

## Weedons Ross Rd Intersection

### Construction

Construction: 2023-2024

Traffic signals, new link road to bypass intersection

	Units	Emissions Factor Unit	Sources and notes
<b>Do Intervention</b>			
<b>Material Quantities Estimate</b>			
Construction Fuel Use			
Diesel	21,493 L	0.0027 tCO <sub>2</sub> e/L	MfE 2020
Construction Materials			
Concrete	110 tonnes	0.11 tCO <sub>2</sub> e/tonne	AECOM derived factor (See assumptions below)
Steel	33 tonnes	2.85 tCO <sub>2</sub> e/tonne	MfE 2020
Road Surface			
Crushed rock or recycled material	- tonnes	0.0032 tCO <sub>2</sub> e/tonne	IS Calculator NZ v2.0
Gravel	- tonnes	0.0182 tCO <sub>2</sub> e/tonne	IS Calculator NZ v2.0
Bitumen	- tonnes	0.3966 tCO <sub>2</sub> e/tonne	IS Calculator NZ v2.0
Asphalt	8,122 tonnes	0.0542 tCO <sub>2</sub> e/tonne	IS Calculator NZ v2.0
Project Breakdown Total	603 tonnes of CO <sub>2</sub> e		
<b>Calculated Emissions</b>			
Best estimate of calculated emissions	603 tonnes of CO <sub>2</sub> e		

### 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. 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 m<sup>3</sup> 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.

Weedons Ross Rd  
Intersection

Construction Schedule

Source: Schedule of quantities provided by WK, sourced from SH73 Weedons Ross Intersection REV A-DBE, 7 April 2021

Schedule of Prices				Material	Unit	Material	Unit	Material	Unit	Material	Unit	Material	Unit	
Code	Description	Quantity	Unit	Concrete	t or m3	Steel	t or m3	Asphalt	t or m3	Aggregates	t or m3	Fuel	l or kg	Assumptions/ Notes
200	Earthworks													
	Site clearance	2232	m2									2232 l		Assumed 0.5m deep. 2l/m3 earthworks
	topsoil stockpile	335	m3									670 l		2l/m3 earthworks
	cut to waste	1007	m3									2014 l		2l/m3 earthworks
	Undercut to waste	166	m3									332 l		2l/m3 earthworks
	Imported fill including undercut	270	m3									540 l		2l/m3 earthworks
	Drainage													
	Standard kerb and channel	394	m											N/A
	Subsoil drain	394	m											N/A
	Stormwater													
	Grassed swale 300m deep 800mm base	260	m									124.8 l		2l/m3 earthworks
	DN200 stormwater pipes (1 to 2.5m depth)	16	m	2.24 t		0.608 t								Calculation provided by AECOM quantity surveyor 19/07/21
	DN225 stormwater pipes (1 to 2.5m depth)	30	m	4.2 t		1.14 t								Calculation provided by AECOM quantity surveyor 19/07/21
	DN300 stormwater pipes (1 to 2.5m depth)	21	m	3.99 t		0.798 t								Calculation provided by AECOM quantity surveyor 19/07/21
	DN1500 soakage chambers	4		8.5 t		0.152 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Single sump	3		1.53 t		0.27 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Sand	38	m3											Considered immaterial
	Gravel	50	m3											Considered immaterial
	DN1500 soakage chambers	2		4.25 t		0.076 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Geotextile													Considered immaterial
	Water race channel	60	m									120 l		Assumed 1m wide x 1m deep. 2l/m3 earthworks
	DN225 stormwater pipes (1 to 2.5m depth)	30	m	4.2 t		1.14 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Water race channel	79	m											
	DN450 stormwater pipes (1 to 2.5m depth)	29	m	5.51 t		1.102 t								Calculation provided by AECOM quantity surveyor 19/07/21
	DN750 stormwater pipes (1 to 2.5m depth)	12	m	2.28 t		0.456 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Split chamber	1		3.032 t										Calculation provided by AECOM quantity surveyor 19/07/21
	DN450 stormwater pipes (1 to 2.5m depth)	15	m	2.85 t		0.57 t								split chamber 3.032t per unit
	1050 manhole	2		4.25 t		0.076 t								https://www.hynds.co.nz/wp-content/uploads/D1.7-Hynds-Wingwalls.pdf
	concrete headwall	2												Calculation provided by AECOM quantity surveyor 19/07/21
	DN900 stormwater pipes (1 to 2.5m depth)	48	m	9.12 t		1.824 t								Standard headwall at 0.21t per headwall
	1500 manhole	2		4.25 t		0.076 t								https://www.hynds.co.nz/wp-content/uploads/D1.7-Hynds-Wingwalls.pdf
	concrete headwall	2												Calculation provided by AECOM quantity surveyor 19/07/21
				0.41 t										Standard headwall at 0.21t per headwall
														https://www.hynds.co.nz/wp-content/uploads/D1.7-Hynds-Wingwalls.pdf
	Pavement surfacing													
	Mill existing areas 200mm	5958	m2									2383.2 l		2l/m3
	saw cut pavement	500	m											N/A
	subgrade preparation and testing	2060	m2											N/A
	M/4 AP40	1754	m3					2631 t						1 5t/m3
	AP65	668	m3					1002 t						1 5t/m3
	AC 180mm	1925	m2					519.75 t						1 5t/m3
	SMA 40-45mm	4773	m2					286.38 t						1 5t/m3
	Grade 4 membrane seal	2849	m2					427.35 t						1 5t/m3. Assume 0.1m depth
	G 2/5 chipseal coats	3814	m2					572.1 t						1 5t/m3. Assume 0.1m depth
	Traffic Services													
	Pavement Marking													
	N/A													N/A
	Lighting													
	10.4m light poles	8				6.24 t								Calculation provided by AECOM quantity surveyor 19/07/21
	7.4m light poles	10				5.55 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Trench 450mm wide x 800mm deep	827	m									595.44 l		2l/m3 earthworks
	Service Relocations													
	Trenching 106m	106	m											
	Replacement of DN150 AC water main	50	m									53 l		2l/m3 earthworks. Assumed 0.5m wide, 0.5m deep
	Replacement of DN100 PVC water main	70	m											N/A removing old pipes
	N/A													N/A removing old pipes
	Landscaping													N/A
	N/A													N/A
	25mm Asphaltic Concrete Standard													
	footpath	235	m2					8.8125 t						1 5t/m3
	+ 75mm AP40	235	m2					26.4375 t						1 5t/m3
	N/A													N/A
	Traffic Management													
100	Environmental Compliance													
200	Earthworks													
	Remove and dispose of vegetation and trees to proposed new corridor areas	5176	m2											
	site clearance	396	m2									396 l		2l/m3 earthworks. Assumed 0.5m deep
	topsoil stockpile on site for reuse	776	m3									1552 l		2l/m3 earthworks.
	cut to waste	757	m3									1514 l		2l/m3 earthworks.
	undercut to waste 500mm	185	m3									370 l		2l/m3 earthworks.
	Imported fill to undercut	2900	m3									5800 l		2l/m3 earthworks.
400	Drainage													
	Grassed swale 300m deep, 800mm base	330	m									158.4 l		2l/m3 earthworks
	DN300 stormwater pipes 1 to 2.5m depth	19	m	3.61 t		0.722 t								Calculation provided by AECOM quantity surveyor 19/07/21
	DN200 stormwater pipes 1 to 2.5m depth	16	m	3.04 t		0.608 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Twin DN375 culverts 1 to 2.5m depth	19	m	3.61 t		0.722 t								Assumed similar to concrete pipes
	375mm precast concrete headwalls	2												Standard headwall at 0.21t per headwall
				0.41 t										https://www.hynds.co.nz/wp-content/uploads/D1.7-Hynds-Wingwalls.pdf
	Single sump	2												Calculation provided by AECOM quantity surveyor 19/07/21
	Soakage basin 1m deep	1		1.02 t		0.18 t								Assumed similar to manholes
	4 DN1500 soakage chambers	4		2.125 t		0.038 t								Calculation provided by AECOM quantity surveyor 19/07/21
	150mm sand	156	m2	8.5 t		0.152 t								Considered immaterial
	200mm gravel	208	m2											Considered immaterial
	DN1500 soakage chambers	4		8.5 t		0.152 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Geotextile													Considered immaterial
	DN750 stormwater pipe 1 to 2.5m depth	12	m	2.28 t		0.456 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Precast concrete headwalls	2												Standard headwall at 0.21t per headwall
				0.41 t										https://www.hynds.co.nz/wp-content/uploads/D1.7-Hynds-Wingwalls.pdf
	DN450 stormwater pipes 1 to 2.5m depth	57	m	10.83 t		2.166 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Manhole 1050	2		4.25 t		0.076 t								Calculation provided by AECOM quantity surveyor 19/07/21
	Precast concrete headwalls	2												Standard headwall at 0.21t per headwall
				0.41 t										https://www.hynds.co.nz/wp-content/uploads/D1.7-Hynds-Wingwalls.pdf
500	Pavement surfacing													
	mill existing area 200mm	2136	m2									854.4 l		2l/m3 earthworks.
	saw-cut existing pavement	200	m											Considered immaterial
	subgrade preparation and testing	3980	m2											N/A
	m/4 AP40	1612	m3					241.8 t						1 5t/m3. Assumed 0.1m depth
	AP65	1106	m3					165.9 t						1 5t/m3. Assumed 0.1m depth
	AC20 180mm	2434	m2					657.18 t						1 5t/m3
	SMA 10 45mm	2434	m2					164.295 t						1 5t/m3
	Grade 4 membrane seal	4621	m2					693.15 t						1 5t/m3. Assumed 0.1m depth
	2/5 chipseal	4616	m2					692.4 t						1 5t/m3. Assumed 0.1m depth
800	Traffic services													
	N/A													N/A
	Lighting													
	10.4m light poles	5				3.9 t								Calculation provided by AECOM quantity surveyor 19/07/21

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Construction Schedule

Source: Schedule of quantities provided by WK, sourced from SH73 Weedons Ross Intersection REV A-DBE, 7 April 2021

Schedule of Prices				Material	Unit	Material	Unit	Material	Unit	Material	Unit	Material	Unit	Assumptions/ Notes
Code	Description	Quantity	Unit	Concrete	t or m3	Steel	t or m3	Asphalt	t or m3	Aggregates	t or m3	Fuel	l or kg	
	7.4m light poles	6				3.33 t						181.44 l		Calculation provided by AECOM quantity surveyor 19/07/21
	Trench 450mm wide x 800mm deep	252	m											2l/m3 earthworks
900	Service Relocations													
	Trenching for power cable	101	m									50.5 l		2l/m3 earthworks. Assumed 0.5m wide, 0.5m depth
	N/A													N/A
1000	Landscaping											1552 l		2l/m3 earthworks
	Respread topsoil from stockpile on site	776	m3											N/A
	N/A													
	25mm Asphaltic concrete standard footpath	225	m2					8.4375 t	25 3125 t					1.5t/m3.
	75mm AP40	225	m2											1.5t/m3.
	N/A													N/A
1100	Traffic Management and temporary works													N/A
	N/A													N/A
	Land acquisition													N/A
	N/A													N/A
Total				110 t		33 t		8,122 t		- t		21,493 l		

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