



Knowledge Exchange Seminar Series (KESS)

...is a forum that encourages debate on a wide range of research findings, with the overall aim of promoting evidence-informed policy and law-making within Northern Ireland



Beach Clean 2.0

A transdisciplinary, civic approach to tackling marine plastic pollution in Northern Ireland

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Prof Justin Magee, Ulster University &
Dr Bronagh Millar, Queen's University Belfast

27 May 2026



Funding Ref: AH/Y003780/1



THE GLASGOW SCHOOL OF ARTS

ual: university of the arts london



ISSUE

Dr
Susann
Power:
Ulster
University



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UNIVERSITY
BELFAST



The Open
University
Ireland



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A WICKED PROBLEM

*500 pieces of litter for each
100m stretch beach (KNIB 2026)*

- "No 'solution'. wicked problems are never solved. At best they are only re-solved, over and over again." (Rittel & Webber 1973, p. 160)
- Design-thinking means "... learning from experience, and across disciplinary boundaries, the skills needed to facilitate bottom up, locally oriented, place-centric, collaborative solutions to wicked problems." (Crowley and Head 2017)
- Only transdisciplinary research can provide pathways to alternative knowledge that may aid in finding resolutions to wicked problems (Brennan and Rondón-Sulbarán 2019)
 - "Positive Design' (Desmet & Pohlmeier 2013)
 - "Enviro-Leisure Activism" (Power 2022)
 - Diversion from landfill and polymer processing (O'Rourke et al. 2024)

BACKGROUND RESEARCH

- Activism: showing behaviours which are conducive to a cause, environmental or otherwise (McGregor 2016)
- Casual volunteering: driven by a motive of self-interest rather than altruism (Elkington and Stebbins 2014)
- Serious leisure: “is the systematic pursuit of an amateur, hobbyist or volunteering activity sufficiently substantial, interesting and fulfilling for the participant to find a (leisure) career there.”(Elkington and Stebbins 2014, p. 4)
- “Environmental ethics is subsequently concerned with redefining the human position towards nature.” (Holden 2003, p. 97)

Beaches 1

Beach Clean Locations

- 1 Smeel Mill Bay
- 2 Swinney Bay
- 3 Ballyhonic Beach
- 4 Helen's Bay Beach
- 5 Whitehouse Lagoon
- 6 Cranfordburn Beach
- 7 Hollywood Sea Park
- 8 Ballyharbert Beach
- 9 Mullagh Beach
- 10 Donaghadee Harbour
- 11 Hollywood Sea Park
- 12 Millisle Beach
- 13 Ballyvaughan Harbour
- 14 Croonspot Beach
- 15 Millisle Beach
- 16 Hollywood Sea Park
- 17 Ardglass Cove
- 18 Ballyvaughan Beach
- 19 Ballyhonic Beach
- 20 Carrislee

Beach Clean Up Locations May 2018 - March 2019



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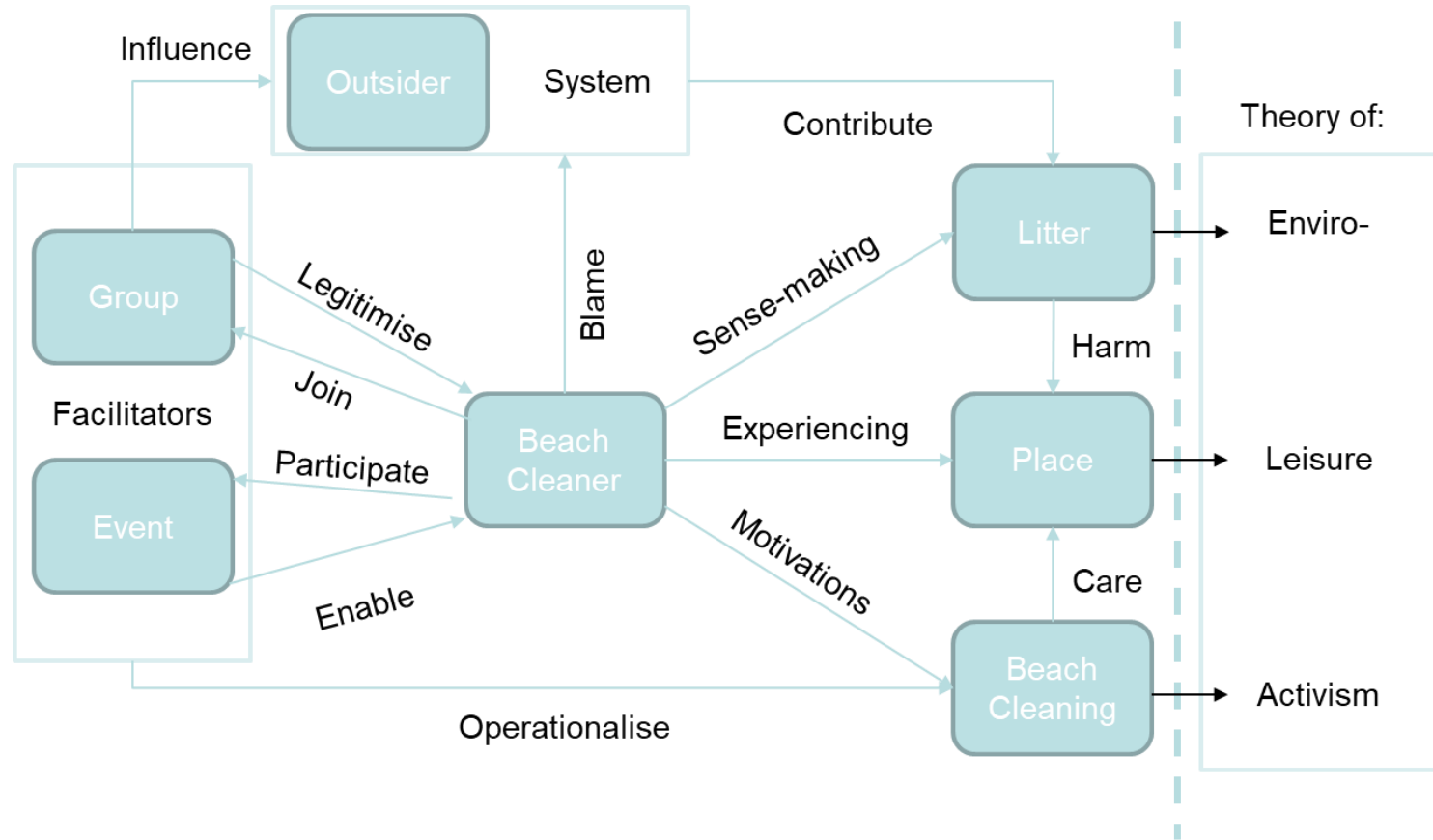


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ENVIRO-LEISURE-ACTIVISM



FROM ENVIRO-LEISURE ACTIVISM TO BEACH CLEAN 2.0



Q1: Could we develop a user-friendly method to sort and separate types at the beach?

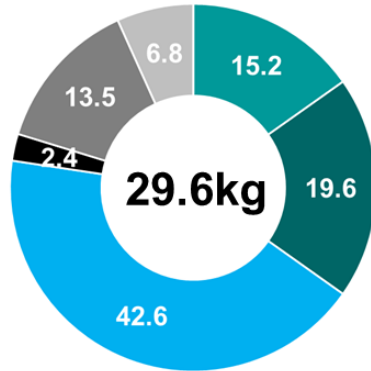
Q2: Could we develop items of use from marine plastic pollution?

Q3: Could we scale this method of plastic harvesting successfully across Northern Ireland and other regions?

1. NI Science Fest. 2024

28 people x 1hr

- Braided Rope
- Twine
- Mixed Rigids
- Strapping Tape
- Mixed Fishing
- Residue



9

Beach Cleans

264

Beach Cleaner hours

212

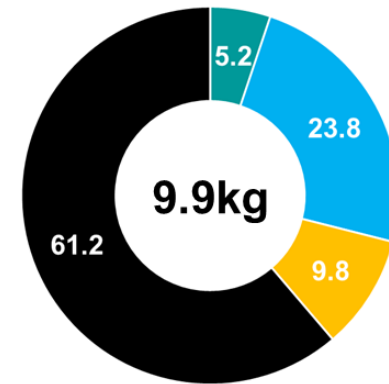
Kg harvested

86+

Kg plastics

2. Rathlin Sound Fest. 2024

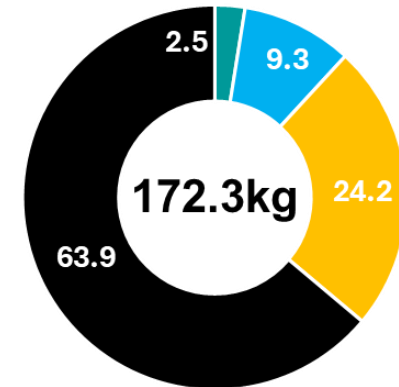
22 people x 2hrs



3. International Coastal Clean 2024

96 people x 2hrs

- Braided Rope
- Twine
- Plastic Rigids
- Everything Else



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DESIGN

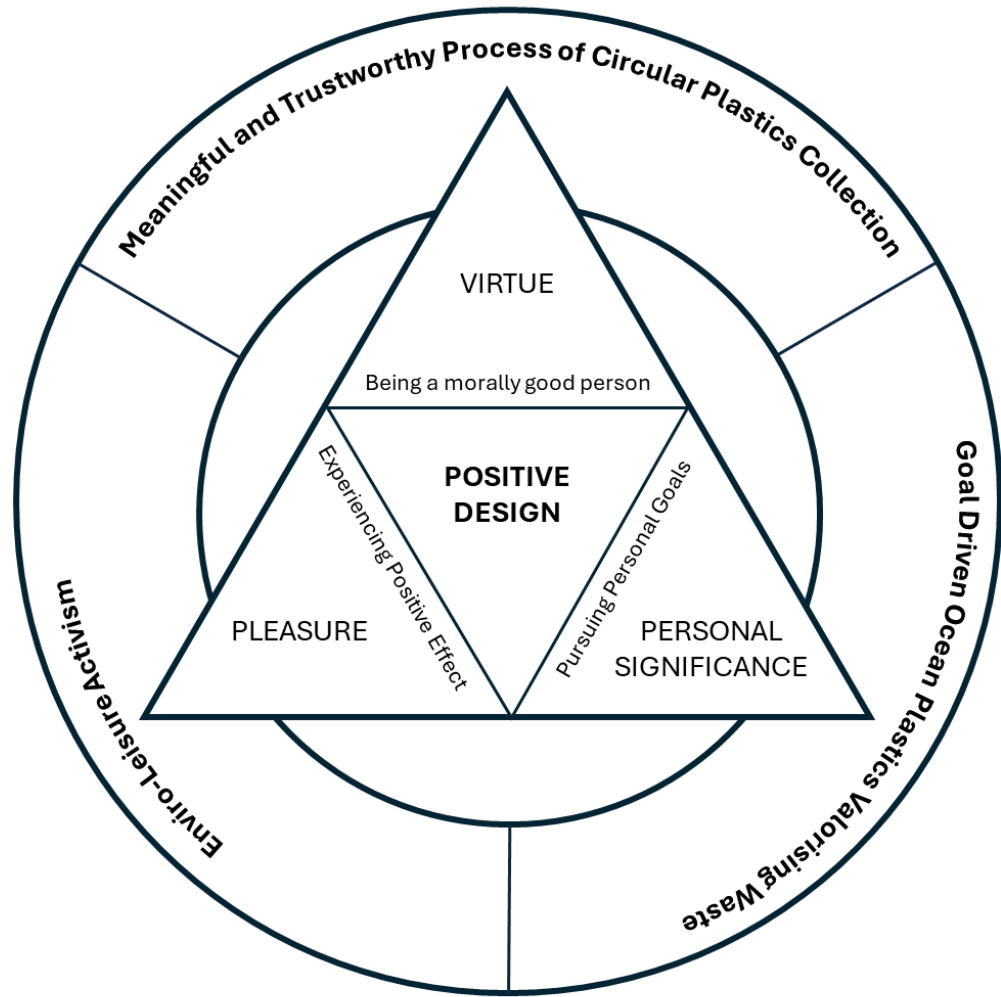
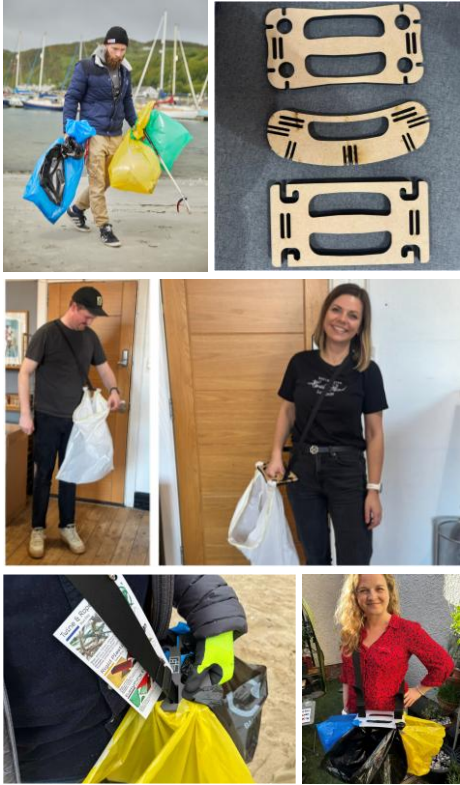
Beach Clean 2.0
Bag Holder

Beach Clean 2.0
Printed Guide

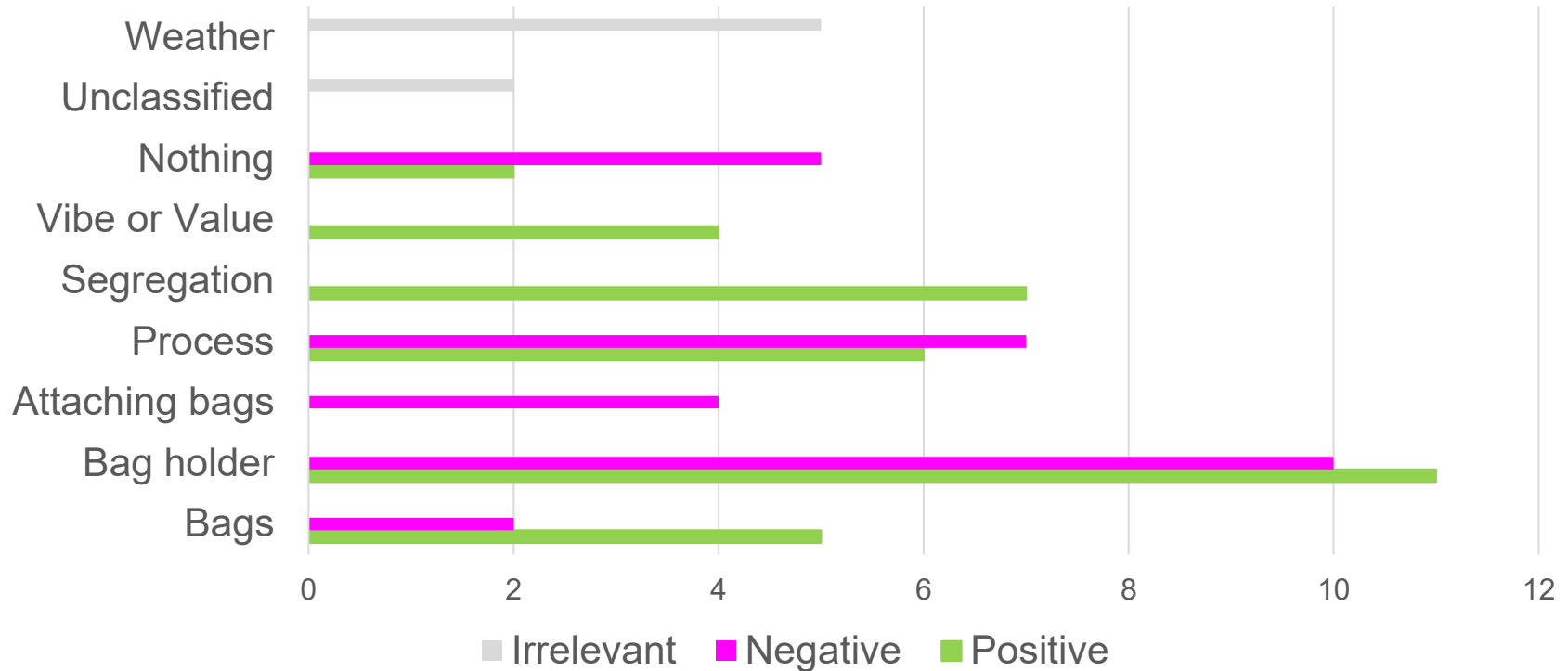


Prof
Justin
Magee:
Ulster
University

POSITIVE DESIGN

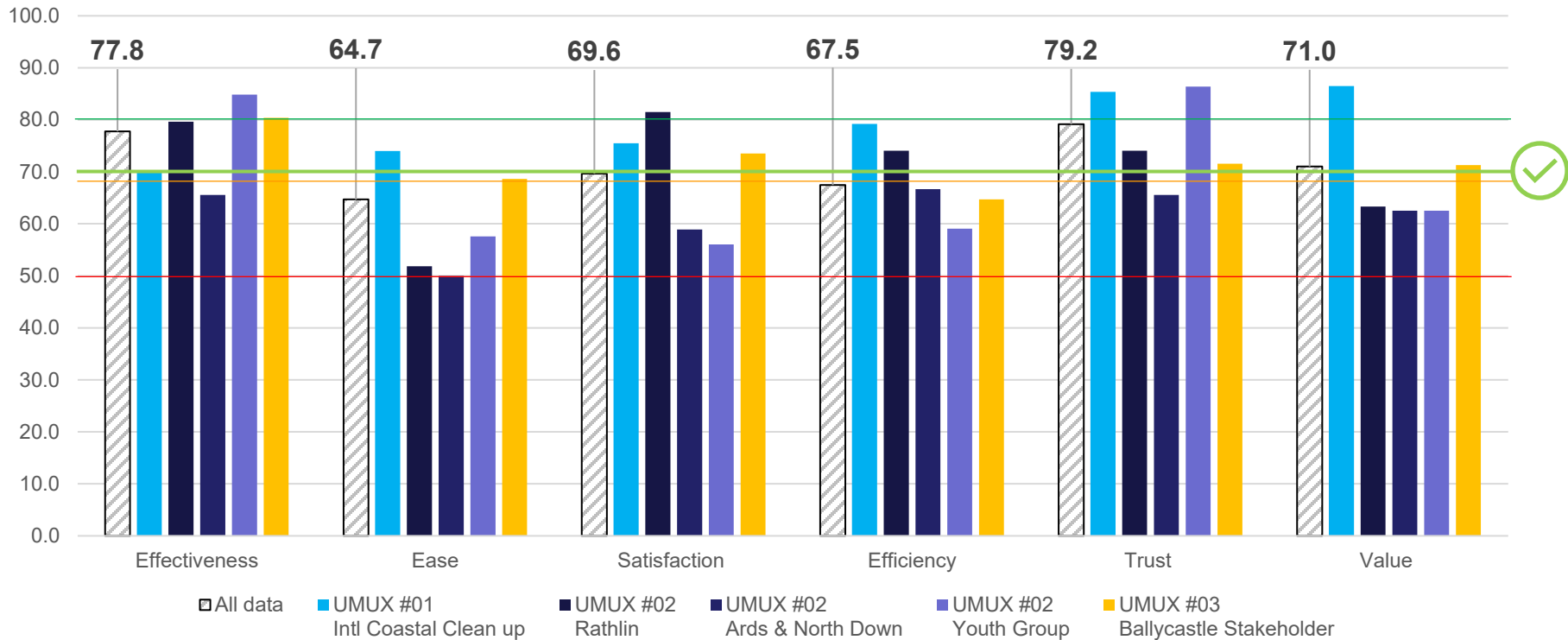


TESTING – FEEDBACK CATEGORIES: UMUX #02



TESTING - UMUX #01 #02 #03 ANALYSIS

>80 = Excellent
 >70 = Good / Easy to use / suitable
 68 = Average
 50-70 = Moderate / Works OK
 >50 = Poor



TESTING - UMUX #02: REFLECTIONS

Issues

- Some felt attaching the bags was difficult
- Some felt securing the bags was difficult
- Some felt the bag holder needed clips
- Some didn't know to adjust the strap
- Some felt the strap was uncomfortable
- A way to keep litter from escaping the bags
- Introduce a sieve to filter small parts of plastic
- Attach instructions to bag holder
- Add a coffee cup holder
- 5/210 individual scores did not match comments

Actions

- Smaller holder design
- Rubber bung to secure bags
- Adjustable strap
- Consider padding
- No actions taken
- Possible human error – generally good compliance

PROCESSING

ADVANCED
MANUFACTURING
INNOVATION
CENTRE

Dr
Bronagh
Millar:
Queen's
University
Belfast



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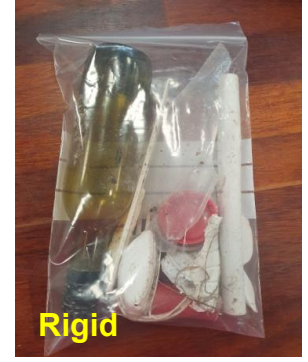


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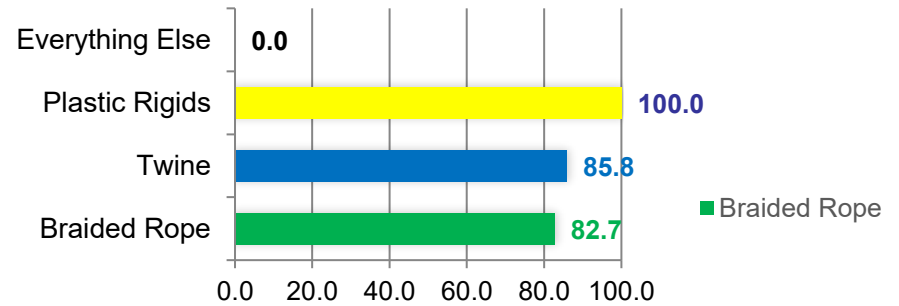


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MATERIAL INSIGHTS



BEACH CLEAN ANALYSIS COMPLIANCE %



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3D PRINT POTENTIAL



MARVELOUS MOULDING

Compliance, cleaning & chipping

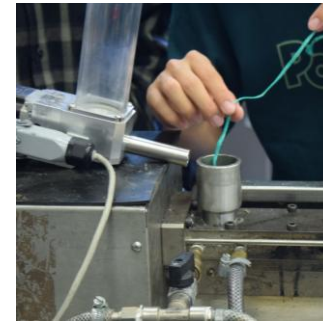
- Removal of any non plastic entity
- Manual process which can be automated at scale
- Large bath washing
- Chipping into flakes

Tooling:

- Design of tools
- Tool making

Compression Moulding

- Successfully moulded blended materials
- Material quality – enoughness
- Low cost – suitable for cottage industry applications (e.g. craft)
- Potential for public art or statement products (eco messaging)



INDUSTRY DEMONSTRATOR

Material Granulation and Preparation:

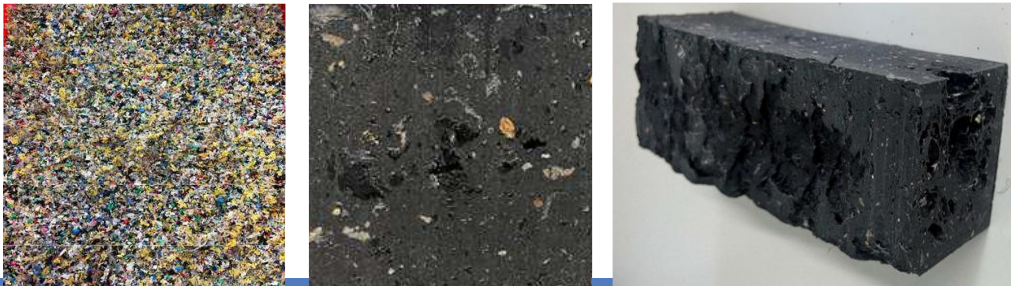
- Batch 1: PE base material (known chemistry)
- Beach Plastics (Sample #7 – blended mix)

Mixing:

- Experimentation led to a 60:40 mix of PE and Sample #7

Extrusion

- Successfully extruded material
- Unreactive – no hazardous threats
- Melting point – undetermined due to variable blend
- Identified PP, PE, PVC and PET and unidentified polymers



CHALLENGES & POLICY NEEDS

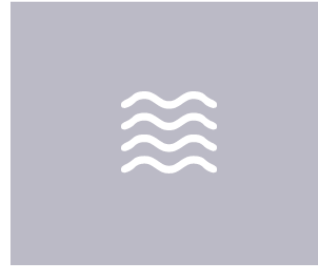
Beach Clean 2.0 Model From Waste, To Resource



System



Awareness



Beach Cleans



Treatment



Re-purpose

1: Plastic Waste Journey Gap

2: Industry Readiness

3: Community Empowerment

CALL TO ACTION: JOIN OUR TASK AND FINISH GROUP

