Rapid assessment of acute environmental risks after Hurricane Dorian on Abaco Islands

Abaco, The Bahamas

September 2019

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This report is based on the information received and gathered during the mission and therefore cannot be seen as exhaustive, but can be considered as representative of the existing situation. All information has been compiled by the experts on mission based upon best available knowledge when drafted.

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Cover photo: Drone view of Marsh Harbour power sub-station (© UAS Dorian Relief)

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*The **UNEP/OCHA Joint Environment Unit (JEU)** responds **as one UN to the environmental dimensions of emergencies**. The Unit pairs UN Environment Programme's environmental expertise with the OCHA-coordinated humanitarian network. By coordinating international efforts and mobilizing partners, the JEU assists countries affected by disasters and crisis and works to enhance the environmental sustainability of humanitarian action. The JEU provides independent, impartial advice and practical solutions, while working with organizations dedicated to medium- and long-term rehabilitation to ensure a seamless transition from emergency response to recovery. The team manages the **EHA Connect digital tool**, as well as the **Environmental Emergencies Centre**.*

*The **United Nations Disaster Assessment and Coordination (UNDAC)** is part of the international emergency response system for sudden-onset emergencies. UNDAC is designed to help the United Nations and governments of disaster-affected countries during the first phase of a sudden-onset emergency.*

Executive summary

On 1 September 2019, Hurricane Dorian made landfall as a Category 5 hurricane on Abaco Islands, The Bahamas, before moving over Grand Bahama Island, The Bahamas. As of 28 October, the official death toll stood at 67, expected to rise given that over 200 people were still missing. Abaco Islands were the most severely affected by the hurricane, which caused widespread devastation with thousands of houses with levelled, telecommunications towers down, and water wells and roads damaged. In Marsh Harbour, most of the infrastructure was damaged, with areas like The Mudd and The Pea left decimated.

Key environmental concerns in the aftermath of Dorian on Abaco Islands included the management of the large quantities of disaster waste generated by the hurricane and any potential secondary and cascading impacts resulting from damages to the numerous hazardous operation facilities located in Abaco.

To support the government-led response to Hurricane Dorian, a United Nations Disaster Assessment and Coordination (UNDAC) team was deployed to The Bahamas from 8 to 28 September. The team embedded an environmental expert from the UNEP/OCHA Joint Environment Unit (JEU). The expert was stationed in Abaco between 10 and 20 September and worked closely with local, national and regional authorities, as well as foreign military personnel and other humanitarian responders.

The main objective of the environmental mission to Abaco was to provide technical advice to local and national authorities to rapidly identify, assess and mitigate any negative environmental impacts following the event, with an emphasis on those that posed immediate life-threatening risks to humans (both local communities and responders); advise on required follow-up actions; promote the early integration of environmental considerations in assessments and overall response efforts; facilitate knowledge sharing and information exchange among national and international counterparts on environmental matters; and deliver recommendations accordingly.

The mission outcomes showed that special considerations on hazardous waste should be incorporated in a comprehensive disaster waste management strategy and any ongoing debris removal efforts should be linked to this strategy. Acute environmental risks on Abaco Islands deriving from some of the worst impacted hazardous operation facilities have been rapidly assessed and mitigated to the extent possible to prevent cascading negative humanitarian and environmental impacts, but timely follow-up by the operators at all sites of concern is required to restore safety.

The key recommendations from the mission are for the Government of The Bahamas to:

Short-term

1. Follow-up with the operators at key sites of concern to ensure that safety is restored as a priority measure;
2. Incorporate special considerations on the handling and disposal of hazardous waste in the disaster waste management plan under development, including the identification of temporary disposal sites and reinstatement of management functions at Marsh Harbour landfill;
3. Ensure that any ongoing debris clearance or clean-up activities of any sort follow the provisions of the disaster waste management plan under development.

Medium-term

4. Develop an inventory of sites storing hazardous materials, including emergency contact details of the operators as well as details on the type of substance, quantities and distance to closest communities, water bodies, protected areas and other environmental attributes;
5. Develop hazard maps showing the impacts of natural and human-induced hazards, or a combination of both, on hazardous operation facilities.

Long-term

6. Integrate disaster waste management considerations in national and sub-national waste management as well as emergency management policies and plans, in preparation for future events.

List of abbreviations, acronyms and glossary of terms

BEST	Bahamas Environment, Science and Technology
BPL	Bahamas Power and Light (Company Limited)
CARPHA	Caribbean Public Health Agency
CDC	Centers for Disease Control and Prevention
CDEMA	Caribbean Disaster Emergency Management Agency
DEHS	Department of Environmental Health Services
ECHO	European Commission's Directorate-General for Civil Protection and Humanitarian Aid
FEAT	Flash Environmental Assessment Tool
IFRC	International Federation of Red Cross and Red Crescent Societies
IOM	International Organization for Migration
JEU	UNEP/OCHA Joint Environment Unit
MSB	Swedish Civil Contingencies Agency
NEMA	National Emergency Management Agency
NGO	Non-Governmental Organization
OCHA	(UN) Office for the Coordination of Humanitarian Affairs
PAHO	Pan American Health Organization
PMAC	Port Managers Association of the Caribbean
PPE	Personal Protective Equipment
RNAT	Rapid Needs Assessment Team
UCPM	(European) Union Civil Protection Mechanism
UN	United Nations
UNDAC	United Nations Disaster Assessment and Coordination
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WFP	World Food Programme
WHO	World Health Organization

1. Mission background and scope

On 1 September 2019 at 12:45 PM EST, Hurricane Dorian made landfall as a Category 5 hurricane at Elbow Cay, Abaco Islands, The Bahamas, with wind speeds of 185 mph. Starting on 2 September at 2:00 PM EST, Dorian moved over Grand Bahama Island, The Bahamas. An all-clear was issued on 4 September.

As of 29 October, the official death count stood at 67, expected to rise given that over 200 people were still missing. The hurricane left a trail of devastation, with destroyed buildings, uprooted trees and significant disruptions to basic services. The Abaco Islands were the worst affected. Environmental concerns arose quickly in the aftermath of the event, notably in relation to disaster waste management as well as cascading negative impacts following damage to hazardous operation facilities.

The National Emergency Management Agency (NEMA) is in charge of overall emergency management and established an Emergency Operations Centre (EOC) in Nassau, with satellite EOC's on Abaco and Grand Bahama Islands led by the local government representation[1]. Coordination is channeled through a set of Emergency Support Functions (ESFs) representing key sectors. Among these, the Ministry of the Environment is leading work on environmental and hazmat risks under the related ESF.

To complement national efforts, two Regional Needs Assessment Teams (RNATs) led by the Caribbean Disaster Emergency Management Agency (CDEMA) were pre-positioned in Nassau as of 31 August. The teams consisted of 18 members from CDEMA Participating States, the Caribbean Public Health Agency (CARPHA), Global Affairs Canada, the Pan American Health Organization (PAHO), the Port Managers Association of the Caribbean (PMAC), the private sector, the World Food Programme (WFP) and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA).

Surge staff from OCHA Regional Office as well as a United Nations Disaster Assessment and Coordination (UNDAC) team was subsequently dispatched in the immediate aftermath of the event to support the government-led response. The UNDAC team embedded an environmental expert from the United Nations Environment Programme (UNEP)/OCHA Joint Environment Unit (JEU) deployed to The Bahamas from 8 to 27 September to rapidly identify and advise on acute environmental risks.

The expert was stationed in Abaco between 10 and 20 September as the international partner lead for the environment/hazmat ESF, working closely with local, national and regional authorities, as well as foreign military personnel and other humanitarian responders to rapidly detect environmental risks and mitigate any negative impacts on human health, livelihoods and the environment. The environment/hazmat ESF did not have a designated government focal point in Abaco at the time of the mission, but this workstream was followed by the government representation in Abaco.

[1] MapAction. The Bahamas: Hurricane Dorian. Coordination sites. https://maps.mapaction.org/dataset/13275a57-719b-4c7f-bebf-bd5d0858d3e6/resource/33a13f7a-bbbc-4e3a-8266-36d28e07d1f1/download/ma058_coordination_sites-300dpi.pdf

1.1 Context

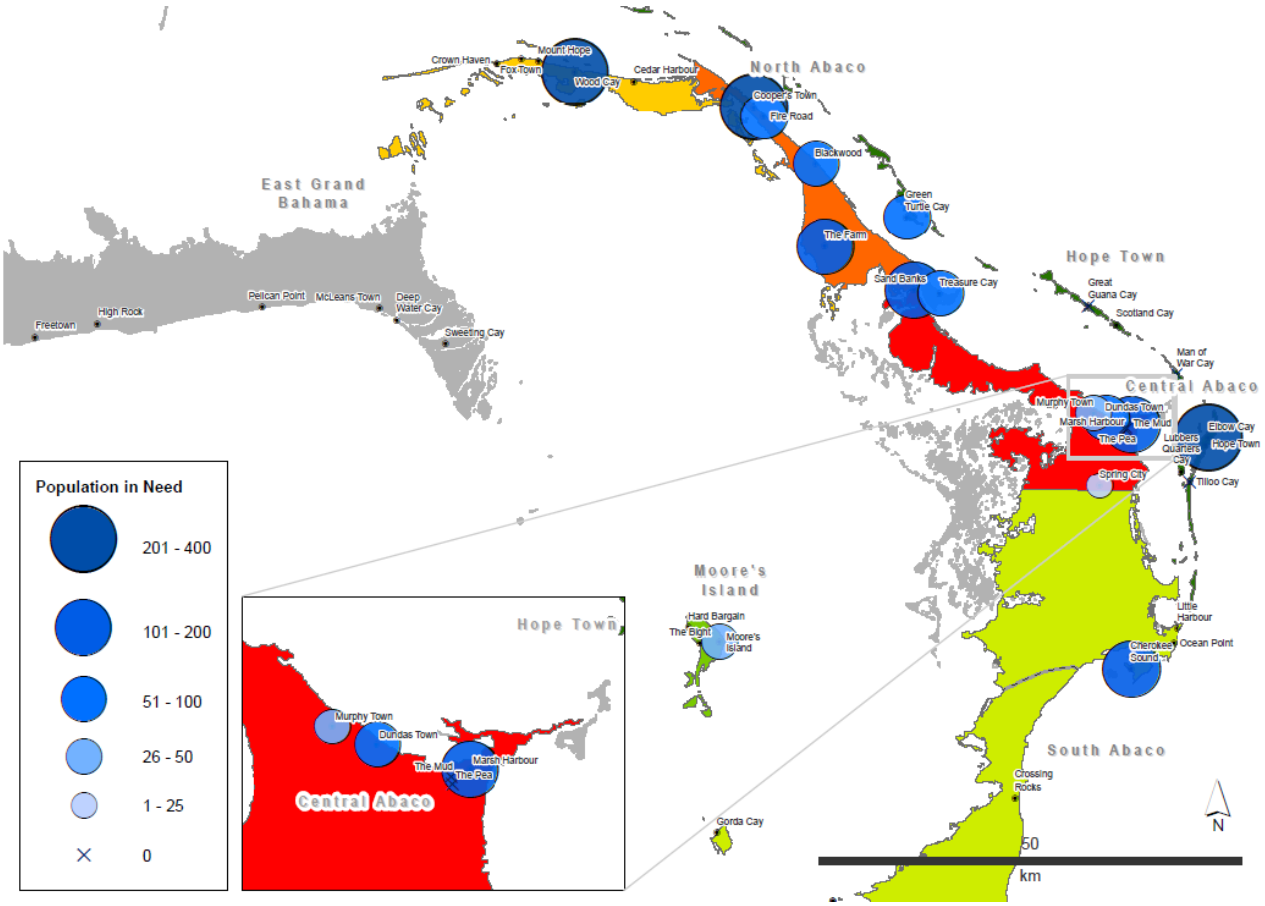

Figure 1: Needs assessment and analysis – Abaco. Source: MapAction (see Footnote 2)

The Abaco Islands were most severely impacted by Hurricane Dorian. Central Abaco, in particular, was the worst affected, with widespread devastation in the area between Treasure Cay and Marsh Harbour.

Many people left the island and cays in the aftermath of the hurricane. Based on consultations with NEMA representation in Abaco and local authorities, as well as on a consolidation of results from coordinated assessments conducted by the different humanitarian and military agencies on the ground, the UNDAC team estimated that 3,978 people were remaining on the island as of 19 September, of which 2,184 were in need of humanitarian assistance. The figures, agreed with the government representation in Abaco, were plotted on a map with support from MapAction, showing population clusters by their geographic distribution across the island and cays[2]. The map (Annex 4) also displays differential recovery status using different background colours, ranging from green in South Abaco (less impacted by the hurricane), to orange/yellow in North Abaco (early recovery status) and red in Central Abaco (in need of humanitarian assistance).

The population figures were varying significantly based on movements of people between Abaco, the shelters in Nassau and private arrangements. However, they can be seen as representative of the situation at the time. More people have been gradually returning as basic services have started to be restored.

[2] https://maps.mapaction.org/dataset/eb1ee87c-d815-4fd0-b8bb-575d27907d42/resource/8262b500-b380-4b87-beef-6ad1805b8461/download/ma092_abaco_assessments_v2-300dpi.pdf

Environmental concerns were identified as one of the key priorities for action in the aftermath of Hurricane Dorian by the NEMA representation in Abaco to minimize any additional threats to the remaining population, their livelihoods and the surrounding environment.

The hurricane generated massive quantities of debris and rubble (Figure 2). Preliminary estimates from the United Nations Development Programme (UNDP) quantified a total of two million m^3 of waste produced by the hurricane in Abaco alone.

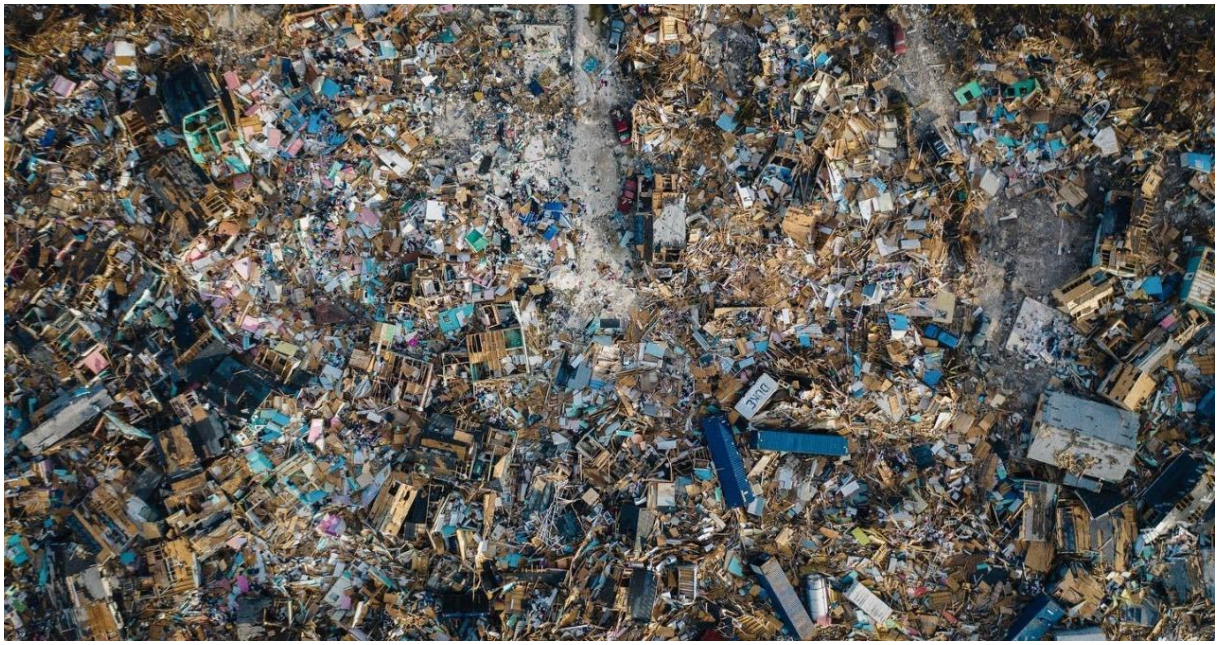

Figure 2: drone view over some of the most affected areas in Marsh Harbour, showing the extent of devastation and accumulation of disaster waste (© Samaritan's Purse)

In addition to destroyed houses and uplifted trees, Dorian also led to damaged industrial complexes, power plants, fuel and chemicals storage facilities, petrol stations and electrical grids, all of which could potentially leak toxic material in the wake of the storm and in the face of subsequent tropical storm alerts, threatening life and the environment.

Disaster waste hampered access to key humanitarian routes after the hurricane. While debris clearance was initiated in the immediate response phase to restore access, no considerations on waste segregation and handling hazardous materials were applied in practice in Abaco, posing challenges for post-disaster management. Cleared waste was brought to Marsh Harbour's landfill, where no management system was in place at the time of the mission.

Following these initial observations, the Ministry of the Environment through the Department of Environmental Health Services (DEHS) have since been working on the development of a disaster waste management plan to address all types of waste, moving beyond debris removal to systematically look at hazardous waste too. These efforts have been conducted jointly with the Ministry of Public Works, coordinating debris removal.

1.2 Mission objective

The objective of the environmental mission to Abaco was to provide technical advice to local and national authorities to:

- Rapidly identify, assess and mitigate any negative environmental impacts following the event, with an emphasis on those that pose immediate life-threatening risks to humans (both local communities and responders);
- Advise on short-, medium- and long-term follow-up measures to address and mitigate those hazards;
- Promote the early consideration of environmental risks and any potential cascading impacts in disaster response coordination and assessments;
- Facilitate knowledge sharing and information management on environmental matters;
- Identify needs for additional specialized expertise and/or equipment as required.

The mission took place from 10 to 20 September 2019 as part of the UNDAC support to government-led response efforts in The Bahamas. It was conducted in close collaboration with relevant local, national and regional authorities, as well as foreign military personnel and other international emergency responders.

2. Key activities and findings

2.1 Key activities

After preliminary meetings with NEMA and the Ministry of the Environment in Nassau, the UNDAC environmental expert was dispatched to Abaco on 10 September as part of the UNDAC team based at the Abaco Local Support EOC in Marsh Harbour. Between 10 and 20 September, the expert coordinated support on environmental matters as the international sector lead for the environment/hazmat ESF, interfacing with government counterparts.

A rapid mapping exercise was conducted to identify the main facilities storing hazardous materials on the Abaco Islands that may have experienced damage, with consequent risk of additional environmental and humanitarian impacts from spilling. This was followed by a desktop rapid environmental assessment. Three types of buffer zones were drawn around each site of concern as concentric circles to show the maximum extent of potential impacts to i) human health; ii) water contamination; and iii) soil pollution. These distances were estimated based on the substances likely to be found at each facility (depending on the type of operations), their corresponding hazard classification and a rough estimation of likely quantities (derived from any indication of site storage capacities) or worst-case scenario. This analysis was done using the Flash Environmental Assessment Tool (FEAT)[3], developed by the JEU to rapidly assess potential environmental and humanitarian risks as a result of the spilling of chemical substances.

A baseline desktop review of sites potentially storing hazardous materials, as well as an estimation of potential impacts on human health, livelihoods and the environment, had already been compiled for preparedness purposes prior to the hurricane and was made available by UNEP Regional Office for Latin America and the Caribbean. The baseline data were updated based on information gathered from the different humanitarian agencies and military forces supporting assessment efforts on the ground, as well as available satellite images.

Support was provided on needs assessment and analysis to understand key population figures and needs (remaining population, population in need and priority needs), but also to ensure early incorporation of environmental considerations in the coordinated assessment design and implementation process to rapidly identify any situation of concern. Coordinated assessments offered an opportunity to gather

[3] https://www.eecentre.org/resources/feat/

information from partners on any additional sites of concern and to get their support in surveying all mapped sites.

A preliminary UNDAC assessment trip was conducted on 11 September, during which the sites in North Abaco, between Treasure Cay and Cooper's Town[4], were surveyed.

Further to reports of extensive damage and a fuel leak at the Bahamas Power and Light (BPL) power sub-station in Marsh Harbour, on 13 September, the UNDAC environmental expert visited the site jointly with the Royal Defence Force and in liaison with DEHS. Drone aerial assessment support was provided by UAS Dorian Relief. The facility sustained damage. A small, wind-spilled leak of diesel fuel affected the area within the plant. In addition, a substantial amount of fuel had flowed into the containment and was exposed to rain and wind, with a tropical storm forecast on the horizon. Contact was immediately established with BPL Abaco Operations Director during a joint visit to BPL main power generation plant in Abaco with the Royal Defence Force. The operator informed that they were aware of the situation. While they had pumping capacity, they had no storage capacity to be able to intervene. The government representation in Abaco as well as the Ministry of the Environment were alerted and kept informed about the situation. Collaboration was established with the operator and follow-up was sought with Fuel Relief Fund and the Dutch Military Forces as part of the European Combined Task Force for rapid intervention. The latter, which had hazmat qualified capacities, was subsequently tasked to inspect the tanks for any leaks and pump the fuel out of the containment ahead of the forecast tropical storm. Thanks to the rapid intervention, any further negative impacts were prevented.

In liaison with the authorities, the Dutch Military Forces were further tasked to survey all mapped hazardous operation facilities. Two assessment teams were pulled together, including hazmat qualified personnel. During a half-a-day training, the UNDAC environmental expert briefed all team members on the tasks, introduced them to the FEAT and trained them on the use of the flash site survey forms developed for this purpose (Annex 10). The teams began inspecting the sites jointly with the UNDAC environmental expert on 17 September. The site surveys were completed on 18 September.

The environmental mission in Abaco was completed on 20 September, when the UNDAC environmental expert moved to Grand Bahama. All environmental findings and key follow-up actions were discussed during a dedicated handover meeting with the NEMA representation in Abaco prior to departure. The Ministry of the Environment was regularly kept informed of all findings throughout the mission. The UNDAC team demobilized from Abaco on 22 September. A full OCHA/UNDAC debrief meeting with NEMA took place on 24 September in Nassau.

In summary, the following main environmental activities were completed during the mission to Abaco:

- Mapping of hazardous operation facilities on the Abaco Islands.
- Determination of maximum extent of potential adverse impact zones for human health, soil and water contamination.
- Rapid assessment of mapped hazardous operation facilities across the islands, with support from two assessment teams gathered by the Dutch Military Forces for the task.

[4] Up until the bridge that collapsed and impeded further access (until after its reopening ceremony following repair works by the Dutch Military Forces).

- Rapid intervention at sites of concern, in liaison with the operators and the Royal Defence Force, with support from a task team from the Dutch Military Forces.

2.2 Key findings

The main sites of concern storing hazardous materials on the Abaco Islands have been mapped with support from MapAction. The reference map is provided in Annex 5.

For each of the sites, buffer zones have been drawn as concentric circles showing the maximum extent of potential negative impacts in terms of:

- Human health (Annex 6)
- Water contamination (Annex 7)
- Soil contamination (Annex 8)

These can be compared and contrasted with the population figures provided in Annex 4 to get an idea of the exposed population among those remaining, noting that the latter figures will be constantly evolving and are likely to increase as the population will be gradually returning upon reestablishment of essential services.

The full, non-exhaustive list of the main hazardous operation facilities located on the Abaco Islands, along with the most common type of substance that could be found at each of them, its hazard classification and maximum distance at which it could be harmful to human health and the receiving environment (rivers, lakes and soil) is provided in Annex 9. This has been compiled using the FEAT.

Results from the rapid survey of the mapped sites show that, while most of the facilities sustained widespread damage, the following were flagged for priority follow-up:

- Marsh Harbour BPL power sub-station;
- Abaco Petroleum Company; and
- Abaco Gas.

Follow-up with the operators was sought in liaison with the government representation in Abaco.

Marsh Harbour BPL power sub-station

The facility, which sustained substantial damage, hosts three diesel storage tanks. As informed by BPL, each tank has a maximum capacity of 140,000 gallons. The tanks are closed on top.

At the time of the site survey, on 13 September, a significant amount of fuel was found in the containment surrounding the tanks. This could have been caused either by continuous flow from the tank valves that may have been left open by fuel looters in the aftermath of the hurricane (when fuel was unavailable and a key priority) or by actual damage to the tanks/pipeline.

Figure 3: drone view of BPL Marsh Harbour power sub-station, showing the three tanks, the amount of fuel in the containment and the wind spilled fuel leak (© UAS Dorian Relief)

A small wind-blown diesel fuel leak occurred at the site. The fuel was spilled from the containment into the surrounding environment, within the plant's premises.

The remaining quantity of diesel fuel, likely mixed with water, in the containment posed a significant threat for further spilling given its exposure to wind and rain days ahead of a tropical storm forecast issued for 19-21 September. The facility is surrounded by forests.

The operator informed that they did not have the capacity to intervene, since they had pumps but no storage capacity, nor immediate capabilities for full inspection of the status of the tanks. Support was identified in the Dutch Military Forces, which had hazmat qualified personnel and the necessary equipment for rapid intervention. Pumping operations started, with rotational shifts put in place by the Dutch troops to ensure 24-hour coverage for fastest execution of the task. Pending full verification of any damage to the tanks/pipeline, fuel sludge was pumped into one of the tanks found to be uncompromised as a temporary measure ahead of the tropical storm forecast.


Figures 4 (left) and 5 (right): Emergency pumping operations at Marsh Harbour power sub-station (©Christophe Illemassene, OCHA)

The early identification of the issue; follow-up with the operator, the local NEMA representation, the Ministry of the Environment, the Royal Defence Force; and the rapid intervention with support from the Dutch Military Forces to inspect the site and pump the fuel out of the containment into a non-compromised tank, allowed for mitigation of risks and prevention of additional negative impacts.

However, further to the damages, the site was effectively accessible to anyone. At least one episode of fuel looting occurred during the interventions, showing the need to refence the area and instate a security guarding system to prevent further risks linked to uncontrolled and unsafe fuel handling. The operator was informed of the incident and suggested to follow-up.

BPL also informed that neither the main power generation plant nor the other sub-stations had experienced any damage, with the exceptions of two sub-stations in Treasure Cay and Sandy Point, where tanks storing sludge may have been leaking. The company was dealing with this at the time of the mission.

Abaco Petroleum Company

The facility experienced damage as a consequence of the hurricane, with wind-blown storage tanks and cylinders (Figure 3).

The operator informed that these were close to empty (below extraction levels) and that the site will be cleaned up upon insurance inspection. A site survey confirmed there were no signs of leaks, but safety should be restored as soon as possible.

Abaco Gas

Several gas cylinders were blown away by the wind and spread across the site in unsafe conditions (Figure 7). Follow-up is required to restore safety at site.

Figures 6 (left) and 7 (right): hurricane-impacted hazardous operation facilities in Abaco (Abaco Petroleum Company, left; Abaco Gas, right)

3. Recommendations

The key recommendations from the mission are for the Government of The Bahamas to:

Short-term

1. Follow-up with the operators at key sites of concern to ensure that safety is restored as a priority measure;
2. Incorporate special considerations on the handling and disposal of hazardous waste in the disaster waste management plan under development, including the identification of temporary disposal sites and reinstatement of management functions at Marsh Harbour landfill;
3. Ensure that any ongoing debris clearance or clean-up activities of any sort follow the provisions of the disaster waste management plan under development.

Medium-term

4. Develop an inventory of sites storing hazardous materials, including emergency contact details of the operators as well as details on the type of substance, quantities and distance to closest communities, water bodies, protected areas and other environmental attributes;
5. Develop hazard maps showing the impacts of natural and human-induced hazards, or a combination of both, on hazardous operation facilities.

Long-term

6. Integrate disaster waste management considerations in national and sub-national waste management as well as emergency management policies and plans, in preparation for future events.

4. Conclusions

In conclusion, environmental concerns were identified as a key priority in the aftermath of Hurricane Dorian. The early integration of environmental considerations in emergency response helps in preventing additional cascading impacts on human wellbeing, livelihoods and the environment.

Findings from the mission showed that special considerations on hazardous waste should be incorporated in a comprehensive disaster waste management strategy and any ongoing debris removal efforts should be linked to this strategy. Acute environmental risks on Abaco Islands deriving from some of the worst impacted hazardous operation facilities have been rapidly assessed and mitigated to the extent possible to prevent cascading negative humanitarian and environmental impacts, but timely follow-up by the operators at all sites of concern is required to restore safety.

References

Rapid assessment of hazardous material risks

- Flash Environmental Assessment Tool (FEAT): https://www.eecentre.org/resources/feat/. The FEAT helps to identify existing or potential acute environmental impacts that pose risks for humans, human life-support functions and ecosystems, following sudden-onset natural disasters. FEAT focuses primarily on immediate and acute impacts arising from released hazardous chemicals.
- E-learning module on the FEAT: https://www.eecentre.org/training/

Disaster waste management

- Disaster Waste Management Guidelines: https://www.eecentre.org/resources/dwm/
- E-learning module on the Disaster Waste Management Guidelines: https://www.eecentre.org/training/
- Guidance materials on asbestos management in emergency situations:
    - Case study after Cyclone Idai in Mozambique: https://ehaconnect.org/?s=asbestos
    - Asbestos in Emergencies, Brief Guide: https://postconflict.unep.ch/humanitarianaction/documents/02_05-08.pdf
    - Asbestos clean-up practices post-earthquake: https://www.who.int/hac/crises/chn/asbestos/en/
    - WHO page on asbestos: https://www.who.int/ipcs/assessment/public_health/asbestos/en/
    - CDC fact sheet on asbestos: https://www.cdc.gov/niosh/topics/asbestos/

Other useful links

Environmental Emergencies Centre, www.eecentre.org

Environment and Humanitarian Action Connect, www.ehaconnect.org

Annexes

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GENERALIST ENVIRONMENTAL EXPERT

2019 HURRICANE DORIAN, BAHAMAS

UN Environment/OCHA Joint Unit[1]

On 1st September at 12:45pm EST, Hurricane Dorian made landfall as a category 5 hurricane at Elbow Cay, Abaco Islands (population of 17,200). Starting from 2nd September, it moved over Grand Bahama (population of 51,000). An all-clear was issued on 4th September. Aerial footage of the affected areas shows widespread debris, with extensive damage to buildings, flooded roads, windswept trees and power lines. According to the International Federation of Red Cross and Red Crescent Societies (IFRC), there could be as many as 13,000 houses damaged or destroyed. Disaster waste threatens public health, hinders rescue operations, reconstruction and livelihoods recovery and impacts the environment. Other potential environmental impacts, closely associated with human impacts, include waterways and communities contaminated by chemicals and heavy metals. On 5th September, Equinor reported an oil leak of unknown quantity from their South Riding Point oil storage terminal, confirmed from aerial assessment. The company is in contact with national authorities and following up, pending access to the facility.

The National Emergency Management Agency (NEMA) is in charge of response. Two (2) inter-agency Rapid Needs Assessment Teams, led by the Caribbean Disaster Emergency Management Agency (CDEMA), were pre-positioned in Nassau as of 31st August. The teams include surge staff from the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Further to the all-clear issued on 4th September, the teams began rapid needs assessments in the affected areas.

To complement ongoing efforts on coordination and assessment, OCHA is mobilizing a United Nations Disaster Assessment and Coordination (UNDAC) team, including environmental expertise. The UN Environment/OCHA Joint Unit (JEU) is looking for a generalist environmental expert and a disaster waste management expert to be on standby for immediate deployment to the Bahamas as part of the UNDAC team.

Responsibilities

Under the overall guidance of the UNDAC Team Leader, the environmental expert is expected to:

- Identify and assess environmental hazards and impacts following the event, with an emphasis on those that pose immediate life-threatening risks to humans (both local communities and responders);
- Identify short-, medium- and long-term follow-up measures to address and mitigate those hazards;
- Promote early consideration of environmental risks and any potential cascading impacts in disaster response, in coordination with national authorities and other disaster responders;
- Identify needs for additional expertise and/or equipment as appropriate.

Expected Actions

[1] For more information on the UN Environment/OCHA Joint Unit: http://ochaonline.un.org/ochaunep

- Gather, consolidate and analyze environmental assessment data and provide recommendations to national authorities and the UN Resident Coordinator to minimize and/or mitigate impacts and promote the integration of appropriate actions into the overall disaster response strategy – in coordination with national and local actors with access to environmental data and assessments;
- Participate in ongoing assessment design and implementation processes, promoting the integration of environmental considerations;
- Support liaison with national and international counterparts working on environmental issues, including disaster waste, natural resource management and chemical hazards – facilitating information exchange between the relevant actors;
- Communicate rapidly and regularly all findings to the UN Environment / OCHA Joint Unit, emphasizing the possible need for additional specialized expertise (e.g. related to oil/chemical contamination, natural resource management, etc.) and/or additional equipment as required;
- Identify, where applicable, pre-existing contributing environmental factors to the disasters (e.g. deforestation, poor urban planning, lack of prevention and preparedness in environmental sector);
- Provide a support function to the UNDAC team on environmental issues.

Note: Contact with media, including interviews, should only be undertaken in agreement with the UNDAC Team Leader and the UN Resident Coordinator.

Education and work experience

- Background in environmental/natural sciences, environmental/civil engineering, chemistry, chemical/industrial engineering, disaster management, or related fields;
- Ability to integrate environmental considerations across disciplines and specifically into disaster response;
- Ability to distinguish immediate, medium-term and long-term priority actions;
- Familiarity with rapid environmental assessment tools and frameworks;
- Familiarity with the emergency response/humanitarian architecture;
- Ability to coordinate with international and national agencies involved in disaster response;
- Familiarity with management of operational support functions including telecommunications, logistics and basic field security;
- High motivation, coupled with an ability to improvise effectively in rapidly changing situations with minimal guidance and support;
- Team skills required for working in a multi-disciplinary, multi-national team in field conditions of hardship, with an ability to assume authority as and when needed;
- Availability for short-notice mobilization (within 48 hours) and to stay in the field for up to 3-4 weeks;
- Fluency in the English language;
- Knowledge of MS Windows and MS Office and ability to operate standard IT and communications equipment;
- Completed training course on Environment and Emergencies (of stand-by partner, UNDAC system, JEU response partner and/or other organization) is an asset;
- Availability for additional follow-up, collaboration and editing of mission report after the official mission deadline.

ABACO - ESF (1-13)

Hurricane Dorian Coordination Structure

as of 20 Sept 2019 by Abaco EOC

Emergency Support Function	Role/area of coverage (suggested sector equivalent)	Bahamas lead agency and contact	Regional / international counterpart and contact
ESF 1 - Transportation	Coordination of land, sea and air transportation services (Logistics)	RBDF	WFP - Giuseppe "Pepe" Linardi giuseppe.linardi@wfp.org
ESF 2 - Communications	Inter and intra-departmental communication (serices and equipment) Family island communication	NOT SPECIFICALLY ASSIGNED	WFP - Angel Buitrago angel.buitrago@wfp.org
ESF 3 - Public Works and Transport	Civil Engineering / Utilities / Water and Sewage / Damage Assessment / Debris removal / Infrastructure and critical faciliities / Road repair and maintenance (early recovery) / Rehabiliataion / Wash	Water and Sewage / RBDF	Public Works liaison not present. **WASH** performed by Adrianus Vlugman +1-246-836-5496 . vlugmana@paho.org **Debris management** CORE Ann +1 (917) 655 4467
ESF 4 - International Assistance	Foreign affairs / International aid / Briefing of arriving international teams / Reception centers	N/A	N/A
ESF 5 - Planning, Information and Public Information	Information management (IM working group)	Jamie	N/A
ESF 6 - Mass care and Shelter Service	Social Services / Shelter management / (Shelter / CCCM)	NOT SPECIFICALLY ASSIGNED	IFRC - Interim - Betisa Egea (IFRC) surgeshelterco.bahamas@ifrc.org
ESF 7 - Relief Supplies and Distribution	Logistics / Relief supplies / Donation management (logistics, NFI)	NOT SPECIFICALLY ASSIGNED	WFP - Giuseppe "Pepe" Linardi giuseppe.linardi@wfp.org
ESF 8 - Health and Medical Services	National medical asset coordination and mgmt. / Public health / Medical care	NOT SPECIFICALLY ASSIGNED	PAHO - Adrianus Vlugman vlugmana@paho.org

ESF 9 - Search and Rescue (SAR)	SAR	Royal Bahamas Defense Force	Completed
ESF 10A – Hazardous Material Land (Department of Environmental Health)	Hazardous Material spillage / release	NOT SPECIFICALLY ASSIGNED	UNEP - Margherita Fanchiotti eoc.response.abaco@gmail.com
ESF 10B - Hazardous Materials Marine			
ESF 10C – Bioterrorism			
ESF 11 – Food	Design & execution of MOUs with wholesalers and retailers association for food procurement (food)	NOT SPECIFICALLY ASSIGNED	WFP - Elisabet Fadul elisabet.fadul@wpf.com
ESF 12 – Tourism		NOT SPECIFICALLY ASSIGNED	N/A
ESF 13 – Volunteers	This includes service clubs, organizations, religious organizations, private sector	NOT SPECIFICALLY ASSIGNED	N/A

Expert on mission – Environment, Abaco

Name	Organization	Role
Margherita Fanchiotti	UNEP/OCHA Joint Environment Unit (JEU)	UNDAC environmental expert

List of main stakeholders consulted – Environment, Abaco

Name	Organization	Role
Rochelle Newbold	BEST Commission, Ministry of the Environment	Director
Thomasina Wilson	DEHS, Ministry of the Environment	Deputy Director
Algernon Cargill	Ministry of Transport and Aviation	Coordinator
Jack Thompson	Government of The Bahamas	Permanent Secretary, Coordinator
Maxine Duncombe	Central Abaco Administration	Central Abaco Administrator
Frederik Brown	Royal Bahamas Defence Force	Commanding Officer
Donald Joe MacLellan	Bahamas Power and Light (BPL)	Director, Island Operations Abaco
Roland van den Akker	Dutch Military Forces	Civil-Military Cooperation Liaison Officer
Dennis Borst	Dutch Military Forces	Commanding Officer, assessment support
Gerard Guerin	European Union Civil Protection Mechanism (UCPM)	UCPM Liaison Officer
Ted Honcharik	Fuel Relief Fund	Founder and Chairman of the Board
Adrianus Vlugman	Pan American Health Organization (PAHO)	ESF 3 Abaco international lead for WASH
Ann Lee	CORE	ESF 3 Abaco international lead for disaster waste management
Ugo Blanco, Richard Kelly, Tim Walsh, Ana Fonseca	United Nations Development Programme (UNDP)	Disaster waste management
Urs Bloesch	Swiss Development Cooperation	Disaster waste management
Jan-Willem Wegdam, Joseph Ashmore	International Organization for Migration (IOM)	Disaster waste management

Peter Robinson, Alice Goudie, Leon Baruah, Tom Hughes	MapAction	Mapping
Dan Stothart, Camilla Piviali	UNEP Regional Office for Latin America and the Caribbean	Regional interface, FEAT support
Charlotta Benedek, Emilia Wahlstrom, Dawit Yared	UNEP/OCHA Joint Environment Unit (JEU)	Back-up support

The Bahamas: Hurricane Dorian

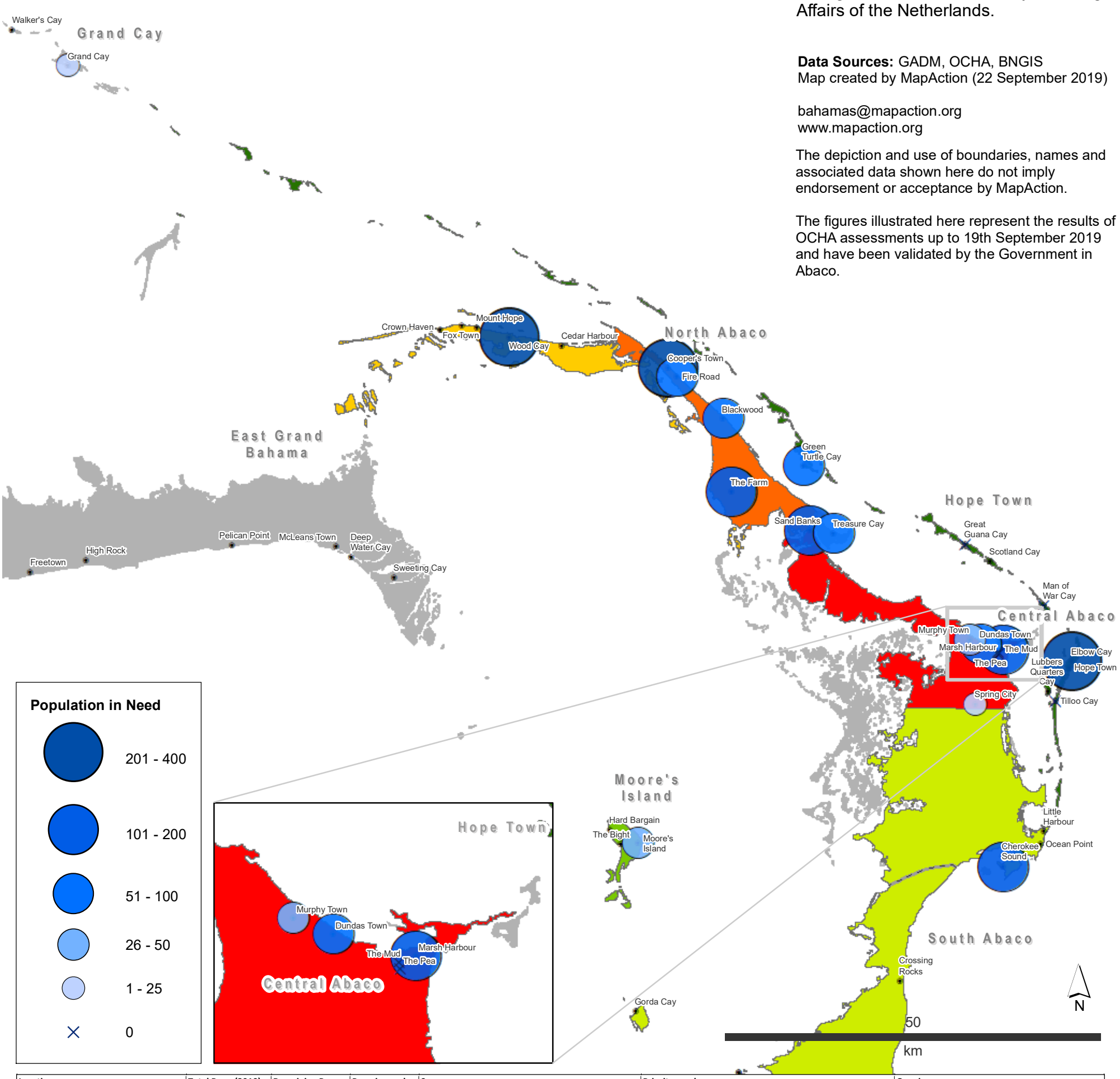
Needs assessment and analysis - Abaco. Symbols represent the number of people in need following assessments up to19th September 2019.

Supported by the German Federal Foreign Office and the Ministry of Foreign Affairs of the Netherlands.

Data Sources: GADM, OCHA, BNGIS
Map created by MapAction (22 September 2019)

bahamas@mapaction.org
www.mapaction.org

The figures illustrated here represent the results of OCHA assessments up to 19th September 2019 and have been validated by the Government in Abaco.



Location	Total Popn (2010)	Remaining Popn	Popn in need	Source	Priority needs	Ongoing response
Cedar Harbour, Wood Cay, Mount Hope, Fox Town, Crown Haven	762	700	**400**	Community member (came from north of bridge), Team Rubicon, Northern Administrator	Early recovery (houses/bridge repair, WASH, fuel, shelter	Bridge repair, WASH, generator, pump, shelter
Spanish Cay and all of Cooper's Town	676	450	**300**	Informed Elder, Northern Administrator	WASH, shelter, early recovery	Food, water, shelter, medical clinic repair (EMT - 10 clinicians total)
Hope Town / Elbow Cay	458	650	**300**	Deputy Counsellor/Hope Town Fire & Rescue	Shelter, food, WASH for displaced from other areas	Tarps
The Farm	402	250	**200**	Team Rubicon, SOS International	Shelter, WASH, food, fuel early recovery	Food, water, shelter
Sand Banks	333	150	**150**	OCHA, PAHO	WASH, food, shelter, fuel, early recovery	Food, water, shelter
Cherokee Sound, Little Harbour, Yellow Wood, Casuarinas Point	363	200	**150**		Early recovery, fuel	
Marsh Harbour	1874	150	**135**	Community members, WFP	WASH, food, shelter, fuel,early recovery	Food, water, shelter
Treasure Cay (without Sand Banks)	854	150	**100**	Airport manager, Deputy Chairperson, Police inspector, business owner	WASH, food, shelter, fuel, early recovery	Food, water, shelter, health
Grape Tree and all of Blackwood	396	100	**100**	Community members, WFP, Northern Admininstrator	Health, WASH,telecom, fuel, food, early recovery	Food, water
Green Turtle Cay	595	306	**92**	Boat rental owner in Treasure Cay, Northern Administrator	Shelter, WASH, food, early recovery	Food, water, shelter
Fire Road	349	245	**74**	Northern Administrator	WASH, shelter, early recovery	
Dundas Town	2890	75	**68**	WFP	WASH, food, shelter, fuel,early recovery	Food, water, shelter
Murphy Town	1938	50	**45**	WFP	WASH, food, shelter, fuel,early recovery	Food, water, shelter
Moore's Island	593	100	**30**	Medic Corps	Water, food, health, fuel	
Grand Cay	383	250	**25**	Northern Administrator	Early recovery, fuel, telecomms, power	
Spring City	500	42	**15**	Pastor / local leader	Power, water	Tarps, shingles
The Mudd	1612	0	**0**	Community members		
The Pea	882	0	**0**	Community members		
Parrots Cays, Lubbers Cay, Tilloo Cay, Cornish Cay and Bridges Cay	18	5	**0**		Early recovery, fuel, telecomms, power	
Man of War Cay	215	65	**0**		Early recovery, fuel, telecomms, power	
Great Guana Cay and Scotland Cay	127	40	**0**	Deputy Counsellor for Hope Town, Council Member for Guana Cay	Early recovery (repair houses, debris clearance), power	
Totals	8432	3978	2184			

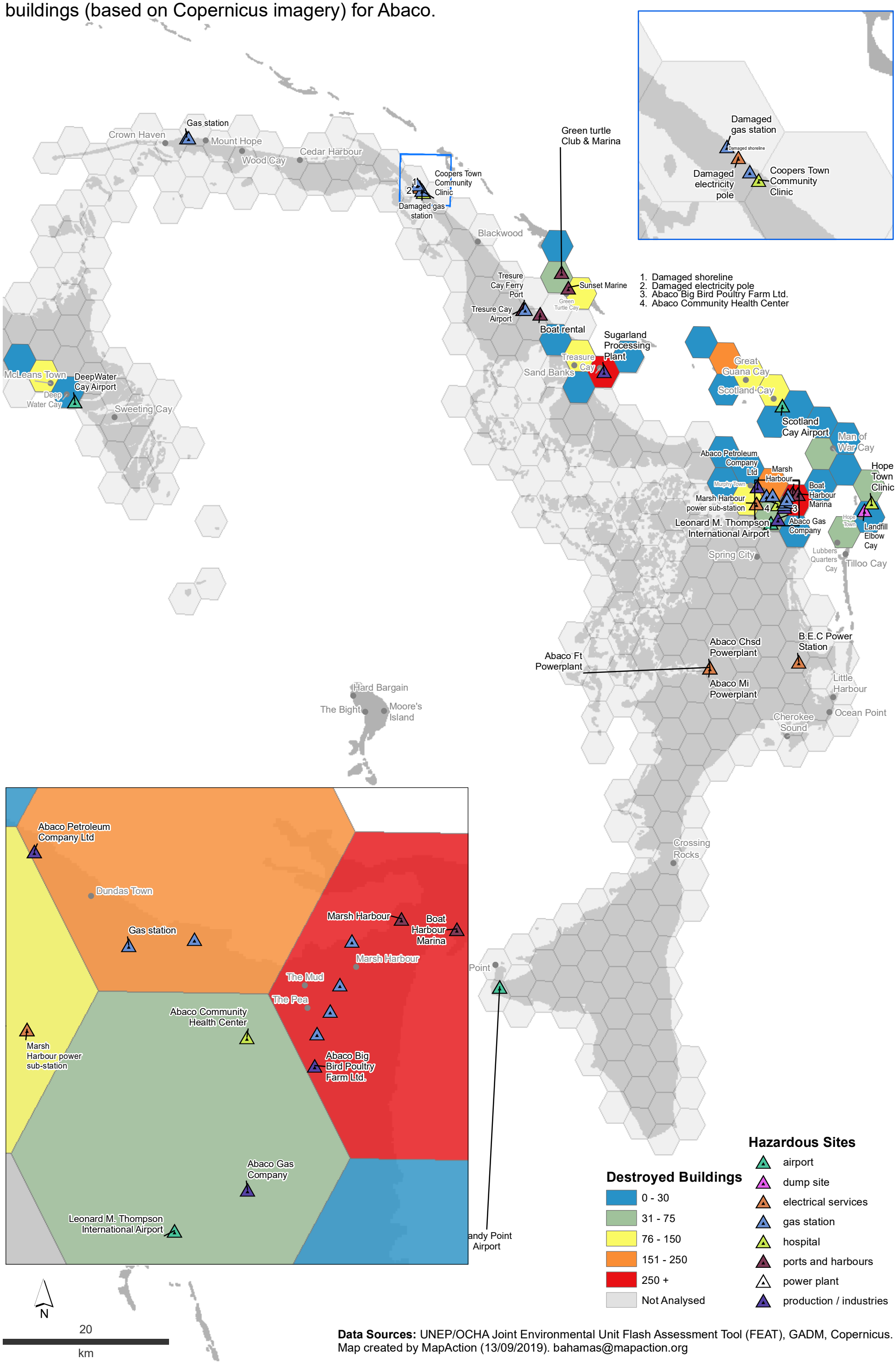
Note: South Abaco locations have been excluded because it is reported they are not in need of humanitarian assistance

The Bahamas:
Hazardous sites, settlements, 2019 population at sub island level and damaged buildings (based on Copernicus imagery) for Abaco.

MA047 v02

UKaid

MAP ACTION



Data Sources: UNEP/OCHA Joint Environmental Unit Flash Assessment Tool (FEAT), GADM, Copernicus.
Map created by MapAction (13/09/2019). bahamas@mapaction.org

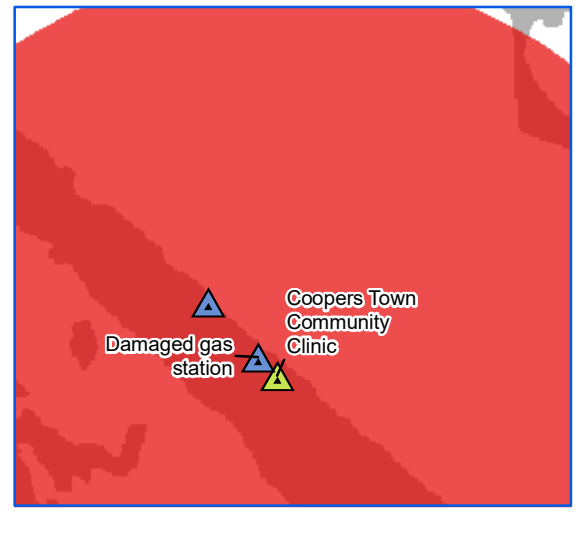
The Bahamas:
Hazardous sites and hazardous areas for human health in Abaco.

MA081 v02

MAP ACTION

NORTH ABACO
2019 POP: 4164

Crown Haven
Mount Hope
Wood Cay
Gas station
Cedar Harbour
Damaged gas station
Fire Road
Coopers Town Community Clinic
Blackwood
Green turtle Club & Marina
Tresure Cay Ferry Port
Sunset Marine
Tresure Cay Airport
Boat rental
The Farm
McLeans Town
DeepWater Cay Airport
Deep Water Cay
Sweeting Cay
Treasure Cay
Sand Banks
Sugarland Processing Plant
Great Guana Cay
Scotland Cay
Scotland Cay Airport
Man of War Cay
Abaco Petroleum Company Ltd
Murphy Town
Marsh Harbour
Boat Harbour Marina
Hope Town Clinic
Marsh Harbour power sub-station
Abaco Gas Company
Lubbers Quarters Cay
Hope Town
Landfill
Elbow Cay
Leonard M. Thompson International Airport
Spring City
Tilloo Cay
Abaco Ft Powerplant
Abaco Mi Powerplant
Abaco Chsd Powerplant
B.E.C Power Station
Little Harbour
Hard Bargain
Moore's Island
The Bight
Ocean Point
Cherokee Sound

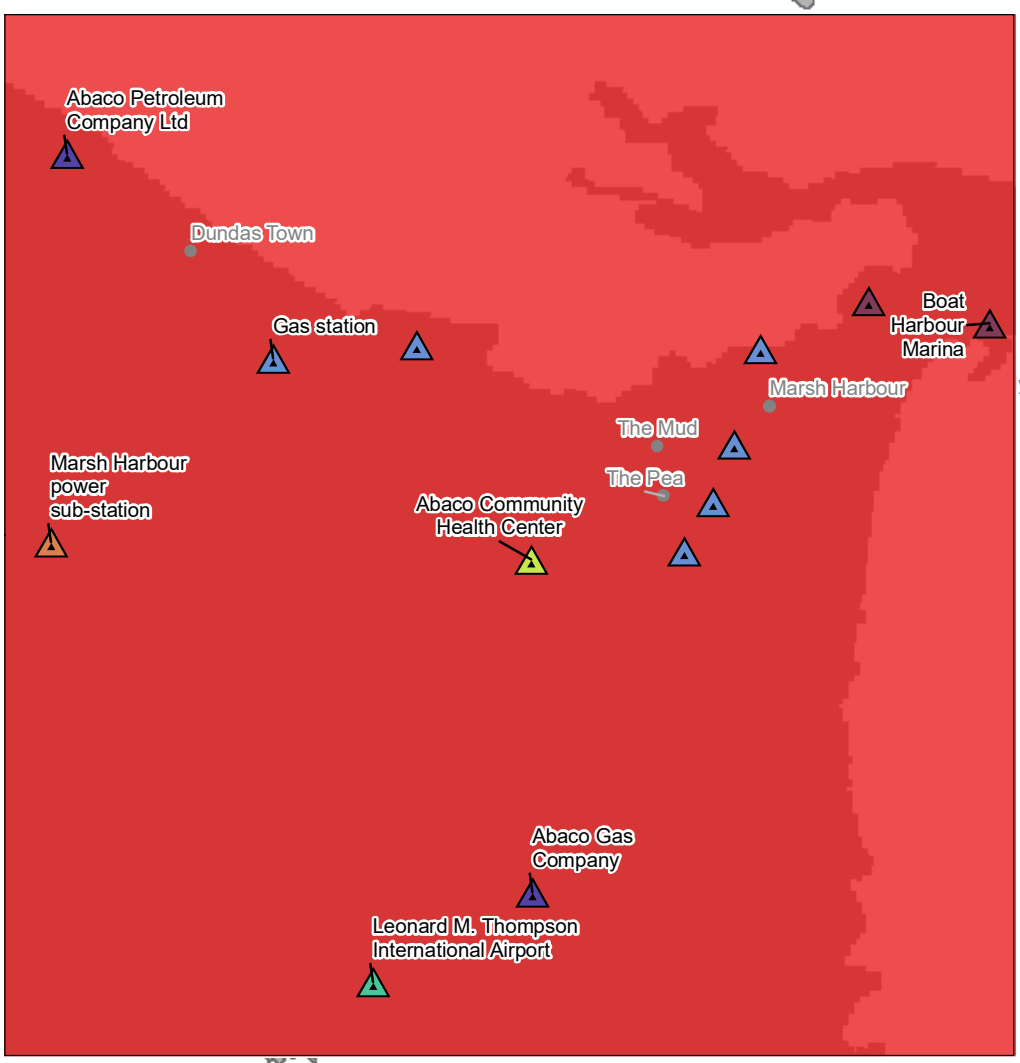


CENTRAL ABACO
2019 POP: 12247

Crossing Rocks

SOUTH ABACO
2019 POP: 3352

y Point
Sandy Point Airport



Hazardous Sites

Site Type

- airport
- dump site
- electrical services
- gas station
- hospital
- ports and harbours
- power plant
- production / industries
- Potential risk for human health

N

20
km

Data Sources: UNEP/OCHA Joint Environmental Unit Flash Assessment Tool (FEAT), GADM, Copernicus.
Map created by MapAction (19/09/2019). bahamas@mapaction.org
Supported by the German Federal Foreign Office and the Ministry of Foreign Affairs of the Netherlands.

The Bahamas:
Hazardous sites and hazardous areas for water in Abaco.

MA083 v02

MAP ACTION

NORTH ABACO
2019
POP: 4164

Crown Haven
Fox Town
Mount Hope
Wood Cay
Cedar Harbour
Cooper's Town
Coopers Town Community Clinic
Fire Road
Blackwood
Green turtle Club & Marina
Sunset Marine
Tresure Cay Ferry Port
Tresure Cay Airport
Boat rental
The Farm
Sand Banks
Treasure Cay
McLeans Town
DeepWater Cay Airport
Deep Water Cay
Sweeting Cay

Coopers Town Community Clinic

1. Abaco Big Bird Poultry Farm Ltd.
2. Abaco Community Health Center

Great Guana Cay
Scotland Cay
Scotland Cay Airport
Man of War Cay
Abaco Petroleum Company Ltd
Murphy Town
The Mud
Marsh Harbour
Boat Harbour Marina
Marsh Harbour power sub-station
Hope Town Clinic
Elbow Cay
Hope Town
Leonard M. Thompson International Airport
Spring City
Lubbers Quarters
Tilloo Cay

Hazardous Sites

Site Type

- airport
- dump site
- electrical services
- gas station
- hospital
- ports and harbours
- power plant
- production / industries
- Potential risk of water contamination

Rivers and Lakes

- Outside Risk zone
- Within/connected to Risk zone

Hard Bargain
Moore's Island
The Bight

Little Harbour
Ocean Point
Cherokee Sound

CENTRAL ABACO
2019 POP:
12247

Crossing Rocks

Abaco Petroleum Company Ltd
Dundas Town
Boat Harbour Marina
Marsh Harbour
The Mud
The Pea
Abaco Community Health Center
Abaco Big Bird Poultry Farm Ltd.
Marsh Harbour power sub-station
Sandy Point
Sandy Point Airport
Leonard M. Thompson International Airport

SOUTH ABACO
2019 POP:
3352

N

20
km

Data Sources: UNEP/OCHA Joint Environmental Unit Flash Assessment Tool (FEAT), GADM, Copernicus, OSM.
Map created by MapAction (19/09/2019). bahamas@mapaction.org
Supported by the German Federal Foreign Office and the Ministry of Foreign Affairs of the Netherlands.

The Bahamas:
Hazardous sites and hazardous areas for soil in Abaco.

MA082v02 MAP ACTION

NORTH ABACO
2019
POP: 4164

Crown Haven
Fox Town
Mount Hope
Wood Cay
Cedar Harbour
Cooper's Town
Coopers Town Community Clinic
Fire Road
Blackwood
Green turtle Club & Marina
Sunset Marine
Green Turtle Cay
Tresure Cay Airport
1
Boat rental
The Farm
McLeans Town
DeepWater Cay Airport
Deep Water Cay
Sweeting Cay
Sand Banks
Treasure Cay
Great Guana Cay
Scotland Cay
Scotland Cay Airport
Man of War Cay
Abaco Petroleum Company Ltd
Murphy Town
Marsh Harbour
Dundas Town
Marsh Harbour power sub-station
3
2
Boat Harbour Marina
Hope Town Clinic
Elbow Cay
Hope Town
Leonard M. Thompson International Airport
Spring City
Lubbers Quarters
Tilloo Cay

1. Tresure Cay Ferry Port
2. Abaco Big Bird Poultry Farm Ltd.
3. Abaco Community Health Center

Coopers Town Community Clinic

Hazardous Sites

Site Type

- airport
- dump site
- electrical services
- gas station
- hospital
- ports and harbours
- power plant
- production / industries
- Potential risk for soil contamination

Hard Bargain
The Bight
Moore's Island

Little Harbour
Ocean Point
Cherokee Sound

CENTRAL ABACO
2019 POP: 12247

Crossing Rocks

Abaco Petroleum Company Ltd
Dundas Town
Boat Harbour Marina
Marsh Harbour
The Mud
The Pea
Marsh Harbour power sub-station
Abaco Community Health Center
Abaco Big Bird Poultry Farm Ltd.
Leonard M. Thompson International Airport

ly Point Airport

SOUTH ABACO
2019 POP: 3352

N

20
km

Data Sources: UNEP/OCHA Joint Environmental Unit Flash Assessment Tool (FEAT), GADM, Copernicus.
Map created by MapAction (19/09/2019). bahamas@mapaction.org
Supported by the German Federal Foreign Office and the Ministry of Foreign Affairs of the Netherlands.

FEAT Impact Table

Site_Name	Latitude (decimal deg)	Longitude (decimal deg)	Substance	Hazard Classification - priority response	Physical State (gas, liquid, solid)	Quantity [kg]	Risk type (human / environment)	Impact Zone (m) Human Lethal	Impact Zone (m) Human Health	Impact Zone (m) Environment Soil	Impact Zone (m) Environment River
								enter number only - if > 10km enter 999 (or some agreed value)	enter number only - if > 10km enter 999 (or some agreed value)	enter number only - if > 10km enter 999 (or some agreed value)	enter number only - if > 10km enter 999 (or some agreed value)
Name	**Lat_dec**	**Long_dec**	**Substance**	**Haz_Class**	**hys_Sta**	**Quant_kg**	**Risk_Type**	**IZ_H_Lethal**	**IZ_H_Health**	**IZ_EnvSoil**	**IZ_EnvRiver**
Leonard M. Thompson International Airport	26.513669	-77.078017	Kerosene 8008-20-6	Flam. Liq. 3	Liquid	50000	Human	400	600	0	0
Leonard M. Thompson International Airport	26.513669	-77.078017	Kerosene 8008-20-6	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
West end Airport	26.687250	-78.980806	Kerosene 8008-20-6	Flam. Liq. 3	Liquid	50000	Human	400	600	0	0
West end Airport	26.687250	-78.980806	Kerosene 8008-20-6	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Auxiliary Field	26.630500	-78.360000	Kerosene 8008-20-6	Flam. Liq. 3	Liquid	50000	Human	400	600	0	0
Auxiliary Field	26.630500	-78.360000	Kerosene 8008-20-6	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
DeepWater Cay Airport	26.630806	-77.921194	Kerosene 8008-20-6	Flam. Liq. 3	Liquid	50000	Human	400	600	0	0
DeepWater Cay Airport	26.630806	-77.921194	Kerosene 8008-20-6	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
International Airport Grand Bahama	26.548142	-78.696264	Kerosene 8008-20-6	Flam. Liq. 3	Liquid	50000	Human	400	600	0	0
International Airport Grand Bahama	26.548142	-78.696264	Kerosene 8008-20-6	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Tresure Cay Airport	26.741109	-77.381737	Kerosene 8008-20-6	Flam. Liq. 3	Liquid	50000	Human	400	600	0	0
Tresure Cay Airport	26.741109	-77.381737	Kerosene 8008-20-6	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Sandy Point Airport	26.004806	-77.395000	Kerosene 8008-20-6	Flam. Liq. 3	Liquid	50000	Human	400	600	0	0
Sandy Point Airport	26.004806	-77.395000	Kerosene 8008-20-6	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Scotland Cay Airport	26.641181	-77.066408	Kerosene 8008-20-6	Flam. Liq. 3	Liquid	50000	Human	400	600	0	0
Scotland Cay Airport	26.641181	-77.066408	Kerosene 8008-20-6	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Marsh Harbour	26.546567	-77.052319	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Marsh Harbour	26.546567	-77.052319	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Boat Harbour Marina	26.545581	-77.045869	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Boat Harbour Marina	26.545581	-77.045869	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Green turtle Club & Marina	26.782092	-77.336139	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Green turtle Club & Marina	26.782092	-77.336139	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Sunset Marine	26.765425	-77.327800	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Sunset Marine	26.765425	-77.327800	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Freeport Container Port Limited	26.529600	-78.765700	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Freeport Container Port Limited	26.529600	-78.765700	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Grand Bahama Yacht Club	26.518078	-78.638178	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Grand Bahama Yacht Club	26.518078	-78.638178	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Freeport Ship Services	26.516583	-78.747806	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0

Freeport Ship Services	26.516583	-78.747806	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Port Lucaya	26.513889	-78.642389	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Port Lucaya	26.513889	-78.642389	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Tresure Cay Ferry Port	26.741109	-77.381737	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Tresure Cay Ferry Port	26.741109	-77.381737	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Boat rental	26.736409	-77.361236	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Boat rental	26.736409	-77.361236	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Abaco Petroleum Company Ltd	26.552961	-77.094994	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Abaco Petroleum Company Ltd	26.552961	-77.094994	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Abaco Gas Company	26.518078	-77.069647	Natural Gas	Flam. Gas 1	Gas	1000000	Human	200	300	0	0
Sugarland Processing Plant	26.675398	-77.282536	Ethanol	Flam. Liq. 2	Liquid	10000000	Human	400	600	0	0
Abaco Big Bird Poultry Farm Ltd.	26.531119	-77.062108	Carbamate pesticide	Aquatic Acute 1	Solid	5000	Environment	0	0	10000	10000
Pine Ridge Landfill	26.564333	-78.665389	Benzene	Flam. Liq. 2	Liquid	10000000	Human	400	600	0	0
Landfill Elbow Cay	26.529028	-76.965167	Benzene	Flam. Liq. 2	Liquid	10000000	Human	400	600	0	0
Grand Bahama Powerplant	26.518558	-78.753997	Ammonia	Acute Tox. 2	Gas	1000000	Human	200	3000	0	0
Abaco Ft Powerplant	26.355364	-77.148747	Ammonia	Acute Tox. 2	Gas	1000000	Human	200	3000	0	0
Abaco Chsd Powerplant	26.355364	-77.148747	Ammonia	Acute Tox. 2	Gas	1000000	Human	200	3000	0	0
Abaco Mi Powerplant	26.355364	-77.148747	Ammonia	Acute Tox. 2	Gas	1000000	Human	200	3000	0	0
B.E.C Power Station	26.363331	-77.041703	Oil and solvents	Flam. Liq. 3	Liquid	10000000	Human	400	600	0	0
Substation	26.523083	-78.699083	Oil and solvents	Flam. Liq. 3	Liquid	10000000	Human	400	600	0	0
Substation	26.539861	-78.698000	Oil and solvents	Flam. Liq. 3	Liquid	10000000	Human	400	600	0	0
Substation	26.524833	-78.662333	Oil and solvents	Flam. Liq. 3	Liquid	10000000	Human	400	600	0	0
Substation	26.565944	-78.594222	Oil and solvents	Flam. Liq. 3	Liquid	10000000	Human	400	600	0	0
Rand Memorial Hospital	26.532097	-78.692828	Ethylene oxide 75-21-8	Carc. 1B	Gas	Any	Human/Enviro	5000	5000	10000	10000
Sunrise Medical Center	26.516764	-78.687206	Ethylene oxide 75-21-8	Carc. 1B	Gas	Any	Human/Enviro	5000	5000	10000	10000
Lucayan Medical Centre	26.523662	-78.661649	Ethylene oxide 75-21-8	Carc. 1B	Gas	Any	Human/Enviro	5000	5000	10000	10000
Hope Town Clinic	26.537338	-76.957006	Ethylene oxide 75-21-8	Carc. 1B	Gas	Any	Human/Enviro	5000	5000	10000	10000
Abaco Community Health Center	26.533944	-77.070000	Ethylene oxide 75-21-8	Carc. 1B	Gas	Any	Human/Enviro	5000	5000	10000	10000
Coopers Town Community Clinic	26.866147	-77.504989	Ethylene oxide 75-21-8	Carc. 1B	Gas	Any	Human/Enviro	5000	5000	10000	10000
Borco Oil Refinery	26.512617	-78.756122	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Borco Oil Refinery	26.512617	-78.756122	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Freeport Aggregates	26.578722	-78.668833	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Freeport Aggregates	26.578722	-78.668833	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Industrial site	26.595222	-78.546694	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Industrial site	26.595222	-78.546694	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Freeport Oil Co LTD	26.516444	-78.765586	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
Freeport Oil Co LTD	26.516444	-78.765586	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
South Riding Point oil storage facility	26.644856	-78.550000	Petroleum	Flam. Liq. 1	Liquid	10000000	Human	400	600	0	0
South Riding Point oil storage facility	26.644856	-78.550000	Petroleum	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
Bahamas Cement Co.	26.538372	-78.761308	natural gas	Flam. Gas 1	Gas	1000000	Human	200	300	0	0
Cemex Bahamas	26.540692	-78.770511	natural gas	Flam. Gas 1	Gas	1000000	Human	200	300	0	0
Gold Rock Corp.LTD	26.556954	-78.666921	natural gas	Flam. Gas 1	Gas	1000000	Human	200	300	0	0
Pestco Maintenance & Supply Ltd	26.537414	-78.701075	Carbamate pesticide	Aquatic Acute 1	Solid	5000	Environment	0	0	10000	10000
Bahamas Poultry Co LTD	26.566058	-78.645019	Carbamate pesticide	Aquatic Acute 1	Solid	5000	Environment	0	0	10000	10000
The Bahamian Brewery	26.523964	-78.737622	Ammonia	Acute Tox. 2	Gas	1000000	Human	200	3000	0	0
Polymers International Freeport Bahamas	26.519942	-78.745312	Acrylic acid	Skin Corr. 1A	Liquid	1000	Human/Enviro	0	0	1,300	2,000
Polymers International Freeport Bahamas	26.519942	-78.745312	Acrylic acid	Aquat. Chronic 2	Liquid	50000	Environment	0	0	7300	10000
PharmaChem Technologies	26.515275	-78.750618	Medicine	Repr. 1A	Mix	Any	Human/Enviro	5000	5000	10000	10000

PharmaChem Technologies	26.515275	-78.750618	Medicine	Aquat. Chronic 2	Mix	50000	Environment	0	0	7300	10000
Gas station	26.517611	-78.761056	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.517500	-78.733528	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.542722	-78.702361	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.539278	-78.694639	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.532778	-78.698250	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.532889	-78.697417	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.517444	-78.693083	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.516972	-78.679139	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.519333	-78.668333	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.516917	-78.637472	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.519611	-78.637750	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.536278	-78.636444	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.617472	-78.319694	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.520597	-78.747028	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.919944	-77.792861	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.919833	-77.790639	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.741083	-77.379333	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.544194	-77.058028	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.543361	-77.083861	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.544111	-77.076250	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.534472	-77.061889	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.536833	-77.060389	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Gas station	26.539611	-77.059333	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Industrial site	26.539889	-78.697778									
Industrial site	26.516389	-78.750556									
Damaged electricity pole	26.871682	-77.509848									
Damaged gas station	26.868258	-77.507056	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Damaged gas station	26.874288	-77.512584	Petroleum, LPG	Liq. Gas 1	Gas	1000000	Human	200	300	0	0
Damaged shoreline	26.873931	-77.512283								0	0
Marsh Harbour power sub-station	26.534416	-77.095492	Diesel	Asp. Tox. 1	Liquid	270000	Human	5000	5000	10000	10000
Marsh Harbour power sub-station	26.534416	-77.095492	Diesel	Aquatic Chronic	Liquid	270000	Environment	0	0	10000	10000
Marsh Harbour power sub-station	26.534416	-77.095492	Diesel	Aquatic Chronic 2	Liquid	270000	Environment	0	0	7300	10000

2019 Hurricane Dorian, Bahamas
Hazardous Operation Facilities
Flash Site Survey

Date:

GPS coordinates:

Accuracy:

Altitude:

Name of facility/site:

Choose type of facility:

- ☐ Agriculture and food production
- ☐ Chemicals production
- ☐ Forestry
- ☐ General manufacturing
- ☐ Infrastructure and transport
- ☐ Mining
- ☐ Pipelines
- ☐ Power
- ☐ Transport interfaces
- ☐ Small and medium enterprises
- ☐ Other: _____

Type of hazardous substance stored:

Quantity of above hazardous substance that is spilling or has the potential to spill, with unit of measure (please state is spill is occurring or potential):

List actual and potential receptors (e.g., soil, forest, river, lakes, nearby communities, etc.):

Description of observed and/or potential impacts:

Contact details of site manager or other resource people:

Please submit the form **along with a (georeferenced) photo** to fanchiotti@un.org