within the area. In order to achieve the potential capacity of the parking area, all cars would need to park very carefully, leaving the

minimum of space between each. This also applies to on-street parking. It is also unlikely that all spaces would be fully occupied at any one time, as spaces are distributed over a wide area. There would be a time lag between a car leaving a space and another car finding that space.

Arrival and departure rates are based on the occupancy profile, with the following assumptions:

- Only 5% of the visitors in the area would depart between 13:00 and 16:00;
- No visitor arrives after 16:00 on both weekdays and weekends for Sandy Bay and Catalan Bay; and
- A small number of arrivals are expected for Eastern Beach between 17:00 and 18:00.

Table 11.18 and Table 11.19 show the estimated number of arrivals and departures for a normal weekday and weekend for the relevant beaches. The arrival and departure peaks occurred around 13:00 – 16:00 and 16:00 – 19:00 respectively.

**Table 11.18 - Arrival and Departure Trips in Relation to the Parked Vehicles in Sandy Bay and Catalan Bay**

Time Period	Weekday - No. of Cars			Weekend - No. of Cars		
	Parked	Arrivals	Departures	Parked	Arrivals	Departures
00:00-01:00	0	0	0	0	0	0
01:00-02:00	0	0	0	0	0	0
02:00-03:00	0	0	0	0	0	0
03:00-04:00	0	0	0	0	0	0
04:00-05:00	0	0	0	0	0	0
05:00-06:00	0	0	0	0	0	0
06:00-07:00	0	0	0	0	0	0
07:00-08:00	0	0	0	5	5	0
08:00-09:00	5	5	0	25	20	0
09:00-10:00	10	5	0	75	50	0
10:00-11:00	15	5	0	273	198	0
11:00-12:00	25	10	0	297	24	0
12:00-13:00	50	25	0	322	25	0
13:00-14:00	223	185	12	421	121	22
14:00-15:00	248	38	13	471	74	24
15:00-16:00	421	195	22	421	5	22
16:00-17:00	372	0	49	396	0	25
17:00-18:00	198	0	174	198	0	198
18:00-19:00	99	0	99	99	0	99
19:00-20:00	25	0	74	25	0	74
20:00-21:00	5	0	20	5	0	20
21:00-22:00	0	0	5	5	0	0
22:00-23:00	0	0	0	0	0	5
23:00-24:00	0	0	0	0	0	0

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**Table 11.19 - Arrival and Departure Trips in Relation to Parked Vehicles in Eastern Beach**

Time Period	Weekday - No. of Cars			Weekend - No. of Cars		
	Parked	Arrivals	Departures	Parked	Arrivals	Departures
00:00-01:00	0	0	0	0	0	0
01:00-02:00	0	0	0	0	0	0
02:00-03:00	0	0	0	0	0	0
03:00-04:00	0	0	0	0	0	0
04:00-05:00	0	0	0	0	0	0
05:00-06:00	0	0	0	0	0	0
06:00-07:00	0	0	0	0	0	0
07:00-08:00	0	0	0	3	3	0
08:00-09:00	3	3	0	12	9	0
09:00-10:00	5	2	0	36	24	0
10:00-11:00	8	3	0	130	94	0
11:00-12:00	12	4	0	141	11	0
12:00-13:00	24	12	0	153	12	0
13:00-14:00	106	88	6	200	57	10
14:00-15:00	177	80	9	224	36	12
15:00-16:00	200	33	10	217	4	11
16:00-17:00	193	3	10	207	1	11
17:00-18:00	200	27	20	212	27	22
18:00-19:00	153	0	47	106	0	106
19:00-20:00	106	0	47	24	0	82
20:00-21:00	47	0	59	3	0	21
21:00-22:00	3	0	44	3	0	0
22:00-23:00	0	0	3	0	0	3
23:00-24:00	0	0	0	0	0	0

**11.3.7** *Estimated Base Traffic Flow*

As mentioned in Section 11.3.5 and 11.3.6, to study fully the seasonal peak traffic conditions in the area it is necessary to take into account the impact of beach-related trips during the summer months. The estimated beach trips are added onto the surveyed flows which constitute the “base flow” as explained in Section 11.3.5, and summaries of the traffic flows in different peaks are attached in Appendix H.

Some of the beach-related trips may be double-counted as the parking areas were not wholly vacant on the surveyed days; the parked vehicles are however considered to be relatively insignificant compared to the peak summer period. These vehicles have not been extracted from the base flow and thus the current estimated base flow would therefore represent a robust worst-case scenario.

**11.3.8** *Junction Assessment*

To determine the estimated conditions during the summer period in the area, the same methodology as detailed in Section 11.3.4 above has been applied using ARCADY and PICADY.

### *Analysis of Base Results*

Again, the assessment seeks to replicate an extreme worst-case scenario by taking the highest flow observed for each individual junction over the peak period for each of the three days, as in the existing scenario. Consequently, flows used do not represent a single day, but a combination of the days observed; a diagrammatic representation can be found in the Appendix H.

Table 11.20 provides a summary of junction performance under base conditions by 'ratio of flow to capacity' (RFC) for the modelled AM Peak (08:00-09:00) and PM Peak (17:00-18:00) periods on the day with the heaviest flow. Full result output is presented in Appendix 4 of Appendix H.

**Table 11.20 Junction Analysis Result for Base Traffic Flows**

Junction (Type)	Approach Arm or Turning Movement	RFC (%)	
		AM	PM
Winston Churchill Avenue / Devil's Tower Road (Sundial roundabout)	Winston Churchill Avenue - N. Arm	75.0	33.4
	Winston Churchill Avenue - S. Arm	34.0	45.6
	Devil's Tower Rd	26.1	44.5
Devil's Tower Road / Eastern Beach Road (Priority)	Eastern Beach Rd (Right-turn traffic)	7.8	42.5
	Eastern Beach Rd (Left -turn traffic)	0.5	13.2
	Devil's Tower Rd - N. Arm (Left turn to Eastern Beach Rd)	13.2	44.4
Sir Herbert Miles Road / Catalan Bay Road (Priority)	Catalan Bay Rd (Left turn to Sir Herbert Miles Rd)	5.2	18.0
	Catalan Bay Rd (Right turn to Catalan Bay Rd - N. Arm)	5.2	18.0
	Catalan Bay Rd - N.Arm (Straight to Sir Herbert Miles Road)	1.2	4.9
	Sir Herbert Miles Rd (Straight to Catalan Bay Rd - N. Arm)	1.2	4.9

Table 11.20 shows that the three junctions would still be performing under capacity with the additional peak summer beach trips. Winston Churchill Avenue (North Arm) still experiences the highest RFC in the AM peak as shown in the existing traffic conditions.

Again, the assessment of the Sundial roundabout does not include the impact of the temporary closure at the airport runway.

### *11.3.9 Public Transport and Pedestrian / Cycle Movement*

There are currently four local bus routes in Gibraltar, one of which (Route 4) passes the proposed Eastside development site on Catalan Bay Road. Route 4 operates between Rosia, on the south western side of Gibraltar, and Both Worlds, on the south eastern side. The route goes via the town centre, Winston Churchill Avenue and Eastern Beach, covering almost all key locations in Gibraltar. Table 11.21 shows the scheduled timetable for Route 45.

5 <http://www.gibraltar.gov.uk/hol/HowToGetAround/Bus%20Route%20Map.pdf>

**Table 11.21 - Bus Service Detail – Route 4**

	Service time	Bus intervals
Monday – Friday	07:05 – 21:00	Every 20 minutes
Saturday	07:30 – 21:00	Every 30 minutes
Sunday	08:30 – 21:00	Every 45 minutes

According to the Gibraltar Tourist Board's website<sup>6</sup>, there are also 112 taxis running in two shifts, offering a 24-hour service. All taxi stands are currently on the north-western side of the island. Taxis are a popular mode of travel.

The eastern half of Gibraltar contrasts with the western half. The town centre and main streets are all on the western half of Gibraltar and are easily accessible on foot and cycling is also observed as being popular. In comparison, the eastern half, apart from the three beaches accessible from Devil's Tower Road, has few tourist attractions. Observations suggest that existing cyclists are observed mainly travelling on the western side, with very few cyclists observed travelling on the eastern side.

The main road along the eastern coastline connecting Devil's Tower Road, Catalan Bay Road and Sir Herbert Miles Road is designed for vehicle use, with basic pedestrian facilities at present. There are footpaths alongside the road, but these are frequently interrupted by side roads and accesses. Only one pedestrian crossing is provided along the eastern coastline; this is near to the cemetery, across Devil's Tower Road, between Sundial roundabout and Eastern Beach Road junction.

#### 11.3.10 *Traffic Growth*

As little new development is proposed on Gibraltar due to lack of space, and the population has remained relatively stable in recent years, no road traffic growth is assumed from the base to the development opening year.

### 11.4 **Predicted Impacts**

#### 11.4.1 *Construction Phase: Introduction*

This section assesses the impact of construction traffic on the existing road network, in particular the Sundial roundabout, the junction of Devil's Tower Road/Eastern Beach Road and along Catalan Bay Road at the junction into the site.

The anticipated completion date for the whole development is 2020, with a relatively tight programme. Construction materials would constantly be transported to the development site during the construction phases. With the size and complexity of the proposed development, where lengthy construction phases are expected, it is necessary to study the impact of construction traffic on the highway system.

#### 11.4.2 *Construction Phase: Assessment Criteria and Assumptions*

The impact assessment is based on a progressive construction programme, where buildings would be constructed continuously, starting from the south and moving northwards. It is assumed that once the construction of a building is completed, it would be available for occupation shortly after. The critical period to be assessed during the construction phase is assumed to be in 2015, when building development plots (DP) 1 – 8 would have been constructed and fully functional whilst construction continued for the remaining building plots. This would represent the worst case scenario.

<sup>6</sup> <http://www.gibraltar.gov.uk/hol/HowToGetAround/taxis.asp>

All vehicular accesses would be available before building construction begins. Construction traffic would therefore use one or all of the site accesses. However, it would be undesirable for operational traffic to share access with construction traffic, thus it is assumed (and recommended) that vehicular access adjacent to the operational buildings be available only to operational traffic. There would only be two accesses for construction traffic to use in 2015, the northern access roundabout access and the access further south (site access 2).

To estimate the most significant impact of construction traffic to local roads, it is assumed that all materials required for building construction would be transported by road. It has been assumed that all materials required for land reclamation work would arrive by sea. It is predicted that, based on this progressive construction programme, a maximum of 260 construction vehicles in total would be required per day on weekdays to satisfy the peak of construction requirement.

It is likely that construction traffic would avoid peak time to minimise possible congestion delay. It is assumed that 10% of these 260 construction vehicles would arrive on site in the modelled peak hour, equating to 26 vehicles.

As the junction assessment is based on PCU, construction traffic is factored up to represent its highway occupancy; each passenger car unit equates to 5.75m. The factor for heavy goods vehicles is normally 2.3, but as a worst-case scenario a factor of 2.5 PCU has been applied to these vehicles.

#### 11.4.3 *Construction Phase: Impact Assessment*

Both the existing Sundial Roundabout and the existing and new northern access junctions have been assessed using the traffic flows during the critical construction phase. ARCADY and PICADY are again used and results are summarised in Table 11.22. The full set of results output are included in Appendix H.



**Table 11.22 Summary of RFC for Junction Analysis of 2015 Traffic with Construction Traffic**

Junction (Type)	Approach Arm or Turning Movement	RFC (%) Weekday	Queues Weekday
Winston Churchill Avenue / Devil's Tower Road (Sundial roundabout)	Winston Churchill Ave - N. Arm	45.1	0.8
	Winston Churchill Avenue - S. Arm	56.9	1.3
	Devil's Tower Road	72	2.5
Northern Access (Site access 1) (Roundabout)	Service Road	2.4	0
	Catalan Bay Road	69.8	2.2
	Northern Site Access	22.3	0.3
	Devil's Tower Road	43.5	0
Site Access 2	Site Access – Catalan Bay Rd North	7.5	0.1
	Site Access – Catalan Bay Rd South	0	0
	Catalan Bay Road North – Site Access	7.5	0.1
Site Access 3	Site Access – Catalan Bay Rd North	15.1	0.2
	Site Access – Catalan Bay Rd South	0	0
	Catalan Bay Road North – Site Access	18.1	0.2
Site Access 4	Site Access – Catalan Bay Rd North	20.3	0.3
	Site Access – Catalan Bay Rd South	0	0
	Catalan Bay Road North – Site Access	25.4	0.3
Southern Access (Site access 5) (Priority Junction)	Southern Access Rd (Right turn to Catalan Bay Rd - N. Arm)	63.3	1.7
	Catalan Bay Road – (Left turn into site access)	37.7	0.6
Eastern Beach Road/ Northern Site Access	Eastern Beach Road – Northern Site Access north and south	28.5	0.4
	Northern Access Roundabout – Eastern Beach Road/ Site	29.5	0.4

#### 11.4.4 Construction Phase: Conclusion

Traffic flow from a worst-case scenario has been used in the assessment, although in reality the development is likely to attract less construction traffic than this. Nevertheless, it can be seen from the previous table that all arms of both junctions are operating under capacity, with all RFC values much below the 85% level and average queue length of 1 PCU, with a maximum at 2.5 PCUs queuing on Devil's Tower Road. Thus, it is unlikely that the construction traffic would cause any adverse effect to the operation of the critical junctions.

#### 11.4.5 Operation Phase: Introduction

To study the net traffic impact of the proposed Eastside development it is necessary to consider the use of the existing land and the estimated traffic that will be generated by the development. The existing land is currently partly used as parking for beach visitors; these trips are assumed to be unaffected but parking would be more centralised and better managed within the development.

These trips would access the new public car parks via the new junctions and therefore be considered locally reassigned base traffic. For the base junction assessments these are considered as existing movements.

Development traffic generated in its anticipated completion (full occupation) year of 2020, together with the beach trips, will be added to the observed flow. The total flow will be assigned to the highway network and both roads and junctions in the surrounding area assessed. Any proposed changes to the highway network are also identified.

As the highest flows noted during the traffic survey were between 16:00 and 19:00, all the junctions have been tested for the hourly average between these times, for both weekday and weekend.

#### 11.4.6 *Operation Phase: Junction Design*

Two new signed main accesses into the development are proposed. The northern access road would be the main access connecting to the existing Eastern Beach Road junction and this junction would be amended to a roundabout junction. Further discussion surrounding this junction can be found in section 11.1.4.

Another new main access is proposed at the southern end of the development, which would also require junction layout changes. This junction would remain as a t-junction, with a right-hand turn only out of Catalan Bay Village Road onto Catalan Bay Road. There are also three additional secondary accesses proposed, between the southern and northern parts of the site. These would be right-hand turn exit only from the site and available before the start of the building construction. The proposed changes to the local road layout can be seen on Figure 11.2.

To assess these new access junctions, PICADY and ARCADY software are used. Figure 11.3 shows the preliminary design for the northern access roundabout, which complies with deflection standards, whilst Figure 5.1 (see Appendix H) shows the southern access. DMRB<sup>7</sup> was used as a basis for the outline design, taking into account the geometric constraints and existing road layout in the area.

#### 11.4.7 *Operation Phase: Trip Assignment*

To study the impact of the estimated development trips on the surrounding highway, these trips have been distributed into the highway network based on the existing pattern of traffic, as well as the building arrangement within the development.

Residents and visitors to the development would probably have a varied purpose of trips and may be attracted to different parts of Gibraltar or to Spain; this is taken into account in the forecast northern / southern access split and direction of the trips at the Sundial roundabout. The strategic distribution of road traffic as percentages is shown in Figures 5.2 to 5.10 (see Appendix H) for the residents and visitors of each scenario respectively, including for the proposed development at Both Worlds.

The resident trip distribution was calculated by dividing the site into 5 land parcels per access and calculating the total number of apartments in each as a proportion of the site total. This figure then became proportions of the total to use the relevant access points. The combined traffic flows for future year scenarios, with the Eastside development completed as well as base and committed development flows, are shown diagrammatically in Figures 5.11 to 5.13 (see Appendix H) for weekdays during 2015 with construction and operational traffic and 2020 fully operational.

#### 11.4.8 *Operation Phase: Impact of Generated Traffic Flows*

##### *Link Capacity*

The link capacity of any urban road is dependent on the road type (speed), road width, type of land-use fronting the road (which affects incidence of on-street parking and loading) and frequency of junctions. The surrounding roads have been classified as urban all-purpose, category 2.

It is suggested<sup>8</sup> that a design flow for all-purpose 40 mph 2-way urban roads is 1,525 vehicles/hour/direction for a road with width 8.5m as on Catalan Bay Road. Devil's Tower Road is wider than Catalan Bay Road and thus would have a higher capacity.

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<sup>7</sup> Volume 6 Section 2 Part 3 (Roundabout) and 6 (Priority Junction), Design Manual for Roads and Bridges

<sup>8</sup> TA 79/99, Determination of Urban Road Capacity, The Highway Agency

None of the maximum peak hour 2-way flows on Devil’s Tower Road, Catalan Bay Road and the northern access would exceed this design flow and therefore it can be concluded that the additional traffic generated by the proposed development would have no significant adverse impact on the link operating characteristics of these roads.

*Junction Analysis*

On urban road networks it is generally junction capacity which constrains the overall capacity of the network. As mentioned in Section 11.3, existing junctions have been analysed using the peak summer base flow and all junctions would then operate under capacity. These junctions are again analysed using the combined development flows.

All proposed site accesses – the northern access, the southern access and all three of the secondary accesses were assessed with the proposed layout in Figure 11.2. Table 11.23 displays the predicted RFC for the final development.

**Table 11.23 Final Phase Development Traffic with Base (with Committed Development at Both Worlds)**

Junction (Type)	Approach Arm or Turning Movement	RFC%		Queue length	
		W/day	W/end	W/day	W/end
Winston Churchill Avenue / Devil's Tower Road (Sundial roundabout)	Winston Churchill Ave - N. Arm	54.9	56.1	1.2	1.3
	Winston Churchill Avenue - S. Arm	69.2	68	2.2	2.1
	Devil's Tower Road	95.8	94.1	15.4	12.8
Northern Access (Site access 1) (Roundabout)	Service Road	2.8	5	0	0
	Catalan Bay Road	77.8	99	3.3	20
	Northern Site Access	55.7	76.9	1.2	3
	Devil's Tower Road	61.4	69	1.6	2.2
Site Access 2	Site Access – Catalan Bay Rd North	20.6	34	0.3	0.5
	Site Access – Catalan Bay Rd South				
	Catalan Bay Road North – Site Access	24.6	35	0.3	0.5
Site Access 3	Site Access – Catalan Bay Rd North	21.3	34.1	0.3	0.5
	Site Access – Catalan Bay Rd South				
	Catalan Bay Road North – Site Access	25.8	35.2	0.3	0.5
Site Access 4	Site Access – Catalan Bay Rd North	18.2	22.2	0.2	0.4
	Site Access – Catalan Bay Rd South				
	Catalan Bay Road North – Site Access	23	23.4	0.3	0.4
Southern Access (Site access 5) (Priority Junction)	Southern Access Rd (Right turn to Catalan Bay Rd - N. Arm)	56.9	55.8	1.3	1.2
	Catalan Bay Road – (Left turn into site access)	38	45.7	0.6	0.8
Eastern Beach Road/ Northern Site Access	Eastern Beach Road – Northern Site Access north and south	33.9	0.5	61.7	1.5
	Northern Access Roundabout – Eastern Beach Road/ Site	41	0.9	60	2

It can be seen from Table 11.23 that none of the arms of any junction exceed capacity, with all RFC values below 100%. RFC values along Catalan Bay Road approaching the northern site roundabout would reach 99, but the flows used for this assessment include the proposed development at Both Worlds and these junction assessments do not take into consideration any modal shift to public or sustainable travel. This equates to a queue of 20 PCUs, or a queue length of 115m. RFC values for Devil’s Tower Road approaching the Sundial roundabout would reach a level of 95.8, corresponding to a maximum queue of only 15.4 PCUs, or a queue length of 88 metres. This could be easily accommodated on Devil’s Tower Road. This level of capacity provision would be economically justified in an urban area such as this, since queues and delay would be modest, with the queues on the more strategically important Winston Churchill Avenue staying low, at around two vehicles.

The full results have been provided in Appendix H for each junction, operating under the peak period of the average hourly flow between 16:00 and 19:00.

An issue previously raised was the proximity of the southern access to the Sir Herbert Miles Road / Catalan Bay Road junction, as a potential queue on Catalan Bay Road from the Sir Herbert Miles Road junction may affect operation of the southern access. The results show that this queue would be negligible, with queue lengths during the period with the heaviest flows averaging less than one vehicle.

Larger developments usually generate lower trip rates due to the internalisation as discussed in Section 11.2.14. Trips are also less likely to concentrate during the morning and evening peak due to the variety of journey purposes. Also, the nature of the trips would be different, as would the time and the direction of the trips. As such, the accumulated peak impacts would be reduced.

#### 11.4.9 *Car Parking Considerations*

To ensure that the site would operate satisfactorily internally, the provision of parking on the site has been examined to ensure that there would be no operational problems arising. As the trips were differentiated between car and moped trips (see Section 11.2.16), two parking accumulation profiles were developed for each vehicle type which were then combined. It was assumed that two mopeds/motorcycles would require one standard parking space. The service vehicles were assumed not to need parking outside of the dedicated servicing area.

As a result of this analysis, it was estimated that in the peak parking hour of 1500 - 1600, a total of 943 spaces would be required should all demand to the site be met by individual vehicular trips. Currently, the site has provision for a total of 800 parking spaces (see Section 11.1.6). This leaves a shortfall of 15%; however, mitigation measures are suggested below to encourage modal shift to public transport options, especially for the travel to work element of the trips, and taxis form a large proportion of the trips made in Gibraltar, which do not require parking.

It is therefore considered very unlikely that all expected demand would be met by individual private trips requiring parking. It is considered prudent to not 'predict and provide' the parking provision, and that limited parking space reduces vehicular trips and encourages modal shift to public and sustainable transport modes.

#### 11.4.10 *Development Trip Self-Limitation*

As previously mentioned, the analysis undertaken is based upon the demand to the site. However, this rarely happens in reality, as travellers soon learn the busiest hours for the roads and/or parking availability, and therefore attempt to travel earlier, by an alternative means or not at all.

As the development is due to open from the south to the north, with units opening and being occupied as they are completed, traffic would build up slowly to the site. This would also allow a slow increase in demand for public transport alternatives to the site, and if these sustain an increase in public transport provision then a strong modal shift can be expected before the site is fully complete.

### 11.5 *Mitigation Measures*

#### 11.5.1 *Construction Phase: Phasing of HGV arrivals*

In order to minimise disruption to the local road network, it is proposed that efficient management and scheduling of heavy goods vehicles is undertaken to avoid peak times. This is particularly relevant when more of the development opens and there are a greater number of residential vehicles on the local road network. It is also proposed that construction vehicles use separate access points into the development.

**11.5.2**      *Operation Phase: Highway – Winston Churchill Avenue Roundabout*  
Winston Churchill Avenue roundabout would operate under capacity under normal situations. However, due to the occasional closure of Winston Churchill Avenue across the runway, traffic often queues beyond the roundabout towards the town centre.

Subject to the future need to avoid this queue affecting access to the eastern coast, a possible cost-effective improvement for future consideration would be to provide a box junction to help to keep the space free for other traffic. This would minimise interruption of this queue to the remainder of the general traffic at this junction.

**11.5.3**      *Operation Phase: Public transport improvement*  
Existing public transport and pedestrian facilities are modest on the eastern side of Gibraltar due to the lack of development or tourist attractions. It is the intention as part of the development to promote tourism, as well as to provide easy access, including access by other modes of transport (especially sustainable modes).

As bus route 4 is a relatively long route covering most of Gibraltar, it may cause undesired delay to existing passengers if the route is to be diverted into the development. However, a greater demand would allow the bus companies to provide a more frequent service and potentially provide a more direct route. The bus operator(s) may see a benefit in extending the service operating hours to capture the evening leisure peak passengers. The extra service would promote public transport and improve access to the Eastside development which would attract more visitors to the area.

**11.5.4**      *Operation Phase: Pedestrian Facilities*  
Segregated access for pedestrians will be provided for the new development to encourage walking. Pedestrian access from Catalan Bay village and Eastern Beach to the site will be upgraded. This will link in to walkways and footpaths within the retail areas and along the sea front promenade.

**11.5.5**      *Operation Phase: Cycling Facilities*  
Cycling activities seem to be popular around the town centre area and should also be a promoted mode of transport for the east side of Gibraltar. Cycle facilities, such as safe cycle stands and cycle lanes, could be provided within the development for both visitors and residents. This would encourage cycling for all kinds of trips and improve safety.

**11.5.6**      *Operation Phase: Taxi Facilities*  
Currently there is no taxi stand on the eastern side of Gibraltar. A number of new taxi pick-up / drop-off points could be proposed within the development for the convenience of visitors without cars. Taxi use is very popular in Gibraltar and contributes to reducing single occupancy car trips.

## **11.6**      ***Residual Impacts***

**11.6.1**      *Construction Phase*  
Negligible residual impacts are anticipated as a result of the construction phase.

**11.6.2**      *Operation Phase*  
While a development of this scale would evidently have a tangible effect on the local highway network, the modelling has shown the road network to operate within capacity and the resultant flows with the development completed not sufficiently material in magnitude to compromise this efficiency. The junction analysis does also not take into consideration any modal shift.

Therefore it is anticipated that this development will have moderate residual impacts for the operation phase.

## **11.7 Cumulative Effects**

### *11.7.1 Cumulative Effects*

All cumulative effects of the development are covered in Sections 11.4 and 11.5.

## **11.8 Transboundary Effects**

Transboundary effects were not assessed as part of this transport assessment, with the road network under assessment extending as far as Winston Churchill Avenue. The majority of development trips have been assumed to originate in Gibraltar town, although all construction traffic has been assumed to arrive via the Spanish border.

## **11.9 Uncertainty**

The reader should note that the transport assessment has been based on a number of assumptions explained in Section 11.2. It should be noted, however, that when there is a (significant) change in these assumptions, the results are liable to change.

## **11.10 Summary**

### *11.10.1 Development Proposal*

This Transport Assessment Report has been undertaken to inform the EIA process and support the planning application for Eastside. It includes information on the existing condition and highway networks and consideration of the possible improvements.

### *11.10.2 Overall Transport Impact*

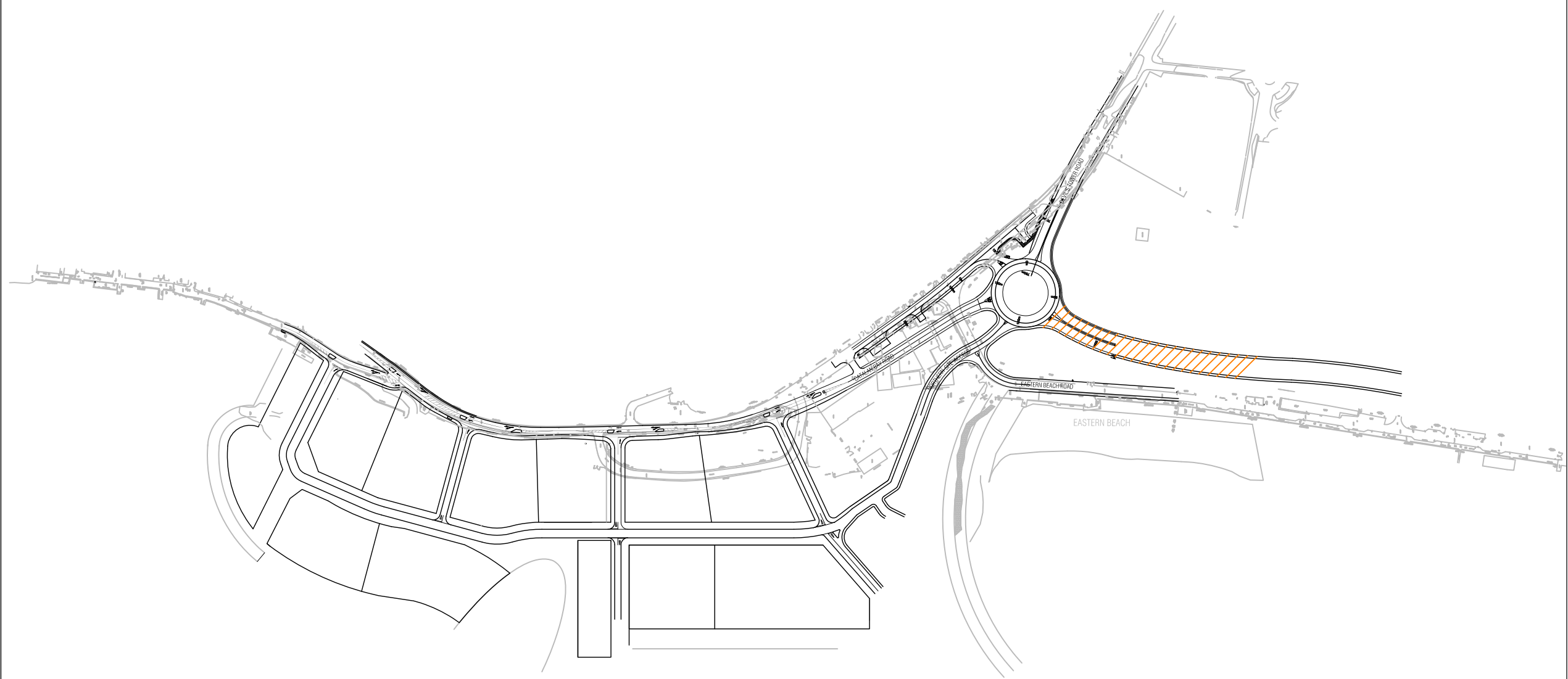
In terms of highways, current traffic levels in the area are moderate. It is shown in Section 11.4 that the potential trip generation may be significant but analysis on link capacity and junction capacity shows that existing and proposed new access junctions would be able to operate within capacity.

With the new public parking provided both on site and adjacent to the site, parking conditions should improve. Improvement in public transport, cycle facilities and pedestrian friendly access would encourage the use of sustainable transport modes. Whilst extra traffic would be attracted to the area, the Eastside development would be unlikely to cause significant adverse impact on the surrounding road network and would create an opportunity to develop sustainable travel.



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Project  
**Eastside, Gibraltar**

Drawing  
**Highway Layout  
Specimen Design**

Drawn by: KC	Date: 30/07/07
Checked by: CS	Date: 30/07/07
Approved by: KW	Date: 31/07/07

Drawing No.	Revision
<b>Figure 11.2</b>	-

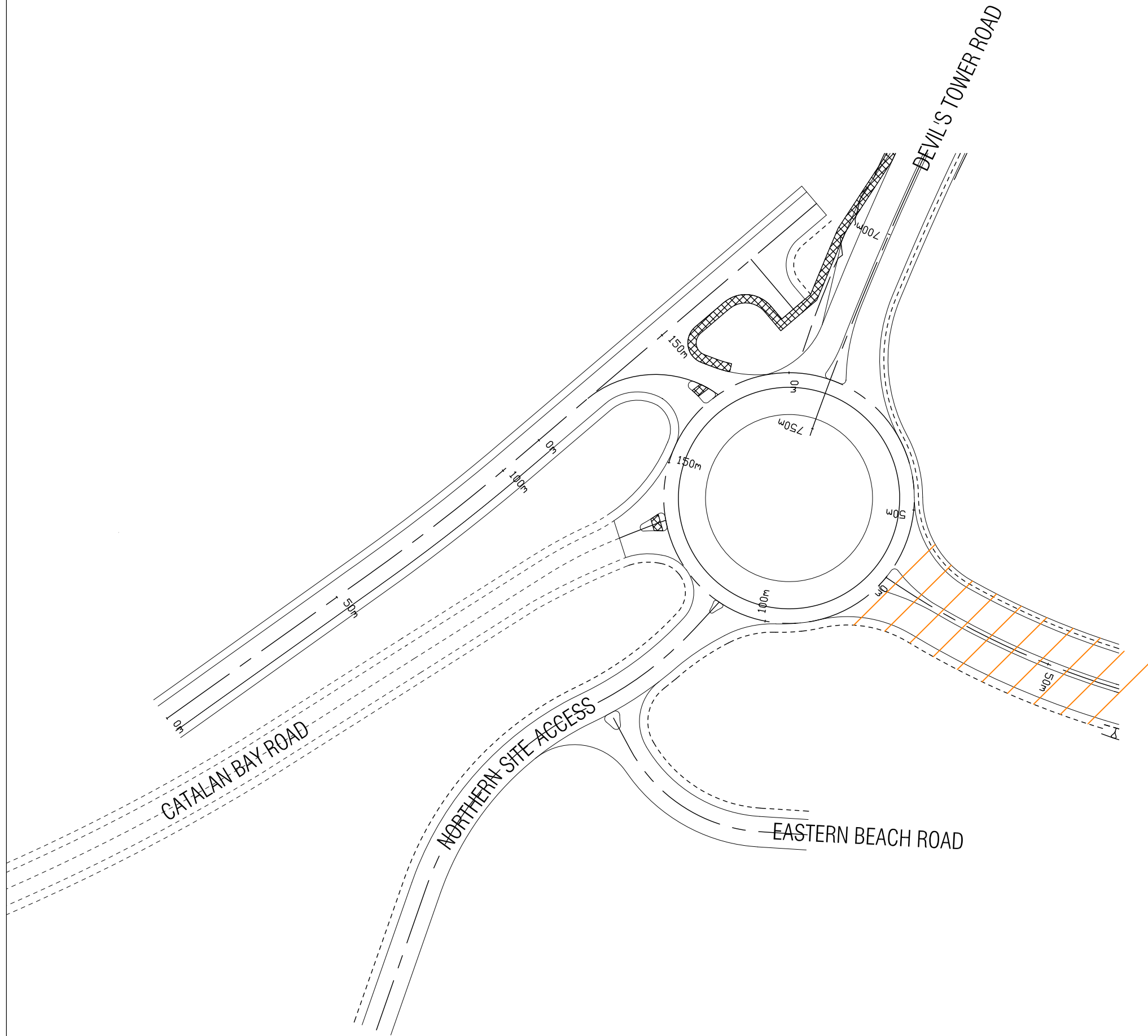
Drawing Scale: 1:2000 & A1

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User and Plot Date: U:\HF\Projects\Gibraltar - Eastside\Drawings\Figures\Figure 11.2 Rev 6.dwg  
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Project  
**Eastside, Gibraltar**

Drawing  
**Devils Tower Road / Eastern Beach Road Roundabout**  
**Preliminary Design - General Layout**

Drawn by: KC Date: 30/07/07  
 Checked by: CS Date: 30/07/07  
 Approved by: KW Date: 31/07/07

Drawing No.	Revision
<b>Figure 11.3</b>	-

Drawing Scale: 1:500 & A1

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