Pharming our Water

Pharming our Water
Before the Flood

Studio Brief: Cyborg City

Once a prominent and formidable place which was recognised as one of the Worlds greatest ports, the Titanic Quarter of Belfast, Northern Ireland is one that is enriched by its former shipping building and linen industries.
The site which has suffered social and economic stagnation has recently seen a steady increase in investment, but nothing to indicate further growth.

This project, which envisages the use of the Belfast City deal will strategically relocate and extend Queen's University Belfast's STEM faculties into a new and uplifting waterfront campus. This project looks to rejuvenate Belfast's waterfront into a place of culture, trade and learning with the invention of the circular economy.
The campus will seek to resolve issues with the demand for courses, the effects of global warming and the expectations on future Universities.

What will the future of the campus be by 2050?

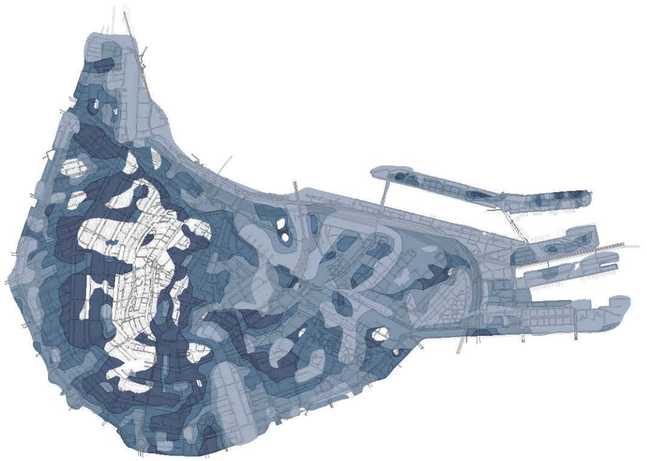
Project Description:

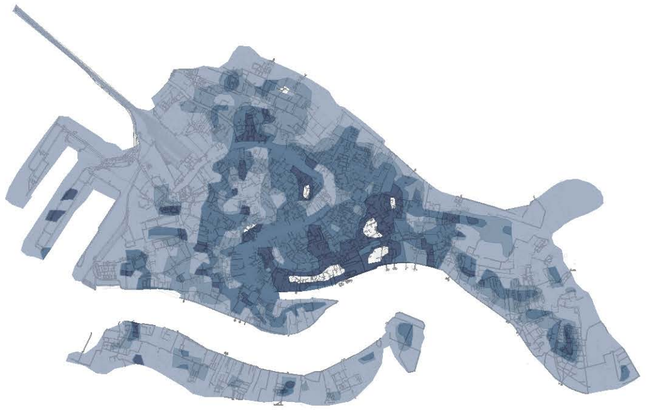
I

Antibiotic Resistance is one of the greatest threats to our civilisation today, threatening our global security, food and development, yet what are we doing to combat this? We continue to increase this threat, through our livestock, our fertilisers, our water and our misuse of these substances. This dependence has led to the development of super-bugs, bacteria that are resistant to all form of antibiotics. The growing number of infections puts the entire population at risk, regardless of age, country of origin or lifestyle. Scientists predict that by 2050 10 million people will die annually from antibiotic resistance. That figure is currently at 70,000 (2016).

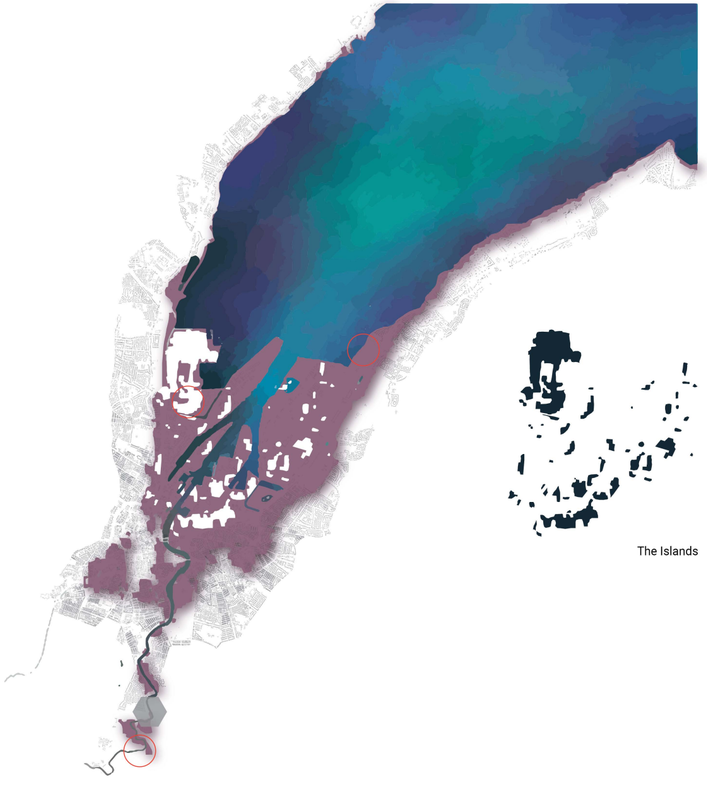
II

This project will adapt to its landscape in preparation for the increasing issues regarding rising sea levels and global warming while seeking to raise awareness about our dependency and overuse of these medicaments. My proposal is to create a botanical facility along Queen's Island acting as an education centre for students and visitors concerning the growing antibiotic crisis while adapting the surrounding context to provide places of leisure, connection and habitat. This design will attempt to rejuvenate Queen's Islands waterfront, seeking to cleanse the water through the use of wheat production and improving public connections between the surrounding urban fabric and the edges of the water.

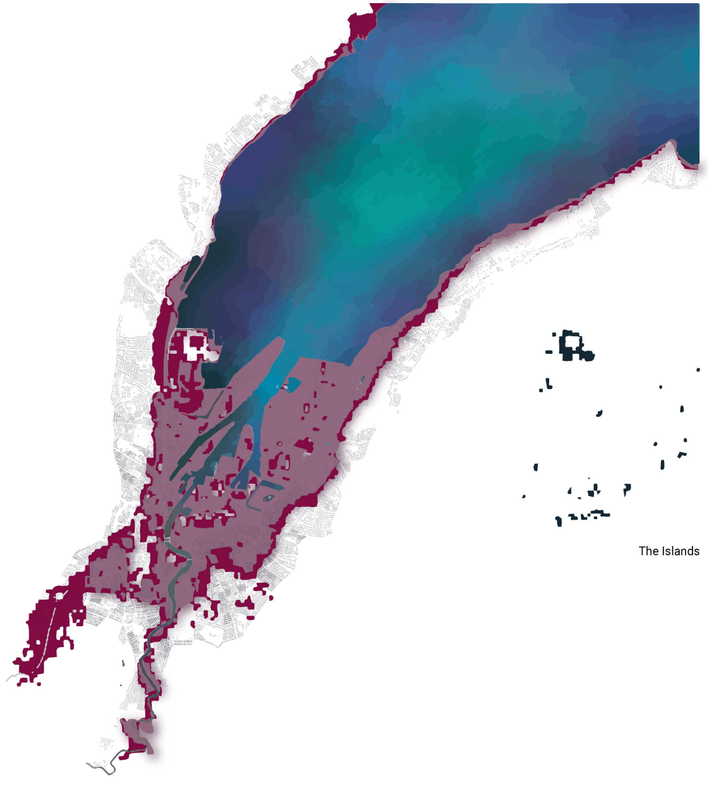




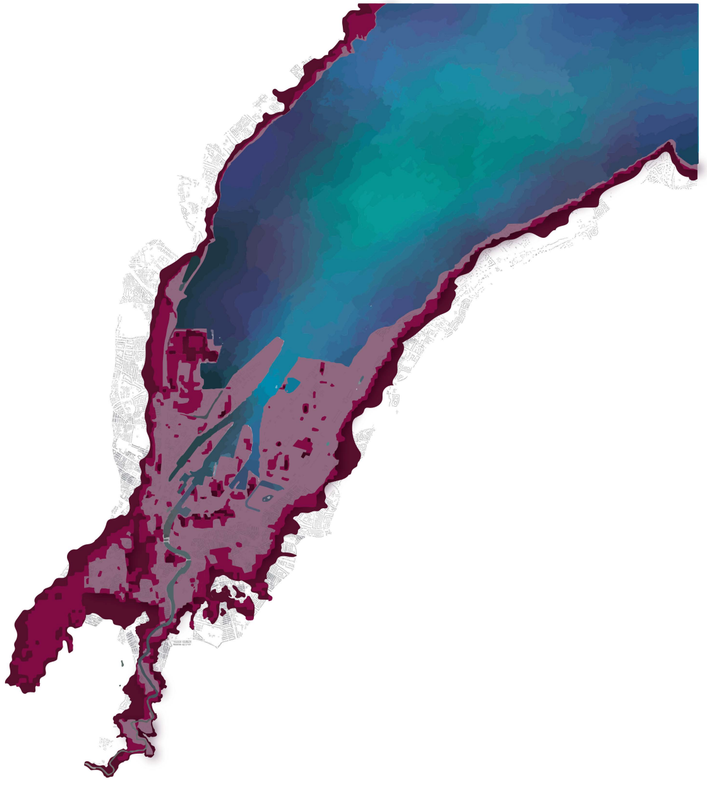
1 Metre	2 Metre	3 Metre	4 Metre
1.5°C Warming	2.0°C Warming	3.0°C Warming	4.0°C Warming



1. 2075: 2.0°C Increase in Sea Temperature - 1.5m - 2m Rise



2. 2075: 3.0°C Increase in Sea Temperature - 2.5m - 3.5m Rise



3. 2075: 4.0°C Increase in Sea Temperature - 4m - 5m Rise

Traces of Antibiotics in Water

90ng(L) - Recommended Max Dosage

170ng(L) - Lagan Strandmillis Weir

Sublethal Dosage

Sewage Treatment Plant

01.

02.

03.

04.

01. **1832 - 1846**

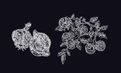
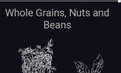
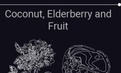
02. **1900 - 1907**

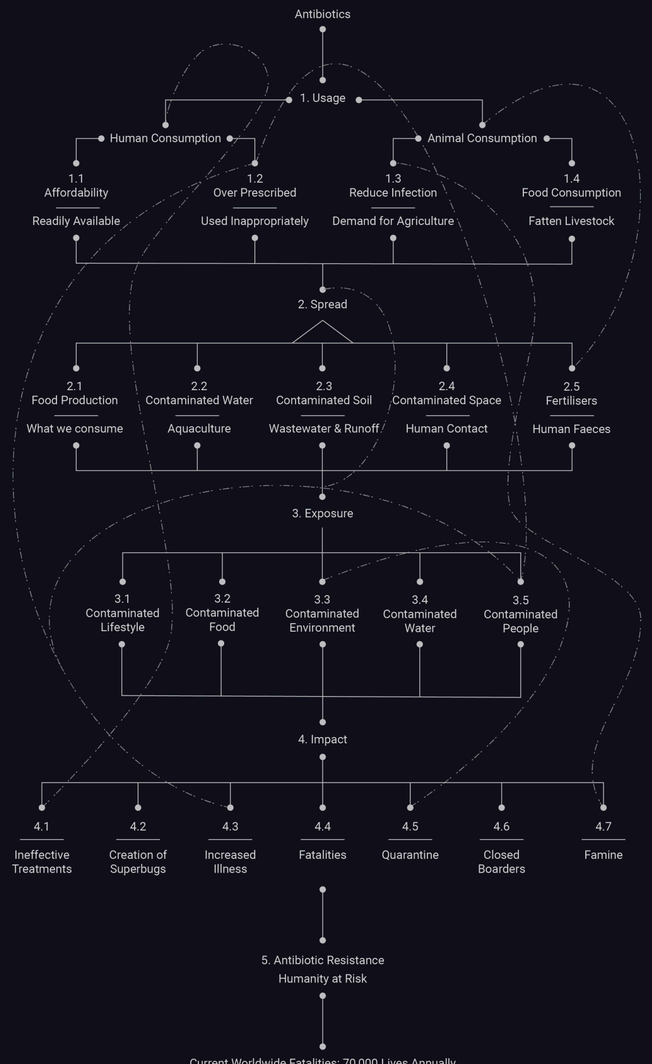
03. **1908 - 1957**

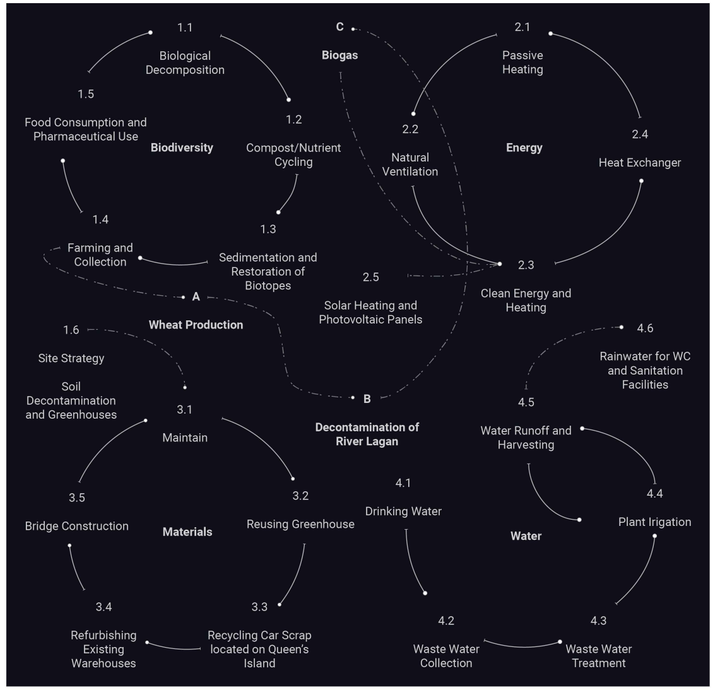
04. **1958 - 1969**

Area of Interest

1. Belfast Reservoir (Future location of Ormeau Bathhouse)
2. Intercepting Hospital (Contagious Diseases)
3. Quarantine Station
4. Quarantine Station

	Staphylococcus Aureus (MRSA) First Documented: 1884 Illness Caused: Pneumonia, and meningitis Antibiotic Resistance: Medium Virulence: Dangerous	Garlic, Turmeric and Honey 
	Burkholderia Cepacia First Documented: 1949 Illness Caused: Pneumonia Antibiotic Resistance: Low Virulence: Worrying	Fruit and Vegetables 
	Pseudomonas Aeruginosa First Documented: 1872 Illness Caused: Pneumonia, Various Infections Antibiotic Resistance: Medium Virulence: Worrying	Grapefruit, Vinger and Honey 
	Clostridium Difficile First Documented: 1935 Illness Caused: Diarrhoea Antibiotic Resistance: Low Virulence: Dangerous	Oatmeal, Wheat, and Potatoes 
	Klebsiella Pneumoniae First Documented: 1886 Illness Caused: Lung infections, Pneumonia Antibiotic Resistance: Medium Virulence: Worrying	Astragalus and Garlic 
	Escherichia Coli (E.coli) First Documented: 1895 Illness Caused: Diarrhoea and Urinary Tract Infection Antibiotic Resistance: High Virulence: Worrying	Honey, Fruit and Vegetables 
	Acinetobacter Baumannii First Documented: 1911 Illness Caused: Pneumonia and Urinary Tract Infection Antibiotic Resistance: High Virulence: Worrying	Fruit and Vegetables 
	Mycobacterium Tuberculosis First Documented: 1882 Illness Caused: Tuberculosis Antibiotic Resistance: Medium Virulence: Deadly	Nuts, Honey and Fruit 
	Neisseria Gonorrhoeae First Documented: 1885 Illness Caused: Gonorrhoea Antibiotic Resistance: Medium Virulence: Worrying	Whole Grains, Nuts and Beans 
	Streptococcus Pyogenes First Documented: 1884 Illness Caused: Sore Throat and Skin disorders Antibiotic Resistance: Low Virulence: Deadly	Coconut, Elderberry and Fruit 





Education
University
School
Nursery

Leisure
Museum
Cafe
Hotel

Housing
Housing
Apartment
Student Accommodation

Service
Barber
Police Station
Library

Retail
Music Shop
Clothes Shop
Book Shop

Law
Law Courts
Solicitors
Lawyers Office

Religious
Church
Youth Centre
Cathedral

Food
Supermarket
Corner Shop
Fast Food Restaurant

Industrial
Factory
Warehouse
Distribution Centre

Shopping Centre
Large Retail Complex

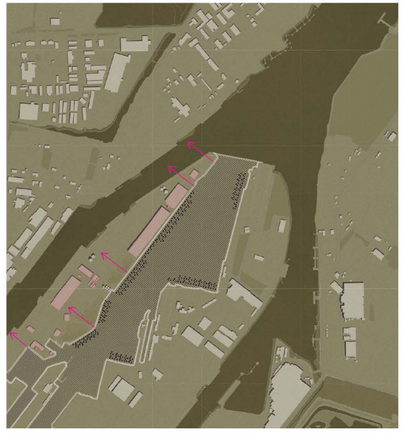
Derelict
Abandoned Site
Unoccupied Building

Healthcare
Elderly Care Home
Hospital
Clinic

Government
Political Party Office
Government Office
Tax Office

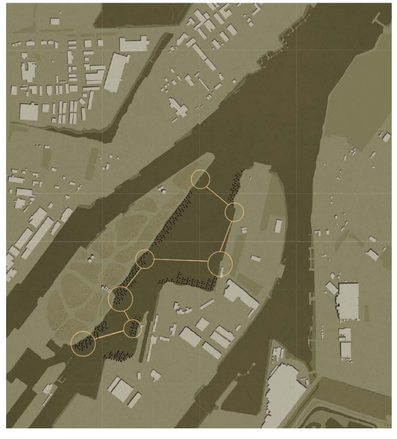
River
River Lagan

Railway
Central Station
Railway Line
Service Station



Year I: 2021

During the early stages of the project, the strategy will be to encourage and implement sedimentation along Queen's Island and the surrounding harbour edge. Using methods which includes a modular system with the plantation of the wheat crop, a natural method of trapping and soaking antibiotics within the water system will support the need to decontaminate the waterfront.



Year 5: 2025

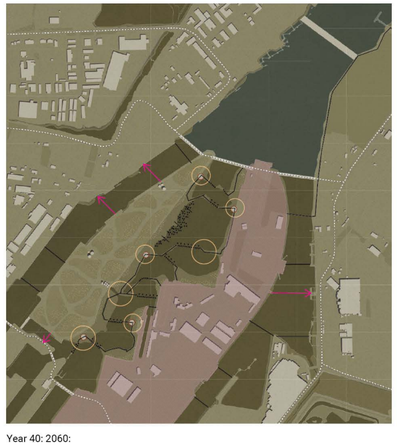
Over time, the resulting landscape will be formed to replace the docklands on the Western side of the embankment, creating a diverse environment for the local ecosystem to flourish. The production of wheat as a natural absorbent of antibiotics within the water stream will be continuous throughout this process.

Year 15: 2035

Overtime as sediment is deposited and vegetation emerges from the site, the cultivating landscape is continually advancing producing new land and area for plant growth. The introduction of horizontal structures including the incorporation of Groynes supports further sedimentation and encourages the formation of land barriers.

Year 30: 2050:

The incorporation of infrastructure across the site provides a necessary link between the edges of the campus and the existing city boundaries. The proposal of flood defences near the mouth of the channels is fundamental in allowing for cross circulation and prevention of natural environmental changes of sea level.



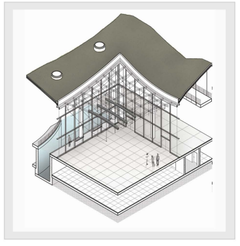
Year 40: 2060:

Over time, as the University Campus continues to expand within the urban fabric of the site, preparation for the increased risk of rising sea levels and flooding around the mouth of the channel will be introduced, whilst also providing connections across the surrounding embankments.

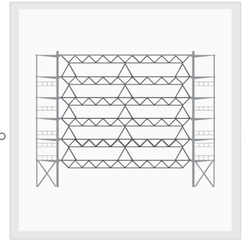
Year 50: 2070:

The transformation of Queen's Island and its waterfront provides a natural and emerging ecosystem adjacent to the advancing University Campus. The relationship between the past, present and future of the site and the emerging technologies which provide places of learning and recreation will provide a project that is immersed within the site and one that is adaptive to its surrounding context.

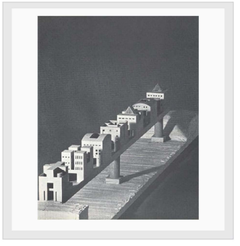
Stage 01 -Precedent Study



Adaptive Design
Science Academy Museum



Open and Expansive Floors
Pompidou centre



Form and Aesthetics
Steve Holl - Manhattan

Rising Sea Levels
Dutch Floating Houses

Stage 02 - Context and Form

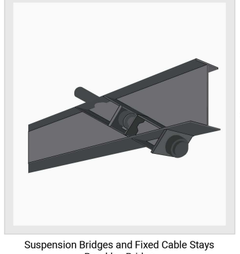
Linear and Repetitive Steel Elements
Pompidou centre

Structural Steel Elements and Cost Effective
Cladding

Existing Industrial Warehouses and Large Spanning
Structures

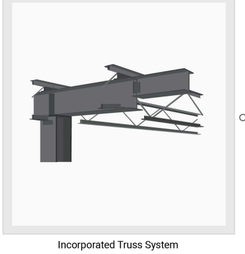
Local Manufacturing Methods
Lagan Footbridge

Stage 03 - Technological Strategy

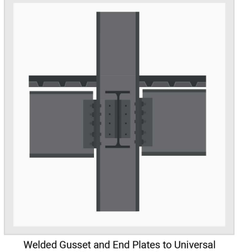


Suspension Bridges and Fixed Cable Stays
Brooklyn Bridge

Composite Metal Flooring and Public Accessibility

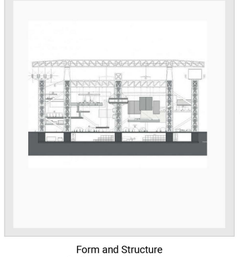


Incorporated Truss System



Welded Gusset and End Plates to Universal
Structural Elements

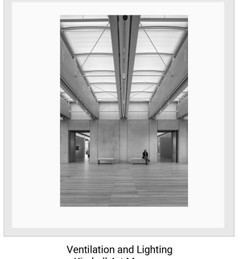
Stage 04 - Assembly and Environmental Strategy



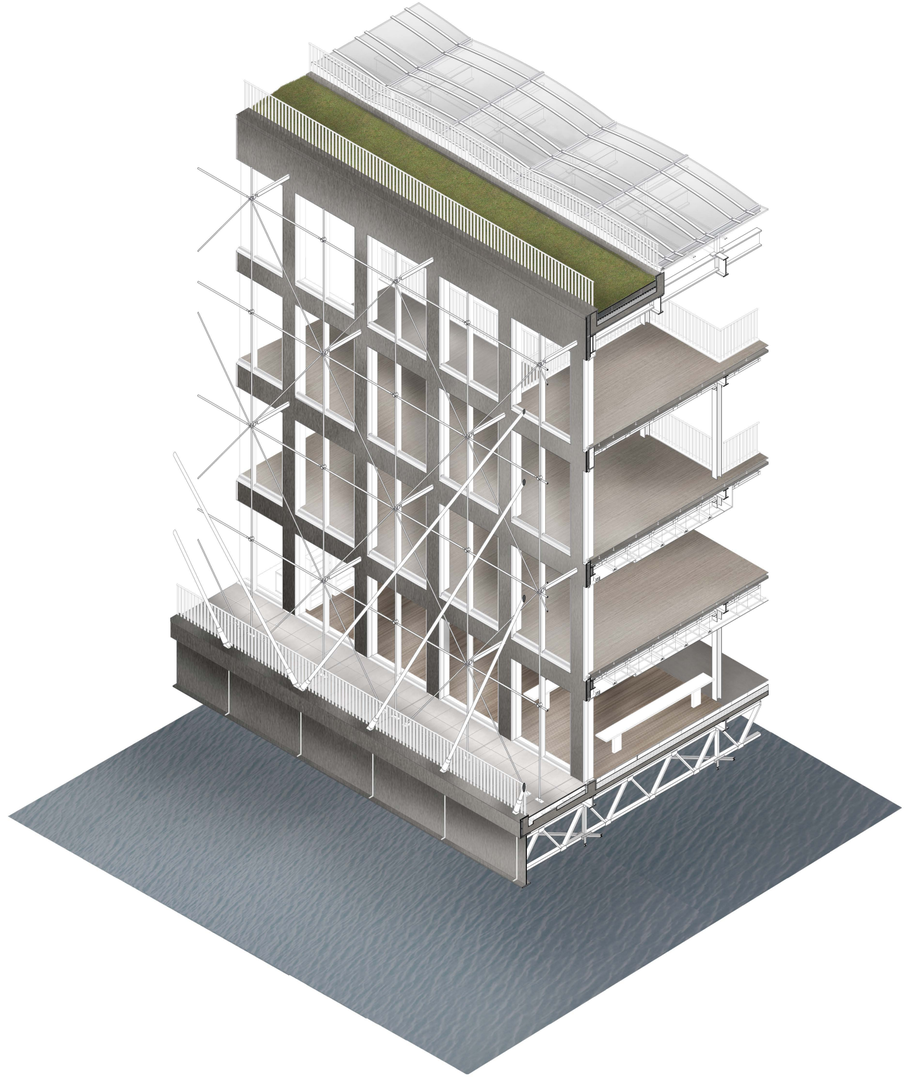
Form and Structure
Cedric Price Fun Palace

Adaptive Facade
MVRDV, Expo Pavillion 2000

Green Roof Construction
Science Academy Museum



Ventilation and Lighting
Kimbell Art Museum



Technical Key:

1. 4mm Filter Layer
2. 4mm Root Barrier Fabric
3. 4mm Separation Layer
4. 12mm Cement Particle Board
5. 12.5mm Roof Decking
6. 38mm Fixing Bracket
7. 38mm Green Roof Drainage Layer
8. 25mm Insulation Upstand
9. 100mm Insulation between Studs
10. 150mm Semi-Rigid Insulation

11. 200mm Semi-Rigid Insulation
12. 250-300mm Concrete Upstand
13. 1850mm x 360mm Galvanised Steel Girder as Per Structural Engineers Specification
14. Aluminium Drip Flashing
15. Access Floor
16. Balustrade Fixed to Concrete Upstand
17. Balustrade Fixing Bracket
18. Bracing Connection to Gusset Plate
19. Breather Membrane
20. Cable Stay with Type Locked Coil

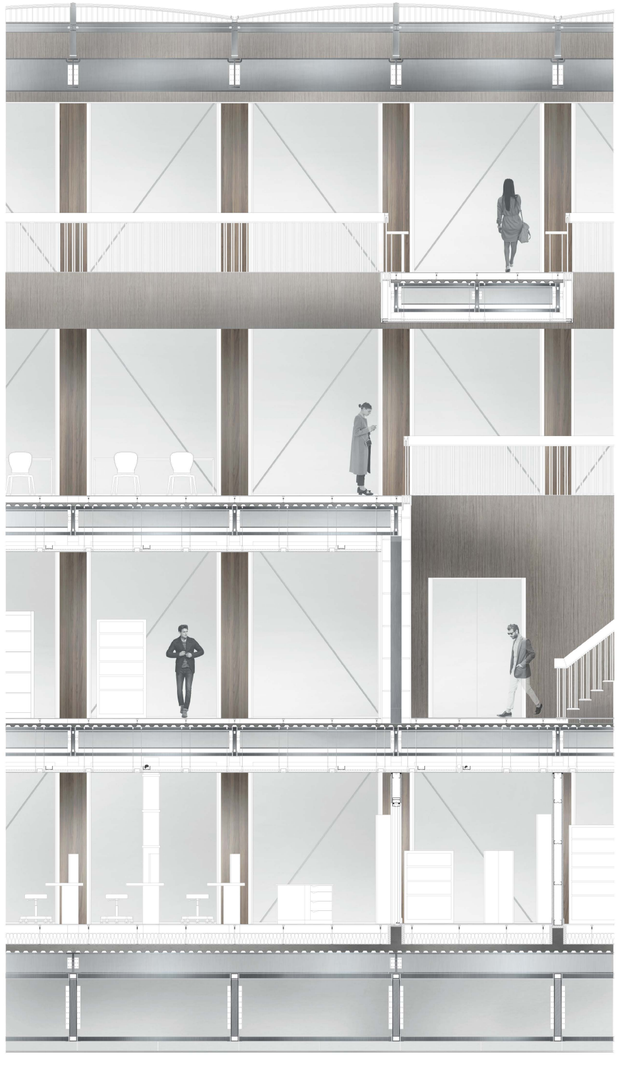
21. Cable Stay Anchorage fixed at Concrete Upstand and Steel Girder
22. Coconut Husk Biodegradable Plant Trays
23. Column Plate Splices
24. Cast in Place Concrete
25. Concrete Upstand/Plinth
26. Davit Arm Fixing
27. Double Glazed Aluminium Window Unit
28. DPC
29. Edge Trim and Restraint Strip
30. EPDM Lapping and Sealed

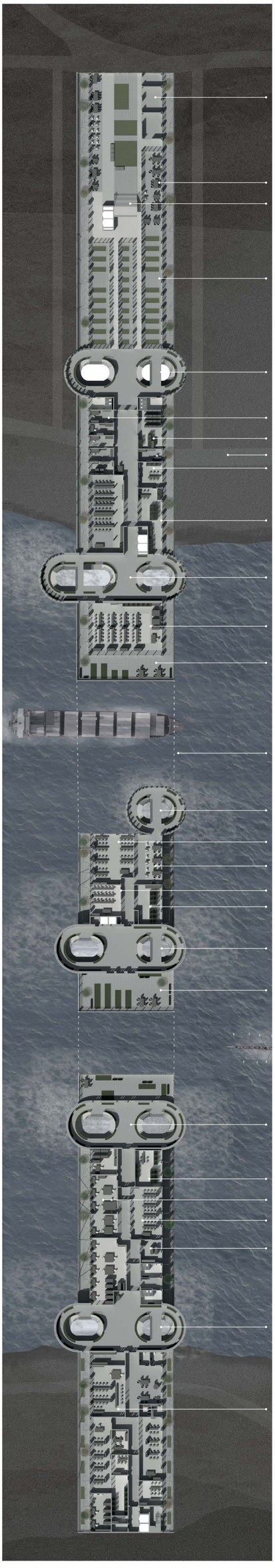
31. End/Fin Plate
32. Fire/Acoustic Rated Sealant
33. Fire Curtain Incorporated into Suspended Ceiling
34. Fixing Bracket
35. Flexible Sealant
36. Folded Zinc Strip fixed to Plywood Support
37. Fully Adhered Roof Membrane
38. Galvanised Steel Gerberette Fixed to Structural I-Beam
39. Galvanised Steel I-Beam as Per Structural Engineers Specification
40. Galvanised Steel Warren Truss as Per Structural Engineers Specification

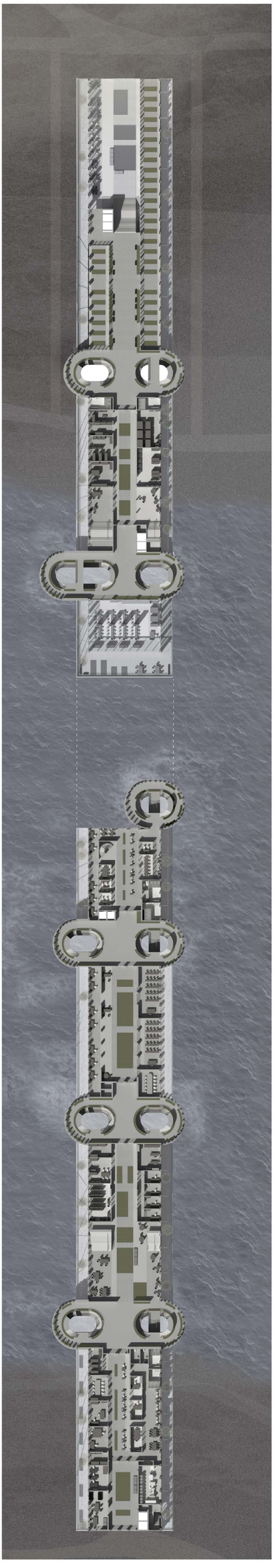
41. Glazed Skylight
42. Hardwood Floor Finish
43. Intumescent Cavity Closer 30min FR
44. Metal Balustrade with Guardrail (1100mm High)
45. Metal Decking Sheet
46. Metal Decking Stud Connectors
47. Paving Slabs on Support Brackets
48. Planted Roof Assembly
49. Plasterboard Wall
50. Polythene Sheathed Mineral Wool with Intumescent Strip (1HR)

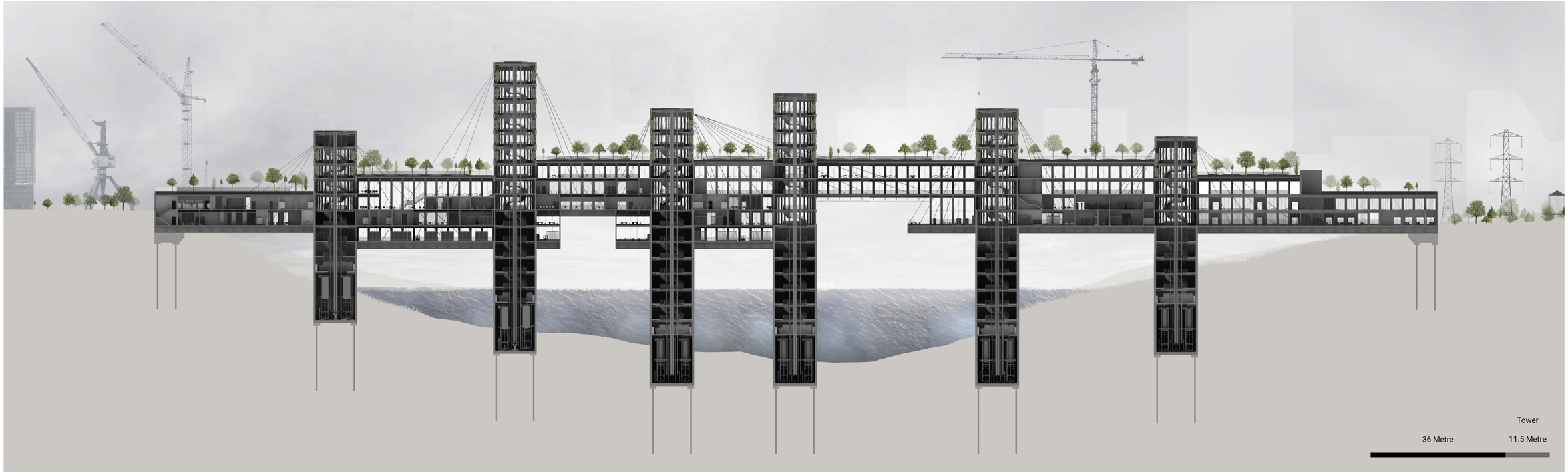
51. PU Foam
52. Raised Floor Pedestal
53. Reinforced Cast in Place Concrete Roof Structure
54. Skirting
55. Skylight System Support Post
56. Soil/Vegetation
57. Standing Seam Zinc Cladding on Plywood Backing
58. Stainless Steel Column Encasement
59. Steel Runner
60. Steel Support Angle

61. Suspended Ceiling with Light Fixings, Sprinkler System and Incorporated Services
62. Wooden Transition Strip
63. Tongue and Groove Wooden Cladding
64. Two Layers 12.5mm Acoustical Plasterboard
65. Vapour Control Layer
66. Ventilation Strip with Insect Mesh
67. Window Fixing Bracket




Commercial Establishments
Private Study Area
Public Access to Ground Floor
Plant Growth Chambers
Circulation Tower 01
(PGC on Upper Floors and Fire Route)
Team Leader Offices
Herbarium and Library
Public Route underneath
Flexible Lab Support
Support Laboratory
Circulation Tower 02
Laboratory
External Plant Growth and Viewing Terrace
Shipping Route (Public Access Route above)
Circulation Tower 03
Laboratory
Write Up
Small Lecture Theatre
Support Laboratory
Circulation Tower 04
External Plant Growth and Viewing Terrace
Circulation Tower 05
Support Laboratory
Private Study Area
Laboratory
Digital Archive
Circulation Tower 06
Flexible Lab Support




Tower
36 Metre
11.5 Metre