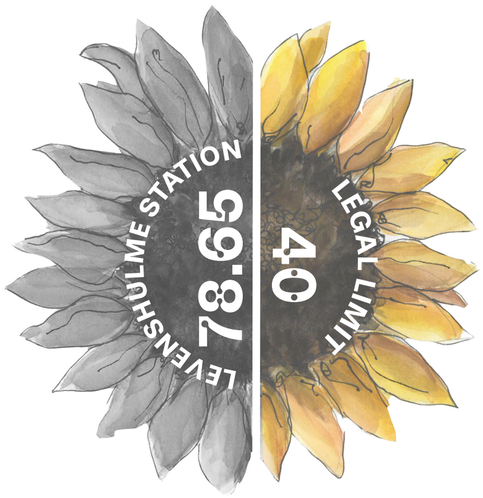


ANNUAL NO_2 LEVELS µg/m3

P R O B L E M

Rising Nitrogen Dioxide (NO_2) levels in the air is not only a regional problem in Levenshulme but something that affects every living organism. This pollution is the result of the burning of fossil fuels and causes irreversible effects on our lungs, vegetation and influences the development of asthma in children.

P R O C E S S

Research was conducted into the most affective materials at absorbing NO_2, the best being sunflowers, which were dissected to further investigate the structures and conceptually experiment with. Questionnaires were sent out to local environmental groups in Levenshulme to gather opinions, on the conditions of air pollution affecting their child's health and education. A primary interview was conducted with Climafibre's inventor and site visits consisted of nature reserves and existing educational spaces, exploring how these can together stem a vibrant learning environment.

P R O P O S A L

A learning centre, in collaboration with Climafibre, for children, designed around the features of a sunflower and curated with specific techniques and materials that absorb NO_2. Sunflowers grown here will provide resources to circulate Climafibre's regenerative design strategy, which are used and sold within the centre as funding.

SITE MAP OF LEVENSHULME, NOT TO SCALE

LEVENSHULME STATION SOUTH

28%

OF RESIDENTS IN LEVENSHULME ARE AGES **0-19**

10%

OF CHILDREN IN LEVENSHULME HAVE A **LONG TERM HEALTH PROBLEM**

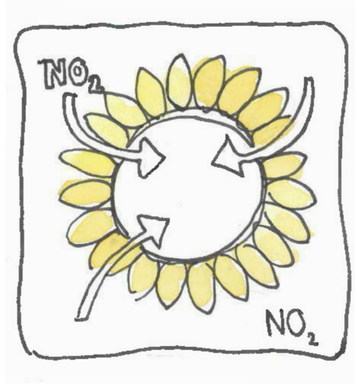
4TH

BIGGEST HEALTH PROBLEM IN LEVENSHULME IS **ASTHMA**

3

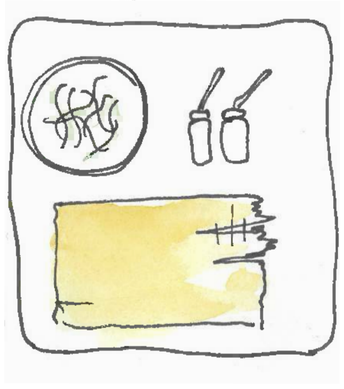
PEOPLE IN THE UK **DIE** FROM AN ASTHMA ATTACK EVERYDAY

GROW →

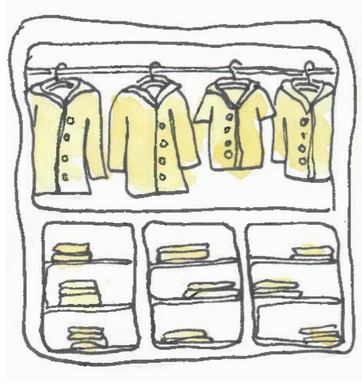


ABSORB →

RE-PURPOSE →



MANUFACTURE →



PRODUCT →

Manchester city council and NHS Manchester, Gorton & Levenshulme- Health & Social Care Cohort Profile, 2019

CLIMAFIBRE

https://jessredgrave.com/

1. A partner of the centre, a new regenerative company using sunflowers to produce modular solutions to materials.

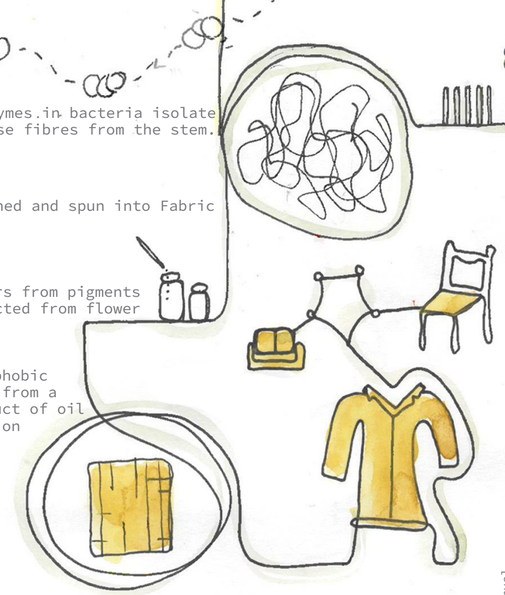
SUNFLOWERS BENEFIT BOTH SOCIETAL AND PLANETARY HEALTH

-Enzymes in bacteria isolate cellulose fibres from the stem.

- Combined and spun into Fabric

- Colours from pigments extracted from flower

- Hydrophobic coating from a bi-product of oil production

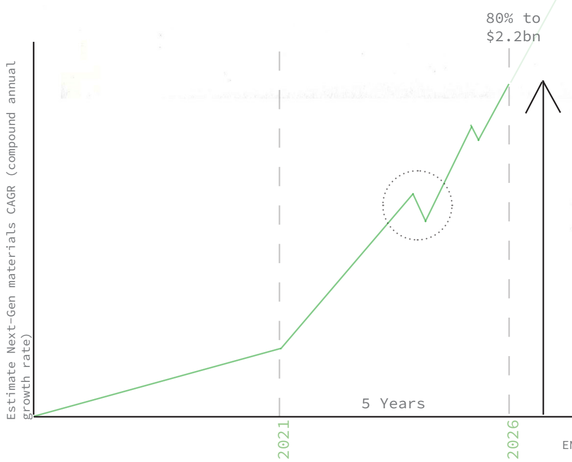


Once all the sunflowers are grown, as a circular design approach they are RECYCLED to produce materials which feature in the centre, and can be brought in the shop (as a way of funding the project). This assures no waste is produced, maintaining a long-term solution to fabric production.

This process will encourage other designers to embed the environment into the physical design

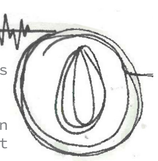
2. Climafibre is an example of a BIOFABRICATED MATERIAL, which is part of the Next-Gen materials industry, which has interest across different industries predicting to increase by record amounts in the 5-10 years.

Challenges- demand for biomanufactured materials exceeds supply with limited availability

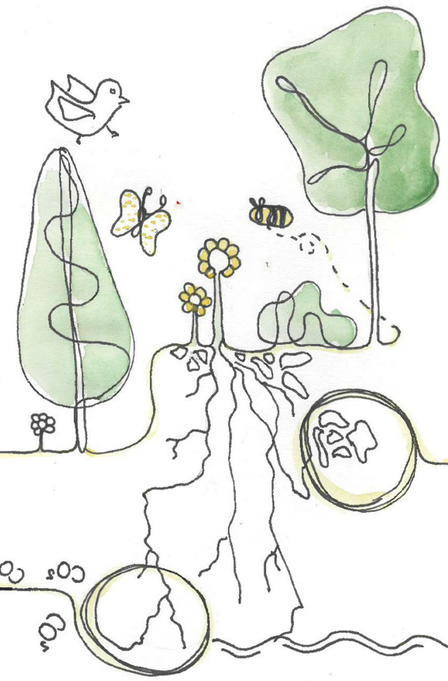


(CR)- Material Innovation Initiative's (MII) 2021 State of the Industry Report, WGSM

4. Sunflower seeds have benefits on the body when consumed, consisting of improving joints and bones, in addition to lowering the risk of heart disease/ diabetes.



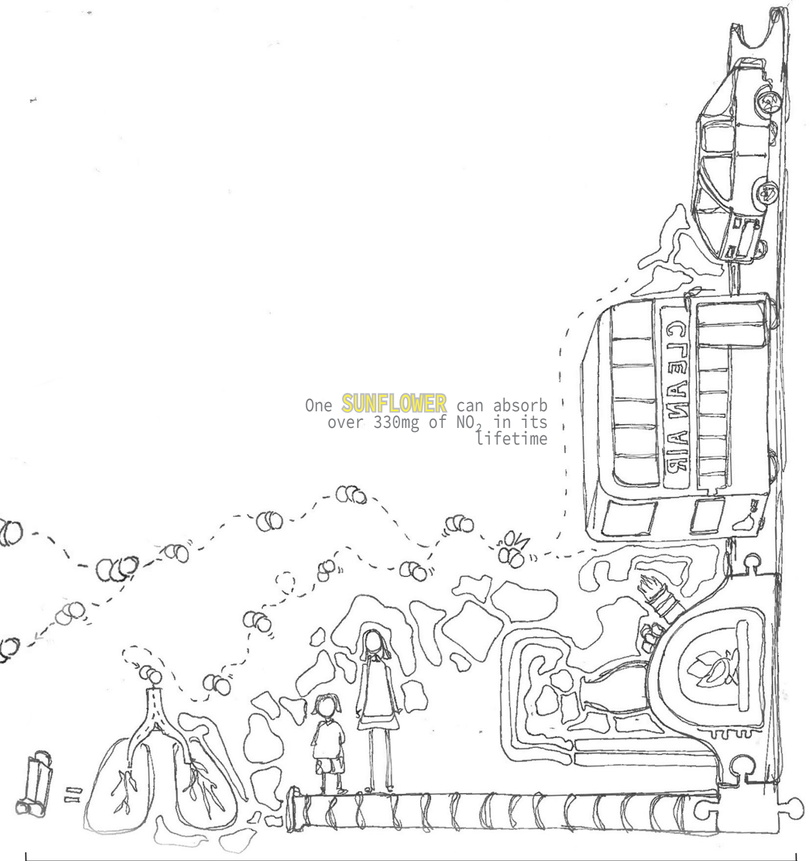
3. Sunflowers create regenerative food systems, PROTECTING BIODIVERSITY above and bellow ground



They aid climate mitigation, helping SOIL REMEDIATION

They have tap roots deep in soil, preventing from compacting and SEQUESTING CARBON

One SUNFLOWER can absorb over 330mg of NO_2 in its lifetime



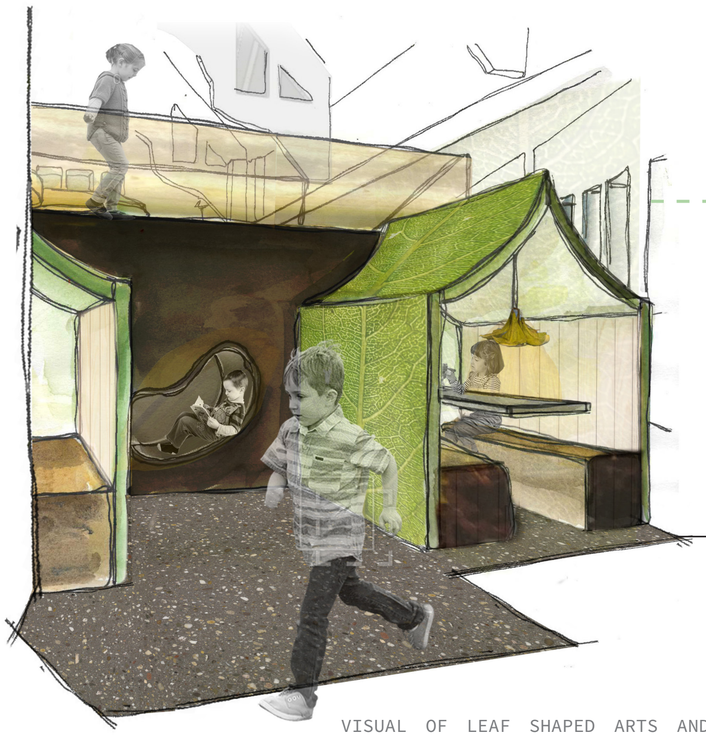
5. Sunflowers absorb NO_2 by converting the harmful toxins into amino acids helping them to grow, whilst cleaning the air we breathe.

2033 2023

“CHILDREN NEED NATURE FOR THE HEALTHY DEVELOPMENT OF THEIR SENSES, AND THEREFORE, FOR LEARNING AND CREATIVITY”
-RICHARD LOUV

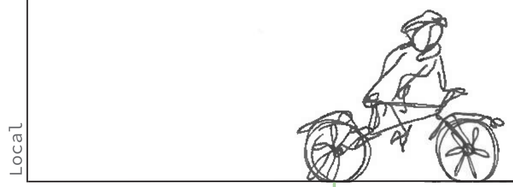
SECTION AA, NOT TO SCALE

VISUAL OF MAIN LEARNING AND CLIMBING AREA



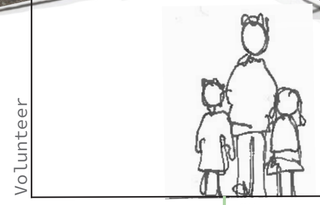
VISUAL OF LEAF SHAPED ARTS AND CRAFT BOOTHS AND SEED READING CUBS

USER PROFILES



Darren, Age 28:

“My names Darren, I commute on my bike from Hardy to Groton for work every day, passing through Levenshulme on the Fallowfield loop. I’m fit and all, but after a long shift at the office I’d like to be able to grab a drink on the way home without locking everything up.”



Winston, Age 68:

“My name is Winston, I have recently retired and have two grandchildren who live and go to school in Levenshulme. Katy, the eldest loves to run around but has recently developed asthma, so struggles with it. I have since joined the ‘Levy Clean Air Society’ as she is not the only one at her school who has been struggling with their breathing. I now volunteer at the sunflower centre to help as much as I can to prevent others from developing it.”

Jamie, Age 6:

“Hi, my name’s Jamie, we go to the sunflower Centre every Thursday after lunch and I love climbing through the tubes . We don’t have much room to play in the flat and mum gets angry when I make dens in the Sofa. This week we drew faces on pots where we put our seeds, and the teacher said that next week it will have hair!”

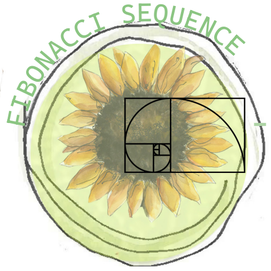
Suzy, Age 8:

“My Names Suzy, I have just turned 8 and me and my mummy live in a small flat. The parks are fun, but a lot of my friends at school get to grow pretty flowers and strawberries, but we don’t have a garden. I like to go to the sunflower centre with my friends so we can do it together.”

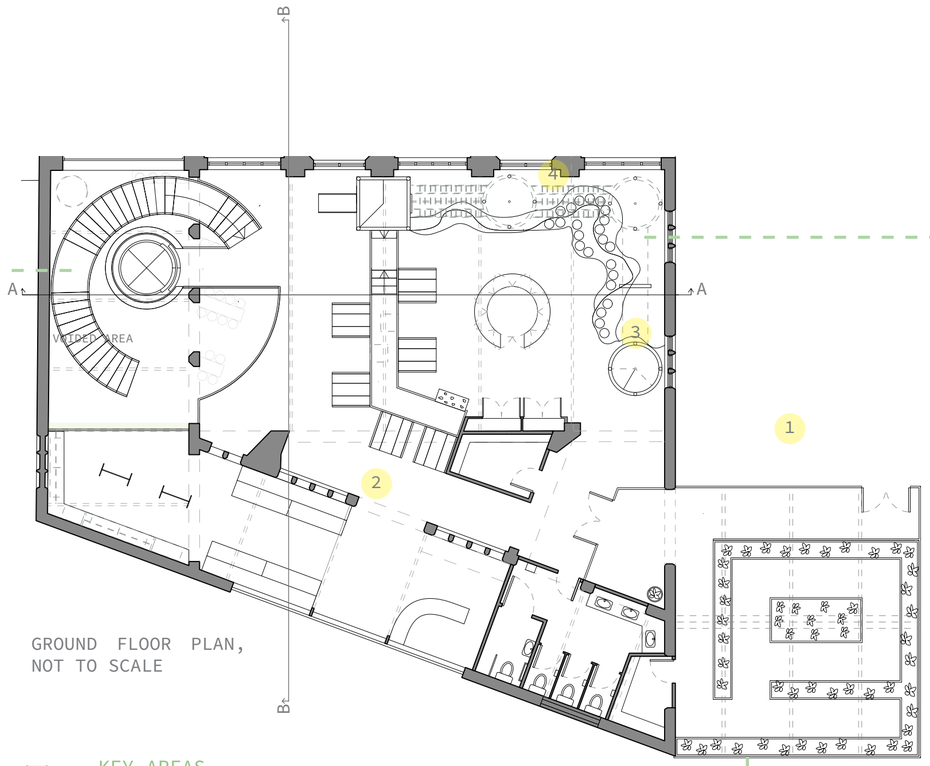
DISSECTING THE SUNFLOWER

The features, textures and colours of the sunflower have informed the structures and materiality of the centre.

FIBONACCI SEQUENCE

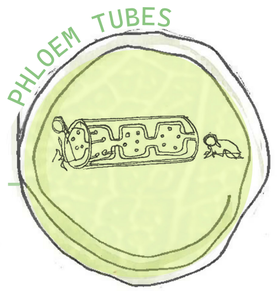


A sunflower has a natural FIBONACCI SEQUENCE within its disk flowers which has been used to circulate the stairs as a key spiral motif.



GROUND FLOOR PLAN, NOT TO SCALE

PHLOEM TUBES



The tubes in the play structures match that of the PHLOEM TUBE, a key method of transport for food and water for the sunflower.

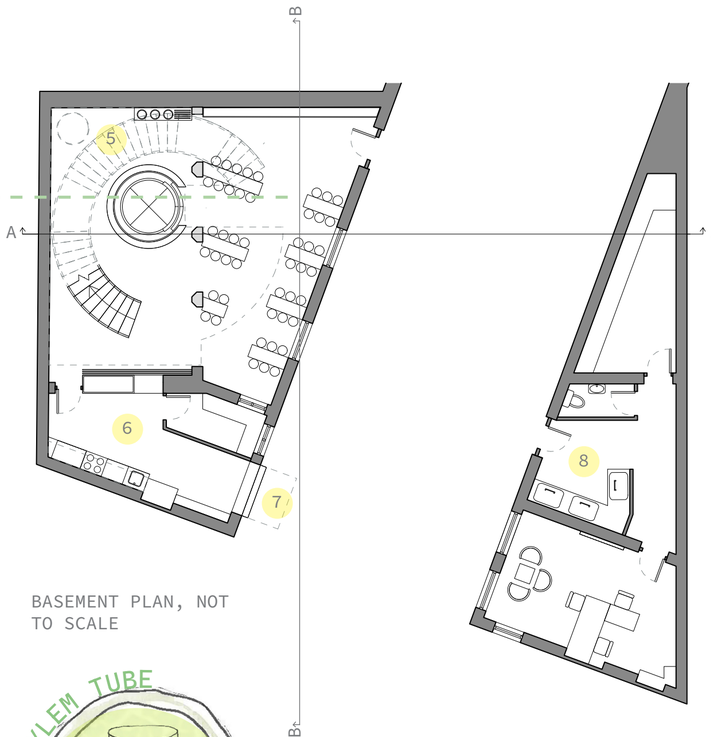
KEY AREAS

1- GREEN HOUSE
2- SHOP (selling plants grown, garden tools and climafibre gear)
3- PLANT VESSEL CLIMBING STRUCTURE
4- TEACHING PLATFORMS
5-JOURNEY OF A SUNFLOWER INSTALLATION (seeds, leafs, petals then flowers)
6- FOOD COUNTER/ KITCHEN
7- TAKE AWAY CAFE
8- SUNFLOWER COLLECTION FOR CLIMAFIBRE

A high percentage of residents in Levenshulme don't have a garden, so this GREEN HOUSE gives the opportunity for them to grow fruit and other veg, either to keep, be sold in the shop, or be used to cook the meals in the respiration station.

MITOCHONDRIA

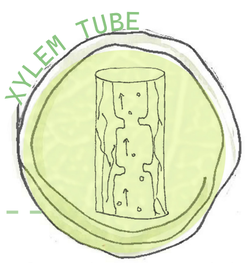
As the MITOCHONDRIA is the power house of the cell, where energy is made, the children's eating area is called the respiration station, and mirrors the shape of the organelle.



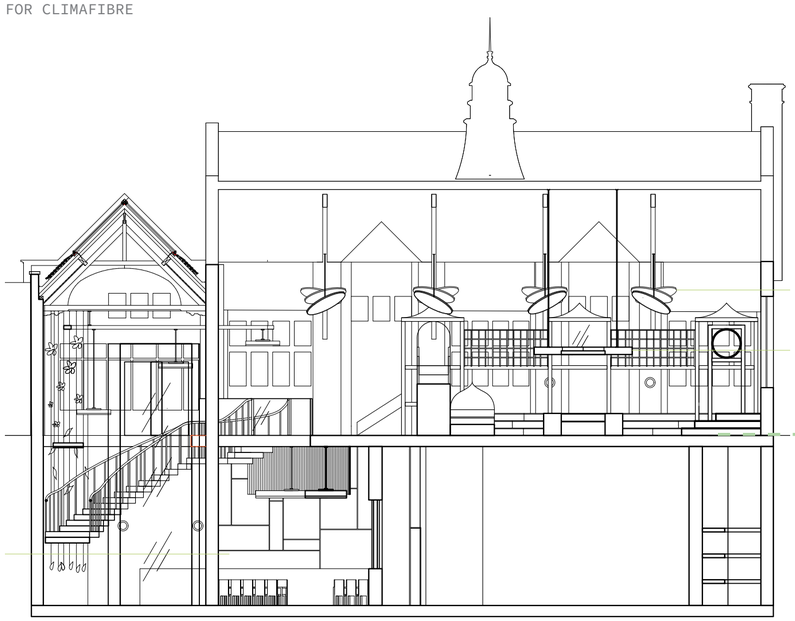
BASEMENT PLAN, NOT TO SCALE

SECTION BB, NOT TO SCALE

XYLEM TUBE

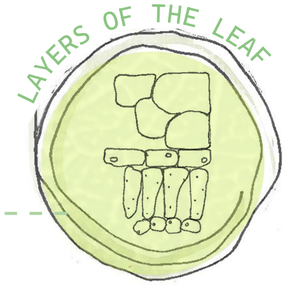


Xylem tubes are used by plants to TRANSPORT WATER up the plant, so the lift has been designed to mirror this mode of transport; a circular glass lift with a green opaque film to match the cross-sectional cut



SECTION AA, NOT TO SCALE

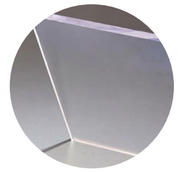
LAYERS OF THE LEAF



The textures of the staged seating match that of the internal layers of the leaf seen in a cross-section. The three different levels represent the WAXY-CUTICLE, the EPIDERMIS and the SPONGY MESOPHYLL, made with a different finish accordingly.

VISUAL OF RESPIRATION STATION ON BASEMENT PLAN

The journey down the stairs/lift is an immersive experience as if you are a part of the sunflower.



SODA LIME GLASS- ABSORBS NO_2, CO_2 AND WATER VAPOUR
Can be recycled, versatile and has a greenish tinge

MOSS WALL- PURIFIES AIR AT THE SAME RATE AS 275 TREES
Contain certain bacteria that convert inorganic pollutants into biomass

NATURAL OAK ACOUSTIC SLAT WALL PANEL- SULCADO
Helps sound proof, eliminating reverberation and echo in larger rooms

CARBI CRETE-
CARBON ABSORBING CONCRETE
3KG of CO removed per CMU

NATURAL DANDILION RUBBER- DEVELOPING MATERIAL
Less chemicals, micro-plastics and CO_2 emissions