



THE LONDON SCHOOL
OF ECONOMICS AND
POLITICAL SCIENCE



Flood
Resilience
Alliance

Community Strengths and Entry Points for Building Flood Resilience in Lowestoft, United Kingdom



Insights from the Flood Resilience Measurement for Communities in Lowestoft conducted by London School of Economics, East Suffolk Council and Zurich Alliance

August 2021

In partnership with:



Executive Summary

This study aims to provide insights for local decision-makers on the challenges and weaknesses of flood resilience in Lowestoft. The Flood Resilience Measurement for Communities (FRMC) tool, developed and tested by Zurich Flood Resilience Alliance, has been implemented in collaboration with East Suffolk Council and Groundwork to provide evidence for this study.

Results of the FRMC implementation show that out of 44 sources of resilience,

- 6 sources have grade A which represents “best practice for managing the risk”,
- 17 sources have grade B which represents “good standard and no need for immediate improvement”,
- 13 sources are graded C which means “deficiencies and room for visible improvements”, and
- 8 sources are graded D representing “significantly below good standard, potential for significant loss”.

These sources have been evaluated and graded based on the data collected during the FRMC implementation, which includes primary and secondary data collected through household survey, key informant interviews, and stakeholder workshops, as well as secondary data and information and knowledge provided by local stakeholders during the FRMC process. Data collection phase has been done from November 2019 until October 2020, followed by two virtual grading workshops in March and April 2021.

The assessment is underpinned by the 5 capitals approach (i.e., financial, natural, physical, social, and human capitals) that consider various drives of resilience. There are several observations for each of the capitals:

- *Financial*: our analysis indicates need for further action to increase financial supports for ‘household asset recovery’, ‘business continuity’, and ‘community disaster fund’.
- *Human*: community awareness and knowledge of flood risks and flood risk management actions appear low.
- *Physical*: further efforts to increase ‘household flood protection’ and ‘large scale flood protection’, and ‘transportation interruption’ are the weakest areas in physical capital.
- *Social*: lack of community participation in flood related activities and lack of disaster risk management plans developed for and communicated with communities are the most challenging areas in social capital.
- *Natural*: protection and preservation of existing natural environment is in a good condition due to the national level policies and investments. However, applying nature-based solutions for flood risk management appears weak or inadequate in Lowestoft.

Through stakeholder mind mapping we also explored the relationships of the different capitals/indicators which allows us to highlight entry points for future resilience interventions. Examples are:

Risk communication and community participation: improving community participation in flood related activities as well as communicating the existing Disaster/Flood Risk Management plans with the community can play an important role in improving some of weak human indicators, i.e., ‘asset protection knowledge’, ‘evacuation and safety knowledge’, ‘first aid knowledge’, and ‘water and sanitation knowledge’ (see figure 1). It has turned out that one of the ways through which community participation can be increased is a collaboration between the local leadership and community representative bodies. Our analysis indicates that there is a good level of trust on the local authority and their skills and abilities in managing flood risks. There are also a few functioning community representative bodies in Lowestoft (e.g., from schools, churches, mosques, business community, etc.) who are not currently involved in flood related activities. Involving such community leaders in flood-related campaigns, trainings, and planning can encourage further community participation, and therefore, enhance knowledge and awareness.

Risk reduction investment on households and business resilience: although risk reduction investment is graded C in this study, recent government’s flood risk management grant allocated to ESC has provided new opportunities for enhancing risk reduction activities. A large part of this funding has been allocated for improving large scale flood protection (which is also graded C in this study). The remaining part of this financial source is recommended to be spent for improving households’ and businesses’ financial capacities in Lowestoft, i.e., ‘household asset recovery’, ‘household flood protection’, ‘business continuity’, and ‘community disaster fund’. Results of this study show that there is a good level of awareness on increasing flood risks and the need for improving finance mechanisms in Lowestoft which can be leveraged for introducing a resilience finance scheme that includes individual households and businesses.

The results of the study can help local stakeholders to better understand the strengths and weaknesses of flood resilience in Lowestoft and identify actions to increase resilience. However, the design and implementation of any actions depends upon the ongoing plans and projects, and capacities of the local authority, e.g., available funding, available expertise, and local stakeholder priorities.

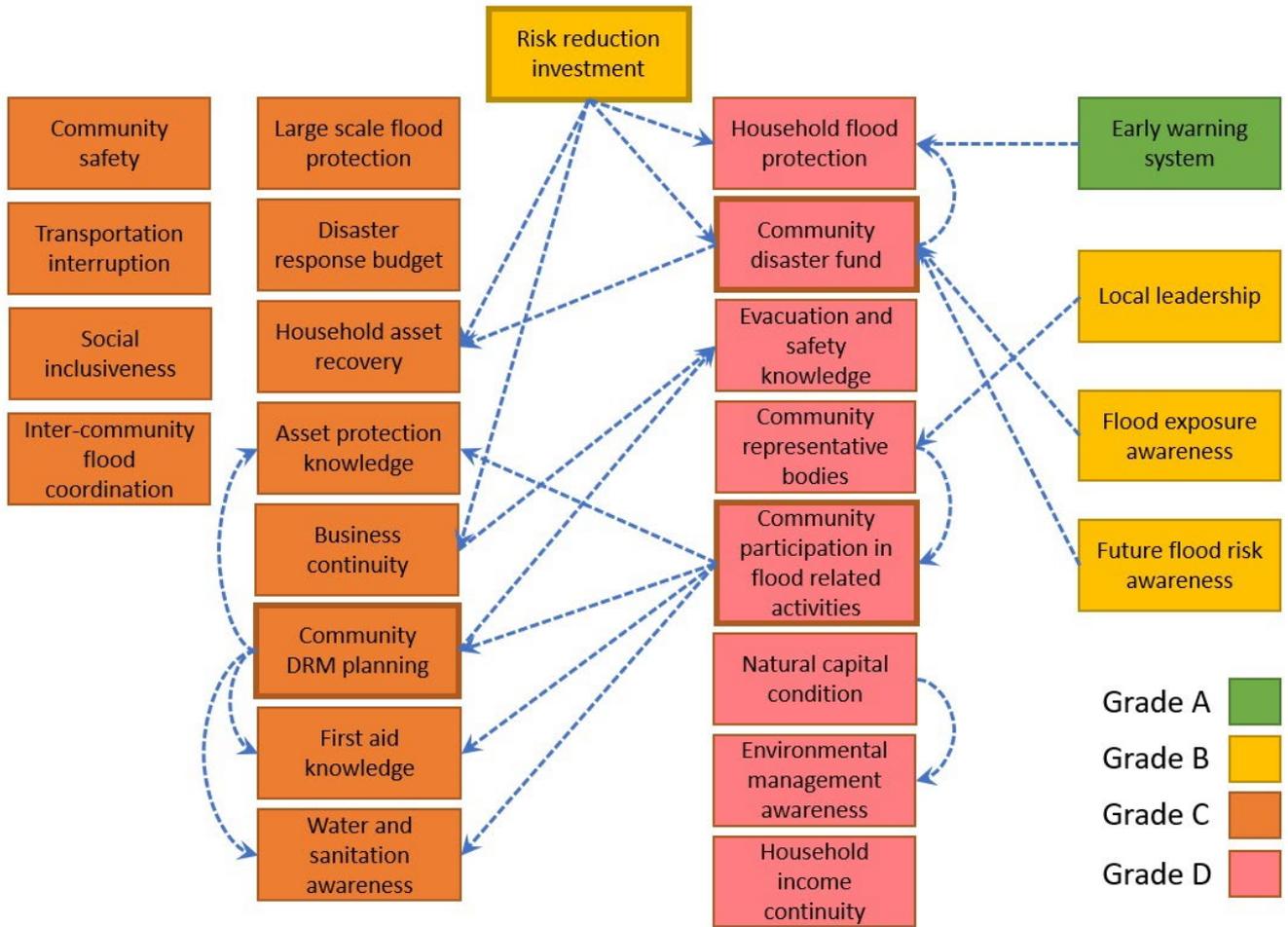


Figure 1. relationships among different sources of resilience drawn from the mind mapping results implemented in Lowestoft.

Introduction to the Community

- Location: east coast of England
- Population: 71000
- Flood risks: tidal, pluvial, and fluvial
- Poverty rate: 19% of population are living below the poverty line and Lowestoft is currently among the 10 most deprived areas in England.
- History of community: developed around the port, Lowestoft is the UK's most easterly town. It has recently become a nationally significant offshore energy hub, which is supposed to support an economic regeneration in Lowestoft.
- FRM plans: Despite the high risk of storm surge and increasing vulnerable areas to tidal flooding, Lowestoft has no formal flood defences. £43 million of the government funding has been allocated to Lowestoft, in July 2020, for building tidal flood walls and barriers which is going to be materialized over the next couple of years.

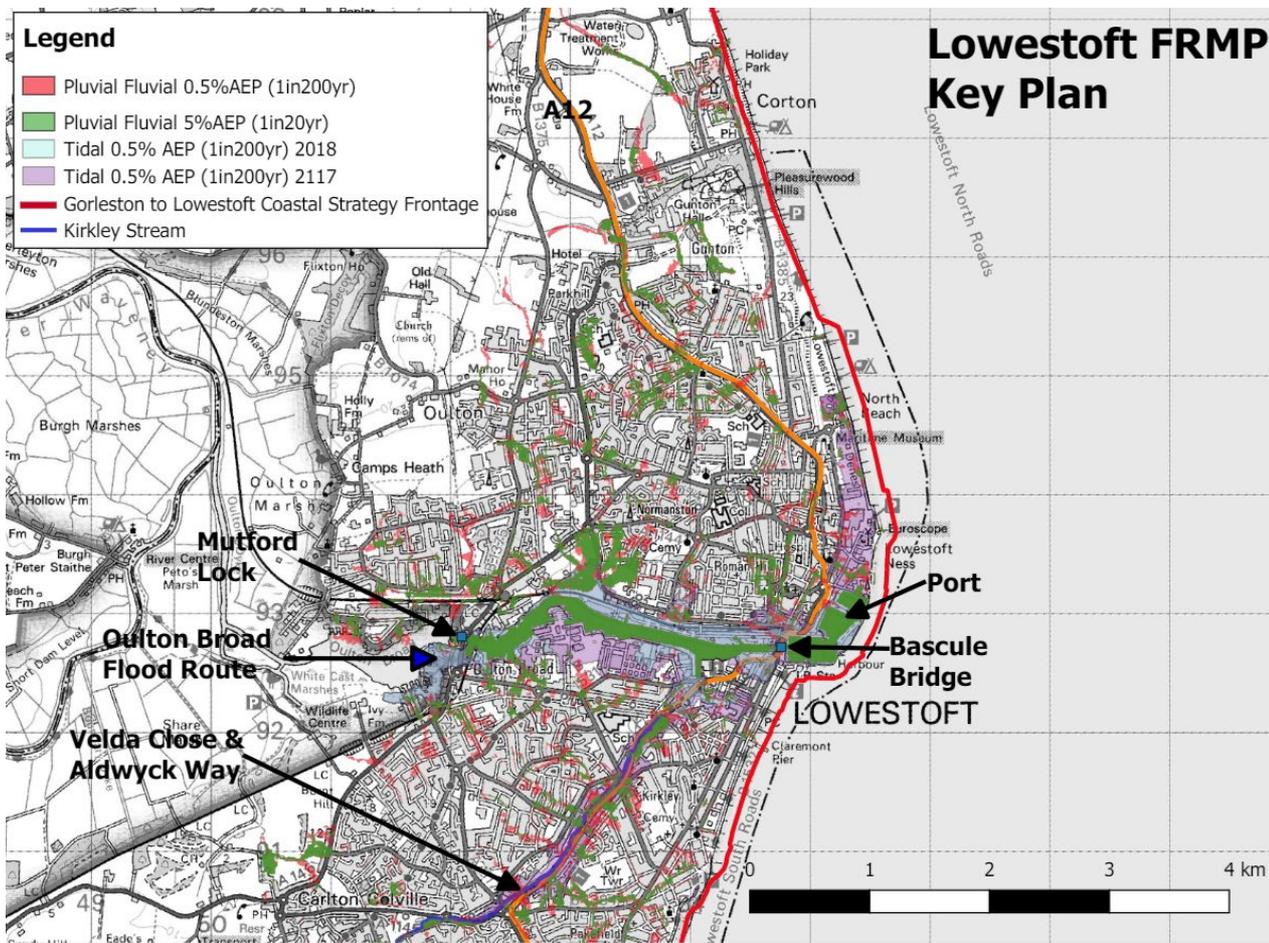


Figure 1 Map of Lowestoft flood risk areas including tidal (current and future), pluvial and fluvial risks.

Measuring community flood resilience in Lowestoft

FRMC process

Flood Resilience Measurement for Communities (FRMC) is a tested approach used to assess and strengthen communities' pre-event flood resilience. It helps to define and measure resilience based on five capitals (i.e., social, human, natural, financial, and physical capitals) and 44 indicators for sources of resilience. These sources of resilience such as 'disaster response budget', 'community flood risk management plan', 'property-level protection measures', 'future flood risk awareness', 'community safety', 'early warning system', and 'evacuation and safety knowledge' help the community to be better prepared for the impact of floods and to manage them more effectively. The FRMC approach has now been implemented across the globe in more than 150 communities in 15 countries. Every FRMC implementation follows the same framework and methodology:

A project team first assesses the various sources of resilience in the community by collecting information related to each source via household survey, key informant interviews, stakeholder workshops, as well as secondary data. Data collection and analysis in FRMC are supported by a web-based tool and an app for mobile devices that allow for smooth and seamless data collection and analysis. The project team then analyzes the sources of resilience and identifies the strengths and weaknesses as well as any interconnections and dependencies in the data. These multidimensional insights can help the community to identify and implement innovative interventions that build resilience.

The FRMC implementation provides a baseline against which resilience sources can be tracked: is resilience increasing, decreasing and if so why and what can be done about it? Conducting FRMC studies helps track the quality of resilience sources over time showing any improvement and providing a measure of the impact of the work being done. The FRMC approach is process-driven and so is scalable and allow for the team to select and manage the projects more effectively. The rigorous analysis uncovers the real issues in the community promoting the use of innovative options and help the team to move away from off-the-shelf solutions. The participatory approach used also ensure that different perspectives and interests of stakeholders in the community are being heard and included in the process of decision-making.

FRMC implementation in Lowestoft

FRMC data collection in Lowestoft started in November 2019 and finished in October 2020 (with some delays due to Covid-restrictions). Required information was gathered through:

1. one workshop with three focus group discussions across community, businesses, and flood risk management representatives,
2. seven key informant interviews with representatives from the ESC, Lowestoft Rising, Lowestoft Vision, Business sector, and Church of Lowestoft, and

3. a household survey—number of responses: 108 household, rate of responses: 7%.

The 44 sources of indicators were finally graded in two grading workshops. The first and second grading workshop involved 9 and 8 local experts, respectively. During the grading workshops, local experts reviewed the qualitative and quantitative data points collected through the methods above, compared the situation of each indicator with the definitions of A, B, C, and D for that source, and selected a grade which would represent the best where that indicator stands in terms of the scale. A short explanation as to why that grade was selected was added into the tool.

- Workshop planning, preparation, and implementation: October and November 2020
- Individual interviews planning, preparation, and implementation: January and February 2020
- Household survey planning, preparation, and implementation (including the shift from the door 2 door to the phone/online survey): March – September 2020
- Collecting data for remained question via using secondary data (previous reports and census results) or emailing to relevant stakeholders: October and November 2020
- First grading workshop: 9th March 2021
- Second grading workshop: 12th March 2021 continued with an online survey due to technical issues.

Community Strengths¹

Among the 44 sources of resilience analyzed, **6 received A** meaning they are considered to be sufficient/appropriate in terms of quantity and quality and there is no need for immediate or significant policy changes to improve these sources. In the FRMC they are labelled as “**best practices for managing the risk**”. These 6 sources are:

1. Flood emergency infrastructure
2. Flood healthcare access
3. Early Warning Systems (EWS)
4. National forecasting policy & plan
5. Natural habitat restoration
6. Natural resource conservation

In addition, **17 sources are graded B which represents “good standard and no need for immediate improvement”**—although they still have a room for improvement to become A. These sources are mainly about the awareness of community on flood risks and governance of risks, and post-flood services such as access to safe water, energy, food, communication, and transportation means, and continuity of education. These 17 sources are:

1. Conservation budget
2. Flood exposure awareness
3. Governance awareness
4. Education commitment during floods
5. Future flood risk awareness
6. Priority managed units
7. Priority natural units
8. Communication interruption
9. Flood emergency food supply
10. Provision of education
11. Flood safe water
12. Flood waste contamination
13. Flood energy supply
14. External flood response and recovery services
15. Local leadership
16. Integrated flood management planning
17. Community structures for mutual assistance

Note: details and rational of the grades for each indicator can be seen in supplementary A.

¹ As studies of the high and low risk areas showed very similar results, here we present the results of the entire Lowesoft. For detailed results and see supplementary materials.

Entry Points for Resilience Building

8 sources² are **graded D** standing for “*Significantly below good standard, potential for significant loss*”. These 8 sources are:

1. Household flood protection

Comment: There seems to be a very low take-up of the household-level protection measures. Survey results show that 64% of households surveyed have not taken any flood protection measures in their properties, while 27% have used sandbags, 14% installed flood barriers for doors and windows or around the house, and 4% raised their ground floor level (some have taken more than one measure). This means 75% of those who have taken a property-level measure merely rely on sandbags as a protection option which is proved to be ineffective in severe flood events. In addition, 50% of those who had taken any of these measures mentioned that they were not effective in the past floods. Lack of take-up is more significant in the rented sector and poor-quality housing areas (Groundwork - in the grading workshop). So, unless there are no-cost options, there would be little take-up, particularly, from this section of the community.

2. Evacuation and safety knowledge

Comment: Although there are some evacuation and safety plans, these appear not to be specifically developed and/or communicated with communities. 73% of households surveyed mentioned they do not know where to evacuate if necessary and 30% mentioned their household does not receive direct early warning or any other warnings for flood. In addition, it has been discussed that “... due to a high rate of population turnover (with people moving in and out) many people do not have knowledge from previous floods”. It is been also discussed that “a majority of those identified as ‘vulnerable population’ do not have access to early warnings”. The evacuation and safety plans in Lowestoft could be 1) improved in a way to include all groups of community (including social, physical, and financially vulnerable communities), and 2) better and more frequently communicated with all groups of community.

3. Community participation in flood related activities

Comment: Community engagement in flood-related activities is very low. 75% of households surveyed mentioned that they have never attended any formal or informal flood related activities such as flood awareness raising campaigns or community preparedness training. This may impact the 1) acceptance level and contribution of public to the implementation of new projects, and 2) perception of flood risk and preparation for future flood event among the public. Further and more frequent activities aimed at raising awareness and communicating flood facts and skills could help address this. These could also be tailored and delivered in line with wider community priorities – for example jobs, recreation, health, education.

² Please note that two of these indicators (i.e., 7&8) are graded D but either are not relevant for the context of Lowestoft or improvement of them relies on improving other indicators. Therefore, they are not mentioned in the summary as the most important indicators needing immediate action.

4. Community representative bodies

Comment: There is no formal or informal flood focused community-body in Lowestoft. However, there are some community organization (e.g., from church, mosques, schools, etc.) which can play a role in raising awareness and help facilitate flood-related activities. None of these organization are currently focused or involved in flood-related activities.

5. Community disaster fund

Comment: This indicator measures whether there is a dedicated budget for *community* support and emergency funding aimed at protecting incomes (i.e., supporting those who have lost their income due to impacts of floods). There is no such fund specifically for flood, but in the discussions, it was mentioned that “for the pandemic it has been provided for the first time. Therefore, there might be more awareness now for the future disastrous events”. Exploring this in terms of a wider community resilience fund could be an option.

6. Natural capital condition

Comment: There appear limited actions for natural flood risk management because Lowestoft is a highly urbanized area - there has been major intervention into the natural systems over many decades in this region which has made it a highly artificial and urbanized environment. However, it has been acknowledged that “... there might be opportunities for some micro-actions through replacing concrete with green areas, green roofs, increasing parks, etc.” Possibility of any measure of this kind or bigger project such as shoreline interventions, needs to be discussed and further explored. This may require further collaboration among the urban planning, environmental management, infrastructure, and risk management sectors.

7. Environmental management awareness

Comment: Results of survey and interview discussions show that awareness about the role and importance of environmental management in flood risk management is very low. However, this is mainly because of the limited actions taken for natural flood risk management as explained above. This was discussed during the workshop: “As we cannot offer them these options, they won't be aware of them. So, the problem is not that people are not aware of them it's about the availability of these options.” Therefore, improving the “natural capital condition” can help improving such awareness in the community.

8. Household income continuity strategy

Comment: This is graded D because the majority of respondents stated that they do not have any plan for when their income is interrupted due to flood events. However, it has been discussed during the grading workshop that this result is due to the fact that respondent's income is generally not affected/disrupted by floods in Lowestoft—neither in the past nor in the future. Therefore, people do not see a need to have a plan and discuss it with their families.

In addition, **there are 13 sources graded C indicating parts that have “deficiencies and room for visible improvements”**. These are:

1. Risk reduction investments

Comment: the stakeholder discussion concluded that “funding for risk reduction activities exist but they are 1) not available for local authorities and households directly, 2) not properly joined up, and 3) most people would not know about this budget and how to apply for.”

2. Large scale flood protection

Comment: this is grade C as it stands, “however, there are plans and programs for the implementation of the flood barrier that will protect most communities in Lowestoft. Individual property flood resilience measures will also be incorporated as part of the project for those that might still be at risk. Some **green infrastructure** can be potentially used to support flood risk which is missed in the current plans.”

3. Disaster response budget

Comment: This source measures if there is any government disaster response and recovery budget targeted at the community level that is activated in the event of a flood. It has been discussed that “Under the Bellwin Scheme the government provides emergency financial assistance to local authorities which East Suffolk accessed in 2017 to pay for the deployment of the Lowestoft Temporary Flood Barrier. The Government also provided funding in 2013 after the tidal surge, but there are strict criteria about what the fund is used for (property level flood mitigation) and how it is spread equitably”. Therefore, it exists but 1) not joint-up and the speed of action is slow, and 2) difficult to access quickly by communities.

4. Household asset recovery

Comment: This source measures whether the people in the community have financial resources to recover their assets should a flood event occur. The survey results show that 52% of households have access to flood insurance whereas others either do not have any plan or rely on their personal savings or community support. However, it has been raised in the workshop that vulnerable and poor communities in Lowestoft have no access to such financial resources who may have not been covered proportionately in the survey, and that the grading is between C and D.

5. Asset protection knowledge

Comment: This source assessed the community's knowledge of pre-emptive actions they could realistically implement which might reduce the physical vulnerability of homes and contents, business premises and productive assets to damage from flood waters. Household survey results show that 24% of households do not know what measures they can use to protect their properties and assets, and 41% do not take any measure because they believe their property do not flood. This was also confirmed in the workshop that knowledge about actions that need to be taken to protect assets is even lower among the socio-economic vulnerable communities.

6. Community disaster risk management planning

Comment: similar to the evacuation and safety plan, there is a disaster risk management plan in place (such as multi-agency plan and community flood plan) but this has not been developed in a participatory way nor has its content been communicated with the community.

7. Business continuity

Comment: "Based on the business efficiency resilience toolkit (BERT) results, a large number of small and medium businesses do not have a contingency plan. Particularly after covid many of these businesses do not have saving either. It is down to the size of businesses rather than their locations."

8. First aid knowledge

Comment: Only 48% of the households surveyed have participated in a first aid training in the last 10 years and only 35% know how to respond if someone is seriously injured. The workshop experts believed that "people do not take responsibility when someone is injured or underestimate their ability and what they have learned in trainings to do something in an emergency".

9. Water and sanitation awareness

Comment: The grading workshop participants discussed that "people often expect utility companies (or somebody else) to provide them with clean water" rather than taking precaution measure to make sure they clean drinking water.

10. Inter-community flood coordination

Comment: "Some coordination mechanisms exist through the Suffolk Resilience Forum but should be improved and target wider communities."

11. Community safety

Comment: it has been admitted that "we haven't seen any anti-social behavior during and after 2013 flood, (however) we have a high rate of homelessness in lowestoft which affect the safety during/after flood, and additionally, it is always more difficult to assist vulnerable population."

12. Transportation interruption

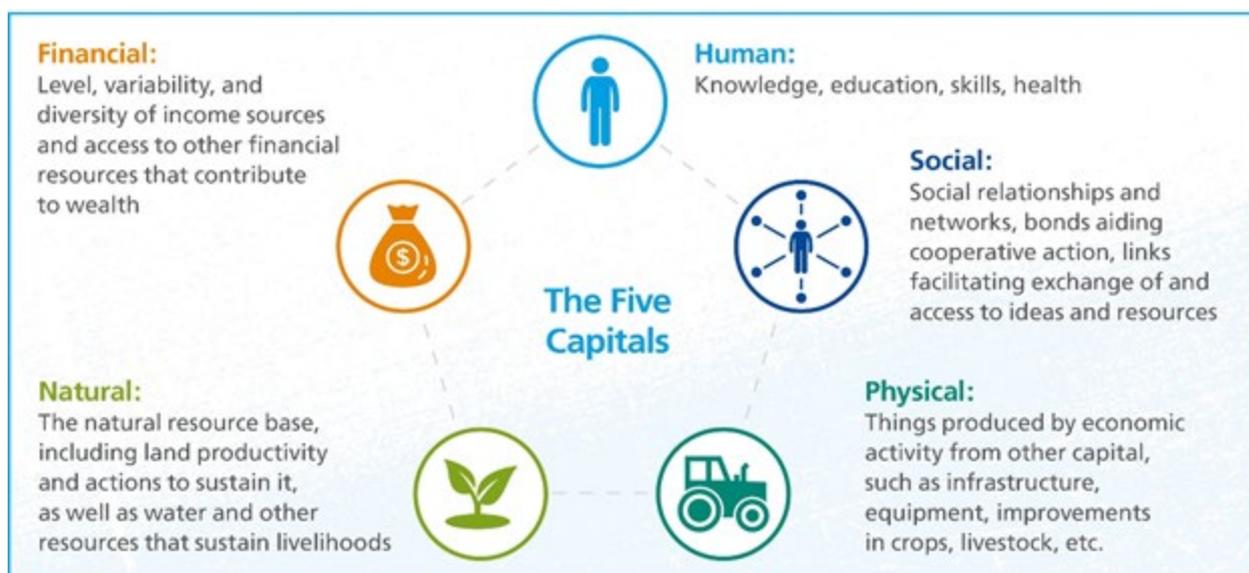
Comment: this has been graded based on the evidence from flood 2013: A12, Kessingland road, the bridge, and footpaths over the bridge were affected by flood 2013 and can be affected by future similar floods.

13. Social inclusiveness

Comment: It has been admitted that "as it is about decision-making body such as council, EA, vulnerable groups considered in their decision-making might not be high but is not zero either."

FRMC results through the lenses of the 5 capitals, disaster risk management cycle, and seven key themes.

Lens 1: five capitals

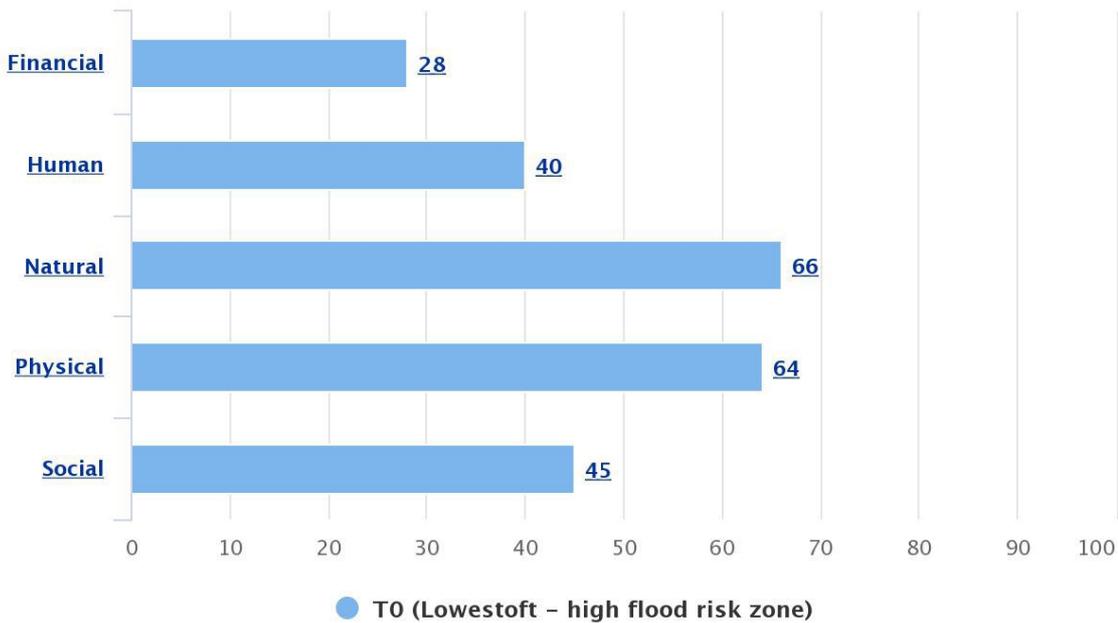


Strengths in the community are presented based on the five capitals that are measured using the FRMC framework and tool, defined as the graphic shows. Source: *Step by Step Guide to the Software and Process*, p. 14

Key observations in Lowestoft:

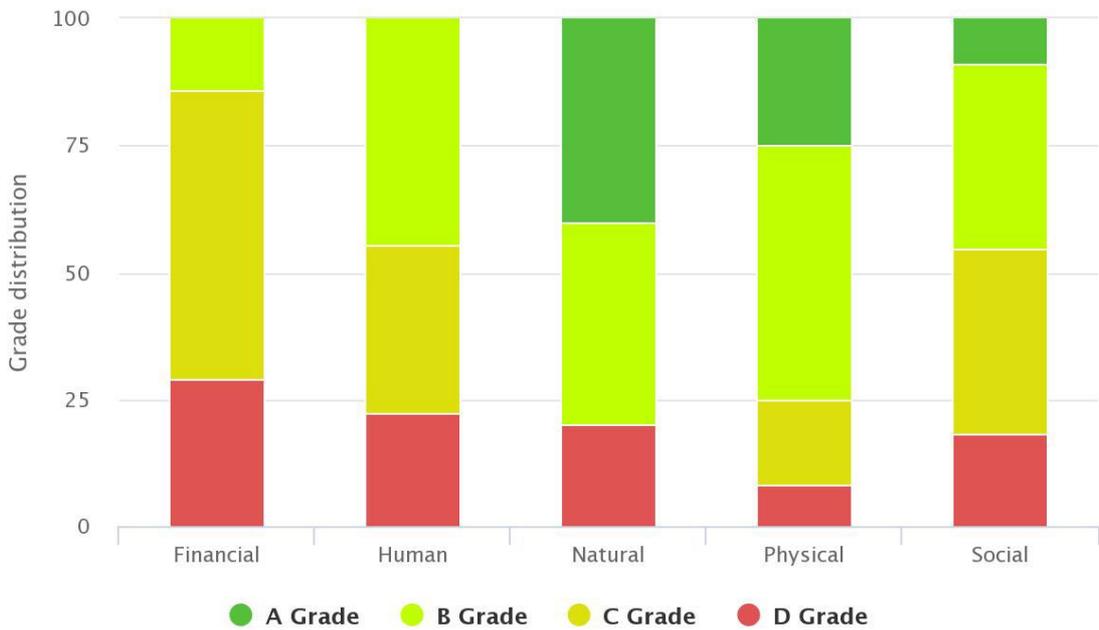
- Among the five capitals, financial capital has the lowest score followed with human and social capitals while the physical and natural capitals show the highest scores. The low score of financial capital is mainly because of the lack of:
 - Financial support for household asset recovery (e.g., available credit lines/loans or insurance),
 - Disaster response budget (i.e., government disaster response and recovery budget targeted at the community level that is activated in the event of a flood),
 - Household/individual disaster fund (i.e., emergency funding for households whose income is disrupted),
 - business continuity plan (i.e., having some sort of financial resources for recovery e.g., insurance, credit, saving, government disaster relief),
 - risk reduction investment (i.e., dedicated budget available for flood risk reduction)

Average of weighted score



Highcharts.com

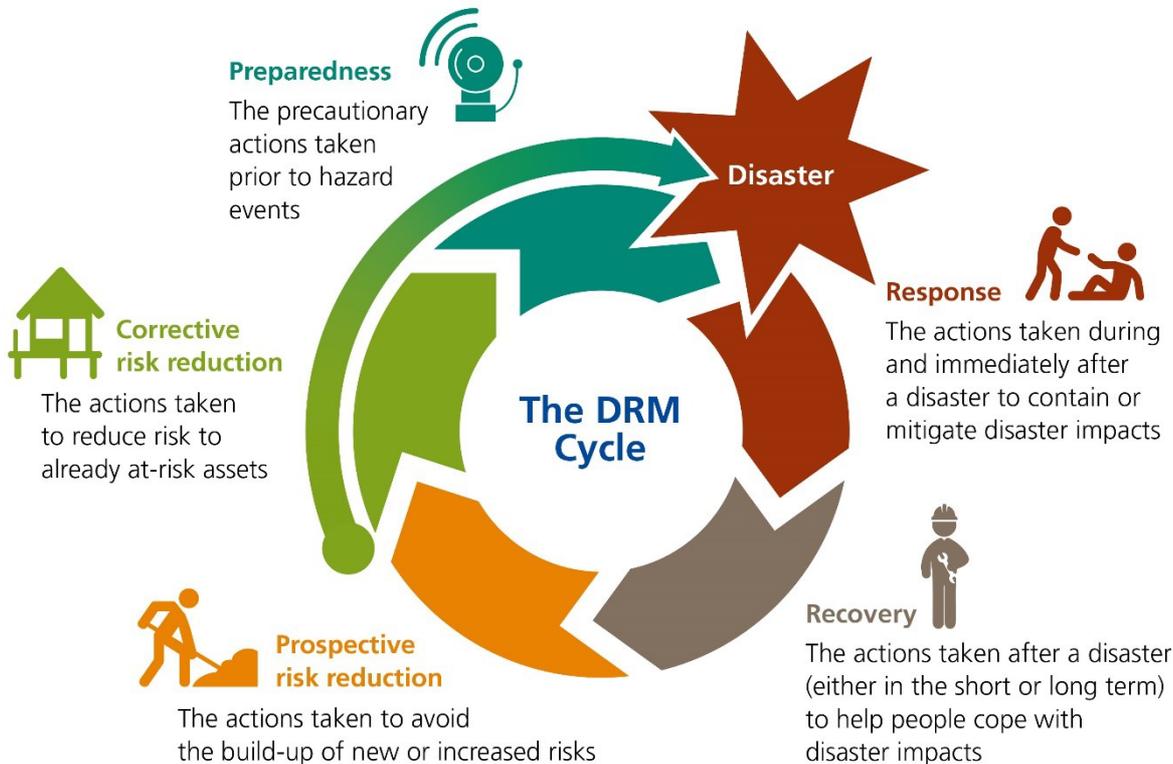
Average of Grading



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Lens 2: disaster risk management cycle

The disaster risk management cycle lens

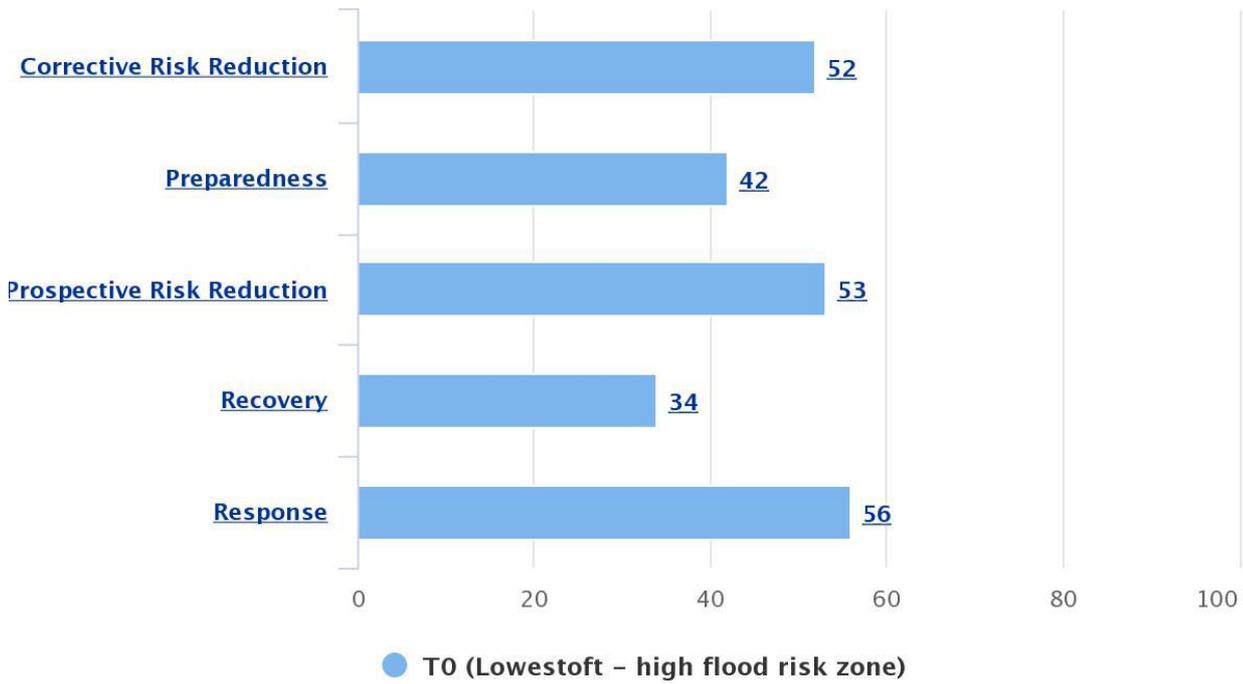


Strengths in the community are presented based on the phases of the DRM Cycle that are measured using the FRMC framework and tool, defined as the graphic shows. Source: *Step by Step Guide to the Software and Process*, p. 17

Key observations in Lowestoft:

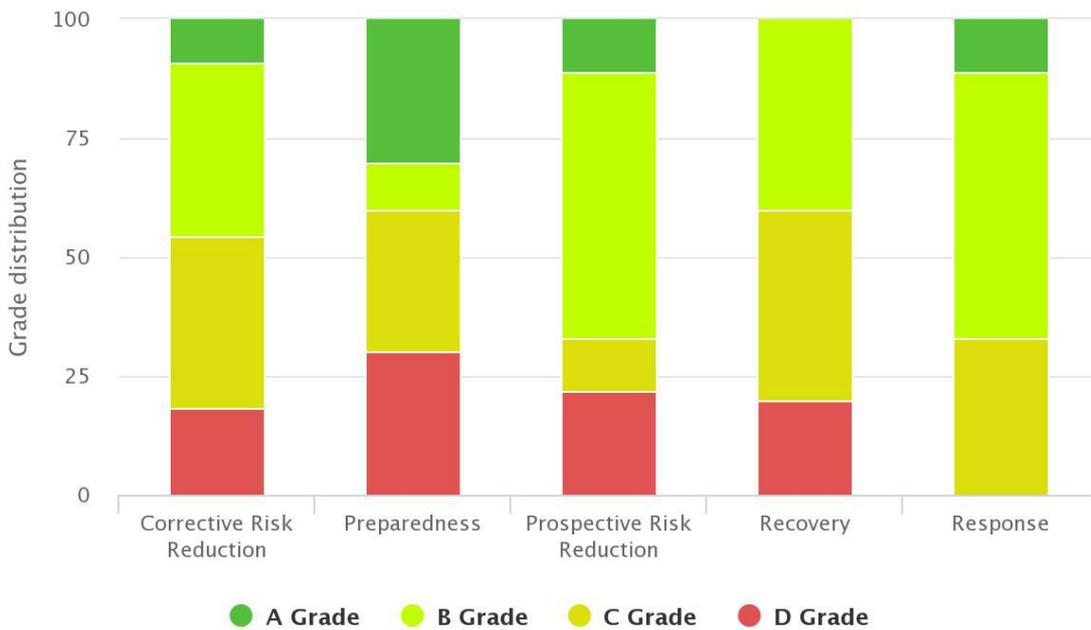
- Among the five stages of flood risk management, recovery has a significantly lower score than other stages and response phase shows the highest score followed by prospective and corrective risk reduction. Interestingly, the low score of recovery phase is again because of the lack of financial capital related to the recovery phase, which are lack of:
 - Financial support for household asset recovery (e.g., available credit lines/loans or insurance),
 - Disaster response budget (i.e., government disaster response and recovery budget targeted at the community level that is activated in the event of a flood),
 - business continuity plan (i.e., having some sort of financial resources for recovery e.g., insurance, credit, saving, government disaster relief).

Average of weighted score



Highcharts.com

Average of Grading



Highcharts.com

Lens 3: seven themes



Assets: physical assets in the community, such as buildings and their contents, productive assets, land, and infrastructure



Livelihoods: the means through which community members make a living, including people's capabilities, income, and activities required to secure the necessities of life via income or subsistence



Natural environment: the living and non-living components that occur naturally (are not made by humans), including natural features such as rivers, ecosystems, and the ecosystem services they provide



Life and health: the protection of human life and supporting human physical health



Lifelines: essential systems or critical infrastructure that provide the necessities for meeting the community's needs



Governance: formal/official and informal/unofficial organizations and institutions, and their operations, that govern life in the community



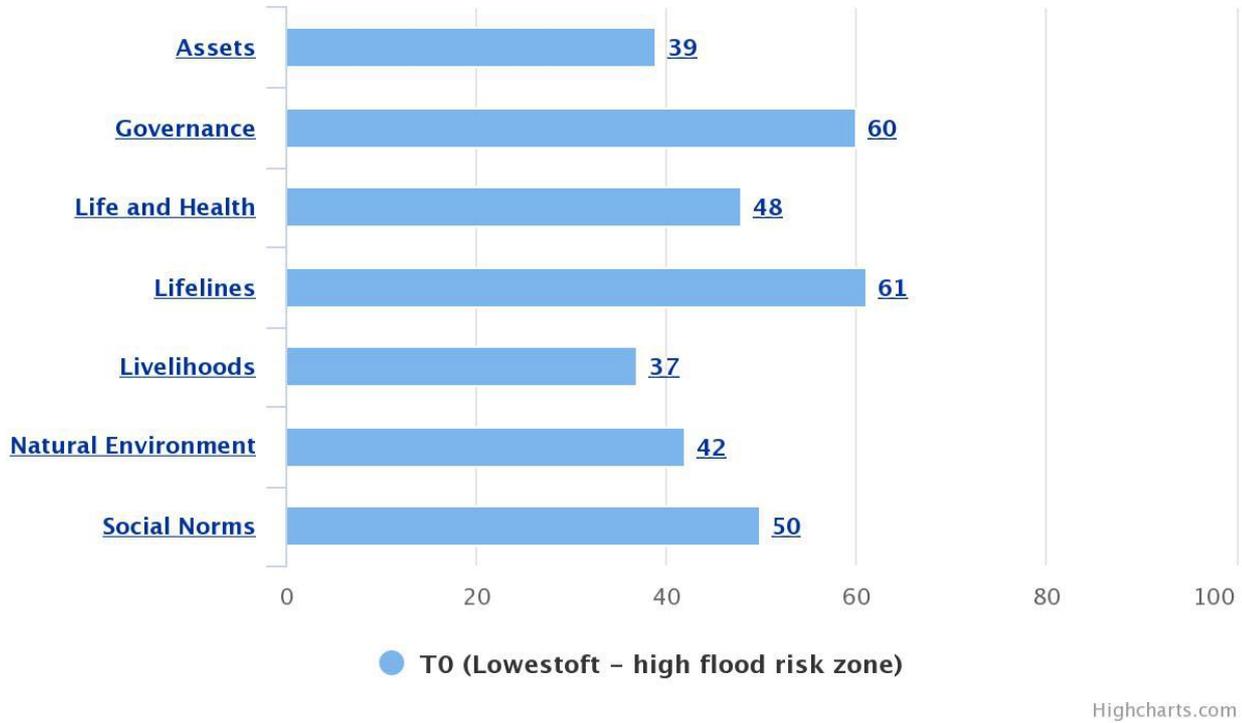
Social norms: informal agreements that govern people's behaviour

Strengths in the community are presented based on the FRMC themes that are measured using the FRMC framework and tool, defined as the graphic shows. Source: *Step by Step Guide to the Software and Process*, p. 15

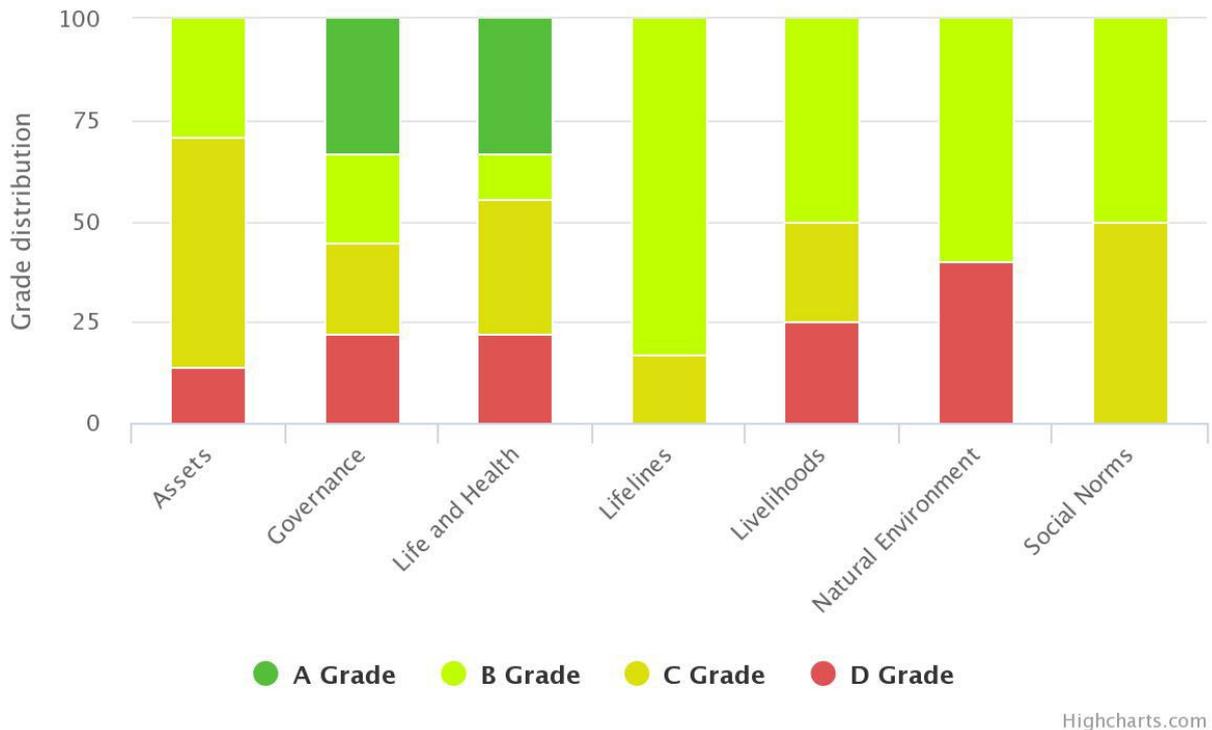
- Among the seven themes of flood resilience, 'governance' (e.g., local leadership, integrated flood management planning, and national forecasting policy and plan) and 'lifelines' (e.g., post-flood access to safe water, food and energy supply, and waste removal) have the highest score in Lowestoft.
- On the other hand, 'livelihood' (e.g., business continuity and household income continuity strategy) has the lowest score followed by 'assets' (e.g., household

flood protection, large scale flood protection, asset protection knowledge, and household asset recovery) and 'natural capital'.

Average of weighted score



Average of Grading



Lens 4: four properties of resilience



Robustness

The ability to withstand a shock



Redundancy

Functional diversity



Resourcefulness

The ability to mobilize when threatened



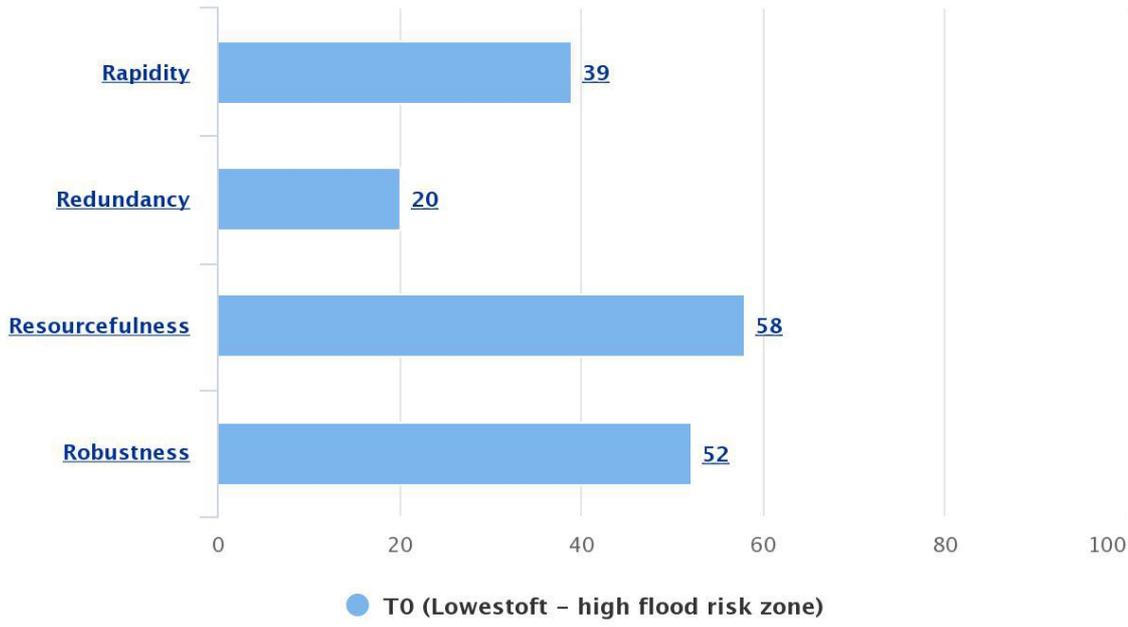
Rapidity

The ability to contain losses and recover in a timely manner

Strengths in the community are presented based on the 4Rs that are measured using the FRMC framework and tool, defined as the graphic shows. Source: *Step by Step Guide to the Software and Process*, p. 16

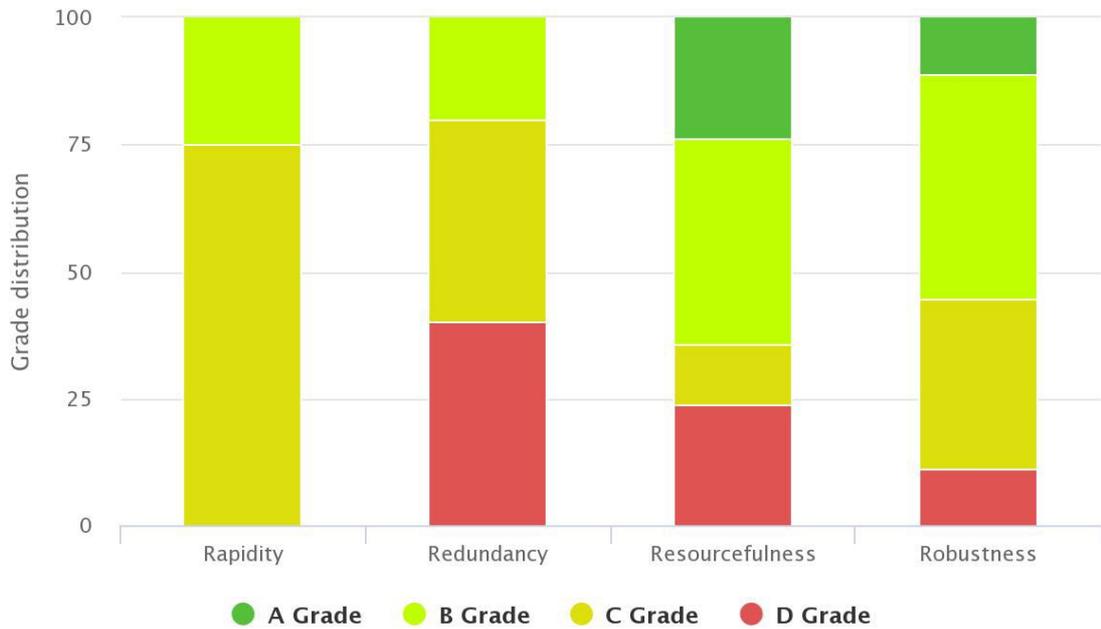
- Among the four properties of resilience, 'redundancy' has the lowest score and 'resourcefulness' has the highest score followed by 'Robustness'.

Average of weighted score



Highcharts.com

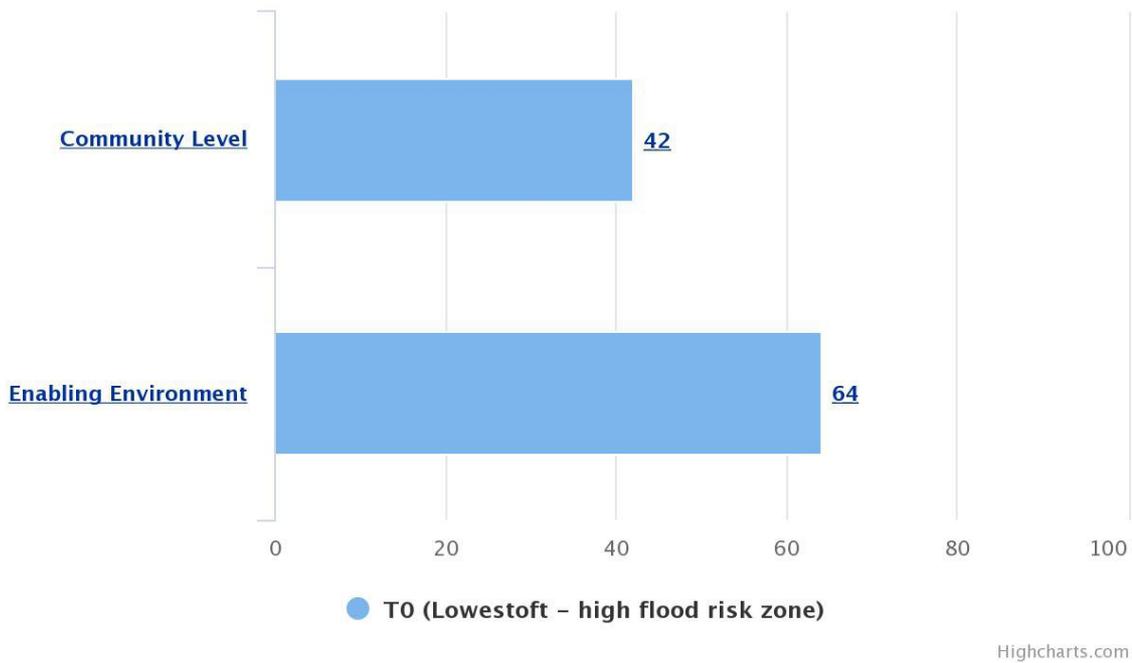
Average of Grading



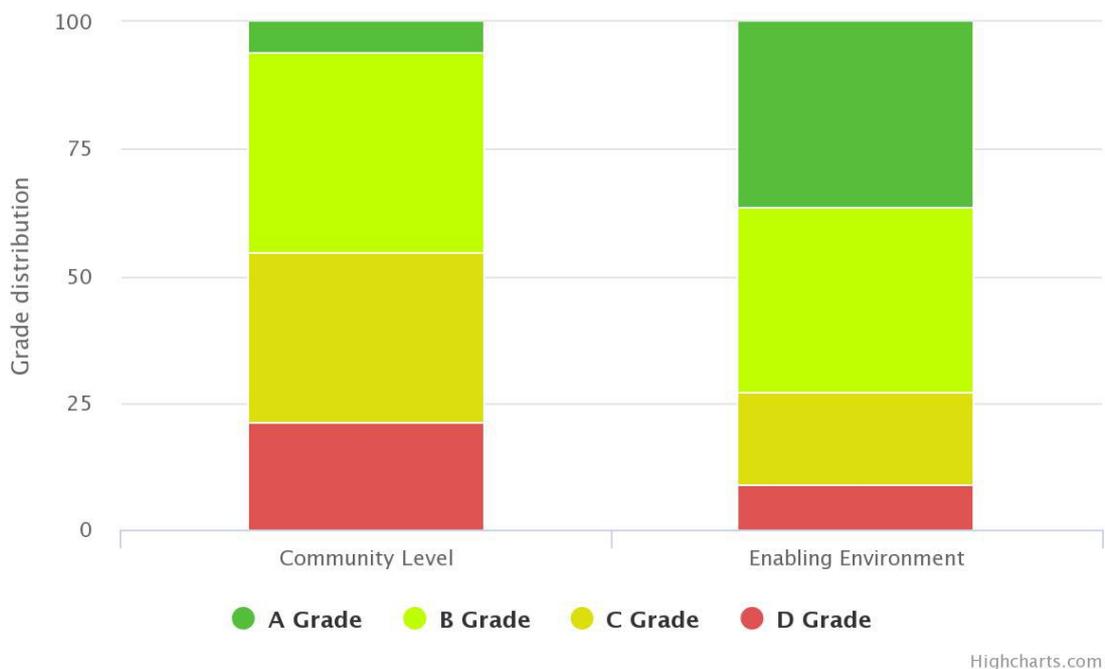
Highcharts.com

Lens 5: community level vs enabling environment

Average of weighted score



Average of Grading



Mind mapping results

In the mind mapping section, we asked 23 participants of the workshop and interviews to identify the most important aspects of flood risk management that need to be improved based on the 44 sources of resilience discussed. We also asked them to identify the relationship between the sources (i.e., how improving of some sources may influence others).

The aim of this project was to collect and present the various perceptions, priorities and preferences of local stakeholders on 1) what actions should be taken, and 2) what would be the impacts of these actions on different sources of resilience. 23 participants were the stakeholders who were involved in key informant interviews and workshop.

The aggregated map of participants (see below) shows that:

- There is a high agreement among the stakeholders that the most important resilience indicators in Lowestoft needing improvements are:
 - 1) large scale flood protection (building flood walls and barriers),
 - 2) risk reduction investment (national government grant to risk reduction measures),
 - 3) early warning system (making sure people are signed-up and know what to do when they receive warnings),
 - 4) future flood risk awareness (understanding the level and location of future flood risks which are increasing due to climate change), and
 - 5) community disaster risk management planning (a plan that is well distributed and communicated with all members of community).
- In terms of benefits and impacts of interventions, '*risk communication*' and '*future flood risk awareness*' turned out to be the most impactful intervention. This means that improving risk communication and future risk awareness in Lowestoft can cause a high impact on other resilience indicators (based on the knowledge and perception of stakeholders).

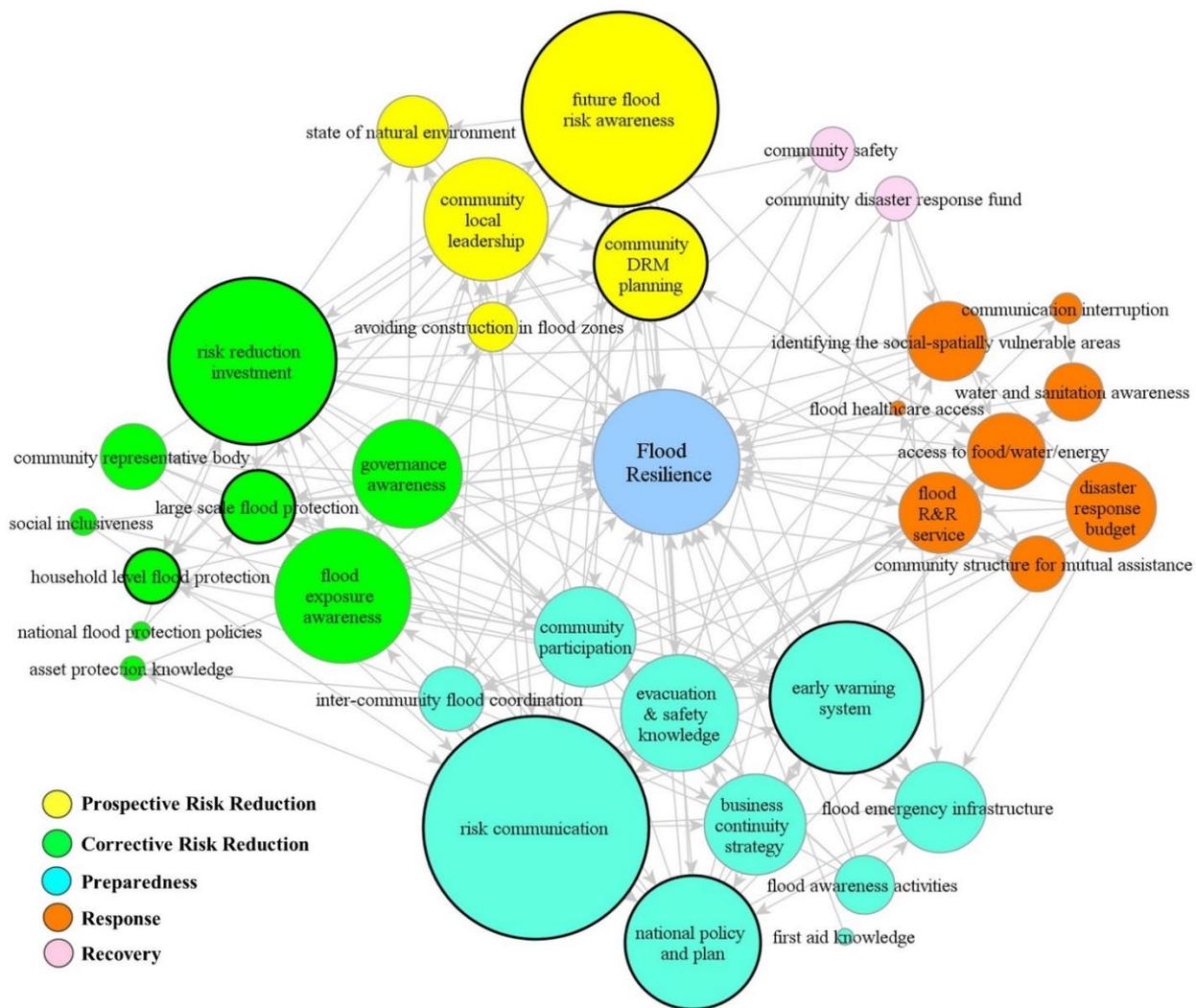


Figure 3: combined mind map of stakeholders representing the most important factors influencing flood resilience in Lowestoft. Nodes with tick black borders have more than 70% popularity (i.e., more than 70% of participants selected these indicators as the most important part of flood resilience that should be improved). Size of nodes show their impact level on other parts of resilience.

Results of this exercise show that, based on stakeholders' perceptions and knowledge, 'enhancing **future risk communication and awareness**' can impact and improve many of the weak indicators identified in the FRMC analysis such as uptake of property-level measures and financial support mechanisms, increasing evacuation & safety knowledge, and participation in flood-related activities.

Activity sheet: Prioritization table

Intervention	Source(s) that this intervention targets	Criterion 1. Relevance – level of urgency	Criterion 2. Equity and inclusiveness	Criterion 10. Availability of financial or material resources	Criterion x

Activity sheet: Action plan

Intervention	Details of Activities	Responsible	Necessary Resources	Who is in charge of resources?	Timeframe