

Weston Package Phase 1
Major Scheme Business Case

Appendix 3.5

Accident Analysis Technical Note



West of England Partnership

Bath & North East
Somerset Council



North
Somerset
Council

South Gloucestershire
Council



South West RDA

Technical Note

Project: Weston Package	To: Halcrow / GNS
Subject: Analysis of Accident benefits	From: Graham Bown
Date: 8th April 2009	cc:

1. Introduction

This Technical Note describes the accident analysis undertaken as part of the Weston Package Phase 1 Major Scheme Business Case.

The note includes the following sections:

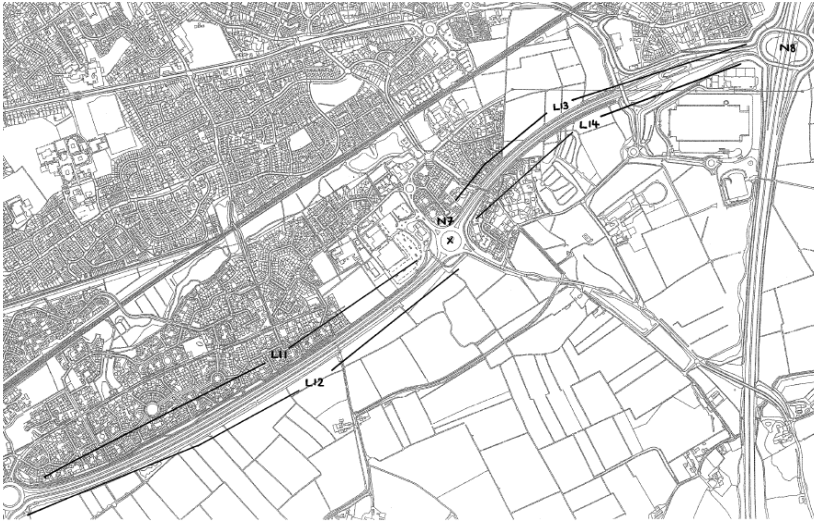
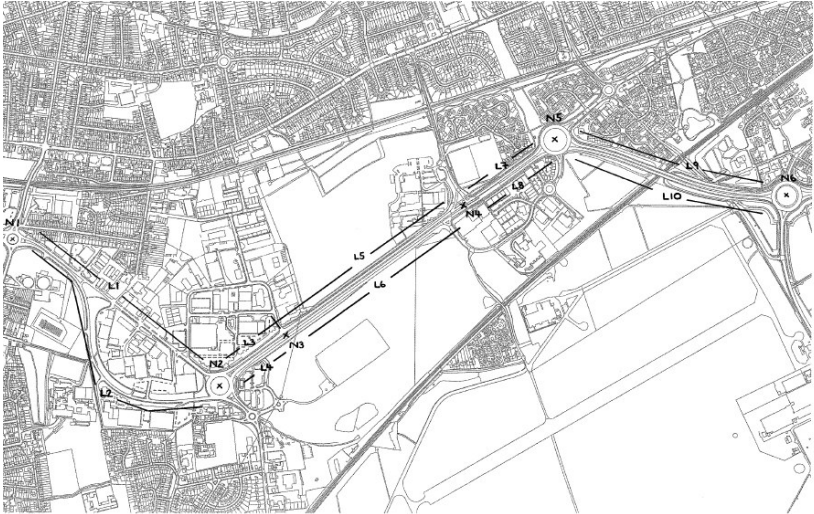
- accident data;
- data processing;
- area of Influence; and
- results.

2. Accident Data

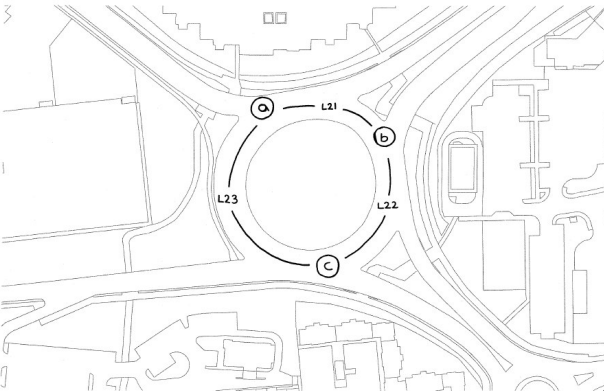
Atkins received data for all accidents along the A370 between the M5 J21 and Drove Road Roundabout in the North Somerset network for the years 2003 to 2008. The data included the M5 J21 off-slips in both directions. The links and their reference number are shown in Figure 2.1 and the numbers of accidents per year are shown in Table 2.1.

This route covers not only the scheme but also the largest changes in flow as a result of the scheme.

Figure 2.1 – Links and Junctions with Observed Accident Data



N2 Winterskoke Rd Roundabout



N8 M5 521

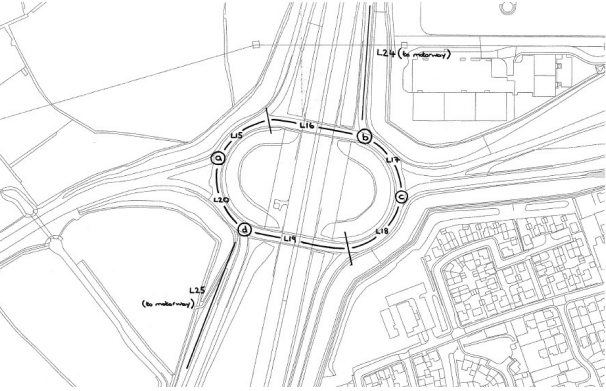


Table 2.1 – Accidents by Year

Area	2004	2005	2006	2007	2008
L1	2	2	2	4	2
L10	1	1		1	3
L11	1	1		1	1
L12				2	
L13	1	2	2	4	2
L14					
L15		1	1		
L16			1	1	
L17					
L18		1	1		
L19					
L2	8	4	4	3	1
L20	1	1	2		1
L21					
L22		1			
L23					
L24	2				
L25				3	1
L3	1		3	1	
L4	1	3	3	2	1
L5	2		2		
L6	2	1			
L7	1		1	1	
L8	1		2	2	
L9			1	2	
N1 Drove Rbt	3	6	4	4	1
N2 Winterstoke Roundabout a	3			1	
N2 Winterstoke Roundabout b	1	2	1	1	
N2 Winterstoke Roundabout c	1			1	2
N3 Searle Crescent	2	5		2	3
N4 Hutton Moor Road	2	2	2		2
N5 Hutton Moor Roundabout	7	8	6	6	4
N6 Airport Roundabout	7	4	4	8	2
N7 Locking Castle Roundabout	4	2	3	9	1
N8 J21 a	1				2
N8 J21 b			1	1	
N8 J21 c	1				
N8 J21 d	5		1	4	

3. Processing

Accidents are relatively rare and random events, with only limited numbers occurring on each link assessed over the five year sample period. The actual location of each of the few accidents occurring in the sample years can lead to considerable variation in accident rates along sections of roads despite similar flow levels and traffic conditions, as shown for the A370 links above. The precise location of accidents and consequent variation in rates by link is largely due to chance and is unlikely to be repeated in future years

To counter the effects of this variation between short link sections, the local accident rates were calculated for aggregations of links (each with consistent COBA link type allocation) as shown in Figure 3.1. The aggregation creates the following five sections of road:

- 1 – Town Centre Gateway (Winterstoke Road / Marchfields Way Gyratory);
- 2 – A370 Herlum Way and Somerset Avenue to Locking Moor Road;
- 3 – A370 Somerset Avenue from Locking Moor Road to Wick Wick Roundabout;
- 4 – A370 A370 Somerset Avenue from Wick Wick Roundabout to M5 J21; and
- 5 – M5 J21 Roundabout and off-slips.

The flow, number of accidents and accident rates for each section is shown in Table 3.1.

Figure 3.1 – Accident Grouping

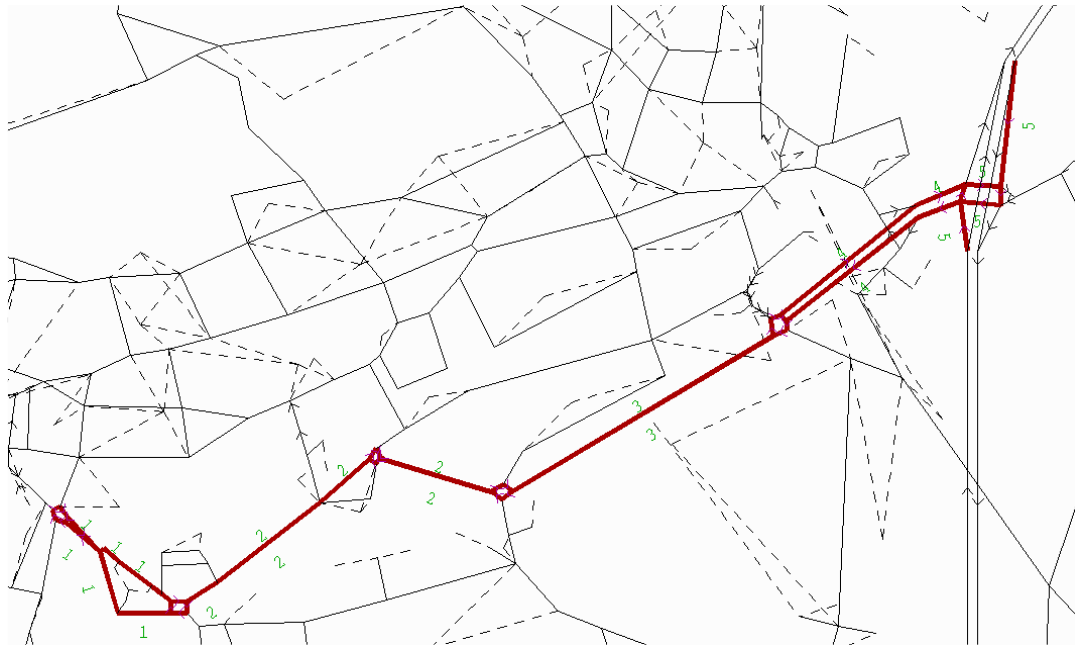


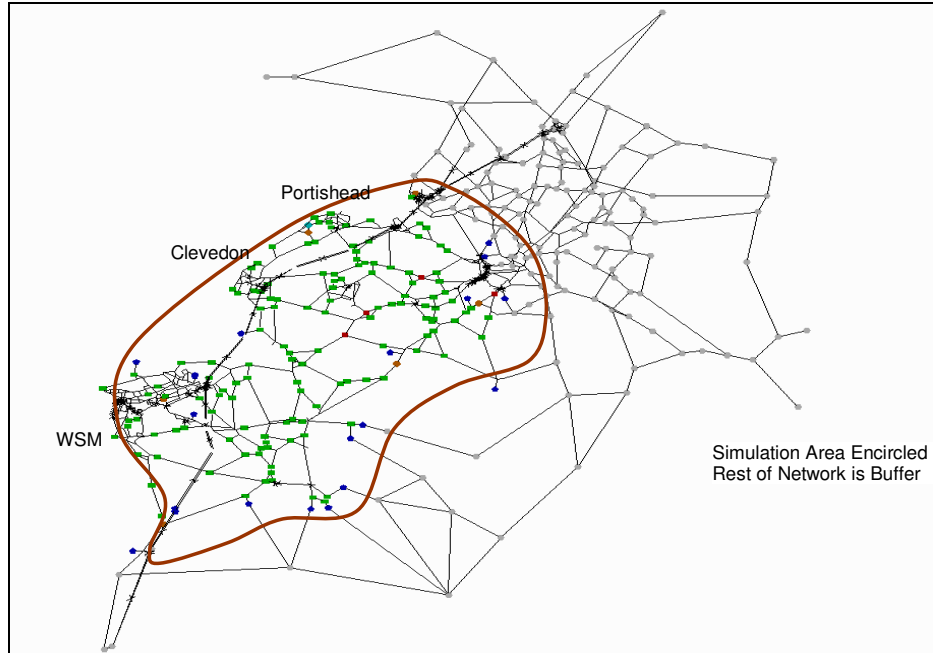
Table 3.1 – Calculation of Accident Rate for Each Section

Link Number	Million Veh Km	Accidents	Accident Rate per million Veh km
1	12.5980	11.90	0.9446
2	31.5064	17.90	0.5681
3	22.6902	6.20	0.2732
4	17.6649	2.58	0.1462
5	8.3510	6.20	0.7424

4. Area of Analysis

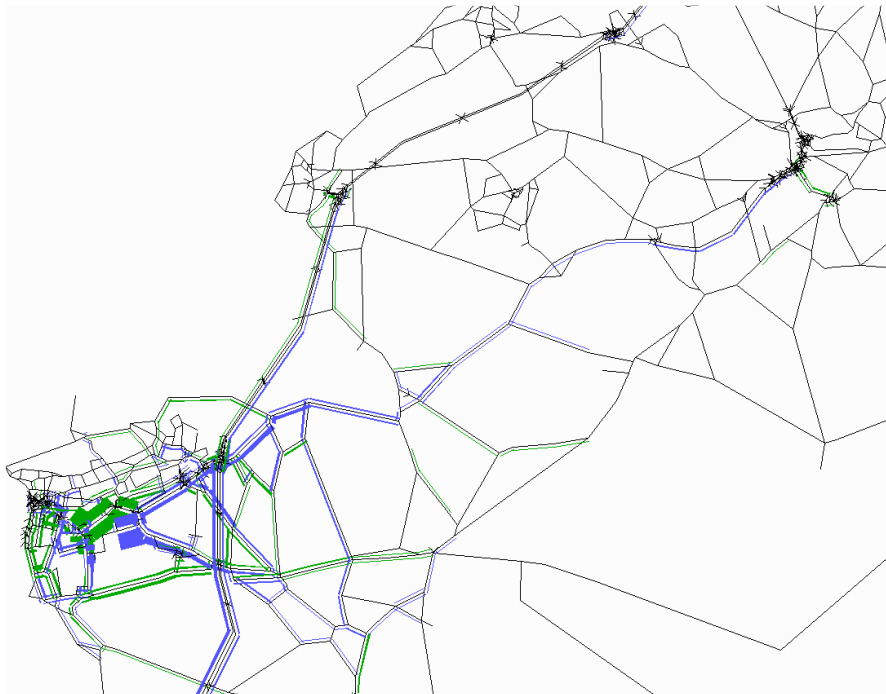
The highway network represents junctions and links in North Somerset in considerable detail in the simulation area shown in Figure 4.1 below. The network also extends to include Bristol as buffer network, also shown in Figure 4.1.

Figure 4.1 - Simulation and Buffer Areas



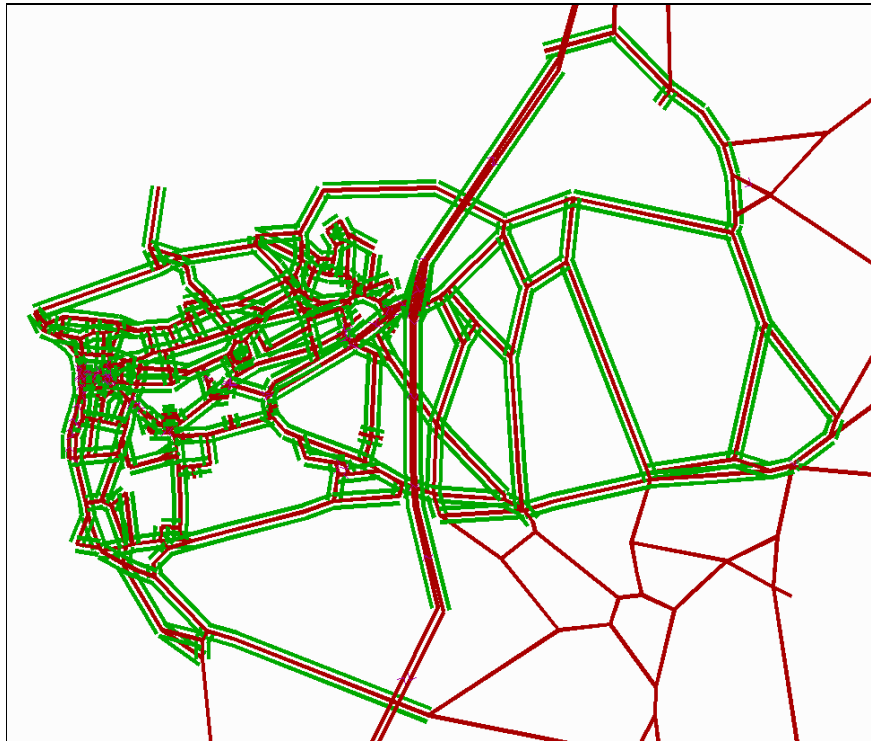
The modelled area is very large and the scheme and its impact covers only a small proportion of the modelled network. As such, the area of accident analysis was reduced to capture the scheme and all main flow changes within Weston-super-Mare and its environs to the immediate east of the M5. The changes in flow between the 2031 Without Intervention Case and Preferred Option are shown in Figure 4.2.

Figure 4.2 – Flow Changes Between the 2031 Without Intervention Case and Preferred Option



Following a review of flow changes, the area shown below in green was chosen to be the area of accident analysis (Figure 4.3). The rest of the network was not appraised to reduce noise caused by low flow changes on relatively long links that would have a disproportionately large impact on the accident analysis.

Figure 4.3 – Accident area of analysis



The analysis has been undertaken using an Atkins spreadsheet based approach that applies the COBA combined link and junction accident assessment methodology and has been used on a number of projects, including the recently approved A14 Ellington to Fen Ditton scheme.

5. The Scheme

The **Preferred Option** contains a number of elements, each summarised below and shown in Figure 5.1:

- M5 Junction 21
 - widening 170m of the southbound off-slip from 2 to 3 lanes;
 - widening 70m of the A370 (east) approach from 2 to 3 lanes;
 - widening and/or marking out 3 lanes on the roundabout and on into Weston on 180m of the A370; and
 - new traffic signals on the M5 off-slips and the A370 (east) approaches to the J21 roundabout.
- The Cross-Airfield Link [CAL]
 - the proposal is for a single carriageway road 2.4km in length, 4 roundabout junctions and parallel shared-use foot/cycle ways connecting Winterstoke Road and the A371 Locking Moor Road;
 - the scheme design includes bus lanes, footway and cycle routes, together with Toucan crossings in strategic locations; and

- a proposed new 'showcase' bus service would use the CAL, which would initially be funded by developers until commercially viable.
- The Airfield Bridge Link [ABL]
 - the proposal consists of a new all purpose road and bridge linking the CAL and Winterstoke Road via the Avoncrest redevelopment site.;
 - the main 0.75km section of the ABL across the railway is a 7.3m single carriageway with 3.0m foot/cycleways on both sides, in length; and
 - at the road is widened to provide space for additional lanes and signal junctions, including an access to the Avoncrest site and a new junction with Winterstoke
- Weston Gateway
 - the proposal includes widening the westbound highway (Marchfields Way) from two to four lanes, with associated intermediate junctions (one signal, one roundabout) and crossings;
 - the existing eastbound highway (Winterstoke Road) would be remodelled as a local access route and a route for buses and cyclists;
 - potential through traffic would be prevented by a bus-only section;
 - a new roundabout would be required at the junction of Marchfields Way/ Winterstoke Road; and
 - the existing Drove Road roundabout would be geometrically modified, to accommodate the increased flows, whilst a town-bound bus lane is provided on Winterstoke road.
- Worle Station
 - the proposal would provided a new 320 space car park on council-owned land south of the station, a bus interchange, drop-off/pick-up point, motorbike and cycle parking;
 - facilities in the existing north-side car park would be improved, including a bus interchange, together with improved passenger waiting facilities on the station itself.
 - the south-side bus interchange facilities would be used by a new service to the Locking Parklands redevelopment site; the north-side would be served by extending existing local bus services to the station; and
 - bus priority on routes to/from the station would be provided, namely:
 - 80m bus-only link along the old Queensway road to help buses get to the station from an existing suburban terminus at Sainsbury's; and
 - 180m of bus lanes on Elmham Way to assist southbound buses from the station.

The **Low Cost Option** excludes the Cross Airfield Link and the Cross Rail Link and thus only includes the following items:

- M5 Junction 21
- Weston Gateway
- Worle Station

Figure 5.1 – Weston Package Phase 1



6. Results

The analysis has been divided into two parts, one which excludes the scheme links shown in Figure 2.1 (referred to as Ex-Scheme) and one which focuses only the scheme links (referred to as Scheme). The Ex-Scheme analysis was undertaken using modelled flows and default accident rates taken from COBA. The Scheme analysis was again undertaken using modelled flows but this time used locally derived accident rates.

The Cross Airfield Link, Cross Railway Link and Gateway Improvements were each assigned COBA accident rates in the analysis as they were either new links (Cross Airfield Link and Cross Railway Link) or significantly changed in the case of the Gateway Improvements (from one way gyratory to two-way links).

The results of the accident analysis are shown in Table 5.1 below. The results cover a 60 year period, use 2016 and 2031 modelled flows and are in 2002 Prices (Discounted to 2002 @ 3.5% p.a. to 2037, 3% p.a. 2038 onwards).

The benefits are approximately £6m for the Preferred Option and £4m for Low Cost Option. Details of casualties in the two modelled years are shown in Table 6.2.

Table 6.1 – Accident Analysis Results

	Scheme Option (£m)			Benefits (£m)	
	Without-Intervention	Preferred Option	Low Cost Option	Preferred Option	Low Cost Option
Ex-Scheme	679.084	700.971	688.804	-21.887	-9.720
Scheme	118.916	90.678	105.316	28.238	13.600
Total	798.000	791.649	794.121	6.352	3.880

Table 6.2 – Change in Casualties in 2016 and 2031

Severity	Without-Intervention		Preferred Option		Low Cost Option	
	2015	2031	2015	2031	2015	2031
Fatalities	3	4	3	3	3	3
Serious Injuries	36	38	35	38	35	38
Slight Injuries	431	466	432	467	429	468
Total Casualties	470	508	470	508	467	509