Environmental Management Plan

Tonga Cyclone Ian Reconstruction and Climate Resilience Project

Ministry of Infrastructure
Kingdom of Tonga

Tonga
14 April 2014
Tonga Cyclone Ian Reconstruction and Climate Resilience Project (TCIRCRP)

Environmental Management Plan

Project Description

1. Tropical Cyclone Ian (Category 5) passed directly through the Ha’apai Islands group on January 11, 2014. The Cyclone had a devastating impact, affecting 5,500 of the 6,616 residents and resulting in one fatality. Good preparedness measures had been in place and the Government of Tonga’s response was rapid and likely prevented more fatalities and injuries to human life. It is estimated that the total damages and losses from TCI are TOP 93 million (US$50 million), most of which was in the housing sector with some 900 buildings (main dwellings, community facilities and ancillary buildings) partially damaged or destroyed. A full structural damage assessment is currently underway.

2. A three month Tropical Cyclone Ian Response Plan was formulated by the National Emergency Operations Committee (NEOC) and endorsed by the Cabinet as the strategy for immediate response to Ha’apai. The Plan facilitated coordination of the humanitarian responses and strengthened early recovery planning.

Project Components

3. The project development objectives are to: (i) restore housing, community facilities, and basic services to the population of affected Ha’apai; and, (ii) strengthen the country’s policy, institutional and executing capacity for Disaster Risk Management and inclusive reconstruction.

4. The project components are:

Component A: Housing and Key Community Facilities Repair, Reconstruction and Climate Resilience (USD12.97 m including contingencies and taxes):

A.1 Houses for the Vulnerable (H4Vs). Provision of two resilient1 habitable rooms/dwellings for socio-economically extremely vulnerable households or households in extremely vulnerable communities (equivalent to ~USD18,000/TOP32,500 per household).

Supported Self-Recovery (SSR). Facilitation of SSR for eligible households2 for replacement or repairs and retrofitting/climate resilience of slightly damaged and undamaged housing:

   A.2A: SSR funding for eligible households with destroyed or severely damaged main dwellings – home reconstruction funding (~USD9,000 / TOP16,500 per household3) in tranches, subject to compliance with an agreed resilience standard.

   A.2B: SSR funding for eligible households with repairable damage to main dwellings - small repairs and retrofitting funding (average ~USD2,750 / TOP5,000 per household) in tranches, subject to compliance with an agreed resilience standard.

   A.2C: SSR funding (resilience strengthening) for eligible households with undamaged buildings - small retrofitting funding (average ~USD750 / TOP1,400 per household) for building supplies subject to compliance with an agreed resilience standard.

1 For 70m/s wind speeds and appropriate seismic loading.
2 An eligible household is one whose main dwelling and/or associated water and sanitation facilities were damaged by Cyclone Ian.
3 Households have the option to choose owner-led or central contractor-led building.
Reconstruction and Resilience Strengthening of Community Facilities:

A.3: Provision of supported self-recovery funding to eligible communities for repairs and climate resilience of community-run public facilities – materials funding for repairs and retrofitting (average ~USD6,000 / TOP 11,000 per community) in tranches, subject to compliance with an agreed resilience standard.

A.4: Reconstruction and resilience strengthening of key large public facilities. (~USD100,000 / TOP180,000 total amount).

Proper disposal of building debris and demolition rubble:

A.5A: Provision of funding to 1,100 households (~USD150 / TOP 180) to sort and assemble for collection non-hazardous building debris.

A.5B: Removal of debris – The safe collection of construction and demolition waste and hazardous waste, and transport and disposal to a registered, managed landfill site on the main island of Tongatapu.

A.6: Household supplementary potable water and sanitation facilities. Address critical basic services at household level to improve potable water supplies and provide appropriately constructed, on-site sanitation disposal (average ~USD1,800 / TOP3,300 per household).

A.7: Logistical support for materials supply (USD0.23m) – purchase of a barge for MoI to transport reconstruction advisory and inspectorate personnel and building materials to supplement limited private sector carriers to the remote islands.

Component B: Technical Assistance and Training for Enhanced Disaster and Climate Resilience (USD1.58 m including contingencies and taxes)

B.1 Resilience strengthening for safer homes and communities:

i. **B.1A: Mobilization and Building Advice for households (USD1.04m).** Provision of technical assistance for repairs and retrofitting of homes and community facilities as part of the supported self-recovery (Component A).

ii. **B.1B: Climate Resilience Training.** Knowledge building and practices training of tradespeople, supervisors and community leaders for climate resilient buildings and infrastructure.

iii. **B.1C: Improve Building Code Application.** Strengthening and updating of the Building Code and design and implementation of public awareness and practices campaigns for self-enforcement (focusing on low income groups).

iv. **B.1D: Hazard Mapping.** Assessment and mapping of coastal hazards and risks to inform reconstruction planning and resilience building within the affected areas.

B.2 Disaster Recovery and Reconstruction Framework

i. **Operationalize and institutionalize recovery and reconstruction.** Activities include: (i) review and documentation of lessons learnt from reconstruction and recovery of past major disasters; (ii) review and update of relevant legislation and institutional arrangements, such as the Emergency Management Act 2007 and the National Emergency Management Plan 2010; (iii) development of an operations manual detailing implementation and planning arrangements for disaster recovery and reconstruction, including standard assessment templates and procedures; and, (iv) conduct of a roadshow and
broad community consultations on the draft Recovery and Reconstruction Policy.

ii. **Improved post-disaster mapping capacity and damage assessments** based on experiences to date in Tonga (including the project) to support efficient disaster response and recovery.

**Component C: Project Support (USD1.34 m including contingencies and taxes)**

i. Technical support for construction activities.

ii. Project support for procurement, financial management, contract and project management.

iii. Social and environmental safeguards oversight, monitoring and evaluation.

**Project Location**

5. The Ha’apai Islands are the geographic centre of Tonga’s four main groups of islands. Most of the islands are small, low-lying coral atolls except for the volcanic islands of Tofua and Kao to the west. Located south of the equator in the Pacific, the Tonga archipelago is most vulnerable to natural disaster. Tropical cyclones often bring strong winds, intense precipitations and sometimes storm surges inundating the Islands. Climate change and increase in sea level will exacerbate those threats. In addition, the archipelago’s location in the Pacific “ring of fire” makes it vulnerable to extreme seismic activities and tsunamis. A map of the cyclone affected area is provided in Annex A.

**Environmental Impacts and Mitigation Measures**

6. The Project is classified as Category B Project for environment.

7. The Project will support the reconstruction and climate proofing of about 950 destroyed and damaged houses, public buildings such as Lifuka market, community facilities such as community halls, basketball courts, etc. For the worst affected, it will provide potable water and sanitation facility. It will strengthen and update the building code and train trades-people, supervisors and community leaders in way of repairing / constructing climate resilient buildings and infrastructure.

8. The initial environmental assessment found that the proposed housing repairs / construction, installation of potable water and sanitation facility will have only small, temporary, and localized adverse impacts on the environment. The impacts can be readily managed by the proposed mitigation measures in the EMP. Currently, asbestos containing materials (ACM) is being removed and secured by a New Zealand based company specializing in the asbestos removal. Construction and demolition waste (CDW) debris, after segregation of hazardous waste material and removal of recoverable, recyclable and reusable will require disposal. At this stage, the asbestos and the unusable CDW debris will be barged to the secure, engineered and managed Tapuhia landfill in Nuku’alofa, Tongatapu. However, in the event the Government of Tonga wishes to open a landfill site in Ha’apai, the Project will support identification and selection of a landfill site leading to the design of an engineered landfill. The Ministry of Infrastructure (MoI) is in the process of hiring a Consulting firm to assist with the management of CDW debris, including identifying suitable temporary stockpile site(s) to accommodate asbestos and CDW debris, and public consultations and environmental studies of the site(s).

**Climate-Resistant Housing**

9. Depending on the cyclone impacted family’s vulnerability, the Project may provide two resilient, habitable rooms (35.2 m² respectively) under component A.1, and assist others with SSR housing, under component A.2. Each house will be a wood frame structure with
plywood walls and floors and a metal clad roof. The houses will include 240V grid connections where available or 12V solar photo voltaic system (mostly on the outer Islands). All houses will have provision for gutters and downspouts connected to existing rain water tanks. The houses will include either latrines or septic tanks and toilets or composting toilets, where practicable. Where available, the houses may be connected to the village water supply mains.

10. The provision of cyclone-resistant shelters, with options to install new septic tank and potable water supply will minimize adverse impacts on the environment, maximize safety and improve household health. New houses will include soak-pits with coral material to provide enhanced filtration for septic and waste water from shower / kitchen. The installation of gutters tied to rainwater harvesting, using either the large 5,000 L capacity plastic or other on site tanks to store rainwater, will have positive health and environmental benefits. The tanks will provide drinking and cooking water needs of each family.

11. Most of the Cyclone-resistant houses will be constructed on the same plots and within the plot boundaries. Some destroyed or damaged houses, located in areas subject to environment / climate risks may be relocated to an area with an acceptable environmental risk. Each new house will be founded on 400 x 400 x 600 mm concrete pad footings, with 200 x 200 x 1100 mm reinforced concrete piles tied to the footings. The footings will be arranged in 1.6m x 1.6m grid pattern and the house floor will be built about 800 mm above ground. The houses will be erected using either the reusable lumber from CDW or imported lumber and materials, with minor excavation for foundation. Most of the construction material such as cement, steel, lumber, galvanized roofing, plastic fittings, etc. will be sourced from either the local suppliers or from Nuku‘alofa. The suppliers import the material either from Fiji, Australia, New Zealand, Singapore, China, etc. Aggregate and sand will be procured from the Government owned and operated Lotofoa Quarry. Most impacts will result from dust and noise from delivery trucks or construction. The small volume of excess excavated material will be spread in the garden or on the ground under the houses.

Water Supply and Sanitation

12. Fresh water resources in Ha’apai, especially in the villages of Pangai and Hihifo (Lifuka Island) and villages of Faleloa, Lotofoa and Fotua (Foa Island) are scarce, largely due to Islands’ geographical location, geological formation and geomorphology. Rain water or bottled water is used for drinking and in kitchen.

13. The increase in use of flushed toilets, while improving lifestyle and health, has contributed to groundwater contamination from lack of maintenance of septic tank systems, pollution from piggeries, and increase in groundwater pumping rates leading to shrinkage and contamination of groundwater lenses. The problem is exacerbated in Lifuka and Foa, where the contaminated groundwater is the main source of water used for shower, washing, toilet, etc. for the residents and public / commercial establishments. Post cyclone testing of the water supply, carried out by the Natural Resource Division of MLECCNR, showed groundwater salinity in the range of 3000-6000 uS/cm compared to rainwater salinity of 100-200 uS/cm. The testing showed that all water samples were contaminated by fecal coliforms.

14. The provision of sanitary facility for new houses, and assistance for SSR houses, the project will improve general sanitation of the residents in the area. The project will consider installing composting toilets or dry pit latrines where groundwater levels are high or the houses are near coastal protection zones. The Project has potential budget for
replacement of pumps, supply of chemicals for chlorination and other repair needs and is awaiting needs assessment from the Government’s WASH Committee.

15. The overall impacts from the installation of new septic tanks, better connections to water mains and septic tanks and the installation and connection of roof gutters to rainwater storage tanks, will have positive environmental impacts on the residents, and on the groundwater. The civil works will basically involve digging of about 60-90 cm deep trench to make septic tank and main water supply connection. The installation of prefab or in situ construction of septic tanks will result in small volume of surplus dirt/soil. The construction will result in impacts from noise, dust and excavation. The small volume of excess excavated material will be used in either burying the old septic tanks or in pothole fillings or will be spread around the garden.

16. Except for drinking and cooking water which will have to be supplied either from rainwater tanks or from bottled water, there are 4 x 40,000 L ground level storage tanks and one 2,000L elevated tank in Lifuka supplying water to the villages of Pangai and Hihifo. In addition, there are a number of small (1,000 – 2,000 L) elevated storage tanks owned privately or by villages / communities with operating pumps which supply smaller communities. At current usage of about 17,000 – 20,000 L/d for the villages of Pangai and Hihifo, there is adequate water supply available for construction purpose. As there are no large structures requiring large volume of water during construction for concrete mixing and curing and since most of the labor will be recruited locally, construction imposed water demand is not considered an issue, except in drought condition, when pumping from groundwater aquifer may be restricted.

17. The Contractor, whether building the Bank funded housing or assisting the households with repairs to their houses will abide by the World Bank Group Environmental, Health, and Safety Guideline available at: www.ifc.org/ehsguidelines

Other Donors / Public / Private Sector Development

18. To date ADB and the Government of New Zealand are supporting the Government of Tonga to reconstruct and climate proof the main electricity network on Ha’apai; and reconstruct and climate proof damaged school facilities. The network rehabilitation includes construction of a 6.6 kV distribution network, repair and rehabilitation of transmission lines, laying of underground cables, restoring connections to residences and commercial / government buildings and installation of LED street lights. The project will also repair / reconstruct and climate proof 17 damaged schools, and two marine landings to facilitate the transport of construction material. ADB has classified the project as a Category B project for environment and expects it to “have only small, temporary, and localized adverse impacts on the environment, which can be readily managed by proposed mitigation measures”.

19. Work on the reconstruction and climate proofing of the electrical power grid has already started and is expected to be completed by December 2016. Repair, reconstruction and climate proofing of the schools will be given a priority with much of the repairs to be completed as soon as possible to return the approx. 1,700 students to safer schools. This work is expected to be completed by Dec 2015.

20. Except for a few minor private sector and some church / local community activities there are no other donor related construction activities proposed at this time. However, other donors provided relief support and emergency supplies shortly after Tropical Cyclone Ian hit, and continue to provide funding for TA support to the Government of Tonga.
Cumulative Impacts

21. The attached Program Schedule (Figure 1) shows the Government of Tonga’s timeline for the construction / restoration of housing and ancillary facilities for the cyclone impacted households. The schedule largely reflects the Bank’s TCIRCRP proposed program except for the self-recovery efforts and in particular the retrofitting / resilience home improvements which are expected to continue through 2016. The Contractor led construction accounts for only 165 replacement housing out of the current estimated 550 replacement houses and 550 repairs and climate resilience homes and 2 of 20 community facilities. Bulk of the TCIRCRP will support self-recovery / home-owner led initiative and work by NGOs. To support this initiative, some NGOs are planning to take supervised youth groups across from Tongatapu to Ha’apai on a rotation basis to assist with the work. They plan to stay in their undamaged church buildings and Pastor housing. Given that about 79% of the construction / repairs will be carried out by the owners contributing his or her skills, labor / time and material, the pace of construction and the associated impacts is expected to vary and either remain steady or increase at a slower pace.

22. Most noise, dust, traffic congestion, safety, air pollution related impacts are expected early during the initial flurry of transporting construction material to Ha’apai. The magnitude and pace of impacts will be constrained because of limited wharf space at the Ha’apai end to dock and receive boats. Since there will be no medium or large scale civil works requiring heavy construction equipment or concrete mix plants or transport of quarry / borrow materials, environmental impacts such as noise, dust, safety, local air pollution from transport equipment, etc. will result mostly from the construction of pad foundation for new houses, installation of septic tanks and soak pits, digging of trenches for burying electrical cables or strengthening schools. And because the construction is expected to spread over a longer period of time, cumulative impacts on the availability of water, dust, noise, etc. are expected to be minor and spread over time.

![Figure 1: Program schedule](image)

Asbestos Removal

23. The MoI, has contracted a New Zealand firm – Nikau Contractors Limited – to confirm the presence of asbestos in the destroyed and impacted housing, schools, hospitals and other buildings, assess the magnitude of the asbestos problem and develop asbestos handling, removal and disposal strategy for the Ha’apai Islands.

24. Two asbestos specialists from the company holding “Certification of Competency” from the NZ Department of Labour, visited Ha’apai and confirmed the presence of asbestos in residences, hospital and schools. Based on their preliminary findings, about 250-300 tons of ACM and asbestos contaminated debris has been identified. A report / strategy on safe
removal, handling, secure containment and storage / disposal of asbestos has been delivered to MoI. Once the asbestos handling strategy has been finalized and approved by Government of Tonga, the team will return to Ha’apai and train selected local people on the safe handling of asbestos and implement the asbestos strategy to safely remove and secure the ACM. The plastic wrapped asbestos will be stored in a safe and secure location (likely in 20 ft. containers) awaiting final disposal (after safe transport) to the Tapuhia landfill site in Nuku’alofa, which is designed to handle hazardous waste and has the capacity to handle and safely dispose of asbestos waste.

All work will be carried out in accordance with the New Zealand Guidelines for the Management and Removal of Asbestos (3rd Edition) produced by the New Zealand Demolition and Asbestos Association (NZDAA), the World Bank Group 2009 Guidance Note on Asbestos Management (attached in Annex B) and the World Bank Group’s “Environmental, Health, and Safety Guidelines” available at: www.ifc.org/ehsguidelines

Tapuhia Solid Waste Management Facility, Tongatapu

25. In 2001, Australian Aid (then AusAID) agreed to fund a solid waste management facility for Tongatapu based on the Solid Waste Management Plan (SWMP) of March 2000. The Plan recommended that the old, disused Tapuhia Quarry site be developed as a modern waste management and sanitary landfill facility to service the solid waste management needs of Nuku’alofa and other villages on Tongatapu. At 10,000 tons/year of waste, the Tapuhia Landfill has a life of about 30 years.

26. The first landfill waste disposal cell (currently in use) was developed in the southwest corner of the quarry. The cell floor was raised above the groundwater level to ensure that no leachate escaped directly into groundwater. The cell floor was lined with 500 mm layer of low permeability compacted clay followed by a geosynthetic clay liner (Bentofix X1000) to form a composite liner system. A leachate collection system was placed directly above the liner system to direct the leachate to a sump / extraction system. A 300 mm layer of drainage aggregate was placed over the entire floor of the cell to complement the leachate pipe network and to protect the liner system. Bentofix X2000 liner, with geofabrics on either side of the liner, was used to provide protection from the quarry face and initial UV radiation. When full, the entire cell will be covered with compacted soil cover, followed by geosynthetic Bentofix liner and capped with drainage aggregate and topsoil. The cell surface will be sloped to direct surface drainage away from the cell. The current cell is now almost full and a new 30,000 ton capacity cell is currently under construction using the same design.

27. The Tapuhia facility also includes a low level (household chemicals, hospital autoclave and medical waste) hazardous waste landfill cell with its own leachate collection facility draining into the common sump. Leachate from the sump is pumped to a treatment pond, where it is recirculated and aerated. Following suitable treatment and settling period, it is released to a storage pond for spray irrigation of the facility green areas and gardens or sprayed on the landfill. The facility also has four boreholes – one at each corner of the landfill, to monitor for groundwater contamination.

28. In addition to the above, the facility has a gatehouse, vehicle reception facility, staff amenities, recycling centre, storage sheds, workshops, etc. It also has four covered septic sludge drying bed system with translucent roof panels for rapid drying of the sludge. Liquid from the sludge beds is collected and disposed of into the leachate treatment pond. The dried, processed sludge is given to the nearby farmers or reused on the site. Construction of the landfill started in June 2004 and was completed in August 2006.

29. Site visit to the Tapuhia Landfill showed that the Landfill seemed to be well managed and

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operated and has enough capacity to accommodate the estimated 300 tons of asbestos waste and cyclone generated CDW debris.

**Construction and Demolition Waste (CDW)**

30. Tonga Cyclone Ian has generated large quantity of waste which requires response beyond initial waste removal to prioritize waste management options. The attached table shows the type of waste expected and the management options for each type of waste. Ownership of waste, in particular reusable waste, is an important issue, especially in light of the SSR option, which may prompt the owners to reuse reclaimed CDW in repairing their homes. This ownership issue will be clarified early in the process, to avoid later conflicts.

31. Once the households have recovered the reusable materials for their own use, they will be encouraged to separate CDW into rubbles, toxic and hazardous waste, recyclable metals and plastic wastes and unusable waste. Mol will assist the households in separating and in reusing / recycling the CDW and will transport the remaining waste to an approved quarry site in Pangai where a Project financed crusher will crush the rubbles into small pieces for use in reconstruction activities or road maintenance. The remaining waste will be transported to the Tapuhia Landfill in Tongatapu for recycle and disposal.

32. At present there is no estimate of how much cyclone related CDW has been generated. With a large number of partially damaged houses still standing, it is difficult to estimate the amount of debris which can be recovered / recycled or reused or that which may require disposal. Table 1 below provides potential options to manage CDW with intent to maximize reuse and to minimize disposal.

**Table 1: Construction Demolition Waste and Management Options**

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Potential Use</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biodegradable Waste</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetative waste, paper, spoilt food</td>
<td>Composting for land regeneration</td>
<td>Waste should be shredded before composting in order to hasten the composting process</td>
</tr>
<tr>
<td><strong>Hazardous Waste</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesticides, fertilizers, paint, lubricants, fuels, solvents, household cleaners, medical wastes, automobile batteries, etc.</td>
<td>Segregate and store in secure location.</td>
<td>Identify appropriate facility complying with local regulations for safe disposal. Recycle car batteries.</td>
</tr>
<tr>
<td><strong>Non-biodegradable waste</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood</td>
<td>Use in reconstruction or as vegetative matter (see above)</td>
<td>Recycle – determine ownership before removal from site.</td>
</tr>
<tr>
<td>Metals (all types), wire, electronic equipment, damaged bicycles, white goods (fridges, cookers, small appliances), pop cans, iron roofing</td>
<td>Send for recycling</td>
<td>Cut or crush for easy transportation.</td>
</tr>
<tr>
<td>Glass (bottles, mirrors, automotive, windows)</td>
<td>Send for recycling</td>
<td>Handle safely</td>
</tr>
</tbody>
</table>
Construction and demolition debris: tiles, aggregates, gypsum boards, masonry and stones, asphalt, concrete, bricks

- Reuse tiles, bricks, where possible. Crush remainder to max. 10 cm size for use in road bases or backfill.
- The debris should not contain hazardous chemicals or residue.

Plastic – non-specific (bottles, containers, bags, sheeting)

- Send for recycling
- Should not include hazardous material

Miscellaneous waste – household / office waste and furnishing, clothing, rags, shoes, mattresses

- Reuse / reclaim if possible. Send to landfill.
- Should not include hazardous material

**Potential Ha’apai Landfill**

33. To deal with potentially large amount of CDW generated by the cyclone, the MoI plans to engage a Consultant / Contractor to prepare a solid waste management plan for the project and to assist with the transport and disposal of the non-asbestos related CDW. The Consultant will inventory the CDW, and make recommendations about its reuse, recycle, and ultimate disposal of unusable waste. In the event the Government of Tonga wishes to open a landfill on Ha’apai, the Consultancy will identify a suitable site either on the Lifuka or Foa Islands for development as a modern landfill in future when the Government of Tonga has identified a source of financing for the landfill. The proposed landfill will be capable of handling domestic household and other commercial / industrial wastes in the future. For the present, all unusable CDW will be stored in a secure temporary site(s) before shipping it to the Tapuhia landfill on Tongatapu for safe disposal. A chance find procedure for handling physical cultural artifacts is attached in Annex C.

34. In screening for potential landfill sites the Consultant should consider the siting considerations given in Table 2 below. In Tonga, land ownership is an issue that may disqualify a potential site. So early focus should be directed to screening government owned candidate site. The screening should also consider potential climate change impacts.

**Table 2: Screening Criteria for Potential Landfill Sites**

<table>
<thead>
<tr>
<th>Screening Criteria</th>
<th>Detailed Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community needs</td>
<td>Amenity, safety, aesthetics</td>
</tr>
</tbody>
</table>
| Landfill type      | Area method – use of quarry site  
|                    | Trench-and-fill method  
|                    | Mound method  
|                    | Valley method | |
| Groundwater        | Location over potable groundwater  
|                    | Location over recharge area  
|                    | Minimum separation of wastes to watertable  |
| Buffer distances   | Buffer distances for gas migration, safety, coastal area and amenity impacts  |
| Geology            | Landform / geotechnical stability  |
| Flora and Fauna    | Loss of biodiversity  
|                    | Critical natural habitat  |
| Infrastructures    | Local infrastructure  
|                    | Access to site  |

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Access to water supply, power, sanitation

Surface Water
- Wetland
- Marine and coastal reserves
- Water supply catchment
- Flood areas

Land
- Ownership

35. Annex D provides the criteria to determine the applicability of the World Bank Environmental and Legal Safeguard Policies. If triggered, these policies would be applicable to the preparation of an EIA for the proposed landfill site.

Monitoring

36. A qualified Social and Environmental Safeguard consultant will be hired by the Project Management Unit (PMU). This consultant will be responsible for monitoring implementation of the World Bank approved safeguard documents including the ARAP, EMP and CEMP. This consultant will provide detailed inputs to the project quarterly reporting.

37. All supervision reports shall include sections on environment and social safeguard compliance. The contents of these sections shall verify that the requirements as detailed in the ARAP, EMP and CEMP have been satisfied. If requirements have not been satisfied, the consultant shall provide recommendations for further actions to ensure compliance.

38. An EMP Implementation Monitoring Checklist is attached in Annex E for regular completion and submission by the Contractor.

39. Table 3 below identifies the key issues related to the construction / recovery process for the housing and community building repairs, the proposed measures to mitigate the impacts, implementation schedule and supervision responsibility.

Table 3: Summary of Key Construction / Recovery Issues

<table>
<thead>
<tr>
<th>Key Issues</th>
<th>Proposed Measures</th>
<th>Timing</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asbestos Containing Material (ACM)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identification &amp; assessment</td>
<td>Site visit &amp; survey</td>
<td>Ongoing Process (Mostly Completed – March 2014)</td>
<td>Nikau Contractors &amp; MOI</td>
</tr>
<tr>
<td>Training</td>
<td>Train local staff</td>
<td>April / May 2014</td>
<td>Nikau Contractors</td>
</tr>
<tr>
<td>Asbestos removal &amp; storage</td>
<td>Remove &amp; secure ACM</td>
<td>May / Jun 2014</td>
<td>Nikau Contractors &amp; MOI</td>
</tr>
<tr>
<td>Disposal</td>
<td>Transport &amp; Dispose at Tapuhia Landfill</td>
<td>July 2014 (Uncertain – depends on availability of barge)</td>
<td>Nikau Contractors MOI Tapuhia Landfill</td>
</tr>
<tr>
<td><strong>Construction Demolition Waste (CDW)</strong></td>
<td></td>
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</tr>
<tr>
<td>Assessment of CDW</td>
<td>Site visit</td>
<td>Ongoing</td>
<td>MOI</td>
</tr>
<tr>
<td>Identification of reusable material</td>
<td>Households</td>
<td>Ongoing</td>
<td>MOI</td>
</tr>
<tr>
<td>Separation of toxic and hazardous, metal, rubble &amp; other recyclable waste</td>
<td>Households with assistance from MOI, PMU, NGOs and Community</td>
<td>Ongoing to May / Jun 2014</td>
<td>PMU / MOI</td>
</tr>
<tr>
<td>Transport &amp; Store</td>
<td>Transport to local landfill for storage</td>
<td>Ongoing to Dec 2014</td>
<td>PMU / MOI</td>
</tr>
<tr>
<td>Rubble</td>
<td>Crush for immediate reuse or stockpile for</td>
<td>May – Dec 2014</td>
<td>Contractor / PMU / MOI</td>
</tr>
<tr>
<td>Future Use</td>
<td>July to Dec 2014 as barge space available</td>
<td>Contractor / PMU / MOI Tapuhia Landfill</td>
<td></td>
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<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
<td>----------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Disposal</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Transport hazardous, recyclable &amp; unusable waste to Tapuhia Landfill</td>
<td></td>
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</tbody>
</table>

**Housing, Community Facilities - Repair, Reconstruction, Climate Resilience**

<table>
<thead>
<tr>
<th>Repair / reconstruct houses &amp; community facilities</th>
<th>Engage Contractors &amp; building specialists to assist households to repair / reconstruct</th>
<th>July 2014 to Dec 2016</th>
<th>MOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water / Sanitation upgrades</td>
<td>Contractors / Self Recovery</td>
<td>Jul 2014 to Dec 2016</td>
<td>MOI</td>
</tr>
<tr>
<td>Advisory &amp; inspection assistance</td>
<td>Train trades people, supervisors &amp; community leaders</td>
<td>Apr 2014 to Dec 2015</td>
<td>MOI</td>
</tr>
</tbody>
</table>

**Environment**

<table>
<thead>
<tr>
<th>Construction related impacts (dust, noise, safety, pollution, etc.)</th>
<th>Spray water to suppress dust. Restrict noisy work to core hours. Use Monitoring Checklist. Contractor to abide by World Bank EH&amp;S Guidelines</th>
<th>Continuous to end of construction</th>
<th>PMU under MOI</th>
</tr>
</thead>
</table>

**Institutional Arrangements and Capacity Building**

40. The oversight for physical implementation of the EMP will be the responsibility of the MoI as the lead implementing agency. The day-to-day responsibility will rest with the PMU under the Transport Sector Consolidation Project (TSCP) set up under the MoI. The PMU has gained good experience from implementing the TSCP and has the capability to undertake the implementation of EMP as related to the environment. Since the work will be carried out in Ha’apai, the PMU plans to recruit a full time, social / environmental specialist to implement the EMP.

41. In preparation for the physical removal of asbestos from houses, schools and hospital, the asbestos Contractor plans to recruit local people and provide them with hands on training in health, environment and safety aspects of handling asbestos and ACM. The Ministry of Lands, Environment, Climate Change & Natural Resources (MLECCNR) has expressed keen interest to have six of its staff participate in the proposed asbestos training so that they can respond to requests to handle / remove small amounts of ACM.

42. The processing of CDW to segregate hazardous, recoverable, reusable, and recyclable waste will require closer scrutiny to ensure that the debris left for disposal does not contain hazardous material and that all usable / recyclable material have been removed to the fullest extent. Each household, with the assistance of the community, will be asked to sort its debris to segregate different types of waste. The PMU will provide oversight and advice to assist the households, contractors and the communities with the effort.

43. The PMU in consultation with the Environment Division (MLECCNR) will provide oversight to ensure that site identification and selection process for the landfill is carried out as per the TOR issued by the MoI which requires public consultation and environmental assessment. The EA report will be sent to the Bank for review and comments.

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ANNEX A: Map of Project Location
Good Practice Note: Asbestos: Occupational and Community Health Issues

1. SUMMARY

The purpose of this Good Practice Note is to increase the awareness of the health risks related to occupational asbestos exposure, provide a list of resources on international good practices available to minimize these risks, and present an overview of some of the available product alternatives on the market. The need to address asbestos-containing materials (ACM) as a hazard is no longer under debate but a widely accepted fact.

Practices regarding asbestos that are normally considered acceptable by the World Bank Group (WBG) in projects supported through its lending or other instruments are addressed in the WBG’s General Environmental, Health and Safety (EHS) Guidelines.1 This Good Practice Note provides background and context for the guidance in the WBG EHS Guidelines.

Good practice is to minimize the health risks associated with ACM by avoiding their use in new construction and renovation, and, if installed asbestos-containing materials are encountered, by using internationally recognized standards and best practices (such as those presented in Appendix 3) to mitigate their impact. In all cases, the Bank expects borrowers and other clients of World Bank funding to use alternative materials wherever feasible.

ACM should be avoided in new construction, including construction for disaster relief. In reconstruction, demolition, and removal of damaged infrastructure, asbestos hazards should be identified and a risk management plan adopted that includes disposal techniques and end-of-life sites.

2. ASBESTOS AND HEALTH RISKS

2.1. What is Asbestos, and Why are We Concerned with its Use?

Asbestos is a group of naturally occurring fibrous silicate minerals. It was once used widely in the production of many industrial and household products because of its useful properties, including fire retardation, electrical and thermal insulation, chemical and thermal stability, and high tensile strength. Today, however, asbestos is recognized as a cause of various diseases and cancers and is considered a health hazard if inhaled.2 The ILO estimates that over the last several decades 100,000 deaths globally have been due to asbestos exposure,3 and the WHO states that each year 90,000 people globally die because of occupational asbestos exposure.4

3 http://www.ilo.org/wow/Articles/lang--en/WCMS_081341
4 http://www.who.int/occupational_health/publications/asbestosrelateddiseases.pdf

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Over 90% of asbestos fiber produced today is chrysotile, which is used in asbestos-cement (A-C) construction materials: A-C flat and corrugated sheet, A-C pipe, and A-C water storage tanks. Other products still being manufactured with asbestos content include vehicle brake and clutch pads, roofing, and gaskets. Though today asbestos is hardly used in construction materials other than asbestos-containing products, it is still found in older buildings in the form of friable surfacing materials, thermal system insulation, non-friable flooring materials, and other applications. The maintenance and removal of these materials warrant special attention.

Because the health risks associated with exposure to asbestos are now widely recognized, global health and worker organizations, research institutes, and some governments have enacted bans on the commercial use of asbestos (see Box 1), and they urge the enforcement of national standards to protect the health of workers, their families, and communities exposed to asbestos through an International Convention.²

**BOX 1. BANS ON THE USE OF ASBESTOS AND ASBESTOS PRODUCTS**

A global ban on commercial use of asbestos has been urged by the Building and Wood Workers Federation (IFBWW), the International Metalworker’s Federation, the International Trade Union Confederation, the government of France, and the distinguished scientific group Collegium Ramazzini. All member states of the European Union and over 40 countries worldwide (see Appendix 1) have banned all forms of asbestos, including chrysotile.⁷ In June 2006, the General Conference of the ILO adopted a resolution to “promote the elimination of all forms of asbestos and asbestos-containing materials.”

- The International Ban Asbestos Secretariat keeps track of national asbestos bans. [http://www.ibas.btinternet.co.uk/frames/f_lka_alpha_asb_ban_280704.htm](http://www.ibas.btinternet.co.uk/frames/f_lka_alpha_asb_ban_280704.htm)

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**2.2. Health Concerns Linked to Asbestos-Containing Products**

Health hazards from breathing asbestos dust include asbestosis, a lung scarring disease, and various forms of cancer (including lung cancer and mesothelioma of the pleura and peritoneum).⁸ These diseases usually arise decades after the onset of asbestos exposure. Mesothelioma, a signal tumor for asbestos exposure, occurs among workers’ family members from dust on the workers’ clothes and among neighbors of asbestos air pollution point sources.⁹ Some experimental animal studies show that high inhalation exposures to all forms of asbestos for only hours can cause cancer.¹⁰

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⁶ ILO Asbestos Convention No. 162, (see http://www.ilo.org/ilolex or [http://www.itcilo.it/actrav/osh_es/m%F3dulos/legis/c162.htm](http://www.itcilo.it/actrav/osh_es/m%F3dulos/legis/c162.htm))
⁸ [http://www.euro.who.int/document/aiq/6_2_asbestos.pdf](http://www.euro.who.int/document/aiq/6_2_asbestos.pdf)
Very high levels of airborne asbestos have been recorded where power tools are used to cut A-C products and grind brake shoes. For chrysotile asbestos, the most common variety, there is no threshold (non-zero) of exposure that has been shown to be free from carcinogenic risks. Construction materials are of particular concern, because of the large number of workers in construction trades, the difficulty of instituting control measures, and the continuing threat posed by in-place materials that eventually require alterations, repair, and disposal.\textsuperscript{11} Renovations and repairs in buildings containing A-C materials can also endanger building occupants. In addition to the problems from products made with commercial asbestos, asbestos also occurs as a contaminant in some deposits of stone, talc, vermiculite, iron ore, and other minerals. This can create health hazards for workers and residents at the site of excavation and in some cases in the manufacture and use of consumer products the materials are used to make. While asbestos is a known carcinogen when inhaled, it is not known to be carcinogenic when ingested, as through drinking water,\textsuperscript{12} although pipe standards have been issued for A-C pipes conducting “aggressive” water.\textsuperscript{13}

From the industrial hygiene viewpoint, asbestos creates a chain of exposure from the time it is mined until it returns to the earth at a landfill or unauthorized disposal site. At each link in the chain, occupational and community exposures coexist. Workers in the mines are exposed to the fibers while extracting the ore; their families breathe fibers brought home on work clothes; workers in the mills and factories process the fiber and manufacture products with it; and their families are also secondarily exposed. Communities around the mines, mills, and factories are contaminated with their wastes; children play on tailings piles and in contaminated schoolyards; transportation of fiber and products contaminates roads and rights-of-way.\textsuperscript{14} Tradesmen who install, repair, and remove ACM are exposed in the course of their work, as are bystanders, in the absence of proper controls. Disposal of asbestos wastes from any step in this sequence not only exposes the workers handling the wastes but also local residents when fibers become airborne because of insufficient covering and erosion control. Finally, in the absence of measures to remove ACM from the waste stream and dispose of them properly, the cycle is often repeated when discarded material is scavenged and reused.\textsuperscript{15}

\textsuperscript{12}http://whqlibdoc.who.int/hq/2000/a68673_guidelines_3.pdf
\textsuperscript{13}http://whqlibdoc.who.int/hq/2000/a68673_tech_aspects_4.pdf

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2.3. Increasing Use of Asbestos Fiber

There is evidence that, after a decline in the 1990s, the use of asbestos fiber is increasing globally. A recent study\textsuperscript{16} shows that a 59% increase in metric tons was consumed in 12 countries from 2000 to 2004.

3. INTERNATIONAL CONVENTION AND STANDARDS FOR WORKING WITH ASBESTOS

3.1. International Convention

The International Labor Organization (ILO) established an Asbestos Convention (C162) in 1986 to promote national laws and regulations for the “prevention and control of, and protection of workers against, health hazards due to occupational exposure to asbestos.”\textsuperscript{17} The convention outlines aspects of best practice: Scope and Definitions, General Principles, Protective and Preventive Measures, Surveillance of the Working Environment, and Workers’ Health. As of March 4, 2008, 31 countries had ratified the Convention;\textsuperscript{18} 17 of them have banned asbestos.

Some of the ILO asbestos convention requirements:

- work clothing to be provided by employers;
- double changing rooms and wash facilities to prevent dust from going home on street clothes;
- training of workers about the health hazards to themselves and their families;
- periodic medical examinations of workers,
- periodic air monitoring of the work environment, with records retained for 30 years;
- development of a work plan prior to demolition work, to protect workers and provide for proper waste disposal; and
- protection from “retaliatory and disciplinary measures” for workers who remove themselves from work that they are justified in believing presents a serious danger to health.

Standard considerations for working with and procuring ACM are common to most projects. An overview of some basic ones is provided in Appendix 5.

3.2. International Standards and National Regulations

Standards and regulations for work involving ACM have been published by nongovernmental organizations and government agencies. Appendix 3 lists some resources, including international organizations (e.g., WHO, ISO, ASTM) and national governments (e.g., UK, US, Canada, South Africa). The resources range from manuals to individual standards and cover a variety of work guidelines, including surveys, identification, inspection, maintenance, renovation, repair, removal, and disposal. Some of the key issues discussed in these standards and regulations are as follows:

- The scale of occupational hazards. The health risk is not simply a function of the properties of the ACM, but also reflects the type of work being done and the controls used. Although A-C products, for example, may seem to intrinsically present less of a risk than fire-proofing, air monitoring has shown that cutting dry A-C sheet with a power saw can release far greater amounts of airborne fibers than scraping wet, saturated fireproofing off a beam. The relationship between the nature of A-C products, the work being done and the controls used to control the release of fibers and debris is important (as discussed in ASTM E2394 and HSG189/2).
Controlling exposure to airborne fibers. Because asbestos fibers are primarily an inhalation hazard, the basic purpose of the regulations and standards is to control the concentration of asbestos fibers in the air inhaled by workers or others. Concentration limits have been set by regulations in numerous countries for workers whose duties involve contact with ACM; however, they do not purport to totally eliminate the risk of asbestos disease, but only to reduce it. Exposure limits for individuals other than workers, including occupants of buildings and facilities and the community, are lower than those for workers in deference to the very young and old as well as the physically compromised.

Measuring exposure to airborne fibers. Compliance with exposure limits is demonstrated by air sampling in workers’ breathing zone or in the space occupied by the affected individuals, with analysis of the sample by optical or electron microscopy, as explained in Appendix 3. Abatement protocols determine whether a building can be reoccupied after asbestos abatement.

Proper disposal. Proper disposal of ACM is important not only to protect the community and environment but also to prevent scavenging and reuse of removed material. ACM should be transported in leak-tight containers to a secure landfill operated in a manner that precludes air and water contamination that could result from ruptured containers. Similar requirements apply to remediation of sites such as mines, mills, and factories where asbestos fiber was processed and products manufactured. (See EPA NESHAP regulations, Appendix 3.)

Transboundary movement of waste. Waste asbestos (dust and fibers) is considered a hazardous waste under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Basel Convention imposes use of a prior informed consent procedure for movement of such wastes across international borders. Shipments made without consent are illegal. Parties have to ensure that hazardous waste is disposed of in an environmentally sound manner. Strong controls have to be applied from the moment the material is generated, to its storage, transport, treatment, reuse, recycling, recovery, and final disposal. \(20\)

Identifying asbestos products. A-C products include flat panels, corrugated panels used for roofing, water storage tanks, and pressure, water, and sewer pipes. In some countries asbestos may still be used in making wallboard, heat-resistant gloves and clothes for industrial use, and brake and clutch friction elements and gaskets used in vehicles. \(21\) Thermal insulation containing asbestos and sprayed asbestos for insulation and acoustic damping were widely used through the 1970s and should be looked for in any project involving boilers and insulated pipes. Insulation dating from before 1980 should be presumed to contain asbestos unless analyzed and found not to. The microscopic methodology for analyzing bulk samples for the presence of asbestos is widely available in industrialized countries and is not expensive; it is less available in developing countries. In a developing country samples may have to be mailed out for testing; alternatively, training may be available for a laboratory in the country.

Training. It is impossible to overemphasize the importance of training for working with ACM in any capacity—whether it involves inspections, maintenance, removal, or laboratory analysis. The duration of the training and the course content depend on the type of work the individual will be doing. Quality control and proficiency testing for laboratories and individual analysts are also important.

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\(20\) See Basel Convention Secretariat http://www.basel.int/

\(21\) In 2004, Russia, China, India, Kazakhstan, Thailand, and Ukraine together accounted for about three-quarters of world asbestos consumption. Other major consumers of asbestos are Iran, Brazil, Vietnam, and Indonesia.
4. ALTERNATIVES TO ASBESTOS-CONTAINING MATERIALS

4.1. Growing Marketplace
Safer substitutes for asbestos products of all kinds are increasingly available (see Appendix 4). These include fiber-cement products using combinations of local vegetable fibers and synthetic fibers, as well as other products that serve the same purposes. The WHO is actively involved in evaluating alternatives.

4.2. Cost and Performance Issues
Fiber-cement roof panels using polyvinyl alcohol (PVA) or polypropylene combined with cellulose now cost 10-15% more to manufacture than A-C sheets. Polypropylene-cellulose-cement roofing, a new product, is made at a cost of about 12 percent more than A-C roofing and has superior impact resistance. The non-asbestos fiber-cement panels are lighter, less brittle, and have improved nailability over A-C. The increase in the overall cost of building construction that such products represent is to some degree offset by the obviation of special hygiene measures in installation/maintenance/renovation, the lack of a continuing hazard to building workers and occupants, and reduced costs of waste removal and disposal. Micro concrete tiles are cheaper than A-C to produce, and can be made in a basic workshop near the building site with locally available small contractors and materials, lowering transport costs. Compared with A-C pipes, iron pipes can be transported and installed with less difficulty and breakage, take greater compression loading, and last longer.

5. WORLD BANK GROUP APPROACH TO ASBESTOS HEALTH RISK
The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice. When one or more members of the WBG are involved in a project, the EHS Guidelines are applied as required by their respective policies and standards.

The WBG’s EHS Guidelines specify that the use of ACM should be avoided in new buildings and construction or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management plan that clearly identifies the locations where the ACM is present, its condition (e.g., whether it is in friable form or has the potential to release fibers), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should be performed only by specially trained personnel following host country requirements or, if the country does not have its own requirements, internationally recognized procedures. Decommissioning sites may also pose a risk of exposure to asbestos that should be prevented by using specially trained personnel to identify and carefully remove asbestos insulation and structural building elements before dismantling or demolition.


24 Defined as the exercise of professional skill, diligence, prudence, and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.


26 Training of specialized personnel and the maintenance and removal methods applied should be equivalent to those required under applicable regulations in the United States and Europe (examples of North American training standards are
Examples include the ASTM International E1368 - Standard Practice for Visual Inspection of Asbestos Abatement Projects; E2356 - Standard Practice for Comprehensive Building Asbestos Surveys; and E2394 - Standard Practice for Maintenance, Renovation and Repair of Installed Asbestos Cement Products.

APPENDIX I. COUNTRIES THAT HAVE BANNED THE USE OF ASBESTOS

1. Argentina  
2. Australia  
3. Austria  
4. Belgium  
5. Bulgaria  
6. Chile  
7. Cyprus  
8. Czech Republic  
9. Denmark  
10. Egypt  
11. Estonia  
12. Finland  
13. France  
14. Gabon  
15. Germany  
16. Greece  
17. Honduras  
18. Hungary  
19. Iceland  
20. Ireland  
21. Italy  
22. Japan  
23. Jordan  
24. Kuwait  
25. Latvia  
26. Lithuania  
27. Luxembourg  
28. Malta  
29. Netherlands  
30. Norway  
31. Poland  
32. Portugal  
33. Republic of Korea  
34. Romania  
35. Saudi Arabia  
36. Seychelles  
37. Slovakia  
38. Slovenia  
39. South Africa  
40. Spain  
41. Sweden  
42. Switzerland  
43. United Kingdom  
44. Uruguay
## APPENDIX 2. WORLD BANK GROUP ASBESTOS REFERENCES

<table>
<thead>
<tr>
<th>Policy guidance</th>
<th>References</th>
</tr>
</thead>
</table>
| ACM should be avoided in new buildings or as new material in remodeling or renovation  
• Existing buildings: ACM Survey and management plan needed  
• Disposal of ACM shall be carried out by specially trained individuals only following host country requirements, or in their absence, internationally recognized procedures | Guidance: General Environment Health and Safety Guidelines April 2007, p 34 and 71. |

Some examples of project requirements:  
• risk assessment to determine extent of problem; surveys to abate asbestos exposure; management plan; removal by trained personnel; prohibition of ACM; procedures for handling, removal, transport, and disposal of asbestos.  
• Ukraine - Equal Access to Quality Education (Project ID PO77738)  
• KH - Health Sector Support (Project ID: P070542)  
• ID - Health Workforce and Services (Project ID: P073772)  
• Changchun, China - TBK Shili Auto Parts Co., (IFC, 2005)
APPENDIX 3. LIST OF RESOURCES FOR ASBESTOS STANDARDS AND REGULATIONS

NOTE: this listing is not meant to be all-inclusive, but is a sample of available information.

INTERNATIONAL STANDARDS

WHO Policy and Guidelines (www.who.org)
  - www.searo.who.int/LinkFiles/Publications_and_Documents_prevention_guidelines.pdf (p. 70)
  - www.searo.who.int/en/Section23/Section1108/Section1835/Section1864_8658.htm

International Organization for Standardization (ISO) (www.iso.org)
  - ISO/FDIS 16000-7: Indoor air -- Part 7: Sampling strategy for determination of airborne asbestos fibre concentrations.
  - ISO 8672: Air quality -- Determination of the number concentration of airborne inorganic fibres by phase contrast optical microscopy -- Membrane filter method (1993) [Method similar to AIA RTM1]

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
  - Basel Convention Secretariat (www.basel.int)

International Labour Organization (www.ilo.org)

European Union
  - (europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32003L0018&model=guichett)
  - Directive 2003/18/EC amending Council Directive 83/477/EEC on the Protection of Workers from the Risks Related to Exposure to Asbestos at Work. (March 2003). Provides regulations including: worker protection, training and medical surveillance; inspections for asbestos-containing materials; notification of asbestos work; air sampling; exposure limits of 0.1 fibres per cm³ (8-hr TWA) measured by Phase Contrast Microscopy.

NATIONAL STANDARDS

ASTM International (www.astm.org)
  - E2356 Standard Practice for Comprehensive Building Asbestos Surveys. July, 2004. Covers baseline surveys for management of ACM and includes assessment protocols to make and prioritize removal vs. maintenance decisions. ASTM E2356 provides information for long-term management of ACM in a Baseline Survey and for preparation of the plans and specifications for a removal project. It contains detailed procedures and equipment (mostly ordinary hardware items) needed to take bulk samples of common types of suspect ACM. Once materials have been identified as asbestos-containing, an assessment is made as to which can be left in place. Quantitative assessment of the Current Condition and Potential for Disturbance of all friable and non-friable materials allows removal priorities to be tabulated and graphically displayed. Budgetary estimates for removal can be established on the basis of the quantitative assessments.


D7201: Practice for Sampling and Counting Airborne Fibers, Including Asbestos Fibers, in the Workplace, by Phase Contrast Microscopy (with an Option of Transmission Electron Microscopy)

Combines methodology of NIOSH 7400 and 7402.

**Australia**

(www.ascc.gov.au/ascc/AboutUs/Publications/NationalStandards/ListofNationalCodesofPractice.htm)

- Code of Practice for the Management and Control of Asbestos in the Workplace [NOHSC: 2018 (2005)]

**U. K. Health and Safety Executive** (http://www.hse.gov.uk/asbestos/index.htm)

- Asbestos Regulations (http://www.opsi.gov.uk/si/si2006/20062739.htm)

Publications include:

- Working with Asbestos in Buildings INDG289 08/01 C600. An overview (16 pages) of asbestos hazards and precautions.
- MDHS100 Surveying, sampling and assessment of asbestos containing materials (2001). Contains many illustrations and examples of asbestos-containing products as well as sampling and analytical methods. MDHS100 is comparable in thoroughness to ASTM in its discussion of bulk sampling techniques and equipment, organizing a survey and assessment of ACM using a numerical algorithm based on the product type, extent of damage, surface treatment and type of asbestos fiber. The document contains numerous photographs of typical ACM found in buildings.
- HSG189/2 Working with asbestos cement (1999). Describes asbestos-cement products and methods of repairing and removing them, including fiber concentrations for controlled and uncontrolled operations.
- The Control of Asbestos at Work Regulations (2002). Requirements for the protection of people being exposed to asbestos, including the requirement for those with responsibility for the maintenance and/or repair of non-domestic premises, to identify and manage any risk from asbestos within their premises.

**National Institute of Building Sciences** (http://www.nibs.org/pubsasb.html)


**Austrian Standards Institute** (http://www.on-norm.at/index_e.html)

ONORM M 9406, Handling of products containing weakly bound asbestos, 01 08 2001. Contains a protocol and algorithm for assessing the condition and potential fiber release from friable asbestos-containing materials.

**International Chrysotile Association** (www.chrysotile.com). [Please note this organization represents asbestos industries and businesses]

- Recommended Technical Method No. 1 (RTM1), Reference Method for the determination of Airborne Asbestos Fibre Concentrations at workplaces by light microscopy (Membrane Filter Method). Method using Phase Contrast Microscopy for counting fibers on an air sampling filter.

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that does not distinguish asbestos from other fibers

Recommended Technical Method No. 2 (RTM2) Method for the determination of Airborne Asbestos Fibres and Other Inorganic Fibres by Scanning Electron Microscopy. Method that identifies smaller fibers than Phase Contrast Microscopy and can distinguish types of asbestos fibers.

U.S. National Institute for Occupational Safety and Health (www.cdc.gov/niosh/topics/asbestos)

- Occupational Safety and Health Guidelines for Asbestos (www.cdc.gov/niosh/pdfs/0041.pdf)
- Recommendations for Preventing Occupational Exposure (www.cdc.gov/niosh/topics/asbestos/#prevention)
- Method 7400, Asbestos and other fibers by PCM (1994). Phase Contrast Microscopy method similar to AIA RTM1 that counts all fibers greater than 5µm long with a 3:1 aspect ratio
- Method 7402 Asbestos by TEM (1994). Method using Transmission Electron Microscopy that identifies and counts asbestos fibers greater than 5µm long and greater than 0.25µm in diameter with a 3:1 aspect ratio

U.S. Environmental Protection Agency (www.epa.gov/asbestos)

- Resources include managing asbestos-containing materials in buildings, schools, and the automotive industry. Includes procedures for inspection, analysis of bulk samples, assessment of friable ACBM, response actions (removal, encapsulation, enclosure), Operations and Maintenance, and clearance air sampling.
- Guidance document covering: organizing an Operations and Maintenance (O&M) program including training O&M workers; recognizing types of O&M; work practices and precautions for O&M work.
- EPA-600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials (1993) Polarized Light Microscopy, Gravimetry, X-ray diffraction and Transmission Electron Microscopy methods of identifying and quantifying asbestos fibers in bulk building materials. The identification of materials as containing asbestos is done by analysis of bulk samples, usually with Polarized Light Microscopy. The analytical procedures described and the equipment to perform the analyses is similar to that found in academic or commercial geology laboratories, but specialized training to identify and quantify asbestos fibers in bulk building materials is needed as well as quality control and proficiency testing programs.
- Polarized Light Microscopy, Gravimetry, X-ray diffraction and Transmission Electron Microscopy methods of identifying and quantifying asbestos fibers in bulk building materials

U.S. Occupational Safety and Health Administration (Department of Labor) (www.osha.gov/SLTC/asbestos) / (www.osha.gov/SLTC/asbestos/standards.html)

- Occupational Exposure to Asbestos (Construction Industry Standard) 29CFR1926.1101. (1994). Regulations for: Permissible Exposure Limits of 0.1 ft/cc over a full shift (8 hr time-weighted average) and short-term exposure limit of 1.0 ft/ml for 30 minutes; employee exposure monitoring for compliance with the PELs; work practices for friable and non-friable ACM; respiratory protection; worker decontamination and hygiene facilities; notification of employees and other employers of employees; medical surveillance; record-keeping and training.
- OSHA Method ID 160 Asbestos in Air (1994). Phase Contrast Microscopy method similar to NIOSH 7400

Ontario Ministry of Labour (Canada) (www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2005/R05278_e.htm)

- Ontario regulation 278/05 Designated Substance — asbestos on construction projects and in

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buildings and repair operations (2005). Regulations covering: respiratory protection and work procedures; inspections for asbestos; management of friable and non-friable asbestos; advance written notice; asbestos bulk sampling and analysis; glove bag requirements and procedures; negative air enclosures; and clearance air testing requirements (0.01 f/cc by Phase Contrast Microscopy).

WorkSafe British Columbia (Canada)  
(www2.worksafebc.com/publications/OHSRegulation/Part6.asp)  
Part 6 Substance Specific Requirements: Asbestos. Regulations covering: identification of asbestos-containing materials; substitution with non-asbestos materials; worker training; exposure monitoring; containment and ventilation of work areas; work practices; decontamination; respirators and protective clothing.

Republic of South Africa, Department of Labour (www.acts.co.za/ohs/index.htm - type ‘asbestos’ in search box)  
Occupational Health and Safety Act, 1993; Asbestos Regulations, 2001. Regulations covering: notification; assessment and control of exposure; Occupational Exposure Limit of 0.2 f/cc - 4 hr TWA measured by Phase Contrast Microscopy; training; air monitoring; medical surveillance; non-employee exposure; respirators, personal protective equipment and facilities; asbestos building materials including asbestos cement sheeting and related products; disposal.
## Appendix 4. Some Alternatives to Asbestos-Containing Products

<table>
<thead>
<tr>
<th>Asbestos product</th>
<th>Substitute products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestos-cement corrugated roofing</td>
<td>Fiber-cement roofing using synthetic fibers (polyvinyl alcohol, polypropylene) and vegetable/cellulose fibers (softwood kraft pulp, bamboo, sisal, coir, rattan shavings and tobacco stalks, etc.); with optional silica fume, fly ash, or rice husk ash. Microconcrete (Parry) tiles; galvanized metal sheets; clay tiles; vegetable fibers in asphalt; slate; coated metal tiles (Harveytile); aluminum roof tiles (Dekra Tile); extruded uPVC roofing sheets; recycled polypropylene and high-density polyethylene and crushed stone (Worldroof); plastic coated aluminum; plastic coated galvanized steel.</td>
</tr>
<tr>
<td>Asbestos-cement flat sheet (ceilings, facades, partitions)</td>
<td>Fiber-cement using vegetable/cellulose fibers (see above), wastepaper, optionally synthetic fibers; gypsum ceiling boards (BHP Gypsum); polystyrene ceilings, cornices, and partitions; façade applications in polystyrene structural walls (coated with plaster); aluminum cladding (Alucabond); brick; galvanized frame with plaster-board or calcium silicate board facing; softwood frame with plasterboard or calcium silicate board facing.</td>
</tr>
</tbody>
</table>
| Asbestos-cement pipe | **High pressure:** Cast iron and ductile iron pipe; high-density polyethylene pipe; polyvinyl chloride pipe; steel-reinforced concrete pipe (large sizes); glass-reinforced polyester pipe.  
*Low pressure:* Cellulose-cement pipe; cellulose/PVA fiber-cement pipe; clay pipe; glass-reinforced polyester pipe; steel-reinforced concrete pipe (large diameter drainage). |
| Asbestos-cement water storage tanks | Cellulose-cement; polyethylene; fiberglass; steel; galvanized iron; PVA-cellulose fiber-cement |
| Asbestos-cement rainwater gutters; open drains (mining industry) | Galvanized iron; aluminum; hand-molded cellulose-cement; PVC |
APPENDIX 5. CONSIDERATIONS FOR WORKING WITH ASBESTOS MATERIALS IN EXISTING STRUCTURES

A. Evaluation of alternatives

1. Determine whether the project could include the installation, replacement, maintenance, or demolition of any of the following:
   • Roofing, siding, ducts or wallboard
   • Thermal insulation on pipes, boilers, and ducts
   • Plaster or fireproofing
   • Resilient flooring materials
   • Other potentially asbestos-containing materials

2. If the use of asbestos-containing materials (ACM) has been anticipated for new construction or renovation, provide information about alternative non-asbestos materials and their availability. For new construction, determine the expected difference for the entire project—on initial and operating costs, employment, quality, expected service life, and other factors—using alternatives to ACM (including consideration of the need for imported raw materials).

3. In many cases, it can be presumed that ACM are part of the existing infrastructure that must be disturbed. If there is a need to analyze samples of existing material to see if it contains asbestos, provide information on how and where can that be arranged.

4. Once the presence of ACM in the existing infrastructure has been presumed or confirmed and their disturbance is shown to be unavoidable, incorporate the following requirements in tenders for construction work in compliance with applicable laws and regulations.

B. Understanding the regulatory framework

1. Review the host country laws and regulations and the international obligations it may have entered into (e.g., ILO, Basel conventions) for controlling worker and environmental exposure to asbestos in construction work and waste disposal where ACM are present. Determine how the qualifications of contractors and workers who maintain and remove ACM are established, measured, and enforced.

2. Determine whether licensing and permitting of the work by authorities is required.

3. Review how removed ACM are to be disposed of to minimize the potential for pollution, scavenging, and reuse.

4. Incorporate in tenders involving the removal, repair, and disposal of ACM the requirements set out in Section C below.

C. Considerations and possible operational requirements related to works involving asbestos

1. Contractor qualification
   
   • Require that contractors demonstrate that they have experience and capability to observe international good practice standards with asbestos, including training of workers and supervisors, possession of (or means of access to) adequate equipment and supplies for the scope of envisioned works, and a record of compliance with regulations on previous work.

2. Related to the technical requirements for the works

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• Require that the removal, repair, and disposal of ACM be carried out in a way that minimizes worker and community asbestos exposure, and require the selected contractor to develop and submit a plan, subject to the engineer’s acceptance, before doing so.

• Describe the work in detail in plans and specifications prepared for the specific site and project, including but not limited to the following:
  - Containment of interior areas where removal will occur in a negative pressure enclosure;
  - Protection of walls, floors, and other surfaces with plastic sheeting;
  - Construction of decontamination facilities for workers and equipment;
  - Removing the ACM using wet methods, and promptly placing the material in impermeable containers;
  - Final clean-up with special vacuums and dismantling of the enclosure and decontamination facilities;
  - Disposal of the removed ACM and contaminated materials in an approved landfill;
  - Inspection and air monitoring as the work progresses, as well as final air sampling for clearance, by an entity independent of the contractor removing the ACM.

• Other requirements for specific types of ACM, configurations and characteristics of buildings or facilities, and other factors affecting the work must be enumerated in the plans and specifications, and applicable regulations and consensus standards must be specifically enumerated.

3. Related to the contract clauses

• Require that the selected contractor provide adequate protection to its personnel handling asbestos, including respirators and disposable clothing.

• Require that the selected contractor notifies the relevant authorities of the removal and disposal according to applicable regulations as indicated in the technical requirements and cooperates fully with representatives of the relevant agency during all inspections and inquiries.

4. Related to training and capacity building

• Determine whether specialist industrial hygiene expertise should be hired to assure that local contractors learn about and apply proper protective measures in work with ACM in existing structures.

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29 Alternative guidance for circumstances where approved landfills are not available for disposal of hazardous substances, such as asbestos, guidance is provided in the EHS General Guideline, reference above as well as in the Guideline on Waste Management Facilities. http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_WasteManagementtSFlE/Final+-+Waste+Management+Facilities.pdf

30 Standard contract clauses for asbestos work exist but are too extensive for this short note. To view an example, the U.S. National Institute of Building Sciences “Asbestos Abatement and Management in Buildings: Model Guide Specification” has a complete set – in copyright form – and the clauses and instructions for using them fill a two-inch binder.
ANNEX C: Chance Find Procedures: Protection of Cultural Property

1. Cultural property include monuments, structures, works of art, or sites of significance points of view, and are defined as sites and structures having archaeological, historical, architectural, or religious significance, and natural sites with cultural values. This includes cemeteries, graveyards and graves.

2. The list of negative subproject attributes which would make a subproject ineligible for support includes any activity that would adversely impact cultural property. In the event that during reconstruction or construction sites of cultural value are found, the following procedures for identification, protection from theft, and treatment of discovered artifacts should be followed and included in standard bidding documents.

3. Chance find procedures will be used as follows:

(a) Stop the construction activities in the area of the chance find;

(b) Delineate the discovered site or area;

(c) Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the relevant Ministry take over;

(d) Notify the supervisory Engineer who in turn will notify the responsible local authorities and the relevant immediately;

(e) Responsible local authorities and the relevant Ministry would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures;

(f) Decisions on how to handle the finding shall be taken by the responsible authorities and the relevant Ministry;

(g) Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the relevant Ministry; and

(h) Construction work could resume only after permission is given from the responsible local authorities and the relevant Ministry concerning safeguard of the heritage.

4. These procedures must be referred to as standard provisions in construction contracts. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed.

5. Relevant findings will be recorded in World Bank Supervision Reports and Implementation Completion Reports will assess the overall effectiveness of the project’s cultural property mitigation, management, and activities.
ANNEX D: Environmental and Legal Safeguard Policy Application

1. Will any part of the proposed project and its ancillary aspects and related activities or any of its sub-projects have potential to cause adverse environmental and social impacts in its area of influence?

2. Will any of the proposed project and its ancillary aspects and related activities or any of its sub-projects have potential (i) significant impact on natural habitat (e.g., wetlands, rivers, streams, coral reef, mangroves, shoreline, protected areas, national parks, areas of biodiversity significance) as defined under OP 4.04; and/or (ii) opportunity to benefit natural habitats?

3. Will any of the proposed project and ancillary aspects and related activities or any of its sub-projects involve purchase of pesticides and pesticide equipment, or will lead to increase usage of pesticides be it for vector or agricultural pest control regardless of financing sources?

4. Will any of the proposed project and ancillary aspects and related activities or any of its sub-projects involve significant excavations, demolition, movement of earth, flooding, or other environmental changes or located in; or in the vicinity of a Physical Cultural Resources (PCR) site recognized by the Borrower; or designed to support the management or conservation of PCR, as defined under OP 4.11?

5. Will any of the proposed project and ancillary aspects and related activities or any of its sub-projects have (i) impacts on the health and quality of forests; (ii) effects on the rights and welfare of people and their level of dependence upon or interaction with forests; and, (iii) brought about changes in the management, protection or utilization of natural forests or plantations, whether they are publicly, privately, or communally owned?

6. Will the project and its ancillary aspects and related activities or any of its sub-projects involve the construction of a new dam regardless of height and/or is the project and its ancillary aspects and related activities or any of its sub-projects dependent on existing dam, or a dam under construction?

**OP 4.01.** If the answer to any of the questions 1-6 is “yes”, World Bank Operational Policy 4.01, Environmental Assessment, is triggered and preparation of Environmental Assessment (EA) documents is necessary prior to appraisal. EA documents could be Environmental and Social Impact Assessment (ESIA), Environmental and Social Management Plan (ESMP) or Environmental and Social Management Framework (ESMF) depending on whether the project sites and details are known by appraisal.

**OP 4.04.** If the answer to question 2 is “yes”, World Bank Operational Policy 4.04, Natural Habitats, is triggered. The environmental instrument for the project includes screening for impacts on natural habitats and preparation of mitigation measures as part of the ESIA and/or the ESMP.

**OP 4.09.** If the answer to question 3 is “yes”, World Bank Operational Policy 4.09, Pest Management, is triggered. A Pest Management Plan is prepared separately or as part of the ESIA and/or ESMP.

**OP 4.11.** If the answer to question 4 is “yes”, World Bank Operational Policy 4.11, Physical Cultural Resources (PCR), is triggered. The environmental instrument includes a PCR Management Plan and/or Chance Find Protocols/Procedures, as part of the ESIA and/or ESMP.

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**OP 4.36.** If the answer to question 5 is “yes”, World Bank Operational Policy 4.36, Forests, is triggered. The environmental instrument includes screening for project impacts on forests and preparation of mitigation measures as part of the ESIA and/or the ESMP.

**OP 4.37.** If the answer to question 6 is “yes”, World Bank Operational Policy 4.37, Safety of Dams, is triggered. For dams under 10 m in height, generic dam safety measures designed by qualified engineers are usually adequate. For large dams (15 m or more in height), the Bank requires: (a) reviews by an independent panel of experts of the investigation, design, and construction of the dam and the start of operations; (b) preparation and implementation of detailed plans, including: a plan for construction supervision and quality assurance; an instrumentation plan; an operations and maintenance plan; and an emergency preparedness plan; (c) prequalification of bidders during procurement and bid tendering; and (d) periodic safety inspections of the dam after completion.
# ANNEX E: EMP Implementation Monitoring Checklist

## General information

<table>
<thead>
<tr>
<th>DD/MM/YY</th>
<th>Report prepared by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name of road and location of construction site</td>
</tr>
<tr>
<td></td>
<td>Name of contractor/ subcontractor</td>
</tr>
</tbody>
</table>

## Permits, agreements

<table>
<thead>
<tr>
<th></th>
<th>Request for obtaining a permit for quarry use during construction</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Request for obtaining an agreement for disposal of construction waste</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>

## Management of construction sites

<table>
<thead>
<tr>
<th></th>
<th>Proper location of construction site/camp</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Availability of proper storage for fuel, oil and construction materials</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Proper maintenance of construction machinery and equipment (prevent leakage of fuel, oil, lubricants, etc.)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Availability of places of preliminary accumulation of excavated and demolished materials and construction wastes within the existing right-of-way</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Timely removal of excavated and demolished materials and construction waste from the places of preliminary accumulation and disposal to planned and agreed places</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Use covered trucks for transportation of construction materials and waste for safety and dust suppression</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Clean the surrounding area from dust by water sprinkling in construction zone (when necessary)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Clean/ wash tires of vehicles before they get to dwellings and/or drive on highways (when necessary)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Implementation of works at the established time (e.g. work during daytime)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Installation of road signs in construction sites, camps and along access roads</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Ensure proper sanitary/ hygienic conditions for workers at the construction site</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
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<tr>
<td>Safety measures</td>
<td>Restoration of the area of construction sites and camps when the construction works are over</td>
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<td></td>
<td>☐ Yes ☐ No ☐ N/A</td>
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<td>Workers are provided with necessary safety uniform</td>
<td>☐ Yes ☐ No ☐ N/A</td>
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<td>(e.g. vests, helmets, high boots, gloves, glasses,</td>
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<td>etc.) and use them</td>
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<td>Availability of fire-resistant measures on</td>
<td>☐ Yes ☐ No ☐ N/A</td>
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<td>construction sites/ camps (fireproof shield, fire</td>
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<td>extinguisher, sand, etc.)</td>
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