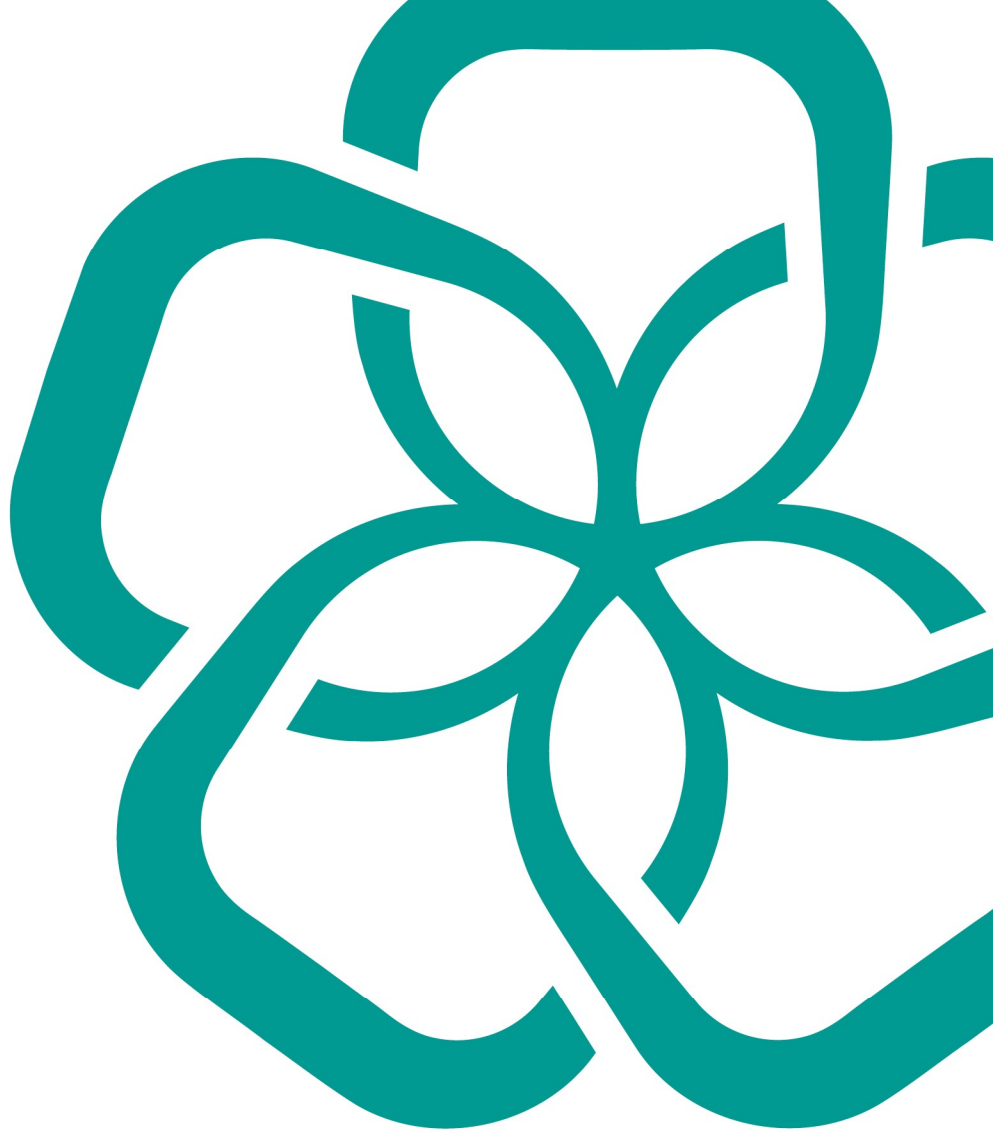




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Bradford Local Plan Carbon Impact Assessment Tech Note

Strategic Transport Modelling Team

August 2026

Purpose of note

For the Bradford Local Plan 2026, an assessment of the transport generated carbon impacts of the plan is required.

This note summarises the following:

- Technical approach to estimating carbon impacts
- High level summary of local plan assumptions – additional households, additional trips generated (SATURN model)
- Annualization factors
- Summary of carbon impact assessment

Technical approach

The approach for estimating and quantifying the Carbon Impacts of the Bradford Local Plan will use the Department for Transport (DfT) Vehicle Emissions Carbon Tool (VECAT).

This approach has been chosen for a number of reasons:

- The spreadsheet-based tool has been developed by DfT and is widely used across project appraisal
- It is simple to use and easily links to the SATURN model

Here is a link to the VCAT model and documentation [Vehicle emissions carbon tool \(VECAT\) - GOV.UK](#)

VCAT requires the following inputs:

- Car, LCV, OGV traffic volumes by model link for 'with and without scheme' scenarios
- Link (road) distance, speed

VCAT undertakes emissions calculations drawing on a range of assumptions (defined in the DfT TAG data book) relating to:

- Change in vehicle fleet composition through time
- Emissions factors by vehicle type (petrol, diesel) and engine size
- Ratio of OGV 1 / OGV 2

The key outputs are as follows (for each year in the 60 yr appraisal period):

- Annual VKT (without scheme, with scheme, differences) by vehicle type, fuel type, time period
- Annual Emissions (without scheme, with scheme, differences) by vehicle type, fuel type, time period

Local Plan Summary

Two scenarios have been run through the Bradford SATURN Model (BSTM) to provide the required inputs to VCAT:

- 'Without Local Plan' – 2034 and 2043
- 'With Local Plan' – 2034 and 2043

Infrastructure schemes that are more than likely to happen (or, in some cases, have already happened since 2023) have been added to the model to reflect our current best-guess of future network conditions to develop the 2034 and 2043 with and without local plan networks (note these have common networks). The schemes assumed were as follows:

- Bradford City TCF Improvements (completed),
- Great Horton Road/Horton Grange Road (completed),
- Thornton Road/Cemetery Road CIP,
- Thornton Road Cycle Superhighway Extension Phase 2,
- Toller Lane CIP,
- Wakefield Road/Tong Street,
- Bus Hotspots – Westgate & Thornbury Gyratory,
- loss of multi-storey car parks at City Village,
- Completed 20mph schemes (Manningham, Shipley and Ilkley)
- King's Road,
- Leeds Road/Carr Lane,
- New Works Road/Abb Scott Lane junction improvements, and
- Manchester Road Targeted Bus Improvements.

The travel demand for both scenarios was created as a result of the following process:

- BSTM 2023 base year model was developed
- West Yorkshire Transport model (WYTM) scenarios for 2034 and 2043 were developed as follows:
 - 2034 and 2043 Without Local Plan → standard NTEM growth applied for Bradford with overall growth controlled to NTEM West Yorkshire totals
 - 2034 and 2043 With Local Plan → same as 'Without Local Plan' outside of Bradford, local plan growth applied in Bradford instead of controlling to NTEM
 - The only difference between with and without local plan scenarios relates to the growth – without local plan controls to NTEM within Bradford, with local plan does not constrain to NTEM and results in higher population / jobs
- Changes in WYTM demand between 2023 and 2034 / 2043 with and without local plan scenarios were estimated
- BSTM 2034 and 2043 with and without local plan demand was created by applying the WYTM change (2023 → 2034 / 2043) to the BSTM 2023 demand matrices

Further documentation relating to working assumptions, the WYTM modelling and BSTM calibration and validation can be found here:

- [BLP2 - BSTM Local Plan Modelling - working assumptions.docx](#)
- [BLP3 - Bradford SATURN Model update and cal_val summary, July26.docx](#)
- [TN- Bradford LP - WYTM Forecasting v2.docx](#)

Annualisation Factors

In order to estimate annual emissions and emissions across a 60 year appraisal period, SATURN time period demand needs to be annualised.

The BSTM has two peak hour models:

- AM peak – 08.00 to 09.00
- PM peak – 16.30 to 17.30

As a starting point, the AM and PM peak demand matrices were summarised to understand the split between cars, LGV and HGV.

Table 1 BSTM AM and PM peak Base Year matrix totals

User Class	User Class Definition	AM Peak			PM Peak		
		Prior	Post-ME	%diff	Prior	Post-ME	%diff
UC1	Car business	39305	38473	-2.10%	47402	46769	-1.30%
UC2	Car commute	259490	257440	-0.80%	226204	225886	-0.10%
UC3	Car Other	215879	216953	0.50%	297886	299185	0.40%
	All cars	514674	512867	-0.30%	571491	571841	0.10%
UC4	LGV	63985	63175	-1.30%	54468	53752	-1.30%
UC5	HGV	68491	67949	-0.80%	40551	40283	-0.70%
	Total	647150	643991	-0.50%	666511	665876	-0.10%

Data from 50 count locations was obtained to estimate the ratio average AM / PM hourly car trips to average Inter-peak hourly car trips, as summarised below. The average figures in red were used for the annualization process.

Table 2 Ratio of average AM / PM hour counts to Inter-peak counts

Ratio of AM / PM hour to inter-peak counts	Car	LGV	HGV	All vehicles
50 count sites - Average	0.42	0.58	0.49	0.43
50 counts sites - Min	0.23	0.29	0.13	0.23
50 count sites - Max	0.55	0.9	0.83	0.56
17 cordon count - Average	0.43	0.61	0.47	0.44
17 CC - Min	0.31	0.38	0.16	0.33
17 CC - Max	0.51	0.9	0.76	0.53

The count data was used along with the following factors:

- factor for 6.30-18.30 --> Daily – 1.28
- factor for weekday --> average weekend day – 0.83
- weekday → annual – 252
- weekend → annual – 113

The calculations came up with the following annualization factors:

- AM peak hour → annual AM peak / half off-peak: 2423
- PM peak hour → annual PM peak / half off-peak: 2311
- The final annualization of trips is calculated by $(AM * 2423) + (PM * 2311)$

Summary of Carbon Impact Assessment

The tables below summarise the results for the following scenarios

- 2034 With Local Plan
- 2034 With Local Plan + Mitigation
- 2034 Without Local Plan
- 2043 With Local Plan
- 2043 Without Local Plan
- 2043 With Local Plan + Mitigation

Outputs are provided for vehicle kilometres travelled (within Bradford), tonnes Co2 emitted (within Bradford) for all vehicles, cars, light vehicles and heavy vehicles separately. Buses account for less than 1% of total vehicles so are not presented separately.

Figures are provided for 2034 and 2043, and the full 60 year appraisal period (2034 to 2093)

Table 3 All vehicles - Emissions and VKT

	Vehicle Kilometres (000's)			Annual emissions (tCO2e)		
	2034	2043	60yr	2034	2043	60yr
Without	2,857,392	3,064,185	182,865,084	381,023	270,625	15,370,924
With	2,872,610	3,131,745	186,657,074	382,042	272,982	15,475,544
With + Mitigation						
Diff (With)	15,219	67,560	3,791,990	1,019	2,357	104,620
% Diff (With)	0.5%	2.2%	2.1%	0.3%	0.9%	0.7%
Diff (With + M)						
% Diff (With + M)						

Table 4 Cars - Emissions and VKT

	Vehicle Kilometres (000's)			Annual emissions (tCO2e)		
	2034	2043	60yr	2034	2043	60yr
Without	2,426,767	2,595,250	154,913,598	205,133	105,543	5,668,979
With	2,444,168	2,666,502	158,919,549	206,796	108,768	5,823,386
With + Mitigation						
Diff (With)	17,402	71,251	4,005,951	1,663	3,225	154,408
% Diff (With)	0.7%	2.7%	2.6%	0.8%	3.1%	2.7%
Diff (With + M)						
% Diff (With + M)						

Table 5 LCV - Emissions and VKT

	Vehicle Kilometres (000's)			Annual emissions (tCO2e)		
	2034	2043	60yr	2034	2043	60yr
Without	219,151	250,389	14,870,766	29,179	22,438	1,262,977
With	218,031	248,702	14,772,357	29,047	22,328	1,256,813
With + Mitigation						
Diff (With)	- 1,120	- 1,687	- 98,409	- 131	- 110	- 6,164
% Diff (With)	-0.5%	-0.7%	-0.7%	-0.4%	-0.5%	-0.5%
Diff (With + M)						
% Diff (With + M)						

Table 6 HCV - Emissions and VKT

	Vehicle Kilometres			Annual emissions (tCO ₂ e)		
	2034	2043	60yr	2034	2043	60yr
Without	186,574	193,798	11,594,481	128,677	124,604	7,369,897
With	185,527	191,810	11,479,893	128,149	123,779	7,322,526
With + Mitigation						
Diff (With)	-1,047	-1,988	-114,588	-529	-825	-47,371
% Diff (With)	-0.6%	-1.0%	-1.0%	-0.4%	-0.7%	-0.6%
Diff (With + M)						
% Diff (With + M)						

Table 7 Cars as % of total Emissions and VKT

	Vehicle Kilometres			Annual emissions (tCO ₂ e)		
	2034	2043	60yr	2034	2043	60yr
Without	84.9%	84.7%	84.7%	53.8%	39.0%	36.9%
With	85.1%	85.1%	85.1%	54.1%	39.8%	37.6%
With + Mitigation	84.9%	84.7%	84.7%	53.8%	39.0%	36.9%

In summary:

- Over a 60-year period, the local plan is forecast to increase vehicle kilometres by around 2% and transport generated CO₂ emissions by around 0.7% - this difference is due to the fact that whilst the majority of the VKT change is due to additional car trips, car trips produce much lower emissions per kilometres (compared to LCVs and HCVs in particular) resulting in a lesser increase in emissions.
- At a user class level, there is forecast to be smaller (less than 1%) decreases in LCV and HCV vehicle kilometres travelled and transport generated CO₂ emissions over a 60 year period, balanced by a 2.5% increase in car VKT and emissions over the 60 year period
- Through time, the car contribution to VKT remains broadly similar (85%) however the car contribution to emissions declines from 54% (2034) to around 37% for the whole appraisal period (and 30% in 2094 – end of 60 yr appraisal period) due to the car fleet having a faster rate of transition from ICEs to hybrid and electric vehicles compared to LCVs and HCVs.