SH1/SH29 Intersection — Construction

Expected construction 2022-2024

Roundabout

	Units		Emissions Factor	Unit	Sources and notes
Do Intervention					
Material Quantities Estimate					
Construction Fuel Use					
Diesel	425,428	L	0.0027	tCO2e/L	MfE 2020
Construction Materials					
Concrete	435	tonnes	0.11	tCO2e/tonne	AECOM derived factor (See assumptions below)
Steel	92	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	51,116	tonnes	0.0182	tCO2e/tonne	IS Calculator NZ v2.0
Bitumen	-	tonnes	0.3966	tCO2e/tonne	IS Calculator NZ v2.0
Asphalt	25,663	tonnes	0.0542	tCO2e/tonne	IS Calculator NZ v2.0
Project Breakdown Total	**3,774**	tonnes of CO2e			
Calculated Emissions					
Best estimate of calculated emissions	**3,774**	tonnes of CO2e			

Assumptions

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, aggregates, gravels and fuels used during construction.

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).
Materials and works related to bridge abutments have been included where relevant.
Fuel used in the construction is assumed to be 2 litres of diesel for every m3 of earth works (AECOM derived fuel-use ratio).
The following were not included in the estimate: fuel used in quarrying activity; emissions from the transportation of construction materials to/from site.

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 and ISCA guidance and is based on a standard concrete mix.

SH1/SH29 Intersection — Construction Schedule

Source Schedule of quantities provided by WK; sourced from DBE, 23/12/20

Schedule of Prices

Code	Description	Unit	Quantity	Material	Unit	Material	Unit	Material	Unit	Material	Unit	Material	Unit	Assumptions/Notes
				Concrete	t/m3	Steel	t/m3	Asphalt	t/m3	Aggregates	t/m3	Fuel	l/kg	
1	Environmental Compliance													
1.1	Compliance													N/A
1.1.6	Contactor's Environmental Management Plan	LS	1											N/A
1.1.7	Implementation and Management of the EMP	LS	1											N/A
1.2	Environmental Controls													N/A
1.2.10	Silt Fence (Supply, install and remove)	m	6,000											N/A
1.2.13	Sediment Retention Pond Medium - 1,000m3 (3.3 Ha	No.	4											N/A
1.4	Additional Permits and Plans													N/A
1.4.1	Ecological Management Plan and Implementation	LS	1											N/A
2	Earthworks and Clearing													
2.1	Clearing													N/A
2.1.2	Clearing vegetation, General Site Clearance	LS	1											N/A
2.2	Earthworks - Primary													N/A
2.2.1	Cut to Waste Stockpile	m3	24,503									49,006	l	2l/m3 of earthworks
2.2.2	Import fill (Structural 1V:2H)	m3	69,127									138,254	l	2l/m3 of earthworks
2.2.3	Import fill (Landscape)	m3	25,677									51,354	l	2l/m3 of earthworks
2.2.5	Strip Topsoil to Stockpile	m2	69,950									69,950	l	2l/m3 of earthworks. Assume 0.5m depth
2.2.6	Topsoil Stockpile to spread	m2	57,660									57,660	l	2l/m3 of earthworks. Assume 0.5m depth
2.2.7	Import Topsoil and Spread (provisional)	m3	1,000									2,000	l	2l/m3 of earthworks
2.2.9	Undercut and Backfill	m3	18,204									36,408	l	2l/m3 of earthworks
3	Ground Improvements													
3.1	Geosynthetics													Considered immaterial
3.1.3	Supply and install Geogrid	m2	7,160											Considered immaterial
3.7	Misc													N/A
3.7.4	Subsidence Area Import Fill	No.	3,580											N/A
4	Drainage													
4.1	Kerbs													
4.1.1	Supply and install mountable kerb and channel	m	1,903											
4.1.2	Supply and install n b kerb (islands)	m	1,466											
4.1.6	Supply and install roundabout centre collar	m2	185											
4.2	Sumps and Pits													
4.2.1	Supply and install Sump	No.	16	8.16	t	1.44	t							Calc at o pro d by AECOM quant ty surveyor 19/07/21
4.3	Pipes and Culverts													
4.3.1	Pipes - In Berm													
4.3.1.4	Supply and install CRRJ 450 dia pipe	m	1,000	190	t	38.0	t							Calculation provided by AECOM quant ty surveyor 19/07/21
4.4	Wingwalls													
4.4.1	Headwalls and Wingwalls													
4.4.1.2	**Supply and Install Headwalls and wingwalls (675-9**	No.	19	3.90	t									Standard headwa l at 0.21t per headwall https //www.hynds.co.nz/wp-content/uploads/D1.7-Hynds Wingwalls.pdf
4.5	Manholes													
4.5.1	Manholes													
4.5.1.2	Supply and install Manhole 1050mm	No.	16	34.000	t	0.61	t							Calculation provided by AECOM quant ty surveyor 19/07/21
4.5.8	Scruffy Domes													
4.5.8.2	Scruffy Dome Outlet 1050mm	No.	9	19.125	t	0.34	t							Assumed similar to manhole
4.6	Drains													
4.6.1	Swale Drains													
4.6.1.1	Form and construct swale drains	m	1,105									795.60	l	Assumed 450mm depth x 850mm width. 2l/m3 earthworks
4.7	Protection													
4.7.8	Re-direct stormwater away from Waikato River	LS	1											N/A
4.8	Removal													
4.8.5	Remove existing drainage structures	LS	1											N/A
4.9	Wetlands													
4.9.7	Extended detention pond	No.	3											Considered immaterial
4.9.8	Wetland Pond	No.	1											Considered immaterial
5	Pavement													
5.1	Surfacing													
5.1.1	Chip Seal													
5.1.1.1	Single Coat Seal	m2	25,520					3,828.0	t					1.5t/m3. Assume 0.1m depth
5.1.4	SMA													
5.1.4.3	SMA10 40mm	m2	25,520					1,531.2	t					1.5t/m3.
5.1.5	AC													
5.1.5.1	AC10 40mm	m2	25,520					1,531.2	t					1.5t/m3.
5.3	Subbase													
5.3.1	Hilab 65 w 3% cement	m3	2,370					18,555.0	t					1.5t/m3. Assuming density of aggregate of 1800kg/m3 (C AECOM)
5.3.7	GAP 65	m3	28,398							51116.4	t			
5.6	Works													
5.6.4	Remove existing pavement to waste	m2	20,000									20,000.0	l	Assume 0.5m depth. 2l/m3 earthworks
6	Structures													
6.2	Box underpasses													
6.2.1	Supply and Install Underpass													
6.2.1.6	Superstructure													
6.2.1.6.1.2	Supply and Install Precast Box Sections	m	60	180										/om https //www.numes.co.nz/assets/Product-Guide/992c864329/Humes-Concrete-Box-Culvert-Stock-Underpass-Brochure.pdf
7	Retaining Walls													
7.3	Cantilever Post and Panel wall													
7.3.2	Cantilever Post and Panel wall (timber post) to 2m hig	m2	160											Considered immaterial
7.6	Misc													
7.6.8	Fall Protection Fence	No.	100											Considered immaterial
8	Traffic Services													
8.1	Barriers													
8.1.2	W Section													
8.1.2.1	Supply and Install W Section Guardrail	m	160			0.1695	t							11.3kg/m (https //www.csppac fic.co.nz/)
8.1.2.2	W Section Entry Terminal End Treatmen	No.	8											Considered immaterial
8.2	Pavement Markings													
8.2.9	Misc													
8.2.9.1	Supply and Install Marking	LS	1											N/A
8.2.9.2	Supply and Install RRPMs	LS	1											N/A
8.4	Signs													
8.4.10	Misc													
8.4.10.7	Supply and Install ignage c mplete	LS	1											N/A
8.5	Lighting													
8.5.1	Single Outreach													N/A
8.5.1.4	Supply and Install 10m high Column Complete, incl s	No.	68			51	t							Calculation provided by AECOM quant ty surveyor 19/07/21
9	Service Relocations													
9.1	Relocations													
9.1.2	FX Fibre	PS	1											N/A
9.1.3	Chorus Fibre	PS	1											N/A
9.1.8	Transpower	PS	1											N/A
9.1.9	PowerCO	PS	1											N/A
9.1.10	Contractors on-cost for 9.1.1-9.1.9	%	1,035,000											N/A
10	Landscaping & Entrances													
10.1	Landscaping													
10.1.1	Grass seed	m2	200,000											N/A
10.1.3	Supply and Install Mulch	m2	32,000											N/A
10.2	Entrances and Access													
10.2.6	Construct Property Accessways	m2	900											N/A
10.3	Fences													
10.3.1	Construct Temporary Stock proof Fencing and Dis-Es	m	3,000											N/A
10.3.2	Supply and Install Permanent Post and Wire Fence	m	3,000											N/A
10.4	Paths													
10.4.1	Supply and Place New Concrete Footpath	m2	1,450					217.5	t					1.5t/m3. Assumed 0.1m depth
10.5	Plantings													
10.5.3	1L Plant (PB2/3)	No.	69,400											N/A
10.5.11	45L Trees (PB95)	No.	46											N/A
10.8	Pou Whenua													
10.8.1	Pou Whenua (incl anchor fixing)	PS	1											N/A
10.9	General Insert													

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Schedule of Prices				Material	Unit	Material	Unit	Material	Unit	Material	Unit	Material	Unit	
Code	Description	Unit	Quantity	Concrete	t or m3	Steel	t or m3	Asphalt	t or m3	Aggregates	t or m3	Fuel	l or kg	Assumptions/ Notes
10.9.13	Forming Car Park in Revocation Area	No.	1											N/A
11	Traffic Management and Temporary Works													
11.1	Traffic Management													
11.1.6	Preparation of Traffic Management Plans	LS	1											N/A
11.1.9	Traffic Management of State Highway (a)	day	504											N/A
12	Preliminary and General													
12.1	Preliminary and General													
12.1.1	Preliminary and General	LS	20%											N/A
13	Extraordinary Construction Costs													
			Total	435	t	92	t	25,663	t	51,116	t	425,428	l	