

ENVIROCAL®

USER GUIDE

For Interbloc® and Stonebloc® gravity retaining walls designed in Envirobuild® and verified with Envirocalc®.



IMPORTANT NOTICE

PROFESSIONAL RESPONSIBILITY

Envirocalc® is a design verification tool that automates the calculation procedures outlined in the referenced standards. The accuracy of the output is entirely dependent on the accuracy of the user-provided input parameters. All inputs for a final design must be derived from a site-specific geotechnical investigation report. Designs intended for regulatory consent must be reviewed and signed off by a Chartered Professional Engineer (CPEng).

CONTENTS

01	INTRODUCTION	03
	Overview · Standards	
02	GETTING STARTED	04
	Envirobuild® account · Envirocalc® access	
03	WALL DESIGN IN ENVIROBUILD®	05
	Structure tool · Free draw · Design aids · Product list	
04	ENVIROCALC® ANALYSIS	08
	Launching · Inputs · Auto-generated parameters · Real-time checks	
05	RESULTS & REPORTING	13
	Detailed calculations · PDF design report	

01 INTRODUCTION

WHAT ENVIROCALC® DOES AND THE STANDARDS BEHIND EVERY CHECK

1.1 OVERVIEW

Envirocalc® is a cloud-based engineering tool for the analysis and design verification of gravity retaining walls using Envirocon's Interbloc® and Stonebloc® modular block systems. The software performs limit state design checks in accordance with the Australian standards and guidelines listed in 1.2.

This guide outlines the input parameters, the calculation workflow, and the interpretation of the results.

1.2 STANDARDS

STANDARD	TITLE
AS/NZS 1170.0	Structural design actions, Part 0: General principles
AS/NZS 1170.1	Structural design actions, Part 1: Permanent, imposed and other actions

02 GETTING STARTED

STEP 1 · ACCOUNT REGISTRATION AND ACCESS

Access to Envirocalc® is provided exclusively to verified engineering professionals. The process involves two stages: registering in Envirobuild® and having Envirocalc® access enabled by our team.

2.1 CREATING YOUR ENVIROBUILD® ACCOUNT

- 2.1.1** Navigate to **envirobuild.au**.

- 2.1.2** Click on 'Sign Up' to create a new account.

- 2.1.3** Complete the registration form and accept the terms and conditions.

2.2 ENABLING ENVIROCALC® ACCESS

- 2.2.1** After registering, please notify your Envirocon® representative or respond to your training follow-up email to confirm you have registered.

- 2.2.2** Our team will then enable full Envirocalc® functionality for your specific email address.

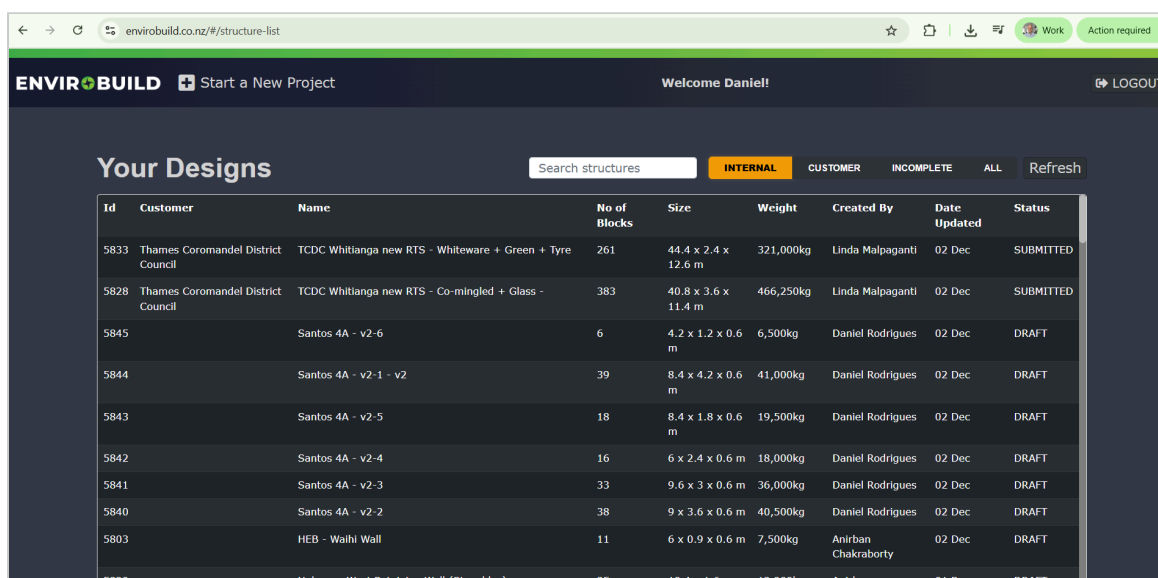
03 WALL DESIGN IN ENVIROBUILD®

STEP 2 · MODEL THE WALL GEOMETRY IN 3D BEFORE LAUNCHING ENVIROCALC®

Before launching Envirocalc®, you must first model the wall's geometry. The Envirobuild® platform is a 3D design tool used for visualisation and defining the physical structure.

3.1 LOG IN

Log in to your Envirobuild® account. You will see your project dashboard, where all previous work is saved.



The screenshot shows the Envirobuild web application interface. At the top, there's a navigation bar with the Envirobuild logo, a 'Start a New Project' button, a welcome message 'Welcome Daniel!', and a 'LOGOUT' link. Below this is a section titled 'Your Designs' with a search bar and filter tabs for 'INTERNAL', 'CUSTOMER', 'INCOMPLETE', and 'ALL'. A 'Refresh' button is also present. The main content is a table listing various wall designs with columns for Id, Customer, Name, No of Blocks, Size, Weight, Created By, Date Updated, and Status.

Id	Customer	Name	No of Blocks	Size	Weight	Created By	Date Updated	Status
5833	Thames Coromandel District Council	TCDC Whitianga new RTS - Whiteware + Green + Tyre	261	44.4 x 2.4 x 12.6 m	321,000kg	Linda Malpaganti	02 Dec	SUBMITTED
5828	Thames Coromandel District Council	TCDC Whitianga new RTS - Co-mingled + Glass -	383	40.8 x 3.6 x 11.4 m	466,250kg	Linda Malpaganti	02 Dec	SUBMITTED
5845		Santos 4A - v2-6	6	4.2 x 1.2 x 0.6 m	6,500kg	Daniel Rodrigues	02 Dec	DRAFT
5844		Santos 4A - v2-1 - v2	39	8.4 x 4.2 x 0.6 m	41,000kg	Daniel Rodrigues	02 Dec	DRAFT
5843		Santos 4A - v2-5	18	8.4 x 1.8 x 0.6 m	19,500kg	Daniel Rodrigues	02 Dec	DRAFT
5842		Santos 4A - v2-4	16	6 x 2.4 x 0.6 m	18,000kg	Daniel Rodrigues	02 Dec	DRAFT
5841		Santos 4A - v2-3	33	9.6 x 3 x 0.6 m	36,000kg	Daniel Rodrigues	02 Dec	DRAFT
5840		Santos 4A - v2-2	38	9 x 3.6 x 0.6 m	40,500kg	Daniel Rodrigues	02 Dec	DRAFT
5803		HEB - Waihi Wall	11	6 x 0.9 x 0.6 m	7,500kg	Anirban Chakraborty	02 Dec	DRAFT
5820		Hobanz - West Retaining Wall (Stoneblock)	35	10.4 x 1.6 x	12,900kg	Anirban	01 Dec	DRAFT

FIG 01 PROJECT DASHBOARD — YOUR DESIGNS

3.2 CREATE A NEW PROJECT

From the dashboard, click 'Start a New Project' to open the design board.

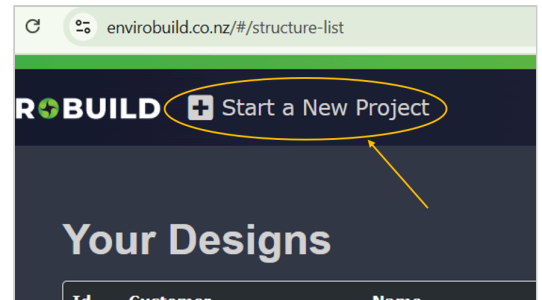


FIG 02 START A NEW PROJECT

3.3 MODEL THE WALL GEOMETRY

You have two ways to do this.

STRUCTURE TOOL

Quickly define a standard wall by its primary shape and dimensions.

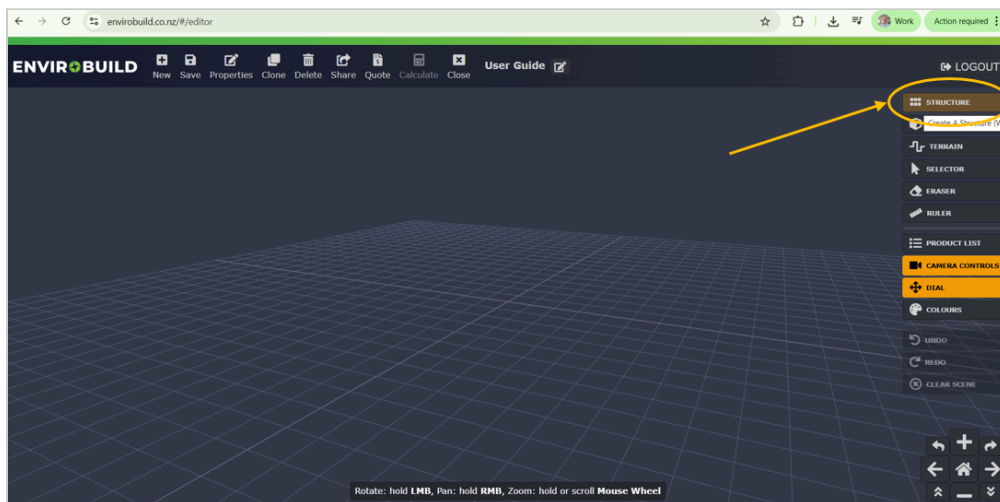


FIG 03 STRUCTURE TOOL (W)

FREE DRAW TOOL

For custom layouts, select specific block types and place them individually on the design board.

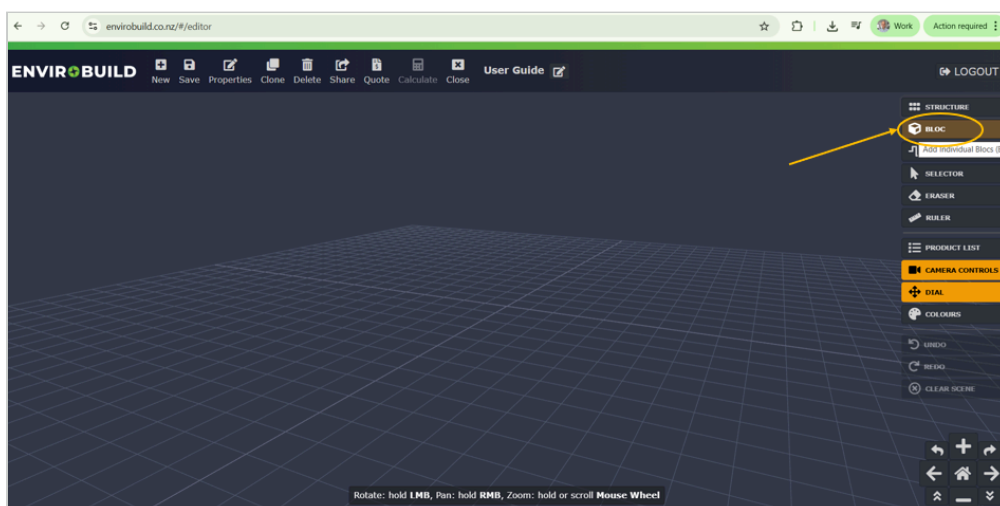


FIG 04 BLOC TOOL — ADD INDIVIDUAL BLOCS (B)

3.4 DESIGN AIDS (OPTIONAL)

Terrain tool: visualise how the structure will integrate with uneven ground levels.

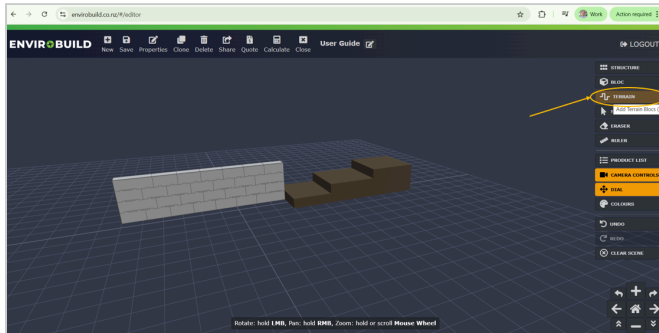


FIG 05 TERRAIN TOOL (T)

Colour feature: display colours for different block types to create clear installation plans for contractors.

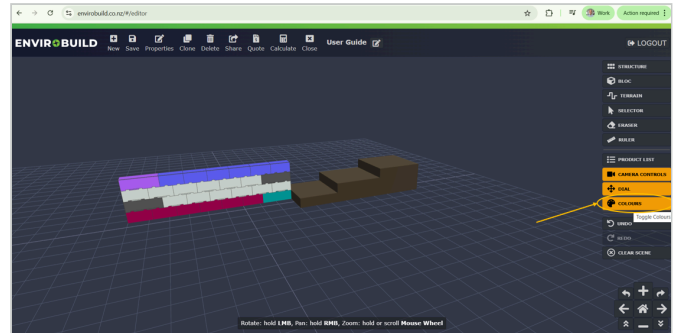


FIG 06 TOGGLE COLOURS

3.5 REVIEW THE PRODUCT LIST

Once the design is complete, the 'Product List' tab provides an exact bill of materials with all the required SKUs.

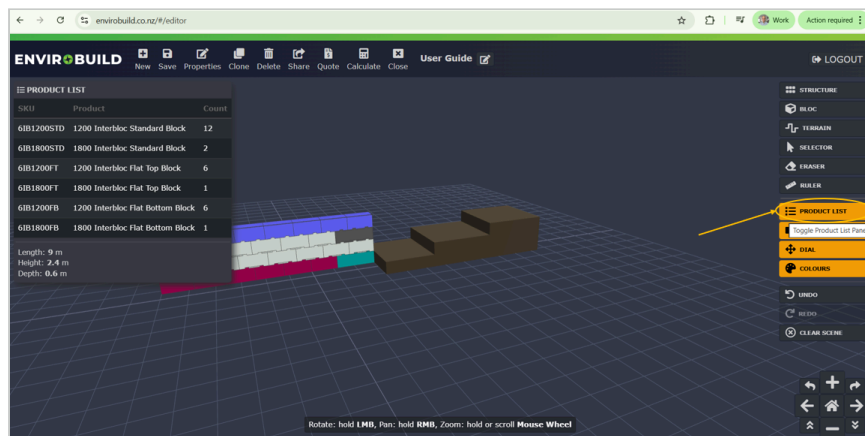


FIG 07 PRODUCT LIST — BILL OF MATERIALS BY SKU

3.6 SAVE YOUR PROJECT

Click 'Save' in the top menu before moving on to the engineering analysis.

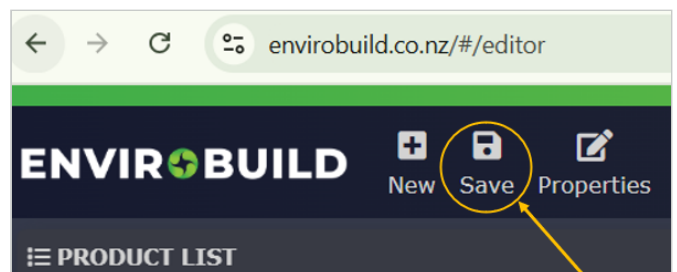


FIG 08 SAVE

04 ENVIROCALC® ANALYSIS

STEPS 3-5 · LAUNCH, INPUT SITE PARAMETERS AND ITERATE TO A STABLE DESIGN

4.1 LAUNCHING ENVIROCALC®

With the wall geometry defined and saved, you can now proceed to the engineering analysis.

4.1.1 From the top menu in Envirobuild®, click the 'Calculate' button.

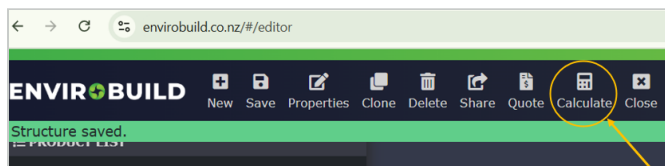


FIG 09 CALCULATE

4.1.2 Select the appropriate design standard for your region.

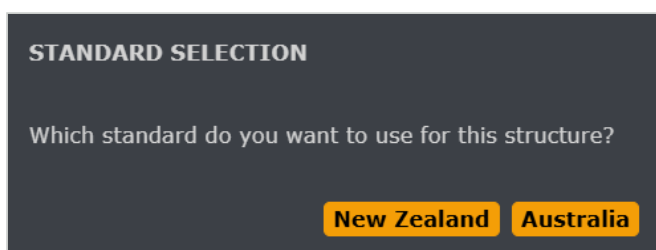


FIG 10 STANDARD SELECTION

4.1.3 The Envirocalc® interface will launch, with the Structure Dimensions section automatically populated from your 3D design.

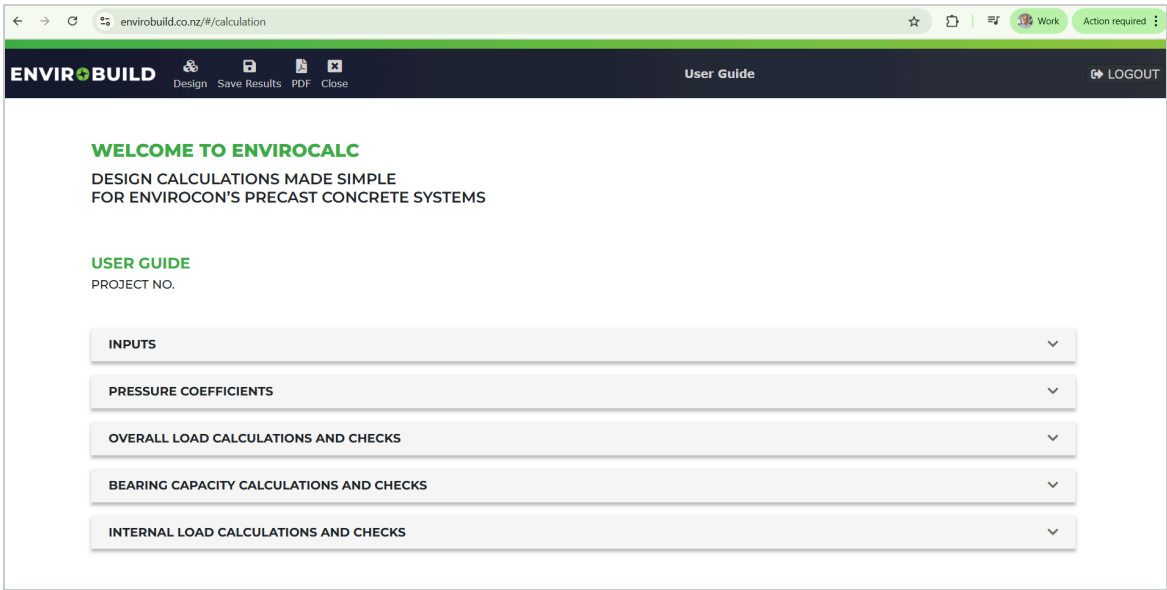


FIG 11 ENVIROCALC® CALCULATION SCREEN

STRUCTURE DIMENSIONS

Block Type: ☒ Interbloc ☐ Interbloc+ ☐ Stonebloc

Reinforced: ☒ On ☐ Off

Total Height (mm): 1800

Block Width (mm): 600

Foundation Block Length: 1200

Heel Type: ☒ None ☐ Single Heel ☐ Double Heel ☐ 3 Heels ☐ 4 Heels

FIG 12 STRUCTURE DIMENSIONS — POPULATED FROM ENVIROBUILD®

4.2 GEOTECHNICAL & LOAD PARAMETERS

The Envirocalc® ‘Inputs’ tab is where you will define all site-specific geotechnical and loading conditions.

NOTE

Upon launching, Envirocalc® populates many fields with common, default values to provide a sample case. These defaults are placeholders only. For a final, accurate design, you must override these defaults with the specific parameters from your project’s geotechnical investigation report.

4.2.1 Backfill and base soil parameters. Enter the required soil properties (ϕ , δ , β , c' , γ , c_u) from the geotechnical report.

BACKFILL PARAMETERS	
Internal Friction Angle (ϕ)	30 °
Wall Friction Angle (δ)	15 °
Slope (β)	0 °
Cohesion (c)	1 kPa
Density (γ)	18 kN/m ³
BASE SOIL PARAMETERS	
Internal Friction Angle (ϕ)	30 °
Cohesion (c)	4 kPa
Density (γ)	18 kN/m ³
Undrained Shear Capacity (c_u)	80 kPa

FIG 13 BACKFILL & BASE SOIL PARAMETERS

4.2.2 Surcharge loads. Enter any permanent (G) or imposed (Q) surcharge loads.

LIVE LOAD	
(Q)	3 kPa
DEAD LOAD CALCULATION	
Driveway Thickness (T_{dl})	0 m
Width within virtual back of the wall (W_{dl})	0 m
(G)	0 kPa

FIG 14 LIVE & DEAD LOAD

4.3 AUTO-GENERATED PARAMETERS

Envirocalc® automatically calculates or populates the following parameters based on the inputs you provide and the embedded code logic. These can typically be manually overridden if required by the design engineer.

PARAMETER	HOW IT IS DERIVED
$C_{o,1000} \cdot R \cdot f$	Based on the Region and Subsoil Classification, the software determines the Peak Ground Acceleration Factor ($C_{o,1000}$), Return Period Factor (R), and Site Response Factor (f) from the tables in NZS 1170.5.
$a_{max} \cdot k_h$	These factors, along with the Wall Displacement Factor (W_d) and Topographic Amplification (A_{toppo}), are used to calculate the final Peak Horizontal Ground Acceleration (a_{max}) and the Horizontal Seismic Coefficient (k_h). This k_h is then used to derive the seismic earth pressures (K_{ae}) and inertial forces ($H_{inertia}$).
$\alpha \cdot \phi$	The software auto-populates the requisite Load Factors (e.g. $\alpha_{EP_STATIC} = 1.6$) and Strength Reduction Factors (e.g. ϕ_{sl} , ϕ_{pp} , ϕ_{bc}) as specified in the B1/VM4 methodology.

HORIZONTAL ACCELERATION COMPONENT CALCULATION

Subsoil Classification

Class A, B & C

Region

Christchurch

Distance to Closest Building

> 1.5H

FACTORS

Peak Ground Acceleration Factor ($C_{O,1000}$)

0.3

Wall Displacement Factor (W_d)

0.3

Return Period Factor (R)

0.5

Site Response Factor (f)

1.33

Topography Amplification Factor (A_{toppo})

1.2

FIG 15 HORIZONTAL ACCELERATION COMPONENT & FACTORS

4.4 REAL-TIME ANALYSIS & DESIGN ITERATION

Envirocalc® provides instantaneous feedback on the wall’s stability, allowing for rapid and efficient design optimisation directly within the analysis interface.

REAL-TIME STABILITY CHECKS

As you input your parameters, observe the stability check results on the right side of the screen. The status updates instantly:

- ✓

Green checkmark: the design is stable and compliant for that specific limit state.
- ✗

Red ‘X’: indicates a failure. The design action exceeds the design capacity and requires modification.

OVERALL STABILITY CHECKS			
STATIC		EARTHQUAKE	
Overturning Stability	✓	Overturning Stability	✓
Short Term Sliding Stability	✓	Short Term Sliding Stability	✓
Long Term Sliding Stability	✗		
BEARING CAPACITY CHECKS			
STATIC		EARTHQUAKE	
Short Term Safety Factor	✓	Short Term Safety Factor	✓
Long Term Safety Factor	✗		
INTERNAL STABILITY CHECKS			
STATIC		EARTHQUAKE	
Overturning Point 1	✓	Overturning Point 1	✓
Overturning Point 2	✓	Overturning Point 2	✓

FIG 16 STABILITY CHECKS — STATIC & EARTHQUAKE

RAPID DESIGN ITERATION

If a failure is indicated (red), you can iterate towards a stable design directly within the Envirocalc® interface without returning to the Envirobuild® design board. Use the controls in the Structure Dimensions section to modify the design. For example, you can:

- Increase the Heel Width or Heel Height.
- Change the Heel Type (e.g. Single to Double Heel).
- Increase the Wall Embedment Depth.
- Toggle Reinforcement on.

With each adjustment, the stability checks on the right will instantly update, providing immediate feedback on the impact of your change. This allows for rapid design optimisation, enabling you to efficiently find the most economical and stable wall configuration that satisfies all ULS checks.

05 RESULTS & REPORTING

STEPS 6-7 • REVIEW THE DETAILED CALCULATIONS AND GENERATE THE DESIGN REPORT

5.1 REVIEWING DETAILED CALCULATIONS

Envirocalc® provides full transparency for engineering review.

- 5.1.1** Scroll down and expand the 'Detailed Calculations' tabs (e.g. Overall Load Calculations, Bearing Capacity, etc.).
- 5.1.2** For further clarity, click on any numerical value within this section. A pop-up will display the exact formula and variables used to derive that specific result.

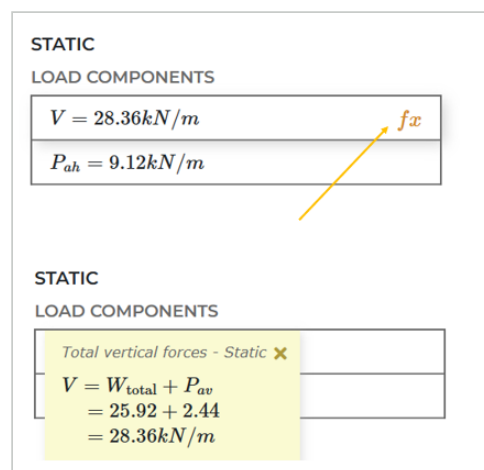


FIG 17 FORMULA POP-UP (FX)

5.2 GENERATING THE FINAL REPORT

Once your design is stable, generate a formal design report.

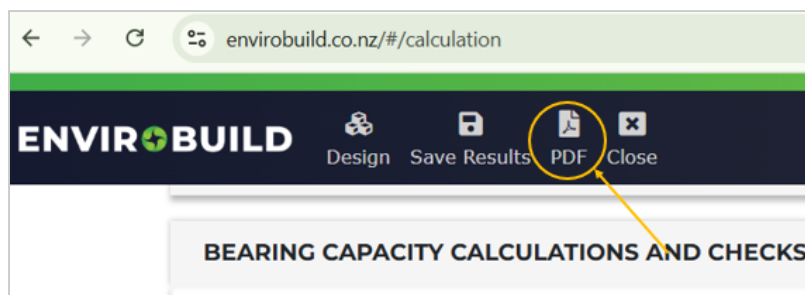


FIG 18 PDF DESIGN REPORT

5.2.1 Navigate to the 'PDF' function.

5.2.2 The software will compile a comprehensive, consent-ready PDF document containing all inputs, a summary of the ULS checks, and the full detailed calculations for submission and peer review.

CONCRETE KEPT IN CIRCULATION

At Envirocon®, we lead the way in sustainable construction with our innovative precast concrete block system, designed to support the circular economy by transforming surplus concrete into durable, reusable building solutions.

As the country's first accredited construction product stewardship scheme, we create ultra-low embodied carbon products that can be reused, recycled, or repurposed at the end of their life, and our buyback guarantee keeps concrete in circulation and out of landfills.

THE ENVIROCON® SYSTEM

INTERBLOC®	Interlocking precast concrete blocks for retaining walls, storage bays and push walls.
ENVIROBUILD®	3D design, visualisation and block quantification.
ENVIROCALC®	Cloud-based gravity retaining wall design verification.