Jons Civil
Engineering Co. Ltd.
2025

An Independent advisor (Sustainability Works) has commented on this report

sustainability works

JONS CIVIL ENGINEERING CO. LTD.

WASTE VALUE CHAIN ANALYSIS REPORT

2025

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Executive Summary

Jons Civil Engineering Co. Ltd. is among the first construction firms in Ireland to adopt the CO_2 Performance Ladder as a strategic framework for reducing greenhouse gas (GHG) emissions across its operations and supply chain. This report presents a detailed analysis of Scope 3 emissions related to waste generated in operations, fulfilling requirement 4.A.1 of the CO_2 Performance Ladder.

The CO_2 Performance Ladder is a certified carbon management system that guides organisations through progressive steps to reduce emissions:

Step 1 focuses on direct emissions (Scope 1 & 2).

Step 2 expands to value chain emissions (Scope 3), requiring collaboration with suppliers and customers.

Step 3 demands a long-term climate transition plan, independent validation, and sectoral leadership.

This report identifies and quantifies key Scope 3 waste emissions, maps the waste value chain, and highlights reduction opportunities. It includes professional commentary from Sustainability Works, meeting the Ladder's requirement for independent review.

Key findings include:

- Waste Generated in Operations ranks as the second most material Scope 3 category for Jons, based on emissions volume, control, and savings potential.
- Hotspots include the transportation of aggregates and mixed construction and demolition (C&D) waste, which have disproportionately high carbon impacts.
- A case study at the IDA Parkmore site demonstrates a 16.95 tCO_2e reduction through a change in drainage repair methodology - equivalent to an 8% reduction in total project emissions.

The report concludes with a targeted Action Plan to improve waste tracking, optimise transport, engage subcontractors, and embed circular economy principles in procurement and site practices.

Certain specific data may not be fully included for commercially sensitive reasons or if some ongoing research is not finalised.

1. Introduction

Jons has conducted this Value Chain Analysis as part of the CO2 Performance Ladder to give demonstrable insight into the most material emissions from scope 3 as per requirement 4.A.1
The Jons Scope 3 Relevant Emissions Report outlines in detail the 15 Scope 3 Categories and their significance to Jons with a full explanation of their ranking.
Table 1 below is a snapshot of the top 6 Scope 3 categories, where the table is matrix showing the relative importance of each of the top 6 Scope 3 categories.
For clarity this report only focuses on the second most relevant Scope 3 category, that of Waste Generated in Operations

Ranking	Scope 3 Category	Carbon Emissions	Control	Potential Savings	Relevance (Emissions x Control x Savings)
1	Purchased Goods and Services	5	5	4	100
2	Waste Generated in Operations	4	4	4	64
3	Capital Goods	3	5	3	45
4	Upstream Transportation and Distribution	4	2	5	40
5	Employee Commuting	2	2	4	16
6	Fuel and Energy Related Activities	1	2	5	10

Table 1: Jons top 6 most relevant Scope 3 Categories

For clarity this report only focused on Waste Generated in Operations that is category 5 of Scope 3. This specifically refers to the indirect greenhouse gas (GHG) emissions from the treatment and disposal of waste produced by a company's activities, where the disposal is handled by a third party. This category also includes emissions from activities such as landfilling, incineration, recycling, composting, and wastewater treatment, as well as the transportation of waste by third-party providers.

As this is Jons first value chain analysis, detailed carbon emissions generated from waste composition and transportation data has not yet been fully captured. For this initial baseline, industry conversion factors (including those published by DEFRA and other recognised sources) have been considered to provide indicative values for typical construction waste streams.

It is recognised that actual emissions are likely to be lower than industry averages, as processors increasingly recover and recycle waste materials. Future analyses will aim to capture project-specific waste data through waste management contractors, enabling a more accurate understanding of the carbon impact of this category.

2. Methodology

This Waste generated in Operations Value Chain Analysis is conducted in accordance with the CO_2 Performance Ladder (Handbook 3.1 and Version 4, Step 2), the GHG Protocol, and ISO 14064-1. The approach ensures robust, transparent, and auditable identification, quantification, and management of waste-related carbon emissions, with a focus on continuous improvement and sector best practice.

2.1 Organisational Boundaries and Scope

- The organisational boundary is defined using the GHG Protocol's "operational control" approach, as recommended by the CO_2 Performance Ladder.
- All relevant legal entities and activities are included, ensuring that waste emissions from both direct operations and significant projects are captured.

2.2 Identification and Prioritisation of Relevant Emissions

Waste generated in Operations related emissions are identified and prioritised using a relevance assessment, considering

- Relative volume of carbon emissions Jons generates
- The level of influence or control Jons has over those emissions
- The potential opportunities for reduction of emissions

2.3 Data Collection and Emission Quantification

- Emission quantification follows the GHG Protocol Scope 3 Standard's 15 categories, with waste generated in operations (Category 5) as the primary focus.
    - Waste data is currently collected on site by various means such as subcontractor invoices, reports, site waste management plans and weighbridge or skip records where available.
- Where direct measurement is not possible, industry-standard emission factors are applied, prioritising national databases (e.g., DEFRA, SEAI, etc.) and sector-specific LCA/ EPD data. All conversion factors are set out in table 2.

Source	Use
ICE (2013), CESMM4 Carbon & Price Book 2013	Construction materials Clearance and excavation activities
Sustainable Energy Authority of Ireland (2019), Conversion Factors	Electricity (Ireland Specific) Fuels (Ireland Specific)
UK Government (2021), Greenhouse Gas Reporting Conversion Factors	Passenger Vehicles (except light rail) Freight vehicles (HGV only) Material disposal (reuse, recycling, landfill)

Table 2 Carbon Emission Factor Sources

2.4 Value Chain Mapping

- The analysis maps the full waste generated in operations value chain, from material procurement and design through to waste generation, collection, transport, treatment, and final disposal or recycling. See Figure 1 for an overview of Jons value chain.
- The mapping includes both upstream and downstream activities.

2.5 Continuous Improvement and Verification

- The methodology is subject to annual review and improvement, in line with the Ladder's "Plan-Do-Check-Act" cycle.
- This value chain analysis has been professionally commented on by an independent knowledge institute, as required for the CO2 Ladder.
- All findings, assumptions, and data sources are documented for audit and external verification.

2.6 Gaps and Limitations

- Where data gaps exist, these are clearly highlighted in the analysis.
- Plans for data improvement and stakeholder engagement are included to address these gaps in future reporting cycles.

3. Mapping the Value Chain

Jons waste data is currently focused on site operations but it is important to map the entire value chain as without it the Scope 3 waste calculations risk being inaccurate, incomplete, or misleading and you'll miss opportunities to cut emissions.

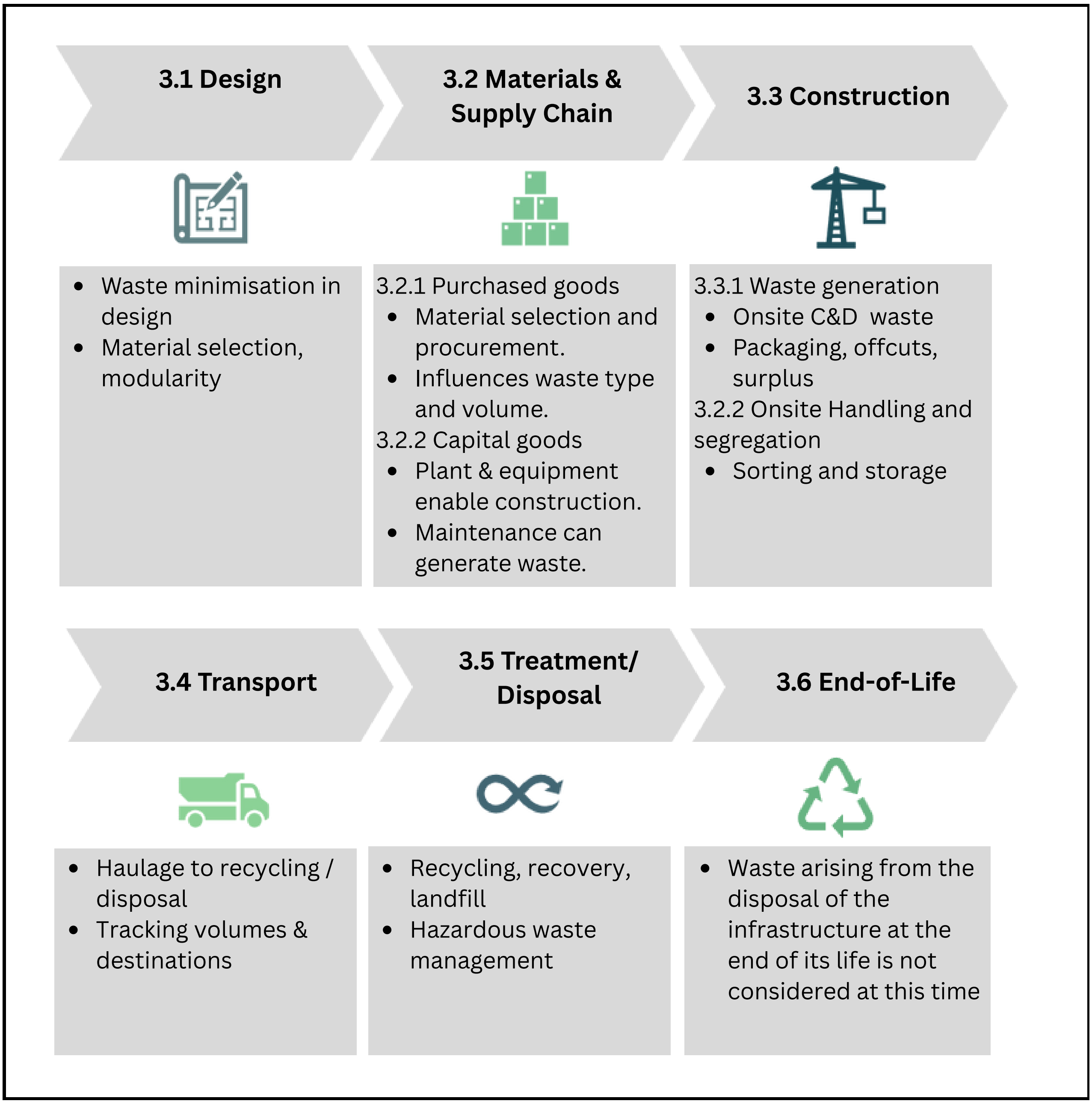

Figure 1: Waste Generated in Operations Value Chain

3.1 Design

While waste is not typically generated in this step, it has a significant impact on waste generation further down the chain.

- Early design choices (materials, methods, modularity) have a significant impact on the type and amount of waste generated during construction.
- Engagement with stakeholders, the client and the designers to discuss possible waste reduction measures, incorporating waste minimisation, reuse, and recycling principles.
- Design for deconstruction and adaptability to reduce future waste, where relevant

3.2 Materials and Supply Chain

It is important to consider all relevant Scope 3 categories, not just waste to ensure accurate, complete, and credible reporting, identifying where the biggest impacts and opportunities lie, and avoiding blind spots or overlaps. The following section outlines the key considerations with regards to each of the categories which have the most significant potential impact on waste generated in operations. Two key categories considered by Jons in how they manage waste are Purchased Goods & Services and Capital Goods.

3.2.1 Purchased Goods & Services

There is a strong link between goods and services and waste generated as material choices affect both embodied emissions and downstream waste. The type, quantity, and design of purchased goods and services directly influence how much waste is generated and how it needs to be treated.

Material Choices: If materials with excessive packing or short lifespans are purchased, these directly increase the amount of operational waste generated.
Quantity of Purchased Goods: Over purchasing or poor planning may mean surplus products end up as waste due to becoming expired, obsolete or damaged.
Design and Durability: Goods with poor design or low durability become obsolete quickly, generating more operational waste while sourcing recyclable or reusable products can reduce waste downstream.
Indirect effect through disposal: The composition of purchased goods determines the emissions profile of waste treatment. Can it be recycled or must it be sent to landfill, i.e. this affects not just the volume of waste but also the carbon intensity of the waste.

Making smarter procurement choices, it’s possible reduce both categories simultaneously.

3.2.2 Capital Goods

Capital goods for Jons includes long term assets such as construction plant, vehicles, and supporting equipment required for project delivery.
The link between capital goods and waste significant, and includes:

Installation and construction waste: Purchasing new capital goods can involve construction, packaging or installation waste.
Longevity and quality: Short lived or low-quality goods need to replaced more frequently, creating more operational waste
Maintenance and spare parts: The design of capital goods can determine how much maintenance waste is generated e.g. filters, oils, lubricants and replacement parts

The characteristics of capital goods as outlined above shows that this category can directly affect the amount and type of operational waste generated. Choosing more durable, modular, and circular capital goods reduces Jons overall impact.

3.3 Construction

3.3.1 Generation

Waste is generated onsite from construction activities such as earthworks, Pavement, formwork, packaging, offcuts, and surplus materials. The waste type and amount can vary greatly depending on the type of work being completed.

Types of waste include aggregates, soils, concrete, metals, timber, plastics, and general site waste.
The ancillary waste generated by the use of capital goods is considered, and typical waste streams include Wate oil lubricants mostly during the maintenance of equipment.
Both direct employees and subcontractors contribute to waste streams.

Two activities that have the potential to generate large amount of waste for Jons, as identified through our carbon data analysis across all our sites include:

- Earthworks
- Pavement work (where planning is involved)

Waste could be generated directly by Jons or subcontractors.

3.3.2 Collection & Onsite Handling

Waste is collected, sorted and stored in designated areas on site ready for disposal, recycling or reuse on site.
Waste is segregated at source e.g., separating metals, inert waste to increase recycling rates.

Jons don't process waste on site so the main cause of emissions here is the transportation required to move the waste. (If this is using Jons plant, this is part of our Scope1 emissions). We do reuse suitable materials such as excavated soil for bunds or stockpile on site for use in fill areas.

3.4 Transportation off-site

Waste is transported using third party haulers to either treatment, recycling or disposal facilities. On occasion it is sometimes transported to another site under article 27 for suitable material. Depending on the quantity of waste and the distance travelled this can form a significant part of the waste carbon emissions.

Transport emissions are a significant part of the waste carbon footprint, especially for heavy materials like soil and aggregates.

Accurate tracking of waste volumes, destinations, and vehicle movements is essential for carbon accounting

3.5 Treatment & Disposal

Waste is processed at external facilities. It is either
Recycled: plastics, paper, timber, metal, plannings are recycled.
Landfilled: Residual, non-recyclable, or contaminated waste is sent to landfill.
Hazardous Waste: Special handling and licensed facilities are required for hazardous materials (e.g., contaminated soils, asbestos).

3.6 End of life

The nature of Jons work is to construct infrastructure that has a long-term life span. Recognising the increasing importance of whole life of carbon and the long-term impact of their work, Jons considers the end-of-life of the infrastructure built so to have the lowest carbon footprint.

- Considers repairs, deconstruction and demolition.
- Considers whether materials can be recovered for circular use, sent for recycling, or disposed of as waste (e.g., landfill or incineration), promoting materials that can be recovered.
- Considers current and upcoming compliance with regulations.

4. Waste Stream Analysis

4.1 Construction and Demolition Waste

The specific breakdown of waste can vary year to year based on what projects were completed but the following categories typically make up Jons waste streams. (This is by weight in tonnes and not CO2e)

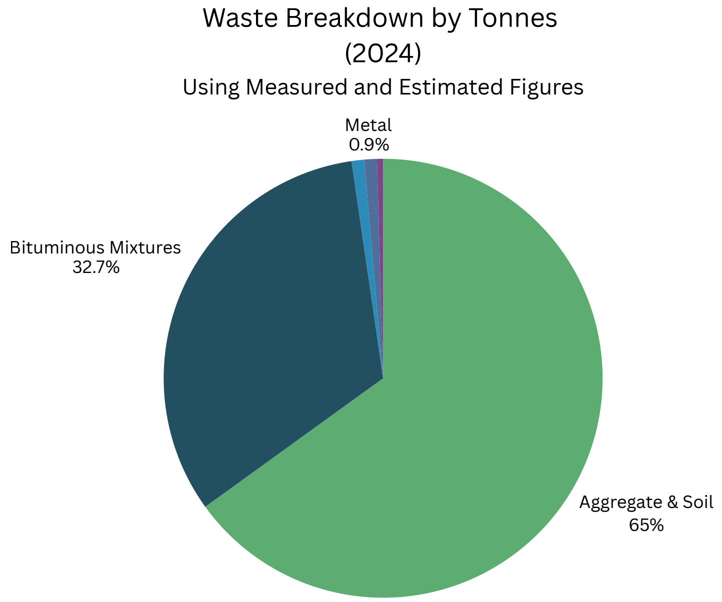

Figure 2: Waste Breakdown by Tonnes (2024

4.1.1 Aggregate and Soil Exported Off-Site

Aggregate and soil represent 65% of Jons waste stream. This is typically excavated material that is removed from site because it's surplus, unsuitable or generated during site preparation.

Whether this type of waste is classified either as a "waste" or a "resource" depends largely on whether they can be reused or must be landfilled. This sub-category of waste made up the largest proportion, by weight, in 2024 which was in keeping with data from previous years.

4.1.2 Bituminous Mixtures

Bituminous mixtures represent 32.7% of the waste stream. This is asphalt-based materials that are removed from roadworks or resurfacing projects, for Jons this mainly consists of planings from resurfacing works which can be recycled into new asphalt - reclaimed asphalt pavement (RAP).

4.1.3 Concrete

Concrete represents 0.9% of the waste stream. This can include fresh waste (leftovers, washout), hardened waste (demolition rubble, defective elements) and reinforced concrete waste. While this can be one of the largest waste streams in construction, due to the nature of Jons work (i.e., minimal demolition work) this is in practice a relatively small waste stream for the company.

4.1.4 Metal

Metal represents 0.9% of the waste stream. This sub-category of waste can include a variety of ferrous, non-ferrous and composite metals from rebar to demolition scraps. Nearly all can be recycled, making metals one of the most resource-efficient waste streams in construction.

4.1.5 Mixed Construction and Demolition

Mixed construction and demolition (C&D) waste represents 0.4% of the waste stream. Mixed C&D waste is the unsorted combination of construction and demolition materials (concrete, metals, wood, plastics, glass, soil, etc.). Because it's heterogeneous, it has lower recycling potential and higher costs compared to source-separated waste, which is why many sustainability frameworks encourage separation at site.

4.1.6 General Office Waste

General office waste represents 0.1% of the waste stream. This includes waste generated by site offices and is the smallest by proportion. It does have a high carbon emissions factor so still needs to be considered

4.2 Classification

Hazardous vs non Hazardous Waste

Hazardous waste is any waste material that poses a significant risk to human health, animals or the environment and as such there are more limitations to how it is handled and disposed of. For non-hazardous waste there are many more options available.

The majority of waste for Jons is classified as non-hazardous. From time to time there has been certain small amounts of hazardous waste such as soil contaminated by invasive species or hydrocarbons which was disposed of as required by transporting it for treatment and disposal at licensed facilities.

4.3 Transportation

Jons are currently working on full details of carbon emissions of transportation across all of our projects and waste streams. We do have some specific emissions recorded on a case by case basis where a specific initiatives were put in place on sites.

It is recognised that the carbon emissions could be significant, for example based on the amount of waste solely from aggregates and soil exported off site in 2024 (captured in our carbon reporting), that could equate to between 1600- 2400 lorry loads (assuming a load of 20 - 30 tonnes depending on type of vehicle used.)

Also, on the M7 Kildare Pavement Scheme (level 4 CO2 Ladder accredited project) completed last year where planings were transported and recycled, It was calculated that 75% of the associated waste generated in operations carbon emissions came from the transportation of the waste. (Waste tonnage and vehicle movements was captured by weighbridge records and fuel used was a combination of actual records and estimated usage). This was with mitigating controls in place, where 25% of the trucks used HVO and the distances travelled were approx. 50km or less.

4.4 Disposal Method

4.4.1 Reuse

Where possible Jons tries to reuse materials either on the project itself or for a future one. This can be done in multiple ways including excavated soil for fill (optimised by Earthworks Balance), using waste timber for shuttering, reusing demolition materials on site where feasible such as kerbs or manhole covers stone crushing operations on site.

Recycling

Currently certain materials are being segregated and recycled such as metal waste, timber, paper, plastic, wee and waste oil. Planings are also recycled into RAP and concrete was crushed for reuse off site. Full details on these figures are ongoing and under review as part of a continuous development project.

Landfill

All remaining C&D waste currently goes to landfill.

5.Hotspot Identification

Based on current data quantity alone, soils and aggregates exported off site is a waste stream hotspot

Mixed construction and demolition (C&D) waste could be a key source of emissions. Although it makes up a smaller share of total waste, its high emission factor means it can still contribute significantly to overall carbon emissions. For example, sending mixed C&D waste to landfill produces 93.094 $kgCO_2e$ per tonne, compared to just 0.989 $kgCO_2e$ per tonne for aggregate and soil.

Transportation of waste should be looked into as it has the potential to have significant carbon emissions based on the limited data collected. In the future as more and more waste is being recycled or reused this will increase the proportion of the total Scope 3 waste emissions being due to transportation rather than other elements such as waste treatment. This was seen in the M7 Kildare Pavement Scheme where 75% of the associated waste from recycled planing came from transportation.

6. Reduction Opportunities

6.1 Change work methodology

Review our methodology for carrying out works to assess whether it is possible to reduce the quantity of waste generated at source.

6.2 Procurement of Materials

Consider the following when procuring materials and goods.

- Lifespan
- Can be recycled at end of life
- Maintenance requirements

6.3 Reuse of “waste” on site

Put circular economy initiatives in place on site which encourage the reuse of materials

6.4 Optimisation of Waste Transport

Optimisation of waste transport by consolidating collections and selecting disposal sites close to the works.

6.5 Collaboration with Subcontractors

Engagement with subcontractors to improve on-site waste segregation and recycling. Collaborate with Haulage Subcontractors to reduce carbon emissions in the transportation of waste such as switching to HVO.

6.6 Training and Awareness

Training and awareness programmes for site staff to minimise waste generation.

7. Site Case study- Internal vs Open Drainage Repair in IDA Parkmore

Original Methodology

The tender design for the project Civil Remediation Works at IDA Parkmore required that 13 No. drainage repairs within the industrial estate were to be carried out by traditional open dig methods.

Carbon emissions from this open-dig method would have come from the following:

- It would have required heavy machinery, including 8-ton and 5-ton excavators and a 9-ton dumper.
- The use of new concrete and PVC pipes, quarrying and transporting stone for pipe bedding and backfill, reinstating road surfaces, and disposing of excavated material to landfill

New Methodology

Jons proposed to use internal patch and robotic cutting repairs in lieu of external repairs. Changing the design from the external repairs meant that repair works were completed internally using a robot and the existing drainage pipes were repaired rather than replaced.

The internal repairs were carried out mostly on live carriageways and completed much faster than the old methodology, reducing the need for temporary traffic lights and minimising vehicle idling.

In calculating the carbon saved from this change in methodology we considered the following

- Diesel usage of heavy plant required for excavation to expose drainage
- Carbon emissions of materials required for reinstatement
- Carbon emissions of excavated tar and aggregates transported off site as waste.

We did not include the resulting carbon emissions of replacement pipe vs relining materials or the potential carbon emissions saved by reduction in traffic management.

Assumptions & Limitations

- Machine litre/hour values are based on averages and hours required for work based on similar previous experience.
- Transport trips assumed typical rigid HGVs unless otherwise specified. (Capacity 25 tonnes and average fuel consumption 40 litres per 100km)
- Material carbon factors drawn from EPD averages.
    - Diesel 2.6674 kgCO2e per Litre
    - Material Aggregates 7.75 kgCO2e per tonne
    - Material Asphalt 3.991 kgCO2e per tonne
    - Waste Aggregates to Landfill 1.239 kgCO2e per tonne

- Same local supplier quarry and landfill used as for the rest of the project
- No rebound effects (e.g., reallocation of machines) were considered.
- Carbon Estimate for project is based on previous Scope 1&2 Jons Carbon Intensity figures for similar work from 2024 and the assumption that Scope 3 emissions make up approx. 90% of total emissions for the project

Results

The implemented drainage repair methodology change resulted in a total estimated reduction of 16.95 tonnes CO_2e as per the breakdown in the below table. This equates to at least an 8% reduction in the total potential carbon estimated for this project or a saving of 31.39kgCO2e per tonne of waste material saved (9.52kgCO2e per tonne if only including savings from Scope 3 Waste Generated in Operations)

Scope	Saving	Total Carbon Savings
Scope 1	Reduction in hours of plant in operation and associated diesel usage	7.44 tCO2e
Scope 3 Purchased Goods and Services	500T of 808 material and 40T of asphalt not needing to be purchased for reinstatement (Including transportation of material)	4.37 tCO2e
Scope 3 Waste Generated in Operations	540T of aggregates not needing to be sent to landfill (Including transportation of waste)	5.14 tCO2e
		16.95 tCO2e

Table 3: Overview of carbon emission savings for drainage repair at IDA Parkmore using alternative methods

This demonstrates the tangible impact of value engineering and methodology changes on Jons Scope 3 emissions.

Monitoring and Reporting

To ensure these savings were captured the following was put in place on site:

- Regular tracking of site waste quantities and recycling rates.
- Reporting on value engineering initiatives implemented.
- Site audits to confirm reduced use of large machinery where methodology changes have been applied.
- Monthly meetings with site engineers and Sustainability Officer to update Sustainability Initiatives Tracker

Recommendations

Internal Drainage repair is not suitable in every instance but where it is possible, it is recommended that this methodology becomes standard across Jons projects involving drainage repair

8. Action Plan

Action*	Category	Responsibility	Timeline	Monitoring / KPI
Implement methodology changes to reduce material waste and eliminate unnecessary excavation	Site Waste	Project Managers / Design Team	Ongoing, applied to projects where feasible	Number of projects applying revised methodologies; tonnes CO_2e avoided
Increase use of HVO fuel for site machinery (pilot extended to other projects)	Site Waste / Fuel Use	Plant Manager	2025–2027 (rollout)	% of fuel replaced with HVO; CO_2e savings vs. diesel
Optimise waste collection and transport (consolidated loads, low-emission transport options)	Site Waste	Site Managers / Waste Contractors	From 2025	Waste transport logs; emissions per tonne of waste transported
Subcontractor engagement to improve on-site waste segregation and recycling rates	Site Waste	Sustainability Officer / Site Managers	2025–2028	% of waste diverted from landfill; recycling rate improvement
Training and awareness for site staff on waste minimisation practices	Site Waste	Sustainability Officer	Annual from 2025	Training sessions delivered; staff feedback surveys
Collaboration with suppliers on low-carbon materials (concrete, steel)	Purchased Goods & Services	Procurement Manager / Sustainability Officer	2025–2030	Supplier engagement records; uptake of EPDs / CIF Carbon Calculator
Improve Waste Records including transportation of waste	Site Waste	Site Team /Sustainability Officer	From 2026	Site Carbon Dashboards
Interim CO_2 reduction targets (10% by 2026, 15% by 2028, 25% by 2030)	All relevant categories	Board & Sustainability Officer	2025–2030	Annual CO_2 report; third-party audit verification

***Specific actions and targets are fully outlined in Jons Internal Energy Management Action Plan**

JONS CIVIL ENGINEERING CO. LTD.

WASTE SCOPE 3 VALUE CHAIN ANALYSIS REPORT

LET'S WORK TOGETHER TOWARDS A
SUSTAINABLE FUTURE

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