

TRANSPORT ASSESSMENT

Proposed Asphalt Plant at Celsa Steel Works

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1.0 Executive Summary

This Transport Assessment has been prepared to support the proposal of an asphalt plant within the Celsa Steel Works which will utilise excess waste slag from the steel making process combined with other imported materials to create asphalt for export.

Current national and local planning policy has been reviewed to ensure this Transport Assessment complies with the relevant policies contained therein. While sustainable travel to the site is difficult due to the nature of the development and location of the site, the proposed operations provide environmental benefits in terms of sustainability. The application proposals accord with the guidelines provided and this Transport Assessment has been produced to meet the relevant requirements, consider the likely impacts and to highlight and address any potential highway or transportation issues.

A review of the recent accident history for the study area road network has concluded that there is no evidence of accidents that are indicative of a deficiency in the layout or condition of the highway network. No accidents within the study area involved an HGV with a vulnerable road user. The scale and composition of traffic that will be generated by the proposed development is not expected to have a material impact on the safety of the existing highway network.

The trip generation for the proposed operations has been determined from first principles and the result is that an average of 40 additional two-way movements will be on the local highway per day during the opening year of 2019, and 108 additional movements during maximum operation within year 5 (2023).

The additional vehicles have been added to the highway network and existing flows, with a network capacity assessment of Rover Way. The Trip End Model Presentation Program (TEMPro) has been used to calculate a growth scale figure for the predicted base flow in 2023. The assessment identified that the additional traffic will have a negligible effect on the local highway network.

The conclusion of the Transport Assessment is that the proposed development would result in minimal impact to the current operation of the highway network, in respect of capacity and safety. Additionally, the existing road infrastructure has been considered for its suitability to accommodate the scale and type of trips anticipated from the proposed development, and the report concludes that there would be no deficiency that should give rise to any objection.

2.0 Introduction

SLR Consulting Limited (SLR) has been appointed by Harsco Metals Group Limited (Harsco) to provide Highways and Transportation consultancy services to support a planning application at Celsa Steel Works, Rover Way, Pengam, Cardiff, CF24 5TH. Herein the proposed may be referred to as 'the site' or 'the proposed development'.

2.1 Background

The application site is located within the southern extent of the wider Celsa Steel Works site. This southern area of the Celsa site is accessed from Tide Fields Road along its southwestern boundary. A purpose-built access onto the public highway is provided a short distance to the southeast of the roundabout junction of Tide Fields Road with Rover Way in Cardiff, South Wales.

Celsa Steel UK was acquired in 2003 by Celsa Group and is the largest producer of steel reinforcement in the United Kingdom and one of the largest manufacturers of other long steel products. The facilities in Cardiff produce and deliver around 1.2 million tonnes of finished product each year, mainly to the UK and Irish markets.

Harsco operate a similar plant to the proposed at SteelPhalt in Rotherham, South Yorkshire which has been developing and manufacturing high performance asphalt products for the UK roadmaking industry since the 1960's. The plant is ideally located to source slag cost-effectively from the surrounding steel industry – a sustainable way of making asphalt since at least 95% of the product is recycled.

2.2 Planning Proposal Summary

The proposal is for the development of an asphalt batching plant situated within the existing Celsa Steel site. The plant will use the slag from the steel making process to produce the asphalt. The construction and operation of the plant will be managed by Harsco on behalf of Celsa Steel and under Celsa's environmental permit.

The asphalt plant has the capacity to produce a maximum of 320 tonnes per hour of asphalt materials. The process will utilise waste materials from the steel works which would otherwise need to be disposed of as a waste material. As such, there are clear operational and sustainability benefits to the asphalt plant being located within this site. Notwithstanding, there will need to be further materials imported to the site for the operation of the plant and also vehicular movements taking the prepared asphalt away from the site.

The asphalt is produced in accordance with the Slag Quality Protocol to a required specification enabling it to achieve 'end of waste status'.

The process enables the recovery of slag from the steel making process thus reducing reliance on disposal to landfill. By recovering waste materials, the need to source virgin materials is also reduced.

Some raw materials will be brought on to site which will be incorporated into the asphalt mix. However, the plant will predominantly process the slag which will reduce the need for Celsa to transport slag off site to other outlets.

2.3 Assessment Methodology and Report Structure

This Transport Assessment (TA) report has been produced to consider the implications of the proposals from a traffic and transport perspective, identifying the potential impacts associated with the proposed development and the required mitigation measures needed to manage the impacts.

This report has been prepared in compliance with national and local planning guidance, included as Section 3.0.

This report contains a logical arrangement of the information and analysis required to thoroughly assess the potential impact of the proposed development. Hereafter this assessment has been produced to include the following Sections:

- **Section 3.0 Planning Policy Review** – A review of relevant local and national planning policy and how the proposals accord with these in transport terms;
- **Section 4.0 Existing Situation** – A description of the local highway network within the assessment study area with a road safety review and site accessibility appraisal;
- **Section 5.0 Existing Traffic Demand** – A quantified outlook of the existing traffic flows and turning counts of the local highway network;
- **Section 6.0 Development Proposals** – A description of the site proposals in terms of trip generation, operations and the infrastructure;
- **Section 7.0 Transport Impact Assessment** – An assessment of any impacts upon the local highway network which may arise from the proposed development; and
- **Section 8.0 Summary and Conclusion** – A summary of the report and its findings.

3.0 Planning Policy Review

Current national and local planning policy has been reviewed to ensure this Transport Assessment complies with the relevant policies. National policy provides for the wider strategic aims and objectives of the transport policy and gives general guiding principles for the implementation of developments. Local policy defines the detailed requirements for new developments in respect of transport and specific requirements for individual sites.

3.1 Considered Planning Guidance

Accordingly, the following national and local planning policy guidance on the transportation implications of the development will be considered:

- Planning Policy Wales (10th Edition - December 2018);
- Technical Advice Note 18: Transport (March 2007);
- Local Transport Plan 2015 – 2020 (January 2015); and
- Local Development Plan 2006 – 2026 (January 2016).

3.2 National Policy

3.2.1 Planning Policy Wales (2018)

Planning Policy Wales (PPW) was first published in 2002 and is the Welsh Government's national land use planning policy supported by a suite of Technical Advice Notes (TANs) and other guidance. Since publication the document has seen many revisions and is currently on its 10th edition (revised December 2018).

Objectives of PPW in relation to transport for 'Strategic and Spatial Choices' (Chapter 3) include:

- **Access and Inclusivity** – Development proposals should seek to provide suitable access for various modes of transportation and enable safe, easy access to local services;
- **Environmental Sustainability** – Developments are to promote environmental sustainability through such schemes as maximising sustainable movement where applicable and prevent the generation of waste;
- **Character** – Whereby the area characteristics should be central to development designs with clear rationale;
- **Community Safety** – Safety must be considered in the preparation of development plans and local authorities must have regard for this when making planning decisions;
- **Movement** – Proposals should include sustainable travel options and attempt to reduce car-based travel where applicable while utilising existing infrastructure; and
- **Considering Design Issues** – Development plans should include policies and guidance which promote good design while planning authorities should consider strategic design issues.

Chapter 4 of the guidance considers transport and provides a list of measures which are aimed to improve the transport environment. Paragraph 4.1.2 states that:

“The Wales Transport Strategy provides the strategic policy framework for transport related activities in Wales up to 2030. Covering all modes, it sets out the Welsh Government’s strategic priorities and desired outcomes, providing a link to the wider priorities as well as plans at the local authority level”.

Paragraph 4.1.56 under ‘Transport Assessments’ discusses the importance of such reports in assessing the likely impacts of a proposed development as well as to what scale. TAN 18: Transport provides categories of development types which must be accompanied by a Transport Assessment.

“Transport Assessments provide the basis for negotiation on scheme details, including the level of parking, and measures to improve walking, cycling, and public transport access, as well as measures to limit or reduce levels of air and noise pollution”.

Paragraph 6.7.15 within Chapter 6 ‘Distinctive and Natural Places’, Section 6.7 ‘Air Quality and Soundscape’ discusses the ‘Location of Commercial, Industrial and other Potentially Polluting Development’. It is stressed that such development as commercial, industrial, energy, agriculture and transport – which are potentially polluting – *“should be located in areas where there is low potential for public exposure, or where its impact can be minimised”*. Impacts on the highway network, particularly with traffic generation, must have the relevant considerations in making planning decisions (paragraph 6.7.16).

3.2.2 Technical Advice Note 18: Transport (2007)

Consideration has also been given to the Planning Policy Wales Technical Advice Notes (TAN)18: Transport (March 2007).

TAN18 describes how to integrate land use and transport planning. It explains how transport impacts should be assessed and mitigated. It also gives advice on integration between land use planning and transport, location of development, parking, design of development, walking and cycling, public transport, planning for transport infrastructure and assessing impacts/managing implementation.

Paragraph 3.8 of TAN18 notes that:

“Locations that are highly accessible by a variety of travel modes offer significant opportunities to make travel patterns more sustainable. When preparing or reviewing development plans, planning authorities should identify all potential development sites which have high levels of accessibility to non car modes. Care should be taken to ensure that allocations in these locations are at sufficient densities to fully utilise the accessibility potential of the site and to including housing with other uses where appropriate. Development sites which are car dependent and unlikely to be well served by new public transport, walking and cycling should only be allocated or reallocated in development plans for uses which are not travel intensive”.

It is recognised that the proposed asphalt batching plant would generate a limited number of people trips associated with staff and would not have the trip generation potential of a more densely populated land use.

Land use planning can have a significant impact on distribution. Paragraph 8.11 of TAN18 states that:

“...through policies and decisions on patterns of development and transport infrastructure. RTPs will develop regional actions to implement the Wales Freight Strategy. Such work may assist planning authorities in considering the strategic significance of freight access to industry and commerce when reviewing development plans and determining planning applications. Wherever possible, planning authorities should promote the carriage of freight by rail, water or pipeline rather than road where it forms a feasible alternative for part or all of the journey”.

Paragraph 8.12 adds that *“Development which attracts substantial movements of freight (including large scale warehousing, distribution and manufacturing which uses bulky raw materials or produces bulky products) should be located away from congested inner areas and residential neighbourhoods”.*

3.3 Local Policy

3.3.1 Local Transport Plan 2015 – 2020 (2015)

The Local Transport Plan (LTP) was brought out in January 2015 to replace the South East Wales Transport Alliance Regional Transport Plan which was dissolved in March 2010.

It is highlighted within the Local Transport Plan (LTP) that an apparent issue is the *“increased congestion on [the] strategic road network, increased journey times and reduced journey time for the movement of people and goods”*. The intention to eradicate this issue is through *“positively managing the highway network to support sustainable travel”*. All potential sustainable travel methods are appraised within Section 4.5 of this report, and the Transport Impact Assessment at Section 7.0 assesses the effects on congestion the proposed may induce and discusses mitigation measures where applicable.

A further issue is *“the need for safer roads”* whereby a *“reduction in casualties”* is sought. The existing situation has been assessed in Section 4.0 inclusive of an accident review of the local highway network in vicinity of the proposed development site in order to evaluate whether there are any clusters which may be indicative of a deficiency in the layout or condition of the roads.

Paragraph 3.1.9 discusses the ‘Highway programme – Strategic Junction Improvements and Strategic Highway Improvements’ which are proposed as a management technique to facilitate network resilience and improve access and road safety.

3.3.2 Local Development Plan 2006 – 2026 (2016)

The Local Development Plan (LDP) for Cardiff was adopted on 28th January 2016 and has now become operative on its adoption and now forms the development plan and will be the basis for decisions on land use planning in Cardiff.

Within the brief interjecting summary of the LDP, Section 4 ‘Delivering sustainable transportation solutions’ states that *“the overall approach seeks to minimise travel demand and provide a range of measures and opportunities which reduce reliance on the car”*.

The following is a reproduction of the list of ‘Key transportation trends and issues’ within Chapter 2 of the LDP.

- *“Traffic on Cardiff’s roads grew by 9% between 2002-2012;*
- *56% of Cardiff’s residents travel to work by car;*
- *Nearly 77,900 people commute into Cardiff [daily] by all modes (37% of Cardiff’s workforce). The 2001 Census indicates that approximately 80% of commuters travel to Cardiff by car;*
- *Travel on rail services has increased considerably – the use of Cardiff Central and Queen Street Stations has risen by 82% between 2001-2011;*
- *Cycle use has increased 10% between 2001-2011 but bus use has fallen slightly over the same period;*
- *Cardiff International Airport is located within the Vale of Glamorgan providing the closest international links to Cardiff; and*
- *The operational port in Cardiff performs an important role in terms of freight movement”.*

Chapter 4 ‘Strategy, Key Diagram and Key Policies’ expands the summarised point of Section 4 ‘Delivering sustainable transportation solutions’ with KP8: ‘Sustainable Transport’. Although there is emphasis on significantly reducing travel demand and dependence on the car and eliciting a modal shift from single occupancy car use to sustainable and active modes of transport, it has been identified that *“the location and form of developments are major determinants of the distance people travel, the routes they take and the modes of transport they choose”* (paragraph 4.107). This is discussed further within Section 4.5 of this Transport

Assessment as an 'Accessibility Appraisal' whereby various and alternative transport modes are discussed which may possibly be used in place of the single use car.

Chapter 5 details the 'Detailed Policies' with Section 4 specifying those in 'Transport'. Policy T6; 'Impact on Transport Networks and Services' states that:

"Development will not be permitted which would cause unacceptable harm to the safe and efficient operation of the highway..."

3.4 Planning Policy Summary

The application proposals accord with the guidelines provided and this Transport Assessment has been produced to meet the relevant requirements, consider the likely impacts and to highlight and address any potential highway or transportation issues.

In so doing the extent to which highway or transportation issues may or may not detract from the contribution of the project to wider national and local policies in respect of sustainability and environmental benefit of returning valuable raw material into production within the global steel and metals industries can be assessed.

4.0 Existing Situation

This section establishes the existing conditions at the site, detailing the study area in terms of the surrounding highway network. The recent record of Personal Injury Accident (PIA) data is reviewed in order to determine the presence of existing safety concerns throughout the local road network, and an accessibility appraisal determines potential methods of travel to work other than single occupancy car use.

4.1 Application Site

The application site is situated within the southern confines of the existing Celsa Steel Works site. The drawing at **Appendix 01** shows the proposed location for the asphalt plant. The intended area for the asphalt plant measures approximately 11,300m², while the plant footprint is approximately 4,200m².

The southern confines of the Celsa Steel Works site is located to the southeast of Rover Way and is accessed via its southwestern boundary onto Tide Fields Road, to the southeast of the Rover Way/Tide Fields Road roundabout junction. Both Tide Fields Road and Rover Way accommodate street lighting and footway/cycle ways surrounding the Celsa Steel Works perimeter and is also bordered by largely vegetated verges.

Celsa Steel Works has two usable access points in the form of T junctions. One as previously specified is located on Tide Fields Way and is a purpose-built priority T junction situated approximately 60 metres from the roundabout with Rover Way. The photograph in Figure 4-1 shows that the road markings are visibly worn due to extensive vehicle override over time.

Figure 4-1: Priority Access Junction on Tide Fields Road



Another access junction is situated on Rover Way approximately 536 metres northeast of the roundabout junction with Tide Fields Road. This junction is unmarked. All associated operations and staff vehicles of the proposed development will access the site via the junction off Tide Fields Road.

4.2 Local Highway Network

A site visit was undertaken by the SLR Highways and Transportation team on 15th March 2019 to gain more knowledge and understanding of the area in vicinity of the site. Photos were taken of the highway network and used to inform this section of the report.

4.2.1 Tide Fields Road

Tide Fields Road provides the main access point to the southern Celsa Steel Works site and the proposed development located within this facility. This road is a single carriageway link enabling traffic flow in both directions and with central white line road markings. This road includes pedestrian infrastructure with street lighting and footways along both edges of the carriageway. Tide Fields Road continues southeast for approximately 300 metres in length before coming to a dead end and 'Stop' road markings at Welsh Water, providing a no through route. This is stressed on entry to Tide Fields Road upon the road sign as depicted in Figure 4-2.

Figure 4-2: Tide Fields Road Sign Indicating a No Through Road



This link is heavily used by large industrial vehicles which is reflected in its poor condition through lack of maintenance. Figure 4-3 below is a photograph of Tide Fields Road to the southeast of the site access which highlights this.

Figure 4-3: Tide Fields Road – View Southeast



As is clear from the above image this section of road is undulating and rutted with numerous potholes. It is also noted that site traffic from Celsa Steel and the proposed operation will not utilise this part of the link; the road is also infrequently used by members of the public.

The photograph shown in Figure 4-4 provides evidence of the pedestrian infrastructure as aforementioned. There is regular street lighting and a sufficient footway in terms of width and condition and the road is subject to a 30mph speed restriction.

Figure 4-4: Tide Fields Road Infrastructure – View Southeast



Also seen within Figure 4-4 are wooden bollards which are bordering the site frontage and set back into the verge, shown along the left side of the photograph. These are likely to be provided as part of an informal management technique, required to prevent vehicles parking on the verge. Figure 4-5 below shows the use of

the southern side of Tide Fields Road for vehicular parking where mud from the verge is evident and tyre marks remain on the footway.

Figure 4-5: Tide Fields Road – View Northwest



4.2.2 Rover Way

This road adjoins Tide Fields Road by a small raised roundabout junction. Rover Way extends approximately 2.32km (1.44 miles) to the northeast and approximately 887 metres to the southwest; bordered by two larger roundabouts which adjoin the A4232 and Ocean Way respectively.

Figure 4-6 shows the roundabout junction between Tide Fields Road and Rover Way from Tide Fields Road.

Figure 4-6: Rover Way/Tide Fields Road Roundabout Junction – View from Tide Fields Road



As indicated from the above, the roundabout accommodates single flow traffic comfortably however it is in a poor state of repair.

Rover Way is subject to a 40mph speed restriction and is well lit with street lighting throughout its full length. A shared pedestrian footway/cycle way runs the full length of the road to the southwest, and for approximately 750 metres of the road to the northeast, the provision finishing approximately 45 metres from the junction with Seawall Road.

Figure 4-7 provides a view of Rover Way northeast bound.

Figure 4-7: Rover Way – View northeast bound



The photograph in Figure 4-7 shows the two-way flow of traffic on Rover Way, as viewed from the junction with Tide Fields Road; this section of Rover Way is subject to a 40mph speed restriction. Figure 4-8 provides a view of Rover Way southeast bound from the roundabout junction with Tide Fields Road.

Figure 4-8: Rover Way – View Southeast bound



The road contains central road markings throughout its full length which are partly worn in places. These are just visible from the above view. It is evident that the shared footway/cycle way borders the southwestern edge of this carriageway.

4.3 Wider Highway Network

The M4 is located approximately 6.81km (4.23 miles) directly north of the site. This provides strategic links across South Wales and into the West of England via both the M4 or the M48 utilising either of the Severn Crossing bridges.

The M4 is easily accessible from the site by following Rover Way northbound to the A4232 which extends approximately 1.92km (1.2 miles) before entering the A48 and continuing northbound. The A48 continues for approximately 2.58km (1.6 miles) before linking to the A4232 via a grade-separated roundabout junction. The M4 is accessible from here via the exit off the A48 and the second exit of the corresponding roundabout back onto the A4232; or alternatively the M4 can be accessed by continuing along the A48 and onto the A48(M). This link then continues for approximately 3.76km (2.34 miles) before reaching the M4. The M4 then forks onto the M48 or continues to the Second Severn Crossing near to the hamlet of Llanfihangel Ridget, East Wales.

4.4 Accident Safety Record

A full report of the Personal Injury Accident (PIA) collision data have been obtained from South Wales Police and can be viewed at **Appendix 02**. The data have been used, alongside data from CrashMap.co.uk, to compile an assessment with the underlying objective to identify any existing safety concerns that may be exacerbated by the proposed development. The accident data analysis can also be used to inform the assessment of any deficiencies in the layout or condition of the local road network which may be present.

The Police data includes PIA collision records between 2013 and 2018, and the study area comprises the following road links and junctions within the vicinity of the Site:

- Rover Way;
- Ocean Way;
- A4232/Rover Way Junction – Roundabout;
- Rover Way/Tide Fields Road Junction – Roundabout;
- Rover Way/Darby Road Junction – Roundabout;
- Rover Way/Ocean Way Junction – Roundabout; and
- A4232/Ocean Way Junction – Roundabout.

The Police report provides information on the number of vehicles and casualties involved, vehicle types, location, summary of the accident and the time of day. CrashMap.co.uk has been analysed alongside this for the quantitative aspect of the assessment as the Police report fails to provide the accident severity, the full date and some of the recorded accidents are from outside of the specified study area.

For clarification, those accidents recorded which result in slight injury indicate that the victim was likely to suffer from slight shock with occurrences of sprains or bruises from the accident, whereas a serious accident accounts for breakages, lacerations, concussion or hospital admittance. A fatal accident means there was a resultant death from the injuries sustained.

A total of twenty-seven accidents were recorded throughout the study area over the most recent five-year period of 2014 – 2018 as opposed to 2013. This averages to 5.4 accidents per year spanning a 3.38km (2.1 miles) stretch. This further averages to 1.6 accidents per kilometre each year. The accidents have been grouped by year and severity in the following table.

Table 4-1: Accidents by Date and Severity

Year	Accident Severity			Total
	Slight	Serious	Fatal	
2014	4	1	-	5
2015	9	-	1	10
2016	7	-	-	7
2017	4	-	-	4
2018	1	-	-	1
Total	25	1	1	27

The table provides evidence that twenty-five of the accidents resulted in slight injury with one serious and one fatal accident. 2015 contained the greatest number of recorded accidents with ten while the most recent year (2018) saw a 100% decline from this with one accident recorded.

The recorded accidents have also been grouped by their location for discussion and comparison purposes and are laid out in Table 4-2.

Table 4-2: Accidents by Location

Location	No. of Accidents	% of Accidents
Rover Way	11	41
Ocean Way	1	4
A4232/Rover Way Junction – Roundabout	12	44
Rover Way/Tide Fields Road Junction – Roundabout	3	11
Rover Way/Darby Road Junction – Roundabout	-	-
Rover Way/Ocean Way Junction – Roundabout	-	-
A4232/Ocean Way Junction – Roundabout	-	-
Total	27	100

Overall, more accidents occurred at junctions than on road links, with a total of 15 (56%) recorded. This is expected as there are likely more accidents which occur in and around junctions; *“this is because of the combination of busy roads, traffic that can be nose-to-tail and people crossing all sorts of different paths, combined with impatience and perhaps tiredness, means that some vehicles either drive aggressively, get*

confused by road markings, or simply make mistakes: all of these mean that junctions are definitely an accident hot spot”¹.

As identified by FORS (Fleet Operator Recognition Scheme), *“the most vulnerable road users are:*

- *Pedestrians (particularly children, the elderly or the disabled);*
- *Cyclists;*
- *Motorcyclists; and*
- *Horse riders”.*

While utilising the qualitative Police data for accidents recorded between 2014 to 2018 there have been twelve involving a vulnerable road user, ten of which involved a secondary vehicle. Due to the nature of the proposed development, accidents involving an HGV are the most troublesome. The dataset concludes that one accident involved an HGV while none involved both an HGV and a vulnerable road user.

4.4.1 Conclusion of Safety Assessment

The consistent decline in recorded accidents per year since 2015 is suggestive of highway improvements which minimise the risk of an accident occurring. There have been some clusters of accidents in and around the junctions which is expected, however no accident ‘hot spots’ have been identified within the study area which may be cause for concern.

The site is to increase the number of HGVs on the local highway network and so accidents involving HGVs and particularly with vulnerable road users were of the greatest concern; however, it was acknowledged that no accidents whereby conflict between an HGV and vulnerable road user have occurred.

4.5 Accessibility Appraisal

The overall accessibility of the site has been assessed with respect to pedestrian, cycle and public transport access. The purpose of the assessment is to demonstrate whether the development site is in a suitable location for travel to be undertaken by modes other than the private car.

Due to the nature of the development, it is anticipated that the majority of the employees will be car owners, however the following sections consider pedestrian, cycle and public transport access for those who are non-car owners.

NOMIS 2011 census data provided for by the Office for National Statistics has been used to identify car ownership within the local area (2011 super output areas – middle layer W02000403: Cardiff 037) as well as the wider area of Cardiff. The results of which have been reconstructed in Table 4-3.

Table 4-3: NOMIS 2011 Census Data for Car/Van Availability

Number of Cars/Vans (per household)	Percentage (%) MSOA W02000403	Percentage (%) Cardiff
None	38	29
1	43	43

¹ Driving Theory Test Questions. 2018. *What Causes Accidents: Junctions*. [ONLINE] Available at: <https://www.drivingtheorytestquestions.co.uk/guides/accident-cause-junctions> [Accessed 03rd June 2019].

Number of Cars/Vans (per household)	Percentage (%) MSOA W02000403	Percentage (%) Cardiff
2	17	22
3	2	5
4+	-	1
Total	100	100

It is evident from the census data that only 62% of residents within the local area have access to a car or van, whereas a greater portion (71%) of households own a car/van throughout wider Cardiff.

The general method of travel to work has also been identified using the NOMIS 2011 census data and is reconstructed in Table 4-4 below:

Table 4-4: NOMIS 2011 Census Data for Method of Travel to Work

Method of Travel to Work	Percentage (%) MSOA W02000403	Percentage (%) Cardiff
Work Mainly at or from Home	2	2
Underground/Metro/Light Rail/Tram	-	-
Train	1	2
Bus/Minibus/Coach	9	6
Taxi	-	-
Motorcycle/Scooter/Moped	-	-
Driving a Car/Van	34	35
Passenger in a Car/Van	5	3
Bicycle	2	2
On Foot	8	10
Other	-	1
Not in Employment	39	39
Total	100	100

As expected, the main mode of transport for travel to work is the car with a bus/minibus/coach as the second option.

4.5.1 Pedestrian Infrastructure and Access

The assessment has considered the accessibility of the site from local provisions by foot and the quality of the surrounding pedestrian environment.

Pedestrian amenity is of a poor standard along Rover Way and Tide Fields Road. The footways are usable however considered hazardous for use due to the aforementioned undulations and poor state of repair. Figure 4-9 provides evidence of the poorly maintained footway which clearly shows that it is uneven. Street lighting can be seen and is provided at regular intervals along Tide Fields Road and Rover Way.

Figure 4-9: Footway on Tide Fields Road – View Northwest



Figure 4-10 below provides evidence of large cracks in the pedestrian footway and loose debris covering the surface.

Figure 4-10: Footway on Tide Fields Road



In context of the location of the site, within the immediate vicinity any pedestrian access both to and from the site will be via Tide Fields Road. The footway extends east on Tide Fields Road approximately 52 metres from the

existing site access and adjoins the roundabout junction with Rover Way which provides crossing facilities in the form of dropped kerbs, tactile paving and islands as depicted within the image at Figure 4-11.

Figure 4-11: Rover Way/Tide Fields Road Junction Crossing Facilities



The pedestrian infrastructure bordering this link continues northeast approximately 750 metres and ceases at the junction leading to Seawall Road and extends southwest to the roundabout junction with Ocean Way. A footpath extends from the eastern edge of Celsa Steel Works and follows the coastline and estuary north until meeting with the roundabout junction with the A4232. This footpath also extends south adjacent to Rover Way approximately 970 metres.

The Manual for Streets (DfT, 2007), notes at Section 4.4.1 that “*walking offers the greatest potential to replace short car trips, particularly those under 2km*”. A 2km radius of the Celsa Steel Works site access is inclusive of the majority of a large residential catchment in the west.

4.5.2 Cycle Infrastructure and Access

The assessment has considered the accessibility of the site from local provisions by cycle and the quality of the surrounding cycling environment.

Tide Fields Road is considered unacceptable for use by bicycle with its poor condition and lack of maintenance. Rover Way provides infrastructure to accommodate cyclists in the form of a shared foot/cycle way; however, the width is undesirable for use by pedestrians and cyclists singularly and in conjunction. This road is heavily trafficked by both cars and HGVs and is therefore not seen as an appropriate route for cycle use.

Figure 4-12: Shared Foot/Cycle Way on Rover Way



The photograph above in Figure 4-12 shows the inappropriate width of the shared foot/cycle way along with the poor state of repair it is in with a large amount of debris littering the infrastructure. Large cracks are prevalent, and the path is clearly uneven.

The Sustrans National Cycle Network map has been reviewed and there are no on or off-road cycle routes within a 2km radius of the site.

4.5.3 Public Transport Audit

Reasonable walking distance is considered to be up to 400 metres in the case of accessing bus based public transport. This distance equates to a 5-minute walk time assuming a walk speed of 80 metres per minute. There are no bus stops located within 400 metres of the site; the nearest being an approximate 18-minute walk away at a distance of 1.42km (0.88 miles).

There are no railway stations within a 2km radius of the site.

4.5.4 Sustainable Transport Conclusion

From a review of the accessibility appraisal for more sustainable modes of transport it can be concluded that the site is not located in an area whereby methods of travel to work via other modes than the car are conceivable. In order to elicit a modal shift from single occupancy car use it is proposed to promote car sharing as an alternative.

5.0 Existing Traffic Demand

This Section provides the existing traffic demand within the study area. Traffic flow patterns are determined, and existing capacity issues identified through the analysis of traffic survey data collected at key locations across the local highway network.

5.1 Data Collection

In order to determine the existing traffic conditions throughout the local highway network, traffic survey specialist Trafficsense have been commissioned to undertake traffic counts. The traffic surveys included an MTC located at the roundabout junction between Rover Way and Tide Fields Road.

Trafficsense installed the MTC on Tuesday 02nd April 2019 and data were recorded continuously for a thirteen-hour period between 06:30 until 19:30. This is in order to reflect typical weekday traffic flow conditions upon the junction (i.e. non-school holiday periods) and to provide scope for the usual 12-hour working day (07:00 – 19:00). Traffic count data are attached at **Appendix 03**.

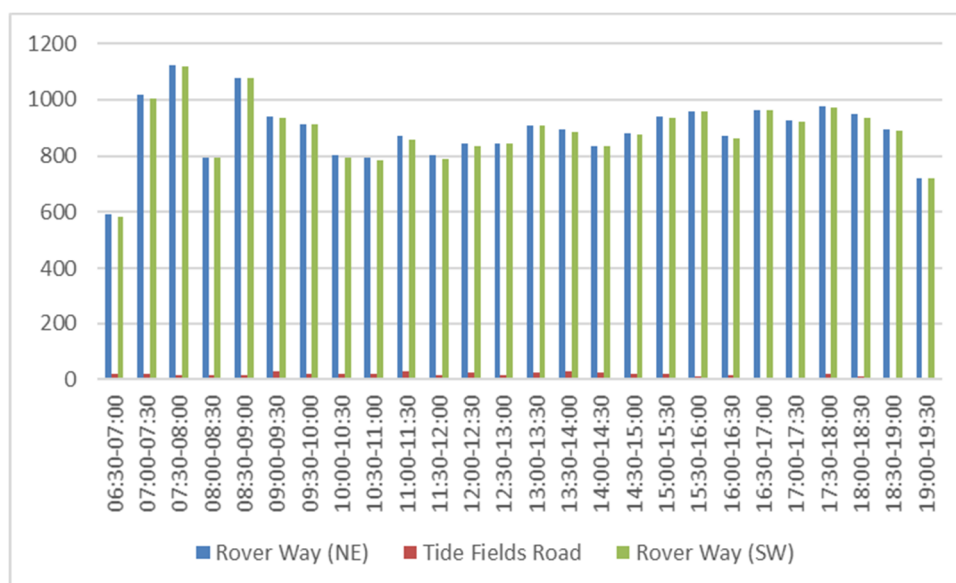
The following are considered within this TA:

- Average weekday profile (06:30 – 19:30);
- Average weekday AM and PM peak hours; and
- 12-hour flows for the average weekday for all vehicles and HGVs (07:00 – 19:00); and
- Existing assessment of the Rover Way/Tide Fields Road junction.

5.2 Peak Times

Analysis of the data confirms that across the surveyed weekday, the AM peak occurs between 07:00 – 08:00 hrs. The weekday PM peak was observed between 17:30 – 18:30 hrs. This is reflected within Figure 5-1. The peak hours are considered marginally earlier and later than is commonly assessed which is expected for an industrial area whereby start times for employees are usually earlier than standard, and the working day tends to be longer meaning a later finishing time.

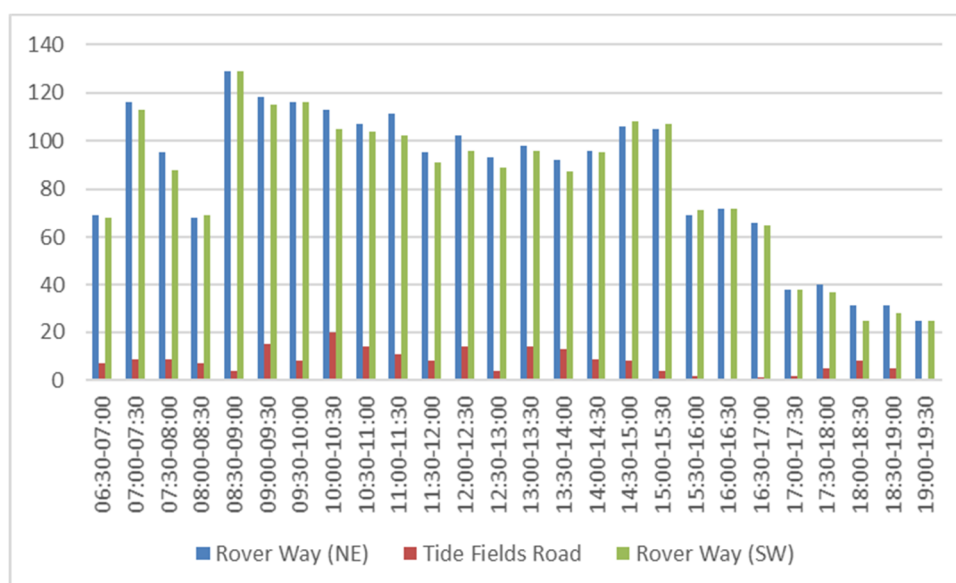
Figure 5-1: Average Weekday Traffic Profile (All Vehicles)



It is evident from the graph at Figure 5-1 that Rover Way sees a far greater volume of traffic than Tide Fields Road which is to be expected. The flows along Rover Way, both northeast and southwest are shown to be almost the same, which indicates that a limited number of vehicles turn onto Tide Fields Road.

Similarly to the above graph, Figure 5-2 provides a graph of the average weekday traffic profile for HGVs for each arm of the assessed junction.

Figure 5-2: Average Weekday Traffic Profile (HGVs)



The AM peak for HGVs is clearly 08:30-09:30 with an earlier secondary peak at 07:00-08:00. The HGV AM peak is likely to be later than the overall network AM peak for all vehicle classifications as typically within industrial sites employees work a 12-hour day (07:00-19:00) and so arrive at their place of employment in time to prepare

the HGVs and set off for the day. The PM peak for HGVs is distinctly 14:30-15:30 which is to be expected to allow staff time to prepare for the next day of work.

As with Figure 5-1 for 'All Vehicles', there is a far greater number of HGVs on Rover Way, with similar numbers on the north eastern and south western arms, than upon Tide Fields Road.

5.3 12-Hour Flows

A summary of the twelve-hour Annual Average Weekday Traffic (AAWT) flows for each arm of the roundabout junction are shown in Table 5-1. This is inclusive of all vehicle types, as well as HGVs.

Table 5-1: 12-Hour Average Weekday Two-Way Traffic Flows (07:00 – 19:00)

Arm	All Vehicles	HGVs ²	%HGVs
Rover Way (NE)	21,815	2,107	10%
Tide Fields Road	438	185	42%
Rover Way (SW)	21,685	2,046	9%

The base level average number of vehicles on Rover Way (NE) and (SW) are similar with 10% and 9% of traffic being HGVs respectively. Tide Fields Road contains a high percentage of HGVs with 42%. In most scenarios this would be considered detrimental to the highway, however in this situation this road is in-situ to link industrial units with the main haulage route; therefore, the majority of vehicles are anticipated to be HGVs.

5.4 Existing Junction Flows

The junction of Rover Way with Tide Fields Road has been presented in the Figures below as traffic flow diagrams displaying a summary of the turning count results for the network AM and PM peak flow hours of 07:00 – 08:00 and 17:30 – 18:30.

² Classifications include OGV1, OGV2 and Bus/Coach.

Figure 5-3: Rover Way/Tide Fields Road Junction AM Peak (07:00-08:00)

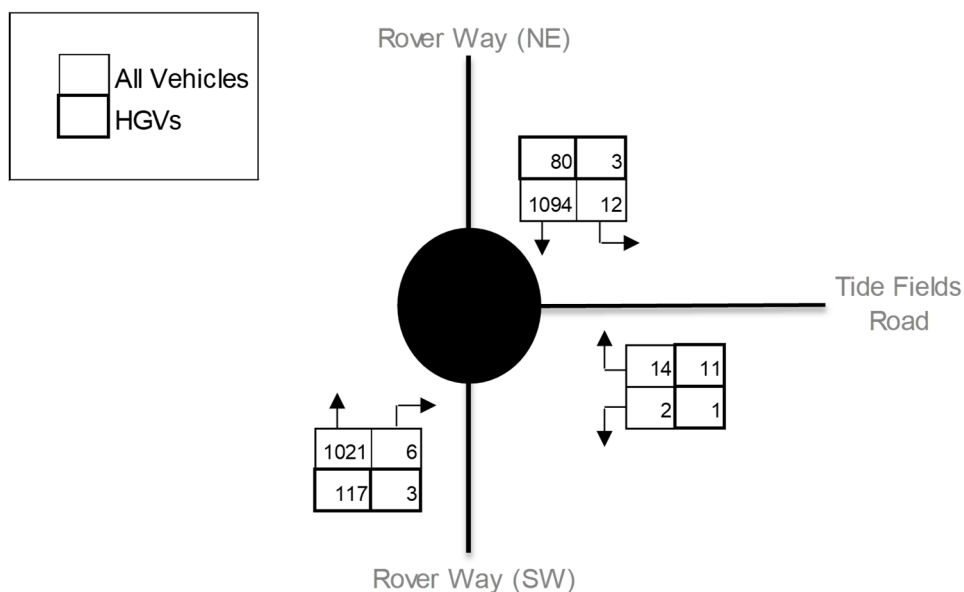
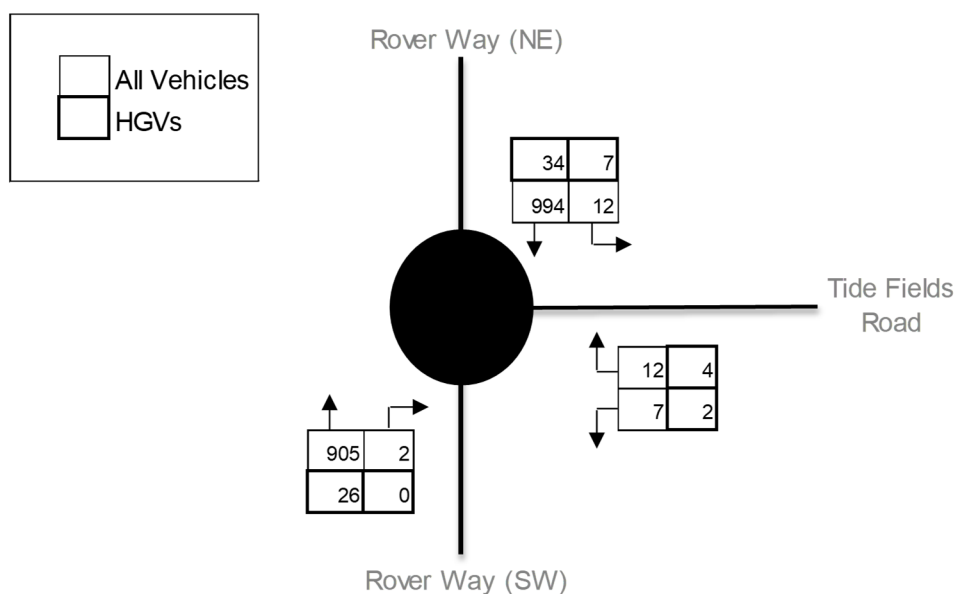


Figure 5-4: Rover Way/Tide Fields Road Junction PM Peak (17:30-18:30)



As is expected and seen in the traffic flow diagrams, Rover Way accommodates a greater volume of traffic than Tide Fields Road. Rover Way is the only through road which spans the industrial area surrounding Celsa Steel Works. Both peak periods present similarities in the total number of vehicles and HGVs. There is a slightly higher volume of traffic utilising the Rover Way (NE) arm.

6.0 Development Proposals

This Section of the TA provides a description of the proposed development in terms of the operations and associated likely traffic flows generated by the proposed. The distribution of those trips has also been identified.

6.1 Description of Proposed Development

6.1.1 Operations

The proposal is for the development of an asphalt plant situated within the existing Celsa Steel site. The plant will use the slag and other waste materials from the steel making process to produce asphalt at a maximum capacity of 320 tonnes per hour. Notwithstanding, there will need to be further materials imported to the site for the operation of the plant and also vehicular exports of the prepared asphalt from the site.

6.1.2 Accessibility

The access route for employees and the associated vehicles during delivery and despatch is from the existing entrance on Tide Fields Road. From here the HGVs will utilise an internal route following nearby the north western edge of Celsa Steel Works. All access roads will be hard surfaced to prevent dust lift off.

6.1.3 Parking Facilities

Parking areas exist within the wider Celsa Steel site with one located in the south eastern section. This is located in the southwest corner and is accessed immediately to the left upon entry to the Celsa Steel site. This car park will be a shared facility with other users of the wider site and will provide ample parking for the additional staff members.

6.2 Development Trip Generation

6.2.1 HGV Trips

The trip generation has been calculated using a first principles approach based upon predictions made of the amount of material input from existing operations of the Celsa Steel Works facility, taking account of additionally required raw material input and material quantity exports from the new asphalt plant.

The following assumptions have been made in order to assess for the worst-case scenario:

- Trips will be spread evenly across a 12-hour working day;
- Arrivals and departures will take place during the network peaks.

Table 6-1: Proposed Average Development Trip Generation Upon Public Highway (Year 1 - 2019)

Material	Source/Destination	Vehicle Size/Type (tonnes)	Tonnes (per year)	Trips per Annum (one-way)	Movements per Annum (two-way)	Operational Days	Daily Trips (one-way)	Daily Movements (two-way)
Input								
Unprocessed Slag	On-Site	N/A						
Processed Slag	On-Site	N/A						
Bitumen	Off-Site	30t Artic Tanker	5,000	167	334	251	1	2
Limestone	Off-Site	30t Artic Tanker	5,000	167	334	251	1	2
RAP	Off-Site	20t Rigid Tipper	Included in 'Asphalt Products' Figure (RAP is produced from returned asphalt)					
Filler	Off-Site	30t Artic Tanker	1,500	50	100	251	0.2	0.4
SMA Fibre Pellets	Off-Site	20t Artic Tanker	50	3	6	251	0.01	0.02
Additive (No IBCs)	Off-Site	7.5t Flat Bed	5	1	2	251	N/A	
Output								
Asphalt Products	Off-Site	20t Rigid Tipper	100,000	5,000	10,000	251	20	40
Total			111,555	5,388	10,776	251	22	44

Table 6-2: Proposed Average Development Trip Generation Upon Public Highway (Year 5 - 2023)

Material	Source/Destination	Vehicle Size/Type (tonnes)	Tonnes (per year)	Trips per Annum (one-way)	Movements per Annum (two-way)	Operational Days	Daily Trips (one-way)	Daily Movements (two-way)
Input								
Unprocessed Slag	On-Site	N/A						
Processed Slag	On-Site	N/A						
Bitumen	Off-Site	30t Artic Tanker	12,500	417	834	251	2	4
Limestone	Off-Site	30t Artic Tanker	25,000	833	1,666	251	3	6
RAP	Off-Site	20t Rigid Tipper	Included in 'Asphalt Products' Figure (RAP is produced from returned asphalt)					
Filler	Off-Site	30t Artic Tanker	4,000	133	266	251	1	2
SMA Fibre Pellets	Off-Site	20t Artic Tanker	120	6	12	251	0.02	0.04
Additive (No IBCs)	Off-Site	7.5t Flat Bed	5	1	2	251	N/A	
Output								
Asphalt Products	Off-Site	20t Rigid Tipper	250,000	12,500	25,000	251	50	100
Total			291,625	13,890	27,780	251	56	112

There are some existing trips of slag which will now be processed on-site and so these trips will no longer be on the local highway network. The existing slag trips were for 88,000 tonnes in sales based upon 2018 figures. 27,000 tonnes were transferred to the existing asphalt plant in Rotherham via train, and the other 61,000 tonnes was collected and distributed out via road haulage. It has been predicted that these trips were made via 20t rigid tippers which equates to 3,050 trips per annum, 12 trips daily and 1 trip per hour.

6.2.2 Staff Trips

There is expected to be up to an additional ten members of staff in employment for the operational asphalt plant working a 12-hour day from 06:00 to 18:00, therefore staff trips would arrive before this AM hour meaning no additional light vehicle trips made during the network AM peak hour. Employee trips will be included within the network PM peak hour. In order to assess for a worst-case scenario the following has been assumed:

- No shift patterns; and
- All staff members will drive to work via single occupancy car trips.

6.2.3 Trip Generation Summary

Table 6-3 provides an overall summary of the number of trips the proposed development will generate:

Table 6-3: Summary of Proposed Development Vehicular Movements

	Daily Trips	Daily Two-Way Movements
Year 1 – 2019		
Operations	22	44
Staff	10	20
Slag	-12	-24
Total	20	40
Year 5 – 2023		
Operations	56	112
Staff	10	20
Slag	-12	-24
Total	54	108

There will be an increase of 34 vehicular trips (68 two-way movements) from the opening year to the proposed development in year 5.

6.3 Development Trip Distribution

It has been assumed that all operations HGVs will travel north onto Rover Way from the roundabout junction with Tide Fields Road while staff vehicles associated with the proposed development will be evenly distributed on Rover Way (50:50).

7.0 Transport Impact Assessment

The following Section combines the development trip generation and existing highway conditions determined above to assess the likely level of impact that the proposed development would bear on the local highway network. Particular focus is given to the possible impacts on Rover Way.

7.1 Committed Development

Other local development which has been permitted must be taken into consideration with relation to their transport implications upon the local highway network. The objective is to identify any combined effects from the Development or effects from several developments; and if, whilst individually the effects may be insignificant, could when considered together cause a further significant direct or indirect impact requiring mitigation.

The following permitted development have been identified in close proximity to the proposed:

- **Land at Rover Way, Pengam (The Cardiff Motocross Centre MX)** – The removal of fill material and the construction of a biomass power plant (up to 9.5MW) and a maximum of 130,000sqft of industrial accommodation (B8 Use Class), new access roads and associated landscaping works – **application ref. 17/02130/MJR**;
- **Land at Rover Way, Pengam (The Cardiff Motocross Centre MX)** – Amendments to Condition 28 to incorporate minor amendments to access layout previously approved under 17/02130/MJR – **application ref. 19/00244/MJR**; and
- **SIMS Metal UK Metal Recovery Plant, Rover Way, Pengam** – Proposed industrial building (Class B2) to house scrap metal sorting machinery, in addition to related works, associated with existing site use – **application ref. 18/02065/MJR**.

The planning application documents have been reviewed and the trip generations identified. There will be no additional vehicular movements from application ref. 18/02065/MJR and the movements generated from application ref. 17/02130/MJR will create a daily increase of less than 2% to the baseline traffic levels along Rover Way. This was concluded to have minimal traffic impact upon the local highway network. Traffic flow increases of less than 10% per day can be considered a part of everyday baseline fluctuations.

7.1.1 Committed Development Summary

To summarise the identified committed development the traffic impact upon the local highway network will be minimal and so these applications will not form a part of the traffic impact assessment for the proposed.

7.2 Assessment Years and Methodology

This assessment determines the expected level of impact generated by the proposed development traffic during the opening year – ‘Year 1 (2019)’ and a suitable future year scenario whereby the proposed is expected to be at its maximum operations.

The Trip End Model Presentation Program (TEMPro) uses data from the National Transport Model (NTM) with local data combined to determine local growth factors. These factors can be applied to traffic survey data to calculate expected future traffic levels. For the purpose of this assessment, the current 2019 traffic data must be growth scaled to represent traffic levels in 2023, the future assessment year. The appropriate growth factors have been determined using version TEMPro version 7.2 and the most recent dataset from the National Trip-end Model (NTM).

7.3 Impact on Network Capacity

An assessment of net traffic change between the existing situation and the forecasted trip generation of the proposed development has been undertaken. Increases in traffic levels of below 10% are considered insignificant and are likely a part of day-to-day traffic flow variation. The following tables reflect the increases in traffic flows which the proposed is anticipated to generate.

The TEMPro growth scale figure for the AM peak hour from 2019-2023 was calculated as 1.0631 while the PM peak hour came in at 1.0649.

Table 7-1: Network AM Peak Hour (07:00-08:00) Change in Traffic Flows

Year	Highway Link	Traffic Flows							
		Network		Development		Network + Development		Increase (%)	
		All Veh.	HGVs	All Veh.	HGVs	All Veh.	HGVs	All Veh.	HGVs
1 (2019)	Rover Way (NE)	2,141	211	2	2	2,143	213	0.1	1
	Tide Fields Road	34	18	2	2	36	20	6	11
	Rover Way (SW)	2,123	201	0	0	2,123	201	0	0
5 (2023)	Rover Way (NE)	2,276	224	7	7	2,283	231	0.3	3
	Tide Fields Road	36	19	7	7	43	26	19	37
	Rover Way (SW)	2,257	214	0	0	2,257	214	0	0

Table 7-2: Network PM Peak Hour (17:30-18:30) Change in Traffic Flows

Year	Highway Link	Traffic Flows							
		Network		Development		Network + Development		Increase (%)	
		All Veh.	HGVs	All Veh.	HGVs	All Veh.	HGVs	All Veh.	HGVs
1 (2019)	Rover Way (NE)	1,923	71	8	2	1,931	73	0.4	3
	Tide Fields Road	33	13	12	2	45	15	36	15
	Rover Way (SW)	1,908	62	6	0	1,914	62	0.3	0
5 (2023)	Rover Way (NE)	2,048	76	15	10	2,061	86	1	13
	Tide Fields Road	35	14	20	10	55	24	57	71
	Rover Way (SW)	2,032	66	5	0	2,037	66	0.3	0

The above assessment indicates that the proposed development would likely result in a percentage increase in the level of potential traffic generated during the AM and PM network peak periods by up to 3% on Rover Way. An increase in traffic flow levels of 19% are expected on Tide Fields Road during the AM network peak, and up to 57% in the future year scenario PM peak hour.

It can be seen that an increase in HGVs on Rover Way (NE) of 13% occurs in the future year scenario of 2023 during the PM peak hour. Although this appears to be high, the total vehicle flows do not exceed the recommended 10% for achieving normal base flow fluctuations. As such it is considered insignificant and warrants no further assessment. As further consideration, the road is not considered to be sensitive and the HGV PM peak was identified at an earlier hour to the assessed network peak, meaning this scenario is likely to not occur as was assessed in terms of a worst-case scenario.

The increase of all vehicles upon Rover Way represents an insignificant increase in trip generation per hour, as such it is considered that minor uplift in vehicular trip generation resulting from the proposals would have minimal impact on the operation of the highway network.

The full traffic flow diagrams created to complete Tables 7-1 and 7-2 can be seen at **Appendix 04**.

Tide fields Road has an increase which evidently exceeds 10%, however this link acts as an access road and so is not considered concerning with such an increase.

7.4 Junction Impacts

Due to a minimal increase in vehicular movements during the network peak hours, a junction capacity assessment was considered unnecessary. The additional vehicular trips upon the local highway network (Rover Way) are determined as part of usual daily network fluctuations and will amalgamate to become usual background traffic.

7.5 Impact on Highway Safety

Following a review of the data available to view on CrashMap.co.uk and received by the South Wales Police, it has been concluded that no incident occurring within the identified study area within the most recent years examined (2014-2018) may be attributed to a highway deficiency of any kind, and that all recorded incidents are likely to be attributed to human error.

As such, it is the conclusion of this report that no highway deficiency exists at present within the relevant proximity of the application site boundary or surrounding highway infrastructure that may now or in the future pose a detrimental effect upon highway safety in the vicinity.

The minimal increase in vehicular traffic generated by the site is unlikely to result in any increased likelihood of incident or highway safety issue.

7.6 Impact Assessment Conclusion

In view of the above it is concluded that the proposed will not result in any perceptible detrimental impacts on the local highway network, both in terms of highway operation and highway safety, nor will the Tide Fields Road/Rover Way roundabout junction be any further exacerbated by the increase.

8.0 Summary and Conclusions

This Transport Assessment has been prepared in order to determine the significance of any transport related impacts associated with the proposed development and changes to the site operations at Celsa Steel, Tide Fields Road, Cardiff.

The principle purpose of this report is to provide a detailed consideration of the proposed development in terms of its implications for highway and transportation matters. This included a forecast of the potential traffic generated by the proposed development and a consideration of the potential impact on the local highway infrastructure as a result.

The application site area measures approximately 11,300m², while the plant footprint is c.4,200m² and is situated northerly within the existing southern Celsa Steel Works site, Rover Way, Cardiff, CF24 5TH which is mainly accessed from Tide Fields Road.

The proposed development is for an asphalt plant which will use the surplus slag from the steel making process and other imported raw materials to produce asphalt with a maximum capacity of 320 tonnes per hour. The process will utilise waste materials from the steel works which would otherwise be disposed of. As such, there are clear operational and sustainability benefits to the asphalt plant being located within this site.

An audit of the local highway layout has been undertaken in order to understand the existing road conditions. Personal Injury Accident Data was also obtained for the local highway in proximity of the application site. The data and CrashMap.co.uk combined showed that there are no highway safety issues in the local proximity which could potentially be exacerbated by the proposals.

The overall accessibility of the site was assessed in detail with respect to pedestrian, cycle and public transport access. The assessment demonstrated that the development site is not best situated for access via walking or cycle, and there are no nearby bus stops; therefore it is recommended that car sharing is the best method for travel to work in place of single occupancy car use.

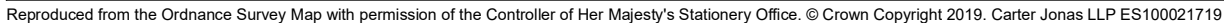
A traffic generation forecast has been determined using first principles which determined that the opening year of 2019 will have 40 two-way vehicular movements across an 11-hour day (06:00-17:00), and Year 5 of operations (2023) will have 108 two-way movements.

The overall conclusion drawn is that there will be no discernible impact upon the local highway network in terms of network capacity or safety concerns; the proposals will have an insignificant effect upon the local highway network.

For the above reasons the proposed development of the site accords with the national and local planning policies and is considered to be acceptable in traffic and transportation terms.

APPENDIX 01

Site Location Plan



APPENDIX 02

South Wales Policy Road Traffic Collision Data

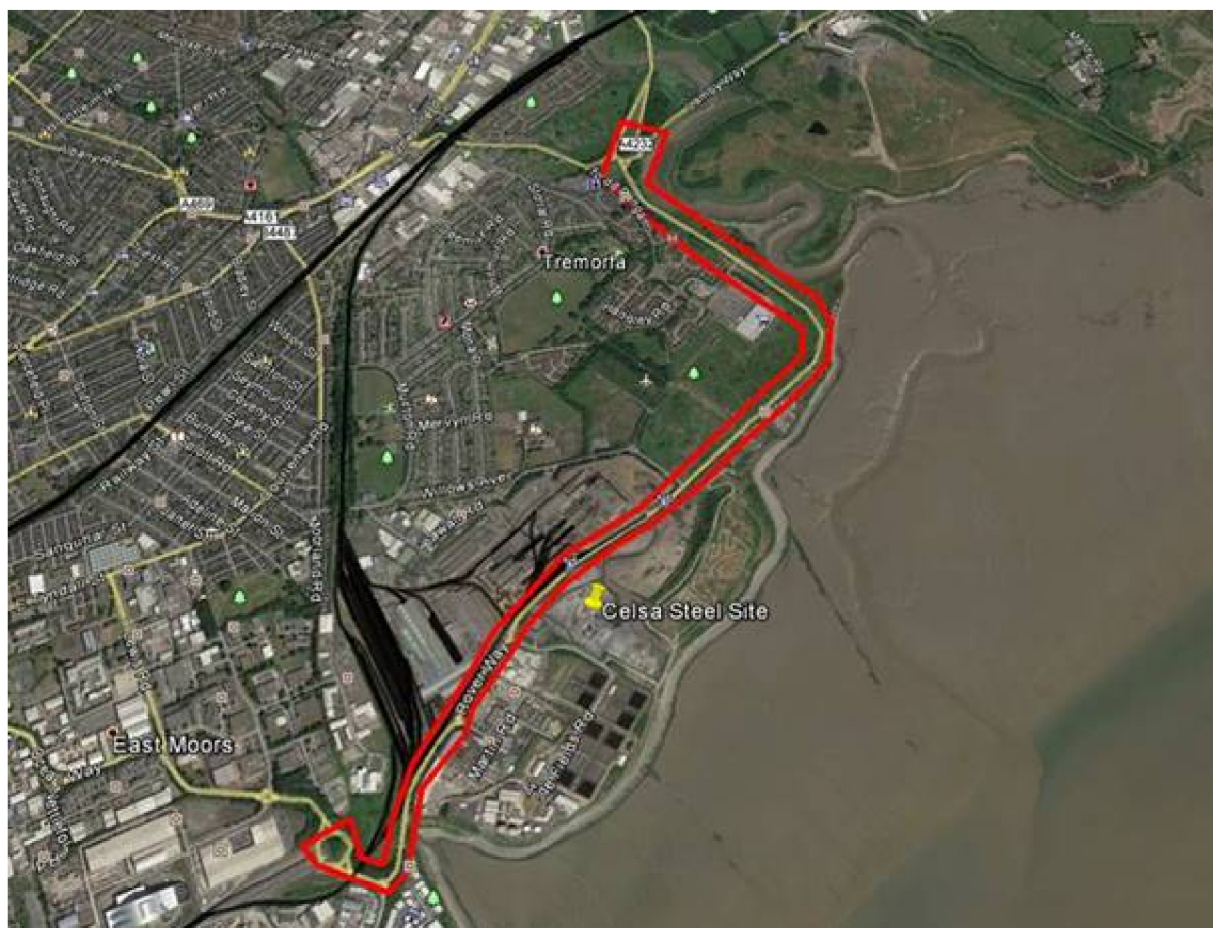


Freedom of Information Request 402/19

Response date: 23rd May 2019

I am looking to obtain the RTC data for the latest five year period for a stretch of road located in Cardiff. The road is Rover Way and the study area is to include the two roundabout junctions at either end. I have attached a picture which is clearer.

I am not sure what information you are able to provide on the accidents, but we usually get no. of vehicles involved, no. of casualties, vehicle type, collision location and a description of the incident. Some reports previously have contained road conditions and weather also.



Continued...

THIS INFORMATION HAS BEEN PROVIDED IN RESPONSE TO A REQUEST UNDER THE FREEDOM OF INFORMATION ACT 2000, AND IS CORRECT AS AT THE DATE ORIGINALLY PROVIDED.

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Freedom of Information Request 402/19

RESPONSE

We have consulted with our analysts who have provided a dataset to answer your request.

Please see the attached document entitled 'Response Data 402_19' that provides the information to answer your request.

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Reported Year	No. of Vehicles	No. of Casualties	Vehicle Type	Street	City	Summary	Light Conditions
2013	2	1 PERSON INJURED	MG MGF & SUZUKI ALTO	LAMBY WAY	CARDIFF	2 VEHICLE RTC ON THE ROUNDABOUT	Daylight
2013	2	3 PEOPLE INJURED	RENAULT CLIO & YAMAHA YBR (MOTORCYCLE)	LAMBY WAY	CARDIFF	MOTORCYCLE COLLIDED WITH REAR OF VEHICLE ON THE ROUNDABOUT	DarknessPM
2013	1	1 PERSON INJURED	AUDI A3	DARBY ROAD	CARDIFF	VEHICLE HAS HIT BOLLARD	DarknessPM
2013	1	1 PERSON INJURED	FORD FIESTA	ROVER WAY	CARDIFF	VEHICLE HAS MOUNTED THE PAVEMENT AND HIT PEDESTRIAN	DarknessPM
2013	1	1 PERSON INJURED	CITROEN C5	OCEAN WAY	CARDIFF	VEHICLE HAS COLLIDED WITH BICYCLE ON ROUNDABOUT	
2013	2	2 PEOPLE INJURED	RENAULT CLIO & VAUXHALL MERIVA	HANDLEY ROAD	CARDIFF	2 VEHICLE RTC AT THE ENTRANCE OF TESCO OFF ROVERWAY	Daylight
2013	2	1 PERSON INJURED	MINI COOPER & SUZUKI GSXR (MOTORCYCLE)	ROVER WAY	CARDIFF	RTC INVOLVING CAR & MOTORBIKE BY THE DOCKS ROUNDABOUT	Daylight
2013	2	1 PERSON INJURED	FORD MONDEO & HYUNDAI COUPE	ROVER WAY	CARDIFF	VEHICLES HAVE COLLIDED ON THE ENTRANCE OF THE ROUNDABOUT	Daylight
2013	NOT RECORDED	NOT RECORDED	NOT RECORDED	SEAWALL ROAD	CARDIFF	VEHICLE HAS BUMPED MOTORCYCLE	
2013	2	2 PEOPLE INJURED	DENNIS (GOODS VEHICLE) & VOLKSWAGEN GOLF	LAMBY WAY	CARDIFF	VEHICLE HAS COLLIDED WITH ANOTHER VEHICLE WHEN EXITING ROUNDABOUT	Daylight
2013	2	2 PEOPLE INJURED	PEUGEOT 207 & VAUXHALL CORSA	ROVER WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE ON ROUNDABOUT	Daylight
2013	2	1 PERSON INJURED	LORRY (TYPE NOT RECORDED) & CITROEN C5	SEAWALL ROAD	CARDIFF	VEHICLE HAS COLLIDED WITH REAR OF LORRY	
2013	1	1 PERSON INJURED	FORD FOCUS	A4232	CARDIFF	VEHICLE HAS COLLIDED WITH BICYCLE ON ROUNDABOUT	Daylight
2014	1	1 PERSON INJURED	VOLKSWAGEN PASSAT	ROVER WAY	CARDIFF	VEHICLE HAS HIT PERSON ON BICYCLE	Daylight
2014	2	2 PEOPLE INJURED	PEUGEOT 3008 & VAUXHALL VIVARO	LAMBY WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE ON ROUNDABOUT	Daylight
2014	1	1 PERSON INJURED	FORD FOCUS	LAMBY WAY	CARDIFF	VEHICLE HAS KNOCKED INDIVIDUAL OFF BICYCLE ON THE ROUNDABOUT	Daylight
2014	2	1 PERSON INJURED	BMW 123D & FORD FOCUS	ROVER WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE SIDE OF ANOTHER VEHICLE	Daylight
2014	2	1 PERSON INJURED	FORD KA & HONDA CBF (MOTORCYCLE)	OCEAN WAY	CARDIFF	VEHICLE PULLED OUT INFRONT OF MOTORCYCLE ON ROUNDABOUT	Daylight
2015	1	1 PERSON INJURED	FERRARI CALIFORNIA	A4232	CARDIFF	CYCLIST KNOCKED DOWN BY A CAR	Daylight
2015	1	1 PERSON INJURED	NISSAN JUKE	LAMBY WAY	CARDIFF	VEHICLE ENTERED THE ROUNDABOUT AND HIT BICYCLE OVER	Daylight
2015	1	1 PERSON INJURED	VAUXHALL ASTRA	ROVER WAY	CARDIFF	PEDESTRIAN WALKED OUT INTO THE ROAD AND WAS STRUCK BY VEHICLE	Daylight
2015	1	1 PERSON INJURED	YAMAHA YZF (MOTORCYCLE)	ROVER WAY	CARDIFF	SINGLE MOTORCYCLIST HAS COME OFF THEIR BIKE AND STUCK THE ROADSIDE BOLLARD	TwilightPM
2015	1	1 PERSON INJURED	VOLKSWAGEN CADDY (VAN)	A4232	CARDIFF	VEHICLE PULLED OUT ONTO ROUNDABOUT AND COLLIDED WITH BICYCLE	Daylight

2015	1	1 PERSON INJURED	FORD MONDEO	A4232	CARDIFF	VEHICLE PULLED OUT ONTO ROUNDABOUT AND COLLIDED WITH BICYCLE	Daylight
2015	2	1 PERSON INJURED	JAGUAR X TYPE & JAGUAR XF	OCEAN WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE	Daylight
2015	1	1 PERSON INJURED	PEUGEOT 206	LAMBY WAY	CARDIFF	INDIVIDUAL KNOCKED OF BICYCLE	Daylight
2015	1	1 PERSON INJURED	FORD FUSION	OCEAN WAY	CARDIFF	VEHICLE HAS GONE INTO THE CENTRAL RESERVATION	Daylight
2015	1	1 PERSON INJURED	MAN TRUCKS (TRACTOR)	ROVER WAY	CARDIFF	TRACTOR UNIT AND TRAILER TOPPLED OVER ON ROUNDABOUT	DarknessPM
2016	1	1 PERSON INJURED	AUDI A1	ROVER WAY	CARDIFF	VEHICLE HAS COLLIDED WITH BOLLARDS	DarknessPM
2016	2	2 PEOPLE INJURED	FORD FOCUS & VOLKSWAGEN GOLF	A4232	CARDIFF	2 VEHICLE RTC BY THE ROUNDABOUT	Daylight
2016	2	1 PERSON INJURED	FORD FIESTA & YAMAHA MT (MOTORCYCLE)	OCEAN WAY	CARDIFF	VEHICLE HAS KNOCKED INDIVIDUAL OFF MOTORCYCLE	Daylight
2016	2	1 PERSON INJURED	FORD TRANSIT & VAUXHALL MERIVA	A4232	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE AT ROUNDABOUT	Daylight
2016	2	1 PERSON INJURED	SEAT IBIZA & BMW (MODEL NOT RECORDED)	OCEAN WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE	Daylight
2016	2	1 PERSON INJURED	FORD MONDEO & MERCEDES A200	OCEAN WAY AND PORTMANMOOR ROAD	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE NEAR ROUNDABOUT	Daylight
2016	2	1 PERSON INJURED	JAGUAR (MODEL NOT RECORDED) & VOLKSWAGEN PASSAT	OCEAN WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE	Daylight
2017	1	1 PERSON INJURED	RENAULT CLIO	ROVER WAY	CARDIFF	VEHICLE COLLIDED WITH LAMP POST AND BOLLARD	Daylight
2017	1	1 PERSON INJURED	BMW G 650 (MOTORCYCLE)	OCEAN WAY	CARDIFF	INDIVIDUAL HAS BECOME UNSTABLE AND FALLEN OFF MOTORCYCLE	Daylight
2017	1	1 PERSON INJURED	FORD FIESTA	OCEAN WAY	CARDIFF	VEHICLE HAS CRASHED INTO THE CENTRAL RESERVATION	Daylight
2017	2	1 PERSON INJURED	RENAULT TWINGO & SEAT MII	LAMBY WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE	Daylight
2018	2	1 PERSON INJURED	FORD FOCUS & TOYOTA AVENSIS	ROVER WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE	Daylight
2018	3	2 PEOPLE INJURED	AUDI A3, HYUNDAI GETZ & RENAULT CLIO	ROVER WAY	CARDIFF	VEHICLE HAS COLLIDED WITH THE REAR OF ANOTHER VEHICLE PUSHING IT INTO THE VEHICLE IN FRONT	Daylight

APPENDIX 03

Trafficsense MTC Data

Manual Classified Turning Counts, Cardiff

DATE: TUESDAY 2nd APRIL 2019

LOCATION: ROVER WAY / TIDE FIELDS ROAD

ARM: ROVER WAY NORTH

TIME / CLASS	LEFT TO TIDE FIELDS ROAD								STRAIGHT TO ROVER WAY SOUTH								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
6:30 - 6:45	0	0	0	0	0	0	0	0	0	0	75	18	4	5	0	102	102
6:45 - 7:00	0	0	3	5	0	3	0	11	0	2	165	33	6	16	0	222	233
7:00 - 7:15	0	0	5	1	0	1	0	7	0	0	188	41	3	18	0	250	257
7:15 - 7:30	0	0	2	0	0	0	0	2	0	4	190	58	8	19	0	279	281
HOURLY TOTAL	0	0	10	6	0	4	0	20	0	6	618	150	21	58	0	853	873
7:30 - 7:45	0	0	0	1	0	1	0	2	1	0	206	44	2	11	0	264	266
7:45 - 8:00	0	0	0	0	0	1	0	1	0	2	244	36	8	11	0	301	302
8:00 - 8:15	0	0	2	0	0	0	0	2	0	1	185	24	1	6	0	217	219
8:15 - 8:30	0	0	2	0	0	0	0	2	0	1	162	30	6	11	0	210	212
HOURLY TOTAL	0	0	4	1	0	2	0	7	1	4	797	134	17	39	0	992	999
8:30 - 8:45	0	0	1	3	0	0	0	4	0	0	201	35	10	24	3	273	277
8:45 - 9:00	0	0	1	0	0	0	1	2	0	2	222	40	12	19	4	299	301
9:00 - 9:15	0	0	1	0	0	2	0	3	0	0	169	40	8	16	8	241	244
9:15 - 9:30	0	0	3	0	0	3	0	6	0	0	181	51	12	19	1	264	270
HOURLY TOTAL	0	0	6	3	0	5	1	15	0	2	773	166	42	78	16	1077	1092
9:30 - 9:45	0	0	2	0	1	1	0	4	0	1	190	48	11	10	3	263	267
9:45 - 10:00	0	0	3	1	0	0	0	4	0	0	177	37	13	22	1	250	254
10:00 - 10:15	0	0	3	1	0	3	0	7	0	0	144	53	9	11	2	219	226
10:15 - 10:30	0	0	0	0	1	3	0	4	0	0	130	40	11	11	0	192	196
HOURLY TOTAL	0	0	8	2	2	7	0	19	0	1	641	178	44	54	6	924	943
10:30 - 10:45	0	0	3	1	0	1	0	5	0	0	124	47	13	16	1	201	206
10:45 - 11:00	0	0	0	0	1	0	0	1	0	1	112	38	9	16	0	176	177
11:00 - 11:15	0	0	2	2	2	2	0	8	0	0	154	52	9	13	1	229	237
11:15 - 11:30	0	0	1	1	1	0	0	3	0	0	124	43	14	16	1	198	201
HOURLY TOTAL	0	0	6	4	4	3	0	17	0	1	514	180	45	61	3	804	821
11:30 - 11:45	1	1	0	3	0	1	0	6	0	0	116	45	3	14	2	180	186
11:45 - 12:00	0	1	0	2	0	1	0	4	0	0	140	46	15	12	0	213	217
12:00 - 12:15	0	0	2	0	0	1	0	3	0	0	131	50	6	11	1	199	202
12:15 - 12:30	0	0	2	1	0	0	6	9	0	0	143	47	10	11	1	212	221
HOURLY TOTAL	1	2	4	6	0	3	6	22	0	0	530	188	34	48	4	804	826
12:30 - 12:45	0	0	3	0	0	2	0	5	0	1	132	40	5	5	2	185	190
12:45 - 13:00	0	0	0	1	0	1	0	2	0	0	152	51	13	13	0	229	231
13:00 - 13:15	0	0	1	0	0	0	0	1	0	0	155	46	9	9	3	222	223
13:15 - 13:30	0	0	1	0	1	1	0	3	0	0	151	37	8	8	1	205	208
HOURLY TOTAL	0	0	5	1	1	4	0	11	0	1	590	174	35	35	6	841	852
13:30 - 13:45	0	0	3	1	2	1	0	7	0	3	138	54	7	7	2	211	218
13:45 - 14:00	0	0	2	1	0	0	0	3	0	1	129	48	9	7	0	194	197
14:00 - 14:15	0	0	0	0	1	0	0	1	0	1	130	53	8	9	2	203	204
14:15 - 14:30	0	0	1	0	2	1	0	4	0	0	132	44	10	8	1	195	199
HOURLY TOTAL	0	0	6	2	5	2	0	15	0	5	529	199	34	31	5	803	818
14:30 - 14:45	0	0	0	0	0	2	0	2	0	0	149	46	11	11	1	218	220
14:45 - 15:00	0	0	0	2	1	0	0	3	0	0	131	49	15	15	0	210	213
15:00 - 15:15	0	0	0	3	0	0	0	3	0	0	155	60	11	15	0	241	244
15:15 - 15:30	0	0	1	0	0	0	0	1	0	0	144	34	9	18	1	206	207
HOURLY TOTAL	0	0	1	5	1	2	0	9	0	0	579	189	46	59	2	875	884
15:30 - 15:45	0	0	0	0	0	0	0	0	0	0	166	52	5	8	1	232	232
15:45 - 16:00	0	0	0	0	0	0	0	0	0	0	173	51	3	5	8	240	240
16:00 - 16:15	0	0	1	1	0	0	0	2	0	2	171	45	6	9	7	240	242
16:15 - 16:30	0	0	1	0	0	0	0	1	0	0	190	33	5	6	9	243	244
HOURLY TOTAL	0	0	2	1	0	0	0	3	0	2	700	181	19	28	25	955	958
16:30 - 16:45	0	0	0	0	0	0	0	0	0	1	194	28	2	11	3	239	239
16:45 - 17:00	0	0	0	0	1	0	0	1	0	0	231	27	4	12	3	277	278
17:00 - 17:15	0	0	0	0	0	0	0	0	0	1	210	21	4	7	0	243	243
17:15 - 17:30	0	0	0	0	1	0	0	1	0	1	231	26	3	6	2	269	270
HOURLY TOTAL	0	0	0	0	2	0	0	2	0	3	866	102	13	36	8	1028	1030
17:30 - 17:45	0	0	0	1	0	0	0	1	1	1	241	11	1	7	2	264	265
17:45 - 18:00	0	0	2	0	3	0	0	5	1	0	218	17	2	7	0	245	250
18:00 - 18:15	0	0	0	0	4	0	0	4	0	1	197	19	0	5	0	222	226
18:15 - 18:30	0	0	1	1	0	0	0	2	0	0	228	25	2	8	0	263	265
HOURLY TOTAL	0	0	3	2	7	0	0	12	2	2	884	72	5	27	2	994	1006
18:30 - 18:45	0	0	0	0	0	0	0	0	0	1	219	11	1	6	2	240	240
18:45 - 19:00	0	0	0	0	0	0	0	0	0	1	201	12	6	3	0	223	223
19:00 - 19:15	0	0	0	0	0	0	0	0	0	1	159	23	3	6	2	194	194
19:15 - 19:30	0	0	0	0	0	0	0	0	0	1	149	18	2	3	0	173	173
HOURLY TOTAL	0	0	0	0	0	0	0	0	0	4	728	64	12	18	4	830	830
12 HOUR TOTAL	1	2	55	33	22	32	7	152	3	31	8749	1977	367	572	81	11780	11932

Manual Classified Turning Counts, Cardiff

DATE: TUESDAY 2nd APRIL 2019

LOCATION: ROVER WAY / TIDE FIELDS ROAD

ARM: TIDE FIELDS ROAD

TIME / CLASS	LEFT TO ROVER WAY SOUTH								RIGHT TO ROVER WAY NORTH								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
6:30 - 6:45	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
6:45 - 7:00	0	0	0	1	1	0	0	2	0	0	0	0	0	1	0	1	3
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	4	4
HOURLY TOTAL	0	0	0	1	1	0	0	2	0	0	1	2	0	6	0	9	11
7:30 - 7:45	0	0	0	1	1	0	0	2	0	0	0	0	0	4	0	4	6
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3	3
8:00 - 8:15	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0	2	3
8:15 - 8:30	0	0	1	1	0	1	0	3	0	0	0	1	0	1	0	2	5
HOURLY TOTAL	0	0	1	2	1	2	0	6	0	0	0	2	1	8	0	11	17
8:30 - 8:45	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	2
8:45 - 9:00	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	2
9:00 - 9:15	0	0	0	0	0	2	0	2	0	0	1	0	0	0	0	1	3
9:15 - 9:30	0	0	3	0	0	0	0	3	0	0	1	1	1	3	0	6	9
HOURLY TOTAL	0	0	4	0	0	2	0	6	0	0	2	3	1	4	0	10	16
9:30 - 9:45	0	0	1	0	3	0	0	4	0	0	0	0	1	1	0	2	6
9:45 - 10:00	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2
10:00 - 10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
10:15 - 10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
HOURLY TOTAL	0	0	1	0	3	0	0	4	0	0	1	1	1	5	0	8	12
10:30 - 10:45	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	2	3
10:45 - 11:00	0	0	0	0	0	2	0	2	0	0	0	0	0	4	0	4	6
11:00 - 11:15	0	0	1	0	0	0	0	1	0	0	2	0	2	1	0	5	6
11:15 - 11:30	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	5	5
HOURLY TOTAL	0	0	1	1	0	2	0	4	0	0	3	3	4	6	0	16	20
11:30 - 11:45	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
11:45 - 12:00	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
12:00 - 12:15	0	0	1	2	0	0	0	3	0	0	1	1	1	1	0	4	7
12:15 - 12:30	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	2	3
HOURLY TOTAL	0	0	2	2	0	0	0	4	0	0	1	2	4	3	0	10	14
12:30 - 12:45	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	1	2
12:45 - 13:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
13:00 - 13:15	0	0	0	0	0	0	0	0	0	0	1	1	0	3	0	5	5
13:15 - 13:30	0	0	2	0	0	3	1	6	0	0	1	1	1	2	0	5	11
HOURLY TOTAL	0	0	3	0	0	3	1	7	0	0	3	2	1	6	0	12	19
13:30 - 13:45	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	6	6
13:45 - 14:00	0	0	0	3	0	1	0	4	0	0	1	1	1	1	0	4	8
14:00 - 14:15	0	0	1	1	1	0	0	3	0	0	1	2	0	1	0	4	7
14:15 - 14:30	0	0	1	0	0	1	0	2	0	0	3	1	0	0	0	4	6
HOURLY TOTAL	0	0	2	4	1	2	0	9	0	0	6	5	2	4	1	18	27
14:30 - 14:45	0	0	0	0	3	0	0	3	0	0	1	0	0	0	0	1	4
14:45 - 15:00	0	0	0	1	1	0	0	2	0	0	3	3	0	0	0	6	8
15:00 - 15:15	0	0	0	1	0	1	0	2	0	0	0	3	0	1	0	4	6
15:15 - 15:30	0	0	1	2	1	0	0	4	0	0	1	2	0	0	0	3	7
HOURLY TOTAL	0	0	1	4	5	1	0	11	0	0	5	8	0	1	0	14	25
15:30 - 15:45	0	0	3	0	1	1	0	5	0	0	3	0	0	0	0	3	8
15:45 - 16:00	0	0	1	2	0	0	0	3	0	0	0	1	0	0	0	1	4
16:00 - 16:15	0	0	0	1	0	0	0	1	0	0	8	0	0	0	0	8	9
16:15 - 16:30	0	0	1	1	0	0	0	2	0	0	2	0	0	0	0	2	4
HOURLY TOTAL	0	0	5	4	1	1	0	11	0	0	13	1	0	0	0	14	25
16:30 - 16:45	0	0	4	0	0	0	0	4	0	0	1	0	0	0	0	1	5
16:45 - 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
HOURLY TOTAL	0	0	4	0	0	0	0	4	0	0	4	1	0	0	0	5	9
17:30 - 17:45	0	0	1	3	1	0	0	5	0	0	1	2	0	0	0	3	8
17:45 - 18:00	0	0	1	0	0	0	0	1	0	0	3	0	1	0	0	4	5
18:00 - 18:15	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	3
18:15 - 18:30	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	2	3
HOURLY TOTAL	0	0	2	3	2	0	0	7	0	0	5	3	4	0	0	12	19
18:30 - 18:45	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
18:45 - 19:00	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	3	3
19:00 - 19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:15 - 19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOURLY TOTAL	0	0	0	0	0	0	0	0	0	0	2	0	4	0	0	6	6
12 HOUR TOTAL	0	0	26	21	14	13	1	75	0	0	46	33	22	43	1	145	220

Manual Classified Turning Counts, Cardiff

DATE: TUESDAY 2nd APRIL 2019

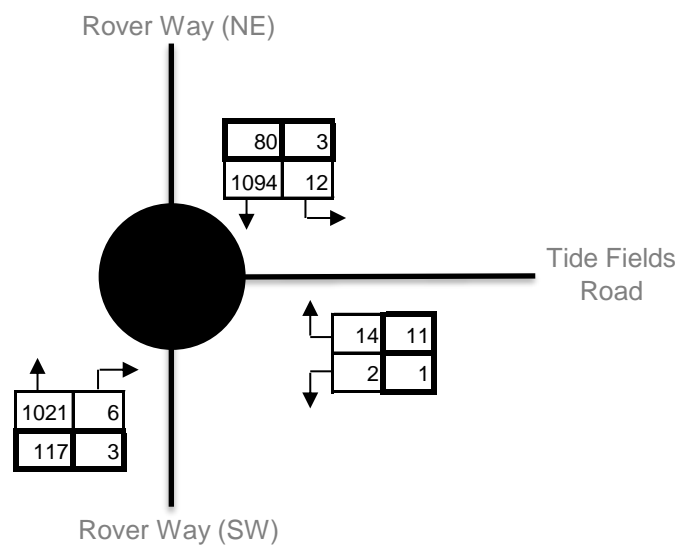
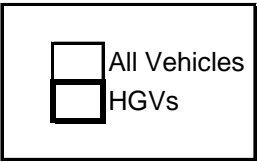
LOCATION: ROVER WAY / TIDE FIELDS ROAD

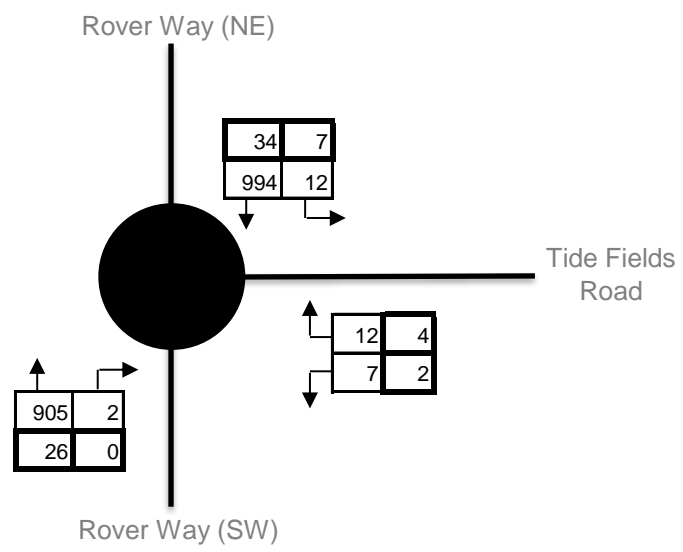
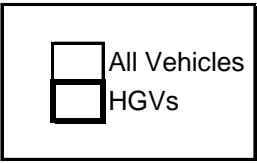
ARM: ROVER WAY SOUTH

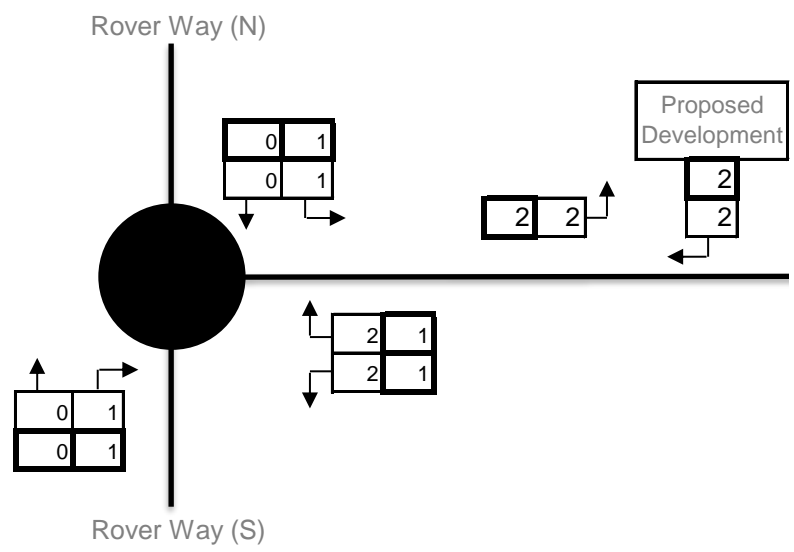
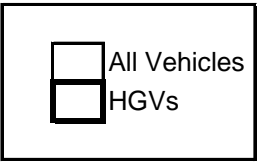
TIME / CLASS	STRAIGHT TO ROVER WAY NORTH								RIGHT TO TIDE FIELDS ROAD								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR TAXI	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
6:30 - 6:45	0	1	52	14	7	6	2	82	0	0	0	0	0	0	0	0	82
6:45 - 7:00	0	2	118	33	8	9	2	172	0	0	0	2	1	1	0	4	176
7:00 - 7:15	0	0	165	20	7	17	5	214	0	0	1	0	1	2	0	4	218
7:15 - 7:30	0	1	185	39	12	14	7	258	0	0	0	0	0	0	0	0	258
HOURLY TOTAL	0	4	520	106	34	46	16	726	0	0	1	2	2	3	0	8	734
7:30 - 7:45	0	1	218	41	10	12	7	289	0	0	0	2	0	0	0	2	291
7:45 - 8:00	0	0	190	44	9	14	3	260	0	0	0	0	0	0	0	0	260
8:00 - 8:15	0	1	126	32	6	17	0	182	0	0	0	0	0	1	0	1	183
8:15 - 8:30	0	2	133	24	8	8	2	177	0	0	1	0	0	1	0	2	179
HOURLY TOTAL	0	4	667	141	33	51	12	908	0	0	1	2	0	2	0	5	913
8:30 - 8:45	0	1	197	39	11	19	0	267	0	0	0	0	0	0	0	0	267
8:45 - 9:00	0	1	166	39	13	12	0	231	0	0	1	1	0	2	0	4	235
9:00 - 9:15	0	0	153	36	6	15	2	212	0	0	1	1	0	1	0	3	215
9:15 - 9:30	0	0	142	43	7	13	2	207	0	0	0	2	2	1	0	5	212
HOURLY TOTAL	0	2	658	157	37	59	4	917	0	0	2	4	2	4	0	12	929
9:30 - 9:45	0	0	125	47	10	17	0	199	0	0	2	1	0	1	0	4	203
9:45 - 10:00	0	0	121	43	6	17	2	189	0	0	1	1	0	0	0	2	191
10:00 - 10:15	0	1	138	49	16	17	0	221	0	0	0	3	0	0	2	5	226
10:15 - 10:30	0	0	99	33	9	15	1	157	0	0	0	0	0	0	1	1	158
HOURLY TOTAL	0	1	483	172	41	66	3	766	0	0	3	5	0	1	3	12	778
10:30 - 10:45	0	1	118	52	12	11	0	194	0	0	0	1	0	0	0	1	195
10:45 - 11:00	0	0	128	59	8	14	0	209	0	0	0	0	1	1	0	2	211
11:00 - 11:15	0	1	131	50	11	12	4	209	0	0	0	2	0	0	0	2	211
11:15 - 11:30	0	1	139	55	5	14	1	215	0	0	1	3	1	0	0	5	220
HOURLY TOTAL	0	3	516	216	36	51	5	827	0	0	1	6	2	1	0	10	837
11:30 - 11:45	0	1	107	47	12	6	0	173	0	0	0	0	1	1	0	2	175
11:45 - 12:00	0	0	144	54	12	10	3	223	0	0	0	0	0	0	0	0	223
12:00 - 12:15	0	0	145	39	12	15	1	212	0	0	0	0	3	1	0	4	216
12:15 - 12:30	0	0	140	38	11	13	0	202	0	0	0	0	0	0	0	0	202
HOURLY TOTAL	0	1	536	178	47	44	4	810	0	0	0	0	4	2	0	6	816
12:30 - 12:45	0	0	164	36	9	15	0	224	0	0	2	0	0	0	0	2	226
12:45 - 13:00	0	1	136	35	9	18	0	199	0	2	0	0	0	0	0	2	201
13:00 - 13:15	0	0	144	44	14	9	0	211	0	0	1	1	2	0	0	4	215
13:15 - 13:30	0	0	176	52	9	16	4	257	0	0	0	1	0	0	0	1	258
HOURLY TOTAL	0	1	620	167	41	58	4	891	0	2	3	2	2	0	0	9	900
13:30 - 13:45	0	0	165	40	9	11	2	227	0	0	2	0	1	1	0	4	231
13:45 - 14:00	0	0	170	45	10	15	4	244	0	0	1	1	1	0	0	3	247
14:00 - 14:15	0	1	152	43	13	10	1	220	0	1	1	0	1	0	0	3	223
14:15 - 14:30	1	1	141	33	8	19	2	205	0	1	0	0	1	0	0	2	207
HOURLY TOTAL	1	2	628	161	40	55	9	896	0	2	4	1	4	1	0	12	908
14:30 - 14:45	0	0	140	45	4	12	7	208	0	0	0	2	0	0	0	2	210
14:45 - 15:00	0	0	163	43	12	10	5	233	0	0	1	0	1	0	0	2	235
15:00 - 15:15	0	0	144	53	9	12	2	220	0	0	0	0	1	0	0	1	221
15:15 - 15:30	0	0	189	44	12	13	2	260	0	0	0	0	0	0	0	0	260
HOURLY TOTAL	0	0	636	185	37	47	16	921	0	0	1	2	2	0	0	5	926
15:30 - 15:45	0	1	169	40	10	10	0	230	0	0	0	0	0	0	0	0	230
15:45 - 16:00	0	1	188	42	5	13	1	250	0	0	0	0	0	0	0	0	250
16:00 - 16:15	0	0	155	32	4	11	0	202	0	0	0	0	0	0	0	0	202
16:15 - 16:30	0	3	132	23	4	11	0	173	0	0	0	0	0	0	0	0	173
HOURLY TOTAL	0	5	644	137	23	45	1	855	0	0	0	0	0	0	0	0	855
16:30 - 16:45	0	0	188	24	4	13	1	230	0	0	0	0	0	0	0	0	230
16:45 - 17:00	0	1	172	29	4	8	0	214	0	0	0	0	0	0	0	0	214
17:00 - 17:15	0	1	178	20	2	5	0	206	0	0	0	0	0	0	0	0	206
17:15 - 17:30	0	0	181	12	4	4	0	201	0	0	0	1	1	0	0	2	203
HOURLY TOTAL	0	2	719	85	14	30	1	851	0	0	0	1	1	0	0	2	853
17:30 - 17:45	0	2	205	21	2	9	0	239	0	0	1	0	0	0	0	1	240
17:45 - 18:00	0	0	193	16	1	4	1	215	0	0	1	0	0	0	0	1	216
18:00 - 18:15	1	1	201	16	0	5	0	224	0	0	0	0	0	0	0	0	224
18:15 - 18:30	0	0	208	15	2	2	0	227	0	0	0	0	0	0	0	0	227
HOURLY TOTAL	1	3	807	68	5	20	1	905	0	0	2	0	0	0	0	2	907
18:30 - 18:45	0	6	194	12	1	2	1	216		0	0	1	0	0	0	1	217
18:45 - 19:00	0	0	188	14	3	2	0	207	0	0	0	0	1	0	0	1	208
19:00 - 19:15	0	1	155	15	5	1	0	177	0	0	0	0	0	0	0	0	177
19:15 - 19:30	0	0	158	13	2	1	0	174	0	0	0	0	0	0	0	0	174
HOURLY TOTAL	0	7	695	54	11	6	1	774	0	0	0	1	1	0	0	2	776
12 HOUR TOTAL	2	35	8129	1827	399	578	77	11047	0	4	18	26	20	14	3	85	11132

APPENDIX 04

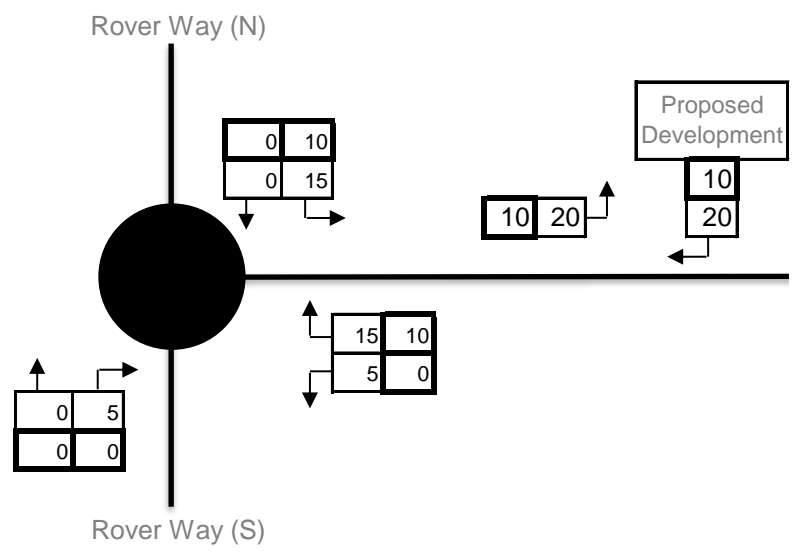
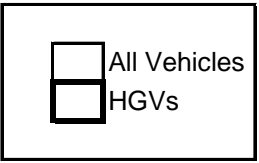
Traffic Flow Diagrams



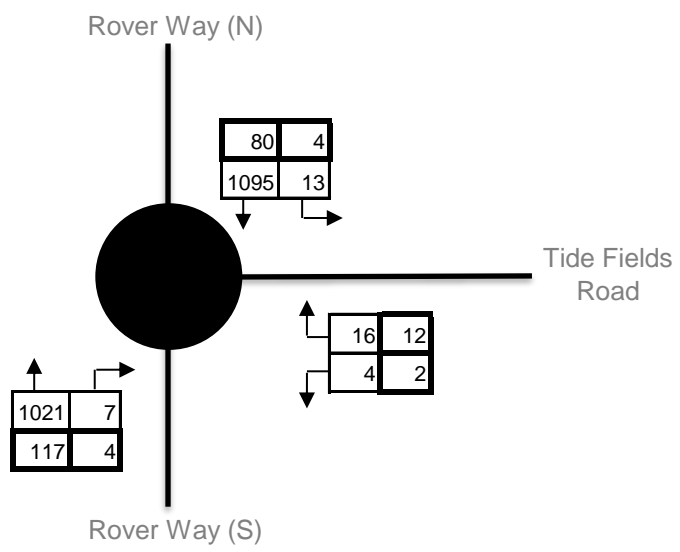
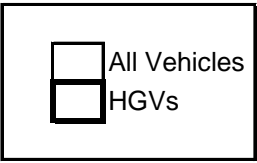


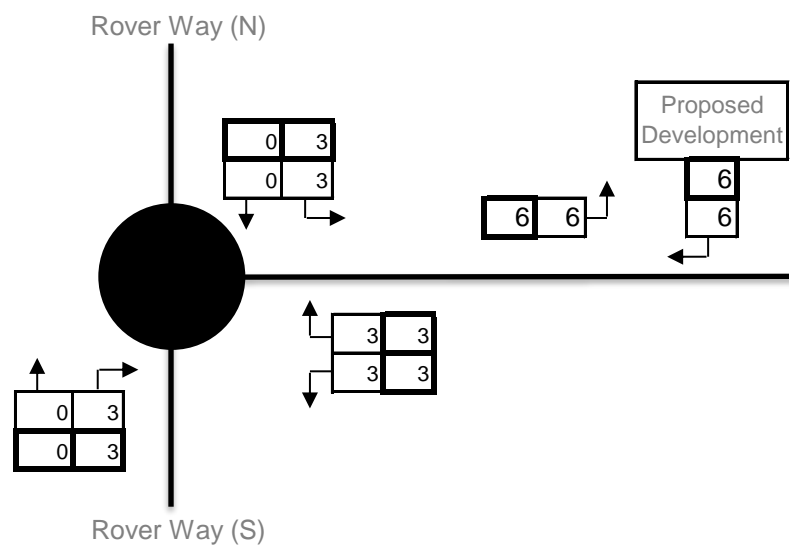
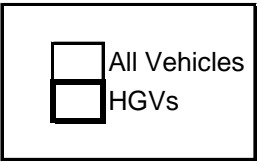


 Tide Fields
Road

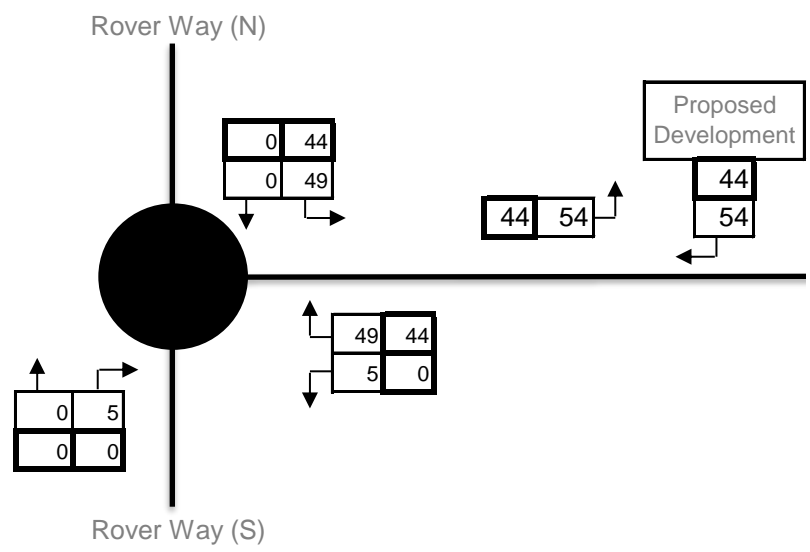
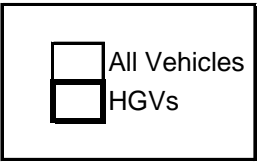


 Tide Fields
Road

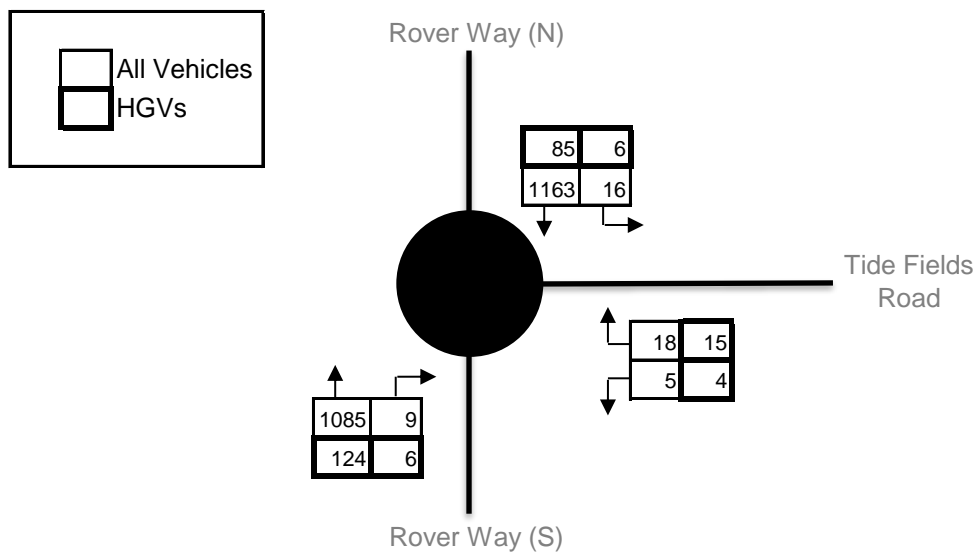




 Tide Fields
Road



 Tide Fields
Road



TEMPro Growth Scale 2019-2023 = 1.0631

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