QSAND

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Quantifying Sustainability in the Aftermath of Natural Disasters

Guidance manual 2014

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QSAND

Quantifying Sustainability in the Aftermath of Natural Disasters

Guidance manual

This QSAND Guidance manual should be read in conjunction with the QSAND assessment and scoring tool available at www.QSAND.org. Also available at this website, completion of the QSAND e-learning tutorial is also strongly recommended prior to use of QSAND

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About IFRC

The International Federation of Red Cross and Red Crescent Societies (IFRC) is the world's largest humanitarian organization, providing assistance without discrimination as to nationality, race, religious beliefs, class or political opinions.

Founded in 1919, the IFRC comprises 187 member Red Cross and Red Crescent National Societies, a secretariat in Geneva and more than 60 delegations strategically located to support activities around the world. There are more societies in formation. The Red Crescent is used in place of the Red Cross in many Islamic countries.

The IFRC vision is to inspire, encourage, facilitate and promote at all times all forms of humanitarian activities by National Societies, with a view to preventing and alleviating human suffering, and thereby contributing to the maintenance and promotion of human dignity and peace in the world.

The Role of the IFRC

The IFRC carries out relief operations to assist victims of disasters, and combines this with development work to strengthen the capacities of its member National Societies. The IFRC's work focuses on four core areas: promoting humanitarian values, disaster response, disaster preparedness, and health and community care.

The unique network of National Societies - which cover almost every country in the world - is the IFRC's principal strength. Cooperation between National Societies gives the IFRC greater potential to develop capacities and assist those most in need. At a local level, the network enables the IFRC to reach individual communities.

The role of the secretariat in Geneva is to coordinate and mobilize relief assistance for international emergencies, promote cooperation between National Societies and represent these National Societies in the international field.

The role of the field delegations is to assist and advise National Societies with relief operations and development programmes, and encourage regional cooperation.

The IFRC, together with National Societies and the International Committee of the Red Cross, make up the International Red Cross and Red Crescent Movement.

In a world with increasing isolation, tension and recourse to violence, it is clear that the Red Cross Red Crescent must champion the individual and community values which encourage respect for other human beings and a willingness to work together to find solutions to community problems.

The IFRC has embarked on a consistent and inspirational approach to promoting humanitarian values and the seven Fundamental Principles of the Red Cross and Red Crescent Movement.

The seven Fundamental Principles are: humanity, impartiality, neutrality, independence, voluntary service, unity and universality.

The Fundamental Principles

Proclaimed in Vienna in 1965, the seven Fundamental Principles bond together the Red Cross and Red Crescent National Societies, the International Committee of the Red Cross and the International Federation of Red Cross and Red Crescent Societies. They guarantee the continuity of the Red Cross Red Crescent Movement and its humanitarian work.

Humanity
The International Red Cross and Red Crescent Movement, born of a desire to bring assistance without discrimination to the wounded on the battlefield, endeavours, in its international and national

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capacity, to prevent and alleviate human suffering wherever it may be found. Its purpose is to protect life and health and to ensure respect for the human being. It promotes mutual understanding, friendship, cooperation and lasting peace amongst all peoples.

Impartiality
It makes no discrimination as to nationality, race, religious beliefs, class or political opinions. It endeavours to relieve the suffering of individuals, being guided solely by their needs, and to give priority to the most urgent cases of distress.

Neutrality
In order to continue to enjoy the confidence of all, the Movement may not take sides in hostilities or engage at any time in controversies of a political, racial, religious or ideological nature.

Independence

The Movement is independent. The National Societies, while auxiliaries in the humanitarian services of their governments and subject to the laws of their respective countries, must always maintain their autonomy so that they may be able at all times to act in accordance with the principles of the Movement.

Voluntary service
It is a voluntary relief movement not prompted in any manner by desire for gain.

Unity
There can be only one Red Cross or one Red Crescent Society in any one country. It must be open to all. It must carry on its humanitarian work throughout its territory.

Universality
The International Red Cross and Red Crescent Movement, in which all Societies have equal status and share equal responsibilities and duties in helping each other, is worldwide.

Strategy 2020

Strategy 2020 voices the collective determination of the IFRC to move forward in tackling the major challenges that confront humanity in the next decade. Informed by the needs and vulnerabilities of the diverse communities with whom we work, as well as the basic rights and freedoms to which all are entitled, this strategy seeks to benefit all who look to Red Cross Red Crescent to help to build a more humane, dignified, and peaceful world.

Over the next ten years, the collective focus of the IFRC will be on achieving the following strategic aims:

1. Save lives, protect livelihoods, and strengthen recovery from disasters and crises
2. Enable healthy and safe living
3. Promote social inclusion and a culture of non-violence and peace.

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About the BRE Trust

The BRE Trust is the largest UK charity dedicated specifically to research and education in the built environment.

Set up in 2002 to advance knowledge, innovation and communication for public benefit, the Trust uses all profits made by the BRE Group to fund new research and education programmes that will help to meet its goal of 'building a better world together'.

The Trust commission's research into the challenges faced by the built environment and publishes project findings which act as authoritative guidance to the construction industry. Through its activities, the Trust aims to achieve:

- A higher quality built environment
- Built facilities that offer improved functionality and value for money
- A more efficient and sustainable construction sector with a higher level of innovative practice.

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2. Testing and certification in the areas of fire, electronics, security and sustainability
3. Developing world leading sustainability assessment methods
4. Undertaking research and consultancy for clients and regulators
5. Promulgating standards and knowledge throughout the industry through publications and events
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About this guidance document

This document for the QSAND tool describes sustainability performance criteria against which recovery and reconstruction projects can be self-assessed and scored so as to inform decisions made in the aftermath of a natural disaster.

Please note this document and the information detailed therein has been designed for, and to be used by individuals who have undergone the online tutorial associated with the QSAND tool.

Changes to this guidance document

This guidance document maybe subject to revision and may be re-issued from time-to-time, by BRE Global Limited following instruction from IFRC. A schedule of the publication date for each issue of this document is provided below.

Any additions to this document that necessitates its re-issue will be highlighted throughout the text (note: deletions are not identified in the updated issue). A detailed list of all additions and deletions made to each issue will be available in an appendix on the QSAND website.

Guidance document	Issue number	Date of issue
PN272	1.0	28/05/2014
PN272	1.1	19/12/2018

Accessing the QSAND assessment and scoring tool

This document is intended to be used alongside the QSAND assessment and guidance tool. The tool provides a simple means of carrying out an assessment and monitoring the sustainability of a project throughout the critical decision making and delivery stages. It is accessible for aid agencies, donor organisations and other interested parties to download and use at www.QSAND.org

We encourage you to click the link and see how QSAND can support and improve your efforts to recreate a sustainable build environment for the disaster affected community. The tool is designed to provide a simple means of meeting the need for accountability to the beneficiaries and donors involved in a project.

Benefits of using QSAND include;

- Active consideration and application of sustainability approaches throughout the reconstruction process
- Bench-marked sustainability outcomes for the project or programme
- Performance information on sustainability issues targeted by the project or programme
- Embedding sustainability thorough the life cycle of the development
- Collation of data for the on-going monitoring of the affected community and its recovery.

QSAND Online E-learning Tutorial

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BRE Global has developed an online e-learning tutorial which provides information on the content and workings of QSAND. Its purpose is to support understanding, appropriate use and application of the tool. The tutorial is available here: www.QSAND.org

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Introduction to QSAND

QSAND (Quantifying Sustainability in the Aftermath of Natural Disasters) is a self-assessment tool to promote and inform sustainable approaches to relief, recovery and reconstruction after a natural disaster.

Aim

Its aim is to promote and facilitate sustainable approaches to relief, recovery and reconstruction in the shelter and settlement operations after a natural disaster so ensuring economic, social, and health benefits to the community in the short and longer term whilst supporting and protecting the natural environment.

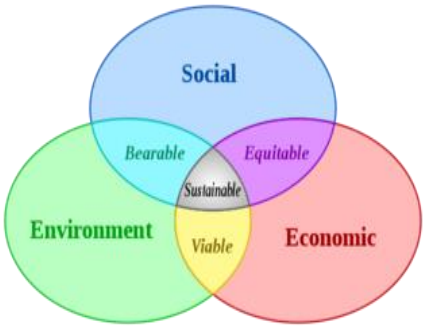
Objectives

- To guide and inform the decision-making processes affecting a disaster-affected community, promoting more sustainable approaches to shelter and settlement activities
- To provide a coordinated framework for identifying and, where relevant, comparing the sustainability of options / solutions in the relief, recovery and reconstruction of disaster-affected communities.

How does QSAND define sustainability?

"*Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future*"[1].

The QSAND tool uses three pillars of sustainability as the basis of defining sustainable development.



These three dimensions represent the balanced integration of social and environmental objectives.

Figure 1: How the three dimensions of sustainability influence each other[2]

[1] *Our common future, United Nations, 1987.*

[2] "The Future of Sustainability: Re-thinking Environment and Development in the Twenty-first Century." Report of the IUCN Renowned Thinkers Meeting, 29–31 January 2006).

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The following are definitions of each of the three pillars of sustainability, specific to the QSAND project.

Each dimension can be defined as follows (taken from UNESCO website[3]):

***"Social** - an understanding of social institutions and their role in change and development, as well as the democratic and participatory systems which give opportunity for the expression of opinion, the selection of governments, the forging of consensus and the resolution of differences."*

In terms of the QSAND issues, this element of sustainability relates to the way the built environment impacts on social issues, and so issues which seek to rebuild a community in a way that its respects and addresses social wellbeing through approaches such as participation are likely to have high social aims. An example issue in this project is "Community Sensitive Design".

***"Environment -** an awareness of the resources and fragility of the physical environment and the effects on it of human activity and decisions, with a commitment to factoring environmental concerns into social and economic policy development."*

In terms of the QSAND issues, this relates to issues which protect, mitigate or improve the environment. For example those which encourage reuse of resources, protection of resources or renewable resources such as "Ecological Protection".

***"Economy** - skills to earn a living as well as a sensitivity to the limits and potential of economic growth and its impact on society and on the environment, with a commitment to assess personal and societal levels of consumption out of concern for the environment and for social justice."*

With respect to QSAND this will cover issues which seek to restore the previous levels of economic success and help the communities to ensure this grows into the future. It may also include issues which encourage the community to be employed and involved in the work associated with re-building the community. An example in this project may be "Site Selection" and "Spatial Planning" both which contain guidance on helping the community to be re-developed in a way that will support the growth of livelihoods.

[3] http://www.unesco.org/education/tlsf/mods/theme_a/mod02.html?panel=2#top

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Scope

Natural Disasters

QSAND has been developed to apply in the aftermath of a wide range of rapidly occurring natural disasters where partial or total reconstruction is required. It is not intended to assist in the development of strategies for dealing with the impacts of longer term health, biological or climatological situations or changes whether these result from man-made or natural causes.

Three natural disaster categorisations fall within the scope of the QSAND tool; geophysical, hydrological, and meteorological. Disaster types under each categorisation are provided in Figure 2.

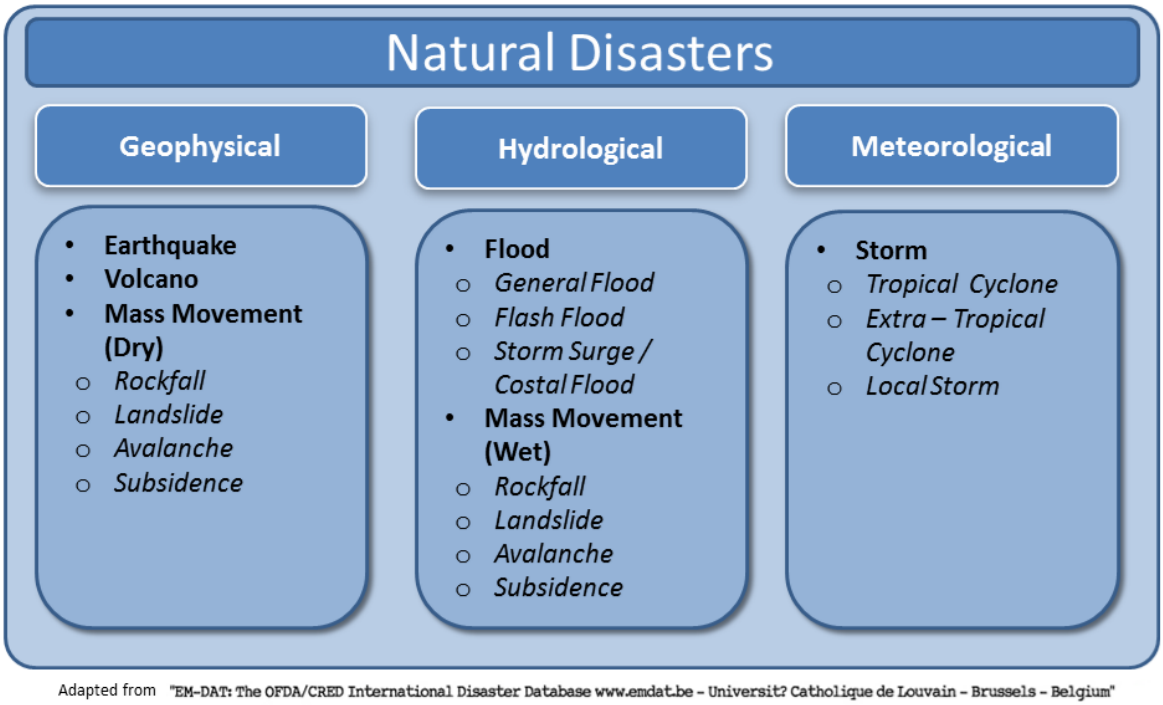

Figure 2: QSAND natural disaster categorisations

QSAND is not developed to be applied in the situations detailed below; however some aspects and content of the tool may be of help in such situations in some circumstances;

- *Biological disasters (disease epidemics and insect / animal plagues etc.)*
- *Climatological disasters (extreme temperatures and drought etc.)*
- *Technological or man-made hazards such as complex emergencies / conflicts, famine, displaced populations, industrial accidents and transport accidents etc.*
- *Situations resulting from civil unrest or war.*

Assumed disaster context

All issues have been developed using the following assumed disaster circumstance as the basis:

– Partial or total destruction of the physical / built environment during a one-off or defined duration disaster event

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- Redevelopment of affected area is to take place
- Proposed redevelopment covers one or both of the following;
    a. Repair or remodelling of existing community areas and/or related infrastructure
    b. Construction of new shelters and/or related infrastructure.

Additional disaster specific assumptions are highlighted within relevant issues where applicable.

Applicability – Geographical, location and settlement types

QSAND has been developed to be applied in a wide range of contexts:

Various geographical, location and settlement types

- Geographic and climatic regions
- Rural and urban locations
- Various settlement size (appropriate scale to be determined by the tool user)
- Various settlement types, including all building types (housing, public / social, livelihood-supporting).

Post disaster situation

- The location is stable and secure (no immediate risk to life, access to basic amenities etc.), lifesaving activities complete and stabilisation of the situation achieved
- Recovery / reconstruction is required
- Sustainable development may be realistically considered and implemented.

Applicability – Disaster Timeline

QSAND's development was informed using a timeline adapted from GRRT (Green Reconstruction and Recovery Tool Kit for Humanitarian Aid) See Figure 3. This diagram illustrates the application of the QSAND Pre-Assessment Tool (PAT) and Core Assessment Tool (CAT) within the disaster timeline.

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Image adapted from the Green Reconstruction and Recovery Tool Kit for Humanitarian Aid (WWF US, American Red Cross)

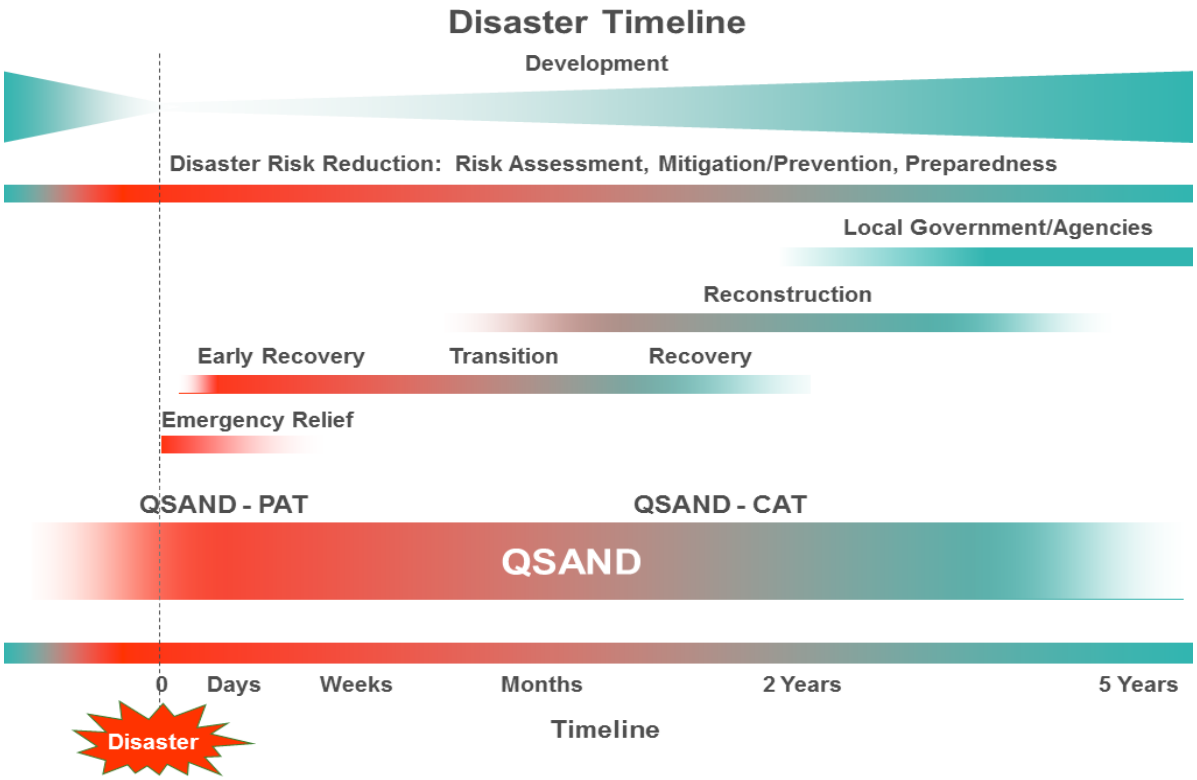

Figure 3: The PAT and CAT against the Disaster Timeline

Organisation and structure

QSAND tool structure

The following diagram shows the overall structure of the QSAND tool. It is composed of two parts: a Pre-Assessment Tool (PAT) and a Core Assessment Tool (CAT).

Key difference**:** *The PAT is designed to inform early decision-making minimising the risk of unintended barriers being created at this stage, whereas the CAT is designed to positively influence the long term reconstruction of an affected community and enhance understanding and skills.*

The issues considered within the PAT correspond with the more detailed criteria of the CAT, which will ultimately aim to help guide the user towards more sustainable outcomes.

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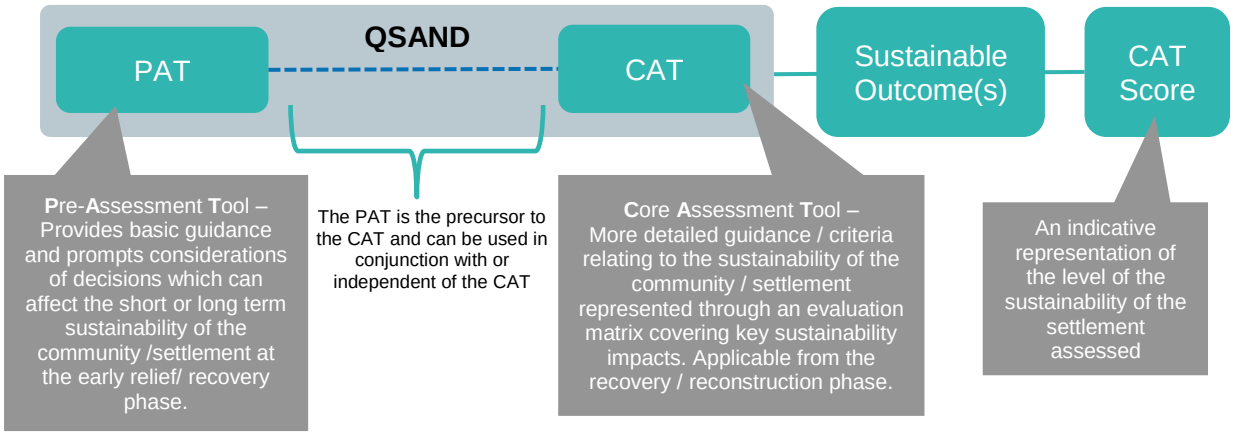

Figure 4: QSAND tool structure

The PAT

The PAT is used during the emergency relief and early recovery phases of a project or programme. It is a precursor to (but can also be used independently of) the CAT. The PAT does not seek to assess or quantify sustainability as this would not be appropriate at this stage but aims to:

- Act as a quick reference guide to apply sustainability in the aftermath of a natural disaster
- Help prevent decisions being made during the emergency relief / early recovery stages which may lead to negative long term impacts during the recovery / reconstruction phase.

The CAT

The CAT is used during the recovery and reconstruction phase. It makes up the main part of the QSAND tool and contains detailed guidance and performance related project characteristics which are aimed at supporting the establishment of a sustainable built environment. The aims of the CAT are to:

- Act as a guide for considering and applying sustainability in the aftermath of a natural disaster in medium to long term reconstruction programmes
- Support the decision-making process by providing a coordinated framework for specifying and assessing sustainability solutions during the recovery and reconstruction of disaster affected communities
- Provide a simple measure (and where relevant quantification) of the sustainability options and approaches applied
- Inform the decision making process by demonstrating the relative benefits of varying options.

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Categories

The QSAND tool is organised into eight sustainability categories relating to the reconstruction of a sustainable built environment. Seven of the eight categories relate to the assessment of issues and one (Cross-cutting) which supports the application and assessment of the seven other issues.

Figure 5: QSAND categories

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Issues

There are a number of assessment issues within each category which detail criteria aimed at producing sustainability outcomes. Linked to these are a number of cross-cutting issues relevant to all or several of the QSAND categories. (See Table 1).

Issue Types	Definition	Number of issues
Assessment Issue	An issue which forms part of the self-assessment process either setting a baseline for decisions to be made against or set levels of sustainability performance. These address specific and discrete sustainability issues and form part of the scoring process.	21
Cross-cutting Issue	A 'reference' issue which does not directly contribute to assessment scores but facilitates more robust consideration of the Assessment Issues in relation to a specific aspect. These have a bearing or impact on all assessment issues and can help to achieve enhanced benefit in each of these categories	8

Table 1: QSAND issue types

The tool consists of twenty two individual issues spanning seven sustainability categories, plus an eighth category of eight cross-cutting issues. The Communications category is only included at the PAT stage, and does not contribute to scoring under the CAT.

Shelter & Community	Settlement	Material & Waste
– Privacy – Internal Environment – Community Sensitive Design – Construction Approaches	– Site Selection – Security of Tenure – Spatial Planning – Infrastructure	– Post Disaster Waste Management – Construction Waste Management – Operational Waste Management – Material Properties / Specification – Material Sourcing
Energy	**Water & Sanitation**	**Natural Environment**
– Energy Demand and Supply – Energy Consumption	– Water Demand and Supply – Water Quality – Sanitation	– Human Relationship to Ecosystem Services – Ecological Protection – Ecological Rehabilitation and Restoration
Communications	**Cross–Cutting Issues**	
– Telecommunication	– Participation – Skills and Capabilities – Security and Safety – Economic Viability	– Community Ownership and Sustainable Management – Livelihoods – Resilience – Access and Non-discrimination

Table 2: QSAND assessment and cross-cutting issues by category

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Issue content

In this document, PAT and CAT issues are set out separately to ensure that they are accessible to the relevant user. Whilst there are close links between the issues covered these are structured differently depending on whether they are a PAT or a CAT issue.

Common sections for both the PAT & CAT

- *Issue Information:* Category, Issue ID, issue title
- *Aim:* Broadly outlines the objective of the issue i.e. what it aims to achieve including the impact it intends to mitigate.

PAT specific sections

- *Risks of Inaction:* highlights the potential problems arising from not addressing the issue as stated.
- *Considerations and Actions***:** identifies the essential considerations at this stage.

CAT specific sections

Assessment issues

- *Assumed disaster context:* provides a worst-case baseline from which the issue has been developed
- *Assessment Criteria:* outlines the criteria or actions required to meet the aim of the issue. Criteria are organised into four sections, aligned to the scoring mechanism:
    - Baseline evaluation
    - Performance level 1
    - Performance level 2
    - Performance level 3.

  Definitions for these performance levels can be found in the next section
- *On-going monitoring and evaluation:* summaries information to support the measurement and monitoring of performance / recovery of the affected community.

Cross-cutting Issues

- *Definition:* Defines the issue in the context of the humanitarian sector
- *Context within the Project***:** Outlines the importance of the issue within the QSAND tool
- *Criteria for Consideration***:** as above for 'Assessment Criteria' but the cross-cutting issues are reference issues and therefore there are no Performance Levels or scoring associated with them
- *Relevant Assessment Issues:* Highlights the assessment issues with which there is a strong connection based on scope or content
- *Supporting frameworks:* Identifies existing frameworks which may be useful when addressing the issue.

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Common to assessment and cross-cutting issues

- *Additional considerations:* provide additional guidance that supports the application and interpretation of the main assessment criteria. Within the issue these are divided into ‘general considerations’ and ‘cross-cutting issue’ considerations.
- *Case studies:* examples of how the issue has been addressed / implemented in a real-world setting. Each case study is given a star rating (3-fold). Increasing numbers of stars represent the perceived increase in the successful implementation of the issue aim.
- *Additional Information:* details relevant definitions of QSAND terminology and contains information to support the assessment of the issue.
- *References:* Details the sources of information used to develop the issue. The user may find these useful when searching for additional materials to support their work.

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Performance Level Definitions

Within each CAT Assessment Issue, assessment criteria are organised under four sets of criteria:

- Baseline evaluation
- Performance Level 1
- Performance Level 2
- Performance Level 3.

The Baseline Evaluation sets out the requirements for a robust evaluation of the context, needs, barriers and opportunities present so as to ensure that decisions are properly informed.

The three performance levels build on the baseline evaluation and represent progressively challenging levels of sustainability performance leading to increased benefits for the disaster affected community in the short or longer term. Achievement of performance levels is linked to the overall score and rating (see **CAT scoring section**) achieved for the project (see **Appendix B – Determining the CAT Score and Rating**).

Activities / features which, where appropriate, are common to all performance levels include:

- Continuous engagement with relevant stakeholders (community, relevant experts, government etc.)
- Information dissemination, skills and capacity building to the affected community and other relevant stakeholders
- Sustainable management and community ownership planning, creation and handover activities.

The performance levels are defined as follows.

Baseline Evaluation - (PL0) – *assessment, research, information gathering*

This level focuses on research and collation of relevant information and data to help identify needs, barriers and opportunities and so ensure that solutions identified are appropriate to the development and tailored to the specific needs of the affected community. Features of the criteria within this level include:

- Establishing the situation prior to the disaster
- Assessments of damage and scale of repairs required
- Participation and consultation with the affected community
- Research of local standards
- Identification of tasks and roles for community members with in the development projects and how they support ownership, capability and skills development and where relevant livelihoods.
- Feeding back outcomes, decisions made, and evaluating progress.
- Ownership and tenure issues
- Resource availability and accessibility.

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Performance Level 1 (PL1) - *planning, basic implementation, risk avoidance*

This level focuses around planning how key tasks associated with meeting the aim of the issue will be met. Tasks required to be undertaken at this level are considered to be essential to the reconstruction to avoid the risk of future failures. They do not seek to promote higher levels of sustainability in any of the three pillars of economic, social or environmental sustainability. Features of the criteria within this level include:

- planning for how the issue is going to be addressed in the given context
- implementing essential aspects of plans
- carrying out actions leading to basic sustainable shelter provision to meet essential health and wellbeing needs (risk avoidance)
- dialogue and communication with relevant stakeholders to build awareness and understanding in the community
- involving the community in the reconstruction process where practical and relevant.

Performance Level 2 (PL2) – *planning, implementation of sustainability enhancements that are cost-neutral / low-cost actions*

This level builds on the content of PL1. It focuses on rewarding application of, and use of, focused resources and actions that will benefit the local community in a more sustainable manner. These aim to provide on-going and sustainable benefit to communities allowing for greater development of skills and reduced barriers to on-going development such as costs and resource use. Features of this performance level include;

- implementing additional actions to boost quality of life and focus on the longer term development of a community, and
- undertaking more advanced actions to enhance local capabilities to become more sustainable through awareness, education and skills development.

Performance Level 3 (PL3) - *exemplar performance, investing for future benefits, maximising opportunities for future adaptation and socio-economic development*

This level focuses on actions / activities which may be outside the normal scope of post disaster reconstruction works but would lead to significant advantages in the longer term. Actions may carry an additional cost and may also require the provision of more in-depth or expert guidance but could be cost effective in the long term. They include a wide range of activities aimed at investing in the future of the development / community or supporting more innovative / exemplary levels of sustainable performance focused on creating a community that is more resilient to future changes and growth. This may involve achieving a range performance levels within other related issues. Features of this performance level include:

- Enhancing the sustainability aspects of the development to an optimal or exemplary level (reconstruction and development activities)
- Incorporating relevant expertise throughout the application of the issue
- Activities and actions which support community ownership of the development and support the long term sustainable operation and management of the community
- Ensuring effective and efficient handover to the local community
- Lobbying of stakeholders at various levels to ensure that the needs of the affected community are being met

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- A focus on long term development of skills and opportunities
- Maximising the opportunities for adaptation of the built environment and socio-economic structures to accommodate future change.

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Who should use QSAND?

QSAND has been developed to be used and applied by a range of stakeholders including;

1. **District / Province / Field level** (e.g. field project managers / practitioners / regulatory officials). Those directly involved in the development, implementation and oversight of activities, using QSAND to inform the programme design and regularly monitoring compliance against the criteria.
2. **National / Regional / Headquarter level** (e.g., desk officer / technical advisors / programme managers / national or provincial government officials). Those who are primarily desk based and not involved in day to day implementation, using QSAND to track overall progress against the key sustainability criteria identified.
3. **Global / International Stakeholder / Donor level** (e.g., international organisations / donors & finance institutions / policy analysts). Those involved in overseeing or advising on the overall response and longer term development needs, using QSAND to track the trends in sustainable recovery & reconstruction.

Assessment Process

The flowchart below shows the typical assessment process for the application of QSAND. The process is illustrative and intended to provide a framework, rather than being prescriptive, so that the tool can be applied in different contexts with a suitable amount of flexibility.

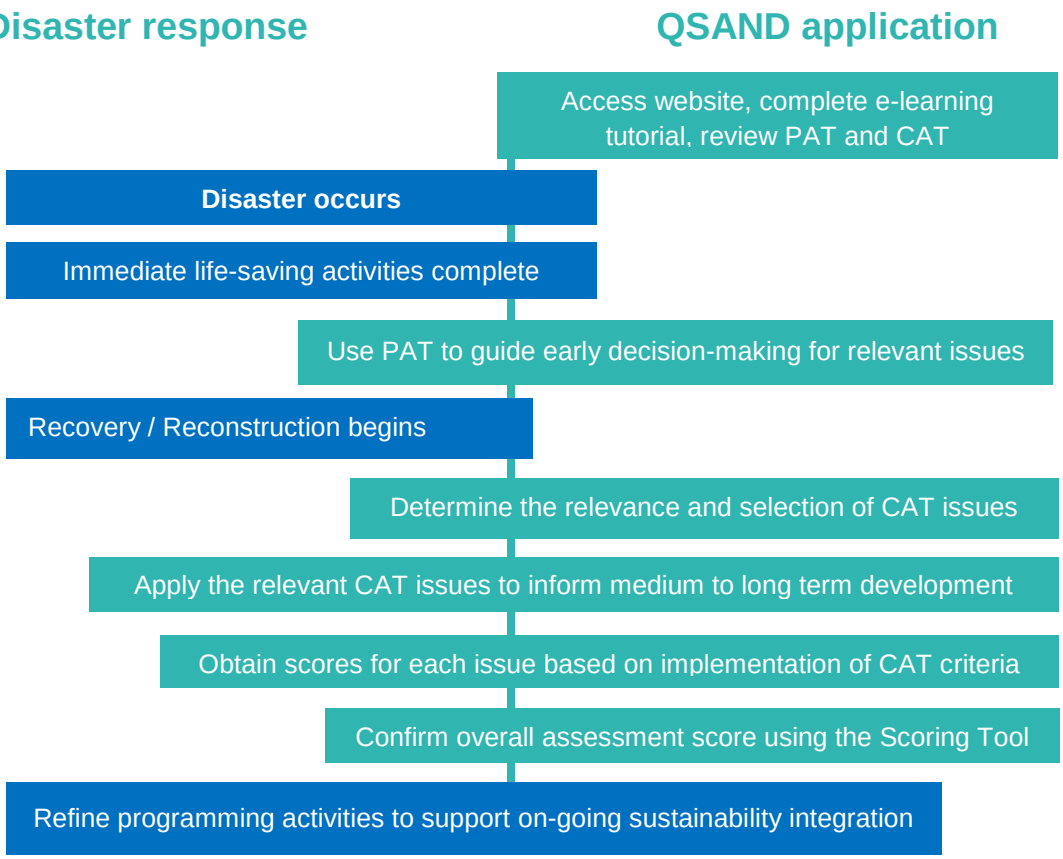

Figure 6: QSAND assessment process

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Scoring

The scoring aspect of the QSAND tool relates to the CAT only. The PAT does not include an element of scoring as the most appropriate solutions will be highly dependent on the specific nature of the disaster, the level of damage and disturbance caused, and the context within which relief activities are being carried out.

The Core Assessment Tool (CAT) allows the user to define an overall assessment performance score in order to quantify the level to which sustainability has been taken into account in a given project / programme. This overall performance is indicated by a percentage score and rating Band on a scale of Minimum to Excellent. Figure 7 illustrates the distribution of projects and the intention to improve sustainability standards over time through the application of QSAND. The most appropriate rating to aim for on a specific project should be determined for each situation on the basis of the local context. It is dependent on the nature of the disaster, community feedback, funding, local political structures and socio-economic needs and priorities.

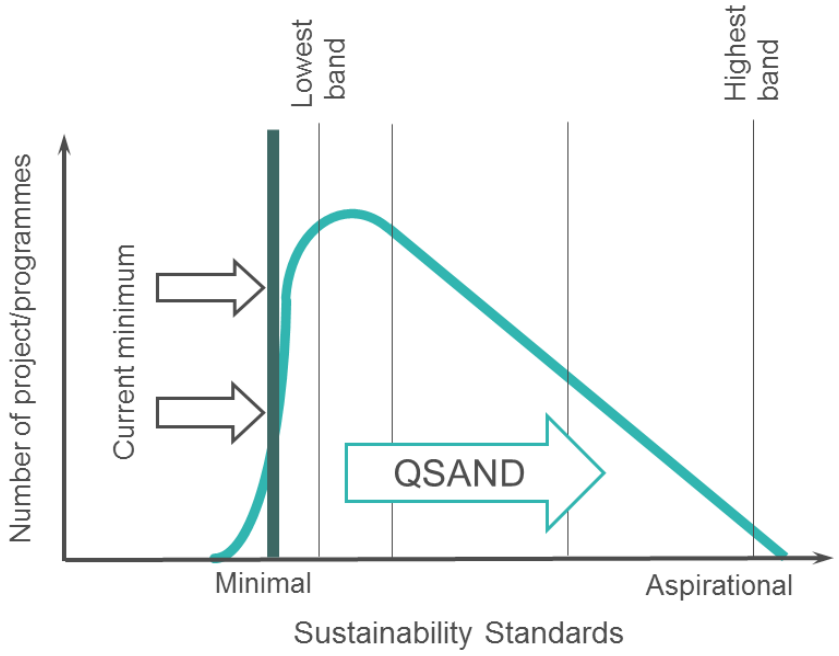

Figure 7: Quantifying performance and driving standards

There are a number of elements that determine the overall CAT performance of a humanitarian programme assessed as follows:

1. The relevance of CAT issues to the project / programme (Relevance Factors)
2. The assessment of CAT issues and associated performance levels (and therefore points awarded)
3. The minimum performance levels achieved
4. The degree to which a holistic approach is taken to enhance performance (The CAT scoring bands and percentage score achieved – Table 3).

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CAT Rating Band	Percentage score achieved
Excellent	90%
Very Good	65%
Good	45%
Minimum	30%

Table 3: QSAND CAT rating and associated % score[3]

There are four key steps involved in determining the CAT rating % score which are summarised below.

- Step 1 – Select the issues relevant for assessment for the project / programme
- Step 2 – Define the relevance of each issue for the project / programme being assessed
- Step 3 – Assessment of CAT issues, associated performance levels and points available
- Step 4 – Calculating the CAT score and band.

Relevance Factors - Minimum standards associated with scoring bands

Relevance factors and achievement of minimum performance levels achieved are linked as follows;

– **Issues with a relevance factor (RF) 0:** N/A for assessment. No score is required

– **Issues with a relevance factor (RF) 1:** As a minimum, the baseline evaluation must be achieved

– **Issues with a relevance factor (RF) 2:** As a minimum, the baseline evaluation and performance level 1 must be achieved.

This recognises that some QSAND issues may not be relevant for all projects / programmes (and allows the user to focus on those that are important for the affected community and support sustainable recovery / reconstruction.

Further information on the CAT scoring process is available in **Appendix B - Determining the CAT Score and Rating**.

QSAND scoring and assessment tool

An MS Excel based assessment and scoring tool accompanies this guidance document. It provides a route for inputting information to allow automatic generation of the score and band for the project and to record information. The tool can be accessed at www.QSAND.org

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Pre-Assessment Tool (PAT)

Overview of PAT

- Developed for use during the emergency relief and early recovery phases of a project
- Actions adopted can contribute towards the early planning stages of the long term reconstruction effort
- Pre-cursor to (but can also be used independently of) CAT
- Some issues may not be applicable depending on the type of natural disaster or the individual context
- Where issues conflict, the user should prioritise the issues most relevant to the context.

Aims of PAT

- A quick reference guide for considering and, where relevant, applying sustainability in the aftermath of a natural disaster
- A tool to support the decision-making process by helping to prevent decisions being made in the emergency relief / early recovery stages of the disaster timeline which may lead to negative long term impacts during the recovery phase.

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Shelter & Community

SC01 Community Sensitive Design		CAT issue – SC01 Community Sensitive Design
Aim Community-sensitive shelter and settlement layout design supporting inclusivity and accessibility for all inhabitants.	**Risk of Inaction** • Pre / post-disaster marginalisation of vulnerable groups is exacerbated by the relief effort • The shelter and settlement needs of specific members of the affected population are not addressed • Shelter and settlement solutions do not adequately meet the priorities and needs of the affected population. • Inappropriate or unsafe alterations are made to shelters and layout to rectify deficiencies.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • The affected population are fully involved in the shelter and settlement design and planning • Shelter and settlement solutions meet the specific needs of the different groups and individuals.	<u>Initial actions</u> • Consult with the affected population at the earliest opportunity to inform the programme design • Where possible protect and maintain existing family and social networks and coping mechanisms • Ensure the needs of the following vulnerable groups and individuals are understood and reflected in the shelter solutions, settlement layout and access to essential services and utilities: - Older people - Children and youths - Pregnant women and families with young and/or multiple children - Single parent and child-headed households - Religious and socioeconomic minorities - Disabled and physically impaired - Geographically marginalised people, i.e. at the boundaries of settlements - Other culturally marginalised groups or individuals (including ethnicity, sexuality, social hierarchy groups or castes).	<u>Essential needs of the affected population</u> • The affected population are fully involved in the shelter and settlement design and planning • Shelter and settlement solutions meet the specific needs of the different groups and individuals.

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Shelter & Community

SC02 Personal safety and privacy		CAT issue – SC02 Privacy
Aim Shelter and settlement design and location ensures personal safety and privacy.	**Risk of Inaction** • The affected population are unable to live safely with dignity • The affected population feel at risk from privacy invasion, leading to concerns about their safety • Inability to access customary support networks • Increased likelihood of psychosocial and social problems in the affected population • Increased health issues due to unwillingness to use inappropriate facilities • Increased gender-based violence and domestic abuse.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Safe and secure settlement and shelter locations • Safe and dignified shelter that does not negatively affect health and family life • Privacy for individuals and households (visual and acoustic) • Cultural sensitivities (including religion, family life, sexuality, safe separation of the sexes as required and social hierarchy) • Consideration of the separate needs of women, children, men and boys, of the young and elderly, of able-bodied and disabled people.	<u>Initial actions</u> • Consider personal and household privacy requirements reflecting personal, cultural and familial practices • Settlement and shelter layout should ensure privacy for families and individuals where possible (by providing adequate screening and space around each dwelling) • Where it is customary, consider grouping shelters / plots so extended families or social support networks can be maintained / (re)established • Toilets and washing facilities should be located to allow safe use and privacy. Where communal facilities must be used consult with the population to understand how to arrange and manage the facilities to be acceptable and safe • Ensure material and detail design specifications of shelter enclosures provide the required visual and acoustic privacy • All personal information that identifies or relates to individuals or groups must be kept confidential unless agreed otherwise with the individuals concerned.	<u>Longer term consideration</u> • Consider cultural / gender issues associated with privacy by undertaking participatory activities with the local community • Shelter and settlement design and planning should enable incremental growth and expansion without compromising safety and privacy of existing households.

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Shelter & Community	SC03 Internal Environment		CAT issue – SC03 Internal Environment
	Aim Internal environments of shelters are safe and minimise potential health risks.	**Risk of Inaction** • Increased risks to health and personal safety • Detrimental impacts on the quality of life of the affected population. • Social tension between inhabitants.	
	Considerations and Actions		
	<u>Essential needs of the affected population</u> • Safe and adequate shelter that minimises health risks • An internal environment that provides adequate thermal comfort and wellbeing.	<u>Initial actions</u> • Design and performance of the shelter should provide protection from the climate • Shelters should have sufficient ventilation, shading, insulation, heating or other measures to ensure thermal comfort • Internal air quality must be safe and free of dust, fumes or smoke • Internal spaces should have sufficient natural light. • Shelter design and construction should minimise the risks from disease vectors such as pests and mosquitoes • Cooking must be possible in a safe manner in accordance with local customs.	<u>Longer term consideration</u> • Design, material specification and type of construction should ensure that any temporary shelters remain habitable and safe for their expected lifespan • Ensure that the affected population are aware of how to effectively maintain their shelters.

	SC04 Construction Approach N/A	CAT issue - SC04 Construction Approach

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Settlement

SET01 – Site Selection		CAT issue – SET01 Site Selection
Aim Sites or return locations are suitable for the affected population and other relevant parties, and the impact on the natural environment can be managed.	**Risk of Inaction** • Detrimental impacts on the quality of life of the affected population • Detrimental impacts on livelihoods • Unsustainable demands on local resources and services • Damage to or unsustainable demands on the natural environment • Conflict between social communities or communities and wildlife.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Opportunity for safe return to the site of their original homes, ancestral land etc. where appropriate • Site selection minimises health risks • Site selection minimises risks of future natural disaster • Site provides sufficient space to ensure safe shelter and settlement design and layout • Ability to maintain existing or establish new livelihoods	<u>Initial actions</u> • Resettlement should be considered only as last option, where in-situ repair or reconstruction is not possible or where it is necessary to temporarily relocate in order to allow reconstruction to occur • Ensure the affected population have safe access to and from the site and to essential services and resources as required • Identify and minimise the risk from natural and man-made hazards • Ensure livelihood activities can be carried out with access to markets and related services as required • Identify and address as required ownership, tenure, use or access rights to existing or new sites • Minimise the impact to and unsustainable demands on the natural environment • Minimise potential conflicts with wildlife populations arising from natural predation, grazing, reproduction or migration • Address the impact of the shelter and settlement activities on host or neighbouring communities.	<u>Longer term consideration</u> • Ensure that return sites can accommodate future growth and demographic changes where possible • Temporary sites should be suitable for the expected duration of occupation, and can be made good safely and cost efficiently at the end of use to bring the land back into productive use for the community or wildlife.

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Settlement

SET02 Security of Tenure		CAT issue – SET02 Security of Tenure
Aim To recognise and support: • Security of tenure • Diverse tenure arrangements relating to housing, land and property • Transparency, accountability and communication with the affected community in regard to tenure issues.	**Risk of Inaction** • Lack of recognition of tenure can prevent return, the receipt of shelter and settlement assistance, and increase the vulnerability of the affected population to eviction • Lack of clarity of housing or land ownership, access to or use rights can result in delay or conflict • Insecurity of tenure and/or rapid movements of individuals / groups can prevent communities from forming / re-establishing in a resilient way.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Recognition of all of forms of tenure and pre-disaster ownership, occupancy and use rights of land and property (including titled ownership, rental, use and occupancy etc.) • Appropriate levels of security of tenure.	<u>Initial actions</u> • Identify pre-disaster forms of tenure, and promote recognition by local regulatory authorities, donors and humanitarian agencies as required • The preference of the affected population to return to property owned, rented, occupied or used prior to the disaster should be supported where safe to do so • Promote the application of local hazard mapping and risk analysis in preference to government-imposed unilateral no build or buffer zones • The siting of temporary settlements or the use of buildings for collective shelter should be informed by knowledge of and agreement with land or building owners or use rights holders • Formal hosting of displaced populations by extended family households or others should be on the basis of agreed use rights within an agreed timeframe as required • Establishment of appropriate tenure arrangements that meet the full needs of the community and those in it.	<u>Longer term consideration</u> • Establish local verification procedures to clarify land and property ownership or use rights in the absence of cadastral records or rapid dispute resolution procedures • Support the re-establishment of rental accommodation where it existed pre-disaster through enabling the owners of rental accommodation to access recovery and reconstruction assistance in return for subsidised rents or similar • Promote the establishment of rapid building approval and land and property dispute resolution procedures.

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Settlement

SET03 Spatial Planning		CAT issue – SET03 Spatial Planning
Aim Settlement planning and layout meets the needs of the affected population.	**Risk of Inaction** • Negative impacts on personal wellbeing • Increased likelihood of social problems • Insufficient or unsuitable space for affected population to maintain livelihoods • Limited communal space or facilities for social interaction and cultural or religious practices • Constraints to accommodating household structures or household / community growth or expansion.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Privacy at individual and household level • Culturally appropriate planning to reflect household structures, gender, age, religion and social hierarchy • Space to undertake social and livelihood activities. • Building types and spaces organised to facilitate safe access and use • Shelters are sited away from potential nuisance types (e.g. industrial).	<u>Initial actions</u> • Collaborative and inclusive design and planning process • Planning reflects existing family and social groupings • Considered provision and positioning of amenities.	<u>Longer term consideration</u> • Consult with the affected population to identify local businesses, community groups and leaders to inform on future growth • Consider existing settlements in the area or region to identify growth patterns and planning implications • Liaise with local authorities to identify existing master plans and development initiatives.

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<table>
<tr><td rowspan="4">Settlement</td><td colspan="2">SET04 Infrastructure</td><td>CAT issue – SET04 Infrastructure</td></tr>
<tr><td>Aim
Water, sanitation, surface water drainage and other essential infrastructure is rapidly provided.</td><td colspan="2">Risk of Inaction
• Inadequate supply of essential services (e.g. water and energy) due to poor infrastructure
• Contamination of water supply and natural environment due to inadequate infrastructure and maintenance
• Serious health risks to population due to inadequate water supply / quality and sanitation.
• Flooding due to limited or lack of surface water drainage.</td></tr>
<tr><td colspan="3">Considerations and Actions</td></tr>
<tr><td><u>Essential needs of the affected population</u>
• Access to safe and sufficient water supply, sanitation and essential services
• Infrastructure can be affordably maintained.</td><td><u>Initial actions</u>
• Ensure that the affected population has access to sufficient quantity of water of adequate quality
• Ensure that the affected population has access to sanitation facilities
• Protect local groundwater and surface water sources to prevent contamination
• Promote good hygiene practices (e.g., place sanitation facilities away from water sources or infrastructure
• Identify sanitation facilities that minimise impact on local natural environmental resources
• Avoid contamination of water supplies from sanitation facilities and other causes.</td><td><u>Longer term consideration</u>
• Consult with the affected population and other relevant stakeholders to identify future infrastructure needs.</td></tr>
</table>

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Materials and Waste

MW01 Material Specification		CAT issue – MW01 Material Properties / Specification
Aim Materials used during the emergency relief phase are appropriate to the context (immediate needs, climate and culture) and are capable of being retained and reused within later reconstruction and development works	**Risk of Inaction** • The affected population are unfamiliar with the materials specified and unable to maintain them • Temporary shelters constructed with unfamiliar materials that do not enable easy reuse become an impediment to recovery and reconstruction activities and a waste management problem.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Shelters that are safe, durable, and provide adequate thermal comfort and protection from the climate • Materials used are culturally and climatically appropriate, and enable basic maintenance by the household • Materials are recyclable for future reconstruction / development • Waste generation is minimised,	<u>Initial actions</u> • Ensure the performance of the shelter materials specified is appropriate to local climatic conditions • Reuse salvaged materials where safe to do so • Ensure that the materials specified allow for rapid construction where this is required • Specify materials familiar to the affected population, so that shelters can be constructed and easily maintained • Ensure materials used for temporary shelters have a durability consistent with the expected duration of use of the shelters • Ensure that materials and components are fabricated in such a way that they can be easily and safely separated and reused by the community.	<u>Longer term consideration</u> • Specify materials for emergency or temporary shelters that can be reused as part of the permanent construction process • Where appropriate, temporary or transitional shelters should be capable of expansion and upgrading to become permanent shelters e.g. homes etc.

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Materials and Waste

MW02 Material Sourcing		CAT issue – MW02 Materials Sourcing
Aim Sourcing of materials for the emergency relief phase does not lead to long term environmental damage	**Risk of Inaction** • Unsustainable demand on natural environmental resources • Damage to livelihoods of population dependent on the manageable use of natural environmental resources.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Ready and continued access to natural environmental resources to meet their emergency shelter and household needs as appropriate.	<u>Initial actions</u> • Assess the demand on local natural environmental resources that would be required as part of emergency relief activities • Identify alternative sources of natural environmental resources if local sources cannot sustainably meet emergency relief needs • Promote the reuse of salvaged materials where possible • Ensure that natural environmental materials sourced from outside of the affected area (nationally, regionally, globally) are from sustainable sources.	<u>Longer term consideration</u> • Ensure that local sources of materials are exploited responsibly, to prevent problems in the long term sustainability of supply • Manage the demand on local sources of materials through complementary activities e.g. replanting • Ensure that the management of local sources of materials maximises local enterprise and livelihood opportunities.

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Materials and Waste

MW03 Post Disaster Debris Management		CAT issue – MW03 Post Disaster Waste Management
Aim Early consideration of debris management and promote safe reclamation of materials.	**Risk of Inaction** • Pollution and contamination of natural resources, agriculturally productive land and possible health risks • Loss of material for repair and reconstruction through the disposal of debris instead of recycling where appropriate • Increased construction costs due to the need to source material that could have been obtained at lower cost through local recycling of debris • Debris presents an obstacle to the initial relief activities, impedes return and the recovery and reconstruction process.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Debris removal is undertaken sensitively and safely where there has been loss of life and household possessions • Relief, recovery and reconstruction is not impeded by the presence of debris • Health and safety risks due to the presence of debris are managed • Households are able to safely access and reuse where possible materials from their damaged homes.	<u>Initial actions</u> • Debris removal should be managed in a sensitive manner • Debris removal should be carried out in conjunction with emergency services where there has been loss of life • Establish the makeup and volumes of debris to identify recyclable, organic and harmful or contaminating materials and determine appropriate disposal options • Rapid hazardous waste assessment should be undertaken to identify and manage risks such as the presence of toxins, the risk of combustion or potential disease vectors • Ensure ownership of or access to debris is clarified prior to removal, and that individual households are able to salvage materials / possessions from their original homes where desired • Rapid structural assessments of damaged structures should be undertaken to ensure safe debris removal • Debris removal should prioritise ensuring access for key services and emergency relief activities, particularly in urban contexts with high density occupation pre-disaster • Identify opportunities for the recycling and reuse of debris as part of recovery and reconstruction activities, including local employment and enterprise generation • Establish temporary debris storage, sorting and processing sites where possible • Identify responsibilities and assess costs associated with debris removal • Consider management of waste generated by relief activities.	<u>Longer term consideration</u> • Ensure a debris management plan is established to inform longer term recovery and reconstruction, particularly where this includes debris recycling and reuse enterprise activities • Prioritise the management and safe disposal of toxins and other hazardous waste which could otherwise impede recovery.

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	MW04 Construction Waste Management – N/A	CAT issue – MW04 Construction Waste Management

Materials and Waste	MW05 Waste Management		CAT issue – MW05 Operational waste Management
	Aim Appropriate and sustainable waste management practices are restored or established where required.	**Risk of Inaction** • Inappropriate disposal of waste resulting in health and environmental hazards • Uncontrolled dumping of waste by the affected population impedes reconstruction or causes environmental damage • Bulk generation of operational waste which could be minimised through effective waste reduction, reuse and recycling • Increased health and environmental risks to the affected population.	
	Considerations and Actions		
	Essential needs of the affected population • To have a means for safely disposing of their personal, household and livelihood waste • Health risks from waste management and disposal are minimised • Adequate separation between homes and any designated waste disposal area • To reduce the amount of waste generated where possible • To maximise the ability to safely recycle and generate value from 'waste' streams	Initial actions • Manage waste generated by relief activities • Liaise with the affected population and the local authorities to determine responsibilities for waste removal and management • Identify employment and enterprise opportunities related to waste management needs.	Longer term consideration • Identify the existing waste management process and how it has been affected by the disaster • Review proposed recovery and reconstruction activities, and the implications on household and settlement waste management processes including the identification of suitable waste management sites • Identify opportunities to promote recycling, to improve the management of hazardous waste, and to further minimise health and vector risks.

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Energy	ENE01 Energy Sources		CAT issue – ENE01 Energy Demand and Supply
	Aim Accessible, adequate, reliable, affordable and sustainable energy sources are available to meet immediate household and community needs.	**Risk of Inaction** • Health and thermal comfort issues related to a lack of adequate space heating • Health and nutrition issues related to an inability to cook food • Health issues related to an inability to heat water to effectively wash clothes, carry out cleaning and maintain personal hygiene • Inability to carry out essential household or livelihood activities.	
	Considerations and Actions		
	<u>Essential needs of the affected population</u> • Availability of or access to energy in order to heat internal living space and water (for the purposes of cooking, washing and cleaning) and for carrying out other essential household and livelihood activities	<u>Initial actions</u> • Determine the immediate energy needs of the affected population • Ensure that the sources of energy are safe and practical for use • Minimise the personal safety and household risks of the affected population sourcing a short term alternative energy supply • Assess whether existing or damaged energy sources or infrastructure can be used in the short term and what percentage of demand can be fulfilled • Identify alternative energy sources that can be provided or accessed • Ensure that all the affected population have equitable and affordable access to the energy supply • Provide or support energy sources for communal services e.g. PV panels for lighting to common areas, facilities or to enable mobile phone charging.	<u>Longer term consideration</u> • Ensure that the sources of energy are sustainably managed in order to avoid potential sourcing problems in the future • Consider the use of renewable energy technologies where feasible.

	ENE02 Energy Consumption -- N/A	CAT issue – ENE02 Energy Consumption

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Water

WS01a Water Demand		CAT issue -- WS01 Water Demand & Supply
Aim Water needs are met through informed analysis of water usage and supply.	**Risk of Inaction** • Inadequate quantity of water available to carry out essential household, sanitation, hygiene and livelihood activities • A potential need to implement water rationing • Infrastructure and water supply are designed and implemented inappropriately.	
Considerations and Actions		
Essential needs of the affected population • Equitable access to sufficient and safe water to meet their essential needs.	Initial actions • Undertake participatory activities to understand the immediate water needs of the affected population • Use secondary data where available in order to understand the water needs of the affected population, e.g. population and demographics. Consult with the local authority and agencies to understand the proposed activities to meet water needs at community and household level.	Longer term consideration • Optimize the water demand of the affected population by identifying potential efficiencies in how water is used • Carry out awareness raising activities with the affected population to manage water demand • Recovery and reconstruction planning should consider the demands of future population growth and livelihood developments on the water supply.

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Water

WS01b Water Supply		CAT issue — WS01 Water Demand & Supply
Aim Water supply meets quantity and quality requirements, can be accessed by all the affected population, and can accommodate incremental population growth as required.	**Risk of Inaction** • The water supply is unable to meet the demand of the affected population • Access to the water supply is not equitable.	
Considerations and Actions		
Essential needs of the affected population • A sustainable and resilient water supply to meet the different needs of all individuals and groups for personal, household and livelihood activities.	Initial actions • Carry out a rapid analysis of existing and potential water supplies to meet the immediate needs of the affected population • Assess alternative water supply options including mains supply, tanks, bladders and transportation, and access at household, stand pipe or water point • Ensuring that sufficient water is provided for community infrastructure (health care, education, etc.) and for essential livelihood activities.	Longer term consideration • Involve the affected population in decision making and potential management of water supply infrastructure • Identify opportunities to manage water resources through the recycling of waste water, rainwater catchment and similar • Ensure that decisions made in terms of infrastructure to meet emergency water supply needs do not impede the development of future infrastructure.

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<table>
<tr><td rowspan="4">Water</td><td colspan="2">WS02 Water Quality</td><td>CAT issue – WS02 Water Quality</td></tr>
<tr><td>Aim
Water quality is ensured through appropriate sourcing, treatment, supply and storage.</td><td colspan="2">Risk of Inaction
• Water is of insufficient quality for intended use by the affected population
• Inappropriate or insufficient protection for water supply and storage.
• Costly water treatment requirements.</td></tr>
<tr><td colspan="3">Considerations and Actions</td></tr>
<tr><td><u>Essential needs of the affected population</u>
• Potable water to meet consumption demands.
• Water must be safe, palatable and free of contamination
• Appropriate and safe water storage resources are available at household and community level.</td><td><u>Initial actions</u>
• Identify potential contaminants on site and ensure these do not compromise the water supply
• Ensure that early infrastructure decisions do not compromise water quality in the community both at source and also away from delivery infrastructure.</td><td><u>Longer term consideration</u>
• Undertake awareness raising activities on how to ensure that water is safely sourced, stored and used
• Ensure that on-going recovery and reconstruction activities do not compromise water quality e.g. ensuring separation of black water pipe runs from treated water supply.</td></tr>
</table>

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<table>
<tr><td rowspan="4">Water</td><td colspan="2">WS03 Sanitation</td><td>CAT issue – WS03 Sanitation</td></tr>
<tr><td>Aim
Sanitation provision and associated infrastructure meets current needs and can accommodate incremental population growth as required.</td><td colspan="2">Risk of Inaction
• Health issues amongst the affected population from inadequate sanitation and vector risks
• Potential contamination of water supply
• Inadequate drainage leading to risk of settlement flooding and water ingress to shelters.</td></tr>
<tr><td colspan="3">Considerations and Actions</td></tr>
<tr><td><u>Essential needs of the affected population</u>
• Safe, accessible and managed sanitary facilities for all, considering particular needs of vulnerable groups and individuals
• Adequate surface water drainage to minimise the risk of contamination arising from ground / surface water flooding.</td><td><u>Initial actions</u>
• Determine the household and communal sanitation requirements of the affected population
• Ensure that all members of the affected population have equitable, safe and adequate access to culturally acceptable sanitation facilities, utilising existing infrastructure where feasible
• Ensure that sanitation facilities are separated from the water supply to minimise the risk of contamination
• Hygiene promotion activities to complement the provision of sanitation facilities.</td><td><u>Longer term consideration</u>
• Sanitation infrastructure should include consideration of future growth and changes to the shelter and settlement plan.</td></tr>
</table>

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Communications

COM01 Telecommunications		***N/A – No corresponding CAT issue***
Aim Telecommunication services and associated infrastructure meet immediate needs for community and relief support personnel and can accommodate future expansion as required.	**Risk of Inaction** • Inadequate communications infrastructure impedes relief activities • Affected population are unable to communicate with family and friends • Affected population are unable to communicate with authorities and humanitarian agencies • Relief and recovery activities including beneficiary communications and cash transfer via mobile phones is impeded.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • To communicate with family, friends and the authorities to address their own needs and promote security and safety.	<u>Initial actions</u> • Assess the communication requirements of the affected population and what existed pre-disaster • Promote equitable access to communication infrastructure where possible • Provide or support communication services where possible e.g. shared use of a common mobile phone.	<u>Longer term consideration</u> • Include provision of telecommunications infrastructure in recovery and reconstruction planning, ensuring equitable access to all the affected population.

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Natural Environment

NE01 Natural Environment	CAT issue – NE01 Human relationship to Ecological Services
Aim Natural environmental resources are managed through an understanding of existing use and access rights, the impact of the disaster, and actions to ensure the sustainability of such resources.	**Risk of Inaction** • Negative impact on the availability of natural resources essential to livelihoods and well-being • Conflict over ownership or use rights of natural environmental resources • Long term damage to and loss of particular natural resources e.g. deforestation and desertification of topsoil • Conflict with wildlife and other communities over scarce natural resources.

Considerations and Actions

Essential needs of the affected population	Initial actions	Longer term consideration
• Adequate access to and supply of natural environmental resources • Recognition of existing ownership or use rights of environmental resources • Managed use and the sustainability of existing environmental resources.	• Identify existing natural environmental resources and ownership and use rights • Assess damage to the natural environmental resources as a result of the disaster, and potential demands and risks due to relief and recovery activities • Identify potentially unsustainable demands on particular natural resources, and means to manage this demand through alternative sourcing or alternative approaches to meeting relief needs • Identify other users of natural resources including neighbouring communities and wildlife • Manage or minimise immediate risks to natural resources or ecosystems.	• Identify and access knowledge and expertise on natural environmental resource management within the affected population, local government or humanitarian agencies • Raise awareness of the risks to the natural environment amongst the affected population, and measures that can be taken to minimise these risks • Incorporate natural environmental resource management into recovery and reconstruction planning, including managed demanded on local natural resources and the sustainability of local ecosystems • Promote the sustainability of local resources through complementary activities e.g. tree planting, managed surface water drainage, rainwater harvesting • Identify enterprise and employment opportunities that contribute to the protection or sustainability of local natural environmental resources.

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Natural Environment	NE02 Ecological Protection		CAT issue – NE02 Ecological Protection
	Aim Risks to the local ecology and ecosystems are identified and addressed.	**Risk of Inaction** • Loss of or damage to local ecosystems resulting in changes to the micro-climate, seasonal weather patterns and new or increased hazards and risks • Overexploitation or pollution of the natural environment causing long term damage.	
	Considerations and Actions		
	<u>Essential needs of the affected population</u> • Recognition and protection of existing ecosystem and natural resources from damage, misuse or overexploitation • A culture of valuing natural resources and the need to protect and sustainably exploit them.	<u>Initial actions</u> • Identify ecological features at risk as a result of the disaster or relief activities by the affected population or response actors • Minimise the unsustainable use of natural environmental resources • Minimise the risk of damage to or pollution or contamination of the local ecosystem • Minimise disturbance to local ecosystems including feeding and migratory patterns.	<u>Longer term consideration</u> • Mitigate against potential sources of pollution or damage as a result of relief activities to avoid long-term or on-going detrimental impact on the natural environment • Protect ecological features that reduce the potential impact of disasters (e.g., planting and woodlands to minimise soil erosion, mangroves in coastal areas).

	NE03 Ecological Rehabilitation and Restoration – N/A	CAT issue – NE03 Ecological Restoration and Rehabilitation

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Cross-cutting Issue

CC01 Access and Non-discrimination		CAT issue – CC01 Access and Non-discrimination
Aim Adequate, equitable and inclusive access for all members of the affected population is ensured that allows individuals to address their needs without discrimination	**Risk of Inaction** • Marginalisation of vulnerable groups. • Lack of community engagement and cohesion. • Risk of violence towards or exploitation of vulnerable groups.	
Considerations and Actions		
Essential needs of the affected population • All individuals and groups have equal access to relief and recovery assistance • All individuals and groups have equal access to adequate healthcare and educational facilities.	Initial actions • Identify the different individuals and groups within the affected population and the social, cultural or economic constraints that may inhibit equal access by all to relief and recovery assistance • Establish locally acceptable mechanisms and procedures to ensure all of the affected population have equitable access to assistance, and the particular needs of vulnerable groups and individuals can be addressed • Emergency relief activities should promote non-discrimination.	Longer term consideration • Recovery and reconstruction activities should acknowledge and respect the social, cultural and economic differences within the affected population whilst ensuring equitable access by all • Identify opportunities to promote greater social inclusion through specific activities that capitalise on or strengthen the contribution of particular individuals and groups • Prioritise activities such as communal facilities and infrastructure that benefit all of the affected population and enable the self-reliance of individuals and groups as required.

	CC02 Community Ownership & Sustainable Management – N/A	CAT issue – CC02 Community Ownership and Sustainable Management

	CC03 Economic Viability – N/A	CAT issue – CC03 Economic Viability

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Cross-cutting Issue

CC04 Livelihoods	CAT issue – CC04 Livelihoods	
Aim Livelihood assets and activities are protected, restored or supported to enable recovery.	**Risk of Inaction** • Inability of the affected population to maintain or restore their livelihoods • Key livelihood assets are lost • Detrimental impacts on the quality of life of the affected population • Unsustainable demands on local resources • Damage to the natural environment • Inequity due to an imbalance in the affordability of essential resources and facilities.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Maintaining, restoring or creating livelihoods • Enterprise or employment opportunities through relief, recovery and reconstruction activities.	<u>Initial actions</u> • Assess pre-disaster livelihoods of the affected population • Identify loss of or damage to livelihood assets e.g. livestock, tools, business premises including houses for home based enterprises, communications and transport infrastructure • Protect core livelihood assets. • Provide opportunities for the affected population to undertake livelihood-related activities e.g. marketplaces, workshops.	<u>Longer term consideration</u> • Protect assets that may be exposed to over-exploitation • Build awareness of ensuring the long term availability and protection of livelihood assets • Identify new or alternative livelihood opportunities as part of recovery and reconstruction activities • Provide education and awareness to develop livelihood assets and activities to improve aspects such as efficiency and profitability.

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Cross-cutting Issue

CC05 Participation		CAT issue – CC05 Participation
Aim Engagement by the affected population is maximised through participatory assessment, design, implementation and monitoring.	**Risk of Inaction** • Affected population do not associate with or acknowledge ownership of the assistance provided, limiting on-going maintenance and management where required • Assistance provided does not adequately meet the needs of some or all of the affected population • Marginalisation or exclusion of vulnerable groups not adequately represented through formal community governance processes.	
Considerations and Actions		
Essential needs of the affected population • Appropriate representation of all members of the affected population in decision making related to post disaster assistance • Opportunities to engage in all post disaster activities subject to capacity, capability and interest.	Initial actions • Identify the different groups and individuals within the affected population and existing participatory or collaborative processes including local governance, agricultural harvesting, house and infrastructure construction, social welfare etc. • Establish mechanisms and procedures to ensure participation by the different groups and individuals subject to their physical, social, cultural or capacity constraints • Establish clear and transparent communication accessible to all members of the affected population on the opportunities to participate in the relief and recovery process • Ensure confidential feedback, complaints and grievance processes are available and accessible to all members of the affected population.	Longer term consideration • Ensure participatory mechanisms established for the emergency relief phase do not undermine existing community governance processes • Establish representative participatory mechanisms to oversee, advise on or manage recovery and reconstruction activities as appropriate • Integrate participatory mechanisms established for the recovery and reconstruction process within existing local governance processes where this ensures appropriate representation and involvement of all groups and individuals within the affected population.

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Cross-cutting Issue

CC06 Resilience		CAT issue – CC06 Resilience
Aim The affected population has the capacity and understanding of their own built environment to prepare for, respond to and recover from future disasters.	**Risk of Inaction** • Detrimental impacts on the quality of life of the affected population • Detrimental impacts on livelihoods, the local economy and household assets • Loss of or damage to shelter and settlement • Unsustainable demands on local resources • Damage to the natural environment • Future calls on external funds to unnecessarily repeat recovery steps following future disasters.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Avoidance of repeat actions in the future similar to the current post disaster recovery assistance needs • The ability to resist, respond to, and recover from the impact of disasters on the built environment.	<u>Initial actions</u> • Assess the capacities and vulnerabilities of the affected population • Ensure emergency relief assistance supports and does not undermine local coping strategies and capacities • Ensure emergency relief solutions do not increase the vulnerability of the affected population through inadequate shelter and settlement solutions • Address new or increased risks resulting from the disaster, particularly where temporary resettlement of the affected population is required.	<u>Longer term consideration</u> • Undertake a Vulnerability and Capacity Assessment (VCA) or similar community-based disaster risk assessment, in order to gauge the affected population's exposure to and capacity to prepare for, resist, respond to, and recover from disaster • Promote early recovery activities involving the affected population to minimise the dependency on emergency relief assistance • Utilise and strengthen the capacities and resources of the affected population through recovery and reconstruction activities • Recovery and reconstruction activities should address identified shelter and settlement risks and vulnerabilities

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Cross-cutting Issue

CC07 Security and Safety		CAT issue – CC07 Security and Safety
Aim Shelter and settlement risk are identified and addressed as required, and the affected population are aware of how to manage such risks.	**Risk of Inaction** • The affected population remain vulnerable to the impact of future disasters due to a lack sufficient understanding of how to manage or address shelter and settlement risks • Post disaster relief, recovery and reconstruction activities do not address existing shelter and settlement risks.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Protection from known hazards through safe shelter and settlement • Knowledge and understanding of shelter and settlement risks and how they can manage such risks.	<u>Initial actions</u> • Identify known risks and hazards in consultation with the affected population, local authorities and technical specialists as required • Assess shelter and settlement risks from known hazards, and additional hazards as a result of the disaster e.g. unsafe structures, unstable ground conditions, toxic waste • Address immediate safety concerns including the location of temporary or improvised shelter, on-going disaster risks such as earthquake aftershocks, flooding, health and hygiene risks etc. • Ensure emergency relief activities do not increase the risks to particular vulnerable groups, such as sexual exploitation to secure relief assistance.	<u>Longer term consideration</u> • Involve the affected population in analysing pre-disaster shelter and settlement risks and how to sustainably address such risks • Address safety and security risks through informed programming, including settlement planning, shelter design and construction, material specification and required on-going maintenance of structures, infrastructure and local natural features including watercourses etc.

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Cross-cutting Issue

CC08 Skills and Capabilities		CAT issue – CC08 Skills and Capabilities
Aim The skills and capacities of the affected population are recognised and supported through appropriate training and employment opportunities	**Risk of Inaction** • Relief and recovery activities do not utilise the skills and resources of the affected population • Skills, capacities and resources are not procured locally, limiting the economic benefit to the affected population of the relief and recovery activities • The affected community do not benefit from the enterprise, employment of learning opportunities of the relief and recovery activities.	
Considerations and Actions		
<u>Essential needs of the affected population</u> • Employment, enterprise and personal development opportunities through the relief and recovery activities.	<u>Initial actions</u> • Map existing knowledge, skills and resources within the affected population • Maximise the involvement of the affected population in relief activities through local employment, acknowledging the constraints on individuals and households due to the impact of the disaster • Identify skills and training needs that can enable greater involvement of particular groups and individuals within the affected population • Provide learning and skills transfer opportunities through on the job training, apprenticeships or similar • Promote local procurement of goods and services where this generates additional local employment and training opportunities.	<u>Longer term consideration</u> • Identify gaps in specialised expertise and establish formal training activities to complement longer term recovery and reconstruction activities and to ensure such knowledge is available within the affected community to support on-going maintenance and future growth • Establish enterprise and small business support activities to scale up local capacity to engage on recovery and reconstruction activities and to maximise the longer term economic benefit to the affected community.

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Core Assessment Tool (CAT)

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Shelter and Community (SC)

SC01 Community-Sensitive Design

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To promote integration of shelter and settlement layout design features which supports inclusivity and accessibility for community members.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- Structure of the built environment may not adequately consider the needs of social minorities or marginalised groups.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Participation with community members to:
    a. Establish the different groups within the community
    b. Understand their needs, vulnerabilities and capacities within the community[1].
    c. Understand affordability of both upgrading, constructing and maintaining shelters to help define an appropriate programme implementation.
    d. Understand community / social structures and their effect on the availability of labour and resources for the construction and maintenance of dwellings, community buildings and external spaces.
    e. Establish existing cultural and historical building techniques.
    f. Establish how the different people in the household use and live in their shelters.

2. Participation for this issue must:
    a. Focus especially on marginalised and minority groups as they will know their needs better than others can assess them.
    b. Take place before the initial shelter design stage to ensure key needs highlighted by the beneficiaries can be addressed and so final design decisions for shelter can be responsive to these needs.

3. Identify international, national and local authorities' standards, guidance etc. on community-sensitive design where available and evaluate application to the project / programme as appropriate.

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4. Assess the need to raise awareness on community sensitive design issues over the period of assessment of this issue and in support of community ownership and sustainable management over the life of the development and identify methods appropriate (workshops, leaflets, talks etc.) to convey this to the community and where relevant other stakeholders.

Performance Level 1

5. The Baseline Evaluation requirements have been met.

6. Address community-focused issues relating to the built environment: develop and implement a community sensitive development plan which covers the following (as relevant to the community);

   a. Cultural and traditional customs, religious practices and socioeconomic hierarchies
   b. Gender requirements
   c. Age related needs
   d. Disability
   e. Safety and safety perception in transient community spaces
   f. Privacy.

7. Community-sensitive design considerations: shelter and settlement design should incorporate the following considerations where relevant:

   a. Cultural and traditional customs, religious practices and socioeconomic hierarchies
      i. Location of places of worship (temporary or permanent) accessible to religious demographic
      ii. Design of facilities that take account of situations where women may not be allowed in public spaces frequented by men[3]
      iii. Distribution of support throughout social structures (such as caste systems) to ensure access to facilities is provided for all
      iv. Use of materials and aesthetical finishes that are culturally appropriate.
   b. Gender requirements
      i. Communal shelters offer a measure of gender separation as dictated by cultural norms[2]
      ii. Respect family bonds when allocating shelter
      iii. Consider gender sensitivities, e.g., is it acceptable to mix men and women? Should guidance / permission be sought from women to determine where individuals are allocated shelter?[2]
      iv. Encourage women to be part of the participation and where relevant design process taking account of cultural sensitivities as appropriate. Note: it may be necessary to hold women-only participation sessions to hear their point of view in some instances.
   c. Age related needs (young and old)
      i. Ensure safe and easy access to and within the shelter, considering door widths, corridors and stairways[4]
      ii. Provide design features to improve safety where relevant such as handrails on ramps and grab bars within toilets
      iii. Light switches and electrical sockets should be at a height that everyone can reach[4] (Please note the safety of young people should still considered when positioning these items)

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iv. Provision of child-friendly and adolescent-friendly spaces (disaggregated by sex if cultural norms dictate) for play and learning.

d. Disability
   i. Access, exit and escape routes should be clear of obstacles and navigable for disabled groups[5]
   ii. Access to shelter and community provisions at ground level (preferably) or entrance ramps at an appropriate gradient to ensure independent movement. Where ramps are used ensure the surface has adequate grip, e.g. non-slip floors[6]
   iii. Toilet arrangements that accommodate all disabilities with consideration of appropriate seat height and increased internal space[6]
   iv. Light switches and electrical sockets should be at a height that everyone can reach[4]
   v. Signposting using images or large fonts for the visually impaired[3]
   vi. Materials used for paving and pathways are durable in all weather conditions[7].
e. Safety and safety perception in transient community spaces
   i. Locate public and communal spaces for meetings, places of employment and communal facilities (e.g. shops, toilets, etc.) in secure and accessible areas[8]
   ii. Consider positioning pathways and public spaces to be overlooked by multiple dwellings and ensure access points and routes through the site are direct[9]
   iii. Adequate lighting for safe access and egress of pathways and communal space to ensure these are well lit especially at night[4].
f. Privacy
   i. Consider how local typography and landscaping may enhance / reduce privacy of community members
   ii. Local outdoor practices that require privacy, such as washing and cooking, should not be overlooked or else visual barriers created. (Please refer to the issue “Privacy” for further detail).

8. Incorporating local knowledge in layout, design and construction process: Identify local know-how and methods of organisation, adaptation and housing protection strategies, and integrate these elements in the implemented programmes[13].

9. Plan for awareness raising with the community and other stakeholder as appropriate and where relevant begin this process.

Performance Level 2

10. The Performance Level 1 requirements have been met.

11. Use of community-sensitive guidance: National and local authorities’ rules and guidance are followed to implement community-sensitive design solutions, where these meet the objectives of the issue and where available. Where not available or inappropriate to the aim of the issue adapt and tailor alternative best practice sources so they are appropriate to the context[4].

12. Flexibility and adaptability of shelter: Individual shelters are designed to address the accessibility needs of the community members who will occupy them.

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a. Special efforts have been made to identify, locate, register, and follow-up with people from vulnerable groups
b. Discussions with males and females of different ages within the householders have ascertained their built environment requirements
c. Information is distributed amongst community members that raises awareness on community-sensitive design features for future adaptation, such as accessible or culturally appropriate features
d. Individual preferences have been considered and, where feasible have been met to allow future adaptability. Where alternative appropriate design solutions are specified, relevant community members are informed of the reasoning behind this.

13. Maintain and if relevant build upon awareness raising activities identified in PL1 as appropriate.

Performance Level 3

14. The Performance Level 2 requirements have been met.
15. Raise awareness and support / promote transfer for ownership of maintenance and development of community-sensitive design aspects of the built environment to the community:
    a. Design and build a prototype / pilot building that takes into account a range of design preferences, to raise awareness among the user groups prior to reconstruction of the community
    b. Identify community members for roles within the design and deployment process to promote future ownership (with care not to reinforce marginalisation or any community tension)
    c. Provide training / workshops that raise awareness on the flexibility of design measures and how they can be adapted as the community changes, grows, etc.
    d. The sessions offered promote the needs of marginalised and minority groups widely amongst the community.
16. Monitoring the participation of the marginalised and minority groups: Input from marginalised and minority groups is monitored in the development and implementation of the decision making, construction and maintenance processes, with particular attention to the most vulnerable groups.
17. Performance Level 1 has been achieved for the following issues:
    a. SC02 Privacy.
18. Performance Level 2 has been achieved for the following issues:
    a. SET01 Spatial Planning.

Additional Considerations	
General Considerations	
Identifying Vulnerable Groups	Identifying vulnerable groups and ensuring their continued input is key to community-sensitive design. This can be done by building an 'outreach' approach into assessments, using staff, volunteers and other marginalised people to locate vulnerable people in particular[2]. For example, focus group discussions with women, elderly women

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Additional Considerations	
	and men, people with a disability and young people are quite common for involving these groups in the reconstruction process.
Design features for future adaptation	Examples of design features for future adaptation could be information on how to improve shelters as members of the family age, such as ensuring materials used for walls will take handrails and access can be levelled for wheelchair users or people with reduced mobility.
Cross-cutting Issue considerations	
Participation	To inform community-sensitive design, information concerning shelter design options should be made available and understandable to all members of the community. For example, distributed information should cater for different language groups, non-literate people, the visually impaired and other marginalised groups as appropriate.
Skills and Capabilities	Use the expertise of people with disabilities for planning and implementing accessible reconstruction as they will know their needs better than others can assess them. This cross-cutting issue is addressed as criteria under point 6.
Livelihoods	Ensuring shelters are accessible to all enhances their social mobility and ability to support themselves.
Community Ownership and Sustainable Management	User manuals can be created to assist management of the shelter, explaining how inclusive design features promote accessibility, what steps need to be taken to ensure they are maintained in working order, and giving advice on inclusive service design and management issues.
Resilience	Empowering marginalised groups in the reconstruction process can build their confidence and allow them to be actively involved in the community. Building resilience back into the community as a whole is important for future prosperity.
Safety and Security	The safety and security of marginalised groups, who are more vulnerable to exclusion, violence or abuse should be considered. Building in the perception of safety in the built environment is paramount to this issue. This cross-cutting issue is addressed as criteria under point 2e.
Economic Viability	Encouraging participation of all groups within the reconstruction process allows them to gain confidence and skills that can be transferred into daily life, increasing their ability to support themselves financially.

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Additional Considerations	
Access and Non-discrimination	Ensuring that the built environment is accessible to all and marginalised groups are not discriminated against is vital to ensure inclusivity within the community.

On-going Monitoring and Evaluation

- Documentation from participation processes, workshops, questionnaires
- Copy of the community-sensitive design action plan or other relevant documentation
- Specification details of shelters / facilities that ensure accessibility of the built environment
- Material from awareness raising events.

Case Studies

Tenkodogo, Burkina Faso, 2001[7]

Rating: +1

This case study provides a good example of how agencies in Burkina Faso were able to make water points and latrines accessible to disabled members of the community.

Dakupa, with the support of WaterAid, began to implement a WASH project in several urban municipalities of the region. The objective of this project was to improve access to WASH services for persons with disabilities through the construction of accessible water points (boreholes, standpipes, wells) and latrines. To date, about ten wheelchair accessible standpipes have been constructed, including in the town of Tenkodogo.

Thanks to the opportunities for intervention identified by the Dakupa team through a community meeting, several technological solutions were found to ensure that the WASH project met its aims for equity and inclusion.

Cape Mount, Bomi and Gbarpolu counties, Liberia, 2008[14]

Rating: 0

This case study provides an example of the importance of considering community-sensitive design and collaboration with the community.

Beneficiaries were selected through collaboration with the community, which assisted cooperation and ensured vulnerability categories (including female-headed households, unaccompanied minors, the chronically ill and physically disabled) were considered in the shortlist of potential beneficiaries. The final selection of 500 beneficiaries was carried out by the agency, in collaboration with local authorities and community representatives, after several visits and open meetings.

By considering cultural and traditional customs and taking learning from previous projects, enough supervisors were employed to ensure that they had a face-to-face meeting with each beneficiary once a week. The NGO also carried out checks on site selection as there was a temptation to allocate land to vulnerable beneficiaries that was inappropriate for building. This was solved through joint meetings with the local authorities and community representatives.

The project coordinator stated:

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> "*The project was a success because we were accountable, delivered what we said we would deliver and had constant discussion with the communities themselves. The communities understood that supporting vulnerable people was of benefit to everyone."*

Hurricanes Ivan and Emily, Grenada, 2004[15]

Rating: -1

This is an example of where community-sensitive design could have been further incorporated into the reconstruction process to ensure inclusivity of the community.

Over two years, the roofs of over 650 houses were repaired and 100 homes were built from scratch. Both women and men were trained in hurricane-resistant construction techniques. However, the project did not meet the needs of many of the most vulnerable and often the weakest houses could not get a roof because they needed too much retrofitting. If the beneficiary was elderly, or was unable to undertake construction him or herself, a carpentry team was sent to reinforce and re-roof the house.

The project did not appear to seek participation from all members of the community, including marginalised groups or incorporate local knowledge into the reconstruction process.

Additional Information

Relevant Definitions

Community-sensitive Design: Community-sensitive design aims to remove the barriers that create undue effort and separation. It enables everyone to participate equally, confidently and independently in everyday activities. An inclusive approach to design offers new insights into the way we interact with the built environment. It creates new opportunities to deploy creative and problem solving skills.

Persons with Disabilities: Persons with disabilities are defined as including "Persons who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others"[16].

Other information

PCR Tool 7 "Planning with the People" (IFRC & Practical Action) provides information on participatory approaches to reconstruction and Community Action Planning that support the principles of inclusive design.

The document "Accessibility: How to design and promote an environment accessible to all" (Handicap International Policy Paper 2009) provides examples of difficulties faced by those with disabilities and possible solutions to encourage community-sensitive design (pp 10)[3].

References

[**1**] The Sphere Project, Humanitarian Charter and Minimum Standards in Humanitarian Response, 2011 Edition. pp 11, pp 66.
[**2**] Older people in disasters and humanitarian crises: Guidelines for best practice, Help the Aged International. pp 5.
[**3**] Accessibility: How to design and promote an environment accessible to all, Handicap International Policy Paper 2009. (http://www.handicap-international.fr/fileadmin/documents/publications/AccessibilityBD.pdf)

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[**4**] International Federation of Red Cross and Red Crescent Societies, 2011, "Guidance on including older people in emergency shelter programmes". pp 12.
[**5**] "Compilation of National Progress Reports on the implementation of the Hyogo Framework for Action" (2009-2011), in [http://www.preventionweb.net/english/hyogo/progress/documents/hfa-report-priority3(2009-2011).pdf].
[**6**] Disability Checklist for Emergency Response, Handicap International, Adapted from the Disability Task Force. pp 2.
[**7**] Making it Work, How can water points and latrines be made accessible to people with disabilities? Handicap International. (link here)
[**8**] Papworth Trust, 2008, "Guide to developing Inclusive communities", in [www.papworth.org.uk]. pp17.
[**9**] BRE Global Ltd, "BREEAM Communities. Technical Manual. SD202 – 0.0: 2012". pp106.
[**10**] Handicap International (2008), Toolkit on Protection of Persons with Disabilities. pp 10.
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[**12**] SURFACE Inclusive Design Research Centre, University of Salford, "English Partnerships Guidance note Inclusive Design". pp 6
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[**13**] IFRC and Caritas, "Promoting local building cultures to improve the efficiency of housing programmes" Manifesto on Local Knowledge, 2010.
[**14**] Shelter Projects 2008, A5. Liberia (http://www.sheltercasestudies.org/shelterprojects2008.html).
[**15**] Shelter Projects 2010, A3. Grenada (http://www.sheltercasestudies.org/shelterprojects2010.html).
[**16**] United Nations. Convention on the Rights of Persons with Disabilities.

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SC02 Privacy

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To recognise and encourage shelter and settlement design measures that respect and promote individual and household privacy within the disaster-affected community and minimises the risk of privacy invasion.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with different groups and representative individuals within the affected community and other relevant stakeholders in order to understand:
   a. The privacy needs of the different groups and individuals within the community
   b. The socio-cultural context around how privacy is valued and maintained in the affected community
   c. Current barriers to privacy pre and post disaster
   d. Social structures and hierarchies (castes) which influence the expectations and valuing of privacy and any resulting conflicts with basic human privacy needs
   e. What types of measure would help reduce / eliminate privacy invasion.

2. Identify international, national and local authorities' standards, guidance etc. on privacy where available and evaluate application to the project / programme as appropriate.

3. Consider flexibility and adaptability of shelters for the communities immediate and future needs.

4. Identification of an appropriate specialist (e.g., gender and diversity officer) to help ensure that privacy is considered and applied throughout the reconstruction process.

Performance Level 1

5. The Baseline Evaluation requirements have been met.

6. Household and communal shelter level: integration of privacy into design and layout of buildings, (includes residential, leisure, educational, healthcare, religious community buildings as relevant) supporting basic privacy needs for human dignity and self-value, covering, as a minimum the following areas:

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a. Personal privacy: provision of space for individuals or families / groups, separation for different activities considering the issue of dignity, physical privacy to minimise intrusion. For example to providing separate spaces for sensitive activities such as washing and drying facilities in both household and communal shelters[3].
b. Acoustic privacy: important to be able to communicate and go about family life in private, this should be considered at individual room and building level as relevant[3].
c. Visual privacy: internal and external. Internal includes separate rooms, screens etc. External includes consideration of potential surveillance from surrounding buildings and spaces. Way of addressing this could be through the position of the openings, or use of visual barriers such as simple curtains, blinds, screens and planting[3].
d. Where external outdoor space is provided for a shelter it must aim to maintain the privacy of individuals appropriate to the function of the associated building, for example play areas in a school or drying space in a household shelter[3].
e. Consider and where relevant apply inclusive design practices to allow all households to be designed to take account of the demographics of the population, the family links / composition, in particularly considering the privacy of the vulnerable members of society, paying attention to issues of age, gender and diversity[3]. See **SC01 Community Sensitive Design**.
f. Consider Gender specific pressures in the local context of the community for example in some communities, women bear the primary responsibility for household chores, and therefore the design of the sites and shelters must reflect their needs and should be undertaken with them[5].
g. Shelter security, ensuring the family units and individuals are, and feel, safe and secure in their homes[5].

7. Community settings: Promote privacy within group contexts specific to community needs such as:
   a. Culturally specific activities
      i. Privacy is necessary for certain religious communities such as churches, mosques etc.
   b. Communal facilities
      i. Public spaces may require separation for different users (e.g., between men and women or adults and children)
      ii. The provision of sanitation facilities such as privacy in bathing areas and in toilet facilities and separation to ensure different needs of men, woman, girls and boys[5]
      iii. Healthcare buildings must have adequate privacy for patients, for example consultation rooms are designed to ensure patient's rights to privacy and confidentiality[3]
      iv. Adequate privacy and security for educational buildings and areas such as school ensure that children specifically are given privacy and security to learn and develop. This can be achieved through distinct boundaries, good natural surveillance and positioning within the community[3].

Note: See Performance Level 3 (PL3) point 12. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

8. The Performance Level 1 requirements have been met.

9. Spatial planning: design layout or features of shared public spaces which encourage and support privacy in individual buildings.

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a. Positioning of buildings, paths and road layout. These should have a distinct hierarchy defining public and private space, providing a clear boundary to the ownership and control of each individual dwelling.
b. Ensure that all internal and external spaces are secure, designing out dead spaces and ensuring that places feel secure for all members of society[1].
c. Provide adequate spaces between dwelling which allows design features for individual dwellings to design in privacy and security without being compromised by surrounding buildings. For example not designing entrances facing each other[1].
d. Show extra consideration for families within shelter and public space layouts. This can be achieved by providing spaces that match the intended number of users for each shelter. This eases pressures on privacy and dignity issues within individual shelters[1].
e. Spatial plan should provide an allocation of private space per dwelling, considering the positioning of surrounding dwellings to restrict intrusive views into private spaces[1].
f. Providing appropriate boundaries, for example, adequate planting could be provided as privacy buffers[3].

10. Personal privacy (data)*:* demographics are key to assessing and understanding the needs in the built environment, data protection is critical whilst gathering information about individuals, families and communities. Consider the following:
    a. Ensure that facilities to hold personal information are designed to mitigate potential hazards.
    b. Targeting only data relevant to useful demographic to establish and develop the built environment.
    c. Consider local context and how the agencies work and relate to the local government in each case, this should consider information regarding individuals and also consider information regarding the community. Consideration can be made through clear checklists, research and understanding of the community relationships with agencies and local government[5].
    d. The types and level of details of personal information that goes on the administration documents (e.g. individual / family registration cards)[2].
    e. Guidance should be provided to management staff in handling private personal information e.g. health or ethnicity information[2].
    f. Avoid privacy intrusion by different agencies or groups during data collection. This could be mitigated using registration procedures set up to monitor agencies and issue of registration cards[2].

Note: See Performance Level 3 (PL3) point 12. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

11. The Performance Level 2 requirements have been met.

12. An appropriate specialist (e.g., gender and diversity officer) has been used throughout the reconstruction process to ensure that privacy is considered and applied in the reconstruction process relating to the affected community.

13. Ensure that an individual or group of individuals are made responsible for ensuring that privacy of all groups (e.g., gender, age, diversity) within the settlement is effectively monitored and maintained.

14. Flexibility and adaptability have been built into shelters and the physical environment to help ensure that privacy is maintained and evolves with the community.

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Additional Considerations	
General Considerations	
Contextual challenge	It is important to consider that depending on the context of the country, culture and the specific community the challenges of applying the principles of privacy of individuals will vary. For example in more conservative communities where equal rights amongst the community are not common the challenges associated with privacy may be complex.
Wind effects	When using any kind of material to act as visual screening (e.g., trees, plants, timber), consider the potential damage that may occur in areas prone to high winds and the impacts of these barriers on local wind environments within the community and neighbouring buildings and external spaces.
Cross-cutting Issue Considerations	
Participation	Through effective community participation privacy issues can be addressed at the onset of recovery. Setting out basic privacy for individuals as required and then understanding different demands needed by the community in this local context.
Economic Viability	Individuals and households require privacy to discuss and seek guidance on financial matters to support growth of their economic prosperity.
Skills and Capabilities	Space and privacy to learn is important to support the sustainable development of the community.
Security and Safety	Designing in privacy must consider safe and secure spaces for individuals, families and parts of the community. Without these considerations they cannot be considered private spaces.
Access and Non-discrimination	Through participation practices it's important to consider the diversity of a community in order to provide equal accessibility of privacy to all.
Resilience	Privacy must be included as early as possible in the process of recovery by providing basic provisions at inception of temporary shelters and sanitation facilities.
Community Ownership and Sustainable Management	It is important to empower the community to adapt shelters, spaces and facilities to meet their needs in terms of privacy and security. This may require a degree of flexibility and adaptability in the physical design and layout of buildings and settlement. In support of sustainable ownership, where spaces are considered to be private, the use of that space as private should continue to be used as interned in the long term. This could be considered again in sanitation facilities to ensure that access and separation of spaces for men and women are maintained. The same can be considered for washing spaces.
Livelihoods	See **Economic Viability**.

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On-going Monitoring and Evaluation

- Post Occupancy Assessment: Monitor the upkeep and consistency regarding use of shared communal facilities and important aspects of privacy, specifically the allocating of toilets in relation to different genders.
- Monitor community balance and consider changing cultural requirements that could influence and impact, this can be done through regular surveys by independents but also by local authorities and agencies acting in the area.
- Organising community meetings and feedback to try and create a safe place for issues to be voiced and tackled as they emerge.
- Monitor shelter usage to identify that population growth and shift are not threatening the privacy provision and security in shelters.

Case Studies

Floods, Pakistan, 2010[7]

Rating: 0

This pilot project built 175 one-room shelters for flood-affected families in South Pakistan. It was later followed by a much larger scale project (building thousands of shelters over 18 months). Working through partners, the agency provided the construction materials and paid for skilled labour. Each shelter was built from burnt brick and had an accompanying kitchen and latrine.

The projects were flexible for the different needs of each village, depending on the social situation and the preferred balance of shared facilities and privacy.

To meet individual community requirements, one village, consisting of one extended family, built communal toilets and washing facilities. In other villages where families wanted more privacy, houses and individual toilets were built in long rows.

Volcanic Eruption, DR Congo, 2002[7]

Rating: -1

15,000 houses were destroyed with 87,000 people made homeless from the volcanic eruption. The recovery effort was based on a self-build scheme with technical support, however the technical support compromised the settlement layout, structure and in turn the individual privacy of within the community.

Households normally divided their houses into separate rooms, so the transitional shelter was designed to allow families to partition the space using their own materials or plastic sheeting provided by agencies. However, for families of eight or more people, space was insufficient and some beneficiaries felt that the plastic walls compromised their privacy and security. It was easy to see what people were doing at night due to the shadows cast on the plastic by lamps and people were worried that the plastic sheeting could be easily cut by thieves.

Earthquake, Duzce City, Turkey, 1999[8]

Rating: -1

Turkey faced two major earthquakes -7.4 and 7.2 Richter magnitudes- which affected deeply the public routine and the sustainability of the urban growth and development with the city of Duzce effective particularly badly.

In terms of privacy the short term and long term implication of disaster recovery there are different conclusions, with temporary constructions meeting the urgent needs of families affected by disaster

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(i.e. shelters, sense of secure, safety, privacy and daily life requirements). With internal designs receiving relatively 'higher satisfaction level is because of the stage of privacy with multi-roomed character and size of the units.' [8]

However, long term implications were not considered, with complaints about issues with basic design principles as opening the side of the doors through the neighbour units and missing the individual privacy.

Additional Information

Relevant Definitions

Data Privacy: This relates to the collection and dissemination of data, technology, the public expectation of privacy, and the legal and political issues surrounding them. Privacy concerns exist wherever personally identifiable information is collected and stored – in digital form or otherwise. Improper or non-existent disclosure control can be the root cause for privacy and security issues.

Personal Data: Any information relating to an identified or identifiable person ('data subject') who can be identified, directly or indirectly, in particular by reference to an identification number or to one or more specific factors (physical, physiological, mental, economic, cultural, social).

Privacy: A state in which one is not observed or disturbed by other people (Oxford Dictionary). This considers acoustic, visual and also personal privacy in terms of information.

Vulnerability: "Vulnerability, in the context of a disaster, can be defined as the diminished capacity of an individual or group to anticipate, cope with, resist and recover from the impact of a natural or man-made hazard. The concept is relative and dynamic. Vulnerability is most often associated with poverty, but it can also arise when people are isolated, insecure and defenceless in the face of risk, shock or stress" [10].

Other Information

None.

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SC03 Internal Environment

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To ensure that the internal environments of individual shelters and community facilities are healthy and comfortable for the occupants.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Through a combination of investigation and assessment and undertaking facilitated interaction and participatory activities, determine appropriate internal environment requirements of the affected community. The assessment / participatory actions should include / cover, as a minimum:
   a. An assessment of the local climate and its impact on the internal environments.
   b. Cultural considerations of how shelters were previously designed, how these designs managed internal comfort, and whether these were healthy for the occupants.
   c. An analysis of what the affected community would consider being “comfortable” and important for internal conditions.
   d. Assessment and consideration of the relevance and applicability of construction codes / standards native to the country the assessment is being carried out in or international as feasible for use to support the achievement of the issue aim.

Performance Level 1

2. The Baseline Evaluation requirements have been met.

3. Produce and implement an internal environment strategy to demonstrate how the indoor conditions of all shelter types can be effectively controlled. This strategy should include as a minimum:
   a. Vector control
   b. Thermal comfort
   c. Internal air quality
   d. Lighting
   e. Control of noise.

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4. Incorporating local knowledge in layout, design and construction process: Identify and consider local know-how and methods of organisation, adaptation and housing protection strategies, and integrate these elements in the implemented programmes as relevant[13].

   The detail for above is provided in the following points. This should be applied as relevant to the climate within and context relating to the assessment.

5. Vector control: the shelters must be designed to minimise the entry of disease vectors such as pests and mosquitoes.
   a. Avoid gaps between construction elements of the shelters (e.g., walls, floors, roofs and openings) that could allow the ingress of vectors
   b. Ensure that materials selected for construction and junction details are resilient to attack by pests so minimising entry risks.
   c. Where appropriate, ensure that openings (entry / exit ways, windows, doors, ventilation openings, chimneys etc.) can be closed effectively.
   d. Where appropriate, ensure that openings are covered in an appropriate material (e.g., gauze or mesh) to allow air to flow but prevent vector entry.

6. Thermal Comfort: shelters should be designed to ensure optimum *internal temperature* comfort*, where possible.*
   a. Solar design: consider the use of solar energy to contribute to thermal comfort
      i. Orientation: seasonal changes in the sun's path make it possible to build a shelter that is more naturally cool in the summer and warm in the winter[2].
         – Ensure that heat gain is optimised. In cooler climates, it is likely that heat gains should be maximised. In warmer climates, it is likely that daytime heat gains should be minimised
         – Ensure sufficient daylighting in shelters to allow basic internal tasks to be undertaken without the need for artificial lighting. The amount of daylighting should be balanced with other issues including thermal comfort levels, glare, and privacy
      ii. Shading: external shading can be used to limit the admittance of direct sunlight in order to avoid excessive solar gains and glare and solar heat transmission through the structure, especially in summer[2]. Internal shading can be used to limit the admittance of direct sunlight.
         – Steps should be taken to ensure that shading devices are properly designed, sized, and orientated based on the local sun paths.
   b. Construction: use appropriate construction methods to contribute to thermal comfort.
      i. Insulation: Although spatial orientation should be the first design consideration, insulation is also necessary to reduce unwanted heat loss or gain and reduce the potential need for mechanical systems to regulate internal temperatures.
         – Consider the use of insulated attics or roofs in order to reduce excessive solar gain and unwanted heat loss. In locations where there is potential for summer overheating and winter chilling, consider the use of exterior insulation or shading to maintain the ability of the building structure to provide thermal mass[2]
         – In cold climates, all components of the building envelope should be designed and insulated to minimise heat loss[1]
         – In cooler night time climates, consider the use of insulated shutters, drapes and double-panes to improve the thermal performance of windows[2]
         – In consistently warm, humid climates, thermal insulation should not be used on the walls as this will trap heat and, with some materials, moisture inside the shelter. Insulation should be used only for roofs and possibly walls exposed to direct solar radiation[2] for long periods of time.

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ii. Thermal mass: using thermal mass is an energy efficient way of managing internal temperatures in some climates. The heavier the weight of construction, the more stable the temperature of the shelter is likely to be in fluctuating conditions. This heat storage is referred to as thermal capacity. The thermal mass of the structure should be balanced with other considerations. Refer to the Additional Considerations below for additional information.
   – In warm, humid climates, the construction of the shelter should be relatively lightweight, as low thermal capacity is required[1]
   – In hot, dry climates with cooler nights, heavyweight construction should ensure high thermal capacity, allowing changes in night and day temperatures to alternately cool and heat the interior. Where there is less diurnal temperature fluctuation, lightweight construction may be more appropriate, providing there is adequate insulation[1]
   – In cold climates, heavyweight construction with high thermal capacity should be specified for shelters that are occupied throughout the day to trap daytime heat production. Lightweight construction with low thermal capacity and high levels of insulation is more appropriate for shelters that are occupied only at night[1]

c. Systems to regulate internal temperature: many shelters in moderate and cold climates will require some form of space heating, especially in winter months. The method of heating should be as safe and energy efficient as possible, whilst providing sufficient heat and controllability to make the space comfortable for the occupants. Adequate ventilation of the heat source must be provided.
   i. In cold climates, stoves or other forms of space heaters will be essential and must be appropriate to the shelter[1]. Heat output should be controllable with fittings correctly sized to, and appropriately located within the shelter and properly considering activities taking place within it. As heat will be required for significant periods of time, the responsiveness of the system is less critical than in other climates
   ii. In more variable climates and/or locations where occupation of a shelter is more sporadic, more responsive systems will be required to avoid waste and maintain comfort
   iii. Some shelters may require mechanical cooling. It is important that these systems are correctly specified, installed and maintained to ensure that they are suitable to the context and function correctly. Wherever possible mechanical cooling should be avoided as it presents a high maintenance burden and associated costs.

7. Internal air quality: shelters should be designed to ensure that the internal air quality is safe / healthy and comfortable for the occupants.
   a. Ventilation: adequate ventilation is important to ensure fresh air, cooling for comfort, and heat removal from the shelter. A well-ventilated shelter design must consider climate, adjacent topography, and vegetation, as well as local wind and airflow patterns, all of which impact shelter ventilation.
      i. Natural ventilation: natural ventilation strategies should be favoured over mechanical ventilation systems, wherever feasible. This is because mechanical ventilation systems are more expensive and require energy to operate and money and skills to maintain.
         – In warm, humid climates:
            • Large openings for good ventilation and air flow both in the walls and on the roof should be provided, provided they are effectively protected from the penetration of solar radiation, rain, and where appropriate vectors[2]

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- Consider the use of raised floors and high ceilings to increase ventilation and improve comfort
- Passive stack techniques can be used to promote ventilation in deeper plan buildings or densely developed communities
- Cooler air for ventilation can be drawn from cooler shaded areas near the ground and from landscaping with significant planting[2].

– In hot, dry climates:
- Position door and window openings away from the direction of the prevailing wind to minimise penetration by hot winds and heat radiation from the surrounding ground[1]
- Consider the use of high ceilings to increase ventilation and improve comfort
- Cool air for ventilation can be drawn from cooler shaded areas near the ground and from landscaping with significant planting[2].

– In cold climates:
- Minimise air flow by improving the air-tightness of the shelter, particularly around door and window openings and junctions between major building elements, to ensure personal comfort while also providing adequate local ventilation for space heaters or cooking stoves[1]
- Ventilation rates should be adequate to prevent mould growth.

– Placement of openings: proper window placement and interior design can capture cool breezes in the summer and increase comfort significantly.
- In hot climates, place doors and windows on opposite sides of a shelter to make use of natural through-draft cooling
- To improve interior airflow, internal doors should have a gap of one or two inches above the floor level, and vents and windows should be placed above the doors[2]. Consider the vector control of linked rooms in such instances in areas such as where insect borne diseases are a risk
- Inlet openings in shelters should be well distributed and should be located on the windward side at a low level. Outlet openings should be located on the leeward side. In extreme wind conditions, additional protection is likely to be required (e.g., windbreaks, buffer zones, shutters).

ii. Mechanical ventilation: where sufficient natural ventilation is not possible, mechanical ventilation may be necessary. It is important that these systems are correctly specified, installed and maintained to ensure that they are suitable to the context and function correctly. Systems should be simple to operate and maintain, avoid reliance on complex sensors and control systems and should be easily understood and maintained by the occupants.

b. Extraction of air: to ensure that unpleasant or unhealthy air is removed from the shelter.
   i. Any heat source / stove must be installed and maintained correctly to ensure that smoke, carbon monoxide and other pollutants are extracted safely[4]. Consider the risks posed by extracted flue gases and particles to neighbours
   ii. Areas such as enclosed sanitation facilities and cooking areas may require air extraction to remove unpleasant or unhealthy air

c. Humidity: the shelters are designed to control humidity through adequate ventilation, as moisture creates conditions for the growth of fungi, mould and mildew.

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8. Lighting: ensuring that there is adequate lighting to carry out necessary tasks in shelters.
    a. Natural light: the shelters should have sufficient openings to ensure that occupants have access to natural light, whilst balancing other issues including thermal comfort levels, glare, and privacy.
        i. Consider the proximity of the shelters to other objects (other structures, trees, etc.) that could potentially limit the availability of natural light
        ii. Window heads should generally be above standing eye height. Sills, normally, should be below the eye level of people seated. Transoms should not obstruct significant parts of the view from normal standing or sitting positions[5]
        iii. Consider the use of rooflights to supply daylight to deeper plan spaces, or spaces with no external walls. In hot climates, rooflights may not be appropriate due to the difficulty in providing adequate shading
    b. Artificial light: where sufficient daylight is not available, artificial lighting should be provided. The level of light required will depend on the function of the space.

9. Control of noise: ensuring that the acoustic performance of the shelter is appropriate.
    a. Noise levels: indoor noise levels should be minimised where the health of individuals may be affected (e.g., hearing impairment, sleep disturbance, annoyance).
    b. Organisation: spaces should be organised appropriately to ensure that noise-sensitive spaces are isolated from more noisy environments.
    c. Sound insulation: appropriate sound insulation should be used between occupied spaces and adjacent shelters, especially acoustically sensitive spaces, in order to provide privacy.

10. Ensure consideration is given to specification of approaches / solution fitting to the culture and resources available (parts, financial etc.) to allow continuous operation of and easy maintenance over the life of the development.

Performance Level 2

11. The Performance Level 1 requirements have been met.

12. The detail in points 5 to 9 has been applied as relevant to the climate within and context relating to the assessment and also considered for the other points within this performance level.

13. Shading: Where specified, the aesthetics of shading devices should be considered, in order to ensure acceptability by the affected community.

14. Performance Level 1 has been achieved for the following issues:
    a. SC01 Community-Sensitive Design
    b. SET03 Spatial Planning.

Performance Level 3

15. The Performance Level 2 requirements have been met.

16. Performance Level 1 has been achieved for the following issues:

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a. SC02 Privacy.

17. Performance Level 2 has been achieved for the following issues:
    a. SC01 Community-Sensitive Design
    b. SET03 Spatial Planning.

18. Ensure that an individual or group of individuals are made responsible for ensuring that the internal environments of shelters are effectively monitored and maintained. This is likely to include on-going assessments of different shelter types.

19. Volatile Organic Compounds (VOCs): the shelters are designed to minimise the use of internal finishes and fittings (e.g., some paints, lacquers, solvents and adhesives) with high emissions of VOCs.

Additional Considerations	
General Considerations	
Climatic design	Although guidance is provided for different climatic situations, the guidance may not be directly applicable in some circumstances. Consult appropriate experts in climatically responsive building design in such instances to ensure that the solution meets the specific context.
Controllability	Shelters should enable the occupants to have an element of control over their internal environment to accommodate different lifestyles and personal preference.
Food and water storage	The shelters should be designed to provide adequate and clean storage for food and water at an appropriate temperature.
Internal daylighting design	Internal design and surface finishes can all help to distribute and redirect daylight. Light coloured and more reflective materials can be used to reflect light around a room although consideration should be given to glare avoidance as this can present significant health and safety issues if not adequately controlled.
Separation of occupants from animals / livestock	The shelters should be designed to provide adequate separation between the occupants and any animals / livestock. Livestock can provide useful heat in colder climates and careful planning can allow this to be used to provide heat to the shelter itself.
Shading Devices	External shading structures, vertical fins, shutters, shades, overhangs or trees can all be used as shading devices. Shading should be designed to meet the specific locational requirements
Site modification	Shelters should be sited to control adverse, and make use of positive, climatic gains. Consider the use of winter sun, summer shade, mild breezes, and protection from severe winter winds[2] as appropriate. If a less-than-ideal site must be used for the construction, the site can often be improved by landscaping. Big shade trees to the east

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Additional Considerations	
	and west are most important. Windbreaks can be used to block severe winds or direct cooling breezes[2].
Thermal Mass	The context must be considered when thinking about using heavyweight structures, including seismic risks (where they can pose significant risks of collapse and risks to life), cultural considerations and any potential unnecessary financial burden to the project or family.
Hydrological	Adequate surface water drainage should be ensured around the shelter together with the use of raised floors to minimise the risk of water entering the covered area[1]. Roofs should have a sufficient pitch for rainwater drainage, above 30° for normal tiles and thatch and above 20° for well-lapped corrugated iron sheeting. Generous overhangs help to protect the openings from water penetration during rainy seasons, but should be avoided in locations vulnerable to high winds[2].
Meteorological	Shelters should be designed to be able to provide protection against sandstorms to reduce the impacts on the internal environment[2].
Cross-cutting Issue Considerations	
Participation	Cultural context and priorities must be considered to ensure that the shelters are designed appropriately. Understand what a comfortable internal environment means to prospective occupants (e.g., comfortable range of internal temperatures).
Skills and capabilities	A range of media exist to disseminate information to the community on appropriate construction and detailing methods and maintaining their internal environment and how to appropriately maintain their internal environments. Appropriate media should be used to support skills and capability building in the community in the short and long term.
Livelihoods	Shelters should be able to support livelihood activities without causing undue impact on the indoor environment in living areas. This means that shelters will need to be adapted to their function. Where livelihood activities produce smoke or fumes, suitable extraction must be used. Where detailed tasks are taking place, sufficient light must be available.
Community Ownership and Sustainable Management	The internal environments of public shelters should be monitored and maintained effectively. Measures to ensure a safe and comfortable internal environment should be easily operable and maintainable by the affected community.
Resilience	Shelters should provide protection from the climate, including extreme weather events.

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Additional Considerations	
	Shelters must be designed to be robust and durable in order to reduce the need and frequency for maintenance. This includes the choice of materials that will be durable in the climate with due consideration given to the effects of heat, frost, solar radiation, salt spray, pollution, dust etc.
Security and Safety	Ensure that safety / security of openings (windows and ventilation) is considered to reduce the potential risk to life and property.
Economic Viability	The construction, operation and maintenance of the shelters must be economically viable. Therefore, measures to support a safe and comfortable internal environment must be cost-effective.
Access and Non-discrimination	Structures should be designed to be appropriate for all user groups, regardless of age, disability, gender, etc.

On-going Monitoring and Evaluation

- Undertake satisfaction surveys on how people perceive their level of internal comfort.
- Undertake technical monitoring to establish that shelters provide:
  - Thermal comfort (with minimal use of systems to regulate internal temperatures)
  - Healthy internal air quality
  - Adequate daylighting and artificial lighting, where necessary
  - Control of noise.
- Maintain records of all assessments and surveys carried out for reference and to inform future development.

Case Studies

Earthquake, Yogyakarta, Indonesia, 2006[6]

Rating: -1

A number of different housing design approaches were attempted by the various organizations working in housing recovery in Yogyakarta following the earthquake. In an attempt to cut project costs, increase sustainability and hazard resilience, improve (modernise) appearance, and address environmental concerns, monolithic dome houses were installed in the village of New Ngelepen. These structures were considered advantageous for a number of reasons, including their high levels of thermal mass and resistance to damage by vectors.

The shelters were a highly cost-effective option. However, they were very different from what the local population was accustomed to, and as such they initially rejected them outright. Recipients found the shape and appearance attractive, but they questioned whether it fit with their culture, and did not believe it to be suitable in a tropical climate. Initially, very little consultation had been conducted to assess the suitability of the homes, and involve recipients in the decision to select the dome design. After the domes were constructed, the donor worked with recipients to modify the domes such that they were more acceptable, including the addition of outside gardens, an external kitchen, awnings, and other minor changes. This was effective in gaining the support of the affected population.

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Earthquake, Sumatra, Indonesia, 2009[7]

Rating: +1

An owner driven project, where cash was distributed to allow 750 families to build transitional shelters. It built on the initial emergency shelter response in West Sumatra that had been supplied to 30,000 families. Each beneficiary household received approximately 275 USD and technical training on safe construction and minimum standards for shelter. A partner organisation provided technical advice on construction which included advice on adequate ventilation and drainage strategies.

Floods, Romania, 2010[7]

Rating: +1

This project mobilised 497 volunteers to help build and repair half of the homes damaged by the floods. It also built or repaired three schools. It managed to use donated materials and supplied families with materials and technical assistance to support self-help home repairs and renovations through resource centres. Aerated thermal blocks were provided for new build shelters due to the availability of the materials and suitability to the temperate climatic conditions. Polystyrene insulation was extensively used for wall insulation both in new build and refurbishment projects.

Additional Information

Relevant definitions

Overhang: an extension of a roof structure over a wall structure or a dedicated projection above an opening to provide shading and prevent water ingress.

Shutter: a cover (often hinged) for an opening which may be louvered, solid timber, fabric, etc.

Shade: an object used to minimise solar gains (e.g., a fabric curtain, timber screen).

Thermal Comfort: The term ‘thermal comfort’ describes a person’s state of mind in terms of whether they feel too hot or too cold.

Thermal Mass: the mass in a shelter (including the structure and the furnishings) that is used to absorb heat when internal temperatures rise and then to release the heat as the shelter cools

Vector: A vector is a disease-carrying agent (e.g., mosquitoes, flies, ticks, fleas, rats and mice).

Ventilation: the circulation of air around a building and the exchange of air to the outside.

Vertical Fins: vertical elements that project outwards around a window or opening in order to limit solar gains.

Volatile Organic Compounds (VOCs): Any organic liquid and/or solid that evaporates spontaneously at the prevailing temperature and pressure of the atmosphere with which it is in contact.

Other Information

None.

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References

[**1**] The Sphere Project. Humanitarian charter and minimum standards in humanitarian response. 2011.
[**2**] WWF US, American National Red Cross. Green Recovery and Reconstruction Toolkit (Module 6: Construction).
[**3**] DFID, IOM, Shelter Centre: Transitional Shelter Guidelines.
[**4**] UNHCR. Cooking Options in Refugee Situations.
[**5**] BS8206-2:2008. Lighting for Shelters: Part 2: Code of practice for daylighting.
[**6**] UNDP, ISDR. Guidance Note on Recovery: Shelter.
[**7**] IFRC. Shelter Projects 2010. Geneva, 2012.
[**13**] IFRC and Caritas, "Promoting local building cultures to improve the efficiency of housing programmes" Manifesto on Local Knowledge, 2010.

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SC04 Construction Approach

Applicable at PAT	This issue is not applicable at the PAT stage

Aim

To recognise and encourage the selection and application of construction methods that are environmentally sound and appropriate to the location and needs of the community.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Shelter and community infrastructure assessment: Identify qualified professional(s) to carry out an assessment of the state of existing structures to determine:
   a. The extent and severity of damage to existing buildings, i.e. whether they are functional, can be repaired / reused or if medium / large scale reconstruction is necessary. Establish why damage has occurred (structural deficiency, etc.) and if existing maintenance plans are available.
   b. Whether structures are safe to use now, appropriately and capable of meeting the functional needs for which they are being used, and if they could withstand future risks. A hazard assessment should include all locally occurring hazards (not just that of the most recent disaster) and whether new site conditions are present as a result of the disaster.
   c. Whether services to buildings (water supply, electrical supply, etc.) are still functional, could be reinstated through minor repair or require upgrading (for safety / quality reasons).
   d. How the natural environment is / has been affected by damage to shelter and community infrastructure. This information could be sourced from an Environmental Impact Assessment (EIA) if available.
   e. People and communities affected by the disruption to shelter and community infrastructure (see **definitions**).
   f. Key stakeholders and their roles in rehabilitation of engineered and non-engineered buildings, including local professionals who have an understanding of construction.
   g. Availability of appropriate skills and material resources to enable adequate repair and maintenance of existing buildings and other structures.

2. Assess and identify appropriate codes and standards to help ensure good quality construction:
   a. If local and national building codes exist determine if they are appropriate to the local context and how these should be used or tailored for design of shelter and community infrastructure in the community.

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   b. If building codes do not exist assess whether international building or other relevant codes can be tailored to the local culture, climatic conditions, resources, building and maintenance capacities, accessibility and affordability to provide a framework[1].

3. Participation: Undertake participatory activities with the community and other key stakeholders to analyse their needs, activities and interest so that these can be taken into account in the design of shelter and community infrastructure. Establish:
   a. How shelters and community infrastructure (non-engineered and engineered) performed before the disaster and whether any functional issues existed.
   b. If local or national building codes for non-engineered and engineered building construction exist within the country.
   c. Local hazards, climatic conditions or seasonal variations that have affected shelters and community infrastructure in the past (i.e. as well as considering the current disaster).
   d. How people use and live in shelter and community infrastructure including key cultural needs / considerations.
   e. Typical construction methods, materials and technologies used by the community and key stakeholders and the availability of individuals with local building skills and good workmanship.

Performance Level 1

4. The baseline evaluation criteria have been achieved.

5. Shelter and community infrastructure planning: Coordinate repair and reconstruction of building assets (shelter, hospitals, educational facilities etc.) by creating a robust reconstruction and repair plan. Consider:
   a. Information gathered from the shelter and community infrastructure assessment to determine how existing structures can be rehabilitated for reuse and how to maximise structural safety of the facility now and in the case of future risks.
   b. Use of appropriate codes and standards to help ensure good quality construction.
   c. Local culture and climatic conditions in terms of design to ensure appropriateness to the context (e.g. microclimatic comfort, required ventilation, efficiency of services, aesthetically acceptable to beneficiaries).
   d. Financing of shelter and community infrastructure reconstruction and future maintenance.
   e. Resiliency and risk planning for shelter and community infrastructure, including how design minimises risk from potential future hazards.

6. Engaging qualified professionals: Qualified professionals should be involved throughout the planning, design and implementation phases of engineered structures. Their responsibility should include:
   a. Identifying construction-related risks.
   b. Developing a Health & Safety plan with the intention of keeping the workforce safe.
   c. Addressing local approaches / regulatory frameworks to ensure safe construction.
   d. Planning for welfare facilities on sites.
   e. Creation and implementation of a quality assurance system to allow for accountability in the construction process.

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7. Reuse / rehabilitation of engineered buildings / structure: Undertake a triage of critical community infrastructure and carry out repairs or other rehabilitation works to ensure the structure is fit for reuse now and in the event of future risks.

8. Use of local construction skills and knowledge: Design of shelter and community infrastructure should give due consideration to social and economic impact of the programme. This includes:
   a. How the design has evolved from information gathered through participatory activities (see **criterion 2**).
   b. Provision of any necessary training to establish and enhance local knowledge, experience, skills and workforce contribution (e.g. for local service providers, site workers, residents, local authorities, etc.) not only for initial construction but also for future maintenance and renovation.
   c. Promotion of safe and culturally acceptable construction approaches, such as enhancing existing building practices to improve resilience, appropriate to the building type.
   d. Selection of an approach to construction that is appropriate to the context of the programme for example :
      i. Self-build or community-build (including a Memorandum of understanding so that needs / expectations can be managed)
      ii. Contracting of works to one or more construction companies. If this is chosen good contracts, specifications and drawings should be agreed
      iii. A combination of utilising the contracted supply of labour or materials to complement a self or community build approach.

9. Construction type and technologies: In the choice of the building technologies and construction type the design demonstrates how the following were considered and optimised:
   a. Procurement and tendering processes (local, national, regional, global) and the required supply chain particularly transportation and handling.
   b. Appropriateness for the climate and natural environment
   c. Required construction, repair and maintenance skills and local availability.
   d. Required consumables (such as nails) and tools (both temporary and permanent).
   e. On-going maintenance requirements.

10. Construction and implementation: The construction of the shelter and community infrastructure is carried out in line with the developed plan with an appropriate monitoring process defined and signed-off by a qualified professional. The process is tailored to the programme context and engages key stakeholders and beneficiaries, for example:
    a. Safety risks identified in planning have been mitigated.
       i. Construction site health and safety standards and process are in place to established international standards as a minimum
       ii. The time of year (climatic season, cultural season)
       iii. Capacities of beneficiaries and key stakeholders (complexity, timescales, monitoring of construction process)
       iv. Local material availability and recyclability
       v. Financial constraints and opportunities
       vi. Guarantee periods are in place for maintenance of newly constructed / repaired shelters / community infrastructure.

11. Operation and maintenance: Ensure future maintenance and operation is considered from the outset of the programme to ensure beneficiaries or other stakeholders can take ownership and responsibility of future upkeep:

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a. Avoid complicated technical installations (plumbing, electrical systems, etc.) so future repairs can be managed. Maintenance should be:
   i. Economically feasible
   ii. Possible using locally available materials.
b. Promote the importance of on-going maintenance through a range of media (to allow all members to engage with the programme), such as:
   i. Maintenance guides relevant to the building design and materials used. (Technical specifications, drawings and other references to completed construction works can help in the creation of guides[2])
   ii. Meetings with key community members and leaders
   iii. Radio or TV messages.

12. Environmental impact of shelter and community infrastructure: Consideration is given to the environmental impact of the construction approach to the local context. For example:
    a. Water use for construction
    b. Energy use for construction
    c. Impact of materials selection.

Performance Level 2

13. The Performance Level 1 criteria have been achieved.

14. Adaptability of shelters and community infrastructure: Engineered and non-engineered buildings have been designed and constructed so that they can be adapted, expanded or upgraded to account for changes in future needs. For example:
    a. Buildings can be adapted to meet the changing spatial needs of occupants such as expansion.
    b. Buildings can incorporate new or additional materials or technologies to increase the specification and performance.
    c. Buildings can incorporate design and construction changes to enhance the resilience of the structure and occupants to emerging or increased risks.
    d. Adaptability must not compromise resilience of shelter and community infrastructure.

15. Construction and implementation: Construction of shelter and community infrastructure is documented for future use; for example:
    a. A statement of shelter and community infrastructure criteria is produced identifying hazards, loads and space, function and accessibility requirements which can be reused in the local area.
    b. Monitoring and near-miss reporting is carried out by the agency to be used to inform future construction programmes to reduce health and safety risks.

16. Using the construction process for positive behaviour change: The process of constructing shelter and community infrastructure demonstrates educational value and embeds good practice into the community. For example:
    a. Construction of a demonstration building with beneficiaries to be used as an example of best practice and an education tool.
    b. Advocating safe and resilient construction practices within the whole community and local / regional governments.
    c. Providing training of the trainer (TOT) training so that the principles of construction and maintenance are understood and applied by beneficiaries.

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d. Providing training of the trainer (TOT) training so that individuals/contractors can implement their own quality assurance systems. These individuals can then act as trainees in their own communities or organisations as a result.

17. On-going operation and maintenance: Ensure that on-going maintenance is addressed and key individuals appointed to carry out future maintenance:
    a. Provide training in building maintenance to maximise the lifespan of the materials and their performance. According to the users' level of knowledge, this may include information about general cleaning, small repairs, ensuring required surface water drainage from roofs and surrounding areas, and how to use the sanitary facilities[2].
    b. Provide access to or information from the material suppliers, contractors or project management agencies regarding maintenance issues.
    c. Financing of future maintenance tasks.

Performance Level 3

18. The Performance Level 2 criteria have been achieved.

19. Appropriately qualified individuals have been used throughout the reconstruction process for construction approaches used and related tasks as relevant.

20. Performance Level 1 has been achieved for the following issues:
    a. MW03 Post Disaster Waste Management.

21. Performance Level 2 has been achieved for the following issues:
    b. SC01 Community Sensitive Design
    c. MW01 Materials Properties and Specification
    d. MW02 Materials Sourcing
    e. MW04 Construction Waste Management.

Additional Considerations	
General Considerations	
Critical community infrastructure	Schools and health centres are critical infrastructure and need to remain in operation after an emergency. They need to be designed and constructed to higher specifications than housing and should be resilient to ensure continuity of operation.
Standard engineered building layouts	Standard building layouts and specifications for schools and public health facilities are sometimes provided by local and government authorities. These could be used as starting points for developing these facilities as per local standards and best practice. These standard designs may be required to be modified to meet specific site or functional requirements.
Rebuilding communities	Where community rebuilding is undertaken the opportunity to rationalise planning to include evacuation routes and strategically address services provision and the location of critical infrastructure

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Additional Considerations	
	should be considered rather than rebuilding by repeating the pattern of organic growth and siting public buildings as before.
Construction management	Careful implementation and management is crucial to deliver quality building products and infrastructure. Consider establishing a team for the management of the implementation from the onset of planning phase.
Routine checks	Where local community is involved in construction process establish a schedule for routine checks by supervisors to regularly monitor construction activity, use of materials, quality, etc.
Temporary shelters and transitional shelters	Temporary shelters and transitional shelters are not directly referenced within the criteria of this issue. As this issue focuses on permanent shelter provision, the user of the tool should define the structures that are present within the community and how these can be integrated into the shelter and community infrastructure planning. Consideration should be given to: 1. Dismantling structures to be recycled for use in permanent shelter solutions. (See **reuse of temporary shelters** below). 2. The life expectancy of temporary shelter, and therefore the assumed materials and design performance. 3. Alternative functions that temporary shelters or material components can perform. This could include the reuse of materials as part of the permanent solution or the upgrading of the temporary structure to provide a more durable solution.
Reuse of temporary shelters	Based on the post-disaster utilisation of the temporary structure or reuse of its basic construction temporary shelters can be reused for following purposes. 1. On site utilisation: - Upgradeable housing: While being inhabited, the temporary shelter is improved to become a permanent housing. This is achieved through maintenance, extension or by replacing original materials with more durable alternatives. - Adapting structures: Following the construction of a permanent housing solution, the temporary shelter is used for a purpose other than housing, such as a shelter for animals, a kitchen or for storage (applicable in less-dense urban areas). - Recycling: The temporary shelter is inhabited while parallel reconstruction activities are taking place. The temporary shelter is gradually dismantled during the reconstruction process and the materials from the transitional shelter are used in the construction of a durable home. 2. Off-site utilisation: - Sale for reuse: The temporary shelter is inhabited while parallel reconstruction activities are taking place. Once reconstruction is complete, the temporary shelter is

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Additional Considerations	
	dismantled and its materials are used as a resource to sell. Therefore, materials need to be selected for their suitability for resale after the shelter is dismantled.
Cross-cutting Issue Considerations	
Participation	Involve the affected population in the planning, design, decision making and implementation of the shelters. Ensure a balanced participation of men and women to enable them to define their housing needs.
Skills and Capabilities	Building skills and capabilities within the local community in building construction and quality control as required.
Livelihoods	Employing members of the affected community in construction process can provide a means of livelihood for those affected even during the reconstruction process and over the life of the development through operation and maintenance activities.
Community Ownership and Sustainable Management	See **Skills and Capabilities**. Activities of the types mentioned help to develop and strengthen a sense of ownership and also promotes sustainable management over the life of the community. Activities of this type support operation and maintenance activities over the life of the development and therefore livelihood creation and so the economic viability of the development.
Resilience	Structural design and detailing should consider all hazards occurring in the local area, for example seismic, flooding, wildfire and typhoon resilience.
Security and Safety	Provide personal protection equipment to all those involved in construction.
Economic Viability	Ensuring appropriate construction technologies etc. helps to ensure on-going viability of the building stock by reducing maintenance and adapting costs and use of non-local skills.
Access and Non-discrimination	Information dissemination, skills and capability building activities, should be open and accessible to all.

On-going Monitoring and Evaluation

Regular monitoring and evaluation must be carried to ensure quality of construction. Monitoring and evaluation can be carried out by selecting a few key indicators and then collecting and summarising them on a regular basis (weekly or fortnightly)[2].

- Ensure site supervision
- Undertake testing of construction elements and maintain records of testing[2]
- If any deviations from set indicators are identified then cause of the deviation and any remedial measure taken must be recorded
- Record evidence of training that has taken place, e.g., leaflets / presentation slides.

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Case Studies

Earthquake, Turkey, 1999[2]

Rating: +1

This case study illustrates how reuse of temporary structures can be an economically viable and environmentally sound solution to quicken recovery process. In 1999, two devastating earthquakes in Turkey left 300,000 housing units damaged or destroyed, and emergency shelter was needed for 600,000 people. In the initial phase, a number of temporary houses were constructed. Post-disaster efforts were subsequently made to disassemble a number of unused temporary housing units and reuse or recycle many of the materials to construct longer-term “redesigned” houses. This approach can speed up the recovery process, allowing for a quicker transition to normalcy for affected populations. A study found that disassembly and reuse of materials from temporary houses for the longer-term houses resulted in significant materials and energy savings without compromising structural integrity.

Earthquake, Jogyakarta, Indonesia, 2006[3]

Rating: +1

This case study illustrates the benefits of adapting local building traditions in reconstruction works. When the 2006 earthquake struck, the level of housing damage was disproportionately high. With over 300,000 houses destroyed the relief efforts were primarily focussed on shelter re-construction. This project aimed to empower community members to rebuild their lives, starting with the construction of a transitional shelter. The transitional shelter design was developed through an understanding of locally available materials, community needs and the capacity and objectives of the organisation. Adapting local design meant that shelters were easily constructed and durable enough to be adapted to long-term use. The programme was rolled out over seven months, with 12,250 shelters built in 761 communities. Use of local materials kept funds in the local economy and enhanced local manufacturing. Environmental impact was minimised through the adoption of managed local construction practices and materials.

Earthquake, Peru, 2007[3]

Rating: +1

This case study illustrates the importance of involving stakeholders in the reconstruction process. The Peru earthquake of 2007 destroyed over 48,000 houses and left 45,000 uninhabitable. The project paid special attention to the potential of shelter-related cash-for-work activities to speed up livelihoods recovery. The basic shelter design was arrived at by asking three carpenters in an affected community to build a sample shelter. Members of the community vetted the shelter design and a pilot project was then implemented. The shelter design was modified during the pilot to improve labour productivity and efficiency in the use of construction materials.

Additional Information

Relevant Definitions

Community Infrastructure: For the purposes of the issue community infrastructure is defined as buildings (public or private) for use by the community such as hospitals, community centres, libraries, entertainment and shopping facilities and educational buildings.

Transitional Shelter: Shelter which provides a habitable covered living space and a secure, healthy living environment, with privacy and dignity, for those within it, during the period between a conflict or natural disaster and the achievement of a durable shelter solution.

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Building Code: A set of ordinances or regulations and associated standards intended to control aspects of the design, construction, materials, alteration and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage.

Self-build: The affected families manage the rebuilding of their houses on their own. Users can contribute with their own resources, if available, whether cash or in-kind. This strategy often requires that the families involved receive training.

Contractor Build: Hiring of contractors (commercial enterprises), for entire or implementation of the construction and related services. This approach is often comparatively expensive and frequently has low support and buy-in from future residents of the houses. Where contractors are brought in from outside the community, it also may not create local skills and contribute to local livelihoods to the same degree as labour and resources will be brought in and funding will not enter the local economy to the same degree as locally led solutions.

Direct Implementation: Where aid agencies have chosen to direct implementation effectively acting as a main contractor. They will have provided materials, hired skilled labour and managed the construction process themselves. Many communities prefer this method of implementation over contractor-build as they have greater trust in humanitarian agencies than in contractors. They can directly express their needs and complaints to the implementing agency, and it is easier to maintain engagement throughout the process. The challenge for agencies will be recruiting, training and retaining skilled labour in a competitive market, and establishing supply chains.

Qualified Professionals: For the purpose of this issue qualified professionals can include project supervisors, civil and structural engineers, planners, and architects. They should not only have technical and organisational capacities, but also have experience in managing teams and good interpersonal skills.

Other Information

Education Buildings: INEE Guidance Notes on Safer School Construction. 2009. http://toolkit.ineesite.org/toolkit/Toolkit.php?PostID=1005 can support discussion, planning and design, implementation, monitoring and evaluation of school construction, including strengthening Education Sector Plans and to develop National Action Plan for Safe Schools. Guidance notes should be adapted to the local context for use.

Quality Control: Practical Action's PCR Tool 10: Quality Control provides information on how this can be implemented in construction programmes.

References

[**1**] IFRC, SKAT. Sustainable Reconstruction of Urban Areas. 2012.
[**2**] World Wildlife Fund, Inc., American National Red Cross. Green Recovery and Reconstruction Toolkit: Materials and the supply Chain. 2010.
[**3**] The Sphere Project. Humanitarian Charter and Minimum Standards in Humanitarian Response. ISBN 978-1-908176-00-4. Rugby, Practical Action Publishing, 2011.
[**4**] Disasters and Emergency Committee, Arup. Lesson from Aceh: Key considerations in post disaster reconstruction. Warwickshire, Practical Action Publishing, 2010.
[**5**] PCR Tool 10: Quality Control, Practical Action and IFRC.

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Settlement (SET)

SET01 Site Selection

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To ensure that the site selected for development or redevelopment is suitable for the affected community and other relevant parties, enabling sustainable resettlement and long term sustainable development.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- Either the existing site will be redeveloped or a new site is required
- Land ownership / tenure arrangements disrupted.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Participation: Undertake participatory activities with the community and other key stakeholders to analyse their needs, activities and interest so that these can be taken into account in the site selection process. This consultation should take place before any final decisions are made on site selection. See **CC05 Participation Issue** for more information.

2. Information collation: gather relevant information and data on the habitability of the existing settlement site and other potential settlement sites. Examples of data to collect may include local settlement plans, hazard risk assessments, historical records of natural disasters in the vicinity, and information on the extent of damage following the disaster. This information will inform the assessments required at the different Performance Levels.

3. Identify international, national and local authorities' standards, guidance and other relevant information on site selection where available and evaluate the application of these to the project / programme as required / appropriate.

4. Assess the need for a relevant settlement specialist to support and take ownership of the assessment of this issue and oversee implementation of its outputs. This is likely to be dependent on the complexity of the context and/or the level of expertise required.

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Performance Level 1

5. The Baseline Evaluation requirements have been met.

6. Complete **SET01 Site Selection Checklist A: In-situ Reconstruction or Relocation** as relevant to the situation and information gathered through the Baseline Evaluation. Using the outputs from the checklist to inform the decision on whether to reconstruct or relocate. Take account of the site dependent issues listed below drawing upon the content to support the decision making process.

7. Where the completion of Checklist A has highlighted that a new site is required complete Checklist B: Relocation (see **Checklists section**) as relevant to situation and information gathered through the Baseline Evaluation. Take account of the site dependent issues listed below using the content to inform the decision making process.

Site dependent issues

1. Location and accessibility: The site should be located in an area that is physically integrated with transport networks and neighbouring populated areas.
    i. Consider the physical distances between the proposed site and other populated areas, and how people may travel safely between them
    ii. Consider the accessibility of places of worship, services, markets, livelihoods and employment[1]. Health and educational facilities should be located within 1km from the site[3] where relevant to the scale of the development
    iii. Accessibility of labour markets and livelihood options, especially in resettlement areas
    iv. Check whether local construction materials are available at the site or nearby in order to minimise transport costs
    v. Local transport network:
        i. Consider the ability of the existing transport network to accommodate additional users
        ii. Consider potential changes to routes and services necessary to service a new or relocated settlement
        iii. Consider the affordability of the local transport services for the affected community.

b. Appropriateness for occupation: Physical characteristics of the site should enable shelters to be safely and securely occupied.
    i. Size: ensure that each person in the settlement has the necessary space required.
        i. A minimum usable surface area of 45m^2 for each person including household plots should be provided. Where communal services are all provided by existing or additional facilities outside of the planned area of the settlement, the minimum usable surface area should be 30m^2 for each person[4]
        ii. If the minimum surface area cannot be provided, the consequences of higher-density occupation should be mitigated, for example through ensuring adequate separation and privacy, sanitation etc. (see **relevant CAT issues**) between individual households, space for the required facilities, etc.[4]
        iii. The area should have the necessary space for roads and footpaths, external household cooking areas or communal cooking areas (where appropriate), educational facilities and recreational areas, sanitation, firebreaks, administration,

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water storage, distribution areas, markets, storage and limited kitchen gardens for individual households[4].

ii. Topography: consider the appropriateness of the site in terms of the terrain and gradient.
    i. The site gradient should not exceed 1:20, unless extensive drainage and erosion control measures are taken, or be less than 1:100 to provide for adequate drainage[4]
    ii. Where terracing is to be considered, a specialist should be employed to consider the viability and detailed design to ensure stability and drainage.
iii. Ground conditions: The soil and geology of the site should be assessed to determine the appropriateness for construction. The assessment should cover, at least:
    i. Ideally, the lowest point of the site should be not less than three metres above the estimated maximum level of the water table[4]. In flood-prone environments, consider potential adaptation measures (such as riverbanks). The most appropriate solution may vary depending on the conditions on the development
    ii. The ground conditions should be stable and suitable for excavating toilet pits. The location of toilets and other facilities should take local ground conditions into account[4]
    iii. The appropriateness of the ground conditions and soil characteristics, taking account of previous and potential natural hazards and disasters. Invest in mitigation measures as required (such as stabilisation, land infill, etc.).

c. Resource availability: The site should enable residents to sustainably acquire necessary resources such as food, water and energy.
    i. Refer to the WS01 Water Demand and Supply for more information
    ii. Refer to the ENE01 Energy Demand and Supply issue for more information
    iii. Refer to the MW02 Materials Sourcing issue for more information.
d. Risk from hazards: The site should enable the community to occupy the settlement safely, without significant risks from natural and man-made hazards.
    i. A hazards assessment should be conducted to identify the risk from hazards (e.g., flooding, wildlife, toxic waste). This assessment should draw on local knowledge to understand contextual issues in detail. Where significant risks are highlighted, measures should be taken to mitigate the potential impacts on the community
    ii. Where there is no alternative but to select a site that is hazard-prone, measures should be taken to ensure that the settlement can be evacuated in a safe and timely way. In these circumstances, an early warning system may be necessary[3]
    iii. Potential impacts from a changing future climate should be assessed and considered.
e. Health and wellbeing: The general living environment should be considered to avoid negative impacts on the quality of life for residents.
    i. Settlements should be sited away from major sources of pollution (e.g., major transport routes and industrial areas). Refer to the SC02 Internal Environment issue for more information
    ii. Settlements should be sited away from areas previously occupied by waste dumps or industries that have polluted the local environment[3].
f. Legal aspects:
    i. Land tenure: Consideration must be given towards how the site may be procured and how local land owners and tenants may be affected by the site selection. Refer to the SET02 Security of Tenure issue for more information.
g. Natural environment: The site selection should have minimal impact on the natural environment. Refer to the Natural Environment issues for more information.
    i. Deforestation and habitat destruction should be minimised
    ii. The ecological features of the site should be protected
    iii. Natural resources such as water and timber should be used sustainably
    iv. Waste collection and management should be planned
    v. Sanitation solutions should be appropriately sited and constructed

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vi. Erosion from surface run off should be minimised or prevented.

h. Cultural acceptability: The cultural, historical, political and social significance of a site and the surrounding areas should be considered, in order to prevent any potential conflicts of interest. Examples of potential conflict would include religiously significant land or land used for burials / cremation in the past. Relations with the host community should be managed in order to alleviate potential tensions between different groups, and demonstrate the benefits of new resources / infrastructure.

i. Future planning: The site should be able to accommodate future growth of the community. This may include:
   a. Physical expansion of the community
   b. Increased demand for resources
   c. Increased demand for social infrastructure.

8. All high level priority actions / issues identified in the checklist have been implemented / addressed.

See Performance Level 3 (PL3) point 15. For this point to be achieved under PL3 the relevant aspects must have been met under this Performance Level.

Performance Level 2

9. The Performance Level 1 requirements have been met.

10. All medium level priority actions / issues identified in Checklist B have been implemented / addressed.

11. Ensure that an individual or group of individuals are made responsible for ensuring that ongoing selection of development sites is effectively managed.

12. Stakeholder engagement: ensure that key stakeholders (e.g. the local community, NGOs, Government) are engaged throughout the site selection process in order to support capacities and skills building in this area.

See Performance Level 3 (PL3) point 15. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

13. The Performance Level 2 requirements have been met.

14. All low level priority actions / issues identified in checklist B have been implemented / addressed.

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15. A relevant settlement specialist has been used to assess this issue to ensure that where necessary, an appropriate site is selected for redevelopment and oversee implementation of other aspect relating to the assessment of the issue.

16. Work with government or other relevant stakeholder to define local guidelines for site selection and drive legislation changes so that site selection is holistically considered.

17. Performance Level 1 has been achieved for the following issues:
    a. SC02 Privacy.

18. Performance Level 2 has been achieved for the following issues:
    a. WS02 Water Quality.

Additional Considerations	
General Considerations	
Relocation	Relocation should be considered only as last option, where in-situ reconstruction is not possible or will place the community at significant future risks that cannot be overcome.
Temporary Shelters / Settlements	This issue considers temporary shelters / settlements but is mainly focused on transitional and permanent reconstruction.
Geophysical	Areas subject to heavy erosion or landslides are more likely to be those with a slope above 10%. When it is not possible to avoid these sites, it would be necessary to take steps to reduce potential hazards (e.g., terracing and maintenance of vegetation)[3].
Hydrological	Sites should not be selected close to major water bodies, rivers or their tributaries without due consideration to flood levels. Sites subject to flooding should not be occupied, wherever possible. Local knowledge is a good source of information on flooding potential. Sites should have a slope of 2 to 4%, in order to ease natural drainage.
Cross-cutting Issue Considerations	
Participation	The consultation required as a pre-requisite for this issue will highlight issues specific to the affected community which are not highlighted in the requirements of the criteria. The population should be given the chance to express its agreement or disagreement with regards to the relocation option. No forced relocation should be accepted.
Skills and Capabilities	The site should ideally be located in an area that can use local skills to contribute to the redevelopment process. The settlement location should enable individuals to use their existing skills with appropriate access to livelihood opportunities.
Livelihoods	The site should enable the affected community to maintain current livelihood activities or provide opportunities for reasonable alternatives. This may include the need for land for farming crops,

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Additional Considerations	
	maintaining livestock and access to markets. Distance from places of income generation need to be considered, and alternative livelihoods planned / explored.
Community Ownership and Sustainable Management	The portion of the population relocated should be put in the condition to possibly become owner of the site they occupy. The site should enable the settlement to be effectively managed and operated by the local community and external persons, where required.
Resilience	The site should have minimal risk from hazards. The settlement should be constructed on appropriate ground, with the appropriate topography to ensure adequate drainage and minimal risk of erosion. The affected community are likely to be more resilient if they are well connected to surrounding populated areas, with safe and well-constructed roads.
Security and Safety	The site should reduce the risks from natural hazards and therefore increase the security of the settlement. Consideration should be given as to whether these is a specific allocation of central budget for DRR.[8]
Economic Viability	The site should enable the affected community to maintain current livelihood activities or provide opportunities for reasonable alternatives. Distance from places of income generation need to be considered, and alternative livelihoods planned / explored.
Access and Non-discrimination	The relationships between the newly settled community and the host / neighbouring ones needs to be carefully assessed and any tension or conflict mitigated through informed participation and site planning.

On-going Monitoring and Evaluation

- Retain completed copies of relevant issue checklists in order to document the decision process and inform future development.
- Where expansion or further development of the settlement is proposed, consider the relevant Assessment criteria.
- Where necessary, undertake on-going monitoring to ensure that the site remains suitable for occupation, specifically considering:
    - Access to necessary resources
    - Risk from hazards
    - Ability to maintain livelihoods.

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Case Studies

Indian Ocean Tsunami, 2004.

Rating: -1

This example shows the unintended consequences that can negatively affect a community. In this settlement in Aceh, seawalls were built to protect against storm surges, but these blocked freshwater flows from inland areas, causing flooding the newly built settlement[7].

Bhuj Earthquake, Gujarat, India, 2001.

Rating: +1

This example demonstrates the advantages to in-situ reconstruction over relocation. The recipient communities formed a wide consensus that preferred in-site reconstruction, informed by experience and surveys from previous earthquake-affected locations. In-situ reconstruction allowed the communities to use existing transport, energy and water infrastructure as well as retaining their nearby fields[10].

Earthquake, Bam, Iran, 2003.

Rating: 0

Following the earthquake in Bam, there were several villages for which seismic risk was assessed to be too great to reconstruct in-situ. The strategy in carrying out relocations was to make every available effort to keep victims as close to their land as possible, avoiding any such movement unless absolutely necessary.

In Lorestan Province it became necessary to relocate two communities where seismic risk was too great to safely mitigate. In order to accommodate the affected communities, new villages were built in an alternate location but were constructed such that they were visually, structurally, and in as much as feasibly possible, the same as the former village. Government planners used photographs, maps, and local knowledge to recreate the communities, even planting trees where they stood in the former settlement. The result was that the villagers felt immediately comfortable in their new surroundings and the effort was deemed a success. This effort showed the importance of community structure and layout to the relocated population[10].

Additional Information

Relevant definitions

None.

Other Information

None.

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SET02 Security of Tenure

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To recognise and support:

- Diverse tenure arrangements relating to housing, land and property[1]
- Transparency, accountability and communication with the affected community in regard to tenure issues[2]
- The promotion of security of tenure in all shelter responses.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- Housing, land and property occupied by individuals and/or the local community have been significantly damaged to the extent that they cannot be used[3]
- Significant damage to, or loss of, records of occupation and ownership and physical boundary demarcations as a result of the natural disaster
- Increased risk of exploitation, tensions and evictions due to a lack of protection and transparency in the tenure arrangements leaving the community less resilient[4]
- Increased vulnerability of livelihoods due to uncertainty of access to secure housing, land and property and reduced ability to carry out 'normal' practices.

Definition

Security of Tenure: is the degree of confidence that land users will not be arbitrarily deprived of the rights they enjoy over housing, land or property or the benefits that flow from it; the certainty that these rights will be recognised and protected in case of specific challenges; or, more specifically, the right of all individuals and groups to effective government protection against forced evictions[8]. The additional information section further explains the scope of the terms tenure and security of tenure.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Consider and map existing tenure arrangements (statutory, customary, hybrid and religious) relating to occupancy, access and ownership of land, infrastructure and property[4&12]. This should include identification of:
   a. Any recent or on-going land disputes that may impact upon the project.
   b. Community, local and central administration entities that are responsible for managing local / national land registration and ensuring details of ownership and occupation are recorded, to the extent possible, (this should also include means of recording non registered land); and

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c. Migratory or seasonal patterns.

2. Undertake facilitated interaction and participatory activities with the affected community and other relevant stakeholders in order to understand the land tenure context. Engage with the community on security of tenure issues via consultation involving;
   a. A wide range of individuals from the local community and individuals / organisations with knowledge on local / national tenure arrangements (including local governmental department where applicable) to inform the creation of a baseline of tenure arrangements.
   b. Where appropriate carry out a community land mapping exercise to verify occupation or ownership pre-disaster.

3. Review and where required conduct a damage assessment and ensure it includes information pertaining to physical land and boundary demarcations. This is likely to form part of a more general damage assessment undertaken.

4. Site selection:
   a. In the case of relocation, site selection should be done in consultation with local land authorities and communities (both those affected and those who will become the host communities) in order to take into consideration both formal and informal land-use patterns and tenure that existed pre-disaster. See **SET01 Site Selection** issue for more information.

Performance Level 1

5. The Baseline Evaluation requirements have been met.

6. Analyse the information collected and mapped as part of the baseline evaluation to inform the team leading the review of the tenure arrangements including:
   a. Identification of the overlap of existing tenure arrangements to avoid any conflict.
   b. Act within or build upon existing tenure arrangements.

7. Identify and engage with local lawyers and tenure specialists who may be able to inform understanding of local land tenure issues and legal frameworks.

8. Undertake awareness sessions or establish information points to ensure the local community are clear about how the project has respected existing tenure arrangements. The awareness session or information point should;
   a. Clearly define land tenure arrangements including temporary shelter and more permanent shelters constructed and provided as part of the recovery[3&4].
   b. Clearly define the registry costs of first time registration and for replacing tenure records[2].
   c. Provide information on different ways to resolve disputes over land tenure arrangements.

9. Training should be provided to shelter practitioners and local government on tenure where appropriate.

Performance Level 2

10. The Performance Level 1 requirements have been met.

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11. Support and build the capacity of central / local land administration as appropriate[2]. Consider the existing arrangements in place to identify or manage different tenure arrangements.

12. Consider ways to help reduce the additional pressures on the administration as a result of the natural disaster and put forward proposals to local administration outlining the assistance that can be offered.

13. A land tenure specialist has been used to ensure that tenure issues are considered and ensured in the redevelopment of the affected community.

14. Where appropriate, support the reconstitution and validation of destroyed land documentation.

Performance Level 3

15. The Performance Level 2 requirements have been met.

16. Where possible support the use of electronic documentation. This could be cloud-based in order to protect the information from physical damage.

17. Advocate or consider ways of improving security of those tenure arrangements identified through the mapping and analysis carried out during the previous performance levels.

18. Ensure that an individual or group of individuals are made responsible for ensuring that tenure arrangements within the settlement are effectively monitored and maintained.

19. Where appropriate, lobby government and other relevant local authorities to ensure that tenure legislation and records can be developed to provide future benefits to the affected community.

Additional Considerations	
General Considerations	
None.	None.
Cross-cutting Issue Considerations	
Participation	Participatory activities should be undertaken with the affected community and other stakeholders in order to understand the land tenure context.
Skills and Capabilities	Raise aware of the existing and proposed tenure arrangements in order to avoid potential disputes or confusion. The knowledge of those involved in the management of tenure arrangements should be assessed and enhanced where necessary.

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Additional Considerations	
Livelihoods	The assessment of tenure arrangements and maintenance of records can provide livelihood opportunities to a small number of the affected community.
Community Ownership and Sustainable Management	It will be necessary for the affected community to be included in the land tenure assessment process and made aware of the activities being undertaken so that these processes may be maintained going forwards.
Resilience	The land tenure records should be kept in a safe place (preferably with digital versions), to minimise the risk of the records being damaged.
Security and Safety	By (re)-establishing recognised land tenure arrangements, the affected community are likely to feel that possession of their land is more secure.
Economic Viability	Encouraging input from all groups during the reconstruction process will allow them to buy into and gain a sense of ownership over the development, supporting skills development which in turn can be transferred into daily life, increasing their ability to support themselves financially.
Access and Non-discrimination	Ensuring that the built environment is accessible to all groups and that marginalised groups are not discriminated against is vital to ensure inclusivity within the community.

On-going Monitoring and Evaluation

- Ensure that accurate records are kept, including the step-by-step process taken to address tenure in the affected community. This information should enable the community to add to this information going forwards and enable others to understand the assessment process undertaken.

Case Studies

None.

Additional Information

Relevant Definitions

Community Mapping: in the absence of official titling systems, community land mapping can be used as a means to verify land occupancy. Such verification is provided by neighbours and/or witnesses who can attest to such occupancy.

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Communal Land: land over which a community has rights or access to. The community may or may not have legally recognised ownership over the land. In some cases, for instance, the state may be considered to be the owner[7].

Customary Tenure: systems referring to the possession of rights to use and allocate land by a group sharing the same cultural identity or established by customs[10].

Formal Property Rights: these are the rights that are sanctioned and legally recognised by the state and can be protected by the state's legal system. Most often, formal property rights are titled and/or registered or recorded under a state system[2].

Informal Property Rights: these rights do not have official state recognition and may not have official protection but are recognized by customary law or by local authorities[2].

Informal Tenure: systems most common in urban areas - these are often hybrid systems that have emerged in response to the difficulties of existing systems to cater for rapidly expanding cities and their urban land markets[11].

Land Administration: the system and processes of making tenure rules operational. It includes the administration of land rights, land use regulation, and land valuation and taxation. Land administration may be carried out by agencies of the State, or through local or customary leaders[7].

Land Tenure: the set of relationships with respect to housing and land, established through statutory law or customary, informal or religious arrangements.

Landlessness: the state of owning no land. In the case of a post-disaster context, landlessness refers to the physical loss of land due to the disaster by two key groups 1) tenants and other secondary holders of rights to land, and 2) informal landholders whose rights are not recognised by State law[9].

Legal Pluralism: is the co-existence of parallel source of authorities (e.g., statutory and customary) considered as legitimate by those who use them and rendering justice in similar matters[9].

Religious Tenure: systems whereby all or some land is owned and managed by religious authorities[10].

Statutory Tenure: systems, established by law or statutes—they consist of two main types, private and public tenure systems, and can guarantee individual or collective rights[10].

Security of Tenure: the degree of confidence that land users will not be arbitrarily deprived of the rights they enjoy over land or the benefits that flow from it; the certainty that these rights will be recognised and protected in case of specific challenges; or, more specifically, the right of all individuals and groups to effective government protection against forced evictions[8].

Tenure Arrangements / Systems: sets of formal and informal documented and undocumented practices, rules and institutions which determine access to and control over housing, land and natural resources[2].

State Property: where governments regulate and control access to resources which are owned by citizens of the state[4].

Common Property: where a specified group of people own the resource and can regulate use and exclude non-owners[4].

Private Property: where resources are owned by individuals or corporations and their rights are defined by terms of exclusivity and transferability[4].

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Other Information

Housing, land and property can be occupied through many different means (for instance by ownership, renting or using) and the term 'land tenure' relates to the ways in which that land is occupied - the relationship which the occupier has with the land. Such differing arrangements are often classified as being based on statutory, customary, informal or religious practices. All four systems may have different rights attributed to them - property rights essentially establish who can do what on a plot of land. Regardless of what type of land tenure the occupier may have, the occupier has a right to derive some form of security in that form of tenure. Such security should provide the holder with a level of protection from eviction; a degree of confidence that, subject to their rights, they will not be arbitrarily deprived of their property – such a person has security of tenure. The concept of security of tenure can refer to a perception, a subjective appreciation of a situation in a given time and place by both people concerned, observers and decision makers[11].

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SET03 Spatial Planning

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To ensure that the settlement layout, amenities, other designated land uses and infrastructure are planned and implemented in an integrated manner to sustainably support social, cultural and economic activities, providing the necessary basis for the community to develop and grow.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated consultation and participatory activities with the affected community and other relevant stakeholders in order to understand the spatial planning context. This will often involve interaction, negotiation and advocating activities with government agencies.

2. Undertake an initial assessment to understand the following:
   a. Identify whether a settlement plan is in existence. Following this, identify whether the plan is still usable or valid in some form[1], or if a new settlement plan is necessary.
   b. Assess and analyse the spatial planning needs (e.g., land uses, spatial needs and spatial interactions) of the affected population in consultation with the relevant authorities and population[2].
   c. Identify and use existing planning processes where possible, informed by agreed best practice, minimising settlement risk and vulnerabilities[2].
   d. Identify any potential risks to the settlement (see **CC06 Resilience issue for more information**).
   e. Assess fire risks to inform the site planning of settlements, considering the following aspects as a minimum:
      i. The grouping of individual household shelters
      ii. Firebreaks
      iii. Construction materials
      iv. Consider access for fire fighters in the layout of roads and dwellings.

3. Assess the need for an appropriately qualified spatial planning specialist to support and/or take ownership of the assessment of this issue and oversee implementation of its outputs.

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Performance Level 1

4. The Baseline Evaluation requirements have been met.

5. Develop a spatial settlement plan to ensure that the redeveloped community is organised in an efficient, integrated and appropriate way. The plan should consider the following aspects as a minimum:
   a. Health and safety:
      i. Develop strategies to cope with the potential risks identified as part of the Baseline Evaluation
      ii. Consider how violence, crime and exploitation will be mitigated through spatial planning, particularly among vulnerable members of the population (e.g., women, children, the elderly, the disabled). See **CC07 Security and Safety** for more information.
   b. Minimise, and where possible eliminate fire risks considering the following aspects:
      i. The grouping of individual household shelters
      ii. Firebreaks
      iii. Construction materials
      iv. Consider access for fire fighters in the layout of roads and dwellings.
   c. Local practices should be encouraged however, mitigating actions could include:
      i. The provision of a 30m firebreak between every 300m of built-up area[2]
      ii. A minimum of 2m (but preferably twice the overall height of any structure) between individual buildings or shelters to prevent collapsing structures from damaging adjacent buildings[2]
      iii. Preferred cooking practices and the use of stoves or heaters should also inform the overall site planning and the safe separation of household shelters[2] and construction materials selection. See **MW01 Material Properties / Specification** and **ENE01 Energy Demand and Supply**.
   d. Layout:
      i. Organisation of access routes and shelters:
         – Provide a balance of public, private and community spaces integrated within a robust network of access roads within the setting of shelters
         – Shelters should be adequately spaced and sized, consultation should be utilised to identify contextual needs[4]
         – Safety and security of individuals in all spaces, avoiding the creation of isolated spaces and considering natural surveillance of all public and private spaces (where culturally appropriate). For example, in general streets should not become isolated dead ends with no surrounding dwellings facing the space[10].
      ii. Access to amenities:
         – All inhabitants are considered through community sensitive design practices (see **SC01 Community Sensitive design issue for more detail**) enabling individuals, families and other groups to have access to service such as water, food, education and healthcare[2]
         – Amenities should be easily and physically accessible for all individuals in the community[4]
         – Local markets and livelihood activities should be considered, ensuring that equal opportunity is given to the community to develop.
      iii. Settlement scale:
         – Provide adequate services for the population considering proximity and demand. For example make sure there are schools that meet the population's needs[3]
         – Consider the spaces available and the population to be supported as to how dwellings and amenities are positioned and sized[3]

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- Show consideration for local context, culture and preferences in the scale and form of developments.

e. Access and movement:
   i. The settlement needs to enable all users to safely access all shelters and to optimise navigation around the settlement[2]. Considering the following:
      - Distances between services
      - The relationship between people and vehicles
      - Appropriate crossings
      - Signs and clear sight lines to landmarks (navigation points)
      - Suitable ground conditions (gradient, materials, etc.)[1]
      - Escape routes, emergency evacuation centres and safe shelters.
   ii. Roads and paths:
      - Should provide safe and secure access to individual dwellings and local amenities / services[2]
      - Spatial planning and communications routes should prioritise pedestrian movement where appropriate, ensure pedestrian safety and make adequate and safe provision for vehicular access for deliveries of aid and materials as well as allowing emergency access
      - Access into and out of the site needs to be included in the plan, enabling a community to function sustainably within a greater community, encouraging trade, community and civil society engagement[6].

f. Infrastructure:
   i. Critical infrastructure: Services that are necessary to each building and individual within a community should be considered alongside dwellings and street hierarchy. These are not limited to but must include:
      - Water supply[1]
      - Energy supply[1]
      - Sanitation planning[1]
      - Drainage systems[1].
   ii. Local infrastructure needs:
      - Designing local infrastructure with resilience in mind, consider disaster history when considering design, materials and scope of infrastructure[6]
      - An impact assessment, for an example an Environmental Impact Assessment (EIA), can identify potential specific conditions to consider for the site such as flood risk, which then can be considered in settlement layout and identify applicable drainage strategies[1]
      - E.g., where appropriate, flood risk management should be utilised when laying out drainage systems, identifying climatic and geographic risks building upon historical community knowledge[1].

6. Amenities and Shelter types:
   a. Assessment of available land:
      i. Ensure the reuse of land and existing buildings where appropriate and safe
      ii. Where new development is required then previously undeveloped land is utilised effectively, minimising wasted space and resources
      iii. An environment assessment, such as an Environmental Impact Assessment (EIA), can provide a basis to analyse land and identify useful resources, possible threats and hazards and opportunities to consider in the early stages of settlement development or redevelopment.
   b. Mixture of uses:
      i. Building variety and a mixture of uses must be provided that reflect the needs of the community, and promote diversity and integration where possible

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ii. Provide a mixture of buildings, community spaces and spaces associated with livelihoods such as markets and cultivation
iii. Uses should be flexible and adjust with community need
iv. Ensure that the settlement is planned with adjoining uses being compatible (e.g., not placing noisy industrial areas immediately next to residential areas).

c. The shelter planning and community and circulation spaces available must be determined by the needs of the community and should generally reflect the following:
   i. Residential dwellings
   ii. Civic (Community centres and public buildings)
   iii. Cultural (Place of Worship)
   iv. Public (Schools and Healthcare)
   v. Commercial (Shops and market place)
   vi. Transport hubs
   vii. Recreation
   viii. Communal activities (e.g., gardening and cultivation).

7. Public Space:
   a. The settlement should have sufficient public space- internal or external as appropriate to climatic conditions- for cultural, social and recreational activities; that reflect the identity and needs of the local community. These spaces might include:
      i. Gathering spaces
      ii. Streets and paths
      iii. Parks and recreational areas
      iv. Public buildings and community centres.
   b. Inclusive space:
      i. Consider all potential users in the community including children, the elderly and disabled individuals
      ii. The space should consider the users safety, comfort and security through good surveillance, ease and scale of access / egress and inclusive design practices[4].
   c. Active spaces:
      i. It is vital that all public space should be available for exercise and related social activities with good natural surveillance to limit any potential anti-social behaviour or negative spaces
      ii. Public spaces should be strongly connected throughout the settlement[4].

8. Natural Resources*:* Make use of natural resources available to enhance the spatial planning of the affected community.
   a. Protection:
      i. Use vegetation where possible to help mitigate the effect of hazards on settlements. For example, in areas vulnerable to cyclones planting trees with long root structures can be used as wind-breaks.

9. Future growth:
   a. The settlement plans should take account of future extensions due to population growth, changing demands with the community's needs[1].

Note: See Performance Level 3 (PL3) point 16. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

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Performance Level 2

10. The Performance Level 1 requirements have been met.

11. A spatial planning specialist has been used to produce the settlement plan (see **Performance Level 1**) and identify ways of achieving efficiencies in how the settlement should be organised.

12. Natural Resources: Make use of natural resources available to enhance the spatial planning of the affected community.
    a. Attractive environments:
        i. The inclusion of vegetation, such as trees, bushes, etc. within the process. Vegetation is important resource for a community and green vegetation has also aesthetic and recreational value[1]
        ii. Show consideration for the natural environment and distinct character of the area, e.g. by encouraging local planting of species and ensuring these figure as the future settlements develop.
    b. Resources:
        i. Identify existing fertile soils and active habitats and utilise these key resources that can provide important natural materials, sources of water and food
        ii. Consider how these can be used sustainably so they are maintained for future generations, by putting in place measures such as education about how to not over cultivate land, spoil water sources or over hunt wildlife.

13. Future growth:
    a. The settlements structure should promote flexibility to meet changes, in particular changing demographics in the population, for example allow spaces for markets and squares to grow to support a population and provide buildings that are flexible to different uses.

14. Holistic learning environments:
    a. In addition to providing schools, they should be surrounded by safe and productive learning environments that allow the affected community to maintain and enhance educational capacities.

15. Ensure that an individual or group of individuals are made responsible for ensuring that on-going spatial planning of the settlement is effectively managed.

Note: See Performance Level 3 (PL3) point 16. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

16. An appropriately qualified spatial planning specialist has been used to support, and/or take ownership of the assessment of this issue and oversee implementation of its outputs.

17. Performance Level 1 has been achieved for the following issues:
    a. SC01 Privacy.

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18. Performance Level 2 has been achieved for the following issues:
    a. SC01 Community Sensitive Design
    b. SET04 Infrastructure
    c. ENE01 Energy Demand and Supply
    d. WS01 Water Demand and Supply
    e. WS03 Sanitation.

Additional Considerations	
General Considerations	
Small scale communities	Applicable assessment criteria may vary in their applicability depending on the scale and scope of the community. For example, amenities and shelter types may not all be applicable depending on the population and community size.
Design Codes	Design codes are most applicable in more developed communities where basic structural and shelter issues are less critical. The aim here is to restore or protect architectural styles if applicable to the settlement.
Geophysical	In areas prone to earthquakes consider shelter foundations, ground stability and also proximity to buildings, other structures or natural features, to reduce risk to life.
Settlements at risk of flooding	Specific land uses such as housing and health should be sited on areas of higher ground or be suitably elevated, whereas some less important networks and paths could be situated at lower levels. ‘Safe havens’ should be identified and safeguarded, where required.
Cross-cutting Issue Considerations	
Participation	Inclusive spatial planning is key to enable a community to function historically and also provide a basis to move forward, asking the community what worked and what didn’t work in the existing or their previous community. Charrettes are one such tool to allow direct community member input.
Economic Viability	Good planning allows for a community to grow and develop economically, providing adequate spaces for markets, farming or context sensitive activities key to the local economy. Designing spaces that account for local contexts, including economic pressures and the livelihoods of local people. Settlement selection should allow people to effectively use the environments resource as they did before; providing spaces for markets and other social and economic activities. Specifically consider planning that considers flood risk that could affect fertile land and crops essential to a community.
Skills and Capabilities	Good spatial planning should consider and build upon existing community structures (modes of communication, traditional considerations etc.). This support skills and capability building through learning, improving and passing on new techniques to future generations.

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Additional Considerations	
Security and Safety	Defensible spaces for individual and families whilst providing safe open and shared spaces with good natural surveillance. Minimising spaces that will be redundant and could lead to negative social activities and poor conditions for the community.
Access and Non-discrimination	Good spatial planning ensures access to a range of cultural spaces in the community and considers all backgrounds and gender and abilities of any individual. This includes considering proximity to amenities of social and economic importance.
Resilience	The settlement should have a layout and necessary features to resist potential hazards, protecting lives and property. Successful spatial strategies allow a community to grow and develop, providing structure and a basis to overcome future issues.
Community Ownership and Sustainable Management	Distinct private and public spaces set boundaries and allow individual and communal ownership in a settlement. Further to this a process of engagement in the wider community results in inclusive design that promotes ownership and connection with the new / redeveloped settlement.
Livelihoods	Consider the position of shelters, populations and their distances to key economic facilitating factors such as markets, crops and other aspects that are important in the local context for the community's livelihood. It is also important for each shelter to be allowed to forge a livelihood through small shops and trades that are appropriate in some local contexts. These aspects should be identified in participation and assessment of a community and their assets.

On-going Monitoring and Evaluation

- Ensure that on-going developments, changes and critical decisions in the community consider the process discussed in this issue going forward, for example participation, local contextual design process etc.
- Feedback any critical findings regarding successes and failures to the local government to inform them of what works and what doesn't in planning out settlements in that region.
- Consider the number of individual shelters required according to the number of population and households, conduct population census to obtain the information and consult with local government.

Case Studies

Floods, Kenya, 2007[7]

Rating: +1

Following the flooding of a refugee camp a combination of shelter upgrading and emergency response funding assisted 500 families to make bricks and build shelters.

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This was a success in terms of involving the community in the consultation and settlement construction process. Strong community participation through the training of beneficiaries to construct their own shelters meant project costs were low and construction standards were high. Activities such as 'training of trainers' to a small group of refugees on construction techniques and brickmaking helped forge a sense of ownership and pride in their shelters was demonstrated by the wide variety of self-implemented modifications, raising living conditions. However the process did not include of people from minority groups, such as the disabled to the extent they should have been.

Lessons that came from this were that in future the use the refugees to help redesign its strategies for settlement and shelter layouts. Also that in supporting livelihood activities may accelerate the construction pace and decrease costs. Opportunities for income-generation activities and broad environmental concerns require joint agency solutions[7].

Earthquake, Italy, 2006[8]

Rating: 0

The organisation used contractors to build three different sizes and designs of shelter for 100 families affected by the earthquake. This was a pilot programme, from which the government designed a programme to house an additional 3,475 families. The government led the overall shelter process limiting the inputs of the disaster affected families, whilst the organisation facilitated discussions to encourage involvement of those affected by the earthquake.

There was strong cooperation between local / municipal authorities, local contractors and beneficiaries to define and develop the project. The first shelters with a design lifetime of 30 years were constructed within months. Three different shelter designs were built and allocated based on the family composition. The organisation was able to act as a facilitator between the affected families and the authorities. The pilot project was followed by the government's construction of 3,475 additional units using a similar programme approach. The government provided all service infrastructures. However as a result of this most of the decisions were government-led within a very prescriptive legal framework. This limited inputs by the affected population to suggesting preferences but not to take decisions based on their inputs and needs[7].

Earthquake, India, Gujurat, 2001[1]

Rating: +1

The city of Bhuj was badly damaged following an earthquake in the region. The result was fundamentally damaging to the city's infrastructure, historical features as well as housing, commercial and public buildings. Even with the wide spread devastation one million people continued to live in the city.

Government and institutional stakeholders decided that a comprehensive development plan was needed in order to guide the city's reconstruction to relocate some people and to make provision for future expansion. The walled city presented even greater problems because it served as the commercial and cultural heart of the whole city was densely populated and had suffered the worst damage.

Steps in development of the plan included:

- An analysis of stakeholders to identify the main community leader's public sector officials and other key resource persons in the city. These people were invited to discuss how the participative process should be undertaken
- A vision statement for Bhuj was drawn up and the leaders formulated objectives strategies and proposals
- The draft plan was taken to a series of ward meetings and focus-group meetings for consultation and comment. The meetings were widely advertised. As part of the meetings a series of maps

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showing the proposed reconstruction was exhibited for public comment

- Based on the public consultation the Plan was modified and more detail was added to the proposals
- The draft Development Plan was again widely advertised for comment. A final version of the plan was then produced including maps of how the city would be reconstructed and developed.

To support the process a Study and Action group was formed consisting of key local resource persons identified earlier. The group helped to inform the process, provide information on the local content, assist in resolving disputes and produce proposals and policies.

A core committee was formed with similar objectives to those of the Study and Action group which interacted very actively with residents.

Decentralised offices were set up where the latest drafts of the plans were available and staff could provide information to residents on the plans and help them to comment or contribute ideas.

The commitment of the government and institutional stakeholders to the idea of participation in planning for reconstruction and development was followed through in establishing the structures for participation. That enabled many local people to contribute their ideas to the final plans[1].

Additional Information

Relevant Definitions

Household Shelter: For this project Household Shelter refers to an individual shelter for an individual or family.

Communal Shelter: For this project a communal Shelter is considered as a public or civic shelter that is shared by all members of the community.

Essential Services or Basic Needs: can be defined as - The items that people need to survive. This can include safe access to essential goods and services such as food, water, shelter, clothing, health care, sanitation, and education[8].

Spatial Planning: Spatial planning deals with the arrangement of settlements on a variety of scales, looking at shelters, paths, streets, communities, settlements and how they relate to each other. Effective spatial planning considers the physical planning of an area as well as the land use planning in a settlement.

Physical Planning: A design exercise based on a land use plan used to propose the optimal infrastructure for public services, transport, economic activities, recreation, and environmental protection for a settlement or area. A physical plan can have both rural and urban components, although the latter usually predominates[8].

Land Use Planning: The process undertaken by public authorities to identify, evaluate, and decide on different options for the use of land areas, including consideration of long-term economic, social, and environmental objectives; the implications for different communities and interest groups; and the subsequent formulation and promulgation of plans that describe the permitted or acceptable uses[8].

Public Space: Public realm (or space) has been defined by the Office of the Deputy Prime Minister (now Department for Communities and Local Government) as: "…all those parts of the built and natural environment where the public has free access. It encompasses: all the streets, squares and other rights of way, whether predominantly in residential, commercial or community / civic uses; the open spaces and parks; and the 'public / private' spaces where public access is unrestricted (at least during daylight hours). It includes the interfaces with key internal and external and private spaces to which the public normally has free access"[4].

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Design Code: “A design code is a set of illustrated design rules and requirements which instruct and may advise on the physical development of a site or area. The graphic and written components of the code are detailed and precise, and build upon a design vision such a master plan or a design and development framework for a site or area”[9].

Natural Surveillance: Is the placement of physical features, activities and people in such a way as to maximise visibility. When considered in crime prevention this strategy utilises design features to increase the visibility of a property or building. Keeping intruders under observation thereby making them less likely to commit offenses, greater visibility makes legitimate users feel safer.

- Use open style designs that maximize visibility
- Illuminate building entrances, pedestrian paths and parking areas
- Watch for landscaping and lighting conflicts
- Orient building entrances toward high-traffic (pedestrian and vehicular) areas
- Use internal and external windows, as well as activity areas, to increase passive surveillance[10].

Other Information

None.

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[**1**] IFRC, SKAT. Sustainable Reconstruction in Urban Areas. 2012.
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SET04 Infrastructure

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To recognise and encourage provision of infrastructure systems that are well planned, resource efficient, environmentally friendly, secure, culturally sensitive and economically viable.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Infrastructure assessment: Carry out an assessment of the state of infrastructure (water supply, drainage, roads, energy supply etc.) or take account of results of an assessment (if carried out by alternative stakeholder, such as local government) to determine:
    a. The scale of damage to existing infrastructure, i.e. whether infrastructure is functional, can be repaired or if medium / large scale reconstruction is necessary.
    b. Whether infrastructure assets are safe to use now and if they could withstand future risks.
    c. People and communities affected by the disruption in infrastructure.
    d. How the natural environment is / has been affected by damage to infrastructure or its previous operation. This information could be sourced from an Environmental Impact Assessment (if available).
    e. Key stakeholders (see **General Considerations**) and their roles in rehabilitation of local infrastructure.
    f. Local ownership / accessibility constraints.

2. Assess and identify appropriate codes and standards to help ensure good quality construction
    a. If local and national building codes exist determine if they are appropriate to the local context and how these should be used or tailored for design of shelter and community infrastructure in the community.
    b. If building codes do not exist assess whether international building or other relevant codes can be tailored to the local culture, climatic conditions, resources, building and maintenance capacities, accessibility and affordability to provide a framework[2].

3. Participation: Undertake participatory activities (appropriate to the programme scale and location, i.e. city wide, urban rural, etc.) with the community and other key stakeholders to analyse their needs, activities and interests so that these can be taken into account in the design of infrastructure assets. Establish:
    a. How infrastructure assets performed before the disaster (capacity, functionality, consistency / reliability of services / utilities etc.).

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   b. Whether any problems existed and why these occurred (design, seasonal issues, etc.).
   c. If local or national building codes for infrastructure assets exist within the country.
   d. The key requirements of different infrastructure stakeholders and how to maximise benefit to the community.
   e. The rate of growth / decrease in the local population levels and any local or national plans for development to determine requirements for future capacity.

4. Assess the need for appropriately qualified professionals to support and/or take ownership of the assessment of this issue and oversee implementation of its outputs.

Performance Level 1

5. The baseline evaluation criteria have been achieved.

6. Infrastructure planning and implementation: Coordinate repair and reconstruction of infrastructure assets (water supply, sanitation, drainage, roads) with local authorities and other appropriate stakeholders by creating a robust infrastructure plan. (This is particularly vital for large communities or neighbourhoods.) Consider:
   a. Planning and implementation for a wide area of service (if relevant) as well as small communities, individual settlements and even individual key assets.
   b. Information gathered from the infrastructure assessment to determine how existing infrastructure can be repaired and upgraded to maximise structural safety of the facility now and in the case of future risks.
   c. The environmental impact of proposed infrastructure assets and how this impact can be mitigated through good design and location choices.
   d. Use of appropriate codes and standards to help ensure good quality construction
   e. The future maintenance strategy and define future ownership.
   f. Resiliency and risk planning for infrastructure assets, including how the infrastructure design minimises risk from potential future hazards. Local infrastructure assets that improve resilience, such as flood defences and cyclone shelters are included in the infrastructure programme.

7. Engaging qualified professionals: qualified professionals should be involved throughout the planning, design and implementation phases of engineered infrastructure assets. These individuals should hold responsibility for design and construction decisions to ensure quality.

8. Use of technologies and/or construction solutions (see **General Considerations**) and knowledge: Design of new infrastructure should give due consideration to the use of appropriate local technologies, knowledge and cultural preferences, including:
   a. Whether imported solutions from developed countries or other cultural contexts are appropriate to the local conditions including associated maintenance implications (see **point 13 below**).
   b. If local solutions have failed (as a result of the disaster) consider how these can be adapted and improved.
   c. How to learn from and transfer knowledge to members of the community for the design, construction and repair of infrastructure assets.

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9. Effective and efficient infrastructure services: Consider how infrastructure assets can meet the needs of the beneficiaries in an efficient manner over the appropriate design life of the asset (as determined for the context).

10. Construction and implementation: The construction of infrastructure assets is carried out in line with the developed plan with an appropriate monitoring process defined and signed-off by a qualified professional. The defined quality assurance system should:
    a. Meet basis subsistence requirements for the whole community ensuring accessibility for all.
    b. Allow for accountability of the infrastructure asset(s).
    c. Cover individuals involved in the implementation.

11. Continued stakeholder engagement and on-going operation and maintenance: Liaise and coordinate with key stakeholders throughout planning and reconstruction to ensure their continued engagement. To support future maintenance and operation establish:
    a. Individuals / bodies to be responsible for financing and management of finance in respect to infrastructure assets.
    b. Organisational capacity and capability to take responsibility and future ownership of infrastructure assets.
    c. For infrastructure services such as provision of grid electricity or telecommunications services, understand how local authorities intend to provide timely provision of these services and liaise / support these stakeholders as relevant to the programme.

12. Knowledge transfer and training: Establish appropriate training / workshops to allow key infrastructure skills to be developed and supported within the community, including knowledge learnt from the community and on-going redevelopment programme.

13. Operation and maintenance: Ensure future maintenance and operation is considered from the outset of the programme as local communities or authorities will need to ensure the longevity of infrastructure assets. Building upon criteria 9:
    a. Create (with relevant stakeholders) a checklist of regular maintenance actions (e.g., cleaning of storm water drains, vegetation control, cleaning of air conditioning units, etc.) for handover and operation and agreements of ownership.
    b. Produce testing schedules for all systems (water treatment facilities, toilets, energy, waste disposal etc.) and carry out full testing before handover.
    c. Avoid complicated technical installations (plumbing, electrical systems, etc.) so future repairs can be managed. Maintenance should be:
        i. Economically feasible
        ii. Possible using locally available of materials.
    d. Promote the importance of on-going maintenance through various media (to allow all members to engage with the programme), such as:
        i. Maintenance guides relevant to the infrastructure design and materials used. (Technical specifications, drawings and other references to completed construction works can help in the creation of guides[2])
        ii. Meetings with key community members and leaders
        iii. Radio or TV messages.

Note: See Performance Level 3 (PL3) point 20. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

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Performance Level 2

14. The Performance Level 1 criteria have been achieved.

15. On-going operation and maintenance: Ensure that on-going maintenance is addressed and key individuals appointed to carry out future maintenance:
    a. Provide training in infrastructure maintenance to maximise the lifespan of the materials and their performance and maintain infrastructure assets including business planning for financing infrastructure asset operation.
    b. Provide access to or information from the material suppliers, contractors or project management agencies regarding maintenance issues.

16. Skills, capabilities and livelihoods: Identify further skills, capabilities or livelihood opportunities directly related to the project and additional training required to meet these needs, including business planning.

Note: See Performance Level 3 (PL3) point 20. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

17. Increased efficiency / efficacy of infrastructure services: Infrastructure solutions can demonstrate a sustainable improvement compared to a local / appropriate baseline. For example:
    a. An increased service level for the affected population.
    b. Green Infrastructure (see **Definitions section**).

Performance Level 3

18. The Performance Level 2 criteria have been achieved.

19. Enhancing local infrastructure regionally: Consider the needs of community as highlighted through participatory approaches (criterion 2). Establish how local infrastructure can be enhanced to improve resilience or development for the community and the region. Examples include:
    a. Advocate for or with local and national infrastructure stakeholders (including partnerships with NGOs or Universities) to improve and adopt appropriate national standards for infrastructure (suitable to the context).
    b. Design and promote local infrastructure that positively enhances resilience or development for the community and region, e.g., energy infrastructure, telecoms, regional hazard defences. Constructed infrastructure assets exceed the core / key infrastructure needs of the whole community (rather than just the affected population).
    c. Constructed infrastructure assets exceed the core / key infrastructure future needs of the whole community to allow for economic and social growth.

20. Appropriately qualified professionals have been used throughout the reconstruction process for construction approaches used and related tasks as relevant.

21. Performance Level 2 has been achieved for the following issues:
    a. ENE03 Energy Demand and Supply
    b. WS01 Water Demand and Supply

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c. WS03 Sanitation.

Additional Considerations	
General Considerations	
Specification of Technologies and Construction solution	Technologies and construction solutions specified should be locally understandable, operable and maintainable. If these are new technologies to the community appropriate training and support should be required. The infrastructure to support these technologies / approaches should also exist / may need to be established.
Key infrastructure stakeholders	Key infrastructure stakeholders are those that will be involved locally or remotely in the financing, planning, design, operation or maintenance of infrastructure assets. These can include, but are not limited to: 1. Government bodies 2. Local authorities 3. NGOs 4. National societies 5. Community based organisations 6. Other agencies 7. Beneficiaries 8. Large and small scale private sector bodies 9. Land owners 10. Other relevant actors[1].
Re-location or significant rebuilding of neighbourhoods	When entire neighbourhoods need to be completely rebuilt or relocated, there is the chance to rethink infrastructure systems and how they interact with each other. If this is the case it is important to plan the layout of the settlement to suit the present and future needs of the community. (See issue **SET03 Spatial Planning** for further guidance).
Cross-cutting Issue Considerations	
Participation	To inform infrastructure programmes, key stakeholders, including the local community, should input into infrastructure option appraisal and design decisions. This can support facilities that are culturally appropriate and meet the needs of the community. This cross-cutting issue is addressed as criteria under point 2 and 6.
Skills and Capabilities	Redevelopment of infrastructure is a good opportunity to transfer knowledge within a community and improve skills and develop capabilities.
Livelihoods	Employing members of the affected community in construction processes can provide a means of livelihood for those affected even during the reconstruction process and over the life of the development through operation and maintenance activities
Community Ownership and Sustainable Management	See **Skills and Capabilities**. Activities of the types mentioned help to develop and strengthen a sense of ownership and also promotes sustainable management over the life of the community. Activities of this type support operation and maintenance activities over the life

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Additional Considerations	
	of the development and therefore livelihood creation and so the economic viability of the development
Resilience	The infrastructure facilities must be resilient against future disasters.
Security and Safety	Infrastructure facilities must be protected against vandalism and other antisocial acts.
Economic Viability	Infrastructure facilities must be economically viable to construct and maintain. It is important to include business planning into the infrastructure reconstruction process to ensure the longevity of these assets.
Access and Non-discrimination	Information dissemination, skills and capability building activities and access to infrastructure facilities, should be open and accessible to all.

On-going Monitoring and Evaluation

None.

Case Studies

Tsunami, Aceh, Indonesia, 2004[6]

Rating: +1

This case study illustrates the benefits of involving local community in infrastructure reconstruction as means to alleviate post-disaster employment shortages and likewise, provide immediate income to the affected population.

In Aceh and Nias, roads that were bad before the tsunami simply disappeared afterward. For aid to be delivered and for the economy to recover, road networks were in dire need of quick repair. Furthermore, conditions made the use of advanced technology not only costly but also generally infeasible. The ILO (International Labour Organization) adopted a local resource-based approach to allow the restoration of roads for the flow of economic and humanitarian services. Simultaneously, the ILO's local resource-based infrastructure rehabilitation generated short-term jobs, immediate income, and local capacity to build good roads and create local employment far beyond the recovery phase. With a budget of $1 million from UNDP-ERTR and OCHA, the ILO restored 18 kilometres of roads, created 28,000 worker-days of employment, and generated insights for promoting medium-term development.

Tsunami, Sri Lanka, 2004[1]

Rating: -1

This case study illustrates the importance of providing simple easy to maintain infrastructure facilities that are suited to local patterns of use .The beneficiaries were handed over a complicated system which they found difficult to maintain. The pump used in the wastewater septic treatment required a lot of maintenance, which had high cost implications and broke down frequently. It was discovered that the facilities were not designed to consider local patterns of use. The community was used to using sachets of shampoos and then discarding the plastic in the drains. The sachets would get caught between the blades of the pump causing it to break down. Furthermore, the wastewater septic

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treatment system itself was a complicated one and required someone with a technical background to maintain it.

Tsunami, Aceh, Indonesia, 2004[4]

Rating: -1

This case study illustrates the importance of coordinating provision of infrastructure components and housing. In Aceh there were several instances where reconstruction of larger scale strategic infrastructure impacted on housing but was not properly coordinated or prioritised. For example, BRR (Rehabilitation and Reconstruction Agency, Indonesia) had to compensate families who received houses from one DEC Member Agency in 2006 which then had to be abandoned due to widening and re-alignment of the USAID road between Banda Aceh and Meulaboh. Repeated delays to the completion of this road also perpetuated the challenge of delivering building materials to the area around Calang. Delay in the reconstruction of sea walls and coastal protection meant that many communities remained vulnerable to flooding, and such protection measures were not identified in the expenditure of the Multi-Donor Fund which was fully committed by early 2008. In Pasir one DEC Member Agency lost several reconstructed houses due to very high tides shortly after they were constructed since the sea wall had not yet been reinstated.

Additional Information

Relevant Definitions

Building Code: A set of ordinances or regulations and associated standards intended to control aspects of the design, construction, materials, alteration and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage.

Comment: Building codes can include both technical and functional standards. They should incorporate the lessons of international experience and should be tailored to national and local circumstances. A systematic regime of enforcement is a critical supporting requirement for effective implementation of building codes.

Centralised Water Supply Systems: refers to an extraction, treatment, storage and transmission / distribution of water from a central facility serving a number of neighbourhoods and urban areas.

Centralised systems for larger cities are often complex systems and use several water sources sometimes located at considerable distance from the city, different supply zones in the distribution network, and sophisticated treatment technology. Operation and management of centralised systems require considerable technical and organisational capacities and are generally assured by municipal or corporate-owned utilities.

Green Infrastructure: Green infrastructure is a term that can encompass a wide array of specific practices. It is an approach to water management that protects, restores, or mimics the natural water cycle. Green infrastructure is effective, economical, and enhances community safety and quality of life. Green infrastructure incorporates both the natural environment and engineered systems to provide clean water, conserve ecosystem values and functions, and provide a wide array of benefits to people and wildlife. *Adapted from the American Rivers definition http://www.americanrivers.org/initiatives/pollution/green-infrastructure/what-is-green-infrastructure/*

Decentralised Water Supply Systems: are based on the same components as are larger centralised systems but use water resources available in closer proximity, supply smaller areas and often use only basic treatment technologies. Decentralised systems can be managed by utilities but also by community based schemes, which make them potential alternative solutions for self-supply of communities in situations with deficient public water supplies[9].

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Infrastructure: Infrastructure can be defined as the physical and structures, networks, or systems required for the successful operation of a society and its economy.

Different components of a society's infrastructure may exist in either the public or the private sectors, depending on how they are owned, managed, and regulated (with shared government / private sector ownership and management occurring in some instances.) Infrastructure may be either physical or social, with the two categories defined as follows:

- Physical infrastructure constitutes public facilities that link parts of the city together and provide the basic services the city needs to function, such as a network of roads and utilities.
- Community and economic infrastructure includes facilities such as hospitals, parks and gardens, community centres, libraries, entertainment and shopping facilities, and educational buildings[6]. (Amended from source)

In the context of this tool infrastructure is defined as community non-building infrastructure elements (water supply, sanitation, road networks and utilities) that are typically among the recovery and reconstruction efforts under taken by aid agencies in the aftermath of disaster. (Community infrastructure, i.e. buildings are covered within the issue Construction Methodology).

Qualified Professionals: For the purpose of this issue qualified professionals can include project supervisors, civil and structural engineers, planners, and architects. They should not only have technical and organisational capacities, but also have experience in managing teams and good interpersonal skills.

Recovery: Recovery programming builds on the affected people's immediate efforts to cope, recover and rebuild. It starts early, alongside relief, seeking to assist people at the peak of the crisis and continues into the mid-term to build greater resilience. Recovery programming includes well-linked actions to protect and restore livelihoods, enhance food security and a wide range of other actions such as community and public health, temporary and longer-term shelter provision, protection and psycho-social support. These activities are undertaken in a way that reduces dependency, mitigates conflict and works towards meeting longer-term risk reduction objectives.

Sanitation: Sanitation systems provide the collection of used water in households and human waste, including its conveyance, treatment and disposal or reuse.

Wastewater: There are three types of wastewater, or sewage: domestic sewage, industrial sewage, and storm sewage. Domestic sewage carries used water from houses and apartments; it is also called sanitary sewage. This typically consists of wastewater that is generated from processes such as washing dishes, laundry and bathing .Industrial sewage is used water from manufacturing or chemical processes. Storm sewage, or storm water, is runoff from precipitation that is collected in a system of pipes or open channels.

Other Information

Practical Action's PCR Tool 10: Quality Control provides information on how this can be implemented in construction programmes.

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Materials and Waste (MW)

MW01 Material Properties / Specification

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To encourage the use of construction materials of an appropriate quality and which consider climate, culture, durability, local supply and environmental impact.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities in order to understand the construction material context with the affected community and other relevant stakeholders in order to determine:
   a. Construction materials typically used by the affected community.
   b. Construction materials that are or would be socially and culturally acceptable.
   c. Whether there are any relevant construction standards or best practice guidance to inform the specification of construction materials.

2. Carry out an initial assessment to identify the following[8]:
   a. Demand for raw materials for the entire project.
   b. Full range of materials available for reconstruction.
   c. Material appropriate to the climate, culture and local context drawing on feedback provided by the community and other relevant groups.
   d. Opportunities for improving project sustainability through material choice:
      i. Ensure that local materials are used wherever possible to create / maintain local employment
      ii. Reduced life cycle impacts of materials specified
      iii. Ensure that materials are responsibly sourced wherever possible
      iv. Select materials that avoid or reduce the need for additional protective finishes
      v. Durability of materials to minimise repair and replacement.
   e. Opportunities to use debris as a resource: Carry out assessment of debris material to check if it can be reused or recycled for re-construction purposes.
      i. Assess the type, quantity and quality of reusable and recyclable debris material available as well as cost for transportation and reprocessing[8]

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   ii. For recyclable debris materials, consider any reprocessing (segregation, crushing rubble into smaller sizes, cleaning of bricks for reuse) required before it can be used for reconstruction works
   iii. For reusable debris materials, consider cleaning, screening, sanding, painting required for it to be considered fit for reconstruction purposes.

3. Assess the need for a construction material specialist to support and/or take ownership of the assessment of this issue and oversee implementation of its outputs.

Performance Level 1

4. The Baseline Evaluation requirements have been met.

5. Develop and implement a construction material specification plan, to understand what materials should be used in the redevelopment of the affected community and implement the plan. The plan should address the following as a minimum:
   a. Appropriateness to local climate. Ensure materials specified are suited to deal with local weather conditions[3].
      i. Consider local weather conditions such as wind, dust, snow, rain patterns before specifying materials, e.g., Plastic sheeting often rips under strong winds or degrades under strong sunlight[2]
      ii. Consider environmental issues of the context (e.g., deforestation, over-exploitation of scarce natural resources) and ensure that materials specified do not exacerbate these issues.
   b. Appropriateness to local context. Ensure users satisfaction and the cultural appropriateness of materials. Residents abandon their homes when they did not feel comfortable with the materials.
      i. Consult with the users / owners regarding whether certain materials are considered to be of low standard or otherwise inappropriate[2]
      ii. Assess whether local materials are being extracted or collected under safe and healthy working conditions[2]
      iii. Assess whether the users are familiar with the materials in terms of their care and maintenance over time.
   c. Appropriateness to local skills and knowledge. Assess locally available skills and capacities for material production. Local workers and contractors must have sufficient capacities to ensure materials produced meet quality and safety standards. Consider the following steps:
      i. Check if special skills, training, experience or equipment are required
      ii. Ensure all safety procedures are understood and followed during production.
   d. Durability: Consider the lifespan of specified materials.
      i. Select materials with due consideration on long term durability to minimise the need for replacement[1]
      ii. More durable transitional shelter materials can be reused for constructing permanent shelters[2]
      iii. Where required use preservative treatment to improve and enhance durability of the materials. E.g., treatment of bamboo and wood components with appropriate preservatives protects the material against decay, insects, fungi, termite attack and increases the lifespan of the material[14]. Always ensure health and safety procedures are followed (especially when treatments are applied locally), including disposal of treatment.

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e. Quality: Building materials specified are of approved quality and/or testing standards. Selected materials comply with relevant legal standards, national building codes and local regulations regarding safety, environmental sustainability, technical feasibility[2].
    i. Community build programmes are labour intensive and require continuous site supervision and monitoring
        1. Raise awareness amongst building artisans, material producers and families rebuilding their homes of the importance of quality of materials to ensure building safety
        2. Provide training to local builders to check the quality of materials in simple ways using visual means (e.g., is aggregate clean and free from organic matter, is sand clean and sharp), touch (e.g., is cement free of lumps) or sound (e.g., do the fired bricks make a ringing sound when knocked against each other?)[10]
        3. Where materials are produced locally the quality of materials produced needs to be closely monitored for at least half a year following training, and further spot checks taken after that[10]
        4. Where concrete is used, slump test, cube tests or Schmidt hammer test can be performed by site supervisors to verify the strength of the mix[10].

f. Buildability: Consider familiarity of the workers and contactors with the material of construction. Where new materials are introduced ensure the material and technologies used are clearly understood by the local workers and contractors.

g. Cost Analysis: Undertake cost analysis before specifying materials. Consider factors such as quality, durability, maintenance cost and reliability of supply. Assess maintenance and potential repair cost of materials over the entire life cycle of the building for overall long term cost savings. Other factors to consider are[2]:
    i. Escalation in material prices due to demand created by reconstruction work. Consider inflation and contingencies while developing budget
    ii. Locally produced materials can save transport costs and avoid taxes on imported material
    iii. Production of construction materials on site is often cheaper.

6. Reuse and recycling of materials for reconstruction. Consider;
    a. Debris recycled for use as base material[1] (See **MW03 Post Disaster Waste Management**) for:
        i. Traditional building components e.g., concrete bricks and pressed blocks, broken bricks can be processed and made into usable bricks / blocks[3]
        ii. Non-structural works e.g., plaster, flooring, broken bricks can be used
        iii. Infrastructural elements e.g., crushed rubble can used as filling for pathways, roadwork.
    b. Reuse: metals (steel etc.), timber, bricks, tiles, doors, windows, and roofing sheets are reused in new construction[2]. Ensure that these meet the applicable specifications for strength and safety.
    c. Reuse and recycling fittings and appliances where feasible and safe to do so.
    d. Materials from transitional shelters are reused for construction of permanent shelters (e.g., bricks, wood, concrete, stone and metal sheets).

Note: See Performance Level 3 (PL3) point 14. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

7. The Performance Level 1 requirements have been met.

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8. Undertake awareness sessions with the affected community so that they are informed about the construction materials being specified and why. Where new or unfamiliar construction materials have been specified, undertake activities to ensure that the affected community are comfortable with them and have the necessary skills to use and maintain them.

9. Local skills and knowledge. Local workers and contractors must have sufficient capacities to ensure materials produced meet quality and safety standards. Additional training must be provided where required. Consider the following steps:
   a. Establish training and resource centres to deliver training programmes on material production technologies targeted at variety of audiences including contractors, labourers and site supervisors[9].
   b. Plan for close site supervision and on job training to ensure high quality of production.

10. Quality: Building materials specified are of approved quality and/or testing standards. Selected materials comply with relevant legal standards, national building codes and local regulations regarding safety, environmental sustainability and technical feasibility[2].
    a. Establish a working strategy for how to control quality of delivered material e.g., carry out regular checks / material testing to ensure delivered material is of appropriate quality. Request material verification certificates, mill or test certificates from suppliers to verify quality[9]
    b. Develop quality assurance procedures to check quality of materials at various stages of construction. These can include a number of tools such as continuous site supervision, checklists for site supervisors and random spot checks (See the **Additional Information section**).

11. Ensure that the reuse and recycling of materials is maximised where they meet quality and safety standards.

12. Minimise raw material consumption: Analyse ways to minimise raw material consumption without compromising standards and programme needs.
    a. Develop engineering strategies that optimise material strength with lower quantities of materials whilst meeting standard building codes and safety considerations. E.g., solid masonry walls can be replaced by cavity walls or buttressed walls, solid concrete slabs by ribbed slabs, timber beams by light weight trusses.
    b. Use of materials with recycled content: Consider using building materials with recycled content where available and appropriate to reduce demand on natural resources and lower environmental impact. E.g., Fly-ash from coal fired power station can be incorporated into cement production[8] as well as fly-ash brick manufacturing.

Note: See Performance Level 3 (PL3) point 14. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

13. The Performance Level 2 requirements have been met.

14. A construction material specialist has been used to produce and oversee implementation of the construction material specification plan (see **Performance Level 1**) and identify ways of

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achieving efficiencies in how materials are specified for the affected community (see **Performance Level 2**).

15. Ensure that an individual or group of individuals are made responsible for ensuring that on-going specification of construction materials is effectively managed.

16. Development of on-going opportunities for materials recycling in the community to build livelihoods and economic activity in the community.

17. Low Embodied Energy: materials with low embodied energy which have low impact on the environment are specified.
    a. While specifying materials consider the amount of energy that was required in extraction / harvesting of raw materials, transportation, processing, building and maintenance, demolition and disposal.
    b. Request life cycle analysis report from the suppliers / manufacturers.
    c. Introduction of relevant technologies: Where applicable introduce technologies that improve the sustainability of traditional methods of building material production and use.

Additional Considerations	
General Considerations	
Local building traditions	Analyse the local building traditions in terms of its quality, advantages, disadvantages, environmental performance and potential for improvements.
Skills training	Provide skills training for construction workers and the community, based on identified knowledge gaps. Ensure quality parameters.
Routine checks	Where local community is involved in construction process, establish a schedule for routine checks by supervisors to regularly monitor construction activity, use of materials, quality, health and safety etc. These quality checks can be carried using different methods such as regular technical supervision, reporting and material testing.
Reuse of debris	This should be considered in conjunction with other issues Post Disaster Waste Management and Material Sourcing.
Cross-cutting Issue Considerations	
Participation	Local culture, preferences and priorities must be considered before selecting materials of construction
Skills and Capabilities	Educate and train local community in building material production and quality control.
Livelihoods	Using locally produced materials / fabrication can boost production and provide a means of livelihood for those affected by the disaster even after the project is over.

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Additional Considerations	
Community Ownership and Sustainable Management	None.
Resilience	Construction materials must be resilient to weathering due to local climatic conditions and general wear and tear
Security and Safety	Provide personal protection equipment to all those involved in material production.
Economic Viability	Using locally produced materials reduces costs for transportation, distribution, import duties and avoids delays in construction.
Access and Non-discrimination	None.

On-going Monitoring and Evaluation

Regular monitoring and evaluation must be carried to ensure quality of construction. Monitoring and evaluation can be carried out by selecting a few key indicators (volumes of materials used, material strength parameters, source of materials etc.) and then collecting and summarising them on a regular basis (weekly or fortnightly)[2].

- Where materials (bricks, concrete etc.) are manufactured on site, undertake regular checks of the quality of raw materials used (sand, clay, aggregates etc.) and materials in use for construction material production and maintain records / feedback
- Undertake testing of materials produced / procured for construction and maintain records of testing[2], e.g., conduct strength test of each batch of bricks manufactured or procured and record testing results
- If any deviations from set indicators are identified then cause of the deviation and any remedial measure taken must be recorded
- Record evidence of training that has taken place, e.g. leaflets / presentation slides etc.

Case Studies

Hurricane Dennis, Cuba, 2005[12]

Rating: +1

This case study illustrates how material selection can contribute to both lower energy use and local capacity building. To promote construction of efficient homes in Cuba in the aftermath of the hurricane a training and capacity-building programme was created for local builders on the production and use of ”eco-materials” with low embodied energy. Materials included micro-concrete roofing tiles, pre-cast hollow concrete blocks, clay bricks fired with bi-waste fuels, bamboo and partially replacing Portland cement with lime-pozzolana cement.

Recurring Drought in Sudan[13]

Rating: +1

This case illustrates the innovation of using locally produced and environmentally conscious materials for economic viability and environmental sustainability while benefitting communities. Traditionally,

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local fuel wood is used in kilns to fire bricks in Sudan. However, finding sustainable sources for local fuel wood is a challenge in the area where Drought is recurrent. More environmentally appropriate brick production methods as well as energy efficient kilns were developed for economic viability and environmental sustainability. A number of alternative fuels were explored to fire the kilns. Up to 80% of wood fuel was substituted with cheaper and more environmentally sustainable cow dung and bagasse residues (fibrous leftovers from the juice extraction of sugarcane and sorghum stalks). Furthermore, improvements to moulding and drying methods resulted in savings in overall construction time and costs. Reduction of transportation costs to benefit both local people and environment was also a consideration.

Earthquake, Yogyakarta, Indonesia, 2006[2]

Rating: +1

In the housing recovery effort in Yogyakarta, following the earthquake, brick masonry from damaged and destroyed structures was used extensively to make cast-in-place concrete for the permanent structures. In doing this, construction costs were significantly reduced. Crushing of the brick masonry wall rubble was performed using both manual and mechanical means. Through the process, brick rubble was crushed into fine aggregate required in the mixing of mortar and concrete. The manual process was performed through the use of a simple hammer, while the mechanical process required the use of a mobile stone crusher. Using the mechanical device, one stone-crusher operator and six support workers could create 15 cubic metres of aggregate each day, relying on only 0.6 litres of oil per cubic metre. Several stone crushers were deployed throughout the affected area, and rubble-crushing was conducted extensively.

Additional Information

Relevant Definitions

Reuse: The use of a whole component, in largely unchanged form and for a similar function; e.g., a brick used as a brick.

Recycling: The melting or crushing of the component and its separation into its original constituent materials, which then re-enter the manufacturing process as raw materials.

Recovery: Burning of the demolished product to produce energy. The use of the raw material as a resource is lost and only its energy content is recovered.

Embodied Energy: Embodied energy is the sum total of the energy spent in the life cycle of a building material or component. This sum includes all of the energy required for the existence of that component, including extraction or harvest, transport, manufacture, assembly, installation, maintenance, and destruction and disposal.

Other Information

1. Considerations for developing quality assurance procedures[9]:
   a. How will the quality of construction be monitored? Have quality assurance systems been put in place?
   b. Who is supervising construction and who is ultimately responsible for ensuring quality of workmanship?
   c. Who has authority to condemn poor quality construction and require it to be demolished?
   d. What procedures have been put in place to monitor or evaluate the quality of construction at key stages? Do they include checklists or guidance?
2. Considerations for assessing local skills for material production[9]:

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a. What capacity exists locally in terms of both skilled and unskilled labour?
b. Do skilled labourers need to be recruited nationally? Or could training programmes increase the availability and quality of skilled labour?
c. Is investment in enhancing local manufacturing capacity required?

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MW02 Material Sourcing

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To encourage and promote procurement of construction materials based on quality, environmental, social and economic considerations.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake and verify facilitated interaction and participatory activities with the affected community and other relevant stakeholders in order to understand the material sourcing context. Determine the construction materials that are available and commonly used by the community and the associated skills and knowledge available.

2. Determine whether there are any relevant local standards or best practice guidance concerning the sourcing of construction materials.

3. Investigate the options available to source materials e.g.:
   a. local, national international.
   b. new, reused, recycled etc.

4. See **MW01 Materials Properties / Specification**. Assess the need for a construction material specialist to support and/or take ownership of the assessment of this issue and oversee implementation of its outputs.

Performance Level 1

5. The Baseline Evaluation requirements have been met.

6. Supplement the construction material specification plan developed and implement for MW01 Materials Properties / Specification with a section on material sourcing covering identified types, amounts and routes of material procurement for the project for consideration and implementation:
   a. Factors to consider while sourcing construction materials or selecting suppliers:

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i. Cultural considerations (e.g., is the material relevant to the local context)
ii. Labour policies adopted in manufacturing and production of materials
iii. Consider advantages of local, national, and international sourcing (e.g., it may be more beneficial to source small quantities of materials locally)
iv. Steps taken by the manufactures / suppliers to limit and/or mitigate environmental impacts.

b. Identify opportunities for strategic actions such as optimisation of sourcing of key materials or increasing local manufacturing capacity[3].
c. Where appropriate, include a contract specification clause for the use of sustainably sourced materials.
d. Consider including sustainability credentials of materials and suppliers in tender processes for the procurement of materials, in order to be able to inform the selection of suppliers.

7. Legal sourcing: Ensure all materials are legally sourced. Verify certificates and other related documents to demonstrate this.

8. Local sourcing: this method can have significant environmental benefits, but this must be balanced against responsible construction practices. Consider and action the following where appropriate (see **MW01 Materials Properties / Specification**):
   a. Based on a local market survey, use locally available building materials for reconstruction purposes, where they can be sustainably sourced.
   b. Ensure that extraction / harvesting, processing and use of these materials have minimal negative impacts on people's health and the environment[2].

Note: See Performance Level 3 (PL3) point 16. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

9. The Performance Level 1 requirements have been met.

10. Undertake actions to enhance the sustainability of materials sourced:
    a. Develop a green purchasing plan for material procurement for reconstruction purposes. The plan should cover the selection of materials which favour lower impact on the environment and human health, during:
       i. Raw materials acquisition
       ii. Manufacturing
       iii. Transport and distribution[5] and have the potential for:
       iv. Reuse and recycling.
    b. Where raw materials (e.g., clay for brick production, stone for masonry, and sand for concrete production) for construction are extracted / harvested from the construction site or surrounding areas:
       i. Avoid extraction of material from ecologically sensitive areas (e.g., mangrove forests, coral reefs)
       ii. Avoid over extraction of materials and ensure materials are extracted at a sustainable rate
       iii. Take steps to mitigate any negative environmental (water course, air pollution, top soil erosion, etc.) and health (dust and particulates) impacts as result of material extraction / harvesting, processing and use

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iv. Undertake measures to prevent water course pollution, air pollution, erosion, etc.
v. Encourage establishment of safety standards for those involved (e.g., local community, aid agencies etc.) material extraction / harvesting, processing of materials. Provide protective gear to individuals involved in raw material extraction, materials production and processing.

11. Responsible sourcing: Based on the materials sourcing aspect of the Construction materials specification plan, consider and mitigate against the environmental impacts and sustainability principles associated with material supply and manufacture.
    a. Identify any local environmental, social or economic concerns associated with the extraction / harvesting of raw materials and take actions to mitigate these impacts[5].
    b. Identify any environmental social or economic impacts associated with the extraction / harvesting, processing or transportation of the materials, pollution of waterways, impacts on air quality, and depletion of ecosystems (e.g., coastlines where sand is extracted).
    c. Understand where suppliers / manufacturers source their materials.
    d. Identify and seek to reduce other related impacts including;
        i. Negative health impacts
        ii. Labour practices
        iii. Loss of natural habitat / ecosystem[2]
        iv. Claims over land, potential conflict arising over disputed sources of raw materials.

12. Undertake actions to enhance local production and skills:
    a. Provide awareness-raising sessions and training to communicate the importance of sustainable material sourcing.
    b. Identify where there are opportunities to develop local capacities in extracting / harvesting raw materials for construction.
    c. Greening local manufacturing processes: where large quantities of materials are going to be used, work directly with material producers to ensure that their operations are environmentally sustainable.
        i. Inform manufacturers of the different methods they can use to reduce pollution, sustainably harvest materials, and lower energy required to process the materials[2]
        ii. Take proactive steps to assist suppliers in making the material supply chain more environmentally sustainable[2].

Note: See Performance Level 3 (PL3) point 16. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

13. The Performance Level 2 requirements have been met.

14. Construction material banks: facilitate the supply and availability of materials and overcome shortage of building materials and the vagaries of the local market (price fluctuations and inconsistency in quality)[1]. Where relevant set up a construction material bank for:
    a. Material production and supply.
    b. Provision of building elements on demand to the community.
    c. Ensuring materials are stored properly and protected from contamination and deterioration.
    d. Making arrangements for suitable security measures to avoid theft of materials (refer to the CC07 Safety and Security issue for more information).

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e. Identifying future use and build in adaptability of warehouse for future reuse.
f. Training:
    i. Production of building elements for local suppliers
    ii. Traders (e.g., stonemasons, welders, carpenters) as a resource centre to provide expert advice related to construction and associated topics.
g. Demonstration of building technologies, equipment, products, production process.
h. Ensuring that any material banks are located and built on a safe site, with minimal risk from potential hazards.

15. Responsible sourcing: Based on the materials sourcing aspect of the Construction materials specification plan, consider and mitigate against the environmental impacts and sustainability principles associated with material supply and manufacture.
    a. Ensure adoption or verification of use of a holistic approach to managing materials of construction from the point at which it is harvested through processing and manufacturing, labour practices, transport and distribution to reduce the associated environmental impacts.
    b. Verify from where suppliers / manufacturers source their materials (chain of custody certificates, third party certification schemes etc.).

16. Use a construction material specialist to produce and oversee implementation of the material sourcing section of the construction material specification plan (see **MW01 Materials Properties / Specification**) and identify ways of achieving efficiencies in how materials are sustainably sourced for the affected community.

17. Community ownership and sustainable management: working with the community put in place structures to allow an individual or group of individuals to have ownership for ensuring that on-going sustainable procurement of construction materials is effectively managed.

Additional Considerations

General Considerations	
Verification of certificates	Timber suppliers may deliver unspecified or illegally sourced timber to construction sites. Investigate the certifying authority's reliability and the authenticity of the certificate.
Regional / national policy	Consult with government officials to determine if there are any environmental concerns with the respect to any materials used for reconstruction purposes[2].
Legal or responsible sourcing	Using certified materials is one way of ensuring materials are legally or sustainably sourced[2].
Timescales	Time required for sourcing and transportation of materials must be considered during planning stages to ensure availability and continuity of material supply during construction.
Geophysical hazards	Extraction of clay from hillsides can create a landslide hazard for residents living in areas adjacent to the clay quarry[2].

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Additional Considerations	
Cross-cutting Issue Considerations	
Participation	Undertake participatory activities throughout the material sourcing process to ensure that local sources are sustainably utilised and materials being sourced from outside of the affected community will be appropriate and accepted.
Skills and Capabilities	Educate local manufacturers and local community of the importance of sustainably harvesting materials, ways to reduce pollution and associated safety measures. Provide training to local community to determine suitability of materials sourced from construction site or surrounding areas for building purposes.
Livelihoods	Using locally produced materials can boost production of economic opportunities and provide a means of livelihood for those affected by the disaster even after the project is over.
Community Ownership and Sustainable Management	Educate local community of the importance of sustainably harvesting materials, ways to reduce pollution and associated safety measures.
Resilience	The sourcing of materials should not affect the ability for the affected community (or any other community) to resist or respond to hazards. For example, the deforestation of an area for timber may increase the risk of flooding at a later date.
Safety and Security	Provide good security at material store facilities to avoid theft of materials.
Economic Viability	Careful planning of material procurement at early stages of reconstruction can significantly reduce costs for transportation, distribution, import duties and avoid delays in construction.
Access and Non-discrimination	Ensure that the materials sourced for reconstruction are appropriate for all groups of the affected community and that all have equal access to the materials available.

On-going Monitoring and Evaluation

- Maintain regular records for procurement, supplies and distribution of construction materials
- Collect product specifications of certified materials from manufacturers
- Record any unforeseen limitation in material supplies and quality considerations that was experienced and reasons for it
- Record any environmental effects or health hazards (immediate or long term) experienced as result of material extraction from local areas.

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Case Studies

Drought, Sudan[6]

Rating: +1

This case illustrates the benefits of engaging with local manufactures and helping them green their manufacturing process. Traditionally, local fuel wood is used in kilns to fire bricks in Sudan. However, finding sustainable sources for local fuel wood is a challenge in the area where Drought is recurrent. More environmentally appropriate brick production methods as well as energy efficient kilns were developed for economic viability and environmental sustainability. A number of alternative fuels were explored to fire the kilns. Up to 80% of wood fuel was substituted with cheaper and more environmentally sustainable cow dung and bagasse residues (fibrous leftovers from the juice extraction of sugarcane and sorghum stalks). Furthermore, improvements to moulding and drying methods resulted in savings in overall construction time and costs. Reduction of transportation costs to benefit both local people and environment was also a consideration.

Cyclone Jokwe, Mozambique, 2008[7]

Rating: +1

This case study illustrates how the intense demand for raw materials in reconstruction process ultimately impacts the environment and the people who depend on it. Following the Cyclone Jokwe, a category 3 cyclone that destroyed 10,000 houses the demand for mangrove wood traditionally used for roofing beams for coastal homes increased. In the two weeks following the cyclone, the entire stock of mangrove timber market was sold out every two days, indicating that rate of mangrove consumption during reconstruction work increased 14 times over non-emergency situations. Because the harvesting of mangrove wood is illegal in Mozambique, the wood collectors did not harvest the mangrove from the continental coast but sailed to the islands of Eata Namacate and Larde in the Primeiras and Segundas archipelagos. These archipelagos are recognized as unique areas of high biological richness and diversity, and the mangrove habitat provides important nursery areas for juvenile fish and shrimp, which are important livelihoods resources.

Earthquake, Jogyakarta, Indonesia, 2006[8]

Rating -1

This case study illustrates the importance of resource management in disaster relief to protect the environment from long term impact. As the shelter sector was affected during the earthquake the Jogyakarta earthquake response was primarily a shelter disaster. A total of 25 million sticks of bamboo were used in the response by shelter cluster, Indonesian Government and other communities. However, management of the growing clumps of bamboo was not integrated into the transitional shelter programmes. In response to demand, much bamboo was clear-cut or harvested using unsustainable techniques. Depending on the type of bamboo and how it was harvested, some areas will take three to five years to return to their original stock. Other areas may take ten years and some will not grow back. The resultant environmental impact was significant. Although formal studies have not been carried out, it is likely that vast areas of bamboo forests were decimated, including entire valleys.

To avoid deforestation of the bamboo stock, this project could have set up purchasing control mechanisms to manage the bulk procurement of bamboo that controlled quality, environmental impact, procurement methods and treatment of the bamboo. It would have also been possible to allocate money to reforestation programmes.

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Additional Information

Relevant Definitions

Green Purchasing: Procurement of products and services that have a reduced effect on human health and the environment when compared with competing products or services that serve the same purpose.

Extraction: Removal from the earth of a raw material that cannot be replenished (e.g., iron for steel or limestone for cement).

Extraction of raw materials can lead to the pollution of water sources, increase the potential for natural hazards (e.g., landslides, erosion, and flooding), or result in air quality impacts from dust and particulates that can affect human health. When dust, soil, and other particulates enter into streams and rivers, the passage of light through the water is reduced, negatively affecting the photosynthetic microorganisms that fish and other species depend on for food.

Harvesting: Acquisition of raw materials such as wood, bamboo, or thatch that are typically plant-based materials and can be replenished over time

Harvesting can have adverse impacts on people and the environment. The removal of timber from hillsides can result in the loss of habitat for food species, erosion of topsoil, and pollution of streams and rivers. The production of plants for building materials, such as reeds or bamboo, may also result in pesticide or chemical pollution of water and land, putting people at risk if not done sustainably[2].

Processing: Involves conversion of a raw material into a bulk material that can be used to manufacture a building product.

The conversion from iron ore to steel also requires a series of processes, including the breaking up of the ore, cleaning, and sintering (heating). As a result of steel processing, large amounts of carbon dioxide are emitted, as well as sulphur dioxide, fluoride compounds, dust, and a wide range of heavy metals. Arsenic, a chemical that is toxic to human health, can also be released as iron ore is converted to steel. Additionally, zinc coating and galvanizing, which are common processes that protect steel from humid air, water, acids, and salt that contribute to rust, have an environmental effect. These processes lead to the emission of organic solvents, cyanides, chrome, phosphates, and fluorides, mainly in the cleaning water used in processing.

Quarry: A site from which rocks, gravel, sand or clay is extracted in substantial quantities.

Responsible Sourcing: The management and implementation of sustainable development principles in the provision, procurement and traceability of construction materials and components.

Sustainable Rate: Material harvest at a sustainable rate relates to harvesting materials (typically plant matter) at a rate that takes into consideration regeneration times of the material resources.

Other Information

Legal sourcing: high demand for raw materials during reconstruction process can outstrip the supply of sustainably produced natural resources (wood for timber, clay for bricks and sand for cement) for building materials. Thus leading to collateral devastation of the environment not directly related to the disaster.

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MW03 Post Disaster Waste Management

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To promote the sustainable management of post disaster waste, by ensuring efficient use, removal and disposal.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with the affected community to understand:
   a. Priority areas that should be cleared of debris.
   b. How the debris may be reused or recycled, in order to minimise waste.
   c. Where and how debris may be stored for future use.

2. Carry out an initial assessment of the affected community to identify the debris present as a result of the disaster event.
   a. The assessment should detail the types and volumes of debris that is present after the disaster. This is likely to form the basis for the disaster waste management plan.

3. Gather information on relevant legal frameworks or existing standards.
   a. Identify and list all regulations that exist for managing each debris type and ensure that waste is managed in accordance with those regulations.
   b. Consideration should be given to the ownership of the land and the belongings of those affected when initiating the start of the clearance works.
   c. Work with relevant national authorities to negotiate use of public domain debris.

4. Management of the deceased victims:
   a. The management and/or burial of the deceased victims from natural disasters should be dealt with in an appropriate and dignified manner. It is usually handled by search and recovery teams, in coordination with responsible government agencies and authorities. Please refer to the Sphere project[3] for further guidance.

5. Assess the need for a waste specialist to support and/or take ownership of the assessment of this issue and oversee implementation of its outputs.

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Performance Level 1

6. The Baseline Evaluation requirements have been met.

7. Hazardous waste: It is likely that hazardous materials will be present in debris generated by the natural disaster therefore specific procedures will be required in order to manage this safely.
    a. Adequate protective clothing / equipment should be made available to protect all working with disaster debris.
    b. Provide individuals with health and safety training which should include but not be limited to:
        i. Information on the correct handling methods.
    c. Risks associated with improper management of the waste.
    d. Hazardous waste should be clearly identified and be separated from non-hazardous waste stream.

    Hazardous waste should be safely disposed of in a designated area. Refer to the Sphere guidance[3] for details on how different types of waste should be managed.

8. Identify priority locations and typologies (e.g., roads, rivers, community space) to begin the clearance of post-disaster waste. In the first instance, this could be based on:
    a. Health and safety reasons: it may not be safe to begin sorting some areas until other areas have been cleared as required by the relevant authority / body.
    b. Set timeframes for the clearance of priority routes for the settlement reconstruction activities so that essential movement can occur as soon as possible.
    c. Site selection: specific areas may be best placed for the reconstruction of the community so will need clearing first to prevent hindering the redevelopment of the new community. See the **SET01 Site Selection** for further information.

9. Debris clearance: Produce and implement a disaster waste management plan which considers how the different waste types will be sorted / managed outlining basic procedures and guidance for how this will be done. Suggested structure for the management plan below. Additional guidance can be found in documents such as *Planning for Natural Disaster Debris, March 2008*:
    a. Location for sorting: where large streams of waste have been generated as a result of the disaster, an appropriate location needs to be identified for temporarily depositing the waste in order to then begin sorting and storing.
    b. Evaluate the need for equipment: It is useful at this stage to consider the equipment that may be needed to aid the removal / sorting of the debris.
    c. Mulching / composting of organic waste:
        i. Vegetative waste generated by a natural disaster could be used for composting to aid the growth of food / vegetation in future
        ii. Buried organic materials should be removed from areas of construction works as they can lead to problems of subsidence and health risks as it decomposes.
    d. Residual waste disposal: If certain streams of non-hazardous waste cannot be reused / recycled, then it will need to be disposed of by one of the following methods:
        i. Landfill:
            – Location: At an appropriate distance from the community and away from any water sources. The height of the water table must be investigated if waste is to be disposed of in pits (guidance on how to do this can be found in Ref. 4). The community should be consulted to determine the final location of landfill
            – Landfill sites should be selected that avoid land of economic or livelihood value such as agricultural land as it is likely to reduce fertility / productivity in the short and medium term

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- Adequate space: Ensure sufficient space is provided for the level of waste that has been generated by the natural disaster
- Contamination concern: Precautionary procedures to avoid contamination of underground water. Disposal sites should always be downhill from groundwater sources
- Safety concern: Appropriate barriers should be put up to keep animals, and children out. When staff work on landfill sites to deliver waste particular care should be taken.

ii. Incineration (note: this should generally only be used as a last resort):

- Facility location: At an appropriate distance from the community and preferably downwind of the community
- Pollution concern: the incineration facility should be carefully managed to ensure emissions are kept to a minimum
- Health concern: plastic waste should be removed before incineration
- Training: Provide adequate awareness training to the community and the workers to ensure they are aware of what to burn and how.

e. Demolition: There may be buildings that are either beyond repair or require demolition for health and safety reasons (i.e. they are likely to collapse if not taken down quickly).
   i. If further waste is generated as a result of demolition shortly after the disaster, then the waste should be managed in accordance with the above considerations. Where the waste is to be reused / recycled for the purposes of reconstruction, please refer to the MW01 Materials Properties / Specification issue
   ii. Wherever possible demolition should be undertaken in a way that facilitates the sorting and reclamation of materials. Unstable structures may mean that this is not possible and health and safety concerns should take precedence over the reclamation of materials.

10. Initiating the clearance of the debris: Employ individuals from the community to begin sorting waste where possible and safe to do so. Popular schemes such as ‘cash for work’ encourage communities to get involved in the recovery work.
    a. Develop a communication strategy for explaining the plan to the local community to ensure they feel involved and that the sorting is done correctly and safely.
    b. Provide suitable training that is accessible for all individuals to enable them to sort through the waste safely.
    c. Provide appropriate protective equipment for the workers including but not limited to:
       i. Hard hats, safety goggles, face masks, gloves, and appropriate footwear
       ii. Soap and water for cleaning.

Note: See Performance Level 3 (PL3) point 19. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

11. The Performance Level 1 requirements have been met.

12. Reuse / recycling of waste: Wherever possible waste should be reused or recycled.
    a. Debris can often be reused or recycled for the reconstruction process following a natural disaster. Please refer to the MW01 Materials Properties / Specification issue for more information.

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b. Where materials cannot be reused by the local community, they may be able to be used elsewhere.
c. Debris can have various uses not just in reconstruction and so should be reused / recycled using other functions wherever possible. For example wood can be used for heat and/or cooking.
d. Electrical appliances, if present, could be recycled.

13. Awareness: Run awareness sessions with the affected community to increase knowledge of how debris is being managed to minimise the waste produced and maximise value of the material.

14. Skills and Capabilities: Conduct information dissemination and educational activities to supplement and develop existing waste management practices and increase capacities and opportunities for reuse and recycling of post-disaster waste.

15. Targets: The disaster waste management plan should include challenging benchmarks / targets for minimising the post disaster waste sent to landfill.
    a. Where targets have been set, these should then be communicated to the individuals / organisations and local authorities working with the disaster waste management plan to provide awareness and motivation.
    b. Incorporate monitoring and measuring of the waste that is being diverted from landfill.

16. Ensure that an individual or group of individuals are made responsible for ensuring that the work carried out with the post-disaster waste is used to inform:
    a. The design and specification of the shelters and settlement (in an effort to maximise the appropriate reuse and recycling of post-disaster waste).
    b. The waste management plans for both construction and operation. See **MW04 Construction Waste Management** and **MW05 Operational Waste Management** for more information.

Note: See Performance Level 3 (PL3) point 19. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

17. The Performance Level 2 requirements have been met.

18. Targets: The benchmarks / targets for minimising post disaster waste sent to landfill or other means of disposal have been achieved, using appropriate levels of data and documentation.

19. A waste specialist has been used throughout the full post-disaster waste management process to oversee assessment and implementation of the issue and ensure that the waste is managed using the most appropriate method(s), whilst minimising long-term impacts.

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Additional Considerations	
General Considerations	
Required input into the disaster debris management plan	It is important that the disaster waste management plan is not developed in isolation. It will require input from the community, surrounding communities, state officials, local contractors and local agencies[5].
Users of the disaster debris management plan	Those responsible for writing the action plan should ensure they fully consider who will be the main users to ensure that its content is accessible, relevant and appropriate for the main users.
Post disaster waste assessment tools	UNEP's Disaster Waste Management Guidelines[10], The Debris Estimating Field Guide September 2010[6], or the Hazards U.S Multi-Hazard methodology and software programme[7] all include tools to identify and quantify debris.
Sorting process	The sorting process will not necessarily happen in the location where the natural disaster has occurred. In many circumstances, the debris will be removed quickly from the site and sorted / treated separately. However where waste is likely to be reused on site in the re-construction process, it is preferable for this waste to be sorted in situ or in the vicinity of the area in which it will be reused.
Incineration	Where incineration is used to dispose of some of the waste, the use of the energy / heat generated from this process should be considered to benefit the community by providing power or heating. This will affect location.
Natural Hazard-specific Considerations	The Planning for Natural Disaster Debris, March 2008 document provides guidance on the type of debris that is likely to be generated as a result of the different natural disasters.
Cross-cutting Issue Considerations	
Participation	It is important to involve the community and local authorities (e.g., officials, municipality) fully when developing the debris management plan. The local community are crucial for both the labour and also the decision making during the recovery process. The beneficiaries can help to support land ownership verification and also to help establish ownership of salvaged and recycled materials.
Skills and Capabilities	The affected community should be involved in awareness / educational sessions throughout to improve waste management knowledge and skills.
Livelihoods	The work to sort through the waste can be carried out by skilled and unskilled workers and provides a potential source of work for those affected by the disaster.
Community Ownership and Sustainable Management	The ownership of post-disaster waste must be established to prevent unwarranted use and subsequent claims. The debris should be sorted, stored and managed appropriately by the community to ensure that it is effectively utilised.

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Additional Considerations	
Resilience	It is important to consider within the disaster waste management plan what measures can be put in place to protect the properties to try to prevent the large scale destruction of properties in future.
Security and Safety	It is important to initiate the disaster waste management plan as quickly as possible to reduce the risk of fire, personal injury and the spread of disease vectors across the community, caused by the stagnant waste[5].
Economic Viability	Careful planning at the early stages of disaster waste management can minimise costly mistakes. It is important to identify cost-effective debris management solutions at an early stage in the clear up process. A well thought through plan may also aid in getting funding assistance from FEMA and other agencies[5].
Access and Non-discrimination	All individuals in the affected community should have equitable access to information, educational opportunities and livelihood opportunities related to post-disaster waste.

On-going Monitoring and Evaluation

- Evidence gathered in the initial assessment when trying to understand the volume / type of waste generated by the natural disaster. This could be in the form of notes from the stakeholder participation workshops
- A copy of the post disaster waste management plan which was implemented, and any subsequent amended revisions throughout the recovery
- Evidence of training that has taken place (e.g., leaflets / presentation slides)
- Photographs, including aerial photographs, and land use maps may prove to be useful sources of information.

Case Studies

Hurricane Katrina, 2005[6]

Rating: +1

This example demonstrates the importance of communication and collaboration as well as careful planning. The Louisiana Department of Environmental Quality (LDEQ) developed a debris management plan. They then communicated with the relevant key groups, for example the U.S. Environmental Protection Agency, the U.S. Coast Guard, the US Army Corps of Engineers (USACE) and FEMA to form a unified command in daily contact. This facilitated debris management and recycling discussions. The citizens were kept informed via flyers, websites, TV and radio announcements, and news releases.

Recycling was identified as a priority for the recovery effort. Vegetative debris was chipped or ground. Although the group recognized that this vegetative debris could potentially be used for energy recovery, in Louisiana, due to the termite infestation in parts of Louisiana, all cellulose material was quarantined, therefore much of the chipped vegetative debris was used as cover at landfills.

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Household owners were encouraged to sort their own waste using the guidance provided in the flyers handed out. Over 12,500 tonnes of electrical waste was sorted and properly recycled. Over 50% of refrigerant extracted from white goods was recycled.

Wildfires, San Diego County, California, USA, 2003[6]

Rating: +1

This example highlights the benefits of a quick response and an organised approach. The wildfires burned more than 400,000 acres of land and destroyed nearly 6,000 structures and 4,000 vehicles throughout San Diego County. The San Diego County Office of Public Works responded immediately, focusing all available resources on the recovery effort. A plan was in place within a week and the debris removal effort commenced approximately six weeks after the fires began. The home owners were first provided instructions for recycling and given recycling bins for metals and wood. They were not given general waste bins until the recycling had been completed. In total, more than 128,000 tons of debris was collected in the wake of the fires. Approximately 74,000 tons of concrete, metal, and vegetative debris were recycled resulting in a recycling rate of nearly 60%, saving over 185,000 cubic yards of landfill space being used up by the debris.

Earthquake, Yogyakarta, Indonesia, 2006

Rating: +1

In the aftermath of the Earthquake in Yogyakarta, the damaged and destroyed brick masonry was crushed both manually using hammers and mechanically using mobile stone crushers and was then used to make both concrete and aggregate in the reconstruction of the community. This significantly reduced the cost of the reconstruction.

Additional Information

Relevant Definitions

Hazardous Waste: A material that poses substantial or potential threats to public health or the environment and generally exhibits one or more of these characteristics:

- ignitable (i.e. flammable)
- oxidant
- corrosive
- radioactive
- explosive
- toxic
- carcinogenic
- disease vector[9].

Reuse: The use of a whole component, in largely unchanged form and for a similar function; e.g., a brick used as a brick[8].

Other Information

None.

References

[**1**] SKAT. Sustainable Reconstruction in Urban areas. 2012.
[**2**] UN-HABITAT, IFRC. Shelter Projects 2010 – Haiti earthquake case study.

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[**3**] The Sphere Project. Humanitarian Charter and Minimum standards in Humanitarian response, 2011.
[**4**] Oxfam – Domestic and Refugee Camp Waste Management collection and disposal – TBN15. 2008.
[**5**] United States Environmental Protection Agency, Planning for Natural Disaster Debris. March 2008.
[**6**] FEMA, FEMA 329, Debris Estimating Field Guide, September 2010.
[**7**] Hazards U.S Multi-Hazard methodology and software programme: http://www.fema.gov/plan/prevent/hazus/index.shtm
[**8**] World Habitat Awards. Ecomaterials in Social Housing Projects. 2007.
[**9**] UN Habitat, United Nations. Solid Waste Management in the World's Cities – Water and Sanitation in the World's Cities, London. Washington, DC. 2010.
[**10**] UNEP, Disaster Waste Management Guidelines: http://eecentre.org/DisasterWasteManagementGuidelines.aspx
[**11**] FEMA. Debris Estimating Field Guide. FEMA. 2010.

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MW04 Construction Waste Management

Applicable at PAT	There are no considerations for this issue at the pre-assessment stage.

Aim

To promote the sustainable management of waste generated on site during the construction process, by encouraging the efficient use, removal and where necessary disposal of waste.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with the affected community to understand:
   a. Current waste management practices in the affected community.
   b. Attitudes towards and knowledge levels of waste management and related risks.
   c. Local authorities and any other institutions that will be involved in the reconstruction process, to ensure any proposed waste management systems are supported.
   d. Any potential constraints on waste management (e.g., high density areas with limited access).

2. Undertake an initial assessment when beginning the construction / reconstruction works on site to understand the following:
   a. Potential waste sources, types and volume generated by the on-site construction process.
   b. Any existing construction waste management systems used by the community, its strengths and weaknesses, and how this could be further improved.
   c. Any potential constraints on waste management (e.g., as high density areas with limited access).

3. Gather information on relevant legal frameworks or existing standards.
   a. Identify and list all regulations that exist for managing each potential waste type and ensure that waste is managed in accordance with those regulations.
   b. Consideration should be given to the ownership of the land and the belongings of those affected when initiating the start of the clearance works.

4. Assess the need for a waste specialist to support and/or take ownership of the assessment of this issue and oversee implementation of its outputs.

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Performance Level 1

5. The Baseline Evaluation requirements have been met.

6. Pre-Demolition assessment (if applicable): Where existing buildings have been damaged by the natural disaster, it may be possible to rehabilitate the damaged elements of the infrastructure, or in some instances demolition may be required. The suitability for infrastructure rehabilitation / demolition should be determined for all relevant buildings.
   a. Conduct a damage assessment for all relevant buildings, which should cover the following as a minimum:
      i. Identification of risk factors associated with the location of the building may mean that the infrastructure rehabilitation is not suitable (e.g., a building situated close to a river that floods frequently, would suggest relocating the occupants of the building / community may be a safer option). Please refer to the SET01 Site Selection issue for further details on selecting safe areas to relocate, if necessary
      ii. An understanding of what made the housing vulnerable to the natural hazard that occurred
      iii. An understanding of which construction technologies were used most commonly in the past and identify their strengths and weaknesses
      iv. Assessment of any adjacent properties to check whether they are putting the building at risk.
   b. The damage assessment is carried out by an engineer or other professional with the relevant expertise to evaluate the stability of the building.
   c. Buildings are tagged, or identified as being appropriate for either rehabilitation or demolition, using visual markers on the buildings to ensure the community is notified of unsafe buildings[1].

7. Managing waste generation pre-construction: a Site Waste Management Plan (SWMP) should be produced and implemented which considers how the different waste types will be disposed of, outlining basic procedures and guidance on how this will be done. As a minimum, the following must be covered within the SWMP:
   a. Hazardous waste: Procedures to manage hazardous waste would be required. The following should be applied as appropriate;
      i. Hazardous waste is clearly identified and separated from non-hazardous waste stream
      ii. Hazardous waste is safely disposed of in a designated area. Refer to the Sphere guidance[5] for details on how different types of waste should be managed
      iii. Health and safety training is provided to relevant individuals which includes but is not limited to:
         – Training on how to identify specific types of hazardous waste such as Asbestos. Leaflets with photographs and advice are a useful and common way to inform:
            • Information on correct handling methods
            • Risks associated with improper management of the waste.
   b. Residual waste disposal: If certain streams of non-hazardous waste cannot be reused / recycled they must be disposed of appropriately. Two methods for disposing of waste including key criteria that must be adhered to for each method are given below:
      i. Landfill:
         – Location: At an appropriate distance from the community and away from any water sources. The height of the water table may need to be investigated if waste is to be disposed of in pits (guidance on how to do this can be found in Ref. 2). The community should be consulted to determine the final location of landfill

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- Adequate space: Ensure sufficient space is provided for the level of waste that has been generated by the natural disaster. This should be determined based on the initial assessment (pre-requisite) which required types and volumes of waste generated by the construction process to be estimated
- Contamination concern: Precautionary procedures to avoid contamination of underground water. Disposal sites should always be downhill from groundwater sources
- Safety concern: Appropriate barriers should be put up to keep animals, and children out. Staff working on landfill sites to deliver waste should take particular care.

ii. Incineration: (note: inn general this should only be used as a last option):
- Facility location: At an appropriate distance from the community and downwind of the community
- Pollution concern: the incineration facility should be carefully managed to ensure emissions are kept to a minimum
- Health concern: plastic waste should be removed before incineration
- Training: Provide adequate awareness training to the community and the workers to ensure they are aware of what to burn and how.

Note: See Performance Level 3 (PL3) point 15. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

8. The Performance Level 1 requirements have been met.

9. Implementation of the SWMP. Once the SMWP has been established it must then be implemented correctly using the following methods:
   a. Responsibility: Assign an individual(s) to be responsible for implementing and updating the SWMP throughout the process.
   b. Awareness raising and training: the majority of the workers are likely to be members of the community and therefore the information within the SWMP will need to be disseminated to them. The following must be provided:
      i. Provide suitable training for individuals to ensure they are aware of how to manage the waste from the construction process
      ii. Provide appropriate protective equipment for the workers including but not limited to:
         - Hard hats, face masks, gloves and footwear
         - Soap and water for cleaning.
   c. Monitor: The content of the SWMP must be continually re-evaluated to ensure it is workable for the community in the reconstruction process and is being implemented correctly. If necessary adjustments should be made to the SWMP and re-training provided to those involved in the construction process, if applicable.

10. Sorting of waste: The SWMP produced should contain procedures and guidance for how the different waste types will be sorted / managed prior to any residual waste then being disposed of through landfill / incineration. The SWMP should therefore cover the following in order of priority:
    a. Minimise waste: Identify processes / procedures which will be implemented to reduce waste being brought onto the construction site. See the **Considerations** sections for what these could be.
    b. Reuse / recycle waste: All non-hazardous waste produced during the construction should be managed by sorting waste for reuse / recycling. Please refer to the materials properties,

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specification issue for further details on the types of materials that can be reused / recycled for the purposes of reconstruction. Note that the waste can be used both on- and off-site.

11. Targets: The SWMP should include challenging benchmarks / targets for minimising the construction waste sent to landfill.
    a. Where targets have been set, these should then be communicated to the individuals / organisations and local authorities working with the SWMP to provide awareness and motivation.
    b. Incorporate monitoring and measuring of the waste that is being diverted from landfill.

12. Management of the transportation of waste on- and off-site: Establish procedures for transporting waste on- and off-site that minimises risk and nuisance to others. The Baseline Evaluation should highlight any potential issues and the best access roads to the community for particular vehicles.

Note: See Performance Level 3 (PL3) point 15. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

13. The Performance Level 2 requirements have been met.

14. Targets: The benchmarks / targets for minimising construction waste sent to landfill have been achieved, using appropriate levels of data and documentation.

15. A waste specialist has been used throughout the full construction waste management process, from developing the SWMP onwards. This is to ensure that the expected and produced waste is assessed and managed using the most appropriate method, whilst minimising long-term impacts.

16. Carry out a post-construction review of the SWMP and the chosen processes for managing the construction waste:
    a. Highlight the key successes of the project (i.e., what worked well in the process).
    b. Highlight lessons learned (e.g., where the process could be improved for future projects).
    c. Ensure that the information collated and produced are used to inform the MW05 Operational Waste Management.

17. The SWMP should be adapted (as required) so that it can be used as a basis for future construction projects in the community.

Additional Considerations	
General Considerations	
Individuals carrying out Damage assessment	It may be necessary to provide training to individuals in the community to help with the damage assessments if additional support is needed.

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Additional Considerations	
General considerations for minimising waste on site	– Re-using of existing waste / debris (please see **MW01 Materials Selection / Properties for further details**) – Avoid wastage by only ordering the materials that are required – Optimisation of the design, for example matching building and product dimensions – Ensure appropriate storage to avoid damage to or contamination of materials.
Procedures for transporting waste on- and off-site	Things to consider when writing procedures for the transportation of waste on- and off-site: – Who will be transporting the waste? – Where does the waste need to go? – Who will be managing the waste? – What access routes to the construction site exist? – Transportation costs?
Storage of materials on-site	Ensure that materials purchased for the reconstruction are stored in appropriate locations, i.e. protected from rain, storms or flooding to prevent materials being wasted.
Cross-cutting Issue Considerations	
Participation	Undertake facilitated interaction and participatory activities with the affected community to develop a contextually appropriate SWMP.
Skills and Capabilities	Infrastructure rehabilitation works - Where a building is deemed to be suitable for refurbishment via the pre demolition assessment, the workers carrying out the repairs may need additional training on the skills required to repair damaged buildings.
Livelihoods	The work to analyse, move and sort the waste can be carried out by skilled and unskilled workers and provides a potential source of work for those affected by the disaster.
Community Ownership and Sustainable Management	The community should be heavily involved in the development and management of the SWMP so that they are engaged and able to use the same principles on future projects.
Resilience	A community is more resilient if it is able to effectively manage potentially harmful wastes, as the risk of injury or health problems is reduced.
Security and Safety	It is important to manage construction waste effectively to reduce the risk of fire, personal injury and the spread of disease vectors across the community.
Economic Viability	The costs of waste management must be considered, in addition to who will bear the costs. Where possible construction waste should be reused / recycled to prevent the need to new materials to be purchased for the site. See the **MW01 Materials Properties / Specification** and **MW02**

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Additional Considerations	
	Material Sourcing issues for further details on how this can be achieved.
Access and Non-discrimination	All individuals in the affected community should have equitable access to information, educational opportunities and livelihood opportunities related to post-disaster waste.

On-going Monitoring and Evaluation

- Evidence gathered in the initial assessment when trying to understand the waste sources and any potential infrastructure rehabilitation. This could be in the form of notes from the stakeholder participation workshops, damage assessments on existing building etc.
- A copy of the construction site waste management plan which was implemented, and any subsequent amended revisions throughout the reconstruction
- Evidence of training that has taken place (e.g., leaflets, presentation slides).

Case Studies

Cyclone Nargis, Myanmar, 2008

Rating: +1

172,000 shelters were destroyed by the cyclone in Myanmar. In the reconstruction effort, the shelter workers ensured that women were as involved in the participation process as the men. There were 287 members in the village reconstruction committee and 46% of these were women. The women participated in purchasing materials and supervising the reconstruction works. Locally sourced bamboo was used in construction. Crude oil was used as a wood preservative and only the exact amount of crude oil needed was bought to reduce excess waste on site. This is a good way of reducing waste goes to landfill and reducing costs.

Additional Information

Relevant Definitions

Damage Assessment: A damage assessment is an assessment of the total or partial destruction of physical assets both physical units and reconstruction costs. One of the objectives of structural damage assessments is to analyse why some buildings were badly damaged and others less so. The assessment can be of public buildings and facilities local authorities', churches, schools, clinics market places[1].

Hazardous Waste: A material that poses substantial or potential threats to public health or the environment and generally exhibits one or more of these characteristics:

- ignitable (i.e. flammable)
- oxidant
- corrosive
- radioactive
- explosive

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- toxic
- carcinogenic
- disease vector[4].

Rehabilitation of Infrastructure: the rehabilitation and (re)construction of infrastructure aims to restore the functioning of the existing structures and services or upgrade them to meet current needs (i.e., refurbishing water supplies to ensure potable water is reliably produced, to reconstructing damage hospitals and schools[6].

Other Information

None.

References

[**1**] SKAT. Sustainable Construction in Urban Areas. 2012.
[**2**] Oxfam. Domestic and Refugee Camp Waste Management collection and disposal – TBN15. 2008.
[**3**] IFRC. Shelter Projects 2010. 2012. A.6.
[**4**] United Nations, UN Habitat. Solid Waste Management in the World's Cities – Water and Sanitation in the World's Cities. London, Washington, DC. 2010.
[**5**] The Sphere project: humanitarian Charter and Minimum standards in Humanitarian response. 2011.
[**6**] IFRC. Post disaster community infrastructure rehabilitation and reconstruction guidelines, IFRC, Geneva, Switzerland. 2012.
[**7**] IFRC. Shelter Projects 2010. 2012. A19.

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MW05 Operational Waste Management

Applicable at PAT	This issue is not applicable at the PAT stage

Aim

To promote sustainable operational solid waste management throughout the disaster-affected community by proper and effective waste management, solid waste reduction and community education.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- Lack of effective operational solid waste management after the disaster event.

Assessment criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with the affected community to understand:
    a. Existing / previous waste management practices in the affected community.
    b. Attitudes towards and knowledge levels of waste management.
    c. Local authorities and any other institutions that will be involved in waste management, to ensure any proposed waste management systems are supported.
    d. Any potential constraints on waste management (e.g., cultural issues, storage capability, frequency of collection).

2. Undertake an initial assessment to determine the following:
    a. The existing / previous waste management system, its strengths and weaknesses, and how this could be potentially improved.
    b. How existing waste management processes have been affected by the natural disaster.
    c. Potential waste sources, types and volume generated by the affected community.

3. Gather information on relevant legal frameworks or existing standards.
    a. Identify and list all regulations that exist for managing each potential waste type and ensure that waste is managed in accordance with those regulations.

4. Assess the need for a waste specialist to support and / or take ownership of the assessment of this issue and oversee implementation of its outputs.

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Performance Level 1

5. The Baseline Evaluation requirements have been met.

6. Develop and implement an operational solid waste management plan which includes sections on management, collection and dispose waste of in a sustainable manner. Further guidance can be found in documents such as *Sustainable Reconstruction in Urban areas, SKAT 2012*[4].
    a. Waste minimisation: encouragement of practices to minimise production of waste.
    b. Waste collection:
        i. Communal collection points should be located at areas that are conveniently accessed by residents / community users as well as waste collection vehicles. The Sphere[1] project states minimum standards for the distance the waste collection point should be from the household
        ii. Waste should be frequently removed to avoid creating a nuisance or a health risk to the neighbourhood. Organising frequent collections may require the implementation of a Governing Structure. Consider the local administrative and political situation when implementing this.
    c. Prohibit uncontrolled dumping:
        i. Areas that are prone to uncontrolled and indiscriminate dumping of solid waste should be identified, checked and cleaned up regularly. Please refer to the Additional Considerations table for more details.
    d. Waste disposal: Depending on the means of disposal deemed as most appropriate for the development the following may be relevant;
        i. Landfills and composting:
            – Location: At an appropriate distance from the community and away from any water sources. The height of the water table may need to be investigated if waste is to be disposed of in pits (guidance on how to do this can be found in Ref. 3).The community should be consulted to determine the final location of landfill
            – Adequate space: Ensure sufficient space is provided for the predicted levels of waste to be generated by the community. Rough estimates are provided in the Sustainable Reconstruction in Urban areas document[4]. Where more accurate figures specific to the site can be determined these should always be used
            – Contamination concern: Precautionary procedures to avoid contamination of underground water. Disposal sites should always be downhill from groundwater sources
            – Safety concern: Appropriate barrier / fencing should be put up to keep animals, and children out. When staff are working on landfill sites to deliver waste particular care should be taken
            – Transportation of waste: where waste cannot be disposed of onsite the transportation of waste off the site should be considered. Guidance on transportation options is provided in document Ref. 3.
        ii. Incineration (note this should generally only be used as a last option):
            – Facility location: At an appropriate distance from the community and downwind of the community
            – Pollution concern: the incineration facility should be carefully managed to ensure non-polluting emissions
            – Health concern: plastic waste should be removed before incineration
            – Training: Provide adequate awareness training to the community and the workers to ensure they are aware of what to burn and how.
    e. Management of medical and hazardous waste:
        i. Hazardous waste should be separated from non-hazardous waste stream
        ii. Hazardous waste should be safely disposed of in a designated area

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iii. Provide staff health and safety training which should include but not be limited to:
  – Information on the correct handling methods
  – Risks associated with improper management of the waste.

f. Personal protection for workers: Measures should be in place to ensure workers in direct contact with waste are protected from injuries, diseases or infection. It should include but not be limited to[3]:
  i. Provision of protective clothing, including protective goggles, masks, gloves and boots
  ii. Provision of water and antibacterial soap for hand and face washing
  iii. Provision of appropriate tools to enable proper transporting and collecting waste
  iv. Facilities for worker to wash and change wherever possible.

Note: See Performance Level 3 (PL3) point 12. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

7. The Performance Level 1 requirements have been met.

8. Operational solid waste management plan and implementation: As part of the operational solid waste management plan develop and implement;
  a. Waste management hierarchy practices: The following waste management hierarchy should be considered to reduce, reuse and recycle the community waste before waste disposal.
    i. Reduce: Encourage waste reduction by organising workshops, community campaigns and put up public awareness signs / posters, etc.
    ii. Reuse: Encourage elements of any discarded items to be used again by initiatives such as waste exchange, garage sales, etc. Opportunities should be explored with the beneficiaries for re-using items as many materials that can be reused depend on culture, location and facilities available. Use of disposable items should be discouraged where possible
    iii. Recycle: Develop and implement procedures to sort and recycle key community wastes including paper, plastics, metals, glass and electronics. Often these products can then be marketed. Organic or 'wet fraction' can be sorted for composting[4].
  b. Community ownership and awareness raising: disseminate information to the community about
    i. how good operational waste management can be achieved
    ii. how it benefits both individuals and the community
    iii. how sustainable waste management will help ensure the longevity of the scheme going forward.
  c. Equipment maintenance: establish an equipment maintenance programme to ensure it stays in working order. Paint and wash periodically all metal equipment to increase the service life of equipment.
  d. Management of the transportation of waste on- and off-site: Establish procedures for transporting waste on- and off-site that minimises risk and nuisance to others. The Baseline Evaluation should highlight any potential issues and the best access roads to the community for particular vehicles.
  e. Targets: The operational waste management plan should include appropriate benchmarks / targets as part of the participation process with the community for minimising the levels of operational waste produced and sent to landfill / incineration.

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i. Where targets have been set, these should then be communicated to the individuals / organisations and local authorities working with the operational waste management plan to provide awareness and motivation
ii. Incorporate monitoring and measuring of the waste that is being diverted from landfill.

9. Managing implementation of the plan. Successful implementation of the plan should be supported using the following:
   a. Responsibility: Assign an individual(s) to be responsible for implementing and updating the plan.
   b. Awareness raising and training:
      i. Provide suitable training for individuals to ensure they are aware of how to reduce and manage operational waste
      ii. Provide appropriate protective equipment for the workers including but not limited to:
         – Hard hats, face masks, gloves and footwear
         – Soap and water for cleaning.
   c. Monitor: The content of the operational waste management plan must be continually re-evaluated to ensure it is workable for the community and is being implemented correctly. If necessary, adjustments should be made to the plan and re-training provided to those involved in the waste management process, if applicable.

Note: See Performance Level 3 (PL3) point 12. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

10. The Performance Level 2 requirements have been met.

11. Consider as part of the operational solid waste management plan:
    a. Specification of technologies (appropriate to the infrastructure in the community and the ability of relevant community members to manage and maintain the technology) could increase the efficiency of waste management and reduce the amount of waste requiring disposal. An example is a waste compaction powered through direct labour or mechanically. Please refer to the Additional Considerations table for more details.

12. A waste specialist has been used throughout the operational waste management development process, from developing the plan onwards. This is to ensure that the expected and produced waste is assessed and managed using the most appropriate method, whilst minimising long-term impacts.

13. Establish where necessary and promote links between sustainable waste management (recycling etc.) and the links to livelihoods.

14. Where current waste management practices are considered inadequate (e.g., due to the creation of environmental issues), lobby the relevant authorities in partnership with the affected community to ensure that the needs of the community are met.

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Additional considerations	
General considerations	
Uncontrolled and indiscriminate dumping of solid waste	Areas that are prone to uncontrolled and indiscriminate dumping of solid waste include[3]: a. Small pits and holes near to shelters b. Passageways in spaces in between shelters c. Pit latrines d. Drains.
Medical waste	Ensure medical waste is managed appropriately to avoid health risks and unauthorised reuse of equipment. For example contaminated waste such as needles and syringes should be deposited in safety boxes[1].
Waste compaction	The aim of waste compaction is to reduce the amount of space that the collected waste occupies. This can help to reduce storage and transport needs but requires energy and careful security / safety controls. The effectiveness of waste compaction depends on the community population size and the type of waste collected.
Local standards and legal requirements	As many countries have their own standards and legal requirements governing waste management, it is important to consult with the local authorities to ensure these standards and legal requirements are respected.
Tropical, humid climates	Regular and frequent waste collection is particularly important in tropical, humid conditions where the decomposition of the materials is increased[3]. Organics waste will begin to perish rapidly in any warmer climate such as a Mediterranean summer so this is a broader issue than just tropics.
Cross-cutting Issue Considerations	
Participation	To ensure a sustainable waste management system, the affected population should be involved in the design and implementation of the waste management.
Skills and Capabilities	Desired improvements are most successful where they are based on people's awareness habits and customs. Education is crucial to raise public awareness of the importance of sustainable waste management at individual and community levels to ensure that good waste management is maintained. Training of workers on the proper handling of waste and the use of waste handling equipment should be provided.
Livelihoods	If managed and organised effectively, waste management can be a source of income for small transport entrepreneurs or community based enterprises[4]. Waste reclamation and recycling can present significant opportunities for livelihoods and this should be promoted in a way that is both safe and healthy to those directly involved and to neighbours who may suffer from disturbance or pollution.

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Additional considerations	
Community Ownership and Sustainable Management	The waste management strategy should be reviewed and updated regularly based on on-going community consultation and feedback from workers at operational level. To ensure there is continued incentive to reduce waste and ensure a regularity and quality in the collection and disposal service, part of the cost of solid waste management could be charged to the residents[4].
Resilience	None.
Security and Safety	None.
Economic Viability	A step by step approach involving as many stakeholders as possible is more likely to provide a cost effective solution than a centrally based planned proposal based on technology and large investments[4].
Access and Non-discrimination	The requirements of men, women, young people, children, and those with special needs and disabilities in relation to solid waste management will be different, and this should be considered in the participation process. In consulting with the community it is important that both men and women are consulted and their needs and requirements identified in this process. For example, women are likely to be largely responsible for household and family waste management while the men may be involved in waste collection roles or act as waste loaders.

On-going Monitoring and Evaluation

- Evidence gathered in the initial evaluation when trying to understand the previous waste management procedures, the impacts of the disaster and establishing the waste volumes / types going forward. This could be in the form of notes from the stakeholder participation workshops
- Retain a copy of the operational management plan implemented, and any subsequent amended revisions throughout the re development
- Evidence of training that has taken place, e.g., leaflets / presentation slides.

Case studies

Syauli Baazar, Nepal[5]

Rating: +1

This case study provides an example of how a little bit of education can make a huge difference to people's lives.

This small community were given waste management training and were educated in how to use their waste rather than just throw it in the streets and it has changed the way the community operates hugely. Residents have compost bins and pits and no longer throw decomposable waste; instead they convert them to resources and use them to grow organic vegetables. Compost bins were distributed to the community in Syauli Baazar and the residents no longer throw waste in the street as they did

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before. They make compost from organic waste and they separate plastic in their homes and they sell them to the plastic collectors.

Ten households in the community have even built a masonry compost pit in order to accommodate more organic waste and to sell the compost to the local nursery and farmers.

Kibera, Kenya[5]

Rating: +1

The residents of Kibera have implemented a scheme called 'Sustainable Management of Plastic Waste'. Around 4,000 plastic bags are produced every month in Kenya which clog up doorways and pit latrines, in the slums.

Aid agencies helped the community set up a 'plastic factory' for residents and also trained individuals in the community about how to on run a business and how to use the plastic washing machines effectively.

Essentially, the residents sell their plastic waste to community members who have formed a 'Recyclers Co-operative Savings and Credit Society'. The plastics' washing machine then washes the plastic bags before they are then sold on for commercial recycling, where plastic pellets can be turned into new produces. The group have so far collected over 30 tonnes of plastic bags.

The machines can also wash other plastics which can be used to make items such as fence posts. Community members have also been trained on business development.

This case study is a great way of demonstrating how recycling can improve livelihoods and therefore sustain a better quality of life, as well as managing excessive waste of surplus plastic.

Port au Prince, Haiti[7]

Rating: +1

Prior to the Haiti earthquake the community of Port au Prince had water, sanitation and waste management issues, as well as weak infrastructure and flooding problems. A combination of poor waste management and lack of maintenance to the canal meant that the canal frequently became blocked which lead to flooding of the low lying houses with waste and sewage. After the earthquake a process called PASSA (Participatory approach for safe shelter awareness) was used to educate the community on how to manage their waste in a better way. This process involved getting 40 representatives from the community to take part in workshops to discuss the issues and work together to find solutions. They developed a waste management process for the community, and designated groups with responsibilities for keeping the community clean.

This process helped to ensure the proposed solution for waste management was appropriate for the community and ensured that those implementing it, understood why and how to implement it.

Additional Information

Relevant definitions

Hazardous Waste: A material that poses substantial or potential threats to public health or the environment and generally exhibits one or more of these characteristics:

- ignitable (i.e. flammable)
- oxidant
- corrosive
- radioactive
- explosive
- toxic

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- carcinogenic
- disease vector[6].

Solid Waste Management: is the process of handling and disposal of organic, hazardous or inert solid waste which, if unattended appropriately, can pose public health risks to the affected population and can have a negative impact on the environment[1].

Other information

None.

References

[**1**] The Sphere Project. Humanitarian Charter and Minimum standards in Humanitarian response. 2011.
[**2**] WHO (World Health Organisation). Solid Waste Management in emergencies, Technical Note 7.
[**3**] Oxfam. Domestic and Refugee Camp Waste Management collection and disposal – TBN15. 2008
[**4**] SKAT. Sustainable Construction in Urban Areas. 2012.
[**5**] Practical Action website: http://practicalaction.org/solid-waste-management:
[**6**] UN Habitat, United Nations. Solid Waste Management in the World's Cities – Water and Sanitation in the World's Cities. London, Washington, DC, 2010.
[**7**] IFRC. Shelter Projects 2012. 2013. A.13 – Haiti, Port Au Prince.

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Energy (ENE)

ENE01 Energy Demand and Supply

Applicable at PAT	There are no considerations for this issue at the pre-assessment stage.

Aim

To establish and optimise the energy demands of the community ensuring that these can be sustainably met in the future through the specification of reliable, affordable and sustainable energy supplies that meet needs of the community.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- Local energy infrastructure is not available or is severely damaged by the natural disaster.
- Centralised energy infrastructure is owned and managed by the public authority, or there is private sector provision.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with the affected community and other relevant stakeholders in order to determine:
   a. Energy demand:
      i. The status of the energy infrastructure before and after the disaster, in conjunction with the relevant public authority where relevant
      ii. The current energy demand of all user groups and how this compares to the pre-disaster situation, e.g.:
         – Heating
         – Cooling
         – Cooking
         – Lighting
         – Food storage
         – Other activities (e.g. to support livelihoods).
      iii. Determine the most common / feasible fuel types available to meet the energy demand and their respective resilience as energy resources
      iv. Understand any daily and seasonal changes in energy demand
      v. As part of this process, identify any opportunities for improvements in efficiencies (e.g., where there appears to be significant levels of wastage or opportunities to achieve additional benefit (e.g. using cooking energy to provide heat where needed or minimising heat gains from cooking where not)

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vi. Identify opportunities for sharing energy consuming activities in order to reduce the overall energy demand of the community.

b. Energy supply:
   i. Local community requirements of any proposed energy supply, including cultural considerations around acceptability of different forms of energy supply and affordability
   ii. Understand any public authority plans for infrastructure building / rebuilding in the aftermath of the disaster
   iii. Identify whether the public authority would be prepared to invest in infrastructure with greater potential to support long term sustainability particularly in the form of supply and distribution (e.g., CHP (Combined Heat and Power), biomass, use of local grids)
   iv. Consult with other relevant stakeholders (e.g., donors)
   v. Identify opportunities for self-led energy provision and how such opportunities may contribute to the overall energy supply of the community.

2. Assess the need for an energy specialist to produce an energy demand model and energy supply strategy and identify ways of achieving efficiencies in how energy is used by the affected community.

Performance Level 1

3. The Baseline Evaluation requirements have been met.

4. Produce a demand model, showing the level of energy demand the community would require for the short and long term. See **ENE01 Checklist: Assessing Energy Demand** for a simple demand model framework that could be used for this activity. The model should be tiered to highlight essential and non-essential demands. The model should also set out any specific requirements for the system, such as:
   a. A breakdown of the amounts and types of energy required (e.g., electricity, gas, fuel) and for what purposes (e.g., heating, cooking, lighting).
   b. Where no centralised infrastructure is in place, consider how a localised energy supply could fulfil the requirements of the affected community. Where centralised infrastructure is in place, identify any localised systems required to fulfil the demand, which could compliment the centralised systems.
   c. The continuity and duration of supply required, and how this varies with the time of day or season.
   d. The security of supply required in order for the community to remain functional.
   e. How the energy demands of the community are likely to change in the future.

5. Based on the demand model produced, develop and implement an energy supply strategy for a suitably flexible, robust and long life energy system to meet essential personal health and wellbeing, basic household and livelihood needs.
   a. Where centralised energy infrastructure is in place, conduct an assessment to determine whether it would be more appropriate to utilise the centralised infrastructure or to implement a localised energy supply. Consider the following:
      i. The ability for the supply to fulfil the demand of the community in the short term and be expanded in the future as the community develops.
      ii. The level of security of the supply required against both natural and man-made hazards (e.g., meteorological events, illegal tapping) to ensure resilience of the community and livelihoods.
      iii. Cost of the supply (installation, maintenance and operation).

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iv. The potential for introducing a mix of energy supplied to reinforce the use of sustainable / renewable energy.

b. Where centralised energy infrastructure is in place but additional localised systems are required to fulfil the demand, ensure that any localised systems installed complement the existing infrastructure.
c. Where no centralised energy infrastructure is in place or is unsuitable, determine an appropriate method of meeting the energy demand of the community using a localised energy supply. Consider the points 5.a.i.-iv. listed above.

6. All members of the affected community have equitable access to an energy supply system that is sufficient to meet their demand for essential activities (e.g., heating, cooking, lighting).

7. Energy location and transportation: Ensure that fuel is sourced, stored and transported in a safe and secure way.
   a. The disaster-affected population should be consulted about the location and means of collecting fuel for cooking and heating to address issues of personal safety.
   b. Fuel should be stored at a safe distance from shelters and stoves, and any liquid fuel should be kept out of the reach of children and infants.

8. Where a localised energy supply is required, consider the following issues:
   a. Sourcing: sources of fuel should be sustainably managed. Particular care is needed where host or neighbouring communities also rely upon them.
      i. Resources should be replenished to ensure that the supply is sustainable (e.g., establishing firewood tree plantations to reduce or eliminate firewood extraction from existing forests). Extraction should be balanced with replenishment rates to avoid depletion of the resource
      ii. Shared resources will need to be effectively managed so that the needs of all affected communities are met in the short term and long term. Where the security of the fuel source is uncertain, alternative suitable fuel sources should be specified
      iii. A range of different fuel sources should be specified, where this is acceptable to the affected populations[1], that are cost effective and sustainable. This is intended to promote fuel security and resilience.
   b. Safety: ensure that the energy system is safe and practical to install, use and maintain. Undertake early engagement with engineers and suppliers, where appropriate, to ensure that this is achieved.
   c. Illegal tapping: the energy supply system should be designed to detect and avoid unauthorised tapping in to the energy supply which is dangerous, can harm equity and be expensive to resolve.
   d. Location: situate electricity generation systems near the end-users to ensure equitable access to the supply and to increase energy efficiency by mitigating energy losses through long-distance transmission. The demands of collecting fuel on particularly vulnerable people should be addressed.
   e. Appropriate technologies: shelters should be designed to reduce the energy required for operation (e.g., appropriate insulation). The use of robust cost-effective technologies should be considered, such as light-emitting diodes (LEDs), and the provision of solar panels to generate localised electrical energy[1].

Note: See Performance Level 3 (PL3) point 17. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

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Performance Level 2

9. The Performance Level 1 requirements have been met.

10. The energy strategy additionally covers important but non-essential activities.

11. Reducing the energy demand: undertake actions to achieve greater efficiencies in the way energy is used by the affected community. For example:
    a. Ensure that shelters are constructed appropriately in order to minimise the energy demands by controlling internal temperatures and lighting. See **SC02 Internal Environment** for more information.
    b. Ensure that the shelters and community buildings are laid out so as to minimise energy demands by avoiding heat gains / losses from solar gain, exposure, internal heat sources etc.
    c. Investigate opportunities for substituting different energy sources or fuels in order to improve efficiency, reduce cost and have lower environmental impact.
    d. Encourage the shared use of energy-consuming practices (e.g., cooking and artificial lighting), where culturally appropriate and without infringing on basic personal privacy needs.
    e. Undertake behavioural awareness training for the local community on how to use energy most efficiently and reduce energy demand, where possible.
    f. Encourage the use of technologies that could help to reduce the energy demand of the affected community. For example, encouraging the construction and use of energy-efficient cooking stoves and the limiting of water flow rates for showering.

12. All members of the affected community have equitable access to an energy supply system that is sufficient to meet their demand for other important but non-essential activities, as identified in the energy supply strategy. The supply system takes fully into account issues relating to gender and vulnerable group discrimination as well as issues such as access to education.

13. Conduct a feasibility study to identify the most appropriate cost effective renewable energy supply for both short and long term and design the community layout to allow for this future use / expansion. The shelters and settlement must be designed with consideration for renewable energy technologies where this is being considered.

14. Undertake an awareness–raising programme amongst the affected community and other relevant stakeholders on the benefits of sustainable energy supply and renewable energy generation.

Note: See Performance Level 3 (PL3) point 17. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

15. The Performance Level 2 requirements have been met.

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16. Ensure that an individual or group of individuals are made responsible for ensuring that the energy demand and supply of the community is effectively managed. This may include the monitoring of energy use and anticipating potential changes in demand.

17. An energy specialist has been used to produce the energy demand model and energy supply strategy (see **Performance Level 1**) and identify ways of achieving efficiencies in how energy is used by the affected community (see **Performance Level 2**).

18. Based on the feasibility study undertaken as part of Performance Level 2, a challenging but feasible level (not below 10%) of the energy demand is met through a simple renewable energy supply system.

19. An assessment should be carried out to understand predicted changes in energy demand in the future (e.g., 2 years, 5 years, 10 years) and how the energy will be supplied to meet this demand.

20. Performance Level 2 has been achieved for the following issues:
    a. ENE02 Energy Consumption

Additional Considerations	
General Considerations	
Simple versus complex systems	This issue focuses on simple systems rather than complex systems. A simple system refers to an off-grid solution that does not rely on a centralised energy infrastructure. A complex system refers to a grid solution that does rely on a centralised energy infrastructure. Although it does not focus on complex systems it is likely in many cases it will cross over with activities to repair, rebuilding central infrastructure and therefore works to complement these activities.
Specialist Expertise Requirements	The specification and sourcing of the energy supply may require specialist expertise from public authorities and engineers.
Fossil Fuels	The use of fossil fuels (e.g., coal, petroleum, natural gas) should be supported as part of an energy strategy where equal consideration is given to the use of renewable sources (e.g., solar, wind, hydro, biomass, geothermal) where they are considered suitable and cost effective and proven to be feasible within the context they are needed.
Cross-cutting Issue Considerations	
Participation	Undertake facilitated interaction and participatory activities in order to understand the energy supply / demand context with the affected community and other relevant stakeholders.
Skills and Capabilities	Undertake an awareness–raising programme amongst the affect community and other relevant stakeholders on sustainable energy

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Additional Considerations	
	supply, renewable energy generation, and the maintenance of the energy infrastructure. Explore cooperative and shared ownership and the development of local grids.
Livelihoods	Ensure that the energy infrastructure can support livelihood activities, It may be possible for community-based individuals or organisations to manage the energy supply, creating livelihood opportunities.
Community Ownership and Sustainable Management	Ensure that the affected community is actively involved in the formulation of the demand model to promote community ownership.
Resilience	Ensure that the demand model is resilient to potential hazards and future changes to the community.
Security and Safety	Ensure that the affected community is able to safely operate and maintain the energy supply system(s).
Economic Viability	Ensure that the energy supply is affordable for the affected community to use and maintain.
Access and Non-discrimination	As part of the energy demand model, the needs of all user groups should be considered to ensure that all sections of the affected community have equitable access to the energy required. Ensure that all sections of the affected community have equitable access to the energy supply.

On-going Monitoring and Evaluation

- Retain evidence gathered in the initial evaluation when the team were trying to understand the previous energy infrastructure, the impacts of the disaster and establishing the energy demand and supply going forward.
- Undertake on-going awareness–raising programmes amongst the affect community and other relevant stakeholders on sustainable energy supply and renewable energy generation.

Case Studies

Emergency Power, Kashmir[2]

Rating: +1

In Kashmir, RedR who have supported a number of small local field hospitals, noticed and encouraged an alternative method of generating electricity. They have followed the locals and constructed a small water wheel in the fast-flowing river. Linked to a generator, and a car battery, they are able to light an entire hospital through the night.

Rebuilding with Renewable Energy, Kansas, USA[3]

Rating: +1

After a tornado devastated their town in May 2007, the citizens of Greensburg, Kansas, turned disaster into opportunity by rebuilding as a model “green” community. Their master plan includes

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goals for making residential and commercial buildings more energy efficient and developing community- and small-scale renewable energy projects. The City of Greensburg, which doubles as a municipal utility, is developing large-scale renewable energy resources. One project is the Greensburg Wind Farm, a joint effort of the City of Greensburg, the Kansas Power Pool, and John Deere Renewable Energy, that will consist of ten 1.25-MW wind turbines. The wind farm will generate enough energy to power every home, business, and municipal facility in Greensburg. Excess electricity will be sold back to the local utility. The city is also working with surrounding counties to explore options for using agricultural wastes to produce energy.

Disaster Relief Technology, Haiti[4]

Rating: +1

After the disaster a team of Princeton researchers launched a one-year effort to develop, deploy and test two novel disaster-relief technologies - a rainwater harvester and filtration system, and a wind turbine for renewable energy production. These technologies would harness Haiti's abundant rainfall and ever-present winds to provide clean water and energy. The team, which includes engineers and architects, is funded by a grant from the National Science Foundation (NSF) through the organisation's Rapid Response Research program. In keeping with this philosophy, both of the Princeton team's technologies are designed to operate independently from existing infrastructure, such as water and electricity transmission lines, and they can be positioned where needed to provide a local source of crucial resources. To enable rapid deployment, both the rainwater filtration unit and wind turbine are designed for transport in standard shipping containers, which are incorporated into the systems once they are put in place.

Additional Information

Relevant Definitions

Energy Supply: energy supply refers to the generation of energy and captures all forms of supply from large scale energy production (electricity) to small scale (domestic cooking and lighting).

Energy Infrastructure includes:

- The physical infrastructure required for the exploration, development and production of energy
- Transformation of energy, such as electric power generation and oil refining
- Transmission and distribution of energy, such as electric power transmission lines and oil and gas pipelines
- Storage of energy products.

Simple Energy Infrastructure: a local or standalone energy supply that operates without the need to be connected to centralised infrastructure (e.g., solar torches, microgeneration technologies, portable wind turbines).

Complex Energy Infrastructure: a complex system refers to a grid solution that relies on centralised energy infrastructure.

Sustainable Energy: the use of renewable sources of energy (e.g., wind, solar, timber from sustainably managed sources).

Other Information

None.

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[**1**] The Sphere Project. Humanitarian Charter and Minimum Standards in Humanitarian Response. ISBN 978-1-908176-00-4. Rugby, Practical Action Publishing, 2011.
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[**3**] http://www1.eere.energy.gov/office_eere/pdfs/45140.pdf
[**4**] http://www.princeton.edu/main/news/archive/S27/36/39A37/
[**5**] Recovery after disaster: Achieving Sustainable Development, Mitigation, and Equity http://desastres.unanleon.edu.ni/pdf/2004/marzo/pdf/eng/doc4333/doc4333-a.pdf
[**6**] Green rehabilitation: Environmental Sustainability and post Disaster Shelter in India http://architecture.brookes.ac.uk/research/cendep/dissertations/FedericaLisa.pdf
[**7**] Holistic disaster recovery: Ideas for building local sustainability after a natural disaster http://csc.uoregon.edu/opdr/sites/csc.uoregon.edu.opdr/files/HDR.pdf
[**8**] USAID: Environmental Guidelines for Small-Scale Activities in Africa
[**9**] IASC: Task Force on safe access to firewood and alternative energy in humanitarian settings
[**10**] https://ochanet.unocha.org/p/Documents/OCHA%20OPB%20Energy%2011Nov10%20fnl-2.pdf
[**11**] WWF US, American National Red Cross. Green Recovery and Reconstruction Toolkit (Module 4: Strategic Site Selection and Development).

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ENE02 Energy Consumption

Applicable at PAT	This issue is not applicable at the PAT stage

Aim

To ensure that energy is consumed by the affected community in an efficient and sustainable way.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- Energy infrastructure is not available or severely damaged by the natural disaster
- Energy infrastructure is owned and managed by a public authority, or there is private sector provision.

Assessment criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities in order to understand the energy consumption context, with the affected community and other relevant stakeholders in order to determine when, where and how energy is used by the affected community. This should be informed by the demand model produced as part of the ENE01 Energy Demand and Supply issue.

Performance Level 1

2. The Baseline Evaluation requirements have been met.

3. Develop and implement an energy consumption strategy which considers the use of efficient equipment / systems, controls, protection of fuel stores to prevent deterioration etc. and as appropriate provide related awareness and capability building to the affected community.
   a. Determine whether there are inefficiencies in current energy-consuming practices.
   b. Plan for how energy consumption could be optimised in order to reduce baseline energy demand and smooth peaks in demand.
   c. Determine current and possible energy use control strategies to optimise energy consumption (e.g., thermostats on heating systems that turn off the system when a room reaches a certain temperature etc. as relevant to the affected community and strategies selected).
   d. Where there are potential deficits in the level of energy supply available, identify priorities in terms of energy-consuming behaviour (e.g., heating and cooking).

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4. Safety:
   a. Ensure that equipment is safely connected to the energy supply and maintained appropriately.
      i. Ensure that those using the energy infrastructure are suitably trained in relevant aspects (e.g., electrical safety)
      ii. Ensure that those maintaining the energy infrastructure are suitably trained in relevant aspects (e.g., use of relevant tools and equipment)
      iii. Undertake a risk assessment to analyse the potential impacts of hazards (e.g., fire). Any significant risks identified should be mitigated (e.g., through physical protection, awareness-raising).

5. Energy consuming equipment should be safe to use and culturally appropriate:
   a. Cooking[1]:
      i. Safety: ensure that cooking equipment is safe to use and does not pose a hazard to vulnerable members of the community such as children
      ii. Cultural acceptability: the location and type of cooking equipment should be culturally acceptable to the affected community.
   b. Heating and cooling (see **SC02 Internal Environment issue for more information**):
      i. Safety: ensure that the method of controlling internal temperature is safe to use and does not pose a hazard to vulnerable members of the community such as children
      ii. Cultural acceptability: the method of controlling internal temperature (either passive or energy-consuming) should be culturally acceptable to the affected community.
   c. Food storage.

Performance Level 2

6. The Performance Level 1 requirements have been met.

7. Awareness: undertake training for the affected community on energy usage, the need to conserve energy, and promote safety measures for all relevant stakeholders.

8. Where necessary, simple energy efficient equipment has been provided for:
   a. Cooking[1]:
      i. Efficiency: the use of fuel-efficient stoves should be promoted. Equipment should be located and specified such that heat generated can be used to heat the shelter, where appropriate. The extraction of polluted air must be ensured.
   b. Heating and cooling (SC02 Internal Environment issue for more information):
      i. System design: shelters should be designed to require as little energy in order to maintain thermal comfort within shelters as is possible. Where heating or cooling equipment is required, this should be energy efficient and correctly specified and sized, installed and maintained
      ii. Skills, capability building, awareness raising: members of the affected community should be educated in how to efficiently maintain control of the internal temperature of their shelters.
   c. Lighting:
      i. Skills, capability building, awareness raising: appropriate delivery means (leaflet, session etc.) should be used to build capability / awareness amongst members of the affected community on how to use lighting efficiently in order to minimise wastage

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ii. Degree of control: ensure that the affected community have adequate control over the levels of internal and external artificial lighting, to allow lights to be used only where and where they are needed.

d. Food storage.

Performance Level 3

9. The Performance Level 2 requirements have been met.

10. Where necessary, simple energy efficient equipment has been provided for energy consuming equipment to support livelihood activities.

11. Controls: implement energy use control strategies to optimise energy consumption (e.g., thermostats on heating systems that turn off the system when a room reaches a certain temperature). Consider the use of switches that enable energy consumption to be minimised to where it is required (e.g., the zoning of lighting controls by room).

12. Long-term strategy: establish a long-term energy efficiency strategy to minimise consumption.

13. Where new technologies (appropriate to the infrastructure in the community and the ability of relevant community members to manage and maintain the technology) are introduced to the community, the community should be informed on the benefits and educated in how to use and maintain the equipment appropriately.

14. Ensure that an individual or group of individuals are made responsible for ensuring that the energy consumption of the community is effectively managed. This may include the monitoring of energy use and anticipating potential changes in demand.

Additional Considerations	
General Considerations	
Simple versus complex systems	This issue focuses on simple systems rather than complex systems. A simple system refers to an off-grid or local grid solution that does not rely on a centralised energy infrastructure. A complex system refers to a grid solution that does rely on a centralised energy infrastructure.
Scope	This issue covers energy consumption specifically related to the built environment. The issue does not directly address the energy consumption of transport and industrial activities such as agriculture.
Cross-cutting Issue Considerations	
Participation	Undertake participatory activities to understand the energy consumed by the community and for what activities. This aspect will be affected by cultural practices.

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Additional Considerations	
Skills and Capabilities	Desired improvements are often based on people's awareness, habits and customs. Education is crucial to raise public awareness of the importance of sustainable energy management at individual and community levels to ensure that good energy management is maintained.
Livelihoods	Efficient consumption of energy can help to support long term livelihood activities.
Community Ownership & Sustainable Management	Ensure that the community is able to effectively manage, maintain and develop the energy infrastructure and consuming equipment.
Resilience	None.
Security and Safety	Ensure that energy consuming equipment used by the community is safe and that the affected community are aware of how to operate the equipment safely.
Economic Viability	The affected community should be informed of the economic opportunities that efficient energy usage can provide personal and collective benefits.
Access and Non-discrimination	Ensure that all community groups have equitable access to energy efficient equipment and strategies. Where vulnerable groups (e.g., young, elderly, disabled) require additional consumption of energy, ensure that this is considered and provided where necessary.

On-going Monitoring and Evaluation

- Retain evidence gathered in the initial evaluation when the team were trying to understand the previous energy infrastructure, the impacts of the disaster and establishing the energy demand and supply going forward
- Undertake on-going awareness raising programmes amongst the affected community and other relevant stakeholders on sustainable energy supply and renewable energy generation
- Develop strong linkages among local stakeholders (institutions, grassroots organisations, academia and research centres) to keep advocating and acting for environmental conservation and on-going community based initiatives around disaster reduction.

Case Studies

Lighting in Aurlaha, India[2]

Rating: +1

The employment of solar lighting has brought significant benefits to the community of Aurlaha. The total absence of electrification in rural areas and the scarce provision of electricity even in towns of modest dimensions (the main town of Saharsa has four hours of electricity a day) is an enormous constraint for the people, as it prevents from carrying out any activity of everyday life.

After 5-6 pm in winter time, inhabited areas are completely left in the dark and it becomes impossible for the women to work on any of their daily chores, while the kids cannot study, read or play at home.

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The total absence of street lighting makes it difficult and especially unsafe to walk in the streets at night, in every village and town. The provision of solar lights in Aurlaha has definitely brought a significant improvement to the villagers' life, as it provided a reliable and clean source of energy for an average of 5 hours every night.

The PV panel is south exposed and connected to a battery charger, while the employment of LED lights instead of conventional incandescent lights allowed a greater energy efficiency of the system and durability (it is acknowledged that LED lights can last up to 10-15 years without requiring any maintenance or replacement).

Additional Information

Relevant Definitions

Energy Infrastructure includes:

- The physical infrastructure required for the exploration, development and production of energy
- Transformation of energy, such as electric power generation and oil refining
- Transmission and distribution of energy, such as electric power transmission lines and oil and gas pipelines
- Storage of energy products.

Simple Energy Infrastructure: a local or standalone energy supply that operates without the need to be connected to centralised infrastructure (e.g., solar torches, microgeneration technologies, portable wind turbines).

Complex Energy Infrastructure: a complex system refers to a grid solution that relies on centralised energy infrastructure.

Other Information

None.

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Water and Sanitation (WS)

WS01 Water Demand and Supply

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To ensure that the water demand of the affected community is optimised and met for all needs, through a sustainable and secure water supply.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with the affected community and other relevant stakeholders in order to determine:
   a. Water demand:
      i. The current water demand of all user groups and how this compares to the pre-disaster situation, e.g.:
         – Consumption (food and drink)
         – Cooking
         – Hygiene
         – Sanitation
         – Other activities (e.g., to support livelihoods).
      ii. Understand any daily and seasonal changes in water demand
      iii. As part of this process, identify any opportunities for improvements in efficiencies (e.g., where there appears to be significant levels of wastage) or opportunities to reduce demand through safe use of recycled water)
      iv. Identify opportunities for shared water use in order to reduce the overall demand of the community.
   b. Water supply:
      i. Analysis of any existing or potential water supplies to ensure that:
         – A safe water supply can be secured, identifying whether any existing water supply can be utilised and built upon or whether new sources would need to be sourced
         – Identify changes in supply quantity, quality and distribution arising from the natural disaster
         – Understand any daily and seasonal variations in water supply
         – Identify strategies regarding aspects such as distribution and coverage and identifying whether a centralised or decentralised solution is applicable / possible

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- Ensure that rights to water supplies are satisfied for the local and surrounding communities
- Identify opportunities for improving the efficiency of the water supply to the affected community.

ii. Identify scope of supply needed for the community
iii. Understand the economic, social and cultural needs of the community in relation to water and any potential issues or opportunities this poses for improving water quality.

2. Consider future trends and potential for growth that should be considered to ensure the quality of water available to future demands.

3. The participatory activities should involve the relevant government agency and NGOs working on water and sanitation in the area, in order to understand local capacities and capabilities.

4. The status of the water infrastructure before and after the disaster, in conjunction with the relevant public authority where relevant.

5. Determine whether there are context-specific water quantity standards specified. Where available, these should go on to inform any water demand model developed.

6. Assess the need for a water specialist to support and/or take ownership of the assessment of this issue and oversee implementation.

Performance Level 1

7. The Baseline Evaluation requirements have been met.

8. Water demand model: produce a water demand model, showing the level of water demand the community would require for the short and long term. See the **WS01 Water Demand and Supply Checklist: Assessing Water Demand** for a simple demand model framework that could be used for this activity. The model should be tiered to highlight essential demands and non-essential demands. The model should also set out any specific requirements for the system, such as:
   a. A breakdown of the amounts and types of water required (e.g., potable) and for what purposes (e.g., consumption, cooking, hygiene).
   b. The varying needs of members of the community, including but not exclusive to:
      i. All gender groups
      ii. Those with disabilities
      iii. Religious groups.
   c. Community level facilities that must be accessible to all members of the community that must include:
      i. Communal washing[1]
      ii. Sanitation facilities[5]
      iii. Healthcare and other critical water supplies.
   d. Local economic and cultural activities that have any significant implications on water consumption and demand such as irrigation of crops and needs of livestock.
   e. Storage required to cope with daily and seasonal variations in supply and demand.
   f. The security of supply required in order for the community to remain functional.

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g. Level of service: the continuity and duration of supply required, and whether this varies with the time of day or season. Understand where peak demands are likely to be and how they will be managed.
h. Identified best practice benchmarks applicable to the local community.
i. Established government practices for infrastructure building / rebuilding in the aftermath of the disaster.
j. Where no centralised infrastructure is in place, consider how a localised water supply could fulfil the requirements of the affected community. Where centralised infrastructure is in place, identify any localised systems required to fulfil the demand and maintain a minimum acceptable security of supply, whilst complementing the centralised systems.
k. How the water demands of the community are likely to change in the future.
l. Determine how a balance will be reached and maintained between groundwater use and recharge.
m. Consideration is given to how waste water will be managed.

9. Water supply strategy: produce a water supply strategy building upon the information established through the Baseline Evaluation and analysis of the area. Establish the means in which the water supply can be delivered.
    a. Ensure that the water source(s) can meet the needs of the community in terms of availability, proximity and sustainability of sufficient quantity of water as set out in the consultation and analysis process. This should take into account daily and seasonal variations in supply.
    b. Consider the types of major sources that are applicable through research and consultation with the local community and general feasibility reviews; at least considering the following:
        i. Ground water sources and/or gravity-flow supplies from springs[5]
        ii. Surface water sources (dams, rivers where applicable)[5]
        iii. Rainwater through varying harvesting techniques.
    c. Take into account the existence of any social, political or legal factors such as ownership concerning the source; these can be identified through the consultation process. For example considering local practices and background as to whether the source of water would be used by the population[1].
    d. Ensure that supply meets the needs of the community and promotes equality in terms of distribution and availability. Provision to meet all groups and genders within a community, considering that in most family units women play a key role in collection and management of water supplies[9].
    e. Protection of sources, ensure that adequate security and protection are placed around water supplies and sources, considering:
        i. Potential pressures from the local population in the wake of a disaster to manage water sources effectively[2]
        ii. Take action to protect water sources from pollution and contamination[2]
        iii. Ensure that the water supply maintains an ecological balance between groundwater extraction and recharge.

10. Provision and infrastructure: Ensure that the water supply is delivered in a way that meets the specific needs of the community, considering the following:
    a. Distribution should ensure that all members of the community have access to supply and depending on applicability will either be:
        i. Centralised systems[2]
        ii. Decentralised systems[2].
    b. Basic water provision needs to be supplied considering the following activities:

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i. Drinking and cooking water through communal sources such as wells or where possible ensure plumbing for individual shelters is utilised
ii. Ensure that there is a basic water supply for washing and hygiene needs, both at community level and if feasible in individual shelters[2]
iii. Water provision to meet sanitation need, supplying for water latrines or individual toilets[2]
iv. Where applicable, ensure that water is available for drainage systems[3].

c. Water treatment: ensure that treatment is considered within all levels of infrastructure considering treatment at central distribution points and decentralised point of use facilities for each individual. (See **WS02 Water Quality** issue for further information).
d. Geographic considerations: Ensure that position of infrastructure points meets the needs of the community considering population spread and local densities when positioning wells and water supplies[2].
e. Healthcare and sensitive shelters: Water supplied to healthcare buildings and other delegate communal shelters must be treated separately and isolated from any potential detrimental water supplies such as for sanitation or for crops.
f. Consider the challenges of water storage and transportation within a community.
    i. Providing adequate infrastructure and guidance for individuals and the community so they can store water where necessary
        – For example for cooking purposes water may be needed to be stored for a period of time to save journey and collection periods of where climate pressures such as droughts cause issues in terms of quantity[1].
    ii. Dealing with stagnant water stores, particular in the case of sanitation facilities and irrigation systems
    iii. Consideration is needed for specific climatic pressures for example consider temperature and potential water evaporation in arid climates[1].

11. Livelihoods and cultural activities:
    a. Ensure that water supplies are in place to enable businesses and trade to function, for example water supplies for a café.
    b. Markets include sufficient water supplies and space and facilities for adequate sanitation and the handling of waste[4].
    c. Accommodating Livestock, have separate watering points that do not contaminating ground or surface water bodies[5].

See Performance Level 3 (PL3) point 18. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

12. The Performance Level 1 requirements have been met.

13. Community ownership, skills, capabilities. Awareness raising: conveying the importance of sustainable water consumption and sanitation through strong education, participation and on-going involvement in the water strategy for the community.
    a. Ensure participation throughout the relief process with the local community to ensure they understand the challenges in meeting demand and how to reduce water wastage as a community[6].
    b. There must be transparency and communication with the community, particularly when water demand outweighs water supply and rationing may be required[5].

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c. Provide a basis of knowledge to ensure that individuals and the community as a whole understand how their demands and consumption trends can affect water sources long term, considering impacts on their community and the environmental impacts on their local habitat.
d. Include all members of the community within the education process, particularly including women as they may play a critical role in water use[9].
e. Communicate the environmental effects of over use and exploitation of water sources and the implications on local habitats.
f. Transfer of knowledge and principles to sustain water sources; how supplies can be managed effectively to ensure long term use of a source. For example considering how to ensure a drinking water source is maintained as such for the health of a community[1].
g. Ensure that new technologies are communicated to the community.
h. Promote awareness about population pressures, the need to meet the needs of a growing population. For example the need to source new water supplies to meet settlement growth needs.

14. Reducing the water demand: undertake actions to achieve greater efficiencies in the way water is used by the affected community. For example:
    a. Ensure that there are appropriate ways to transport and store water in order to minimise leakage and wastage.
    b. Encourage the shared use of water-consuming practices (e.g., cooking), where culturally appropriate.
    c. Undertake behavioural awareness training for the local community on how to use water most efficiently and reduce water demand, where possible.
    d. Encourage the use of technologies that could help to reduce the water demand of the affected community. For example, using rainwater harvesting systems and the limiting of water flow rates for showering.

15. Alternative water sources are explored and utilised as part of the water supply strategy to make use of the full range of natural resources associated with the community and reducing pressures on ground water sources:
    a. Rainwater harvesting: if the local rainfall patterns mean this is applicable then rain water harvesting should be considered:
        i. Rainwater harvesting can be used on two scales:
            – Individual Shelters[11]
            – Agricultural, erosion control, flood control (larger-scale)[1].
        ii. Harvesting rainwater from roofs with solid surfaces like clean plastic or metal which are away from contamination from leaves and grasses, and animal droppings[5]
        iii. Trapping water flowing on the ground, gradually directing this towards storage units such as tanks or containers[5]
        iv. Inclusion of a filtration system removes any contamination threats from debris that ends up washing into the collection system[11]
        v. Local innovation should be encouraged to design appropriate systems of harvesting[5].
    b. Provision of low pressure taps that reduce potable water pressures and wastage[10].
    c. Treadle Pumps can be utilised for small scale irrigation practices[2].
    d. Encourage the use of sustainable control devices where applicable, for example the use of drainage channels known as swales as a source of drainage and also in creation of habitat. This will reduce pressures on supply and reduce water wastage[10].

See Performance Level 3 (PL3) point 18. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

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Performance Level 3

16. The Performance Level 2 requirements have been met.

17. Ensure that an individual or group of individuals are made responsible for ensuring that the water demand and supply of the community is effectively managed. This may include the monitoring of water use and anticipating potential changes in demand.

18. A water specialist has been used to produce the water demand model and water supply strategy and identify ways of achieving efficiencies in how water is used by the affected community.

19. Performance Level 1 has been achieved for the following issues:
    a. WS01 Water Quality.

Additional Considerations	
General Considerations	
Local climatic considerations	Build upon local knowledge and analysis established early on in the process to identify challenges of meeting water demand in specific climatic context. Considering: • General water storage needs that will need to adapt to a specific climate • Water rationing in drought periods and the challenges of storage or provision and allocation of resources in drought periods.
Communal washing facilities	Where individual washing facilities are not provided communal washing and sanitation facilities are important. Provide communal washing facilities that consider: • Gender issues and ensuring privacy is designed into these facilities[9].
Healthcare shelters	Water Demand for these shelters will vary and must be treated separately from other demands. A separate supply could be specified.
Means to reduce demand	There are arrays of technologies that can be considered to reduce the water demand for a community. For example, waterless toilets can be used to reduce water consumption for sanitation purposes[2].
Infrastructure	Infrastructure is critical to water supply; please consider the scope of the infrastructure issue within this issue alongside the criteria set out above.
Appropriate distribution systems	Distribution system should also consider the location of the demand across the community as well as factoring in the positioning of water supplies and sources and the potential challenges associated with that.
Water treatment	Water treatment, threat of contamination and separation of drinking water in area that is susceptible to flooding.

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Additional Considerations	
Water storage	Water storage in specific climates faces different challenges, for example in arid climates such as deserts water sources can be kept below ground level to reduce evaporation and maintain a more accessible temperature[1].
Cross-cutting Issue Considerations	
Participation	Consider the changing needs of the community and ensure that all members of the community are considered in the process. Involve the community initially to understand trends and involve them in targeting critical areas in which infrastructure and supply are needed. The on-going goals would be to ensure that a community management strategy becomes part of the reconstruction process.
Economic Viability	Water is a critical resource to ensure that the economy of a community can develop and grow. Ensure that local businesses are considered in the process and ensure that long term the demand can be met by the supply. Consider the extent of which a water supply can be invested in, factoring in the predicted population growth of a community. This also takes into consideration the cost of maintenance, transportation and treatment of water and the supply.
Skills and Capabilities	Community management of water supplies is key for long term security in which all members of the community must be educated on. All members need to have a fundamental understanding of the demands and challenges of water management and the specific context of their water supply. It is important to pass on good practice to the community for them to build upon long term.
Security and Safety	Ensure that sources of water are available to all and that they are free from contamination and exploitation long term. This is aided by long term management strategies being embedded in the community.
Access and Non-discrimination	Equal access must be considered for all members of the community, particularly women, children and the elderly who are usually key managers of water within households. This also applies to ensuring that healthcare shelters are given access to adequate quantities of water.
Resilience	Context of the community should consider the best infrastructure and means of water supply for the long term benefit of the community. For example, selecting the most appropriate materials for that climate and also materials that are readily available in order to maintain and manage the infrastructure.
Community Ownership and Sustainable Management	Ensure that any management activities consider the changing demands of a community. Particularly consider demands associated with population growth going forward. Community management of water supplies is key for long term security in which all members of the community must be educated on to secure the water supply long term.

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Additional Considerations	
Livelihoods	Ensure that the demand of all livelihoods is considered in the community. Considering appropriate activities such as: • Crops and irrigation demands • Manufacturing • Shelter construction • Cooking and cleaning. Water supply for business and trade is key for community function. It is important to consider this alongside the needs of individuals, as regards long term water supplies for activities for food supplies and supply chain creation within a community.

On-going Monitoring and Evaluation

- A detailed record of decision making and logic behind decisions should be kept to inform future generations of decisions taken and their associated outcomes
- Once the necessary infrastructure has been installed, it is vital that all areas are monitored consistently; any changes in water demand, supply or quality must be recorded and acted upon during and after implementation[18]
- A participation and management strategy should be developed to ensure that there is on-going consideration for changing demands and needs
- A 'look back study' should be undertaken 5-10 years after a project has begun to identify benefits and issues that could be resolved and considered for future development [18]
- Supplies should be protected from exploitation through constant monitoring for any sources of over use, contamination or any actions that could threaten the long term use of the source.

Case Studies

Kenya, Dabaab - Floods, 2007[12]

Rating: -1

Following the flooding of a refugee camp a combination of shelter upgrading and emergency response funding assisted 500 families as it was necessary to make bricks and build shelters.

In terms of management of water sources and resource, consumption was high. Water meant for domestic consumption was used in brick production and as such compromised the water supplied for domestic consumption and also strained the community. However to help reduce this burden, to reduce the water consumption necessary for brick production, 'spilled water' from tap stands was collected. The rest of the water was supplied by truck and stored in oil drums or in water tanks if the bricks were being produced outside the camp. It was also identified that specifying rainwater catchment systems will help to avoid this in the future.

There was provision of tools that were shared amongst the community groups such as water storage provided in the most appropriate areas.

In terms of sanitation, a change in the position of the house on the plot improved this. Latrines were moved to the front of the plot next to the street and the house was positioned at the back of the plot.

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This left space for more construction inside the plot and prevented the problems of a dirty backyard blocked by wastewater runoff.

Uganda, Katakwi and Amuri Districts – Floods, 2007[13]

Rating: -1

The slow on-set floods affected more than 20,000 households and displaced 58,000 people. The disaster occurred only 3 months away from the traditional building season (huts and shelter design in this region requires constant change and maintenance). The project involved components of water, sanitation and agriculture in order to reduce possible effects on the community in the future due to the nature of settlement structures. It was considered the most appropriate way to approach this was through community mobilisation.

The shelter project focused on twenty camps and promoted community awareness, participation and technical awareness. The project combined interventions in many different sectors such as camp planning and water and sanitation. The programme paid less attention to individual needs. It focussed instead on information sharing and the distribution of communal tools. The tools could be used for shelter, road works, agriculture, and other uses.

Myanmar, Yangoon – Cyclone, 2008[13]

Rating: 2

The cyclone damaged over 450,000 households and more than 300,000 considered to be seriously affected. The hardest hit areas included smaller rural farming and fishing villages of less than 100 households. In some cases these were completely destroyed, resulting in many lives lost. Housing in these areas is largely of simple timber, bamboo and thatch construction. To provide temporary shelters 4x6m tarpaulins per family were provided with the occupancy rate for these being extremely high. Although this was a challenging environment it proved that shelters kits had a range of good quality materials included within them.

Shelter kits and tarpaulins were particularly adapted to the warm wet environment with 88.7% of the total amount of tarpaulin was used for shelter and 11.3% of the tarpaulins were used for rain water harvesting, covering the harvested paddy and other purposes. They were used not only for roofs but also for walls. They also made good tanks for water collection.

Tonga, Niuatoputapu – Tsunami, 2010[14]

Rating: 0

This project provided cyclone resistant transitional shelter, water supply and sanitation to 74 families who lost their homes and elected to remain on Niuatoputapu, while waiting for assistance to re-build permanent housing. The tsunami had destroyed the houses of more than half the island's population. The shelter materials and construction teams were imported from an island 600km away

onstruction of latrines was not completed by a number of households in one village. Follow up was required to understand the issues and ensure completion where feasible. This was intrinsically linked to that fact that initial assistance was requested in water supply only but the deployment of an engineer quickly identified other needs including shelter. Although intentions here were good the execution in dealing with the challenges of water was not.

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Additional Information

Relevant Definitions

Water Demand: Water requirements for a particular purpose, as for irrigation, power, municipal supply, plant transpiration or storage[15].

Centralised Water Supply Systems: refers to an extraction, treatment, storage and transmission / distribution of water from a central facility serving a number of neighbourhoods and urban areas.

Centralised systems for larger cities are often complex systems and use several water sources sometimes located at considerable distance from the city, different supply zones in the distribution network, and sophisticated treatment technology. Operation and management of centralised systems require considerable technical and organisational capacities and are generally assured by municipal or corporate-owned utilities[6].

Decentralised Water Supply Systems: are based on the same components as are larger centralised systems but use water resources available in closer proximity, supply smaller areas and often use only basic treatment technologies. Decentralised systems can be managed by utilities but also by community based schemes, which make them potential alternative solutions for self-supply of communities in situations with deficient public water supplies[6].

Control Devices: Any drainage structure or unit designed to control the runoff of storm water. Examples of SUDS (Sustainable Urban Drainage System) control devices are check dams within swales and basins, and combined weir / orifice controls for ponds[10].

Other Information

None.

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WS02 Water Quality

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To ensure that potable water is palatable, of sufficient quality to be consumed and ensures that communities health is not compromised by water resources.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities, with the affected community and other relevant stakeholders in order to understand the water quality context and:
    a. Gain an understanding of the existing water quality and water sources.
        i. Usable existing fresh water sources that can be established and built upon
        ii. Existing non-fresh water sources that need treatment to meet quality standards required for consumption
        iii. Variability in water quality as a result of seasonal variations, climatic conditions, natural events including further disasters.
    b. Identify and build upon knowledge in the local population, understanding traditional sources of water and identify any threats or opportunities associated with these (e.g., by undertaking a KAP (knowledge, attitude and practice) survey).
    c. Understand the economic, social and cultural needs of the community in relation to water and any potential issues or opportunities this poses for improving water quality. Consider future trends and potential for growth that should be considered to ensure the quality of water available to future demands.

2. Stakeholder analysis: develop an understanding of water-related projects in the immediate and surrounding areas in order to gain an insight into how the issue of water quality may be effectively addressed.

3. Existing standards: determine whether there are applicable water quality standards in place. Where available, these should go on to inform any water quality provided.

4. Participation: Involve the community in any processes and decisions relating to water efficiency measures through the development process.

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5. Assess the need for a water specialist to support and/or take ownership of the assessment of this issue and oversee implementation.

Performance Level 1

6. The Baseline Evaluation requirements have been met.

7. A water safety plan[15] is developed to ensure that water is fit for consumption, which is likely to include:
   a. Infrastructure requirements.
   b. Potential sources of contamination and how these will be managed.
   c. Water storage.
   d. How water quality requirements may differ by building type.
   e. Palatability.

8. Contamination: analyse the local context of the site and the water source and supply available, build upon environment assessments and consultation to identify and mitigate threats to water quality as appropriate, considering:
   a. Soil contamination threats from livelihood and other cultural activities associated with the community[2].
   b. Naturally occurring pollutants in the soil, for example clay rich soils can cause issues.

9. Chemical pollutants left from previous activities could compromise the water course. Isolation of drinking water from other water supplies to reduce risk of contamination from other activities, considering:
   a. For drinking and cooking purposes[1].
   b. For washing, hygiene and sanitation purposes[1].
   c. Water used for livestock (consumption and waste).
   d. Water used for irrigation for crops and cultivation.
   e. Water used in industrial style activities which could produce contaminants.

10. Water treatment techniques are required to disinfect non-fresh water sources. This must consider the following areas:
    a. Water treatment types that must be considered:
       i. Chemical disinfection[2]
       ii. Storage (storing water in darkened containers can kill up to 50% of bacteria) [2]
       iii. Filtration techniques[2]
       iv. Boiling water to disinfect[2].
    b. Identification of the most appropriate and robust solutions must be considered at a variety of scale such as:
       i. Municipal or Centralised which considers established settlements, usually more urban communities[11]
       ii. Community scale or Decentralised where water is collected from community managed or private sources[11]
       iii. Communal shelter, and Individual Shelter (or point of use treatment)[11].
    c. It must also consider locations and setting, for example the varying challenges and needs in urban and rural areas.
       i. Urban settings, which typically takes the form of boiling or disinfection systems such as ultraviolet treatment of water[11]

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ii. Rural settings, it is more common that filtration techniques are called upon, for example clay water filters (see **case study for further information**)[12].

See Performance Level 3 (PL3) point 19. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

11. The Performance Level 1 requirements have been met.

12. Palatability: consider if the colouring or conditioning of the water puts off individuals and communities then they could, chose to use unregulated water sources, causing disease and further issues. This can be dealt with through:
    a. A concerted effort to educate the community[1].
    b. Considering applicable water treatments and selecting based on palatability.

13. Infrastructure should be taken into account when looking at the challenges faced as to how water quality can be managed.
    a. Consider the types of infrastructure used and the challenges associated with water quality, primarily considering:
        i. Supply piped directly into household and communal shelters and the issues of managing water quality within a piped infrastructure
        ii. Manually transported from the communal facilities such as ground source pumps
        iii. Consider transportation of sanitation water supplies.
    b. Consider the risk of contamination away from delivery infrastructure.
        i. In transport, where a variety of techniques are adopted that can compromise water quality such as, traditional clay or metal containers, plastic and metal buckets and jerry cans [11]
        ii. Water storage, ensuring that containers should have narrow openings that can be sealed, should be made of an easily cleaned material and should have narrow spouts or taps to minimize contamination[11].

14. Water storage: design to minimise contamination, ensuring that these are provided in shelters appropriately, factoring in that:
    a. Made of easily cleaned material (plastics, most metals, ceramics, polished concrete)[11].
    b. Tap to draw water (must not leak or stick) or narrow spout from which to pour water[11].
    c. Top opening large enough to pour water into but small enough to discourage the entry of hands, ladles and other faeces vectors[11].
    d. Cap for top opening (preferably screw type) Stable with a flat bottom (so that container does not tip over allowing contaminants to enter opening)[11].
    e. Ensure that domestic animals and children cannot access and therefore potentially contaminate the water.

15. Healthcare shelters (and other sensitive shelters): should be considered individually as these are places where diseases can spread amongst vulnerable individuals. The following actions can mitigate these effects.
    a. Water can be managed separately or filter from the main water infrastructure if necessary[2].
    b. Water storage should take into account the threats of stagnancy and disease[2].

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16. Education: to facilitate the transfer of knowledge and practices relating to water quality and the proper use of water sources. This should include:
    a. The importance of water quality for the community, particularly considering issues such as palatability.
    b. Training the community on any new technologies or systems used in water treatment practices, from simple to complex techniques. Passing on the skills to manage these long term[11].
    c. Informing the community as to how to protect water sources from contamination, how to conduct sanitary inspection and any remedial action as well as the physical protection of sources[11].
    d. Promote better hygiene and sanitation practices within the community, looking at reinforcing the links between water, sanitation, hygiene and health[11].

See Performance Level 3 (PL3) point 19. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

17. The Performance Level 2 requirements have been met.

18. Ensure that an individual or group of individuals are made responsible for ensuring that the water quality of the community is effectively managed. This may include the monitoring of water use and anticipating potential changes in demand.

19. A water specialist has been used to ensure adequate water quality and identify ways of achieving efficiencies in how water is stored by the affected community.

20. Incorporate technologies (appropriate to the infrastructure in the community and the ability of relevant community members to manage and maintain the technology) where they are applicable to the local context and have the potential to deliver an improvement in water quality (e.g., SODIS, a method of purifying water using PET bottles).

21. Performance Level 1 has been achieved for the following issues:
    a. WS03 Sanitation.

Additional Considerations	
General Considerations	
Healthcare Shelters	These should be priorities with dedicated water quality procedures where possible. Efforts should be coordinated with health workers to ensure that the supply isn't having a negative effect on the health of the displaced population. This is another area where the inclusion of those affected can lead to greater integration of people into participatory approaches.

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Additional Considerations	
Cross-cutting Issue Considerations	
Participation	It is important to utilise the community long term to ensure that any signs that the water quality could be improved or if the quality is reducing the relevant action can be taken before opportunities to change are missed.
Economic Viability	It is important to consider the cost of different approaches to water treatment. Balance investment with the community scale and demand as well as considering the communities future growth. Please refer to the economic viability cross-cutting issue for further consideration.
Skills and Capabilities	When considering palatability and colouration an alternative could be to run skills and capability sessions with the community to establish what constitutes a safe water source to reduce the impact of palatability issues.
Safety and Security	Ensure that water resources are protected to avoid contamination and exploitation that could compromise the quality of water sources.
Access and Non-discrimination	Consider the communities historic hierarchy and culture to ensure that all member of the community have access to equal quality of water resources.
Resilience	It is important to consider the long term challenges of maintaining water quality supplied to the community. For example consider how sustainable management can ensure that materials and infrastructure can be monitored and replaced where necessary. Consider how water quality can be maintained should a disaster event occur in the future. Ensuring a diversity of water supplies can help in ensuring resilience of a communities supply.
Community Ownership and Sustainable Management	In line with the resilience consideration ensure that the community is equipped to maintain water quality measures and are able to react to issues and make decisions to improve where necessary as the community grows in scale and scope of development.
Livelihoods	The quality of water resources is often critical for community livelihoods. If water quality is poor then aspects such as irrigation of crops may be compromised. It is also important to consider the health of the communities in general and individuals specifically and the impact this may have on their ability to grow economically and socially.

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On-going Monitoring and Evaluation

- Ensure that all decisions and documentation recorded actions relating to the quality of water in storage, infrastructure or in particular in relation to sensitive shelters such as healthcare facilities are recorded and utilised as the settlement grows
- Water quality monitoring - H2S and other inexpensive indicative tests, sampling, availability of outside resources for testing water, structure and functioning of national monitoring programmes[11]
- Once the necessary infrastructure has been installed, it is vital that all areas are monitored consistently; any changes in water demand, supply or quality must be recorded and acted upon during and after implementation[14]
- A 'look back study' should be undertaken 5-10 years after a project has begun to identify benefits and issues that could be resolved and considered for future development[14].

Case Studies

Sri Lanka – Clay Water Filters 2005 (Sri Lanka Red Cross)[12]

Rating: +2

After the Asian Tsunami of 2004, access to clean water became a major issue for people living on the coast of Sri Lanka. Being aware that one of the UN Millennium Development Goals for 2015 is to "halve the proportion of people without sustainable access to safe drinking water", the American Red Cross (AmRC) and the Sri Lanka Red Cross Society (SLRCS) collaborated to introduce an appropriate clay water filter (CWF) technology to Sri Lanka. This is a low cost filter that removes diarrhoea-causing bacteria from water to make it safe for human consumption. These filters represent a sustainable way for Sri Lankans to get safe *"point of use"* water and reduce their risk of contracting diarrhoea and waterborne diseases[12]

Kenya, Dabaab - Floods, 2007[13]

Rating: -1

Following the flooding of a refugee camp a combination of shelter upgrading and emergency response funding assisted 500 families to make bricks and build shelters.

In terms of management of water sources and resource, consumption was high. Water meant for domestic consumption was used in brick production and as such compromised the quality of the water supplied for domestic consumption and also strained the community. However to help reduce this burden, to reduce the water consumption necessary for brick production, 'spilled water' from tap stands was collected. The rest of the water was supplied by truck and stored in oil drums or in water tanks if the bricks were being produced outside the camp. It was also identified that specifying rainwater catchment systems will help to avoid this in the future.

There was provision of tools that were shared amongst the community groups such as water storage provided in the most appropriate areas.

In terms of sanitation, a change in the position of the house on the plot improved this. Latrines were moved to the front of the plot next to the street and the house was positioned at the back of the plot. This left space for more construction inside the plot and prevented the problems of a dirty backyard blocked by wastewater runoff.

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Additional Information

Relevant Definitions

Centralised Water Supply Systems: refers to an extraction, treatment, storage and transmission / distribution of water from a central facility serving a number of neighbourhoods and urban areas.

Centralised systems for larger cities are often complex systems and use several water sources sometimes located at considerable distance from the city, different supply zones in the distribution network, and sophisticated treatment technology. Operation and management of centralised systems require considerable technical and organisational capacities and are generally assured by municipal or corporate-owned utilities[6]

Decentralised Water Supply Systems: are based on the same components as are larger centralised systems but use water resources available in closer proximity, supply smaller areas and often use only basic treatment technologies. Decentralised systems can be managed by utilities but also by community based schemes, which make them potential alternative solutions for self-supply of communities in situations with deficient public water supplies[6].

Other Information

None.

References

[**1**] Sphere Handbook. Humanitarian charter and minimum standards in humanitarian response. Sphere Project, 2011.
[**2**] M Bounds. Practical Action: Water supply in Emergencies. Practical Action, 2012.
[**3**] IFRC, SKAT. Sustainable Reconstruction in Urban Areas. 2012.
[**4**] WWF US, American Red Cross. Green Recovery and Reconstruction Toolkit.
[**5**] Norwegian Refugee Council (NRC). Camp Management Tool Kit. NRC, 2008 pg201-218.
[**6**] WaterAid. Water Security Framework. Water Aid, 2012.
[**7**] WaterAid, Technical Manual. Water Aid, 2012.
[**8**] N Boot. Practical Action: Types of Toilet and Their Suitability. Practical Action, 2008.
[**9**] WSP. Mainstreaming Gender in Water and Sanitation - Gender in Water and Sanitation. WSP, 2010.
[**10**] BRE Global, BREEAM 2011 New Construction, BRE, 2011.
[**11**] UNICEF. Handbook on Water Quality. UNICEF, 2008.
[**12**] Sri Lanka Red Cross, IFRC, American Red Cross. Clay Water Filters. 2005.
[**13**] IFRC, UN-HABITAT, UNHCR. Shelter Projects 2008. 2009.
[**14**] WatSan, WatSan Post Occupancy Assessment.
[**15**] World Health Organisation (WHO). http://www.who.int/water_sanitation_health/dwq/wsp0506/en/.

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WS03 Sanitation

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To ensure that adequate sanitation solutions, facilities and infrastructure are available for beneficiaries and the importance of hygiene is promoted.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities in order to understand the sanitation context, with the affected community and other relevant stakeholders in order to determine:
   a. Knowledge in the local population, understanding traditional hygiene and sanitation practices and identify any threats or opportunities associated with these (e.g., by undertaking a KAP (knowledge, attitude and practice) survey).
   b. Existing sanitation infrastructure (e.g., wastewater treatment) and levels of damage arising from the natural disaster.
   c. Data relating to sanitation and hygiene requirements of the community, including differences in gender, age, mobility and health.
   d. Local knowledge, relating to traditional modes of sanitation and any threats or opportunities associated with these.
   e. Economic, social and cultural needs of the community in relation to sanitation and any potential issues or opportunities this poses for improving sanitation. Future trends and the potential for population growth that should be considered to ensure that sanitation infrastructure is adequate.

2. Stakeholder analysis: develop an understanding of water-related projects in the immediate and surrounding areas in order to gain an insight into how the issue of sanitation may be effectively addressed.

3. Existing standards: determine whether there are applicable sanitation standards in place. Where available, these should go on to inform the quality of sanitation provided.

4. Participation: Involve the community in any processes and decisions relating to sanitation measures and infrastructure implementation.

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5. Assess the need for a sanitation and hygiene specialist to support and/or take ownership of the assessment of this issue and oversee implementation of its outputs working with relevant professionals e.g. civil engineer – drainage etc.

Performance Level 1

6. The Baseline Evaluation requirements have been met.

7. A sanitation plan is developed and implemented to ensure that adequate hygiene levels can be maintained. This is likely to include:
   a. Infrastructure requirements.
   b. How waste will be treated, managed and/or disposed of.
   c. Food preparation and storage.
   d. Water storage.
   e. How sanitation requirements may differ by building type and user.
   f. Identification and selection of the appropriate sanitation solution(s) for the redevelopment process.

8. Good environmental sanitation is critical to ensuring public health. Sanitation systems often require a complex arrangement of different technologies and organisational structures and processes. At this stage of the sanitation cycle:
   a. Identify and select an appropriate sanitation solution (this may vary from one part of the development to another). Selection should be informed by the outcomes of the Baseline Evaluation.
   b. Where specification of the sanitary solution relates to decentralised and on-site sanitation systems (highly dependent on involvement of individual households) provide awareness-raising and information-giving, as well as revisiting or ensuring participation of users in sanitation planning[1].
   c. Building upon the information supplied by consultation / participation process identify and establish the associated water demands for:
      i. Individuals sanitation facilities
      ii. Community level sanitation facilities.

9. Solid waste disposal: While this stage of the sanitation cycle is theoretically a municipal government function, solid waste collection and disposal is often handled by the private sector. This issue should be approached as a community mobilization and organization activity. Please refer to the MW05 Operation Waste Management issue. This issue details criteria points relating to waste disposal and the management of medical and hazardous waste which impacts on sanitation.

10. Drainage: Consider local conditions while designing wastewater disposal systems.
    a. Key factors to consider are the quantity of wastewater, the plot size and the permeability of the ground.
       i. Example: On-site disposal may be feasible where water is being fetched from a public water supply point. However, where the houses have individual water connections it is unlikely to be appropriate unless the ground is very permeable or the plots are very large.
    b. Ensure pre-treatment of waste water before disposal to prevent contamination of ground water sources.

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11. Vector Control: sanitation facilities must be designed to minimise the entry of disease vectors such as pests and mosquitoes. Please refer to the internal environment issue for further guidance. The criteria points listed are equally applicable for this issue.

12. Education: to raise the awareness of the following issues.
    a. Implemented sanitation / hygiene and waste disposal measures.
    b. Health issues relating to poor sanitation / hygiene and how good practices in sanitation can improve / address these.

See Performance Level 3 (PL3) point 18. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 2

13. Performance level 1 requirements have been met.

14. Ensure that, where required, behavioural changes are encouraged in the use of sanitation facilities. All user groups (e.g., men, women, children, the elderly and disabled) should be assessed to ensure that they are using the provided facilities and not resorting to unsanitary behaviours.

15. Sanitary facilities are designed to ensure long term running, through:
    a. Robust and practical design.
    b. Appropriate use and education around the systems.
    c. On-going maintenance.

See Performance Level 3 (PL3) point 18. For this point to be achieved under PL 3 the relevant aspects must have been met under this performance level.

Performance Level 3

16. Performance level 2 requirements have been met.

17. Ensure that an individual or group of individuals are made responsible for ensuring that the sanitation of the community is effectively managed. This may include the monitoring of food / water quality and behavioural assessments.

18. A sanitation / hygiene specialist has been used to ensure adequate performance and identify ways of achieving efficiencies in how sanitation / hygiene is maintained by the affected community.

19. Incorporate technologies (appropriate to the infrastructure in the community and the ability of relevant community members to manage and maintain the technology) where they are

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applicable to the local context and have the potential to deliver an improvement in sanitation and/or hygiene.

Additional Considerations	
General Considerations	
Baseline Evaluation – Consultation and analysis	Point 7e should also consider anal cleansing practices (and water requirements for it) and the needs of women (including menstrual hygiene management), children, disabled, and the elderly.
Food and water storage	Shelter provision should be adequately separated from sanitation provision to prevent contamination and health risks through air and water contamination.
Drainage	Adequate surface water drainage should be ensured around the shelter together with the use of raised floors levels to minimise the risk of surface water, for example rain, snow melt, entering the covered[3] or surrounding area as applicable. Roofs should have a sufficient pitch for rainwater drainage taking in to account precipitation rates, types and duration, above 30° for normal tiles and thatch and above 20° for well-lapped corrugated iron sheeting. Generous overhangs help to protect openings from water penetration during rainy seasons, but should be avoided in locations vulnerable to high winds[4].
Cross-cutting Issue Considerations	
Participation	The affected community and other relevant stakeholders should be involved at the planning and implementation of sanitation and hygiene related activities.
Skills and Capabilities	The affected community should have the awareness / skills / knowledge to understand the importance of adequate sanitation and hygiene.
Livelihoods	None.
Community Ownership and Sustainable Management	The affected community should have the ability to maintain and continually improve the standards of sanitation and hygiene going forwards.
Resilience	Sanitation-related infrastructure should be capable of withstanding future hazards.
Security and Safety	Community level sanitation facilities that must be safe for all members of the community.
Economic Viability	Sanitation-related infrastructure and practices must be economically viable to maintain and enhance going forwards.

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Additional Considerations	
Access and Non-discrimination	Community level sanitation facilities accessible to all members of the community.

On-going Monitoring and Evaluation

- Ensure that all decisions and documentation of justified decisions and action relating to sanitation and hygiene are recorded and utilised as the settlement grows
- Once the necessary infrastructure has been installed, it is vital that all areas are monitored consistently; any changes in circumstance must be recorded and acted upon during and after implementation[5]
- A 'look back study' should be undertaken 5-10 years after a project has begun to identify benefits and issues that could be resolved and considered for future development[5].

Case Studies

None.

Additional Information

Relevant Definitions

None.

Other Information

Sanitation systems often require a complex arrangement of technologies and organisational set-ups.

Many technological options are available for sanitation and can be applied in combination of ways for different situations within the same area but consideration of robustness, skills and cost of maintenance is a key requirement. Reconstruction should always be tailored to the specific situation, which can vary from one neighbourhood to the other. Ensure that the sanitation system is well suited (based on pre-assessment and stakeholder analysis) to the context and needs of the local community[1].

References

[**1**] IFRC, SKAT. Sustainable Reconstruction of Urban Areas. 2012.
[**2**] Oxfam. Domestic and Refugee Camp Waste Management collection and disposal – TBN15. 2008.
[**3**] The Sphere Project. Humanitarian charter and minimum standards in humanitarian response. 2011.
[**4**] WWF US, American National Red Cross. Green Recovery and Reconstruction Toolkit (Module 6: Construction).
[**5**] WatSan, WatSan Post Occupancy Assessment.

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Natural Environment (NE)

NE01 Human Relationships to Ecological Services

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To develop, implement and effectively communicate a locally appropriate Action Plan which will identify existing ecosystem services and facilitate effective management of human activity in the natural environment.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- Significant alteration, damage or increased vulnerability of the natural environment as a result of the natural disaster
- Damage or erosion of ecosystem services due to the natural disaster
- Increased vulnerability of livelihoods due to the impact of the natural disaster on the local ecology
- Increased risk of unsustainable exploitation and management of ecosystem services, due to changes in the natural environment and settlement or resettlement following the natural disaster (including increased post disaster reconstruction work)
- Significant degradation of the natural environment (which may pre-date the disaster event).

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with the following stakeholders[1]:
    a. With the local community to:
        i. Gain an understanding of the local ecology and of the ecology which existed prior to the natural disaster[4&5]
        ii. Identify human dependencies and relationships and any potential conflicts with wildlife pre and post disaster with ecosystem services and where possible determine the species and habitats that make up and support these resources
        iii. Identify where ecological features are used to support the economic, social and cultural needs of the community
        iv. Identify who has ownership over local ecology.
    b. Identify and engage with relevant wider stakeholders with a focus on ecology in the affected area (e.g., local government environment department / agencies, universities, and organisations involved in ecological research / protection). Where possible:

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i. Gain an understanding of the existing local ecology which existed prior to the natural disaster[1&4]
ii. Where a greater understanding is required further explore the human dependencies and relationships with ecosystem services identified during community consultation
iii. Identify and document ecological regulations, laws[6] and cultural heritage. This should include the consideration of protected areas, protected species and habitats, sites of special scientific interest, national park regulations, etc. (Note: Protection may be implemented at a local, regional, national or international level)
iv. Obtain relevant resources to address any fundamental knowledge gaps that exist in the understanding of the local ecology as appropriate (e.g., species inventories, past ecological reports or surveys, existing Action Plans and maps[4&5]).

Performance Level 1

2. The Baseline Evaluation requirements have been met.

3. Assess the information collected as part of the Baseline Evaluation to inform the development of a Natural Environment Action Plan. The assessment should determine whether existing relationships between humans and the natural environment[4] are:
   a. Necessary (i.e., could other resources be used in their place or are resources being extracted and not used).
   b. Sustainable (i.e., resources are being extracted at rates under which they can naturally replenish).
   c. Minimising avoidable conflicts between the community, its livelihoods and local ecosystems.

4. Require management to protect the longevity and sustainability of the resource. Develop a Natural Environment Action Plan: To act as a framework that supports on-going sustainable management of resources and other ecosystem services used by the community.
   a. Complete section a) of the Natural Environment Action Plan (see **NE01 Checklist: Natural Environment Action Plan**) using the information collected as part of the Baseline Evaluation. As a minimum the plan should include species and habitats identified during the consultation process that act as direct resources or provide other ecosystem services to the local community.
   b. Complete section b) of the Natural Environment Action Plan using the information collected as part of the Baseline Evaluation.

      Note: The issues: Ecological Protection and Ecological Rehabilitation and Restoration also form part of the Natural Environment Action Plan.

5. Implementation of the Natural Environment Action Plan. In order to implement the Action Plan where possible the following should be carried out:
   a. Initial implementation by the assessing organisation of the key elements of the plan in partnership with the local community or other relevant stakeholder.
   b. Those identified as being responsible for carrying out the actions in the plan should begin addressing these actions.
   c. Using the overall prioritisation score (in part b of the Action Plan) implementation should be carried out in order from the lowest overall prioritisation score to the highest.
   d. Ownership of the Plan should be transitioned to the local community or other appropriate stakeholder with appropriate links to the local community to support local ownership of the plan.

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6. Inform and engage with the community on the Action plan. This will act to support the local community in taking the Plan forward. The participation should:
   a. Ensure that community representatives are involved in developing the Action Plan.
   b. Engage community representatives on managing the plan.

Performance Level 2

7. The Performance Level 1 requirements have been met.

8. Require management to protect the longevity and sustainability of the resource. Develop a Natural Environment Action Plan to act as a framework that supports on-going sustainable management of resources and other ecosystem services used by the community.
   a. Complete section c) of the Natural Environment Action Plan (see **NE01 Checklist: Natural Environment Action Plan**) which identifies the on-going management and community ownership (legal and engagement).
   NB: Issues Ecological Protection and Ecological Rehabilitation and Restoration also form part of the Natural Environment Action Plan.

9. Enhanced assessment to further develop and inform the Natural Environment Action Plan and where relevant mitigate against negative impacts identified. Assess and develop a mitigation strategy:
   a. Where normal relationships could be altered or substituted to increase the benefits gained by the community and propose any alternative resource use.
   b. The impact of the natural disaster on human relationships with the ecosystem services. Where relationships and services have been altered / disrupted, paying particular attention to relationships that have been intensified as a result of the natural disaster (e.g., greater demand for construction material, increased water extraction or declining resource supply)[6&7].
   c. The potential risks from and susceptibility of the local environment and surrounding area both before and after the natural disaster[1&2] focusing particularly on where they have been exacerbated (e.g., risk of overexploitation, soil erosion or instability, flood or landslide risk, salt water intrusion, fire risk from high volumes of damaged vegetation and risks from animals and invasive species) and accounting for seasonal variation.

10. Implementation of the Natural Environment Action Plan. In order to implement the Action Plan where possible the following should be carried out:
    a. Where appropriate update part c) of the Action Plan with the appropriate timeframe, monitoring and status.

11. Inform and engage with the community with on the Action plan. This will act to support the local community in taking the Plan forward. The participation should:
    a. Where relevant refresh and strengthen the local community's understanding and awareness of the local ecology (e.g., through interactive awareness-raising and training activities).
    b. Highlight which ecosystem resources and services are priorities or at-risk to the local community, raising awareness of the importance of sustainable resource use.
    c. Highlight resources most at risk of unsustainable exploitation.

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Performance Level 3

12. The Performance Level 2 requirements have been met.

13. An Ecological survey has been carried out by a suitably qualified ecologist to gain an in depth understanding of the local ecology in order to better identify measures to inform the Natural Environment Action Plan. As a minimum the following points should be addressed:
    a. Detailed vegetation analysis.
    b. Identification of endemic and endangered species and habitats.
    c. Identification of invasive and pest species.
    d. Identification of protection, rehabilitation and restoration measures that could be implemented.

14. Inform and engage with the community on the Action plan: Conduct awareness raising activities geared towards conveying the highlights, the links and benefits to the community of the natural environment in relation to creating livelihoods, such as development of nature tourism etc. i.e. ecosystem services analysis and exploitation in a sustainable way and of supporting community ownership of long term environmental protection and enhancement activities.

15. Performance Level 2 has been achieved for the following issues:
    a. NE02 Ecological Protection.
    b. NE03 Ecological Rehabilitation and Restoration.

Additional Considerations	
General Considerations	
Understanding local ecology	This should include an understanding of the local biodiversity (plants and animals), habitat types, and landforms (rivers, mangroves, sand dunes) in the area both before and after the natural disaster. This will provide an overview of the impact of the natural disaster on local ecology[1]. As part of this understanding; consider the dominance and coverage of these species and habitats, accounting for seasonal variations that may exist. Also consider surrounding ecology and the existence of ecological corridors and whether species are native or invasive.
Human dependencies and relationships with ecosystem services	Consider the following questions and examples as a means of determining any human dependencies and relationships with ecosystem services. Do the local community use any natural resources? For example they may have a dependency on the natural environment as a food source or a dependency on timber as a means of income or as a construction material. Do the community benefit from any features of the natural environment that provide indirect services to them and/or the wider area? This may be for example mangroves providing storm protection or trees for shading[19].
Resources	Resources to consider include:

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Additional Considerations	

	- maps and images showing ecological features and the extent of habitats and species[5]
	- species or habitat records[5]
	- previous ecosystem or environmental research[5]
	- existing Action Plans
	- Internet resources:
	  ○ Invasive species http://www.issg.org/database/species/List.asp
	  ○ Endangered species http://www.iucnredlist.org/
	  ○ FAO[16]
	  ○ UNOSAT[4].

Cross-cutting issue Considerations	
Participation	Participation is used to engage the local community and to make use of local knowledge relating to the natural environment, dependencies, opportunities and conflicts both before and after the natural disaster. Furthermore it is used to identify and prioritise the needs of the community based on what can be provided by natural resources and ecosystem services. Participation is also key in disseminating the Natural Environment Action Plan and ensuring the local community are equipped to implement it. As part of this, participation is used to identify gaps in local knowledge and in identifying the skills they require to address these gaps (see **Skills and Capabilities cross-cutting issue considerations below**).
Skills and Capabilities	Education may be required to ensure that the local community are well informed about the nature and value of their natural environment and ecosystem services it does or can provide and to give them the skills and/or training needed to deliver the Natural Environment Action Plan.
Livelihoods	Gaining an understanding of and managing the natural environment and the ecosystem services that the local community depend on or could exploit will help to secure the livelihoods of the local community at an economic, social and cultural level.
Community Ownership and Sustainable Management	The Natural Environment Action Plan has been developed to guide the management, protection and restoration of the local natural environment over the long term. This is important in order to enable the community to adapt to their changing needs and to the changing nature of the natural environment. Community management and ownership of this plan will ensure the implementation, updating process and the maintenance of the Natural Environment Action Plan is carried out and in turn ensure that the potential of the natural environment is fulfilled as far as possible, both in the short and the long term.
Resilience	The management of the natural environment can act to improve the resilience of the community; by acting as natural defences, by ensuring economic resources are sustained and by ensuring that

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Additional Considerations	
	the quality of environmental features such as water and air are maintained. The process of assessing and implementing a co-produced plan will develop social and human capital.
Security and Safety	By acknowledging and mitigating against the possible risks in the natural environment, safety and security risks can be addressed and reduced. This should include consideration of vegetation with a flammable risk or a risk of causing structural damage, such vegetation should be situated at an appropriate distance from individual shelters to create adequate fire breaks where appropriate[2]. Furthermore habitats that encourage the colonisation of species that pose a risk to the local community are managed to eliminate or reduce as far as possible the likelihood of human wildlife conflict[16]. For example caution should be taken when sourcing soil or any other activities that create depressions in the ground as this can contribute towards prime breeding habitat for mosquitoes[3]. However, natural habitat and species should not be endangered in this process.
Economic Viability	Managing the natural environment via the implementation of the Natural Environment Action Plan will ensure that environmental resources that support the viability of the local economy are sustained, restored and enhanced where possible.
Access and non-discrimination	The creation and the implementation of the Natural Environment Action Plan will ensure that the local community have access to the natural resources and ecosystem services that they require to sustain their livelihoods and ensure that this access is available to all of those that require it and managed appropriately to avoid environmental stress and degradation.

On-going Monitoring and Evaluation

- Retain any information collected as part of the consultation to act as a benchmark to demonstrate enhancement to the national environment
- Update the Natural Environment Action Plan on the progress made against each goal / action
- Record changes in the nature and makeup of the local ecology and use these to inform the updates to the Natural Environment Action Plan.

Case Studies

Earthquake, Central Java, 2006[3]

Rating: -1

This example demonstrates how over exploitation in terms of deforestation has resulted in resource depletion. Bamboo is the traditional construction material and was used in the construction of shelters following the earthquake. However there was variation in the knowledge of the use and extraction of

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bamboo which may have exacerbated the exploitation of this resource. Deforestation such as this has been linked to increased flood risk, soil erosion and hence soil fertility and stability issues. It was highlighted through this project that the implementation of 'purchasing control mechanisms' should have been used to manage this deforestation issue and hence the associated environmental impact.

Floods, Pakistan, 2010[15]

Rating: -1

The floods greatly affected the relationship between the local community and ecosystem services. The community are dependent on agricultural assets, fisheries and forestry which were all negatively impacted as a result of the flooding.

More information on this case study can be found at the following link:
http://documents.wfp.org/stellent/groups/public/documents/ena/wfp225987.pdf

Tsunami, Maldives, 2005[17]

Rating: 0

The Ministry of Environment and Construction carried out an environmental assessment of affected islands with the help of WHO and the U.S. Geological Survey. National experts were consulted to collate pre-tsunami baseline documentation and information about the tsunami's impact. Numerous limitations were encountered during information gathering, including; inadequate pre- or post-tsunami data; a lack of geographic information systems, satellite imagery or other visual information; a lack of an official tsunami impact assessment; the general lack of environmental monitoring and reporting; and logistical difficulties in inspecting the atolls. However enough information was gathered to determine the following key impacts:

- Waste and contamination of soils and groundwater as a result of salinity and faecal coliforms
- Disruption of water supplies and sanitation systems
- Damage to livelihoods dependent on the environment including tourism, agriculture and fisheries.

More information on this case study can be found at the following link:
http://postconflict.unep.ch/publications/dmb_maldives.pdf

Additional Information

Relevant Definitions

Biodiversity: Biodiversity, or biological diversity, is the variability among living organisms from all sources including inter alia terrestrial, marine and aquatic ecosystems and the ecological complexes of which they are part.

Ecosystem: A functional unit consisting of all the living organisms (plants, animals and microbes) in a given area, as well as the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size – a log, pond, field, forest, or the Earth's biosphere – but it always functions as a whole unit. Ecosystems are commonly described according to the main type of vegetation (e.g. forest ecosystem, old-growth ecosystem or range ecosystem).

Ecosystem Services: The conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life. Examples include provision of clean water, maintenance of liveable climates (carbon sequestration), pollination of crops and native vegetation, and fulfilment of people's cultural, spiritual, intellectual needs.

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Ecological Corridor: A thin strip of vegetation used by wildlife and potentially allowing movement of biotic factors between two areas.

Protected Area: Portions of land protected by special restrictions and laws for the conservation of the natural environment. They include large tracts of land set aside for the protection of wildlife and its habitat; areas of great natural beauty or unique interest; areas containing rare forms of plant and animal life; areas representing unusual geologic formations; places of historic and prehistoric interest; areas containing ecosystems of special importance for scientific investigation and study; and areas that safeguard the needs of the biosphere.

Protected Species: Threatened, vulnerable or endangered species which are protected from extinction by preventive measures.

Invasive Species: Non-native species which have been intentionally or accidently introduced by humans and threaten ecosystems, habitats or species.

Pest Species: A species (native or non-native) that causes significant damage to a valued resource.

Ecosystem Maps: The graphic portrayal of spatial distributions of vegetation, ecosystems, or their characteristics.

Endemic Species: An endemic species is a native species restricted to a particular geographic region owing to factors such as isolation or in response to soil or climatic conditions.

Endangered Species: Any species which is in danger of extinction throughout all or a significant portion of its range.

Ecology: The scientific study of the processes influencing the distribution and abundance of organisms, and the interactions among organisms.

Other Information

None.

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NE02 Ecological Protection

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To protect the ecological value of the site during the re-settlement phase and support on-going ecological protection over the life of the development.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- The natural environment has been significantly altered, damaged or is now more vulnerable as a result of the natural disaster
- Damage or erosion of natural resources which support livelihoods
- Increased risk of further / future disaster events due to damage of defences
- Remaining ecology at risk of unsustainable exploitation.

Assessment Criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with the affected community and other relevant stakeholders in order to:
    a. Gain an understanding of the existing local ecology and of the ecology which existed prior to the natural disaster[4&5].
    b. Identify ecological sites and features that are of particular cultural, social or other importance (e.g., necessary to support livelihood activities).

2. Identify ecological sites and features which are damaged and or vulnerable to further damage as a result of redevelopment / resettlement activities.

3. Identify and use the information on local ecology collected as part of the Baseline Evaluation in the NE01 Human Relationship to Ecosystem Services issue to supplement the evaluation in this issue (NE02), focusing on:
    a. Understanding the existing local ecology and the local ecology which existed prior to the natural disaster[6].
    b. The impact of the natural disaster on local ecology[1].
    c. Risks to local ecology (e.g., overexploitation)[6].

4. Legal responsibilities[5&7]: To ensure that relevant local legal requirements are identified and met and that any legally required protection is implemented where relevant. Note that legal

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requirements may arise as a result of local, regional, national or international laws or commitments.

a. Consider and respect laws and regulations on protected species, habitats and protected areas meeting all requirements.

Performance Level 1

5. The Baseline Evaluation requirements have been met.

6. Supplement development of the Natural Environment Action Plan prepared for NE01 Human Relationships to Ecological Services: Based on the data gathered as part of the Baseline Evaluation, supplement the plan identifying and providing strategies for protecting valuable ecological features and areas.
    a. Include any additional species or habitats that have been identified as requiring protection in section a) of the Natural Environment Action Plan.
    b. Complete / supplement section b) and c) of the Natural Environment Action Plan which develops the requirements for the management of species and outlines on-going management and community ownership.

7. Site Selection: to encourage the consideration of the impact of site selection on local ecology[4]. See the **SET01 Site Selection** issue for more information. Select the appropriate (a or b):
    a. A new site has been selected for development. Where possible select a site that:
        i. Has been previously developed and/or is assessed to be of low ecological value
        ii. Requires minimal clearing of native vegetation[4&5]
        iii. Provides similar ecosystem services and natural resources as the previous site and thus supports the existing livelihoods of local communities
        iv. Is known to not have endangered and/or endemic species or ecologically sensitive areas (e.g., sites of special scientific importance (SSSI's)).
    b. The existing site is being developed. Where possible:
        i. Rebuild on original plots
        ii. Limit native vegetation clearance
        iii. Avoid disturbance in areas known to have endangered and/or endemic species or known to be ecologically sensitive areas (e.g., sites of special scientific importance (SSSI's)).

8. Ecological retention: Retention of ecological features will act to protect the provision of ecosystem services, preserve the economic value of the natural environment[15], promote mitigation against environmental degradation, promote disaster preparedness and reduce human wildlife conflict. Where possible undertake actions to retain;
    a. Native vegetation[1] species, particularly those that support livelihoods and disaster preparedness.
    b. Native species habitats.
    c. Established trees and forested areas[20].
    d. Ecological corridors[5].

Performance Level 2

9. The Performance Level 1 requirements have been met.

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10. Reduce potential ecological stress: This will act to minimise the risk of environmental degradation and protect the ecological value of the site. Where possible;
    a. Provide adequate protection for ecologically sensitive sites and species as recommended by local or national laws and best practice.
    b. Maximise natural contours for paths, roads and other networks[4].
    c. Ensure road and pedestrian networks are well defined and clearly marked to reduce through flow on ecologically sensitive areas.
    d. Protect against the introduction of invasive species[4&22].

11. Pollution: to ensure that the risk of polluting the natural environment and causing environmental degradation is reduced to a minimum. Where possible:
    a. Land required for waste disposal or sewage disposal is of low ecological value.
    b. Avoid waste disposal and sewage disposal and the use of chemicals near to water bodies (e.g. fertilisers and disinfectant) [4]. Where avoidance is not possible it should be reduced to a minimum[22].
    c. Meet the criteria relating to the location and contamination concerning waste disposal and the safe disposal of hazardous waste, within the MW05 Operational Waste issue[4].

Performance Level 3

12. The Performance Level 2 requirements have been met.

13. Resettlement works are used to encourage on going protection of ecological features both on and off site.

14. The Ecological survey carried out under NE01 Human Relationship to Ecosystem Services by a suitably qualified ecologist identifies protection measures and where relevant these measures are implemented.

15. Performance Level 1 has been achieved for the following issues:
    a. NE03 Ecological Rehabilitation and Restoration.

16. Performance Level 2 has been achieved for the following issues:
    a. NE01 Human Relationship to Ecosystem Services.

Additional Considerations	
General Considerations	
Legal responsibilities	There may be cases were conflict may exist with other processes which support local livelihoods.
Understanding local ecology	This should include an understanding of the local biodiversity (plants and animals), habitat types, and landforms (rivers, mangroves, sand dunes) in the area both before and after the natural disaster. This will provide an overview of the impact of the natural disaster on local ecology[1]. As part of this understanding;

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Additional Considerations	
	consider the dominance and coverage of these species and habitats, accounting for seasonal variations that may exist. Also consider surrounding ecology and the existence of ecological corridors and whether species are native or invasive.
Reduce ecological stress	Where a species or habitat requires ecological protection but there are inadequate local guidelines or best practice consider the following: - Where unsustainable exploitation of a natural resource is occurring and where increasing awareness is not appropriate or considered to be insufficient, consider the use of fencing to protect features of ecological value - For the protection of established trees and forested areas ensure the protected area is large enough to incorporate the root systems of trees - Protect water bodies from runoff from built up areas or agricultural areas which use fertilizers by implementing appropriate drainage and considering this at the spatial planning stage (i.e., location of areas which are likely to produce damaging run off). Refer to the SET03 Spatial Planning issue.
Introduction of Invasive Species	Invasive species are primarily transported across boundaries as a result of human movement. Post disaster areas may suffer from increased risk from invasive species carried with materials used in the disaster relief process. Before being brought into the local community materials should be checked for the presence of invasive species[22].
Cross-cutting Issue Considerations	
Participation	Participation is used to engage the local community and to make use of local knowledge relating to the protection or the need to protect the natural environment. Participation is also key in disseminating the Natural Environment Action Plan and ensuring the local community are equipped to implement actions relating to ecological protection.
Skills and capabilities	Awareness raising may be required to ensure that the local community are well informed about the nature and value of their natural environment and ecosystem services it provides and to provide them with the skills and/or training needed to deliver ecological protection measures and actions as part of the Natural Environment Action Plan.
Livelihoods	Protecting the natural environment will help in securing the livelihoods of the local community which depend on the natural environment in an economic, social and cultural respect.
Community Ownership and Sustainable Management	The Natural Environment Action Plan has been developed to guide the management, protection and restoration of the local natural environment over the long term. This is important in order to enable the community to adapt to their changing needs and to the changing

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Additional Considerations	
	nature of the natural environment. Community management and ownership of this plan will ensure the implementation, updating process and the maintenance of the Natural Environment Action Plan is carried out and in turn ensure that the potential of the natural environment is protected as far as possible, both in the short and the long term.
Resilience	The protection of the natural environment can act to maintain and improve the resilience of the community; by acting as natural defences, by ensuring economic resources are sustained and by ensuring that the quality of environmental features such as water and air are maintained.
Security and Safety	By acknowledging the possible risks in the natural environment, safety and security risks can be addressed and reduced by protecting natural resources which provide natural protection to the local community and by avoiding the protection of natural resources that pose a safety or security risk.
Economic Viability	Managing the natural environment via the implementation of the Natural Environment Action Plan will ensure that environmental resources that support the viability of the local economy are protected where possible.
Access and Non-discrimination	None.

On-going Monitoring and Evaluation

- Update the Natural Environment Action Plan on the progress made against each goal / action relating to ecological protection.

Case Studies

Earthquake, Central China, 2008[22]

Rating: 0

Medical and agricultural waste (particularly phosphorus and ammonia) required careful disposal to avoid the spread of disease and adverse effect on the natural environment, including to animals.

Hurricane Mitch, Nicaragua, 1998[22]

Rating: +1

A study of ‘sustainable’ versus ‘conventional’ farming practices established in Nicaragua following Hurricane Mitch found that those that carried out sustainable practices such as soil protection and conservation were less likely to suffer from soil erosion and vegetation loss and hence less likely to suffer from economic losses. This demonstrates the economic and livelihood benefits that stem from appropriate protection and conservation of the natural environment.

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Hurricane Katrina, New Orleans, USA, 2006[22]

Rating: -1

Materials used in the disaster relief carried invasive species in to New Orleans. The Formosan subterranean termite is native to China and caused great concern as it infested woody debris from the disaster. As a result the Louisiana Department of Agriculture and Forestry passed the Formosan Termite Initiative Act – this called for the quarantine of debris from the disaster. This example highlights the need to protect against the introduction of invasive species.

Additional Information

Relevant Definitions

Biodiversity: Biodiversity, or biological diversity, is the variability among living organisms from all sources including inter alia terrestrial, marine and aquatic ecosystems and the ecological complexes of which they are part.

Ecological Corridor: A thin strip of vegetation used by wildlife and potentially allowing movement of biotic factors between two areas.

Environmental Stress: refers to physical, chemical, and biological constraints on the productivity of species and on the development of ecosystems. When the exposure to environmental stressors increases or decreases in intensity, ecological responses result. Stressors can be natural environmental factors, or they may result from the activities of humans.

Ecosystem: A functional unit consisting of all the living organisms (plants, animals and microbes) in a given area, as well as the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size – a log, pond, field, forest, or the Earth's biosphere – but it always functions as a whole unit. Ecosystems are commonly described according to the main type of vegetation (e.g. forest ecosystem, old-growth ecosystem or range ecosystem).

Ecosystem Services: The conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life. Examples include provision of clean water, maintenance of liveable climates (carbon sequestration), pollination of crops and native vegetation, and fulfilment of people's cultural, spiritual and intellectual needs.

Environmental Degradation: Environmental degradation describes the erosion of the natural environment through the depletion of resources, the destruction of ecosystems and the extinction of plant and animal species.

Human Wildlife Conflict: Conflict between people and animals is one of the main threats to the continued survival of many species in different parts of the world, and is also a significant threat to local human populations. If solutions to conflicts are not adequate, local support for conservation also declines.

Low Ecological Value: For the purposes of this assessment, land is considered of low ecological value where; it is considerably less bio-diverse relative to the surrounding area and national levels of biodiversity, where it is ≥2km from Special Areas of Conservation, Special Protection Areas, migratory routes, Ramsar Sites and Sites of Special Scientific Interest and where it does not contain any species of national or international importance (e.g., as outlined in Local Biodiversity Action Plans or similar).

Previously Developed: For the purposes of this assessment, land is considered as previously developed where land has contained permanent built structure(s) within the last 50 years.[23]

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Protected Area: Portions of land protected by special restrictions and laws for the conservation of the natural environment. They include large tracts of land set aside for the protection of wildlife and its habitat; areas of great natural beauty or unique interest; areas containing rare forms of plant and animal life; areas representing unusual geologic formations; places of historic and prehistoric interest; areas containing ecosystems of special importance for scientific investigation and study; and areas that safeguard the needs of the biosphere.

Protected Species: Threatened, vulnerable or endangered species which are protected from extinction by preventive measures.

Invasive Species: Non-native species which have been intentionally or accidently introduced by humans and threaten ecosystems, habitats or species.

Pest Species: A species (native or non-native) that causes significant damage to a valued resource.

Endemic Species: An endemic species is a native species restricted to a particular geographic region owing to factors such as isolation or in response to soil or climatic conditions.

Endangered Species: Any species which is in danger of extinction throughout all or a significant portion of its range.

Other Information

None.

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[**4**] World Wildlife Fund (WWF) and American National Red Cross: Green Recovery and Reconstruction Training Toolkit for Humanitarian Aid (GRRT): Module 3 – Green Guide to Environmental Impact Assessment Tools and Techniques. http://green-recovery.org/wordpress/wp-content/uploads/2010/11/Module-3-Content-Paper.pdf Accessed November 2012.
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NE03 Ecological Restoration and Rehabilitation

Applicable at PAT	This issue is not applicable at the PAT stage

Aim

To encourage the restoration, rehabilitation and enhancement of the ecological value of the site during settlement or re-settlement and the operation of the site.

Assumed Disaster Context

See **scope section**. Additional assumptions made:

- The natural environment has been significantly altered, damaged or is now more vulnerable as a result of the natural disaster
- Damage or erosion of natural resources which support livelihoods
- Reduced disaster preparedness due to damage of natural defences.

Assessment criteria

The following is required to demonstrate compliance:

Baseline Evaluation

1. Undertake facilitated interaction and participatory activities with the affected community and other relevant stakeholders in order to:
    a. Gain an understanding of the existing local ecology and of the ecology which existed prior to the natural disaster[4&5].
    b. Identify ecological sites and features that are of particular cultural, social or other importance (e.g., necessary to support livelihood activities).
    c. Understand the role played by the local ecology in offering natural protection before the disaster and at the current time.

2. Identify and use the information on local ecology collected as part of the Baseline Evaluation in the NE01 Human Relationship to Ecosystem Services issue, focusing on:
    a. Understanding the existing local ecology and the local ecology which existed prior to the natural disaster[5].
    b. The impact of the natural disaster on local ecology[2].

3. Legal responsibilities[5&7]. To ensure that where local legal requirements exist they have been met and required protection is implemented where relevant:
    a. Consider and respect laws, regulations and cultural attitudes towards protected species, habitats and sensitive areas.

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Performance Level 1

4. The Baseline Evaluation requirements have been met.

5. Development of a Natural Environment Action Plan (NE01 Checklist: Natural Environment Action Plan): Based on the data gathered as part of the Baseline Evaluation, develop a plan that identifies and provides strategies for restoring and rehabilitating ecological features and areas.
    a. Include any additional species or habitats that have been identified as requiring rehabilitation or restoration, in section a) of the Natural Environment Action Plan.
    b. Complete section b) and c) of the Action Plan which develops the requirements for the management of species and outlines on-going management and community ownership.
    c. Inform and engage with the community with regards to the information collation and development of the Action Plan.

6. Disaster preparedness[6]. To increase levels of disaster preparedness through the regeneration and provision of ecological features and species that provide natural protection.
    a. Identify possible natural hazards that may affect the area e.g. flooding.
    b. Identify, regenerate and introduce ecological features that can offer protection against natural disasters e.g. reforestation[5].

7. Appropriateness of ecology[4&6]. To ensure that ecological features and the species supported or introduced complement the ecosystem and thus add ecological value and support biodiversity. The following should be considered;
    a. Where new plant species are introduced, these should be native vegetation species.
    b. Provide and support habitats for endemic and endangered species.
    c. Avoid the introduction of invasive and pest species[17].
    d. Removal of invasive and pest species.

8. Ecosystem services[5]. To address community requirements through the provision of ecological features and species that support ecosystem services.
    a. Identify and introduce ecology that can provide ecosystem services, for example vegetation which acts as a wind break or provides shading[1].

9. Socio-cultural aspects[6]: Ensure there is sufficient provision of outdoor spaces and ecological features to meet the social and cultural needs of the community.
    a. Participation: consult with the local community regarding whether the regeneration meets their social and cultural needs.

Performance Level 2

10. The Performance Level 1 requirements have been met.

11. Development of a Natural Environment Action Plan (NE01 Checklist: Natural Environment Action Plan): Based on the data gathered as part of the Baseline Evaluation, develop a plan that identifies and provides strategies for enhancing ecological features and areas. Enhancement activities may include the following:
    a. Providing additional natural protection from potential hazards.

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b. Providing outdoor spaces and ecological features to improve the quality of life for the affected community.
c. Provide livelihood opportunities for the affected community.

12. Mitigate against ecological stress and environmental degradation to maintain and enhance the natural environment[6].
    a. Identify sources of ecological stress and environmental degradation (e.g., soil erosion and soil infertility, blocked water courses).
    b. Identify and introduce ecological features that address ecological stress and environmental degradation within the natural environment (e.g., reforestation to promote soil formation[5]).

13. Livelihoods[5]. To ensure that the rehabilitation and restoration of local ecology is in line with supporting the livelihoods of local communities (Refer to the CC04 Livelihoods issue). Where possible:
    a. Reintroduce species and habitats that local communities are dependent on and where possible reintroduce species in the location they were prior to the disaster, in order to enhance their chance of survival.

Performance Level 3

14. The Performance Level 2 requirements have been met.

15. An ecological and livelihoods survey has been carried out by a suitably qualified professional(s) to gain an in depth understanding of the local ecology in order to better identify measures to inform the Natural Environment Action Plan. As a minimum the following points should be addressed:
    a. Detailed vegetation analysis.
    b. Identification of endemic and endangered species and habitats.
    c. Identification of invasive and pest species.
    d. Identification of protection, rehabilitation and restoration measures that could be implemented.

16. Performance Level 2 has been achieved for the following issues:
    a. NE01 Human Relationship to Ecosystem Services.
    b. NE02 Ecological Protection.

Additional Considerations	
General Considerations	
Understanding local ecology	This should include an understanding of the local biodiversity (plants and animals), habitat types, and landforms (rivers, mangroves, sand dunes) in the area both before and after the natural disaster. It is also important to understand their interdependencies as one habitat with direct value to a community may well be dependent for its health / survival on another habitat that has less direct value. This will provide an overview of the impact of the natural disaster on local ecology[1]. As part of this

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Additional Considerations	
	understanding; consider the dominance and coverage of these species and habitats, accounting for seasonal variations that may exist. Also consider surrounding ecology and the existence of ecological corridors and whether species are native or invasive.
Introduction of Invasive Species	Invasive species (including plants, fungi, invertebrates, rodents) are primarily transported across boundaries as a result of human movement. Post disaster areas may suffer from increased risk from invasive species carried with materials used in the disaster relief process. Before being brought into the local community materials should be checked for the presence of invasive species[22].
Reintroduction of species	Reintroduce species to the location they were or in a location ecologically similar to their location prior to the natural disaster, as they can be very site specific. This will increase the success of re-colonisation[6]. However special consideration should be given to the potential for reintroduction of species where there has been a dramatic change in the natural environment as a result of the natural disaster, as it may not be appropriate or possible given the nature and scale of changes that have occurred[18].
Existing guidance	Existing guidance could include biodiversity / conservation action plans, restoration guidelines and conservation handbooks. These may be available from local authorities, national governments, international bodies such as UNEP[5&7], wildlife bodies or research institutes.
Cross-cutting Issue Considerations	
Participation	Participation is used to engage the local community and to make use of local knowledge relating to the need to rehabilitate and restore the natural environment. Participation is also key in disseminating the Natural Environment Action Plan and ensuring the local community are equipped to implement actions relating to ecological rehabilitation and restoration.
Skills and capabilities	Awareness raising may be required to ensure that the local community are well informed about the nature and value of their natural environment and ecosystem services it provides. Provide them with the skills and/or training needed to deliver ecological rehabilitation and restoration measures and actions as part of the Natural Environment Action Plan.
Livelihoods	Rehabilitating and restoring the natural environment will help in securing the livelihoods of the local community which depend on the natural environment in an economic, social and cultural respect and can also create new opportunities.
Community Ownership and Sustainable Management	The Natural Environment Action Plan has been developed to guide the management, protection and restoration of the local natural environment over the long term. This is important in order to enable the community to adapt to their changing needs and to the changing nature of the natural environment. Community management and

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Additional Considerations	
	ownership of this plan will ensure the implementation, updating process and the maintenance of the Natural Environment Action Plan is carried out and in turn ensure that the potential of the natural environment is restored and rehabilitated as far as possible, both in the short and the long term.
Resilience	The restoration and rehabilitation of the natural environment can act to maintain and improve the resilience of the community; by acting as natural defences, by ensuring economic resources are sustained and by ensuring that the quality of environmental features such as water and air are maintained.
Safety and Security	By acknowledging the possible risks in the natural environment and understanding interdependencies between ecosystems, safety and security can be addressed through the process of restoring and rehabilitating natural resources which provide natural protection to the local community and by avoiding the restoration and rehabilitation of natural resources that pose a safety or security risk.
Economic Viability	Managing the natural environment via the implementation of the Natural Environment Action Plan will ensure that environmental resources that support the viability of the local economy are restored and rehabilitated where possible and can be properly and efficiently managed in the future.
Access and Non-discrimination	All members of the affected community should have equitable access to ecological areas / features of the community for livelihoods, recreation and other activities as relevant.

On-going Monitoring and Evaluation

- Update the Natural Environment Action Plan on the progress made against each goal / action relating to ecological rehabilitation and restoration.

Case Studies

Hurricane Allen, Haiti, 1982[4]

Rating: -1

Haiti has a history of hurricanes and tropical storms. Before hurricane Allen hit in 1982 deforestation was already an issue. The deforestation issue was exacerbated as a result of the hurricane due to increased resource use for shelter and fuel. During reforestation the appropriateness of species being planted was questioned as fast growing species were used to promote soils stability and work as fuel sources but as a result they were not strong enough for construction. This example highlights the need to consider the appropriateness of species not just in terms of ecological appropriateness but also in terms of human use and thus ecosystem services.

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Monsoon Floods, Nepal[16]

Rating: +1

Nepal has had a strong history of monsoon floods and landslides. As a result the Nepal Red Cross Society has promoted and supported disaster response and community-based disaster preparedness since the 1970s. These efforts have included small mitigation projects, including the construction of gabions and planting trees to prevent the erosion of riverbanks and hillsides

India, 1993 onwards[6]

Rating: +1

33 villages across 3 states in India collaborated with forestry experts to restore 1,500 hectares of mangroves. To date three-quarters of the seedlings have become established and it has been noted that the re-establishment of these mangroves acted to protect against the impact of the Indian tsunami.

Additional Information

Relevant Definitions

Biodiversity: Biodiversity, or biological diversity, is the variability among living organisms from all sources including inter alia terrestrial, marine and aquatic ecosystems and the ecological complexes of which they are part.

Ecosystem: A functional unit consisting of all the living organisms (plants, animals and microbes) in a given area, as well as the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size – a log, pond, field, forest, or the Earth's biosphere – but it always functions as a whole unit. Ecosystems are commonly described according to the main type of vegetation (e.g. forest ecosystem, old-growth ecosystem or range ecosystem).

Ecosystem Services: The conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life. Examples include provision of clean water, maintenance of liveable climates (carbon sequestration; storm protection), pollination of crops and native vegetation, and fulfilment of people's cultural, spiritual and intellectual needs.

Protected Area: Portions of land protected by special restrictions and laws for the conservation of the natural environment. They include large tracts of land set aside for the protection of wildlife and its habitat; areas of great natural beauty or unique interest; areas containing rare forms of plant and animal life; areas representing unusual geologic formations; places of historic and prehistoric interest; areas containing ecosystems of special importance for scientific investigation and study; and areas that safeguard the needs of the biosphere.

Protected Species: Threatened, vulnerable or endangered species which are protected from extinction by preventive measures.

Invasive Species: Non-native species which have been intentionally or accidently introduced by humans and threaten ecosystems, habitats or species.

Pest Species: A species (native or non-native) that causes significant damage to a valued resource.

Endemic Species: An endemic species is a native species restricted to a particular geographic region owing to factors such as isolation or in response to soil or climatic conditions.

Endangered Species: Any species which is in danger of extinction throughout all or a significant portion of its range.

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Other Information

None.

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[**3**] UN HABITAT, UNHCR & International Federation of Red Cross and Red Crescent Societies. Intern-Agency Standing Committee (IASC). Emergency Shelter Cluster Shelter Projects 2008. pp 8.
[**4**] UN HABITAT, UNHCR & International Federation of Red Cross and Red Crescent Societies. Intern-Agency Standing Committee (IASC). Emergency Shelter Cluster Shelter Projects 2009. pp 93-109.
[**5**] United Nations Environment Programme (UNEP). 2008. Environmental Needs Assessment in post–disaster situations - A practical guide for implementation
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[**16**] International Federation of Red Cross and Red Crescent Societies (IFRC) World Disaster Report. Focus on Reducing Risk. 2002. http://www.ifrc.org/Global/Publications/disasters/WDR/32600-WDR2002.pdf
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Cross-Cutting Issues (CC)

CC01 Access and Non-discrimination

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To encourage adequate, equitable and inclusive access to the built environment that allows all members of the community to address their needs without discrimination.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Context within the Project

Access and Non-Discrimination are terms used to describe equitable physical and social opportunities for all. All issues in the QSAND tool support this principle.

Criteria for Consideration

1. Provide access for all groups to support their fundamental needs in a way that is sensitive to cultural and demographic requirements. Assess built environment provisions available in the community and determine how to provide equitable access to:
    a. Safe and appropriate water for drinking, personal hygiene, household and livelihood activities (see **WS02 Water Quality issue for more information**).
    b. Sanitation facilities (see **WS03 Sanitation issue for more information**).
    c. Shelter provision.
    d. Healthcare and rehabilitation services.
    e. Energy resources.
    f. Waste disposal.
    g. Livelihood opportunities (see **CC04 Livelihoods issue for more information**).

2. Promote and employ non-discriminatory approaches and a culture of non-violence to shelter and settlement provision. Assess the demographic of the community in a culturally acceptable manner and ensure the needs of all groups are met including minority groups (see **Definitions**) in the community:
    a. Community facilities and infrastructure are safe and secure and incorporate accessibility requirements for all members of the community. For example:
        i. Facilities that are resilient to natural hazards
        ii. Safe spaces for people who have been the victims of violence or abuse
        iii. Safe and overlooked areas for children to play in
        iv. Facilities that are accessible to the disabled (e.g. physically or mentally impaired).
    b. Religious needs or customs are considered and reflected in the design of the community facilities.

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c. Promote equitable access to facilities that provide educational opportunities that cater for early childhood care through to higher or vocational education.
d. Promote equitable access to primary healthcare services, especially for women, girls, men and boys.
e. Promote equitable access to sexual (e.g. HIV / AIDS etc.), reproductive healthcare and maternal and new-born children's healthcare for women, men, adolescent girls and boys[6].
f. Support community independence: Access to a means of income and freedom of movement such as means of connectivity and transportation to facilities and markets, including pathways that connect with neighbours or neighbouring communities, and roads and vehicles for passengers and goods.

3. Monitor access and non-discrimination. As the shelter and settlement programme proceeds ensure the needs of the community are being met:
   a. Advocate the rights of the affected population / community with relevant authorities or actors if appropriate to the context.
   b. Monitor whether accessibility of the built environment meets the requirements of all members of the society.
   c. Promote family and community connections and availability of support systems, including informal and formal structures to support children and families[5].

Relevant Assessment Issues

Appendix D – Links between Assessment and Cross-Cutting issues highlights the assessment issues this cross-cutting issue is likely to be more relevant for.

Supporting Frameworks

– The principle of non-discrimination: a cornerstone of the International Disaster Response Laws, Rules and Principles programme and the IDRL (International Disaster Response Laws) guidelines[2]

– IFRC Strategic Framework on Gender and Diversity Issues 2013-2020.

Additional Considerations	
General Considerations (from related sources / programmes)	
Impartiality	Humanitarian agencies should prioritise the affected people they wish to assist on the basis of their need alone and provide assistance in proportion to need. Humanitarian agencies should not focus uniquely on a particular group if this focus is at the detriment of another section of the affected population[1].
Importance of community access	Access to social, financial, cultural and emotional support through extended family, religious networks and rituals, friends, schools and community activities helps to re-establish individual and community self-respect and identity, decrease vulnerability and enhance resilience. Local people should be supported to identify and, if appropriate, reactivate or establish supportive networks and self-help groups[1].

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Additional Considerations	
Related Cross-cutting Issue Considerations	
Participation	Participatory activities should be undertaken with all groups of the affected community to understand the local context and relevant cultural sensitivities in relation to access and non-discrimination. These activities should be undertaken before any potential actions / solutions are proposed.
Skills and Capabilities	It may be appropriate to undertake awareness sessions with the affected community on the importance of equitable access and non-discrimination, whilst being sensitive to the local context.
Livelihoods	All members and subgroups of the affected community should have equitable access to livelihood opportunities.
Community Ownership and Sustainable Management	All members of the affected community should be equitably represented and acknowledged in the on- going management of the community.
Resilience	None.
Security and Safety	All members of the affected community should be equally safe and secure in individual shelters and the settlement as whole.
Economic Viability	None.
Access and Non-discrimination	None.

On-going Monitoring and Evaluation

- Documentation / information relating to the community which supports assessment of status of access and non-discrimination therein for example;
    - Demographic data and available reports
    - Monitoring documentation.

Case Studies

None.

Additional Information

Relevant Definitions

Access and Non-discrimination: the way in which beneficiaries are enabled to access both physical and social aspects of the community based on their needs alone. All members of the community should be considered in the redevelopment process adequately including to ensure their distinct needs are met without discrimination.

Accessibility: means that everyone has equal access to the built environment with no discrimination based on one's level of ability. It can be defined as being the opportunity that an individual, at any

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given location and of any given ability, possesses to take part in a particular activity or a set of activities within the built environment[8]. It implies that the built environment must be truly usable for all[8].

Culture of Non-violence: respects human beings, their well-being and dignity; it honours diversity, non-discrimination, inclusiveness, mutual understanding and dialogue, willingness to serve, cooperation and lasting peace. It is a culture where individuals, institutions and societies refrain from harming others, groups, communities or themselves. There is a commitment to positive and constructive solutions to problems, tensions and the source of violence; violence is never an option.

Discrimination: Any distinction, exclusion, restriction or preference based on gender, race, colour etc., which has the purpose or effect of nullifying or impairing the recognition, enjoyment or exercise, on an equal footing, of human rights and fundamental freedoms in the political, economic, social, cultural or any other field of public life[2].

Minority Groups: when referred to in the QSAND criteria this includes marginalised and vulnerable groups.

Violence: the use of force or power, either as an action or omission in any setting, threatened, perceived or actual against oneself, another person, a group, a community that either results in or has a high likelihood of resulting in death, physical injury, psychological or emotional harm, mal-development or deprivation[4].

Other Information

None.

References

[**1**] IFRC, SPHERE handbook, 2011, Protection Principle 2: Ensure people's access to impartial assistance – in proportion to need and without discrimination
[**2**] UN Convention on the Elimination of All Forms of Discrimination against Women and the International Convention on the Elimination of All Forms of Racial Discrimination definition, taken from The World Disasters Report: 2007, Focus on discrimination, IFRC. ISBN 92-9139-126-3
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[**6**] IFRC Strategic Framework on Gender and Diversity Issues 2013-2020
[**7**] Predictable, preventable. Best practices for addressing interpersonal and self-directed violence during and after disasters, Canadian Red Cross & IFRC
[**8**] Handicap International, Accessibility: How to design and promote an environment accessible to all, November 2009.

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CC02 Community Ownership and Sustainable Management

Applicable at PAT	This issue is not applicable at the PAT stage

Aim

To ensure that the sustainability of the reconstruction work is maintained through clear community ownership and sustainable management arrangements.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Context within the Project

It is important to ensure that the shelters and infrastructure of the affected community are working effectively, offering maximum benefit to the affected community, and promoting self-sufficiency and longevity.

Criteria for Consideration

Process

1. Considerations at initial planning stages:
    a. When preparing the overall strategy for the reconstruction project, it is vital this considers the handover and maintenance of the new facilities[1]. The 'Gathering community insight' criteria within the CC05 Participation cross-cutting issue should support this thinking and help to identify the relevant stakeholders who should be involved. The participation process should consider the following:
        i. Cultural acceptance: Local sensitivities must be considered in terms of the type and extent of maintenance that will be required by the community and the impact of the design of buildings and spaces (including their fit into the local surroundings)
        ii. Shelter design: Using simple shelter styles to ensure easy maintenance, as overly complex designs can be expensive and difficult to maintain[1]. Building technology experts should be able to provide advice on this, and this knowledge can then be passed onto the community
        iii. Durability: Using materials that have been designed to have a long lifespan can reduce the amount and cost of maintenance required in future. However, this must be offset against the initial and replacement costs of the materials
        iv. Local availability: Designing the reconstruction to use locally sourced materials and component parts helps to ensure that maintenance tasks and replacement can be made easier for the community as they can source the parts that they require locally
        v. Costs: The cost associated with maintaining the chosen solution and how these costs are going to be met. Refer to the CC03 Economic Viability issue for more information.
        vi. Expertise: Determine whether specific expertise will be required to maintain certain systems and whether the appropriate level of expertise is available within the community

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vii. Processes: Processes to be implemented within the community such as waste sorting and collection need to be considered with a long term view to ensure they will not require amending shortly after implementation.

2. Considerations at Construction stage:
   a. When beginning the reconstruction of the settlement, the following aspects should be considered with maintenance in mind:
      i. Accessibility: Ensure that elements likely to require regular maintenance are accessible to the community to ensure that they are easier to maintain long term. For example, accessible drains to ensure they can be cleaned regularly
      ii. Workmanship: Facilitate good quality workmanship to ensure the shelters and their materials will last as long as possible and minimise maintenance requirements
      iii. Training: It is important to consider training at this stage to ensure the local community are familiar with the materials and maintenance requirements associated with their use.

3. Considerations for the handover process:
   a. Maintenance regimes need to be coordinated with all stakeholders (e.g., government, local authorities) to ensure a joined-up approach to the maintenance process. These regimes should be detailed in one or more coordinated maintenance plans, whichever is most appropriate to the situation. These maintenance plan(s) should outline:
      i. What aspects of the redevelopment will require regular maintenance and/or inspection, and who will be responsible for this
      ii. The required frequency of maintenance and/or inspections for the different aspects of the redevelopment
      iii. What costs will be associated with the identified maintenance regimes and where this funding will come from. The estimated costs to the beneficiary should be ascertained and also the costs for maintaining any communal spaces. Mechanisms will need to be put in place to ensure on-going funding for the maintenance to the communal areas. Typically allowance should be made within the project budget to cover the transitional period to allow the community to adjust to their new responsibilities and costs
      iv. Maintenance Responsibilities: There is often assumed ownership of the individual shelters, however it should be determined who will be responsible for maintaining communal aspects of the redevelopment
      v. Actions Needed: Identify the actions required in order to adequately maintain each of the elements outlined supporting sustainable management and community ownership
      vi. Run or contribute to existing education / awareness raising activities to promote / kick start the management process and minimise the risk of any unnecessary repairs caused by a lack of education.

Community Ownership

4. Following the principle of the CC05 Participation cross-cutting issue, working groups should be set up within the community. This process should support the development of a community ownership plan (detailed below) which will need to set out the process required to successfully assign responsibility for maintenance tasks and ensure the community take ownership for the future development of their area.

5. Develop and implement a Community Ownership Plan. The participation process should feed into the development of this plan and should cover the following:
   a. Develop an understanding of the specific needs of the people and how community ownership may affect them, and from this identify the areas of importance which should be

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focused on to develop a strong sense of community. The additional information section provides examples of how and why this is important.

b. Detail how the appropriate skills will be developed and disseminated to the relevant members of the local community to transfer responsibility and ownership of the maintenance tasks for the public / communal spaces within the community (e.g., centralised waste management areas, general cleaning of public spaces).
c. Adaptation and maintenance of all structures and infrastructure: The beneficiaries should be provided with adequate information on their shelters, structural elements etc., for example plans of the homes, highlighting possible extensions / adaptations that are possible, to ensure that any future alterations to the shelter are not to the detriment of the structural integrity, quality and maintainability of the shelter.
d. Determine how the general community will be updated on the maintenance processes that will affect the whole community on a day to day basis, e.g. managing their own household waste appropriately. CC08 Skills and Capabilities issue provides further guidance relating to the process for conveying information to the community and how the community will need to continue this training to ensure the long term needs of the community are met.
e. The continued implementation of the action plans developed as part of the main issues being assessed, please see the **Additional Information** section for a list of action plans that will need to be considered and ownership related tasks detailed within them.
f. Where the community are not able to resolve a particular maintenance / repair issue, for example due to a lack of necessary expertise, the plan should include how these issues should be addressed. This may include where to source the necessary expertise / materials / tools, the cost involved, and how this cost should be met.

Relevant Assessment Issues

Appendix D – Links between Assessment and Cross-Cutting issues highlights the assessment issues this cross-cutting issue is likely to be more relevant for.

Supporting Frameworks

None.

Additional Considerations	
General Considerations	
Frequency of inspections	Regular inspections enable planning of maintenance measures and repairs where required and so should be encouraged. Refer to the Shelter Safety Handbook[2] which provides a list relating to the shelter that should be carried out on a regular basis.
Adaptation	Communities will often wish / need to make alterations / extensions to their shelters after the reconstruction process. It is therefore important that they are supplied with access to sufficient information to ensure that any work carried out is done in a safe, efficient and effective way.
Identifying areas of importance for community ownership	An example of this could be in communities where women are not traditionally involved in decision making relating to the running of the community. Identifying this can aid in developing a plan /

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Additional Considerations	
	participation process that ensures women's views are listened to, providing greater buy-in from the whole community. Another example could be where previous disputes between individuals within the community have resulted in individuals not willing to take responsibility for the community as there has not been 'buy-in' from the whole of the community. Identifying this can help focus the efforts to create more community cohesion to ensure the process of transference is successful and will continue to be successful into the future. In identifying areas of importance, the development and growth of the community and how this will be managed going forward will also need to be considered.
Links to plans in other QSAND issues	The continued implementation of any specific 'plans' which have been required within individual issues that have been assessed will need to be accounted for within the community ownership plan. The issues which would need to be considered and the relevant maintenance tasks that may be required would be as follows: - SC01 - Community-sensitive development plan – requires information relating to community sensitive design to be communicated and transferred to the community - MW03 – Operational solid waste management plan – outlines the requirements of the waste management plan which should continue to be implemented by the community after the transference process - NE01 – Natural Environment Action Plan – outlines measures that can be made by the community moving forward after the initial recovery has taken place.

On-going Monitoring and Evaluation

None.

Case Studies

None.

Additional Information

None.

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Relevant Definitions

Community Ownership: enables those within the community to have influence and responsibility for their settlement. This means that projects are more responsive to the needs of the affected population and the community values the projects more highly.

Sustainable Management: refers to the long term organisation and coordination of the activities of a community in accordance with certain policies and in achievement of defined sustainable objectives.

Other Information

None.

References

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[**2**] International Federation of Red Cross and Red Crescent Societies (2011): Shelter Safety Handbook: Some important information on how to build safer.
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CC03 Economic Viability

Applicable at PAT	This issue is not applicable at the PAT stage

Aim

To encourage and support cost effective reconstruction / adaptation and promote measures which support the economic prospects and livelihoods of the affected community in the short, medium and longer term emphasising the whole life aspect of viability.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Context within the Project

The redevelopment of the affected community offers value-for-money for all relevant parties, affordability for the affected community and long term economic and livelihood opportunities.

Criteria for Consideration

1. Undertake an assessment of the economic status of the affected community and develop a plan for economic development which considers:
   a. Enhancement of the economic status of the affected community based on an understanding of their status before the disaster and the outcomes of participatory activities with the community and their local leadership / governance.
   b. The economic risks and vulnerabilities of the affected community, including vulnerabilities that have been caused by the natural disaster.
   c. The economic feasibility of incorporating low-cost shelter / infrastructure / settlement design.
   d. Utilisation of local skills, materials and labour to provide economic opportunities.
   e. The existing knowledge and skills of the affected community and any potential opportunities for economic development through enhancing local capabilities.
   f. Cost benefits of options identified in the short, medium and long term which plan for community growth.
   g. The long term economic viability of the community, including potential risks and opportunities in the future.

2. Reconstruction process: consider the following aspects as part of the redevelopment of the affected community.
   a. Identify opportunities for sufficient accessible and viable short and longer term employment opportunities for all relevant members of the community.
   a. Construction costs are optimised by appropriate design choices.
   b. Undertake a cost analysis to determine whether it is more economical to renovate existing shelters / infrastructure or demolish and re-build. This may include the cost of systems and technologies associated with infrastructure and key processes such as water treatment and energy generation. The analysis should also be balanced with other factors related to appropriate construction approach, materials and waste.

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c. Use of reused or recycled materials in the construction of shelters and/or infrastructure.
d. Consider the introduction of economic incentives to reuse materials from damaged shelters. This must take account of factors relating to ownership of debris / materials.
e. Ensure land is used efficiently to preserve its economic potential and the importance of infrastructure in restabilising, maintaining or where possible developing access to employment opportunities.
f. Use the concept of “natural capital accounting” when making decisions on the redevelopment of a settlement. Consider the value of surrounding ecosystems to the economy in both monetary and non-monetary terms. i.e. mangroves provide valuable coastal flood defences with the potential to save significant future costs, disruption and lives / livelihoods (see **case study below**).

3. Longer term viability: consider the following aspects as part of the long-term planning of the affected community.
   a. Where new materials or technologies are required, consider the cost effectiveness and skills required to manage, maintain and replace them in the future.
   b. The on-going maintenance and management of the community and its buildings / facilities needs to be cost-effective, with adequate on-going funding available to support this for the foreseeable future.
   c. Use the concept of “natural capital accounting” when making decisions on the potential for future development and adaptation of a settlement. Consider the value of surrounding ecosystems to the economy in both monetary and non-monetary terms.
   d. Consider ways to attract investment to benefit the local community. Any potential investment routes should be investigated in detail to ensure that benefits to the local community will be realised without over-exploiting natural or human capital to the detriment of future local economic resource development.
   An example would be a mechanism for local private businesses and public authorities to form partnerships, which determine the priorities for investment (e.g., roads, shelters, facilities), and deliver economic development to the affected community. Such a partnership should involve independent representatives of the affected community and other relevant stakeholders to ensure impartiality and that the true needs of the community are reflected.

Relevant Issues

Appendix D – Links between Assessment and Cross-Cutting issues highlights the assessment issues this cross-cutting issue is likely to be more relevant for.

Supporting Frameworks

None.

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Additional Considerations	
General Considerations	
None.	
Cross-cutting Issue Considerations	
Participation	All activities undertaken to understand past, present and future economics should involve representatives of the affected community and other relevant stakeholders. This will ensure that the assessments are balanced and draw on local knowledge and expertise.
Skills and Capabilities	It is necessary to understand current levels of local knowledge, capability and skills when assessing economic viability. Any gaps could provide potential training opportunities to boost economic opportunities for the affected community.
Livelihoods	Past and current livelihoods should be analysed and understood when determining the economic viability of the community. Local and cultural issues should be considered when proposing how livelihood activities could become more economically prosperous.
Community Ownership and Sustainable Management	The on-going management of the affected community must be cost-effective, with adequate budget identified to cover these costs for the foreseeable future.
Resilience	The economic viability of the affected community should be resilient to potential risks and hazards. This may mean that diverse livelihood strategies are required in order to mitigate the risks.
Security and Safety	Any safety and security issues that could cause negative impacts on the economic viability of the affected community, now or in the future, should be mitigated. This may include personal and group threats, on a physical and/or non-physical level or the adoption of high risk economic activities which pose a danger to the health and wellbeing of workers and indirectly their families and other dependents.
Economic Viability	None.
Access and Non-discrimination	Equitable economic opportunities should be available to all of the affected community, without discrimination based on age, gender, disability, etc.

On-going Monitoring and Evaluation

- Collation of information. The following metrics are examples of information that should be routinely collected and used to inform development.
  - Employment and unemployment rates (including those who are working from within their own home)
  - Wage levels
  - Hours worked per week

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- Wealth
- Value of personal and community assets,

– Measure of robustness of information: Ensure that the information is collected from a representative cross section of residents in the affected area. This should include a proportional split of male and female, employed and unemployed, home-based and non-home-based workers as well as across all job types.

Case Studies

Mangroves in Thailand – Convert or Conserve?[2]

Rating: +1

This example highlights the true value of mangroves including some non-monetary considerations. This specific example looks at the decision to convert an area of mangroves in Thailand to a shrimp farm. In pure economic terms the value of mangroves is $955 per hectare and converted to a shrimp farm is $10,649 per hectare. However when non-economic value is also considered such as the carbon sequestration, fish habitat, coastal protection from storms and the economic value of wood and non-wood products the value of a hectare of mangroves increases to $21,456. The largest component of this increase is the use of mangroves as coastal protection from storms.

2005 North Pakistan Earthquake[10]

Rating: +1

To help families that were affected by the disaster Habitat for Humanity Pakistan (HFHP) introduced shelters that used materials that could be used in permanent housing later. They were made with a tubular pipe structure, galvanized iron sheets attached with metal ties and foam insulation, costing about the same as a tent. The iron sheets were used as roof materials for new homes that were constructed largely using heavy timber from the destroyed homes. The heavy timber was recycled into lighter wooden construction elements using mobile saw mills that were transported from village to village.

Cyclone Nargis, Myanmar[10]

Rating: 0

6 months after the cyclone there were increasing signs of indebtedness amongst rural villages. This meant that many villagers were worried that they would be unable to meet loan repayments and/or consumption needs in the following year. Relief reached all areas of the country following the disasters but it failed to secure the future prosperity of the areas, this was restored through the payments of cash grants to prevent the loss of family property which may have also included food producing areas of land.

Additional Information

Relevant Definitions

Economic Viability: ensuring the economic decisions will enable the best possible outcome for the reconstruction process and community without compromising the future prospects and prosperity of that community.

Natural Capital: natural assets in their role of providing natural resource inputs and environmental services for economic production.

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Other Information

None.

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CC04 Livelihoods

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To recognise, protect and enhance existing livelihood assets and activities, as well as recognising and encouraging other livelihood opportunities to support the on-going recovery of the community[2].

Assumed Disaster Context

See **scope section**. Additional assumptions made:

- Livelihood opportunities have been adversely affected or reduced and livelihoods are limited as a result of the natural disaster, having a limiting impact on recovery
- Livelihood assets such as natural resources, land, tools and work space have been eroded, contaminated or destroyed by the natural disaster
- The communities access to livelihood opportunities and assets are limited.

Context within the Project

Each QSAND issue has an indirect impact on how the community can maintain their livelihoods. It is essential for those affected by a disaster to be able to gain access to vital resources which enables them to rebuild their livelihoods and develop new livelihood opportunities[7].

Criteria for Consideration

1. Identification of existing and potential livelihood assets and activities: information should be gathered to ensure, as far as possible, that the disaster recovery process accounts for existing and potential livelihoods[4].
    a. The most appropriate information gathering method, such as consultation with the local community and/or the acquisition of data, should be used to determine the nature of the communities 'normal' livelihood assets, activities and capabilities and the impact that the natural disaster has had on these[4]. The following livelihood components should be determined:
        i. Human capital:
            – The skills, knowledge and health of the local community[1]
            – How the livelihoods of the local community change over their lifespan[1&3]
            – Current constraints which affect the longevity and productivity of livelihoods[1]
            – Cultural factors that influence the ability of community members to play an active part in generating income or managing households or providing community services and facilities.
        ii. Natural capital:
            – Productivity of natural resources, spatial variability of resources and access to land / resources[1&8] (see **NE01 Human Relationship to Ecosystem Services issue for more information**)

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- Natural demands on resources such as land and flora / fauna which might be disrupted by redevelopment activities and so cause problems with livelihood activities.

iii. Financial capital:
- Types of industry and employment funding mechanisms
- Types of financial organisations, interest rates etc. (See the **CC03 Economic Viability** issue for more information)[3].

iv. Social capital:
- Social structure and cultural relations including: the connectedness of people, vulnerable groups and leadership[1&3]
- Political environment: government and rights / laws / policies that support or prohibit livelihoods and the extent to which these are complied with[1&7].

v. Physical capital:
- Physical assets (e.g., buildings, equipment and technology)
- Location and accessibility of markets used and required by the community, including determining the distance to market, the condition of roads / paths, public transport (frequency, cost and reliability)[3].

vi. How the above points have been affected by the natural disaster and consider the proportion of those affected, the areas most affected and the proportion of those able to engage in normal livelihood practices[9]

vii. Consider any other vulnerability factors and processes that have had an impact on the affected population[3].

b. Participation: to mobilise the community in order to rebuild, protect and promote local livelihoods and encourage the community to consider ways to enhance livelihoods to secure their longevity (see **CC05 Participation issue for more information**). This should include the following:

i. Involve the local community as far as possible in the initial recovery and rebuilding process, this will provide interim livelihood options while the 'normal' livelihoods re-establish[7]

ii. Support the provision of essential infrastructure:
- Energy supply (see **ENE01 Energy Demand and Supply issue for more information**)
- Water supply (see **WS01 Water Demand and Supply issue for more information**)
- Sanitation (see **WS03 Sanitation issue for more information**)[3].

iii. Support the provision of livelihood assets that may have been negatively affected by the disaster (e.g., livestock)[10]

iv. Support the access to and/or development of new markets and infrastructure to support existing or alternative livelihoods (see **CC03 Economic Viability for more information**)

v. Informing the local community of the existing financial structures, identifying which features they have access to (see **CC03 Economic Viability issue for more information**)[9].

2. Prioritisation of essential livelihood capabilities, assets and activities[7]. The prioritisation of livelihoods will enable efforts to be focused on those livelihoods capabilities, assets and activities that are most essential to the general recovery of the community.

a. Prioritisation of livelihoods identified during consultation should be based on the following features:

i. Individual group vulnerability and needs

ii. Market demand for products from livelihood activities and local market conditions

iii. Access to and availability of livelihood assets and capabilities

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iv. Viability of livelihoods[8&9].

3. Determine the vulnerability and security of livelihoods, identifying and reducing the impact of; shocks, seasonality, trends, conflict and tensions between different needs on livelihood activities, assets and capabilities[3,4&7].

4. Protecting and securing existing and potential livelihoods. Develop a protection plan in order to secure livelihoods. The vulnerabilities within existing livelihood assets, activities and capabilities should be addressed[1].
   a. Information and data review: using information acquired during participatory activities:
      i. Ensure that the community has the essential elements to support their livelihoods[1] ensuring that the design of infrastructure and buildings complements livelihood activities and where applicable community ownership of livelihood assets and activities. For example ensuring energy and water infrastructure is sufficient to support the demand from livelihood activities[7]
      ii. Determine how current livelihood assets are used and consider and implement ways of supporting these (See the **NE01 Human Relationships to Ecosystem Services** issue for more information).
   b. Those livelihoods identified as being of greater priority for the community should be protected and secured as a priority.
   c. Educate the local community with additional skills required to rebuild livelihoods (See **CC08 Skills and Capabilities** issue for more information).
   d. Manage livelihood assets and activities to ensure their continued appropriateness within the local context and to secure their longevity (e.g., ensuring sustainable consumption of water and energy)[1].

5. Develop or enhance new or existing livelihoods through a clear plan. The following should be considered as a means of enhancing livelihood assets and activities:
   a. Provision and access to education, training and information to promote good livelihood practices (see **CC08 Skills and Capabilities issue for more information**)[3].
   b. Where required the provision of technology, equipment and communications (including telecommunications, data and transport infrastructure) to support good livelihood practices.
   c. Opportunities for diversification of current livelihood strategies, considering alternative assets or methods that could be benefitted from[7] and ensuring that the design of infrastructure and buildings complements alternative livelihood activities.
   d. Identify new markets: determining the demand for local livelihood assets.
   e. Ensure equal access and fair distribution of livelihood activities and assets, health, empowerment and involvement of the local community[1&3].
   f. Identify additional support from aid agencies, organisations, etc.,[4&7] considering the capacity of the given organisation and any financial support they can offer such as ‘cash for work’ schemes[8].

Relevant Issues

Appendix D – Links between Assessment and Cross-Cutting issues highlights the assessment issues this cross-cutting issue is likely to be more relevant for.

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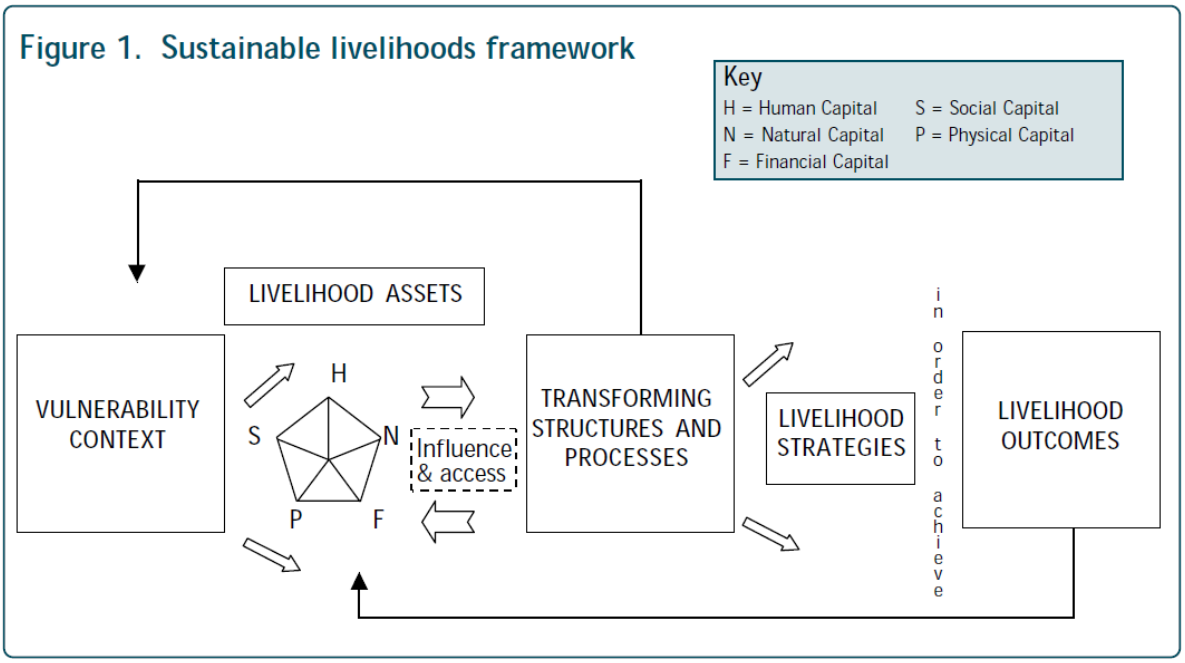
Supporting Frameworks

The DFID Sustainable Livelihoods Framework[3].

This framework demonstrates the linkages and relationships between the different kinds of livelihood assets, how vulnerable they are and how they can be transformed to impact on the nature of the livelihoods of the beneficiaries.



Additional Considerations	
General Considerations	
Acquisition of data relating to livelihoods	The types of data available from organisations such as local / national government, central or local statistics offices, universities or NGOs, that may provide insight into the nature of the local communities livelihoods include: i. Census data (household income / expenditure) ii. Employment data iii. Crop patterns data, livestock numbers iv. Health indices v. Import / export data vi. Education data.
Cross-cutting Issue Considerations	
Participation	Participatory activities should be undertaken in order to understand the livelihoods context and inform what actions should be taken to protect and enhance livelihood assets and capabilities.
Skills and Capabilities	It is important to understand training and skill levels of individuals as these will directly relate to the livelihood capabilities of the affected community.
Livelihoods	None.

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Additional Considerations	
Community Ownership and Sustainable Management	The on-going management and maintenance of the settlement can provide livelihood opportunities to the affected community.
Resilience	The livelihoods of the affected community will need to be resilient to potential hazards. As a result, it may be necessary to develop diverse livelihood strategies to minimise the impact of any potential hazard.
Security and Safety	The affected community requires security and safety in order to carry out livelihood activities with minimal personal risk to their wellbeing (e.g., provision of adequate safety equipment / practices on construction sites, in resource exploitation etc.).
Economic Viability	The livelihood capabilities of the affected community should be economically viable for the foreseeable future. Where there are obvious economic risks to livelihoods, these should be mitigated.
Access and Non-discrimination	All members of the affected community should have equitable access to livelihood opportunities.

On-going Monitoring and Evaluation

- Evaluation of livelihood supporting work
- Evaluate actions to protect, enhance and secure livelihoods and record any key learning's which can be used to inform actions going forward.

Case Studies

Afghanistan, Drought 2003

Rating: +2

In 2003 a cash-for-work program was launched to support communities who were affected from the summer drought. The drought had resulted in lowered food production, harm to livestock and increased debt leaving them vulnerable as the harsh winter approached. Subsequently a range of negative coping strategies emerged including increased migration rates at great costs. A cash-for-work initiative was launched to provide 70 working days to nearly 7,000 participants. The work included building water reservoirs and protection walls, planting trees and collecting fodder for livestock. These activities reduced the effect of seasonal shocks, provided the local community with a source of income for the harsh winter months. As a result migration reduced and the community was better equipped for the winter and to begin rebuilding their 'normal' livelihood activities[7].

Sri Lanka, Tsunami, Supporting existing livelihood practices, 2004

Rating: +1

Following the 2004 tsunami the fish market was destroyed leading to the selling of fish in unhygienic conditions in an improvised market. This in turn had a negative impact on sales, leaving the local community struggling to meet their normal livelihood needs. This was recognised by the Urban Council who responded by constructing a temporary market area, designed to support 50 fish vendors in to sell under hygienic conditions. This allowed the community to resume fishing activities, resume

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'normal' livelihood activities and generate their own incomes. It was estimated that this support helped approximately 5,000 people[8].

Additional Information

Relevant Definitions

Livelihoods: Livelihoods looks at the ways in which people manage their lives to obtain and use resources to meet their needs and wants, whether individually or in groups[8]. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base[7].

Livelihood Assets: the assets that the community have access to and use to support their livelihoods. These can include natural resources, technologies, their skills, knowledge and capacity, their health, access to education, sources of credit, or their networks of social support[1].

Livelihood Activities: the activities that the community engage with as required for a means of living, to support their livelihoods[1].

Other Information

None.

References

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[**4**] Food and Agriculture Organisation of the United Nations. The Livelihood assessment toolkit – Analysing and Responding to the impact of disasters on the livelihoods of people. 2009
[**5**] World Wildlife Fund (WWF) and American National Red Cross: Green Recovery and Reconstruction Training Toolkit for Humanitarian Aid (GRRT): Module 8 – Livelihoods.
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CC05 Participation

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To promote and encourage broad-based community involvement in the design and implementation of shelter and settlement activities and ensure the distinct needs, priorities and knowledge of all subgroups in the community are reflected in the reconstruction outcomes.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Context within the Project

Participation is vital to understanding the context of each issue and ensures that all subgroups of the community play an active role in shaping the post-disaster recovery and reconstruction process and drive the outcomes that affect them.

Criteria for Consideration

1. Gathering community insights: Useful information should be gathered on and from a broad-range of community members to identify hazards and vulnerabilities that could create risks associated with shelter and settlements.
   a. Local knowledge, skills and capacities should be established through appropriate participatory tools and techniques specific to the context and a representative consultation group established (See **General Considerations**). These should cover as a minimum;
      i. A historical profile should be created to understand the present situation in the community and have an insight of past events and hazards faced by the beneficiaries[2]. (See **General Considerations** for Historical Profile topics)
      ii. A hazard map should be created to help the community determine the hazards that have previously and/or are currently impacting them and to understand their vulnerability to future hazards[2].
   b. Additional appropriate means of information gathering should be proposed for those unable to attend meetings (or other participatory techniques) or who do not feel comfortable raising issues in public. These could include phone or email systems, community drop-in service with advertised visiting hours, feedback boxes, and questionnaires[1] and out-reach activities to proactively gather input.

2. Developing community shelter and settlement visions: All groups within the local community who have an interest in, or are impacted by (users etc.), the design and implementation of the shelter and settlement activities and appropriate stakeholders should be identified. Respectful and constructive working relationships should be made to build on community-based and self-help initiatives and enable constructive dialogue amongst all stakeholders.

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a. Facilitation of a working group to analyse current causes of shelter vulnerability and establish what resources are already available to beneficiaries.
   i. Consideration should be taken on the diversity of perceptions among men and women, children and the elderly, and other social or minority groups of the definition of a community that fits with their needs, therefore encouraging representative participation (see **relevant definitions**) [3]
   ii. Consider local skills and capacities in selecting options for new shelters and identify resources within the community (e.g., local individuals, small local contractors), or outside if necessary.
b. Create a baseline for the reconstruction activities with the beneficiaries to create a common vision for recovery and reconstruction of the community[2].
   i. Identify options for improving shelter safety and analyse these based on how effective and how feasible these are to implement
   ii. Ensure that basic hygiene, privacy and other basic needs are considered and shelter and settlement knowledge from within the community is utilised
   iii. Involvement of women, disabled and other minority groups in the process of design is of benefit to understand their needs, priorities and visions for the community.

3. Implementation and monitoring: To facilitate the reconstruction process with the participation of key individuals and groups and to provide assistance to this process.
   a. Feedback is provided on the outcomes of the participatory design process and reasoning for exclusion of unfeasible solutions.
   b. Potential problems that may arise from the shelter and settlement design and upgrade plan have been considered by the beneficiaries and other stakeholders and possible solutions or changes proposed[2].
   c. A monitoring plan is put in place to support the reconstruction process and identify appropriate co-ordinators[2]. Mechanisms for the community to feedback and address any grievances should be included within this plan.

4. Continued beneficiary communication: Communication amongst beneficiaries and internal partners should be established to ensure a consistent out-reach strategy is implemented in the recovery and reconstruction process allowing people to participate effectively.
   a. An information sharing platform should be established to support the out-reach strategy.
   b. Key outcomes and lessons learnt from the project should be discussed and information disseminated within and outside of the main stakeholders as appropriate.

Relevant Issues

Appendix D – Links between Assessment and Cross-Cutting issues highlights the assessment issues this cross-cutting issue is likely to be more relevant for.

Supporting Frameworks

Two frameworks are proposed below which represent good practice in Participatory Approaches to Reconstruction:

1. Architecture Sans Frontières UK (2011): Change by design: building communities through participatory design (2011).
2. UNHCR (2006): The UNHCR Tool for Participatory Assessment in Operations.

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Additional Considerations	
General Considerations	
Appropriate participatory tools and techniques	Appropriate participatory tools and techniques could include early public kick-off meetings, community workshops, etc. Whichever techniques are employed by the humanitarian organisation, these should be promoted as appropriate to the context, e.g. posters, leaflets, newspapers adverts, radio and TV broadcasts[1]. Organisations should be aware of and take account of the risks of 'consultation fatigue'. It is vital that participatory community engagement results in meaningful outputs to maintain engagement levels and enthusiasm for the process.
Representative consultation group	Dependent on the scale of the disaster, local practices, cultural considerations and political situation, different levels of consultation may be appropriate. Members of a representative consultation group could come from groups such as: – Institutional – Regulatory – Local leadership – Neighbourhood – Community – Household. Groups should also be varied and representative of the community, individuals must include: – Male and female – Able / disabled – Young / old – Skilled in construction / unskilled in construction.
Historical profile	The events and trends that should be considered include, but are not limited to: – Major hazards and their effects, including previous disaster occurrences (other than the most recent) – Changes in land use and land tenure – Information on population (growth, migration or displacement), demographics (young, elderly, disabled, religious belief) and administration (community leadership, local authorities, local government) – Changes in food security and availability of natural resources – Current water and waste management strategies – Major political events affecting the community[2] – Sources of livelihoods – Housing practices: approaches, strategies, finance, legislation, inspection.
Available or desired community resources	Consider what is already available and accessible to the beneficiaries and how they want to affect: – Local skills and other human resources – Important physical features and boundaries – Roads, paths and areas of housing

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Additional Considerations	
	– Schools, places of worship, health facilities, businesses, markets, community centres, etc. – Infrastructure – Farms, fields, natural resources (such as forests) and open spaces – Location and direction of water flow from streams and rivers, etc. – Geography of land (e.g. high and low areas) – Location, availability and accessibility of important resources for shelter – Evacuation routes / safe refuge.
Baseline for the shelter programme	Determining the following information can help to form the baseline for the shelter programme: – Level of involvement the individuals within the community would like – Community priorities and discussion of strategies – Functionality, quality and local impact – Local impact on environment including water quality and protected habitats – Local maintenance resources / burdens and local skills – Cultural, spiritual and traditional practices regarded as important by local people – Community examples of good and bad developments – Local infrastructure and economic opportunities (if present) – Opportunities for shared use of facilities and infrastructure within the community[3].
Cross-cutting Issue Considerations	
Participation	None.
Skills and Capabilities	Participation can be a useful tool in raising people's social and human capital as well as their confidence. Insofar as is possible and culturally appropriate, training and skills development opportunities should be made available to women and men of all ages.
Livelihoods	As part of the recovery process restoring and improving physical assets (e.g. shelter, settlement and infrastructure) is important. However, it is also important to rebuild people's livelihoods and social capital. As part of participatory sessions, it is important to understand the beneficiaries' livelihood needs so that they can rebuild these along with physical shelter and settlement. Additionally, by local people participating in the reconstruction process they can earn an income and improve their potential for future work. Again, every effort must be made to include all subgroups in the livelihood consultation as women and men of all ages may have different livelihoods.
Community Ownership and Sustainable Management	Participatory approaches to reconstruction should also focus on empowering the community and involving them in this process. Settlement infrastructure is much more likely to be managed and

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Additional Considerations	
	maintained by the community if this meets their needs and they have been involved in its planning and installation.
Resilience	Participation can strengthen community organisations and better enable them to support vulnerable people in the area. Participatory sessions should consider how resilience can be built back into the community as well as focusing on reconstruction.
Security and Safety	Participatory approaches taken should support identification of safety and security hazards / risks against all groups in the community ensuring adequate consideration is given to minority, the vulnerable and women. Solutions should be identified to eliminate or where not possible mitigate these hazards / risks. Participatory approaches can help communities to be more able to respond to corrupt practices or unfair allocation of reconstruction resources to particular individuals or groups; fairer and more transparent dispute resolution with agencies or local authorities is a positive outcome to consider within participation.
Economic Viability	Participation properly implemented helps to ensure a more viable solution especially if that solution is dependent on local funding and ownership of the strategy moving forward
Access and Non-discrimination	Participatory approaches can be used to better identify the most vulnerable or most severely affected by the disaster within the community and provide appropriate support to these people.

On-going Monitoring and Evaluation

None.

Case Studies

Bhuj, Gujarat, India, 2001[5]

Rating: +1

This case study provides a good example of a participatory approach to reconstruction in the city of Bhuj. Government and institutional stakeholders decided that a comprehensive development plan was needed to guide reconstruction in the city and wanted this to be developed and implemented through a participatory process.

To support the process, a Study and Action Group was formed consisting of key local resource persons identified earlier. The group helped to inform the process, provide information on the local context, assist in resolving disputes, and to produce proposals and policies. In the walled city an even more intensive process was used. A Core Committee was formed with similar objectives, to the Study and Action Group, which interacted very actively with residents. Rehabilitation committees were formed at the falia (neighbourhood) level. The BDC set up decentralised offices, where the latest drafts of the plans were available, and staff could provide information to residents on the plans and helped them to comment or contribute ideas.

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The commitment of the government and institutional stakeholders to the idea of participation in planning for reconstruction and development was followed through in establishing the structures for participation. This enabled many local people to contribute their ideas to the final plans.

Department of Chocó, Colombia, 2012[9]

Rating: +1

This case study provides a good example of how early participation of beneficiaries in the recovery process has ensured the appropriate reconstruction of a community in Chocó. Over the course of one year, the entire community contributed to create a village based around decisions agreed by the community council.

The project used community participation and a pilot house to improve the overall living conditions of 80 families who were struggling to survive flooding in the area and a model was used that can be easily replicated for other flood-prone communities.

Java Earthquake, Indonesia, 2006: Organizing Community-Based Resettlement and Reconstruction[10]

Rating: +1

This case study provides a good example of how lessons learnt from the Aceh tsunami could be used in Java allowing the government to respond quickly and efficiently. Facilitators were recruited and villages elected boards of trustees, which later were instrumental in organizing community meetings and supervising implementation.

Key activities included (1) identifying beneficiaries and prioritizing the most vulnerable; (2) establishing housing groups of 10-15 families, who chose their leaders and a treasurer; (3) developing detailed plans to use the construction grants for each group; (4) opening group bank accounts; and (5) obtaining approval of plans, disbursement in tranches, and group procurement, construction, and bookkeeping.

The role of facilitators was crucial as they both ensured effective communication and adaptability of the program to local situations as well as compliance with program principles. In all 6,480 core houses were funded by a World Bank loan under UPP, and another 15,153 units were funded by the multi-donor Java Reconstruction Fund. This approach to reconstruction became the model for the much larger government-financed rehabilitation and reconstruction program, under which about 200,000 houses were rebuilt in Java.

Additional Information

Relevant Definitions

Consultation: Consultation is the process of engaging with different stakeholders, representative of the wider community, including the beneficiaries, in order to gain an understanding of their experiences, perspectives, responsibilities and local capacity. This information is used to inform key decisions that affect the community in a manner that is respectful, appropriate and meets their needs.

It should be noted that consultation is a step within participation that provides a platform for beneficiaries to discuss their needs and priorities to inform future decisions.

Participation: Participation refers to the full and equal involvement of all members of the community in decision-making processes and activities that affect their lives, in both public and private spheres. The level of participation will depend upon how rewarding people find the experience and whether they gain something from the process. Participation also requires that instead of “informing and deciding for people, we listen to them. Our role is to facilitate discussions and analysis with persons of concern so that they can identify their own priorities and preferred outcomes.

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Participation:

- is a right, and essential for informed decision-making
- promotes protection and reduces feelings of powerlessness
- enables UNHCR to draw on the insights, knowledge, capacities, skills and resources of persons of concern
- empowers women, men, girls and boys of different backgrounds to rebuild self-esteem and self-confidence; and
- helps people of concern cope with the trauma of forced displacement[1].

Representative Participation*:* aims to understand and address the barriers to participation faced by different people. It ensures measures are taken to encourage the participation of members of all groups of the affected people such as the young and old, men and women and that special efforts are made to include people who are not well represented, are marginalised (e.g. by ethnicity or religion) or otherwise 'invisible' (e.g. housebound or in an institution). Representative participation also promotes the participation of youth and children so far as it is in their best interest and when measures are taken to ensure that they are not exposed to abuse or harm[3].

Adapted from SPHERE handbook, page 57 (PDF pg. 64)

Other Information

None.

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[**6**] Practical Action & IFRC: People centred reconstruction PCR Tool 7: Planning with the People
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Embracing Participation in Development: Worldwide experience from CARE's Reproductive Health Programs with a step-by-step field guide to participatory tools and techniques

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CC06 Resilience

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To ensure that the community has the capacity to prepare for, resist, respond to, learn and recover from the effects of hazards on the built environment.

Assumed Disaster Context

See **scope section**. No additional assumptions made.

Context within the Project

Resilience and Disaster Risk Reduction (DRR) are essential parts of sustainable development and affect each aspect of the community. The ability for a community to effectively prepare for disasters, reduce impacts of disasters, and recover more safely is vital to continued safety, security and prosperity.

Criteria for Consideration

1. Assessment: Undertake a Vulnerability and Capacity Assessment (VCA)[1] or similar community-based disaster risk assessment, in order to gauge the affected community's exposure and degree of resistance to hazards[2]. The assessment should also explore how the affected community could become more empowered, developing levels of knowledge and ownership.
    a. The assessment should be a participatory process that should include representatives of all relevant sections of the community and key sources of expertise (e.g., NGOs etc.)[2].
    b. Assess risks and hazards to the built environment that are facing the community and the capacities they have for dealing with them (i.e., local coping mechanisms for dealing with particular hazards)[1].
    c. Identify key environmental, social and economic resources that underpin resilience (e.g., forests stabilising slopes, wetlands reducing coastal flooding, support networks)[7].
    d. Develop an action plan to prepare for and respond to the identified risks[1].
    e. Identify activities that should be undertaken to prevent or lessen the effects of expected hazards, risks and vulnerabilities[1].
    f. Assessment findings should be shared, discussed, understood and agreed among all stakeholders and interested parties. The findings should be used to feed into community disaster planning, through the criteria points below[2].

2. Mitigation and adaptation: ensure that the shelters and settlement as a whole are resilient to potential hazards. See the **Case Studies** and **Additional Information** sections for examples of resilient shelter design.
    a. Structural mitigation measures (e.g., embankments, flood diversion channels, water harvesting tanks) in place to protect the settlement from major hazard threats, built using local labour, skills, materials and appropriate technologies as far as possible[2].

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   b. Adoption of hazard-resistant construction and maintenance practices for shelters using local labour, skills, materials and appropriate technologies as far as possible[2].
   c. Adoption of physical measures to protect items of domestic property (e.g., raised internal platforms and storage as flood mitigation measure, portable stoves) and productive assets (e.g., livestock shelters)[2].
   d. Adoption of short-term protective measures against impending events (e.g., emergency protection of doors and windows from cyclone winds)[2].

3. Early warning and prediction: ensure the provision of timely information enabling people to take steps to reduce the impact of hazards.
   a. Utilise local networks to develop prediction and warning systems progressively so that they meet the needs of the communities and situations for which they are designed.
   b. To be effective, early warning systems must be understandable, trusted by and relevant to the communities that they serve.
   c. Warnings must reach the people most at risk, who need to be trained to respond appropriately to an approaching hazard.
   d. Establish local networks that can both receive and act on warnings and that raise awareness and educate communities to take action to ensure their safety.

4. Disaster preparedness: ensure that measures are taken that help ensure a timely and effective 'first line' of response supported by volunteers, branches, regional and national capacities. Ensure that certain basic community functions and structures are capable of functioning during, and in the immediate aftermath of, disastrous events.
   a. Ensure that there is an adequately protected emergency supply of essential resources established (food, water, energy, medical supplies) and means of communication both within the community, to its neighbours and externally.
   b. Ensure that there are mechanisms in place to ensure that essential social infrastructure is maintained during a natural disaster event (emergency support services, community spaces and activities)[2].
   c. Ensure that there is capacity for livelihood activities to be maintained, altered or rapidly re-established in the event of a natural disaster.
   d. Ensure that access, refuge, evacuation and transport routes nearby and within the settlement are designed and maintained so that they are navigable in the event of a disaster situation[2].

5. Recovery: as part of the recovery process of restoring or improving the pre-disaster living conditions of the affected community, facilitate necessary adjustments to reduce disaster risk.
   a. Continually assess risk to (immediate and future) hazards, recording and sharing the results of assessments with the affected community and other relevant stakeholders.
   b. Where the natural environment has been damaged by the disaster, action should be taken to rehabilitate valuable areas where possible. Consider ways of reducing the future risk of such damage (e.g., by constructing necessary defences).
   c. Where social networks have been damaged by the disaster, ensure that these networks are re-established where possible. Consider ways of reducing the future risk of such damage (e.g., by ensuring that social groups are kept geographically connected).
   d. Encourage the promotion of diverse livelihood strategies in order to reduce reliance on livelihood activities with high risk, promoting economic sustainability. See **CC04 Livelihoods** issue for further information.
   e. Assess levels of risk before undertaking any future development project, using a VCA such as that detailed above.

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Relevant Issues

Appendix D – Links between Assessment and Cross-Cutting issues highlights the assessment issues this cross-cutting issue is likely to be more relevant for.

Supporting Frameworks

- IFRC. A framework for community safety and resilience[9]
- Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters[3]
- Practical Action V2R Framework[4].

Additional Considerations	
General Considerations	
Ecosystem-based activities	There are ecosystem-based activities for risk reduction that should be considered alongside more conventional, man-made / infrastructure-based activities. A few examples include: - Stabilising hillsides with vegetation - Creating open spaces to absorb floodwaters - Restoring mangrove cover for coastal protection against storm surge[7].
Natural Hazards and Resilience	Natural hazard specific considerations should become apparent through the process of undertaking the Vulnerability and Capacity Assessment (VCA)[1].
Cross-cutting Issue Considerations	
Participation	The use of participatory assessment tools is critical for successful risk reduction, as it is individual communities and members who are directly affected by disaster risk and who need to take action to reduce this risk. It is unlikely that risk reduction efforts will be successful without local participation and support during the assessment stage. In terms of environment-based risk reduction, local participation is critical to success, as environment-based approaches require a holistic approach and may require short-term reductions in access to natural resources[7].
Skills and capabilities	Knowledge exchange and skills development are a key aspect of increasing the resilience of a community and have knock-on positive impacts related to empowerment and ownership.
Livelihoods	Ensure that the livelihoods of the affected community are resilient and flexible, in order to respond to natural hazards.
Community Ownership and Sustainable Management	The VCA should also explore how the affected community could become more empowered, developing levels of knowledge and ownership.
Resilience	None.

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Additional Considerations	
Security and Safety	Communicate risks to hazards in order to ensure that the affected community are informed and can take precautions to remain safe.
Economic Viability	Resilience is a vital aspect to ensuring that a community can be economically prosperous. The cost of taking measures to increase resilience should be analysed against on-going financial and social costs.
Access and Non-discrimination	All social groups within the community should have an equal level of protection from the measures taken to the effects of hazards (i.e. no selective shelters) and that specific actions should be taken to maximise the level of protection that more vulnerable groups enjoy where this is required.

On-going Monitoring and Evaluation

- Conduct on-going monitoring of hazards and risks and updating of assessments [2] to account for potential changes in the context of the affected community. This information should be managed and disseminated appropriately[9]
- Skills and capacity to carry out community hazard and risk assessments maintained through support and training[2]
- The knowledge and awareness of the affected community is continually developed in order to reduce vulnerabilities[9].

Case Studies

Typhoons Ketsana and Mirinae, Vietnam, 2009[5]

Rating: +1

650 households who had lost their homes were supported through cash grants to rebuild storm / flood resistant houses. A technical consultant was hired to support a national organisation to organise training on safe housing, develop house designs and supervise the construction of houses. Examples of standardised technical solutions to make the shelters storm / flood resistant:

- Reinforcement of the foundations and structure
- Reinforcement of the links between construction elements
- Protection of tiled roofs in areas susceptible to strong winds
- Doors and windows that can be securely closed
- Attic installed above flood levels.

Earthquake, Kashmir[6]

Rating: +1

The Kashmir Rural Housing Reconstruction Program, rehabilitated and reconstructed more than 600,000 houses to seismic-resistant standards. The project integrated risk reduction by supporting an owner-driven process through financial incentives and technical support, building capacity of owners, local masons, and foremen. It also strengthened logistics for the provision of quality material, mapped hazards, and built capacity for the Earthquake Reconstruction and Rehabilitation Authority and other

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institutions – all with monitoring and evaluating to guide the project. These elements contribute to the long-term resilience of rural housing in the face of future hazards. Systematic risk assessments and community-based activities have since been scaled up nationally under the auspices of the new National Disaster Management Authority.

Preventing typhoon damage, Vietnam, 2008[10]

Rating: +2

The purpose of the programme was to prevent damage to life and property and in particular, to reduce the vulnerability of the community to typhoon and flood damage to their buildings. This helped to address problems caused by the regular economic loss and persistent poverty caused by typhoons and floods, thus achieving a more stable basis for future development. The seven key areas of the programme:

- Demonstrating building strengthening methods
- Developing skills in safe construction methods through training of local builders
- Making damage prevention a priority through participative awareness raising using theatre, concerts, community events and displays
- Promoting affordable credit for improvements aimed at house strengthening
- Building schools using the recommended storm-resistant methods and training teachers and children about disaster prevention
- Developing the institutional environment, through the creation of Commune Damage Prevention Committees in each community
- Preparing commune damage prevention action plans together with local communities.

Additional Information

Relevant Definitions

Disaster Risk Reduction (DRR): there are different definitions of the term, but it is generally understood to mean the broad development and application of policies, strategies and practices to minimize vulnerabilities and disaster risks throughout society. DRR is a systematic approach to identifying, assessing and reducing the risks of disaster. It aims to reduce socioeconomic vulnerabilities to disaster as well as dealing with the environmental and other hazards that trigger them. It is the responsibility of development and relief agencies alike and it should be an integral part of the way such organizations do their work, not an add-on or one-off action. DRR is very wide-ranging and there is potential and need for DRR initiatives in just about every sector of development and humanitarian work.

Resilience: The capacity of a system, community, or society potentially exposed to hazards to adapt, by resisting or changing, in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organising itself to increase its capacity for learning from past disasters for better future protection, to respond to emerging threats, and to improve risk reduction measures.

Adapted from UN International Strategy for Disaster Reduction. Terminology of disaster risk reduction. www.unisdr.org/eng/terminology/terminology-2009-eng.html

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Other Information

Some examples of potential resilient design techniques:

- Adequate drainage provision in flood / storm prone areas in order to minimise erosion and standing water
- Rooms / floors situated above potential flood levels to provide adequate safe space in an emergency situation
- The use of lightweight roofs / primary structures in earthquake prone areas to minimise the potential damage caused by falling materials
- The specification of minimal overhangs and appropriate roof fixings in areas prone to high winds.
- Provision of allocated areas of high and/or safe ground for use in emergency situations
- Construction of houses on raised platforms (soil, piles etc.) in areas prone to flooding
- Separate roof structures in areas prone to high winds in order to reduce vulnerability to damage.

References

[**1**] IFRC Disaster Preparedness Tools. http://www.ifrc.org/en/what-we-do/disaster-management/preparing-for-disaster/disaster-preparedness-tools/disaster-preparedness-tools/
[**2**] Twigg J. The Characteristics of a Disaster-resilient Community. 2009.
[**3**] UN ISDR. Hyogo Framework for Action 2005-2015. 2005.
[**4**] Pasteur, K. From Vulnerability to Resilience. Practical Action Publishing, Rugby, UK, 2011.
[**5**] IFRC. Shelter Projects 2010. 2012.
[**6**] World Bank, GDFRR. The Sendai Report: Managing Disaster Risks for a Resilient Future. International Bank for Reconstruction and Development, Washington DC, USA, 2012.
[**7**] WWF US, American Red Cross. Green Recovery and Reconstruction: Training Toolkit for Humanitarian Aid (Module 9 – Disaster Risk Reduction).
[**8**] IFRC. The Road to Resilience. 2012.
[**9**] IFRC. A framework for community safety and resilience. http://www.ifrc.org/Global/Case%20studies/Disasters/cs-framework-community-en.pdf
[**10**] http://www.worldhabitatawards.org/winners-and-finalists/project-details.cfm?lang=00&theProjectID=981BC068-15C5-F4C0-997B150C75CF5B7D
[**11**] Practical Action. Building Back Better. 2010

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CC07 Security and Safety

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To support and encourage consideration and application of security and safety principles within the community and communicate the risks and measures that are in place to reduce risks.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- Land, property and resources within the community have become insecure as a result of the natural disaster, significantly compromising the safety of the local community
- The natural disaster has resulted in increased vulnerability to safety and security threats within the local community
- The recovery, reconstruction process offers opportunities to build safer and more secure buildings, infrastructure and communities.

Context within the Project

It is important that the settlement provides protection from, and takes account of the perception of those affected of, pervasive threats, danger, theft and injury or harm to ensure the safety of the community in relation to the built environment e.g. shelters – residential and non-residential and settlement wide, public areas etc. This includes consideration of measures that enhance the protection of communities and their interests, especially the vulnerable during daily life activities[2&3].

Criteria for Consideration

1. Determining the need for security and safety through participatory approaches partly aimed at managing and understanding perceptions: Undertake a Risk and Situation assessment to gain a clear understanding of the risks within the community including:
   a. Risks relating to operation staff should be assessed in-line with IFRC guidance[4].
   b. Identification of safety and security threats and risks by undertaking participatory activities with all subgroups from within the affected community and other stakeholders. This should cover:
      i. Existing security and safety issues
      ii. Current activities to mitigate problem areas
      iii. Potential emerging / future issues.
   c. The consultation process should take into account;
      i. The history and current safety and security dynamics of the country
      ii. Safety (personal, shelter and settlement wide):
         – Personal risks to health and wellbeing (e.g., sanitation, water quality)
         – Risks from the built environment (e.g., unsafe buildings / structures)
         – The local pre-existing vulnerabilities; have these been exacerbated by the natural disaster

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- The likelihood of future natural disasters[4].

iii. Security (individual shelter and settlement wide):
- Review of available crime data to support assessment of local risks and threats e.g. the level of breaking and entering into private property[4]
- Risks associated with the economy, stability of resources (e.g., natural resources) and infrastructure[4].

2. Mitigating the security and safety risks to the community using the outcomes of the Risk and Situation assessment, implement mitigation actions to address any safety and security threats and risks. Considerations should include:

a. Personal safety:
   i. Identify fire risks (residential and non-residential shelters, structures and public space) and implement appropriate mitigation measures
   ii. Establish a process for alerting, reporting and monitoring of incidents
   iii. Spaces are designed with appropriate dimensions to ensure they are safe to access (see **CC01 Access and Non-discrimination for more information**)
   iv. Designs should account for local weather and climatic risks and provide protection from them as appropriate
   v. Access to personal protection equipment where relevant for construction and livelihoods.

b. General safety:
   i. Possessions:
      - Property is secure from the risk of intrusion, break-in etc.
      - Ensure shelters offer the possibility for the community to have access to equipment (e.g. lockers, locks etc.) or areas (e.g. secure storage facilities, lockable parts of the shelter) to securely store valuables
      - Livestock shelter is secure and appropriate fencing is in place.
   ii. Human health:
      - Follow local Health and Safety laws and available best practice during the rebuilding and maintenance of homes, property and land, to ensure that the local community have adequate protection
      - Issues relating to health which compromise the safety of the local community such as heightened risk of infectious disease should be contained following appropriate medical guidance and medical supplies should be appropriately stored
      - Materials and construction methods should not pose a risk to those building, or those living within and using, shelters or buildings. Materials should be fit for purpose and the appropriate protective clothing and equipment should be used during construction
      - Appropriate training should be carried out to ensure that construction products are used in accordance with manufacturer's safety recommendations.
      - Hazardous waste materials and sources of pollution should be managed following the appropriate guidelines (see **the appropriate Waste issue (MW01 – MW05) for more information**).

c. General Security:
   i. Utility infrastructure is secured and safely installed to a level where the community have sufficient reliable utility sources and supply to sustain the following:
      - Energy required for internal use (e.g., heating, cooking, lighting) and external environment needs (e.g. safe lighting levels) and healthcare facilities
      - Water supply needs for consumption and sanitation purposes.

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3. The safety of individual shelters and the settlement as a whole should consider the following factors[5]. However, these should be applied with respect to cultural considerations.
   a. Access and movement: Places have well-defined routes, spaces and entrances that provide for convenient movement without compromising security.
   b. Structure: Places are structured so that different uses do not cause conflict.
   c. Surveillance: Places ensure that all publicly accessible spaces are overlooked.
   d. Ownership: Places that promote a sense of ownership, respect, territorial responsibility and community.
   e. Physical protection: Places that include necessary, well-designed security features.
   f. Activity: Places where the level of human activity is appropriate to the location and creates a reduced risk of crime and a sense of safety at all times.
   g. Management and maintenance: Places that are designed with management and maintenance in mind, to discourage deterioration and crime in the present and the future.

4. Skills, capabilities and awareness raising: undertake educational and awareness raising activities with the community to help supplement and strengthen existing knowledge and understanding on safety and security issues.

Relevant Issues

Appendix D – Links between Assessment and Cross-Cutting issues highlights the assessment issues this cross-cutting issue is likely to be more relevant for.

Supporting Frameworks

None.

Additional Considerations	
General Considerations	
Possible sources of information to support the risk and situation assessment and analysis	- Security incident reports - Health sector records - National Society and Movement partners - Humanitarian agencies and government sources - Academics and local communities - Press, media or internet - Private security companies
Cross-cutting Issue Considerations	
Participation	Participatory activities should be undertaken with all groups of the affected community to understand the local context and relevant cultural sensitivities in relation to safety and security. These activities should be undertaken before any potential actions / solutions are proposed.
Skills and Capabilities	It may be appropriate to undertake awareness sessions with the affected community on the importance of how to ensure and maintain personal safety at home, in the community, and at work.

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Additional Considerations	
Livelihoods	Livelihood activities should maintain appropriate levels of personal safety and security for all.
Community Ownership and Sustainable Management	The personal- and community-level safety and security should be monitored and maintained on an on-going basis.
Resilience	Ensure that safety and security measures are resilient over time without requiring un-reasonable levels of replacement and investment.
Security and Safety	Security and Safety consideration must be balanced against the perceptions of the individuals affected versus the actual threat. While this issue is concerned with Security and Safety affecting the community from a built environment shelter and settlement focus it may not always be possible to strictly consider this when considering this issue. Gender specific safety risks must be considered such as risks women and girls can face when going for water, firewood, etc. or at individual shelter level domestic and other violence, burglary, rape, jealousy crimes, bribery, racial / ethnic crimes etc.
Economic Viability	None.
Access and Non-discrimination	All members of the affected community should have equitable levels of safety and security.

On-going Monitoring and Evaluation

– Keep records of incidents relating to safety and security and what was done in response to these and how effective it was. This will provide a log of successful and unsuccessful attempts which can be used as a reference points when responding to new incidents.

Case Studies

None.

Additional Information

Relevant Definitions

Security: A process that enhances

- environmental awareness leading to the implementation and maintenance of measures that will mitigate identified risks and enable people to work and live in as safe a manner as possible including;
- measures that enhance the protection of communities and their interests, especially the vulnerable, from danger and fear during daily life activities[2].

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Safety: freedom of beneficiaries and livestock from physical or psychosocial injury or harm[1], through the provision of information and appropriate internal and external environments[2&3].

Other Information

None.

References

[**1**] INEE Minimum Standards for Education: Preparedness, Response, Recovery." Inter-Agency Network for Education in Emergencies. 2004
[**2**] Security Unit: International Federation of Red Cross and Red Crescent Societies (2013)
[**3**] Jolly, R., Ray, D.B. (2006), "The Human Security Framework and National Human Development Reports." UNDP
[**4**] International Federation of Red Cross and Red Crescent Societies (IFRC) (2011) Stay safe. The International Federation's guide for security managers. Third Edition.
[**5**] The Home Office. Safer Places: The Planning System and Crime Prevention. The Home Office. 2004.

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CC08 Skills and Capabilities

Applicable at PAT	See the Pre-Assessment tool for possible considerations and actions at this stage.

Aim

To recognise the skills and capabilities needs of the community and promote and provide a context in which these can be successfully maintained and/or met.

Assumed Disaster Context

See **scope section**. Additional assumptions made as follows:

- The opportunities for skills acquisition are limited and they do not fully support the needs of the community
- The community has skills and capacities that can be enhanced / built upon to ensure resilient reconstruction after the disaster
- Educational infrastructure is limited – there is limited access to educational networks, buildings or materials such as books.

Context within the Project

Training and awareness raising, supports development of skills and capability building all supporting self-sufficiency. Each QSAND issue provides an opportunity to support / consider skills and capability in moving towards sustainable development. The need for life skills often increases in situations of crisis, requiring increased emphasis on building life skills that are relevant and applicable to the emergency and local contexts[1].

Criteria for Consideration

1. Determining the scope and need for training and skills:
   a. Identification and review of educational / training resources and skills needs to support self-sufficiency, community ownership, livelihoods maintenance, re-establishment, creation etc., Understand the skills and capabilities of the community and current training opportunities to identify existing education and skills resources that can be drawn on to enhance recovery[1&4]. Source data relating to:
      i. Knowledge and skills within the local community[9]. (Refer to SC01 Privacy issue, ensuring that data is; relevant, reliable and up to date and that consent from the community, sensitivity and transparency are all considered in the use of data)
      ii. The impact of social, cultural, demographic, political and geographic variation which can act as barriers to educational opportunities[1&9].
   b. Participation with beneficiaries to:
      i. Determine the nature of their current skills and education access, provision and resources[1]
      ii. Identify what training resources and skills are needed to support safe and secure living environments and livelihoods[1&4]

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iii. Determine with the community their education, skills and training needs and prioritise these.

c. This assessment should be carried out before planning skills and capability building activities to determine needs, gaps in the response and available resources.

2. Meeting educational / training resources and skills needs: Training, capability buildings and awareness raising to provide essential information, to meet the needs of the community and support and promote recovery following the natural disaster.
   a. Training:
      i. Identify or support the creation / appointment of those individuals or organisations well placed to deliver education and training requirements [3]
      ii. Identify, source, or where necessary develop relevant literature, training aids and equipment required to implement training
      iii. Build on and support local skills and educational techniques where they are; beneficial, support the community (livelihoods, cultural) and are safe[3]
      iv. Train beneficiaries in; building construction and repair methods, the use of appropriate equipment and acquiring, producing and supplying building materials and building elements.
   b. Awareness raising: The need for awareness raising should be determined with the community through the initial assessment. Topics that should be addressed include but are not limited to:
      i. Health, sanitation / hygiene, waste disposal, nutrition and safety issues
      ii. Sustainable options for energy and water supply and use
      iii. The maintenance of internal and external environments following the natural disaster (Please refer the following Issues: SC03 Internal Environment and SET03 Spatial Planning)[6]
      iv. Diversification of local economic practices and protection and restoration of local resources (including those supplied by the natural environment)[6].
   c. Access to the most appropriate means of raising awareness: This may be through sessions or other means and should be used to raise awareness on the points outlined above and where possible should follow the following format:
      i. Identify those individuals or organisations well placed to facilitate or deliver awareness raising sessions etc.[3]
      ii. Sessions (or the means chosen) should be organised at a convenient time and in an accessible location
      iii. Ensure the sessions (or the means chosen) include a representative group from the local community
      iv. For each topic covered in the awareness raising session (or the means chosen) provide the key points in clear non-technical language and give a context as to why it is important
      v. Identify and source relevant literature, training aids and equipment required to facilitate awareness raising.

3. Facilities and resources**:** To enable the implementation of required education and training. The following should be considered and implemented where possible:
   a. Any materials supplied should be accessible and comprehensible to the community i.e.: language, tradition, delivery style.
   b. Construct / rebuild educational and training facilities required to meet the needs of the community (See **SC04 Construction Approach** and **SC01 Community Sensitive Design** issues).
   c. Learning environment: safe and secure buildings with adequate provision of water, sanitation, energy facilities etc.[1&3]
   d. Please refer to the **CC01 Access and Non-discrimination** for more information.

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4. Community Ownership: Ownership of education and skills decision making and planning should be with the local community from the outset to ensure that in the long term the needs of the community are reflected in the provision of education and skills training and awareness raising. Agency roles should be to support and strength the capacity of the community to carry this out.
   a. Establish an education and training committee comprised of members of the local community to monitor the provision of education, skills training and the changing needs of the community[6&7]. The committee should where possible:
      i. Be representative of the community structure, with clearly defined aims and roles[7]
      ii. Support local initiatives relating to education and training[9]
      iii. Harness available funding[7]
      iv. Create awareness of education and training opportunities[9]
      v. Be responsible for implementing educational issues highlighted throughout this within QSAND and also identified as important for the community
      vi. Develop an implementation plan for future awareness raising and training including timescales and responsibilities[9]
      vii. Monitor the progress of the implementation plan and communicate key outcomes and lessons learnt from the implementation of education[9].
   b. Support (where required) the established committee to educate and train the community on disaster preparedness and resilience (see **CC06 Resilience**). Where applicable train the community in the use of disaster monitoring equipment[6]

Relevant Issues

Appendix D – Links between Assessment and Cross-Cutting issues highlights the assessment issues this cross-cutting issue is likely to be more relevant for.

Supporting Frameworks

INEE Minimum Standards: Contextualised Standards:
http://toolkit.ineesite.org/toolkit/Toolkit.php?PostID=1005

INEE Pocket Guide to Inclusive Education. 2009:
http://toolkit.ineesite.org/toolkit/Toolkit.php?PostID=1007

On-going Monitoring and Evaluation

Monitoring of educational needs and the success of current training is carried out and evaluated. Systematic and impartial evaluations improve education response activities and enhance accountability. This includes ensuring the following key actions:

- Regular evaluations of training activities produce credible and transparent data and inform future education activities (see **guidance notes 1-2**)
- All relevant stakeholders, including representatives of the affected community and education authorities, are involved in evaluation activities (see **guidance note 3**)
- Lessons and good practices are widely shared and inform future advocacy, programmes and policies (see **guidance note 4**).

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Case Studies

Sichuan Province Earthquake, Oct 2008[6]

Rating: +2

This case study highlights the benefits of training and education for disaster preparedness. In Sangzao Middle School earthquake resistant construction and evacuation training was delivered and the students and teachers were taught a procedure to be used in the event of an earthquake. This involved congregating on the outdoor basketball courts. The training meant that the evacuation procedure was implemented within minutes of the earthquake saving all 2,323 students. In contrast in Beichuan Middle school, just 20 miles away, there was no provision of earthquake resistant construction or evacuation training or education for the students and teachers. Following the earthquake the school building collapsed burying 1,000 students and teachers who had failed to evacuate safely.

Pakistan Earthquake 2005 and Flooding 2010&11[5]

Rating: +1

A training programme provided by Red R to help aid workers, humanitarian organisations and government agencies improve the delivery of aid to communities across the country and better prepare for and mitigate the impact of future disasters. In 2010-2011, 900 aid workers who were predominantly Pakistani nationals were trained.

Additional Information

Relevant Definitions

Capability*:* a combination of the strengths, attributes and resources of individuals or available within a community, society or organisation that can be used to achieve agreed goals.

Training: the provision and transfer of knowledge to increase the capability of the local community and equip them with skills.

Skills: are particular abilities that enable individuals to adapt to and deal effectively with the demands and challenges of everyday life and economic activity. In relation to the built environment this can include skills in a certain trade or technique. The acquisition of skills often requires specific training.

(The additional information section further explains the scope of the terms training and skills)

Other Information

The scope of the term training encompasses the following:

- The provision of quality learning opportunities to encourage the transfer of knowledge throughout the recovery and reconstruction process in relation to the built environment for all age groups as appropriate to the context
- The provision of essential support and information beyond the construction sector such as protection, nutrition, water and sanitation and health services throughout early childhood development, primary and secondary schooling, non-formal, technical, vocational, higher and adult training
- The means of capacity building through strengthening decision making, problem-solving and coping strategies that provide physical, psychosocial and cognitive protection and can sustain and save lives[1].

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The scope of the term skills encompasses the following points:

- The ability to demonstrate positive behaviour that enables individuals to adapt to and deal effectively with the demands and challenges of everyday life
- Skills help people to think, feel, act and interact as individuals and as participating members of society
- Skills fall into three main categories cognitive; personal or emotional; and inter-personal or social and can be general (e.g. analysing and using information, communicating and interacting effectively with others) or relate to specific areas (e.g. construction, risk reduction, environmental protection, health promotion, HIV prevention)[1].

References

[**1**] INEE Minimum Standards for Education: Preparedness, Response, Recovery. International Network for Education in Emergencies. 2010. http://toolkit.ineesite.org/toolkit/Toolkit.php?PostID=1002
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[**3**] Education in Emergencies: Including Everyone INEE pocket guide to inclusive education Inter-Agency Network for Education in Emergencies Task Team on Inclusive Education and Disability. 2009. http://toolkit.ineesite.org/toolkit/INEEcms/uploads/1007/INEE_Pocket_Guide_Inclusive_Education_EN.pdf.
[**4**] The Interagency Network for Education in Emergencies, Minimum Standards for Education; Preparedness, Response and Recovery. 2004 http://toolkit.ineesite.org/toolkit/INEEcms/uploads/1007/INEE_Pocket_Guide_Inclusive_Education_EN.pdf.
[**5**] RedR website: http://www.redr.org.uk/en/Our_impact/building-local-skills.cfm Accessed May 2013.
[**6**] ISDR, INEE and The World Bank. Guidance Notes on Safer School Construction. 2009 http://toolkit.ineesite.org/toolkit/INEEcms/uploads/1005/INEE_Guidance_Notes_Safer_School_Constr_EN.pdf.
[**7**] Education Cluster Unit, Country-level Guidance on Education Cluster Establishment and Leadership. http://education.humanitarianresponse.info/document/country-level-guidance-education-cluster-establishment-and-leadership Accessed February 2013.
[**8**] Education Cluster Unit, Making Education a Priority in Emergencies http://education.humanitarianresponse.info/system/files/documents/files/ECWG_Making_the_case_EIE.pdf Accessed February 2013.
[**9**] Education Cluster Unit, Education Cluster Coordinators Handbook, First Edition, 2010.
[**10**] RedR website: http://www.redr.org.uk/en/What_we_do/disaster-relief.cfm Accessed August 2013.
[**11**] International Network for Education in Emergencies Toolkit. 2013: http://toolkit.ineesite.org/toolkit/Home.php
[**12**] INEE Pocket Guide to Supporting Learners with Disabilities. 2010. http://toolkit.ineesite.org/toolkit/Toolkit.php?PostID=1138
[**13**] INEE Guidance Notes on Teaching and Learning. 2010. http://toolkit.ineesite.org/toolkit/Toolkit.php?PostID=1004
[**14**] INEE Pocket Guide to Gender. 2010. http://toolkit.ineesite.org/toolkit/Toolkit.php?PostID=1009

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Checklists

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SET01 Site Selection Checklist A: In-situ Reconstruction or Relocation

Issue	Why the issue may be relevant	Is the issue relevant? (yes / no)	Level of priority (high / medium / low)	Reasoning
Location and Accessibility	- Is the location and accessibility of the affected site appropriate for all members of the community? - By moving to a new site, would this improve the community accessibility and mobility?			
Appropriateness for (re)construction	- Have the ground conditions changed significantly as a result of the disaster event? - Is it feasible to safely and cost-effectively (re)construct in the same location? - Are more appropriate ground conditions available at other potential sites?			
Access to resources	- What was the level of access to resources before the disaster occurred? - Has the access to resources (e.g., water, food, fuel) been disrupted by the disaster? - Is resource access secure for the long term? - Could the access to resources be improved by moving to a new settlement location?			
Risk of future disaster events	- Is there significant risk of another natural disaster affecting the existing settlement location?			

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	- Could the risk from natural hazards be reduced by moving the settlement to a new location?			
Health and wellbeing	- Is the existing settlement free from pollution and hazardous waste? - What would be best for the health of the affected community? - Is the affected community able and willing to move to a new settlement?			
Land tenure	- Do the affected community currently own their land? - Is it possible to legally obtain suitable land in a new location?			
Natural environment	- Would it be more appropriate to redevelop the existing settlement (including the removal of hazardous waste and pollutants)? - Will the natural environment be significantly damaged by moving to a new settlement location?			
Future planning	- If the existing site is redeveloped, will this accommodate the affected community for the foreseeable future?			
Livelihoods	- Can the affected community continue to maintain their livelihoods in their existing settlement location? - Would livelihood opportunities be improved in a different settlement location? How would they be improved?			
Other (please specify)				

Table 4: SET01 Checklist A

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SET01 Site Selection Checklist B: Relocation

Issue	Why the issue may be relevant	Is the issue relevant? (yes / no)	Level of priority (high / medium / low)	Reasoning and measures taken to address issue
Location and accessibility	To ensure that the affected community will not be physically isolated from neighbouring populated areas. Isolated communities are likely to have less economic and social opportunities.			
Appropriateness for construction	To ensure that the site can be safely, securely and comfortably occupied. If shelters cannot be built safely and cost-effectively, the site will not be suitable.			
Resource availability	To ensure that the affected community has access to sustainable resources (e.g., water, fuel, energy). Without vital resources, the community is likely to be less resilient.			
Risk to hazards	To mitigate the risks from natural and man-made hazards in order to minimise the potential for future disasters. If significant risks are not addressed, the community may be severely affected, leading to potential loss of life, livelihoods and possessions.			
Health and wellbeing	To ensure that the quality of life of the affected community is considered.			

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	Significant sources of pollution or inadequate resource supply may cause health issues and impair the development of the community.			
Livelihoods	To ensure that the affected community has ways and opportunities for maintaining their livelihoods.			
Land tenure	To ensure that the land is acquired with respect to local procedures and other land owners to enable the successful integration of the community.			
Natural environment	The community should make minimal impact on the natural environment. Where damage is unavoidable, measures should be taken to replenish the natural environment.			
Cultural acceptability	The site selection should take into account any cultural issues that may dissuade the affected community from occupying the site, or cause conflict with others.			
Future planning	To ensure that the site can accommodate future development.			
Other (please specify)				

Table 5: SET01 Checklist B

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ENE01 Energy Demand and Supply Checklist: Assessing Energy Demand

These tables can be used to produce a simple energy demand model for a community by assessing the energy requirements at an individual shelter level and then aggregating these figures based on the number of shelters / facilities in the community.

Individual Shelters

Activity	**Type of fuel used**	**Amount of fuel used per year**	**Number of shelters**	**Total** (amount of fuel x number of shelters)	**Potential future demand**
Heating					
Cooking					
Lighting					
Other (please specify)					
Total					

Table 6: Individual shelters energy demand

Settlement & Community Facilities

Activity	**Type of fuel used**	**Amount of fuel used per year**	**Number of facilities**	**Total** (amount of fuel x number of facilities)	**Potential future demand**
Heating					
Cooking					
Lighting					
Other (please specify)					
Total					

Table 7: Settlement and community facilities energy demand

Total Community Demand

Activity	**Type of fuel(s)**
Heating	
Cooking	
Lighting	
Other (please specify)	

Table 8: Total community energy demand

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Level of confidence / accuracy in the demand calculated: XX%

(Scale of 0% (no confidence) – 100% (total confidence))

This figure should inform the boundaries of the demand that should be fulfilled by the supply.

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WS01 Water Demand and Supply Checklist: Assessing Water Demand

These tables can be used to produce a simple water demand model for a community by assessing the water requirements at an individual shelter level and then aggregating these figures based on the number of shelters / facilities in the community.

Individual Shelters

Activity	**Amount of water used per year**	**Number of shelters**	**Total** (amount of water x number of shelters)	**Potential future demand**
Consumption				
Cooking				
Hygiene				
Sanitation				
Other (please specify)				
Total				

Table 9: Individual shelters water demand

Settlement & Community Facilities

Activity	**Amount of water used per year**	**Number of facilities**	**Total** (amount of water x number of facilities)	**Potential future demand**
Consumption				
Cooking				
Hygiene				
Sanitation				
Other (please specify)				
Total				

Table 10: Settlement and community facilities water demand

Total Community Demand

Activity	**Amount of water**
Consumption	
Cooking	
Hygiene	
Sanitation	
Other (please specify)	
Total	

Table 11: Total community water demand

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Level of confidence / accuracy in the demand calculated: XX%

(Scale of 0% (no confidence) – 100% (total confidence))

This figure should inform the boundaries of the demand that should be fulfilled by the supply.

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NE01 Checklist: Natural Environment Action Plan

a) Information Collation

Completing this framework will strengthen the understanding of the natural environment.

Species / habitat	Species / Habitat Characteristics and what they depend on to survive	Population size of species and distribution of species / habitat	Contribution of the species / habitat to the local community (i.e. ecosystem services provided)	Current and potential threats to the species (such as unsustainable extraction)	Who has ownership over the local ecology / ecological feature? (This will help to identify who is responsible for implementing required actions – refer to part c)

Table 12: Natural Environment Action Plan - information collation

NB: Considerations should be made relating to the ecology in surrounding areas.

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b) Review collected information

i) The assessment carried out for criteria 2 and 3 will act to inform the prioritisation of species and habitats to be included within the Natural Environment Action Plan.

	ACTION: Management / protection and recovery actions identified in; criteria 2 and 3 above, criteria 3 & 4 in Issue XX or Issue XX	List any potential barriers to the management / protection / recovery approach (e.g., land tenure)	Procedure to address barriers (e.g. gaining permission, aid agency to work with local Gov. to introduce new regulations)	Rank species and habitats (the highest ranked species / habitats should be those that provide the greatest resources and services) (Rate 1-3, 1 being the most valuable)	Feasibility of management (Rate as 1-3, 1 being the most feasible)	Overall Prioritisation (Rank + Feasibility)

Table 13: Natural Environment Action Plan - review of collected information

ii) After completing the above table, where possible the actions with the lowest combined score of priority and feasibility should be implemented first.

iii) NB: Considerations should be made relating to the ecology in surrounding areas.

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c) On-going management and Community Ownership

RESPONSIBILITY - for implementing actions	TIMEFRAME – for implementing action	MONITORING – progress made against action	STATUS: Action in progress / Goal Achieved / Currently unaddressed / Approach needs revised

Table 14: Natural Environment Action Plan – on-going management and community ownership

NB: Considerations should be made relating to the ecology in surrounding areas.

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Glossary

Term	Definition	Source
Access and Non-discrimination	The way in which beneficiaries are enabled to access both physical and social aspects of the community based on their needs alone. All members of the community should be considered in the redevelopment process adequately including to ensure their distinct needs are met without discrimination.	
Accessibility	Means that everyone has equal access to the built environment with no discrimination based on one's level of ability. It can be defined as being the opportunity that an individual, at any given location and of any given ability, possesses to take part in a particular activity or a set of activities within the built environment. It implies that the built environment must be truly usable for all.	Handicap International, Accessibility: How to design and promote an environment accessible to all, November 2009.
Adaptation	The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.	http://www.unisdr.org/we/inform/terminology
Arbour	An external shading feature of vertical posts supporting cross-beams, upon which vegetation is often grown.	BRE Global Limited.
Biodiversity	Biodiversity, or biological diversity, is the variability among living organisms from all sources including inter alia terrestrial, marine and aquatic ecosystems and the ecological complexes of which they are part.	United Nations Environment Programme (UNEP). Environmental Needs Assessment in post–disaster situations - A practical guide for implementation. 2008.
Building Code	A set of ordinances or regulations and associated standards intended to control aspects of the design, construction, materials, alteration and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage.	UNISDR Terminology on Disaster Risk Reduction. www.unisdr.org/eng/library/UNISDR-terminology-2009-eng.pdf
Capability	A combination of the strengths, attributes and resources of individuals or available within a community, society or organisation that can be used to achieve agreed goals.	

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Centralised Water Supply	Extraction, treatment, storage and transmission / distribution of water from a central facility serving a number of neighbourhoods and urban areas. Centralised systems for larger cities are often complex systems and use several water sources sometimes located at considerable distance from the city, different supply zones in the distribution network, and sophisticated treatment technology. Operation and management of centralised systems require considerable technical and organisational capacities and are generally assured by municipal or corporate-owned utilities.	IFRC & Skat. Sustainable Reconstruction of Urban Areas.2012
Climate Change	The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”.	The United Nations Framework Convention on Climate Change (UNFCCC)
Common Property	Where a specified group of people own the resource and can regulate use and exclude non-owners.	Brown. O, Crawford. A and Hammill. (International Institute for Sustainable Development (IISD)). *Natural Disasters and Resource Rights Building Resilience, Rebuilding Lives.* (2006)
Communal Shelter	For this project a communal Shelter is considered as a public or civic shelter that is shared by all members of the community.	
Community	A group of households that identify themselves in some way as having a common interest, bond, values, resources, or needs as well as physical space. A social group of any size whose members reside in a specific locality, share government, and often have a common cultural and historical heritage.	Safer Homes, Stronger Communities (World Bank)
Community Infrastructure	For the purposes of the issue community infrastructure is defined as buildings (public or private) for use by the community such as hospitals, community centres, libraries, entertainment and shopping facilities and educational buildings.	
Community Mapping	In the absence of official titling systems, community land mapping can be used as a means to verify land occupancy. Such verification is provided by neighbours and/or witnesses who can attest to such occupancy.	

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Community Ownership	Enables those within the community to have influence and responsibility for their settlement. This means that projects are more responsive to the needs of the affected population and the community values the projects more highly.	
Community Participation	A process whereby stakeholders can influence development by contributing to project design, influencing public choices, and holding public institutions accountable for the goods and services they provide; the engagement of affected populations in the project cycle (assessment, design, implementation, monitoring, and evaluation).	Safer Homes, Stronger Communities (World Bank)
Community-sensitive design	Community-sensitive design aims to remove the barriers that create undue effort and separation. It enables everyone to participate equally, confidently and independently in everyday activities. An inclusive approach to design offers new insights into the way we interact with the built environment. It creates new opportunities to deploy creative and problem solving skills.	The Commission for Architecture and the Built Environment (CABE) 'The principles of inclusive design' 2006.
Complex Energy Infrastructure	A complex system refers to a grid solution that relies on centralised energy infrastructure.	
Consultation	Consultation is the process of engaging with different stakeholders, representative of the wider community, including the beneficiaries, in order to gain an understanding of their experiences, perspectives, responsibilities and local capacity. This information is used to inform key decisions that affect the community in a manner that is respectful, appropriate and meets their needs. It should be noted that consultation is a step within participation that provides a platform for beneficiaries to discuss their needs and priorities to inform future decisions.	Humanitarian Practice Network. MSF and accountability from global buzzwords to specific solutions. http://www.odihpn.org/humanitarian-exchange-magazine/issue-41/msf-and-accountability-from-global-buzzwords-to-specific-solutions Accessed February 2013 SPHERE, Core Standard 1, pg. 55 The 2010 Humanitarian Accountability Partnership (HAP): Standard in Accountability and Quality Management. Humanitarian Policy Group (HPG) Report – According to need? Needs assessment and decision-making in the

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		humanitarian sector. 2003 http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/285.pdf Accessed February 2013. Inter-agency standing committee. Task Force on Needs assessment. http://www.humanitarianinfo.org/iasc/pageloader.aspx?page=content-subsidi-common-default&sb=75 Accessed February 2013.
Contractor Build	Hiring of contractors (commercial enterprises), for entire implementation of the construction and related services. This approach is often comparatively expensive and frequently has low support and buy-in from future residents of the houses.	World Wildlife Fund, Inc. and American National Red Cross. Green Recovery and Reconstruction tool: Materials and the supply Chain. 2010
Culturally Appropriate Reconstruction	Culturally appropriate practices, such as burials and religious ceremonies and practices are often an essential element of people's identity, dignity and capacity to recover from disaster. Similarly societies all over the world have developed specific local building cultures, resulting in the establishment of recognisable "situated" architectures and building systems respectful of their local environment that should be respected for culturally appropriate reconstruction.	SPHERE, pg. 57 (PDF 64 "Culturally appropriate practice") & "Promoting local building cultures to improve the efficiency of housing programmes" Manifesto on Local Knowledge, 2010
Culture of Non-violence	This culture respects human beings, their well-being and dignity; it honours diversity, non-discrimination, inclusiveness, mutual understanding and dialogue, willingness to serve, cooperation and lasting peace. It is a culture where individuals, institutions and societies refrain from harming others, groups, communities or themselves. There is a commitment to positive and constructive solutions to problems, tensions and the source of violence; violence is never an option.	

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Customary Tenure	Systems referring to the possession of rights to use and allocate land by a group sharing the same cultural identity or established by customs.	United Nations Human Rights Council (2012) *Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living* A/HRC/25/54 (30 December 2013)
Damage Assessment	A damage assessment is an assessment of the total or partial destruction of physical assets both physical units and reconstruction costs. One of the objectives of structural damage assessments is to analyse why some buildings were badly damaged and others less so. The assessment can be of public buildings and facilities local authorities', churches, schools, clinics market places.	SKAT, Sustainable Construction in Urban Areas , 2012
Data Privacy	This relates to the collection and dissemination of data, technology, the public expectation of privacy, and the legal and political issues surrounding them. Privacy concerns exist wherever personally identifiable information is collected and stored – in digital form or otherwise. Improper or non-existent disclosure control can be the root cause for privacy and security issues.	
De-centralised Water Supply Systems	Based on the same components as larger centralised systems but use water resources available in closer proximity, supply smaller areas and often use only basic treatment technologies. Decentralised systems can be managed by utilities but also by community based schemes, which make them potential alternative solutions for self-supply of communities in situations with deficient public water supplies.	IFRC & Skat. Sustainable Reconstruction of Urban Areas.2012
Design Code	A design code is a set of illustrated design rules and requirements which instruct and may advise on the physical development of a site or area. The graphic and written components of the code are detailed and precise, and build upon a design vision such a masterplan or a design and development framework for a site or area.	From CLG, 'Preparing design codes: a practice manual', RIBA Publishing, 2006
Direct Implementation	Aid agencies chose to direct implementation effectively acting as a main contractor. They provided materials, hired skilled labour and managed the construction process themselves. Many communities prefer this method of implementation over contractor-build as they had greater trust in humanitarian agencies than in contractors. They can directly express their needs and complaints to the implementing agency, and it was easier to maintain engagement throughout	Practical Action. Disasters and Emergency Committee and Arup. Lesson from Aceh: Key considerations in post disaster reconstruction. Warwickshire, Practical Action Publishing, 2010.

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	the process. The challenge for agencies could be recruiting, training and retaining skilled labour in a competitive market, and establishing supply chains.	
Disaster	A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.	http://www.unisdr.org/we/inform/terminology
Disaster Relief	Disaster relief provides assistance to protect life and health and meet the life-saving and immediate needs of people affected by disaster.	IFRC Recovery programming guidance 2012
Disaster Risk Reduction (DRR)	There are different definitions of the term, but it is generally understood to mean the broad development and application of policies, strategies and practices to minimize vulnerabilities and disaster risks throughout society.	
Discrimination	Any distinction, exclusion, restriction or preference based on gender, race, colour etc., which has the purpose or effect of nullifying or impairing the recognition, enjoyment or exercise, on an equal footing, of human rights and fundamental freedoms in the political, economic, social, cultural or any other field of public life.	UN Convention on the Elimination of All Forms of Discrimination against Women and the International Convention on the Elimination of All Forms of Racial Discrimination definition, taken from The World Disasters Report: 2007, Focus on discrimination, IFRC. ISBN 92-9139-126-3
Early Recovery	Early recovery is the process of people's lives returning to normal in the immediate aftermath of a disaster. It involves providing assistance to people in the earliest stages of disaster response in conjunction with the provision of relief, improving the effects of the relief and providing the basis for longer-term recovery. Early recovery enables people to participate more readily in longer-term recovery activities.	IFRC Recovery programming guidance 2012
Ecological Corridor	A thin strip of vegetation used by wildlife and potentially allowing movement of biotic factors between two areas.	European Environment Agency. Glossary – Ecological Corridors. http://glossary.eea.europa.eu/terminology/concept_html?term=ecological%20corridor Accessed December 2012.

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Ecology	The scientific study of the processes influencing the distribution and abundance of organisms, and the interactions among organisms.	
Economic Potential	The output that could be produced in an area if all firms were operating at full capacity.	Essentials of Economics, John Sloman, 2007
Economic Viability	Ensuring the economic decisions will enable the best possible outcome for the reconstruction process and community without compromising the future prospects and prosperity of that community.	
Ecosystem	A functional unit consisting of all the living organisms (plants, animals and microbes) in a given area, as well as the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size – a log, pond, field, forest, or the Earth's biosphere – but it always functions as a whole unit. Ecosystems are commonly described according to the main type of vegetation (e.g. forest ecosystem, old-growth ecosystem or range ecosystem).	United Nations Environment Programme (UNEP). Environmental Needs Assessment in post–disaster situations - A practical guide for implementation. 2008.
Ecosystem Maps	The graphic portrayal of spatial distributions of vegetation, ecosystems, or their characteristics.	Ecomii. Ecomii Science Encyclopaedia - Vegetation and ecosystem mapping. http://www.ecomii.com/science/encyclopedia/vegetation-and-ecosystem-mapping Accessed December 2012
Ecosystem Services	The benefits that people and communities obtain from ecosystems. The conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life. Examples include provision of clean water, maintenance of liveable climates (carbon sequestration), pollination of crops and native vegetation, and fulfilment of people's cultural, spiritual, intellectual needs.	Millennium Ecosystem Assessment Food and Agriculture Organization. FAO/Netherlands Conference Glossary http://www.fao.org/ag/wfe2005/glossary_en.htm Accessed December 2012.
Embodied Energy	The sum total of the energy spent in the life cycle of a building material or component. This sum includes all of the energy required for the existence of that component, including extraction or harvest, transport, manufacture, assembly, installation, maintenance, and destruction and disposal.	World Wildlife Fund, Inc. and American National Red Cross. Green Recovery and Reconstruction tool: Materials and the Supply Chain. 2010
Empowerment	Authority given to an institution or organization (or individual) to determine policy and make decisions. Inclusion of people who are ordinarily outside of the decision making process.	Safer Homes, Stronger Communities (World Bank)

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Endangered Species	Any species which is in danger of extinction throughout all or a significant portion of its range.	Biology online. Endangered Species Definition. http://www.biology-online.org/dictionary/Endangered_species Accessed December 2012.
Endemic Species	Species native to, and restricted to, a particular geographical region.	Food and Agriculture Organization. FRA 2005 - Pilot study for country reporting. http://www.fao.org/docrep/007/ae354e/AE354E28.htm Accessed December 2012.
Energy Infrastructure	Energy Infrastructure includes: • The physical infrastructure required for the exploration, development and production of energy • Transformation of energy, such as electric power generation and oil refining • Transmission and distribution of energy, such as electric power transmission lines and oil and gas pipelines • Storage of energy products.	
Energy Supply	Energy supply refers to the generation of energy and captures all forms of supply from large scale energy production (electricity) to small scale (domestic cooking and lighting).	
Environmental Degradation	Environmental degradation describes the erosion of the natural environment through the depletion of resources, the destruction of ecosystems and the extinction of plant and animal species. Reduction of the capacity of the environment to meet social and ecological objectives and needs.	FWR Group. Definition of Environmental Degradation. http://www.fwrgroup.com.au/environmental-degradation.html Accessed December 2012. IFRC & Skat. Sustainable Reconstruction of Urban Areas.2012
Environmental Impact Assessment	Process by which the environmental consequences of a proposed project or programme are evaluated, undertaken as an integral part of planning and decision-making processes with a view to limiting or reducing the adverse impacts of the project or programme.	http://www.unisdr.org/we/inform/terminology

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Environmental Stress	Physical, chemical, and biological constraints on the productivity of species and on the development of ecosystems. When the exposure to environmental stressors increases or decreases in intensity, ecological responses result. Stressors can be natural environmental factors, or they may result from the activities of humans.	Jrank Science Encyclopaedia. Ecological Stress. http://science.jrank.org/pages/6549/Stress-Ecological.html Accessed December 2012.
Essential Service	Essential service, or basic needs can be defined as - The items that people need to survive. This can include safe access to essential goods and services such as food, water, shelter, clothing, health care, sanitation, and education.	Safer Homes, Stronger Communities (World Bank)
Extraction	Removal from the earth of a raw material that cannot be replenished (e.g., iron for steel or limestone for cement).	World Wildlife Fund, Inc. and American National Red Cross. Green Recovery and Reconstruction tool: Materials and the supply Chain. 2010
Formal Property Rights	**T**hese are the rights that are sanctioned and legally recognised by the state and can be protected by the state's legal system. Most often, formal property rights are titled and/or registered or recorded under a state system.	Mitchell. D. *Assessing and Responding to Land Tenure Issues in Disaster Risk Management. Training Manual.* 2011
Green Infrastructure	Green infrastructure is a term that can encompass a wide array of specific practices. It is an approach to water management that protects, restores, or mimics the natural water cycle. Green infrastructure is effective, economical, and enhances community safety and quality of life. Green infrastructure incorporates both the natural environment and engineered systems to provide clean water, conserve ecosystem values and functions, and provide a wide array of benefits to people and wildlife.	*Adapted from the American Rivers definition http://www.americanrivers.org/initiatives/pollution/green-infrastructure/what-is-green-infrastructure/*
Green Purchasing	Procurement of products and services that have a reduced effect on human health and the environment when compared with competing products or services that serve the same purpose.	UNDP. Environmental Procurement .Practical Guide volume 1. Denmar, UNDP, 2008.
Harvesting	Acquisition of raw materials such as wood, bamboo, or thatch that are typically plant-based materials and can be replenished over time.	World Wildlife Fund, Inc. and American National Red Cross. Green Recovery and Reconstruction tool: Materials and the supply Chain. 2011
Hazard	A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage,	http://www.unisdr.org/we/inform/terminology

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	loss of livelihoods and services, social and economic disruption, or environmental damage.	
Hazardous Waste	Types of waste that are harmful to human health, or to the environment, either immediately or over an extended period of time. A material that poses substantial or potential threats to public health or the environment and generally exhibits one or more of these characteristics: • ignitable (i.e. flammable) • oxidant • corrosive • radioactive • explosive • toxic • carcinogenic • disease vector.	Environment Agency UN Habitat, United Nations: Solid Waste Management in the World's Cities – Water and Sanitation in the World's Cities, London, Washington, DC, 2010
Household Shelter	For this project Household Shelter refers to an individual shelter for an individual or family.	
Human Wildlife Conflict	Conflict between people and animals is one of the main threats to the continued survival of many species in different parts of the world, and is also a significant threat to local human populations. If solutions to conflicts are not adequate, local support for conservation also declines.	World Wildlife Fund (WWF). Human Wildlife Conflict. http://wwf.panda.org/about_our_earth/species/problems/human_animal_conflict/ Accessed December 2012.
Infrastructure	The basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons. In the context of this tool infrastructure is defined as community infrastructure elements (water supply, sanitation, pathways, healthcare facilities, education facilities) that are typically among the recovery and reconstruction efforts under taken by aid agencies in the aftermath of disaster.	Post-disaster community infrastructure rehabilitation and (re)construction guidelines. IFRC & Red Crescent societies.2012. Switzerland
Informal Property Rights	These rights do not have official state recognition and may not have official protection but are recognized by customary law or by local authorities.	Mitchell. D. *Assessing and Responding to Land Tenure Issues in Disaster Risk Management. Training Manual.* 2011

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Informal Tenure	Systems most common in urban areas - these are often hybrid systems that have emerged in response to the difficulties of existing systems to cater for rapidly expanding cities and their urban land markets.	Payne, G. and Durand-Lasserve, A., *Holding on: security of tenure – types, policies, practices and challenges* (2012) www.ohchr.org/EN/Issues/Housing/Pages/StudyOnSecurityOfTenure.aspx
Invasive Species	Non-native species which have been intentionally or accidently introduced by humans and threaten ecosystems, habitats or species.	European Environment Agency. Glossary – Invasive Species. http://glossary.eea.europa.eu/terminology/concept_html?term=invasive species Accessed December 2012. AND World Wildlife Fund (WWF). Impact of invasive Alien Species. http://wwf.panda.org/about_our_earth/species/problems/invasive_species/ Accessed December 2012.
Land Administration	The system and processes of making tenure rules operational. It includes the administration of land rights, land use regulation, and land valuation and taxation. Land administration may be carried out by agencies of the State, or through local or customary leaders.	UN-HABITAT and Global Land Tool Network *Monitoring Security of Tenure in Cities* (2011)
Land Tenure	The set of relationships with respect to housing and land, established through statutory law or customary, informal or religious arrangements.	
Land-use Planning	The process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including consideration of long term economic, social and environmental objectives and the implications for different communities and interest groups, and the subsequent formulation and promulgation of plans that describe the permitted or acceptable uses.	http://www.unisdr.org/we/inform/terminology
Landlessness	The state of owning no land. In the case of a post-disaster context, landlessness refers to the physical loss of land due to the disaster by two key groups 1) tenants and other secondary holders of rights to land, and 2) informal landholders whose rights are not recognised by State law.	Norwegian Refugee Council: *Housing, Land and Property Training Manual* (2011)

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Legal Pluralism	Is the co-existence of parallel source of authorities (e.g., statutory and customary) considered as legitimate by those who use them and rendering justice in similar matters.	Norwegian Refugee Council: *Housing, Land and Property Training Manual* (2011)
Livelihood Activities	The activities that the community engage with as required for a means of living, to support their livelihoods.	FAO; From the Forum on operationalizing sustainable livelihoods approaches. http://www.fao.org/docrep/003/X9371e/x9371e11.htm Accessed February 2013.
Livelihood Assets	The assets that the community have access to and use to support their livelihoods. These can include natural resources, technologies, their skills, knowledge and capacity, their health, access to education, sources of credit, or their networks of social support.	FAO; From the Forum on operationalizing sustainable livelihoods approaches. http://www.fao.org/docrep/003/X9371e/x9371e11.htm Accessed February 2013.
Livelihoods	Livelihoods looks at the ways in which people manage their lives to obtain and use resources to meet their needs and wants, whether individually or in groups. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.	IFRC, Guidelines for Livelihood Programming. 2010 (http://www.livelihoodscentre.org/livelihoods/ShowPropertyServlet?nodePath=%2FLivelihoods%2FKnowledge+repository%2FPublications%2FFiles%2F01.+IFRC+LHH+Guidelines+2010+EN.pdf&_pageLabel=pages_documentDetail_page) Women's Refugee Commission, Building Livelihoods and A Field Guide for Practitioners in Humanitarian Environments. 2009 (http://www.livelihoodscentre.org/livelihoods/ShowPropertyServlet?nodePath=%2FLivelihoods%2FKnowledge+repository%2FPublications%2FFiles%2F11.+WRC+Building+Livelihoods+2009+EN.pdf&_pageLabel=pages_documentDetail_pageot have to migrate or sell off assets.)

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Local Enterprise Zone	Enterprise zones encourage job creation and capital investment. Normally administered by central government they offer incentives (usually in the form of tax relief) to businesses based in that area.	Adapted from City of Oklahoma City Chamber of Commerce here
Low Ecological Value	For the purposes of this assessment, land is considered of low ecological value where; it is considerably less bio-diverse relative to the surrounding area and national levels of biodiversity, where it is ≥2km from Special Areas of Conservation, Special Protection Areas, Ramsar Sites and Sites of Special Scientific interest and where it does not contain any species of national or international importance (e.g. as outlined in Local Biodiversity action plans / or similar)	BRE Global. BREEAM New Construction, Non Domestic Buildings - Technical Manual (SD5073-2.0:2011). (2011).
Minority Groups	When referred to in the QSAND criteria this includes marginalised and vulnerable groups.	
Mitigation	The lessening or limitation of the adverse impacts of hazards and related disasters.	http://www.unisdr.org/we/inform/terminology
Natural Capital	Natural capital are natural assets in their role of providing natural resource inputs and environmental services for economic production.	From OECD definition here
Natural Hazard	Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.	http://www.unisdr.org/we/inform/terminology
Natural Surveillance	The placement of physical features, activities and people in such a way as to maximise visibility. When considered in crime prevention this strategy utilises design features to increase the visibility of a property or building. Keeping intruders under observation thereby making them less likely to commit offenses, greater visibility makes legitimate users feel safer. • Use open style designs that maximize visibility. • Illuminate building entrances, pedestrian paths and parking areas. • Watch for landscaping and lighting conflicts. • Orient building entrances toward high-traffic (pedestrian and vehicular) areas. • Use internal and external windows, as well as activity areas, to increase passive surveillance	Crime Prevention Through Environmental Design
Overhang	An extension of a roof structure over a wall structure or a dedicated projection above an opening to provide shading and prevent water ingress.	BRE Global Limited.
Participation	Participation refers to the full and equal involvement of all members of the community in decision-making processes and activities that affect their lives, in both public and private	Adapted from: 'A community-based approach in UNHCR operations', 2008

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	spheres. The level of participation will depend upon how rewarding people find the experience and whether they gain something from the process. Participation also requires that instead of "informing and deciding for people, we listen to them. Our role is to facilitate discussions and analysis with persons of concern so that they can identify their own priorities and preferred outcomes. Participation: – is a right, and essential for informed decision-making – promotes protection and reduces feelings of powerlessness – enables UNHCR to draw on the insights, knowledge, capacities, skills and resources of persons of concern – empowers women, men, girls and boys of different backgrounds to rebuild self-esteem and self-confidence; and – helps people of concern cope with the trauma of forced displacement.	
Personal Data	Any information relating to an identified or identifiable person ('data subject') who can be identified, directly or indirectly, in particular by reference to an identification number or to one or more specific factors (physical, physiological, mental, economic, cultural, social).	http://ec.europa.eu/justice/data-protection/glossary/index_en.htm
Persons with Disabilities	Persons who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others.	Handicap International (2008), Toolkit on Protection of Persons with Disabilities, page 10.
Pest Species	A species (native or non-native) that causes significant damage to a valued resource.	Invasive Animals Cooperative Research Centre. http://www.feral.org.au/pest-species/ Accessed December 2012.
Physical Planning	A design exercise based on a land use plan used to propose the optimal infrastructure for public services, transport, economic activities, recreation, and environmental protection for a settlement or area. A physical plan can have both rural and urban components, although the latter usually predominates.	Safer Homes, Stronger Communities (World Bank)
Preparedness	The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.	http://www.unisdr.org/we/inform/terminology

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Prevention	The outright avoidance of adverse impacts of hazards and related disasters.	http://www.unisdr.org/we/inform/terminology
Previously Developed	Land which is or was occupied by a permanent structure, including the curtilage of the developed land and any associated fixed surface infra-structure. For the purposes of this assessment, land is considered as previously developed where land has contained permanent built structure(s) within the last 50 years.	www.planningportal.gov.uk Planning policy Guidance (PPG) 3: Housing (BREEAM definition) BRE Global. BREEAM New Construction, Non Domestic Buildings - Technical Manual (SD5073-2.0:2011). (2011).
Privacy	A state in which one is not observed or disturbed by other people. This considers acoustic, visual and also personal privacy in terms of information.	Oxford Dictionary
Private Property	Where resources are owned by individuals or corporations and their rights are defined by terms of exclusivity and transferability.	Brown. O, Crawford. A and Hammill. (International Institute for Sustainable Development (IISD)). *Natural Disasters and Resource Rights Building Resilience, Rebuilding Lives.* (2006)
Processing	Involves conversion of a raw material into a bulk material that can be used to manufacture a building product.	World Wildlife Fund, Inc. and American National Red Cross. Green Recovery and Reconstruction tool: Materials and the Supply Chain. 2010
Protected Area	Portions of land protected by special restrictions and laws for the conservation of the natural environment. They include large tracts of land set aside for the protection of wildlife and its habitat; areas of great natural beauty or unique interest; areas containing rare forms of plant and animal life; areas representing unusual geologic formations; places of historic and prehistoric interest; areas containing ecosystems of special importance for scientific investigation and study; and areas that safeguard the needs of the biosphere.	United Nations Environment Programme (UNEP). Environmental Needs Assessment in post–disaster situations - A practical guide for implementation. 2008.
Protected Species	Threatened, vulnerable or endangered species which are protected from extinction by preventative measures.	European Environment Agency. Glossary – Protected Species. http://glossary.eea.europa.eu/terminology/concept_html?term=protected

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		species Accessed December 2012.
Public Space	Public realm (or space) has been defined by the Office of the Deputy Prime Minister (now Department for Communities and Local Government) as: "…all those parts of the built and natural environment where the public has free access. It encompasses: all the streets, squares and other rights of way, whether predominantly in residential, commercial or community / civic uses; the open spaces and parks; and the 'public / private' spaces where public access is unrestricted (at least during daylight hours). It includes the interfaces with key internal and external and private spaces to which the public normally has free access".	BREEAM Communities / DCLG-RIBA
Qualified Professionals	Qualified professionals can include project supervisors, civil and structural engineers, planners, and architects. They should not only have technical and organisational capacities, but also have experience in managing teams and good interpersonal skills.	
Quarry	A site from which rocks, gravel, sand or clay is extracted in substantial quantities.	
Reconstruction	Activities involving the repair and rebuilding of assets. Assets include physical infrastructure such as roads, transport services, utility supplies, public buildings, markets, and housing. These activities may involve minor repairs, infrastructure restoration or major rebuilding and may be undertaken by individuals (repairing their own properties) or by others such as contractors or locally trained artisans.	Summary of the IFRC Recovery programming guidance 2012
Recovery	The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. Recovery, in the context of disaster response, is a process that results in people's lives returning to normal in such a way that they will be more resilient to future disasters. The extent to which people can recover after a disaster depends on the situation beforehand and how robust or resilient their resources are to withstand the effects of the disaster. For some, recovery will be relatively quick, while for others it may take years.	http://www.unisdr.org/we/inform/terminology IFRC Recovery programming guidance 2012
Recycling	The melting or crushing of the component and its separation into its original constituent materials, which then re-enter the manufacturing process as raw materials[.	Reuse and Recycling from: World Habitat Awards, Ecomaterials in

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		Social Housing Projects, 2007
Rehabilitation of Infrastructure	The rehabilitation and (re)construction of infrastructure aims to restore the functioning of the existing structures and services or upgrade them to meet current needs (i.e., refurbishing water supplies to ensure potable water is reliably produced, to reconstructing damage hospitals and schools.	IFRC – International Federation of Red Cross and Red Societies, 2012, Post disaster community infrastructure rehabilitation and reconstruction guidelines, IFRC, Geneva, Switzerland.
Religious Tenure	Systems whereby all or some land is owned and managed by religious authorities.	United Nations Human Rights Council (2012) *Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living* A/HRC/25/54 (30 December 2013)
Representative Participation	Aims to understand and address the barriers to participation faced by different people. It ensures measures are taken to encourage the participation of members of all groups of the affected people such as the young and old, men and women and that special efforts are made to include people who are not well represented, are marginalised (e.g. by ethnicity or religion) or otherwise 'invisible' (e.g. housebound or in an institution). Representative participation also promotes the participation of youth and children so far as it is in their best interest and when measures are taken to ensure that they are not exposed to abuse or harm.	International Federation of Red Cross and Red Crescent Societies (2011): Participatory Approach for Safe Shelter Awareness (PASSA). Adapted from SPHERE handbook, page 57 (PDF pg. 64)
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.	http://www.unisdr.org/we/inform/terminology
Response	The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.	http://www.unisdr.org/we/inform/terminology
Responsible Sourcing	The management and implementation of sustainable development principles in the provision, procurement and traceability of construction materials and components.	

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Reuse	The use of a whole component, in largely unchanged form and for a similar function; for e.g. a brick used as a brick.	Reuse and Recycling from: World Habitat Awards, Ecomaterials in Social Housing Projects, 2007
Safety	Freedom of beneficiaries and livestock from physical or psychosocial injury or harm, through the provision of information and appropriate internal and external environments.	INEE Minimum Standards for Education: Preparedness, Response, Recovery." Inter-Agency Network for Education in Emergencies. 2004 Security Unit: International Federation of Red Cross and Red Crescent Societies (2013) Jolly, R., Ray, D.B. (2006), "The Human Security Framework and National Human Development Reports." UNDP
Sanitation	Sanitation systems provide the collection of used water in households and human waste, including its conveyance, treatment and disposal or reuse.	
Security	A process that enhances - environmental awareness leading to the implementation and maintenance of measures that will mitigate identified risks and enable people to work and live in as safe a manner as possible including; – measures that enhance the protection of communities and their interests, especially the vulnerable, from danger and fear during daily life activities.	Security Unit: International Federation of Red Cross and Red Crescent Societies (2013)
Security of Tenure	The degree of confidence that land users will not be arbitrarily deprived of the rights they enjoy over land or the benefits that flow from it; the certainty that these rights will be recognised and protected in case of specific challenges; or, more specifically, the right of all individuals and groups to effective government protection against forced evictions.	UN-HABITAT, *Land and Natural Disasters: Guidance for Practitioners* (2010)
Self-Build	The affected families manage the rebuilding of their houses on their own. Users can contribute with their own resources, if available, whether cash or in-kind. This strategy often requires that the families involved receive training.	World Wildlife Fund, Inc. and American National Red Cross. Green Recovery and Reconstruction tool:

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		Materials and the supply Chain. 2010
Settlement	Settlement is defined as the permanent immediate physical environment that a community inhabits.	BRE Global Limited.
Shade	An object used to minimise solar gains (e.g., a fabric curtain, timber screen).	BRE Global Limited.
Shelter	A habitable covered living space, providing a secure, healthy living environment with privacy and dignity for the groups, families, and individuals residing within it. Shelter refers to the structures which are directly used for protection from environmental conditions, as a location for basic, productive and social activities which impact on and use resources from the environment, and as a place where physical possessions are used and stored. A dwelling place considered as a refuge from external conditions.	Safer Homes, Stronger Communities (World Bank) Emergency Shelter Policy with Regards to Environmental Issues BRE Global Limited.
Shutter	A cover (often hinged) for an opening which may be louvered, solid timber, fabric, etc.	BRE Global Limited.
Simple Energy Infrastructure	A local or standalone energy supply that operates without the need to be connected to centralised infrastructure (e.g., solar torches, microgeneration technologies, portable wind turbines).	
Skills	Are particular abilities that enable individuals to adapt to and deal effectively with the demands and challenges of everyday life and economic activity. In relation to the built environment this can include skills in a certain trade or technique. The acquisition of skills often requires specific training.	
Socio-Natural Hazard	The phenomenon of increased occurrence of certain geophysical and hydro-meteorological hazard events, such as landslides, flooding, land subsidence and drought, that arise from the interaction of natural hazards with overexploited or degraded land and environmental resources.	http://www.unisdr.org/we/inform/terminology
Solid Waste Management	This is the process of handling and disposal of organic and hazardous solid waste which, if unattended appropriately, can pose public health risks to the affected population and can have a negative impact on the environment.	The Sphere project: humanitarian Charter and Minimum standards in Humanitarian response, 2011
Spatial Planning	Spatial planning deals with the arrangement of settlements on a variety of scales, looking at shelters, paths, streets, communities, settlements and how they relate to each other. Effective spatial planning considers the physical planning of	Definition has been developed in reference to definition of physical and land use planning definitions in - Safer Homes, Stronger

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	an area as well as the land use planning in a settlement.	Communities (World Bank)
State Property	Where governments regulate and control access to resources which are owned by citizens of the state.	Brown. O, Crawford. A and Hammill. (International Institute for Sustainable Development (IISD)). *Natural Disasters and Resource Rights Building Resilience, Rebuilding Lives.* (2006)
Statutory Tenure	Systems, established by law or statutes—they consist of two main types, private and public tenure systems, and can guarantee individual or collective rights.	United Nations Human Rights Council (2012) *Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living* A/HRC/25/54 (30 December 2013)
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.	1987 Brundtland Commission
Sustainable Energy	The use of renewable sources of energy (e.g., wind, solar, timber from sustainably managed sources).	
Sustainable Management	Refers to the long term organisation and coordination of the activities of a community in accordance with certain policies and in achievement of defined sustainable objectives.	
Sustainable Rate	Material harvest at a sustainable rate relates to harvesting materials (typically plant matter) at a rate that takes into consideration regeneration times of the material resources.	World Wildlife Fund, Inc. and American National Red Cross. Green Recovery and Reconstruction tool: Materials and the supply Chain. 2010
Sustainable Timber	Timber from forests that are managed in such a way to ensure that they are replanted.	Timber as a construction material in humanitarian relief, UN, OCHA, IFRC 7 CARE, 2009
Telecommunication	Any means of transmission, emission, or reception of signs, signals, writing, images, sounds or intelligence of any nature, by wire, radio, optical fibre or other electromagnetic system.	Tampere Convention on the provision of Telecommunication Resources for Disaster Mitigation and Relief Operations.1999
Telecommunication Resources	Personnel, equipment, materials, information, training, radiofrequency spectrum, network or	Tampere Convention on the provision of Telecommunication

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	transmission capacity or other resources necessary to telecommunications.	Resources for Disaster Mitigation and Relief Operations.2000
Tenure Arrangements	Sets of formal and informal documented and undocumented practices, rules and institutions which determine access to and control over housing, land and natural resources,	Mitchell. D. *Assessing and Responding to Land Tenure Issues in Disaster Risk Management. Training Manual.* 2011
Thermal Comfort	The term 'thermal comfort' describes a person's state of mind in terms of whether they feel too hot or too cold.	BRE Global Limited.
Thermal Mass	The mass in a shelter (including the structure and the furnishings) that is used to absorb heat when internal temperatures rise and then to release the heat as the shelter cools.	BRE Global Limited.
Training	The provision and transfer of knowledge to increase the capability of the local community and equip them with skills.	
Transitional Shelter	Shelter that provides a habitable covered living space and a secure, healthy living environment with privacy and dignity for those within it during the period between a conflict or natural disaster and the achievement of a durable shelter solution.	Safer Homes, Stronger Communities (World Bank)
Vector	A vector is a disease-carrying agent and vector-borne diseases are a major cause of sickness and death in many disaster situations.	Sphere Handbook
Ventilation	The circulation of air around a building and the exchange of air to the outside.	BRE Global Limited.
Vertical Fins	Vertical elements that project outwards around a window or opening in order to limit solar gains.	BRE Global Limited.
Violence	The use of force or power, either as an action or omission in any setting, threatened, perceived or actual against oneself, another person, a group, a community that either results in or has a high likelihood of resulting in death, physical injury, psychological or emotional harm, mal-development or deprivation.	IFRC Strategy on Violence Prevention, Mitigation and Response, 2011-2020, IFRC, agreed at the High-level meeting on violence, Geneva, 2008.
Volatile Organic Compound	Any organic liquid and/or solid that evaporates spontaneously at the prevailing temperature and pressure of the atmosphere with which it is in contact.	BS EN ISO 11890
Vulnerability	The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.	http://www.unisdr.org/we/inform/terminology
Water Demand	Water requirements for a particular purpose, as for irrigation, power, municipal supply, plant transpiration or storage.	US department of Interior. Glossary Page – Water Demand.
Waste Management	Waste management is the collection, transport, processing or disposal, managing and monitoring of waste materials.	BRE Global Limited.

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Wastewater	There are three types of wastewater, or sewage: domestic sewage, industrial sewage, and storm sewage. Domestic sewage carries used water from houses and apartments; it is also called sanitary sewage. This typically consists of wastewater that is generated from processes such as washing dishes, laundry and bathing .Industrial sewage is used water from manufacturing or chemical processes. Storm sewage, or storm water, is runoff from precipitation that is collected in a system of pipes or open channels.	IFRC & Skat. Sustainable Reconstruction of Urban Areas. 2012

Table 15: Glossary

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Appendix A – Concept, assumptions and development approach

Background to the development of QSAND

The QSAND tool is the output of a project to develop a self-assessment sustainability tool focused on shelter & settlement recovery / reconstruction in the aftermath of natural disasters. The project was formed from discussions between BRE Global Limited ("BRE Global") and IFRC on how long-term sustainability impacts can be better considered and integrated into the disaster relief / recovery operations of the humanitarian sector.

Concept

The aim of the QSAND project was to develop an assessment tool, building on the experience and features of its world leading whole building assessment method – BREEAM. It aims, to inform and measure the degree to which sustainability impacts and performance have been considered at key stages in the disaster timeline and within the context of shelter and settlement. Where practical, early decisions made should go on to influence positively the sustainability of the long term reconstruction of the disaster hit area. The simple diagram below provides a visual representation of how a range of factors impact the disaster recovery process and the role the QSAND tool will play in helping to promote a holistic sustainability approach.

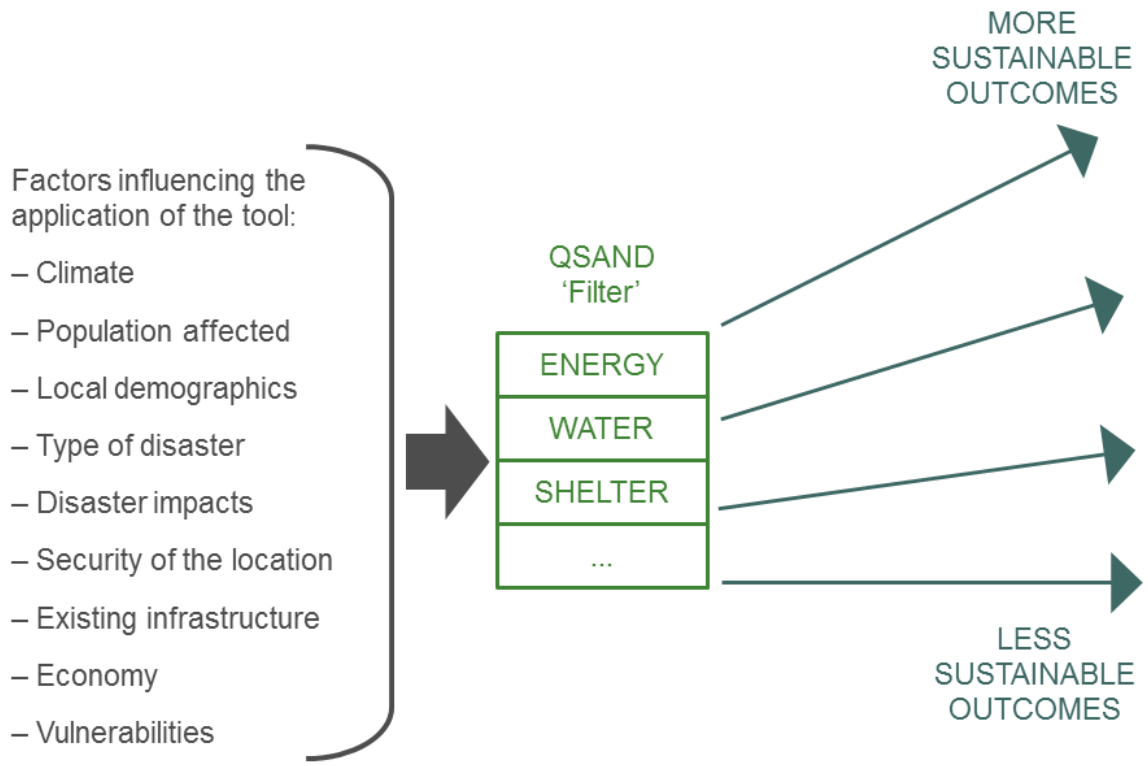

Figure 8: QSAND concept diagram

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Assumptions made in defining the parameters of the QSAND tool

In order to set a basis for developing the tool and to begin to outline its structure, content and scope, it was necessary to make a range of assumptions, listed below. This provided a guiding framework within which to develop a functional, useful and relevant tool.

Security	The tool is designed to be used in locations that are secure (i.e., no immediate risk to life).
Stability	The tool will be designed to be used in locations that are stable (i.e., basic shelter, access to food and water).
Governance & Stability	There will be a basic level of governance and stability within the affected community so that decisions concerning redevelopment can be realistically considered and implemented.
Pre-existing conditions	The criteria within the tool will be flexible enough to allow its use regardless of the level of infrastructure and technological advancement in the affected community.
Post-disaster input	The tool will be relevant to affected communities where external support is required for short and longer term shelter and settlements solutions to take place.
User	The tool will be used by an individual with the appropriate training and expertise, where relevant.
Outcomes	Use of the tool will lead to more sustainable outcomes in the context of the shelter and settlement.
Integration of new / existing construction / infrastructure	The tool will be designed to consider the relationship between existing and new construction (shelter interventions and infrastructure, as appropriate).
Risk Assessment	The tool will not be designed to be a method of assessing disaster risk.
Determining the Priorities	Activities / assessments have taken place with relevant stakeholders to assess and determine priorities for the recovery and reconstruction process relating to the affected community.

Table 16: Basis for development

These assumptions formed the basis on which the tool was developed (See the '**Assumed disaster context**' within the Scope section.

Development Approach

The development of the tool has combined a number of different methods in order to understand and respond to the needs of the humanitarian sector:

- Desk and field research as appropriate
- Consultation with relevant stakeholders both strategic (UN, NGOs, etc.) and technical as appropriate
- Peer review by likely key users (e.g., aid agencies)
- Drawing on BREEAMs extensive experience in developing environmental and sustainability assessment methods both UK and international (e.g., BREEAM Communities, BREEAM Buildings etc.)

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Consultation and Input

QSAND was developed using significant levels of consultation with those working in the humanitarian sector. Consultation and feedback from relevant stakeholders was essential for the delivery of the QSAND tool not only to ensure development of appropriate, relevant, practical and useful content but also to encourage its use by the humanitarian sector. This took place in a range of different ways.

One way is via a **Project Consultation Group** (PCG) managed by BRE Global to guide and advise on the development of QSAND. The PCG comprised of key stakeholders in the humanitarian sector:

- Norwegian Refugee Council
- Habitat for Humanity
- WWF – US
- UN-HABITAT,
- OXFAM,
- IFRC.

PCG members were involved in steering and advising on the content of the tool from an early stage providing advice and guidance throughout the development of the QSAND tool.

To test and review the content of the QSAND with a wider stakeholder group, **Peer Review Groups** (PRG) where established at various times in the project, consisting of a range of organisations likely to be the users of tool. The purpose of these groups were to review and feedback on QSAND to help ensure the content was relevant, appropriate, user friendly and where possible maximises the opportunities for building in sustainable solutions for the long term. The PRG took two forms

- A piloting group focused on reviewing the draft tool
- A performance level review and allocation group focused on organising criteria under performance levels within the issues

A full list of all organisations / individuals who were part of the three groups above is provided in the acknowledgements at the front of this document.

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Appendix B – Determining the CAT Score and Rating

This appendix describes the detail of how the CAT score is calculated and the calculation process behind the CAT assessment and scoring tool. What follows is a step by step process by which the CAT score and rating are determined.

There are four key steps involved in determining the CAT score which are summarised below.

- Step 1 – Select the issues relevant for assessment for the project / programme
- Step 2 – Define the relevance of each issue for the project / programme being assessed
- Step 3 – Assessment of CAT issues, associated performance levels and points available
- Step 4 – Calculating the CAT score and band

These steps are now outlined in more detail.

Step 1 – Select the issues relevant for assessment for the project / programme

Given the wide range of impacts caused by natural disasters the first step in the CAT process is to select issues for assessment relevant to the project / programme. Selection of issues will be determined through review and consideration of information from a range of sources which may include the;

- aims of each CAT issue
- extent of the damage which has occurred as a result of the natural disaster,
- priorities for the affected community,
- funding available
- sustainable use of resources to make the biggest positive impact,

Step 2 - Define the relevance of each issue for the project / programme being assessed

The second step is to establish the relevance of the selected issues to the project / programme being assessed. The relevance of each issue is classified as either 0, 1 or 2 where:

- **Relevance Factor (RF) 0** = Not applicable / relevant. No damage or incentive to affect change relating to the aim of this issue. This issue is therefore not assessed.
- **Relevance Factor (RF) 1** = Partially applicable / relevant. No immediate action is required but some action / support may be beneficial in line with the aim of the issue. Application of the issue is not critical to the recovery / reconstruction of the community.
- **Relevance Factor (RF) 2** = Applicable / Relevant. Damage / incentive to affect change which relates to the aim of the issue is critical to the recovery / reconstruction of the community.

The relevance factor feeds into the overall score so that the more relevant the issue the more value it holds. Each point available for the most relevant issues is worth double that of issues which are only partially applicable. Relevance of issues assigned is also linked to the achievement of performance levels. This is explained in the next section - Assessment of CAT issues, associated performance levels and points.

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Step 3 - Assessment of CAT issues, associated performance levels and points available

The CAT consists of twenty one individual issues spanning seven sustainability categories, plus an eighth category of eight 'cross-cutting issues' (see **Scope section for further detail**). Cross-cutting issues do not form part of the assessment process. Each Assessment issue addresses a specific environmental impact or topic and has four 'points' assigned to it. Each performance level is worth one point. CAT points are cumulative as shown in the points column of table 17 below and are achieved for the action and completion of criteria within distinct performance levels of each CAT issue.

Performance levels	Points
Baseline Evaluation (PL0)	1
Performance Level 1 (PL1)	+1 (2)
Performance Level 2 (PL2)	+1 (3)
Performance Level 3 (PL3)	+1 (4)

Table 17: Points allocated to the Performance Level achieved within each issue

Baseline Evaluation Score – these criteria within each CAT issue are associated with gathering community insights and establishing their needs / requirements. This process allows the end user to understand and support the community in the recovery / reconstruction process. This baseline evaluation score is always worth 1 point.

Performance Level Score – these criteria within each CAT issue are awarded by the end user for demonstrating a level of sustainable performance above standard practice in the sector. The performance level score ranges from 1 to 3 points available based on the achievement of criteria within the relevant issue.

Points and the scoring process – two categories of points are calculated which feed into the CAT scoring process: the '**maximum**' points achievable with the issue (always four) and the '**actual**' points achieved in the issue e.g. achievement of criteria relating to a performance level. This will vary depending on the criteria achievable.

Minimum standards associated with scoring bands

Relevance factors and achievement of minimum performance levels achieved are linked. To reward projects / programmes where relevant QSAND issues are selected to support sustainable recovery / reconstruction of the affected community, the relevance factor of each issue is linked to performance levels as follows:

- **Issues with a relevance factor (RF) 0:** N/A for assessment. No score is required.
- **Issues with a relevance factor (RF) 1:** As a minimum, the baseline evaluation must be achieved.
- **Issues with a relevance factor (RF) 2:** As a minimum, the baseline evaluation and performance level 1 must be achieved.

This is to ensure the priorities of the beneficiaries are reflected in the programme focus. Therefore, scores based on the relevance of the issue.

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Step 4 - Calculating the CAT percentage score and band

The user of the QSAND tool determines the CAT score using the associated QSAND CAT assessment and scoring tool. The process relating to this is outlined below:

1. Each issue must be assigned a relevance factor (RF) for the project / programme being assessed.
2. For each relevant issue the number of 'points' awarded must be determined by the user in accordance with the criteria of each assessment issue (as detailed in the technical sections of this document).
3. The 'maximum' points achievable and the 'actual' points achieved for each issue are determined by:
    - the relevance factor multiplied by
    - the 'points' achieved for the issue multiplied by
    - the 'maximum points achievable' for the issue.
4. The actual scores and maximum scores for all issues are totalled and a percentage calculated to provide the 'Overall percentage score' for the assessment. The 'Overall percentage score' is then compared to the CAT rating benchmark levels and, provided the minimum performance levels have been met, the relevant CAT rating is achieved.

An example calculation included in table 18 below where 11 issues of the 21 assessment issues in the CAT have been selected as relevant for an example reconstruction project / programme.

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Issue	Relevance factor (A)	Actual points achieved (B)	Maximum points achievable (C)	Actual score (A * B)=(D)	Maximum score (A * C)=€
Privacy	1	1 (Baseline)	4 (Baseline + PL3)	1	4
Community sensitive design	1	3 (Baseline + PL2)	4 (Baseline + PL3)	3	4
Construction Approach	2	2 (Baseline + PL1)	4 (Baseline + PL3)	4	8
Spatial planning	2	2 (Baseline + PL1)	4 (Baseline + PL3)	4	8
Infrastructure	2	3 (Baseline + PL2)	4 (Baseline + PL3)	6	8
Post disaster waste management	2	4 (Baseline + PL3)	4 (Baseline + PL3)	8	8
Construction Waste Management	2	2 (Baseline + PL1)	4 (Baseline + PL3)	4	8
Materials Properties / Specification	1	1 (Baseline)	4 (Baseline + PL3)	1	4
Material Sourcing	2	3 (Baseline + PL2)	4 (Baseline + PL3)	6	8
Energy Demand and Supply	2	2 (Baseline + PL1)	4 (Baseline + PL3)	4	8
Water Demand and Supply	1	3 (Baseline + PL1)	4 (Baseline + PL3)	2	4
Ecological protection	1	1 (Baseline)	4 (Baseline + PL3)	1	4
Totals				(F) 44	(G) 76
Overall percentage score and CAT Banding (F) / (G) * 100				**57.89% = Good**	

Table 18: Example CAT assessment score calculation and banding

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Appendix C – PAT References

Category	Issue	Sources of further information / guidance
Shelter & Community	SC01 Community Sensitive Design	– The Sphere Project, Humanitarian Charter and Minimum Standards in Humanitarian Response, 2011 Edition – Accessibility: How to design and promote an environment accessible to all, Handicap International Policy Paper 2009 – Compilation of National Progress Reports on the implementation of the Hyogo Framework for Action" (2009-2011)
	SC02 Personal safety and privacy	– T Corsellis, A Vitale. Transitional Settlement Displaced Populations. Oxfam UK, 2008 – Norwegian Refugee Council (NRC). Camp Management Tool Kit. NRC, 2008 pg201-218 – Sphere Handbook. Humanitarian charter and minimum standards in humanitarian response. Sphere Project, 2011 – WWF US, American Red Cross. Green Recovery and Reconstruction Toolkit (Module 4: Strategic Site Selection and Development). – IASC. IASC -Gender Handbook in Humanitarian Action: Gender and Shelter in Emergencies. IASC, 2009, pg97- 120 – S A Shah. Gender and building homes in disaster in Sindh, Pakistan. Gender & Development Journal, 2012 – IFRC, UN-HABITAT, UNHCR. Shelter Projects 2010. 2012. – Esra Bektas. Post-Disaster Dilemma: Temporary Settlements in Duzce City, Turkey. Erasmus University Rotterdam, IHS, 2006 – European Commission. Glossary, Definition of Data Protection.
	SC03 Internal Environment	- The Sphere Project. Humanitarian charter and minimum standards in humanitarian response. 2011. - WWF US, American National Red Cross. Green Recovery and Reconstruction Toolkit (Module 6: Construction). - DFID, IOM, Shelter Centre: Transitional Shelter Guidelines. - UNHCR. Cooking Options in Refugee Situations. - BS8206-2:2008. Lighting for Shelters: Part 2: Code of practice for daylighting. - UNDP, ISDR. Guidance Note on Recovery: Shelter. - IFRC. Shelter Projects 2010. Geneva, 2012.
	SC04 Construction Specification - N/A	

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Settlement	Set 01 Site Selection	- Inter-Agency Standing Committee (IASC). Human rights and natural disasters. Operational Guidelines and Field Manual on Human Rights Protection in Situations of Natural Disaster. 2008. - IFRC, UN-HABITAT, UNHCR. Shelter Projects 2010. 2012. - Kelly, C. Checklist-Based guide to identifying critical environmental considerations in emergency shelter site selection, construction, management and decommissioning. 2005. - The Sphere Project. Humanitarian charter and minimum standards in humanitarian response. 2011. - Global Facility for Disaster Reconstruction and Recovery (GFDRR). Haiti earthquake reconstruction: knowledge notes from DRM Global Expert Team for the Government of Haiti. 2010. - UNEP, SKAT. After the tsunami: Sustainable building guidelines for South-East Asia. 2007. pp 15. - WWF US, American Red Cross. Green Recovery and Reconstruction Toolkit (Module 4 – Strategic Site Selection and Development). - IFRC. Post-disaster Settlement Planning Guidelines. Geneva, 2012. - IFRC, SKAT. Sustainable Reconstruction in Urban Areas. 2012. pp 78-87. - IRP, UNDP. Guidance Note on Recovery: Shelter. 2010.
	Set 02 Security of Tenure	- UNEP Sustainable Buildings Construction Initiative and SKAT. After the Tsunami Sustainable building guidelines for South-East Asia. 2007 - International Institute for Sustainable Development (IISD). Natural Disasters and Resource Rights Building resilience, rebuilding lives. 2006 - International Recovery Platform and United Nations Development Programme. Guidance Notes on Recovery, Shelter. - Mitchell. D. Assessing and Responding to Land Tenure Issues in Disaster Risk Management. Training Manual. 2011 - Brown. O, Crawford. A and Hammill. International Institute for Sustainable Development. A. Natural Disasters and Resource Rights Building resilience, rebuilding lives. (2006) - United Nations Development Programme China Law Society (UNDP China). Assessment on Legal Issues in Earthquake Stricken Area - UN-HABITAT and Global Land Tool Network Monitoring Security of Tenure in Cities (2011) - UN-HABITAT, Land and Natural Disasters: Guidance for Practitioners (2010) - Norwegian Refugee Council: Housing, Land and Property Training Manual (2011) - United Nations Human Rights Council (2012) Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living A/HRC/22/46 (24 December 2012) - Payne, G. and Durand-Lasserve, A., Holding on: security of tenure – types, policies, practices and challenges (2012)

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	Set 03 Spatial Planning	- IFRC, SKAT. Sustainable Reconstruction in Urban Areas. 2012 - Sphere Handbook. Humanitarian charter and minimum standards in humanitarian response. Sphere Project, 2011 - T Corsellis, A Vitale. Transitional Settlement Displaced Populations. Oxfam UK, 2005 - BRE Global, BREEAM Communities, BRE, 2012 - English Partnership, Housing Corporation. Urban Design Compendium, Llewellyn- Davies, 2007 - RTPI, RICS, RIBA and ICE. The Built Environment Professions in Disaster Risk Reduction and Response: A guide for Humanitarian agencies. MLC Press, University of Westminster, 2012 - IFRC, UN-HABITAT, UNHCR. Shelter Projects 2009. 2011. - IFRC, UN-HABITAT, UNHCR. Shelter Projects 2010. 2012 - RIBA, DCLG. Preparing Design Codes: A Practice Manual. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7623/152675.pdf Accessed April 2013 - CPTED. Crime Prevention through Environmental Design. http://cptedsecurity.com/cpted_design_guidines, 2006
	Set 04 Infrastructure	- Post-disaster community infrastructure rehabilitation and (re)construction guidelines, IFRC & Red Crescent societies, 2012. - Water supply during emergencies, Practical Action: Technical Brief. March 2012. - Types of toilets for emergencies and reconstruction, Practical Action: Technical Brief, August 2008. - Sphere Handbook. Humanitarian charter and minimum standards in humanitarian response. Sphere Project, 2011. - World Wildlife Fund (WWF), American National Red Cross. Green Recovery and Reconstruction Training Toolkit for Humanitarian Aid (GRRT).
Materials and Waste	MW01 Post Disaster Debris Management	- Sustainable Reconstruction in Urban areas, SKAT, 2012. - The Sphere Project: humanitarian Charter and Minimum standards in Humanitarian response, 2011. - Oxfam – Domestic and Refugee Camp Waste Management collection and disposal – TBN15 – 2008. - Planning for Natural Disaster Debris, United States Environmental Protection Agency, March 2008. - Debris Estimating Field Guide, FEMA 329, FEMA, September 2010. - Hazards U.S Multi-Hazard methodology and software programme: http://www.fema.gov/plan/prevent/hazus/index.shtm. - World Habitat Awards. 2007. Ecomaterials in Social Housing Projects. - UN Disaster Waste Management Guidelines, http://eecentre.org/DisasterWasteManagementGuidelines.aspx.
	MW02 Construction Waste Management - N/A	
	MW03 Waste Management	- The Sphere Project: Humanitarian Charter and Minimum standards in Humanitarian response, 2011. - Solid Waste Management, World Health Organisation. - Refugee Camp Waste Management, Oxfam.

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	MW04 Material Specification	- Inter-Agency Standing Committee. Rubble reuse. Haiti Shelter Cluster. Date accessed 10 December 2012. www.shelterhaiti.org - IFRC, Skat. Sustainable Reconstruction of Urban Areas.2012 - UNHCR, IFRC. Shelter Projects 2008.IASC Emergency Shelter Cluster. UN Habitat. - UNHCR, IFRC. Shelter Projects 2009.IASC Emergency Shelter Cluster. UN Habitat. - IFRC. Procurement of works and services for construction projects. Guidelines, checklists and working tools, 2009. - IFRC, Oxfam. Plastic Sheeting. A guide to the specification and use of plastic sheeting in humanitarian relief, 2007. - World Wildlife Fund, Inc., American National Red Cross. Green Recovery and Reconstruction tool: Materials and the Supply Chain. 2010. - Disasters and Emergency Committee and Arup. Lesson from Aceh: Key considerations in post disaster reconstruction. Warwickshire, Practical Action Publishing, 2010. - Practical Action, IFRC. PCR Tool 10: Quality Control.
	MW05 Material Sourcing	- IFRC, SKAT. Sustainable Reconstruction of Urban Areas. 2012. - World Wildlife Fund, Inc., American National Red Cross. Green Recovery and Reconstruction Toolkit: Materials and the supply Chain. 2010. - Disasters and Emergency Committee, Arup. Lesson from Aceh: Key considerations in post disaster reconstruction. Warwickshire, Practical Action Publishing, 2010. - The Sphere Project. Humanitarian Charter and Minimum Standards in Humanitarian Response. ISBN 978-1-908176-00-4. Rugby, Practical Action Publishing, 2011. - UNDP. Environmental Procurement .Practical Guide volume 1. Denmark, 2008. - Intermediate Technology Development Group Ltd. Building in Partnership: The Story of Shambob. 2001. - Randall, Jonathan. Cyclone Jokwe Rapid Environmental Assessment: Nampula Province, Mozambique. Washington, DC: CARE- Mozambique and WWF. 2008.
	ENE01 Energy Sources	- The Sphere Project. Humanitarian Charter and Minimum Standards in Humanitarian Response. ISBN 978-1-908176-00-4. Rugby, Practical Action Publishing, 2011. - Recovery after disaster: Achieving Sustainable Development, Mitigation, and Equity - Oxford Brookes University. Green rehabilitation: Environmental Sustainability and post Disaster Shelter in India - Holistic disaster recovery: Ideas for building local sustainability after a natural disaster - USAID: Environmental Guidelines for Small-Scale Activities in Africa - IASC: Task Force on safe access to firewood and alternative energy in humanitarian settings - OCHA. Energy Security and Humanitarian Action. 2010. - WWF US, American National Red Cross. Green Recovery and Reconstruction Toolkit (Module 4: Strategic Site Selection and Development).
	ENE02 Energy Consumption - N/A	

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Water and Sanitation	WS01a Water Demand	- Sphere Handbook. Humanitarian charter and minimum standards in humanitarian response. Sphere Project, 2011 - M Bounds. Practical Action: Water supply in Emergencies. Practical Action, 2012 - IFRC, SKAT. Sustainable Reconstruction in Urban Areas. 2012 - WWF US, American Red Cross. Green Recovery and Reconstruction Toolkit. - Norwegian Refugee Council (NRC). Camp Management Tool Kit. NRC, 2008 pg201-218 - WaterAid. Water Security Framework. Water Aid, 2012 - WaterAid, Technical Manual. Water Aid, 2012 - N Boot. Practical Action: Types of Toilet and Their Suitability. Practical Action, 2008 - WSP. Mainstreaming Gender in Water and Sanitation - Gender in Water and Sanitation. WSP, 2010 - M Bounds. Practical Action: Rainwater Harvesting for Reconstruction. Practical Action, 2012
	WS 01bWater Supply	- Sphere Handbook. Humanitarian charter and minimum standards in humanitarian response. Sphere Project, 2011 - M Bounds. Practical Action: Water supply in Emergencies. Practical Action, 2012 - IFRC, SKAT. Sustainable Reconstruction in Urban Areas. 2012 - WWF US, American Red Cross. Green Recovery and Reconstruction Toolkit. - Norwegian Refugee Council (NRC). Camp Management Tool Kit. NRC, 2008 pg201-218 - WaterAid. Water Security Framework. Water Aid, 2012 - WaterAid, Technical Manual. Water Aid, 2012 - N Boot. Practical Action: Types of Toilet and Their Suitability. Practical Action, 2008 - WSP. Mainstreaming Gender in Water and Sanitation - Gender in Water and Sanitation. WSP, 2010 - M Bounds. Practical Action: Rainwater Harvesting for Reconstruction. Practical Action, 2012
	WS02 Water Quality	- Sphere Handbook. Humanitarian charter and minimum standards in humanitarian response. Sphere Project, 2011 - M Bounds. Practical Action: Water supply in Emergencies. Practical Action, 2012 - IFRC, SKAT. Sustainable Reconstruction in Urban Areas. 2012 - WWF US, American Red Cross. Green Recovery and Reconstruction Toolkit. - Norwegian Refugee Council (NRC). Camp Management Tool Kit. NRC, 2008 pg201-218 - WaterAid. Water Security Framework. Water Aid, 2012 - WaterAid, Technical Manual. Water Aid, 2012 - N Boot. Practical Action: Types of Toilet and Their Suitability. Practical Action, 2008 - WSP. Mainstreaming Gender in Water and Sanitation - Gender in Water and Sanitation. WSP, 2010 - UNICEF. Handbook on Water Quality. UNICEF, 2008

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	WS03 Sanitation	- IFRC, SKAT. Sustainable Reconstruction of Urban Areas. 2012. - Oxfam. Domestic and Refugee Camp Waste Management collection and disposal – TBN15. 2008 - The Sphere Project. Humanitarian charter and minimum standards in humanitarian response. 2011. - WWF US, American National Red Cross. Green Recovery and Reconstruction Toolkit (Module 6: Construction).
Communications	COM01 Telecommunications	- The Sphere Project: Humanitarian Charter and Minimum standards in Humanitarian response, 2011. - Telecommunications Infrastructure in Disasters: Preparing cities for crisis communication. April 2005. - Tampere Convention on the provision of Telecommunication Resources for Disaster Mitigation and Relief Operations, 1999.
Natural Environment	NE01 Natural Environment	- The Sphere Project. The Sphere Handbook – Shelter and Settlement Standard 5: Environmental Impact. 2011. - International Union for Conservation of Nature (IUCN). Ecosystem, Livelihoods and Disasters. An Integrated approach to disaster risk management. http://data.iucn.org/dbtw-wpd/edocs/cem-004.pdf. Accessed November 2012. - United Nations Environment Programme (UNEP) & Office for the Coordination of Humanitarian Affairs (OCHA) Joint Unit. IASC Leaflet Humanitarian Action and the Environment. 2007. - United Nations Environment Programme (UNEP). Environmental Needs Assessment in post–disaster situations - A practical guide for implementation. 2008. - World Wildlife Fund (WWF), American National Red Cross. Green Recovery and Reconstruction Training Toolkit for Humanitarian Aid (GRRT): Module 3 – Green Guide to Environmental Impact Assessment Tools and Techniques. - International Union for Conservation of Nature (IUCN). Ecosystem, Livelihoods and Disasters. An Integrated approach to disaster risk management. http://data.iucn.org/dbtw-wpd/edocs/cem-004.pdf. Accessed November 2012.

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	NE02 Ecological Protection	- The Sphere Project. The Sphere Handbook – Shelter and Settlement Standard 5: Environmental Impact. 2011. - International Union for Conservation of Nature (IUCN). Ecosystem, Livelihoods and Disasters. An Integrated approach to disaster risk management. http://data.iucn.org/dbtw-wpd/edocs/cem-004.pdf. Accessed November 2012. - United Nations Environment Programme (UNEP) & Office for the Coordination of Humanitarian Affairs (OCHA) Joint Unit. IASC Leaflet Humanitarian Action and the Environment. 2007. - United Nations Environment Programme (UNEP). Environmental Needs Assessment in post–disaster situations - A practical guide for implementation. 2008. - World Wildlife Fund (WWF) and American National Red Cross: Green Recovery and Reconstruction Training Toolkit for Humanitarian Aid (GRRT): Module 3 – Green Guide to Environmental Impact Assessment Tools and Techniques. - International Union for Conservation of Nature (IUCN). Ecosystem, Livelihoods and Disasters. An Integrated approach to disaster risk management. http://data.iucn.org/dbtw-wpd/edocs/cem-004.pdf. Accessed November 2012. - World Wildlife Fund (WWF) Solutions for reducing the human, economic and conservation costs of human wildlife conflict. 2008.
	NE03 Ecological Rehabilitation and Restoration- N/A	
Cross-cutting Issues	CC01 Access and Non-discrimination	- IFRC, SPHERE handbook, 2011, Protection Principle 2: Ensure people's access to impartial assistance – in proportion to need and without discrimination - UN Convention on the Elimination of All Forms of Discrimination against Women and the International Convention on the Elimination of All Forms of Racial Discrimination definition, taken from The World Disasters Report: 2007, Focus on discrimination, IFRC. ISBN 92-9139-126-3 - IFRC, World Disasters Report: Focus on Discrimination, 2007. - IFRC Strategy on Violence Prevention, Mitigation and Response, 2011-2020, IFRC, agreed at the High-level meeting on violence, Geneva, 2008. - IFRC Strategy on Violence Prevention, Mitigation and Response, 2011-2020: Appendices - IFRC Strategic Framework on Gender and Diversity Issues 2013-2020 - Predictable, preventable. Best practices for addressing interpersonal and self-directed violence during and after disasters, Canadian Red Cross & IFRC - Handicap International, Accessibility: How to design and promote an environment accessible to all, November 2009.
	CC02 Community Ownership & Sustainable Management N/A	
	CC03 Economic Viability - N/A	

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Cross-cutting Issues	CC04 - Livelihoods	- FAO; From the Forum on operationalizing sustainable livelihoods approaches. http://www.fao.org/docrep/003/X9371e/x9371e11.htm Accessed February 2013. - IFRC and SKAT, Sustainable Reconstruction in Urban Areas. A Handbook. 2012 - Department for International Development (DFID) Sustainable Livelihoods Guidance sheets. 2001. - Food and Agriculture Organisation of the United Nations. The Livelihood assessment toolkit – Analysing and Responding to the impact of disasters on the livelihoods of people. 2009 - World Wildlife Fund (WWF) and American National Red Cross: Green Recovery and Reconstruction Training Toolkit for Humanitarian Aid (GRRT): Module 8 – Livelihoods. - M. Albu Oxfam GB, Emergency Market Mapping and Analysis Toolkit. 2010. Women's Refugee Commission, Building Livelihoods and A Field Guide for Practitioners in Humanitarian Environments. 2009. - IFRC, Guidelines for Livelihood Programming. 2010. - UNDP, Guidance Note on Recovery Livelihood. (Accessed May 2013) http://www.livelihoodscentre.org/livelihoods/ShowPropertyServlet?nodePath=%2FLivelihoods%2FKnowledge+repository%2FPublications%2FFiles%2F32UNDPISDRRecoveryLHHGuide2010EN.pdf&_pageLabel=pages_documentDetail_page)
	CC05 Participation	- The Sphere Project: Humanitarian Charter and Minimum standards in Humanitarian response, 2011. - Change by Design. - Shelter Projects, IFRC. - Participatory Approach for Safe Shelter Awareness. - The Community Planning Handbook: How people can shape their cities, towns and villages in any part of the world", Nick Wates, Earthscan Publications Ltd.
	CC06 - Resilience	- IFRC Disaster Preparedness Tools. http://www.ifrc.org/en/what-we-do/disaster-management/preparing-for-disaster/disaster-preparedness-tools/disaster-preparedness-tools/ - Twigg J. The Characteristics of a Disaster-resilient Community. 2009. - UN ISDR. Hyogo Framework for Action 2005-2015. 2005. - Pasteur, K. From Vulnerability to Resilience. Practical Action Publishing, Rugby, UK, 2011. - IFRC. Shelter Projects 2010. 2012. - World Bank, GDFRR. The Sendai Report: Managing Disaster Risks for a Resilient Future. International Bank for Reconstruction and Development, Washington DC, USA, 2012. - WWF US, American Red Cross. Green Recovery and Reconstruction: Training Toolkit for Humanitarian Aid (Module 9 – Disaster Risk Reduction). - IFRC. The Road to Resilience. 2012. - IFRC. A framework for community safety and resilience. http://www.ifrc.org/Global/Case%20studies/Disasters/cs-framework-community-en.pdf

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	CC-07 Security and Safety	- INEE Minimum Standards for Education: Preparedness, Response, Recovery." Inter-Agency Network for Education in Emergencies. 2004 - Security Unit: International Federation of Red Cross and Red Crescent Societies (2013) - Jolly, R., Ray, D.B. (2006), "The Human Security Framework and National Human Development Reports." UNDP - International Federation of Red Cross and Red Crescent Societies (IFRC) (2011) Stay safe. The International Federation's guide for security managers. Third Edition.
	CC08 Skills and Capabilities	– INEE Minimum Standards for Education: Preparedness, Response, Recovery." Inter-Agency Network for Education in Emergencies. 2004. – Marla Petal Disaster Risk Reduction Tools for Humanitarian Action and Development in the Education Sector. 2010 http://www.riskred.org/schools/unicef2010.pdf. - Education in Emergencies: Including Everyone INEE pocket guide to inclusive education Inter-Agency Network for Education in Emergencies Task Team on Inclusive Education and Disability. 2009. http://toolkit.ineesite.org/toolkit/INEEcms/uploads/1007/INEE_Pocket_Guide_Inclusive_Education_EN.pdf. - The Interagency Network for Education in Emergencies, Minimum Standards for Education; Preparedness, Response and Recovery. 2004 http://toolkit.ineesite.org/toolkit/INEEcms/uploads/1007/INEE_Pocket_Guide_Inclusive_Education_EN.pdf. - ISDR, INEE and The World Bank. Guidance Notes on Safer School Construction. 2009 http://toolkit.ineesite.org/toolkit/INEEcms/uploads/1005/INEE_Guidance_Notes_Safer_School_Constr_EN.pdf. - Education Cluster Unit, Education Cluster Coordinators Handbook, First Edition, 2010. - INEE Conflict Sensitive Education Pack. 2013: http://toolkit.ineesite.org/toolkit/Toolkit.php?PostID=1148

Table 19: PAT References

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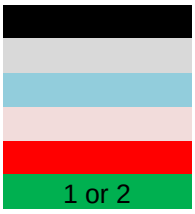
Appendix D – Links between Assessment and Cross-Cutting issues

The table on the following page indicates the linkages between each of the issues within the QSAND tool. It highlights where issues cross over or support the assessment process.

Key

N/A - issue crossover
N/A - issue not applicable at CAT stage
Cross-cutting issues
Cross cutting issue general cross over with assessment issue
Cross cutting issue specific cross over with assessment issue
Requirement to achieve a certain performance level (PL)



When targeting Performance Level 3 for a particular issue, there may be a requirement to achieve a certain Performance Level in another issue in order to ensure a holistic solution. These requirements are shown by the numbers in green boxes. For example, when targeting Performance Level 3 for the Internal Environment issue (SC02), there is a requirement to meet Performance Level 1 of the Privacy issue (SC01).

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	SC01	SC02	SC03	SC04	SET01	SET02	SET03	SET04	MW01	MW02	MW03	MW04	MW05	ENE01	ENE02	WS01	WS02	WS03	COM01	NE01	NE02	NE03	CC01	CC02	CC03	CC04	CC05	CC06	CC07	CC08
SC01 Community-Sensitive Design		1					2																							
SC02 Privacy																														
SC03 Internal Environment	2	1					2																							
SC04 Construction Approach	2								2	2	1	2																		
SET01 Site Selection	1																2													
T02 Security of Tenure																														
SET03 Spatial Planning	2	1						2						2		2		2												
SET04 Infrastructure														2		2		2												
MW01 Material Properties / Specification																														
MW02 Material Sourcing																														
MW03 Post Disaster Waste Management																														
MW04 Construction Waste Management																														
MW05 Operational Waste Management																														
ENE01 Energy Demand & Supply															2															
ENE02 Energy Consumption																														
WS01 Water Demand & Supply																	1													
WS02 Water Quality																		1												
WS03 Sanitation																														
COM01 Telecommunications																														
NE01 Human Relationships to Ecological Services																					2	2								
NE02 Ecological Protection																				2		1								
NE03 Ecological Rehabilitation & Restoration																				2	2									
CC01																														
CC02																														
CC03																														
CC04																														
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