Northern Pathway — Summary

Shared Path

Waitemata-Akoranga shared path (a standalone bridge (2 km over harbour) plus 2.8 km ground level path adjacent northern motorway)

		Units	Assumptions and notes
General Project Information			
Construction Start Date	2023		
Forecast completion date	2026		Opening year
Monitoring Period		years	
Do Intervention			
Road Length	4.8	km	Length of path for which the construction emissions are estimated
Number of lanes	1		Total number of lanes in each direction, including shared pathways
Lane kilometres	4.8	km	Road length multiplied by the number of lanes
Infrastructure Type	Cycleway		
Emissions Breakdown			
Construction	49,696	tCO2e	Total estimated construction emissions. See Construction worksheet.
Construction Emissions per Kilometre	10,353	tCO2e/km	
Construction Emissions per Lane Kilometre	10,353	tCO2e/lane km	
Enabled emissions	2028-2038		
Cumulative calculated enabled emissions	-5786	tCO2e	Cumulative avoided emissions from implemening the intervention (see er

Project Information

Do Minimum in this project is zero as there is no shared path at present.
Do Intervention = new shared path, Waitemata-Akoranga, for cyclists and pedestrian use.
The projected number of users is the increase in users expected as a result of the intervention.

Northern Pathway — Enabled Emissions

Shared Path

Note: Do Minimum in this project is zero as there is no shared path.

			Units	Assumptions and notes
Do Intervention	Cyclist/pedestrian trips using shared path (the projected number of trips is the increase expected as a result of the pathway).			
Road Length	4.8		km	
Number of lanes	1		#	
Lane kilometres	4.8		km	
Inputs for VEPM				
Forecast Year	2028	2038		
Speed Car	30	30 km/hr		Average speed over distance of replaced trip. Source: Waka Kotahi (Auckland Systems Management Team), based on June 2021 data. See clip.
Outputs from VEPM				
	2028	2038		
CO2 at 30 km	233	180 g/km		Source: VEPM v6.2
VKT Inputs				
Length of average replaced trip	10		km	Estimate, based on Birkenhead or Takapuna to Akl CBD.
	2028	2038		
Daily number of trips (cycling or walking)	3100	4750		Source: Flow Transportation data provided via email, 21 July 2021; see clip
Car diversion rate	0.33	0.24		Note: User numbers exclude recreational/tourist trips.
	2028	2038		
Vehicle journeys	-2,670,030	-2,975,400 VKT pa		Car journeys replaced by cycling or walking trips (assuming 5 days per v
Public transport	0	0 VKT pa		
Cycling or walking	8,091,000	12,397,500 VKT pa		New cycling and walking trips
Calculated Emissions				
	2028	2038		
From vehicle journeys	-621	-536 tCO2e		Avoided emissions based on estimated reduction in VKT pa
From public transport	0	0 tCO2e		
From cycling and walking	0	0 tCO2e		
Total	-621	-536 tCO2e		Avoided emissions based on estimated reduction in VKT pa
Cumulative calculated Emissions	2028-2038			
From vehicle journeys	-5786		tCO2e	
From public transport	0		tCO2e	
From cycling and walking	0		tCO2e	
Total	-5786		tCO2e	Cumulative avoided emissions based on estimated reduction in VKT.
Intervention Total Enabled Emissions	-5786		tCO2e	Total change in enabled emissions

References

VEHICLE EMISSIONS PREDICTION MODEL
https://www.nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/air-quality-climate/planning-and-assessment/vehicle-emissions-prediction-model/

The Vehicle Emissions Prediction Model (VEPM) has been developed by Waka Kotahi NZ Transport Agency and Auckland Council to predict emissions from vehicles in the New Zealand fleet under typical road, traffic and operating conditions. The model provides estimates that are suitable for air quality assessments and regional emissions inventories.	VEPM 6.2	Current version of the model [ZIP, 22 MB] Changes to the previous version VEPM 6.1 released in 2020 include: • Updating the fleet profile based on updated vehicle kilometres travelled (VKT) data from the Vehicle Fleet Emission Model (VFEM3) provided by Ministry of Transport

Since its release in 2008, VEPM has been successfully used in Auckland and around New Zealand to estimate vehicle emissions in air quality assessments for road projects. An important feature of the model is the ability estimate changes to vehicle emissions in future years (out to 2050).

VEPM is a password protected Excel spreadsheet which is publicly available upon request from Waka Kotahi. A summary of the previous and current versions of VEPM are provided below.

- Revising the assumed date of introduction of Euro 6/VI standards in VEPM
- Improving the assumptions in VEPM to split heavy commercial vehicle VKT between rigid and articulated truck categories
- Providing methane (CH4) and nitrous oxide (N2O) emission factors and calculation of carbon dioxide equivalent (CO2-e) emission factors
- Incorporating updated emission factors from the latest version of COPERT (the EU standard vehicle emissions calculator)
- Updating degradation factors for light duty vehicle carbon monoxide (CO) and nitrogen oxides (NOX) emissions
- Updating light duty gradient correction factors.

Clip from ASM, via email 28 July 2021:

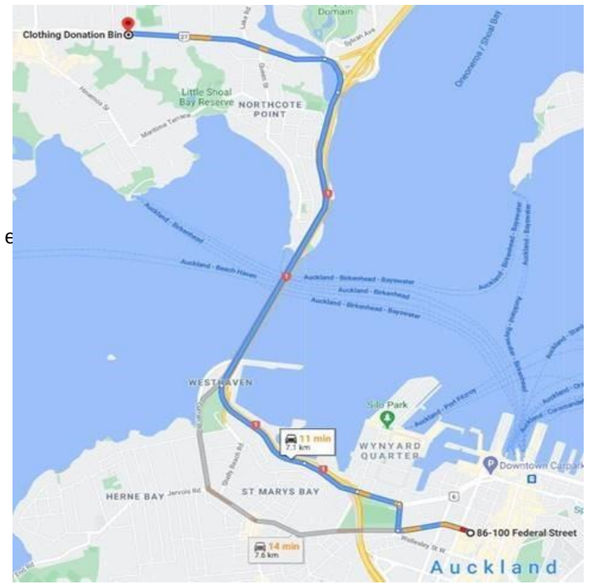
In the table below, we have provided the 4 harmonic speeds for these routes:

Route and Time	Harmonic Average Speed (km/h)
Esmonde/Lake Rd intersection to Skytower AM (0600-0900)	21.2
Skytower to Esmonde/Lake Rd intersection PM (1500-1900)	31.8
Northcote College to Skytower AM (0600-0900)	26.3
Skytower to Northcote College PM (1500-1900)	28.1

The routes used are shown in the images below, exiting and entering the motorway on Fanshawe St ramps.

We have used data from weekdays in June 2021 to get these averages.

Certain segments along the arterial roads were **below 5km/h**, while the average on the motorway section was approximately **60-70km/h**. This resulted in the total route averages presented in the table above.



UPDATED USER DATA FROM FLOW TRANSPORTATION, 21 JULY 2021

Additional data supplied by Michael Jongeneel, email 21 July

Based on expected utility users – moving to cycles from either cars or PT

2028: 31,109 cycle km; trip distance 10 km; therefore no of trips = **3100** trips*; for this calculation, choose peak diversion rate 0.33 (80% of trips expected to occur at peak times

2038: 49,815 cycle km; trip distance 10.5 km; therefore no of trips = **4750** trips* ; for this calculation, choose peak diversion rate 0.24

* Note that a trip is one way. For CIPA analysis, set vehicle distance to 10 km.

Note that diversion rate is low, given high existing usage of PT

or your emissions calculations, figure on:

- 7,451 fewer car-km per day in 2028 (31,109 new cycle km, diversion rates of 0.33 in the peak, 0.17 at other times)
- 8,417 fewer car-km per day in 2038 (49,815 new cycle km, diversion rates of 0.24 in the peak, 0.12 at other times)

Northern Pathway — Construction emissions

Expected construction 2023-2026

Shared Path

		Units	Emissions Factor	Unit	Sources and notes
Do Intervention					
Material Quantities Estimate					
Construction Fuel Use					(No data on fuel use available)
Diesel		L	0.0027	tCO2e/L	MfE 2020
Construction Materials					
Concrete	91,091	tonnes	0.11	tCO2e/tonne	AECOM derived factor (See assumptions below)
Steel	12,997	tonnes	2.85	tCO2e/tonne	MfE 2020
Road Surface					
Crushed rock or recycled material		tonnes	0.0032	tCO2e/tonne	IS Calculator NZ v2.0
Gravel		tonnes	0.0182	tCO2e/tonne	IS Calculator NZ v2.0
Bitumen		tonnes	0.3966	tCO2e/tonne	IS Calculator NZ v2.0
Asphalt	48600	tonnes	0.0542	tCO2e/tonne	IS Calculator NZ v2.0
Project Breakdown Total	**49,696**	tonnes of CO2e			
Calculated Emissions					
Best estimate of calculated emissions	**49,696**	tonnes of CO2e			

Assumptions

Based on previous research for Waka Kotahi, only emissions from the largest emission sources from construction of infrastructure projects have been estimated (concrete, steel, aggregates, asphalt, and on-site fuel use).
Emissions for construction have been calculated from data provided by Waka Kotahi for this project. When possible assumptions have been made in a consistent manner to ensure comparability between projects.
Refer to construction schedule worksheet for indicative schedule of quantities of concrete, steel, asphalt. For this project note that no concept plans were available. Estimates are indicative based on dimensional data provided.
Materials and works related to bridge abutments have been included where relevant.
The following were not included in the estimate: fuel used in quarrying activity; emissions from the transportation of construction materials to/from site; emissions arising from machinery doing on-site earthworks.

Emission factors are sourced from MfE's 2020 Guide (see link below) where appropriate, or from the ISCA-IS Calculator v2.0.
https://environment.govt.nz/publications/measuring-emissions-detailed-guide-2020/
The ISCA-IS Calculator v2.0 is available for ISCA members at https://www.isca.org.au/Tools-and-Resources
The emission factor for concrete is based on MfE 2020 guidance and is based on a standard concrete mix

Northern Pathway   Construction Schedule

Source: Concrete, steel and aspha t qua t ti s derived from ind cative br dge dimensions provided by WK. Grade path estimate derived using Britomart

No concept design plans were a ail b e at time of ca culation

N rthern pathway

D6	BR DGES / STRU TURES			Con rete	t r m3	Steel	t or m3	A phalt	t or m3	Aggregates	t or m3	Fuel	l r kg	
				Mat ri l	Unit	Mat ri l	nit	Mat ri l	Unit	Mat ri l	nit	Materi l	nit	
	Based n dim n ions													A low 50 kg/m3 f r c n rete nd 5% by olume o teel w ight 7,900kg/m3 (450mm thi k de k) A low 20% fact r
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6 1.	FO or butm nt			37 6 5 0	t	5 951 7	t							
6 1.	newa nd na	m	182	245 0	t	38 1	t							
6 1.4	FO for bu m nt			367 54	t	58 7	t							
6 1.5	Staff rd Ov br dge	m2	1254	1 69 90	t	67 48	t							
6 1.6	FO for bu m nt			53 5	t	1 2	t							
6 1.7	Tuff Crat r ridge	m2	2002	70 70	t	4 7 0	t							
6 8	FO or bu m nt			4 054 05	t	40 54	t							
6 1.9	newa N rth ridge	m	1 20	1 782 00	t	81 56	t							
6 1.10	FO or bu m nt			2 673 00	t	422 3	t							
6 1.11	newa So th ridge	m	2398	3 237 30	t	511 49	t							
	GRADE PATHWAY													
	(Assumes imilar desi n to Brit mart v lewa)													
	50mm thi k GA 65	m3	0800					16200	t					Use ru h d ro k
	50mm hi k A 0	m	18000					7000	t					Use ru h d ro k
	Ta k oat l a er	m2	72000					1080	t					
	4 mm Thi k hph lt	m2	72000					4320	t					
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