

Study of Fire Risk Management and Suppression Capacity of Kathmandu Valley

BASED ON FIVE THEMATIC AREAS



Government of Nepal
Ministry of Home Affairs
National Disaster Risk Reduction and Management Authority



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National Disaster Risk Reduction and Management Authority

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ACRONYMS

APF	Armed Police Force
BID	Balaju Industrial District
BIM	Balaju Industrial Management
CAAN	Civil Aviation Authority of Nepal
DASS	Department of Airdrome Safety Standard
DCP	Dry Chemical Powder
DEOC	District Emergency Operation Center
DoI	Department of Industry
DRA	Disaster Risk Assessment
DRM	Disaster Risk Management
DRRM	Disaster Risk Reduction and Management
DUDBC	Department of Urban Development and Building Construction
ECC	Emergency Coordination Cell
EIE	Environmental Impact Examination
GoN	Government of Nepal
ICAO	International Civil Aviation Organization
ICS	Incident Command System
IDML	Industrial District Management Limited
IEE	Initial Environment Examination
IOC	Indian Oil Corporation
KVDA	Kathmandu Valley Development Authority
LEOC	Local Emergency Operation Center
LMC	Lalitpur Metropolitan City
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MoCTCA	Ministry of Culture, Tourism, and Civil Aviation
MoHA	Ministry of Home Affairs
MoICS	Ministry of Industries, Commerce and Supplies
MoU	Memorandum of Understanding
NBC	National Building Code
NDRRMA	National Disaster Risk Reduction and Management Authority
NEA	Nepal Electricity Authority
NEOC	National Emergency Operation Center
NOC	Nepal Oil Corporation
NRCS	Nepal Red Cross Society
OPMCM	Office of the Prime Minister and Council of Ministers

PPE	Personal Protective Equipment
RFD	Rescue and Firefighting Division
SOP	Standing Operating Procedure
SCBA	Self-Contained Breathing Apparatus
SEZA	Special Economic Zone Authority
TIA	Tribhuvan International Airport
TTX	Tabletop Exercise
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

INTRODUCTION



1. INTRODUCTION

1.1 Background

In recent years, Nepal has witnessed a distinct surge in fire incidents, particularly during the dry seasons. Such escalation has notably increased fatalities, injuries, and property loss mostly in urban areas.

As the most urbanized city in the country, the Kathmandu is highly susceptible to the fire hazards. Expanded over 902 square kilometers, the valley is home to over six million people and includes two metropolitan cities, sixteen municipalities, and three rural municipalities. Last year alone, the valley experienced 54 fire incidents.¹ Those fires claimed the lives of five individuals whereas injured sixteen. Among them, thirty-five were household fires, twelve were the fires in small businesses, and seven were the industrial fires.

As illustrated by the health reports, such ramifications of urban fires has extend beyond human and physical losses, adversely impacting the biodiversity and environment and contribute to the human health problems.² Unfortunately, on April 4 this year, the Kathmandu ranked the second most polluted city in the world.³ Due to such reason, in recent years cases of pneumonia, bronchitis, conjunctivitis, skin allergies, strokes, and heart problems have been surged in the hospitals and health centers of the Kathmandu valley.

The Victory Lounge fire of 2019, the Ujjal Petrol Pump fire in 2020, the One World Shoe factory fire in 2022, a furniture factory fire in Kageshwori Manahara in 2023, and the recent fire at APF Warehouse Balumbu are some notable fire incidents that occurred in Kathmandu, illustrating how deadly such incidents can be. Additionally, the fire that broke out in Elite Exped's office in Kapan on September 21, 2022, was the deadliest, killing three people and injuring several others. It took more than four hours for more than dozen fire engines to suppress the fire, which involved hazardous materials.

1.2 Evolving threats and understanding contextual need

However, congested settlements, narrow roads and alleys, tangled and low-hanging electric wires and poles, the establishment of factories and warehouses in densely populated areas,

¹ <http://www.drrportal.gov.np/reports>

² Bhuvan Saud and Govinda Poudel. "The Threat of Ambient Air Pollution in Kathmandu, Nepal." *National Library of Medicine*, July 10, 2018.

³ República. "Kathmandu ranked world's second most populated city." Aril 4, 2024.

mushroomed gas and fuel stations in busy and congested zones, and lack of awareness and negligence by both the public and business owners are among the reasons why Kathmandu valley and other urban areas are becoming highly prone fire zones. Additionally, the proliferation of high-rise buildings, coupled with inadequate fire suppression capacity, has also exponentially increased such threat manifolds.

Similarly, the depletion of water resources in and around the Kathmandu valley has made firefighting more complex in recent days leading to unimaginable losses even in moderately controllable fire. The encroachment upon ancient ponds, taps, and wells by various interest groups and individuals, along with the intrusion of river beds by riverside dwellers, and negligence in maintaining and restoring existing fire hydrant systems in core areas such as Asan, Indrachok, New Road, Patan Durbar Square have further heightened the risk in congested and densely populated areas. However, the congested road network and haphazard parking of vehicles, on other hand, have also hinders the easy access to large fire trucks to reach to the fire site.

In this back drop, definitely, the three tiers of government, including districts, in the country have been facing significant challenges and complexities in addressing effective fire risk management in the town. Furthermore, the absence of national and institutional policies, legal frameworks, and a scarcity of financial and human resources, as well as effective fire suppression mechanism, the Kathmandu valley has become vulnerable and susceptible to the next level of fire hazards.

However, such gaps underscore the need for an effective coordinated mechanism among multiple stakeholders to facilitate, monitor, and mitigate fire hazards, particularly to reduce fire risks in the critical areas of the Kathmandu Valley. Against this scenario, this assessment aims to contribute to the development of an effective fire risk management mechanism so that the trend of losses of human life and property in the capital can be lessened to some extent in the next few years.

1.3 Scope and objective of the assignment

This assignment has aimed to carry out a comprehensive study of fire risk management in five critical areas of the Kathmandu Valley. Fundamentally the four pillars - policies and plans, infrastructure and mechanisms, human resources and capacity building, and the resource management or finance- required for fire risk management have been the scope for the study and investigation. (See Annex 'A')

In addition, "Bipad Sambad" (Disaster Dialogues) programs on five thematic areas have been conducted subsequently. And the dialogue programs were based on the findings of the study.

Ultimately such dialogues helped to support the effective coordination, facilitation, monitoring, and mitigation of potential fire risk and hazards currently prevailing in the Kathmandu Valley.

The objectives of this assignment are the followings:

1. Examination of the fire safety of oil stacks belonging to the Nepal Oil Corporation, aviation fuel management system at Tribhuvan International Airport (TIA) along with TIA firefighting division, and Petrol Pumps.
2. Analysis of industrial zones fire safety provisions, notably the Balaju Industrial Estate, situated amidst residential areas.
3. Assessment of fire risks associated with high-rise residential complexes that may pose challenges beyond the capabilities of conventional fire brigades.
4. Evaluation of the fire risk management of the heritage sites and old historic locations, including Patan, Bhaktapur, and Basantapur Durbar Squares. Special focus will be on the construction materials utilized (e.g., timber, stones, bricks) and the narrow alleys (galli) hindering easy accessibility for firefighting units.
5. Examination of government ministries and departments fire safety protocols, particularly within the Singadurbar premises, considering factors such as large-scale gatherings and demonstrations.

The scope of the participants during Disaster Dialogue programs was as followings:

- Municipal firefighting and management teams from within the Kathmandu Valley, alongside representatives from Nepal Police, Armed Police Force, Nepal Army, and the Civil Aviation Authority of Nepal (CAAN).
- Private sector entities including real estate and housing companies, as well as industrial stakeholders.
- Nepal Oil Corporation officials, Gas Tankers' Association, and proprietors and administrators of petrol pumps.
- Development partners and pertinent agencies actively involved in disaster management.
- Government officials, including but not limited to the Ministry of Home Affairs, Ministry of Federal Affairs and General Administration, Ministry of Industry Commerce and Supply, Ministry of Urban Development, National Disaster Risk Reduction and Management Authority and National Emergency Operation Center.

- Ministry of Culture, Tourism and Civil Aviation, Division of Archeology and heads of National Museum, Numismatic Museum, Basantpur, Patan and Bhaktapur Museums.

1.4 Approach and methodology

1.4.1 Study and investigation of the fire risk management:

Fundamentally, a four-pronged approach has been adopted during the detailed study and assessment of the five thematic areas:

a. Desk Review: A detailed study of concerned policies, plans, procedures and relevant documents related to fire hazards, fire risk management, and fire suppression was carried out at the beginning of the study. These documents ranged from those of the government, public, and private sectors to the fire-related protocols and reports of humanitarian and development agencies.

b. Key Informant Interview (KII): During and following the desk review phase, Key Informant Interviews were conducted with relevant authorities, stakeholders, experts, and practitioners related to the five thematic areas. Staff and employees of these areas were also included in the process. Open-ended questions based on four thematic pillars of fire risk management formed the scope of the questionnaires. Oral interviews were conducted with the participants' verbal consent, and the information received was noted down by the enumerator.

c. Focused Group Discussion (FGD): In addition to Key Informant Interviews, focused group discussions were also convened at times during the study. Officials from the respective agencies were summoned to discuss issues regarding fire hazards, fire risk management, and fire suppression.

d. Field Study: After conducting KII and FGD, the study team visited the respective study areas to obtain firsthand information and to triangulate and verify the received information. Practices, protocols, and provisions for fire risk reduction, mitigation, preparedness, and response were observed during this phase.

1.4.2 Bipad Sambad (Disaster Dialogue):

Based on the aforementioned studies and assessments, Disaster Dialogues on five thematic areas were planned and conducted at the meeting hall of NDRRMA, where experts, think tanks, authorities, security forces officials, and representatives from the public and private sectors, as well as practitioners, were called upon for participation. The programs were first kicked off semi-formally by an NDRRMA official, leading to short presentations and followed by open house discussions moderated by an expert.

The discussions and findings of the dialogues were very helpful in gaining insights on strengthening fire risk reduction, preparedness, and response. Video recordings were made during all the dialogue programs. These dialogues ultimately served as a platform for knowledge sharing, capacity building, and strategic planning, focusing on key aspects preparedness against fire risk, response, and resilience.

FINDINGS AND ANALYSIS



2. FINDINGS AND ANALYSIS

2.1 Nepal Oil Corporation (NOC), and Thankot Fuel Depot

2.1.1 Nepal Oil Corporation (NOC)



NOC is the only state-owned public enterprise responsible for importing, transporting, storing, and distributing petroleum products in the country. Established in B.S. 2027, the corporation has three levels of storing and distributing facilities for petroleum products. The first is the terminal, located only in Amlekhgunj, linked with a pipeline. The second is the depots, which are in all seven provinces, with an additional one in Sinamangal, Kathmandu, for air fuel storage. The third is the refueling stations, also known as petrol pumps, owned by both public and private owners.

Currently, about 600 employees are working in NOC, which has an authorized fuel depots with a working storage capacity of 68,384 kiloliters (KL). Fuel is supplied and distributed daily through 1893 tank trucks to more than 1563 private wholesalers, including petrol pumps, packed dealers, and kerosene dealers.

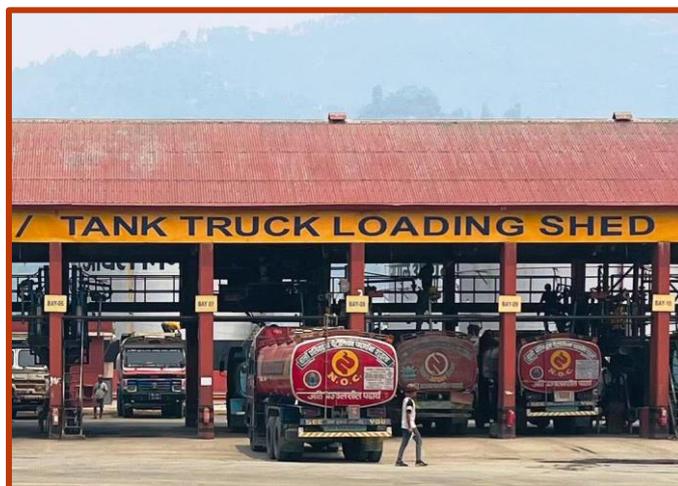
As the corporation is the sole national body managing fuel in the country, it is also responsible for quality control and establishing, monitoring, and supervising the supply chain system. Along the way, there are numerous challenges that need to be addressed. And among them management and administration of fuel depots and petrol pumps along with their safety and security is the pressing one. And Kathmandu valley, being the capital of the nation, provides numerous challenges in terms fuel safety management especially in depots and petrol pumps.

2.1.2 Provincial Office, Thankot

Located in Thankot, Chandragiri Municipality, the Provincial Office of NOC, also known as Thakot Depot, is responsible for distributing fuel within the Kathmandu Valley (Kathmandu, Bhaktapur, and Lalitpur) and nearby districts. With a total storing capacity of 15,100 KL the depot can hold up to 8,400 KL of diesel, 6,000 KL of petrol, and 760 KL of kerosene. Approximately 90% of fuel stocks (around 13,700 KL) are always maintained in the depot. In total, there are thirteen storage tanks: five underground tanks of 17 KL each, three above-ground tanks of 760 KL, and six above-ground tanks of 21,000 KL each.



Operated by around 60 personnel, the depot has 35 permanent staff, 6 short-term contract workers (Karar), and approximately 20 daily wage labors. Most of the technical and operational functions are carried out by the daily wage labors. Expanded across 100 plus ropani land, approximately one hundred tankers, out of a registered 476, enter and exit the depot daily carrying fuel. The perimeter is secured by a platoon minus (35) troops of the Nepali Army, and guard duty is also provided by a private security company Garud Securities. A five-member security team from Garud Security is deployed (four men during the day and one man at night) at the main entrance gate. Since the depot functions only in the daytime, all systems except the fuel storage system are shut down at night, with only the premises guarded by the Nepali Army and security. The depot is situated in an urban settlement and is surrounded by public houses and infrastructures in the close proximity (approximately within 15 to 20 meters).



Considered one of the vital installations in the Kathmandu Valley, the depot, mainly comprises of office area, loading and unloading bays, a laboratory, parking area, fire hydrant shelter, and two entrance gates, has established its own protocols to reduce fire hazard risk and respond if a fire occurs.

Fire Safety Measures in fuel depot

- Around 15 CCTV cameras are installed throughout the premises to monitor ongoing activities. The monitoring system is located in the office of the depot chief.
- A fire hydrant system that dispenses foam and water together has been installed, along with a sprinkler system in the bays and storage areas.
- A fire brigade with the necessary water and foam is always on standby near the bays.
- Since there is no dedicated firefighting team in the depot, all staff and workers are responsible for firefighting in case of an emergency.
- Dozens of required portable fire extinguishers are placed in all sensitive areas of the depot.
- A siren has been installed to inform and alert staff, workers, and people living in the vicinity in case of an emergency.
- One mechanical engineer remains at the depot during the daytime for repair and maintenance.
- Periodic fire safety and suppression drills and awareness sessions are conducted for the staff and workers. These training sessions and drills are conducted by senior staff.
- Fire hydrant and sprinkler systems are tested periodically.
- Checking and screening protocols for fuel trucks and personnel entering and exiting the premises have been established and are carried out by the security personnel deployed at the gate.
- All primary staff and workers possess portable handheld radio sets for regular and uninterrupted communication.
- An ID card system for all staff and workers entering and remaining on the premises has been installed for safety and security purposes.
- Smoking is strictly prohibited within the premises. If someone needs to smoke, they should exit the perimeter.
- An electric cut-off switch has been installed in a reachable location from the main gate's guard duty station.
- Three high-powered earthing systems and required bonding systems have been installed on the premises for protection from lightning and static charge release.
- A financial budget for training and drills is allocated on a yearly basis.

Current challenges for effective fire risk management and fire suppression

- There is a lack of a written protocol or SOP to manage the fire hazard system, including firefighting drills, training, or testing of hydrants and sprinklers. As a result, all activities are carried out randomly on an ad-hoc basis.

- There is no dedicated firefighting team equipped with the necessary tools and PPE. Having only one firefighting truck for such a vital large-scale installation is insufficient. There should be at least two firefighting trucks with dedicated firefighting teams and necessary accessories.
- There is a lack of regular monitoring and a fire detection system. Although a CCTV monitor is placed in the depot chief's office, it is not monitored regularly. Additionally, there is no fire detection system. The smoke detection system installed during the establishment of the depot has been malfunctioning for a long time and has not been repaired.
- There is no incident management system, operation room, or any other infrastructure to facilitate effective command, control, and management of critical situations.
- The automatic firefighting system has been broken down for a long time, so currently, a manual system is in place.
- Several of the fire extinguishers installed on the premises are expired and malfunctioning.
- There is no dedicated fire expert at the depot. One is called from India during critical situations and for advanced training purposes.
- The depot is not staffed during nighttime and lacks 24/7 monitoring of the fuel storage and other facilities. Only a guard from Garud Security and Nepali Army's perimeter duties are responsible for safeguarding the overall system.
- Having only one mechanical engineer is insufficient to meet the needs of such a complex system and technologies. A complete team of mechanical engineers is required. Even his absence during nighttime may cause lapses during maintenance if required, potentially leading to a huge catastrophe.
- Critical operations such as loading and offloading fuel from tankers to the fuel storage tanks and vice versa are carried out by daily wage laborers, which is very sensitive. These laborers are not properly trained, vetted, secured, or regularly screened. Since they are daily wage laborers, they may not come to duty regularly.
- People working in critical areas do not have PPE to wear. Staffs are seen working in casual dress.
- There is no medical backup in case of emergency or disaster. A complete medical team is required at the depot 24/7.
- There is no written protocol to maintain the safety and security of access at the gate.
- There is no incentive such as hazard allowance for the staff and workers to motivate them in such a risky job. Although life insurance has been provided for the staff, medical insurance is also required.

- Even tanker drivers and helpers are allowed to load fuel in their tankers at the loading bay, which should be strictly prohibited. The depot staff should carry out such sensitive duties.
- There is no protocol established for generating awareness among fuel truck drivers, helpers, and even fuel pump operators/owners.
- It is imperative to maintain a safety distance outside the perimeter. Human settlement should not be close to the depot perimeter.

2.2 Tribhuvan International Airport (TIA) Rescue and Firefighting Division and Fuel farm

2.2.1 Tribhuvan International Airport (TIA)



Tribhuvan International Airport is the first international airport of Nepal. Classified as Class 9 by the International Civil Aviation Organization (ICAO), the airport was established in June 1955 (B.S. 2012) and obtained international airport status in 1964. TIA, also known as Gauchaur Airport, can accommodate airplanes ranging from 61 meters to 76 meters in length and with a fuselage width of 7 meters. Aircraft such as the Airbus A380, Boeing 747-8, and Boeing 777X are among those that can operate from TIA.

The runway spans a length of 10,007 feet (3,050 meters) and has an elevation of 4,390 feet (1,338 meters). Presently, Nepal is connected to more than 30 international destinations across Asia, the Middle East, and Europe through TIA. Approximately 300 domestic flights and 60 international flights operate daily from the airport, providing services to around 16,000 domestic passengers and 7,000 international passengers.

2.2.2 Rescue and Firefighting Division (RFD), TIA



Rescue and Firefighting Division was established in B.S. 2030 to suppress any fire incident at TIA. Remaining under the chain of command of the Airdrome Operation Department of TIA and certified by ICAO, the RFD has been maintaining its utmost standards to handle fire incident at TIA. The US Bangla Airlines scheduled flight crash on 12 March 2018 was an example of its capacity. Manned by 55 firefighters, including 5 female firefighters, the RFD has five foam tenders, with four 12,500 liters of water and 1,500 liters of foam capacity, and one with 6,000 liters of water and 1,000 liters of foam capacity. It also has two medical ambulances and one

rescue vehicle with a crane. In addition, the division has two additional firefighting vehicles and one maintenance workshop manned by an additional 8 technical staff.

The watchtower, duty room, administrative building, SCBA room, fire station housing, and rest and recreation areas are the main infrastructures of the institution. Guided by the TIA Airport Emergency Plan and Firefighting SOP, three foam tenders, led by a command vehicle and followed by an ambulance, mobilize at a minimum if any kind of fire or emergency situation occurs at TIA. Additionally, the division has the following standards to maintain its operational readiness:

- The fire brigade operates under a comprehensive Firefighting Standard Operating Procedure (SOP) that not only guides firefighting procedures but also includes a weekly routine program for physical training and drills.
- There is an overhead tank with a capacity of 50,000 liters and an underground tank holding 100,000 liters for refilling purposes. There is also ample foam storage capacity for 100% extra.
- Division provides resting, and entertainment facilities for its 18 to 20 firefighters who work in four shifts over 24 hours.
- During shift changes, thorough drills are carried out, including performance checks of fire trucks and briefings for firefighting squad leaders.
- A Fire Watch Tower and Duty room are manned 24/7 to monitor the airfield and terminals, with radio communication maintained with ATC, and other airport components.
- The operational capacity of the fire brigade undergoes regular audits by ICAO, FAA, and domestic DASS (Department of Airdrome Safety Standard) of CANN.
- To maintain professionalism, a competitive selection process for firefighters is in place, along with basic, advanced, and refresher training series.
- TIA in the lead role of the division conducts three cyclic simulations: Tabletop Exercises (TTX) every six months, partial exercises (drills) annually, and full-scale simulations every two years.



- Provisions for foreign training for firefighters exist in countries such as Singapore, Malaysia, Bangkok, and Denmark.
- Civil Aviation Academy, an integral entity of TIA, provided firefighting training to both its own firefighters and international participants, such as those from Bhutan and Afghanistan. All its instructors are certified by ICAO.
- Medical backup during firefighting is provided by ECC (Emergency Coordination Central), which activates during emergencies and mobilizes TIA's standby medical team within the premises.
- Guided by Airport Emergency Plan coordination with city fire brigades of the Kathmandu Valley is conducted whenever a fire incident occurs at the airport.
- The firefighters are involved in firefighting, search and rescue, and basic first aid duties during any crisis situation.
- Recently, the division, with the assistance from TIA, has signed an MoU with the 14th Brigade of the Nepali Army to provide support as the second echelon for any fire emergency incident occurring at TIA. The 18-men firefighting team of the division will remain as the first echelon. Subsequently, there is a plan to conduct such an MOU with APF, City Fire, and Health Emergency Operation Center.

Prevailing challenges for firefighting

- The total strength of the fire brigade is 219. However, the current strength is 201, and the division is running understaffed (at 80% capacity), whereas the number of flights and fire hazards are increasing. As a result, the five-men firefighting team has been reduced to four.
- The division sometimes dispatches firefighting vehicles with firefighting team outside of TIA to the nearby urban fires, which may compromise its operational capabilities if incase an emergency occurs.
- There is a lack of coordination between NOC's Air Fuel Farm and the division. Hardly any joint activities are conducted between both agencies. However, the fuel farm is also a vital installation at TIA.
- There is no provision for insurance (health and life) for firefighters. Instead, a lump sum Life Protection Amount (Jeevan Surakshya Rakam) is paid at the end of their service.
- Although there is a 24/7 standby ambulance in the division, there are no specific medical teams attached to the division. Instead, the team is located at the far end of the airport (in terminal building) which takes around 10 to 15 minutes to reach to the firefighting team. Besides, there is mere capacity for handling fire burn cases.
- There is a lack of additional incentives or hazard allowances for firefighters.
- There must be provisions for timely training, including foreign training. Due to limited quotas, only a handful of individuals receive foreign training.

- There is a lack of Rating and Licensing provisions in CAAN Regulation, resulting in no periodic physical and mental health checkup system being implemented for firefighters, which is necessary.
- There lacks an Accountability Law in the country, which leaves firefighters susceptible to legal liability for any unforeseen incidents that may occur during firefighting.



2.2.3 Tribhuvan International Airport Aviation Fuel Farm



TIA fuel farm is the aviation fuel depot located in TIA with the capacity of storing 70 lakhs liter of air fuel. Altogether six vertical storage and eight underground distribution tanks are available in the farm that always remains in almost full capacity which will last for two weeks of fuel reserve. Approximately 4 to 4.5 lakhs liters of fuel is supplied to the aircrafts on daily basis through eight standard fuel trucks. Similarly, normally, 20 Air Fuel tankers of Indian Oil Corporation (IOC) deliver fuel directly from Indian fuel depot across the border to the fuel farm

Administratively, the fuel farm is divided into office block, decantation shed, distribution shed, engineering workshop, overhead fuel tanks, laboratory (NOC's central Laboratory), underground tanks, and filter section. Almost manned by 135 staffs (permanent 90, long term agreement 'Karar 15 and daily wage labor 30), the farm remains operational 24/7. Perimeter guarded by Nepali Army platoon, the main gate is manned by three layers of security-Nepali Army, Nepal police and private security.

Operationally, when the fuel tanker arrives at the fuel farm, the fuel is transferred through decantation and filter systems to six vertical storage tanks. Once the fuel is settled in the vertical tanks, it is pumped to the underground distribution tanks, where the filtering process is carried out again. Finally, through the distribution shed, the fuel is loaded into the tankers and carried to the taxi area, where the fuel is refilled in the aircraft following ICAO safety standards, such as maintaining cushion time, bonding, and ensuring the tanker remains at a minimum safety distance from the airplane. Additionally, each fuel tanker is equipped with the required fire extinguishers for fire suppression. Furthermore, the following measures have been adopted to make the fuel farm fire-resistant:



- A fire hydrant system has been installed throughout the farm, with an underground water reserve tank of six lakh liters and a foam reserve tank of 4,000 liters.
- Ample of fire extinguishers have been placed in different critical parts of the fuel farm.
- A sprinkler system has been installed for the fire safety of vertical tanks and the decantation shed, with an auto-operative system that is activated through heat sensors.
- One fire truck with foam and water, along with its driver, always remains on standby in the fuel farm.
- For monitoring purposes, the Air Fuel Farm is fully covered with CCTV cameras that have a central monitoring system at the Chief's office.
- A smoke detection system is currently being installed in the fuel farm.
- Both electric and mechanical alarm systems are in place to alert staff and workers in case of an emergency.



- Recently, a safety manager has been appointed to maintain safety and security. Additionally, a maintenance team is available to carry out repairs and maintenance of the fuel farm.
- A life insurance policy is already in place for permanent staff. Health insurance coverage up to NPR 5 lakh is also provisioned for the staff, including daily wage



laborers.

- Handheld radio sets have been provided to each department for better communication and coordination.
- A hydrant drill is conducted monthly in the decantation area. However, the hydrant system is periodically checked in the distribution shed, but since there is a threat of water mixing with the air fuel, drills are not conducted in the distribution shed.
- A Fire Point has been established near the distribution shed for emergency purposes, where everyone assembles once an emergency occurs or the siren is blared.
- Several electricity cut-off points have been established in the decantation shed, distribution point, and offices for fire safety purposes. Likewise, bonding, earthing, and lightning arrestors have been installed as required in the fuel farm.
- Regular audits of the fuel farm, including the firefighting system, are carried out by ICAO, IOC, and individual international airlines, helping to maintain the standard of the firefighting system

Challenges for fire safety and firefighting

- There is no written fire safety protocol established yet in the fuel farm. All fire safety provisions, activities and drills are being conducted based on mutual understanding.
- There is no dedicated operations center or duty room for monitoring and maintaining command control for firefighting and other emergencies.

- Although there is a fire truck, there is no dedicated firefighting team with the required equipment and capacity.
- Ground-level operational functions are often carried out by daily wage laborers, truck drivers, and helpers, which is very risky.
- There is a lack of effective coordination between the TIA Rescue and Firefighting Division and the fuel farm. Thus the fuel farm staffs are rarely incorporated into the firefighting and rescue drills and simulations conducted at TIA, which occurs periodically.
- Life insurance provisions are lacking for contract staff and daily wage laborers.
- Periodic firefighting training and awareness sessions are required for all staff, including permanent, fixed-term, and daily wage laborers, to enhance their fire safety awareness and firefighting capacity.
- The alarm system has hardly been tested so far, neither the electric nor mechanical one.
- Due to the lack of a firefighting SOP or plan, the staff doesn't have a clear idea of safety protocols and the required actions during firefighting.
- The fuel farm lacks a medical backup system. There is no established casualty evacuation, triage, first aid, or hospital transfer protocol.
- Since the fuel farm is so close to an urban area (hardly 40-45 meters away from the settlement), the chances of collateral damage are high in case of a fire disaster.

2.3 Petrol pumps in Kathmandu Valley



Today, a total of 1,563 private wholesalers, including petrol pumps, packed dealers, and kerosene dealers, are operational in the country. Currently, around 1,893 registered trucks are regularly supplying petroleum products to these dealers and wholesalers. The Kathmandu Valley has a total of 123 petrol pumps, whereas the metropolitan city has only 52 operational petrol pumps within its constituency. However, a few pumps, such as Dhuku Petrol Pump and Mali Oil Store, are not operational due to various reasons.

To regulate these petrol pumps, the Government of Nepal has endorsed the 'Nepal Oil Nigam Petroleum Padartha Bikreta Biniyamawali-2075,' also known as Petroleum Supplier Regulation 2075. As per the regulations, the petrol pumps are divided into five categories: Namuna Petrol Pump (High Standard), General Supplier, Petrol Supplier, Pad Supplier, and Kerosene Supplier. Nevertheless, there is only one Namuna Petrol Pump so far in the Kathmandu Valley, which is in Tokha



Municipality. Therefore, all the other petrol pumps fall into the General Supplier category. Additionally, a few pumps, such as Mayaram Bholaram Petrol Pump, were established even before the establishment of NOC, and thus hardly meet the provisions of the supplier regulation.

Indeed, Regulation 2075 is the fundamental legal provision to ensure the safety and security of petrol pumps, even from fire hazards. On the other hand, the respective local governments, such as Kathmandu Metropolitan City, are equally responsible for ensuring the pumps are operating in a safe and sound environment.

The following are some provisions catered for 'General Suppliers' by Regulation 2075 to ensure fire hazard safety

- The total area of the petrol pump should be at least 2 ropani 6 ana.
- The frontage of the pump towards the roadside should be at least 25 meters.
- All fuel dispensers in the petrol pump should have a canopy.
- An earthing pit and bonding system need to be established at the pump.
- One trolley-type 50-70 kg DCP fire extinguisher and six 10 kg ABC fire extinguishers need to be placed at the pump.
- A minimum 1,000-liter firefighting PVC water tank, six buckets, four picks, and four shovels need to be placed at the pump.
- There should be an emergency cut-off switch installed at a location reachable by everyone to prevent fire hazards from short circuits.
- At least a 30-foot gap should be maintained between the generator and underground fuel storage tanks.
- The vapor relief vent pipe should be erected at least 1.5 meters high from the cash counter.

- A heavy-duty electronic digital display auto-stop fuel dispenser system needs to be installed in all pumps, whether they were established before the Regulation was implemented.
- All wiring systems in the pump need to be concealed.

Following are the prevailing challenges in terms of effective establishment and management of petrol pumps including their fire safety management:



- Different policies exist in the country regarding the establishment of petrol pumps. Municipalities, road divisions, and NOC have different categories and provisions, which often overlap and contradict each other.

- There is a lack of fundamental provisions for establishing petrol pumps based on the demand and supply theory (i.e., establishment of pumps according to geographical distribution versus consumer distribution).

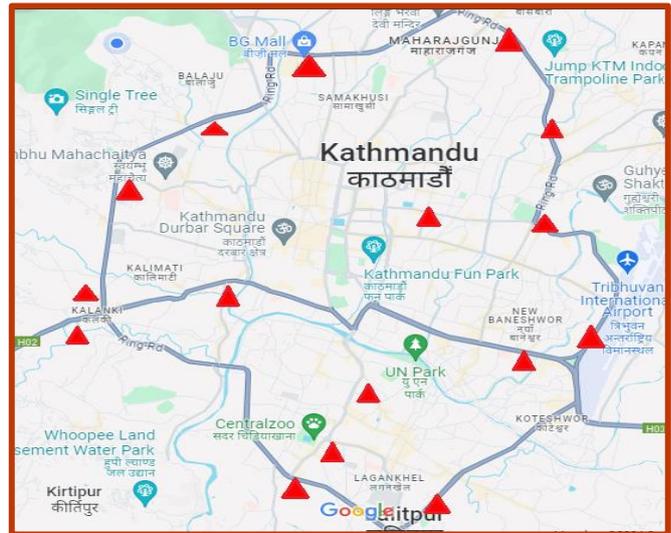
- There is a lack of stringent policies for monitoring and evaluating the safety and security of depots and petrol pumps. Although local governments and NOC are involved in the supervision and audit process, there is a need for an established protocol for the safety audit of petrol pumps and depots.



- Petrol pumps established before the NOC do not meet the criteria and standards set by current regulations. Bringing these pumps into the legislative loop is a significant challenge for the respective authorities.

- Ensuring competent human resources to operate petrol pumps and maintain their safety and security is also a considerable challenge.
- Consumer awareness of fuel safety protocols is very weak.

For the study purpose, 16 General Category petrol pumps were selected within the Kathmandu Valley. The following gaps were identified in terms of fire risk management in such petrol pumps. The detailed results of the survey are given in Annex 'B':



Findings of the petrol pump survey:

- Only 25% of pumps meet the criteria for the required land area for establishing a general petrol pump
- 62% of petrol pumps have a Heavy Duty Electronic Digital Display Auto Stop Fuel Dispenser system.
- All petrol pumps have earthing systems.
- 12.5% don't have bonding wires with crocodile clips to normalize the static charge generated in the fuel truck. Only 6% of the pumps were found to be carrying out bonding during fuel unloading from the tankers.
- 13% of pumps don't have an emergency electricity cut-off system. Although 88% have such a system, they are all installed in the office, which is not reachable by everyone at the pump. Only 6% have such systems installed outdoors.
- 19% of petrol pumps have exposed wiring systems, making them vulnerable to fire, as they are not concealed.
- All petrol pumps have their vent pipes installed at the standard height.
- Only 44% of the pumps have standard fire extinguishers in place.
- None of the pumps have any kind of fire safety PPE in their possession.
- 12.5% of petrol pumps still don't have firefighting water tanks.
- 44% of petrol pumps' have not maintained safety distance between underground fuel tanks and generator.
- Only 19% of the staff at petrol pumps are aware of fire hazards and fire safety.
- Only 6% of the staff have some form of firefighting training.
- 50% of petrol pumps don't have emergency service contact numbers in their possession.
- 69% of petrol pumps don't have fire safety instruction boards to alert their customers.



- 25% of pumps still don't have any kind of fire hazard alert signs or signals. 50% of pumps only have NO SMOKING boards/signage, and only 25% have different kinds of fire alert signs.
- 56% of pumps have placed their card swipe machines and QR code pictures attached to their fuel dispensers.
- 38% of petrol pumps don't have a medical first aid box.
- One of the petrol pumps is even established just below the high-tension electricity supply line.
- Only 44% of pumps have life insurance policies for their staff, and 6% have health insurance policies. The other 50% of petrol pumps don't have any kind of health or life insurance policy for their staff.

2.4 Provision for industrial safety in Nepal



As per the Industrial Enterprises Act 2076 (2020), industries in Nepal are classified based on capital, assets, capacity, and objectives. Fundamentally, they are categorized into five categories: Micro Industry, Cottage Industry, Small Industry, Medium Industry, and Large Industry. Fundamentally Special Economic Zone Authority (SEZA), Industrial District Management Limited (IDML), Department of Industry (DoI), Ministry of Industry, Commerce and Supplies (MoICS), Department of Small and Cottage Industry, Department of Urban Development and Building Construction (DUDBC) are the entities involved for building industrial infrastructure in the country.

Along with other details and documents, the Initial Environment Examination (IEE) and Environmental Impact Examination (EIE) are among the submissions required during the registration of the industry by the owner. Additionally, the industries listed in Schedule 1 of the Act must seek approval from the Industrial and Investment Promotion Board. This board is the authority responsible for making provisions for the fire safety of industries, including fire risk management.

The Nepal Bureau of Standards and Meteorology and the Labor and Employment Office are among the government bodies responsible for ensuring the safety and security protocols of industries. Likewise, provincial and local governments are equally responsible for ensuring fire safety and fire risk management.

2.4.1 Balaju Industrial District (BID)

Aiming to establish an industrial zone with all required facilities in a single place, Balaju Industrial District was founded in B.S. 2016 and formally inaugurated in B.S. 2020. The initiative was initially supported by the Government of the United States. To further institutionalize and regulate these efforts, the Government of Nepal (GON) established IDML, a Public Limited Company, under the Company Act in 2045 B.S. Since then, IDML has assumed overall management and supervision responsibility for BID.



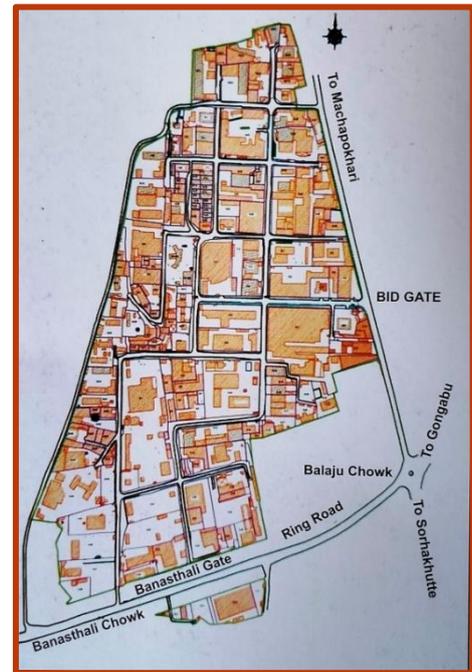
Expanded over 670 ropanis of land, today 540 ropanis is developed with all required facilities such as electricity distribution, drainage, water, sheds, warehouses, and boundary walls. Situated in the west of the Kathmandu Valley, in the lap of the Nagarjun conservation area, BID has

accommodated 146 industries, out of which 126 are operational and 4 are under construction. Established with an initial investment of US\$ 25 million, almost the entire investment is from the private sector, providing employment to approximately 5300 employees.

Incorporating various industries such as textiles, plastics, metal fabrication, food processing, LPG gas refilling, printing, vehicle service centers, and lubricants, BID has its own electricity distribution capacity for power supply of 15000 KVA and water boring, filter and supply system with the consumption of 787 kilo liter/day. Similarly, banking, transportation, repair and maintenance, and garbage disposal are currently operational within the district. Additionally, educational facilities for the children of laborers and their routine health checkup services are available within BID. Along with a few accommodation facilities for laborers and their families, it also includes canteens, restaurants, and designated open spaces. The overall security of the

BID has been the responsibility of the Armed Police Force Nepal industrial security unit, deployed in the premises.

However, the BID is also one of the most fire-prone areas of the Kathmandu Valley. Industries filled with combustible materials and fuel, poor electrification and circuit systems, human negligence, and other unforeseen reasons are causing fires there time and again. The Nebico Biscuit factory fire occurred on 7 August 2021, and the One World Shoe Factory fire happened on 19 August 2022, are the incidents that caused huge losses of property. Thus, being such a sensitive area, the BID should have an effective and efficient fire risk management, detection, monitoring, and suppression system. The following are the current fire risk management provisions available at the BID.



Current provisions for fire safety of the industries in Nepal

- Department of Industry (a component of Ministry of Industry, Commerce and Supplies), Department of Small and Cottage industry, Nepal Bureau of Standards and Metrology, Department of Labor and Occupational Safety, a part of Ministry of Labor, Employment and Social Security, and IDML, a government's ad-hoc body, is responsible to ensure overall safety and security, including fire risk management, of BID.
- The Industrial Investment and Infrastructure Board, the prime policy-making body for industries, has implemented a policy stating that gas filling stations and industries related to petroleum products should be located 1 km away from densely populated areas, while petroleum product refineries should be situated 5 km away from such areas.
- As a prerequisite during industry registration, the Department of Industry mandates the installation of fire hydrant systems and fire extinguishers according to the industry's requirements.
- The provisions for IEE and EIA, necessary for industrial establishments, have addressed safety and security issues of the industry to some extent.



- Industrial and Investment Promotion Board is responsible to establish ad-hoc fire safety provision for the industries.

Challenges at policy level for fire risk management

- There is not any industry-related fire safety protocol (policies, rules, and regulations) nor has any for other disasters been established at the ministry and department levels.
- The rules and regulations related to fire safety have been established on ad-hoc basic.
- Although there is a mandatory provision for monitoring and supervising industries by Labor and Employment Office for the safety and security, including fire safety, has hardly been occurring.
- There has been no official designated in the Department of Industry nor any related agencies to oversee the fire safety and security of industries, nor any focal person.
- There is a lack of programs as well as financial resources for training, simulations, and awareness sessions to enhance industrial fire safety and security protocol at the national, sub-national, and industrial levels.

Eleven factories in BID were randomly selected and visited for the assessment purpose. A questionnaire survey along with physical inspection was carried out in due process (See Annex 'c' for the outcome of Survey). Following provisions the factories have maintained been found for fire risk management and firefighting:



- Balaju Industrial Management (BIM) Office, responsible to supervise the industries, has time and again inspecting the industries established in the BID.
- There are two fire trucks from Juddha Fire Brigade with eight men firefighters' team from Armed Police Force Nepal has been pre-positioned at BIM Office premises for fire suppression in case of any fire incident.
- Five men team of Kathmandu Metropolitan Police under the command of Inspector is assigned 24/7 for the safety and security of the BID.

- Random coordination has been maintained by the office with Ward official; security forces local units and local clubs to maintain safety and security of the industrial area.
- Labor and Employment Office has been randomly providing fire safety awareness and training programs for APF and NP units deployed in BID.
- Most of the industries have placed fire extinguishers in the critical locations within their premises.
- Even the Nepal Gas industry has installed required fire sprinkler system with water reserve tank for firefighting.
- Handful of industries have installed fire hydrant system for fire safety and firefighting.
- Siren system has been installed in the industries and BID to inform all the staffs and labors about emergency situation.
- Kathmandu Metropolitan City is constructing a new building for fire brigade by the side of main entrance of BID. It will have 1 lakh liter underground water tank for refilling fire trucks.

Challenges in firefighting in BID



- Many of industries are established in small piece of land and are joined together with each other; enhance the fire hazard in manifold.
- There is no written fire safety protocol for fire safety management and fire suppression for the BID.
- Although there are two fire trucks prepositioned in the BID, there is no water refilling facility. The trucks have to go to Balaju Bais Dhara or Mudku to refill water during firefighting. Likewise, there is no reserve foam available with the fire brigade for firefighting.
- There is no fire information system established in the BID to make laborers and staff aware of fire hazards and possible risks.
- Fire monitoring and detection systems are lacking. Only a few industries have installed smoke detectors or fire detection systems.



- Although the industries have installed CCTV cameras for monitoring their operations, warehouses, and critical areas, the central monitoring system is installed in the office of the operations head or manager, who is seldom present full-time in the office.

- Regarding fire suppression systems, although industries have installed fire extinguishers, they are limited in number and some are already expired. Additionally, only a handful of staff and laborers are aware of the operational procedures for extinguishers.
- There are no drills or emergency plans developed for employees to follow during a fire crisis. Nor is there any designated fire escape route, assembly area, collection point, or fire alert signs and signals for safety. Even the regular entrances and exits are narrow and congested.
- There is no medical backup (medical team and ambulance) on standby for any kind of disaster or emergency, including fire, within the BID premises.
- There is a lack of fire-related awareness and capacity-building programs (training, awareness sessions, drills, and simulations) for laborers, staff, and security guards working in the BID.
- Some industries in the BID have not carried out health and life insurance for their staff and laborers.
- Although the APF has been deployed for the safety and security of the BID, including fire suppression, the troops lack the required firefighting equipment, accessories, and training.
- Three-phase and four-phase electric cables need to be managed properly. Wires are snagged and tangled in many locations.
- Many industries have placed their generators with reserve fuel in vulnerable locations, which may induce a fire hazard at any time.



2.5 High Rise residential apartments

In recent years, the construction of high-rise buildings has been increasing in the Kathmandu Valley. According to National Building Code 206, buildings that are nine to thirty-nine stories or 25m to 100m in height are considered high-rise buildings. However, as recorded by the Department of Urban Development and Building Construction (DUDBC), there are currently sixty-eight high-rise buildings in the valley, with a total of 6,655 residential units⁴. These units can accommodate around 27,000 people. Additionally, few of buildings are under construction.



Today, the 20-story Grande Tower Apartment, located in Dhapasi, is the tallest residential high-rise building in the country. Similarly, the 19-story Silver City Apartment at Kalikasthan, the 17-story Vegas City Apartment at Balkumari, the 17-story City Escape at Hattiban, and the 17-story Horizon Park View Apartments at Dhapasi are among the other taller buildings. Furthermore, the Kathmandu View Tower, currently under construction and primarily commercial, is expected to be the next tallest building, standing at 24 stories once completed.

Fundamentally, the Kathmandu Valley Development Authority (KVDA), the DUDBC, and the respective local governments (Municipality/Sub-Metropolitan City/Metropolitan City) are the responsible government bodies facilitating the construction of such high-rise buildings. Initially, KVDA provides the planning permit to the building developer once they submit the engineering design along with other required documents. Then, an IEE and EIE are carried out and must be approved by the Ministry of Forest and Environment. Likewise, permission is also sought from the Kathmandu Valley Water Supply Management Board for water boring, the

⁴ DUDBC official record

Nepal Electricity Authority for electricity, the CAAN to ensure no threat to aircraft landing and takeoff routes, and safety clearance from Shital Niwas (the Presidential Residence) and Singha Durbar if the building is in close proximity to these locations.

With all these approvals and clearances, the process then transfers to the DUDBC. The department checks compliance with the provisions of National Building Codes (NBCs), specifically NBC 107, 206, 207, and 208. NBC 107 relates to fire safety, NBC 207 covers electrification, NBC 206 addresses architectural design, and NBC 208 is for plumbing and sanitation purposes.

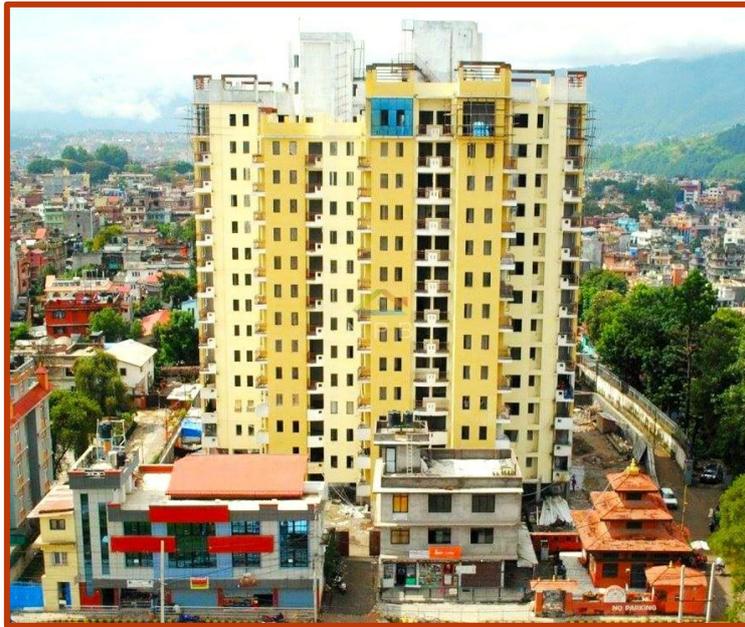
Regarding fire safety, NBC 107 only provisions basic requirements for ordinary buildings. There are no specific fire safety measures for high-rise buildings. It addresses fireplaces and chimneys in kitchens, placing fire extinguishers in appropriate places, fire escape routes, open spaces, external staircases, and lightning arrestors/conductors, which are not adequate for the fire safety of high-rise residential buildings. Similarly, NBC 207 provides general guidance for electrical wiring installation, prevention of short-circuiting, and installation of lightning arrestors. However, metropolitan cities have mandated by law that developers must get the electrification design of high-rise buildings certified, which can help prevent short circuits.

Once the process reaches the DUDBC, the department examines details of electrification, water supply, drainage, structural design, and soil bearing capacity as per the NBCs. Thenceforth, the department gives final authorization for the development of the high-rise building. The file then goes to the respective municipality, where, after paying the required taxes and completing some formal documentation, the developer can initiate the construction of the high-rise building. The DUDBC and the respective municipality carry out inspections and field visits as required during the construction process. Once the construction is completed and certified by the municipality, the developer must again visit the DUDBC to coordinate with the Land Revenue Office (Malpot Karyalaya) to get the Land Owner Certificate (Lapurja) for each apartment for distributing residential flats/apartments.

In this context, there is a lack of sophisticated national rules and laws to ensure fire risk management and suppression for high-rise residential buildings. Although there are some fire safety and suppression measures such as installing fire extinguishers, lightning arrestors, provisions for emergency exits, and external staircases, there is a lack of provisions for fire monitoring and detection systems. Formulating a complete fire preparedness and response plan should be included in national law to make such buildings more resilient against fire hazards. However, protocols maintained by some high rise buildings have been mentioned in subsequently in the following paragraphs:

2.5.1 Bajra and Sangrila Residency

Located in the bustling town of Jamsikhel, Ward No. 3 of Lalitpur Metropolitan City, the Bajra and Sangrila Residency was built in the year B.S. 2073. The residency is among the most well-known residential high-rise buildings in the Kathmandu Valley. It comprises two units: Tower A and Tower B, each with thirteen floors. Both towers have five to six apartments of 2BHK and 4BHK on each floor, which can accommodate a total of 125 families at a time.

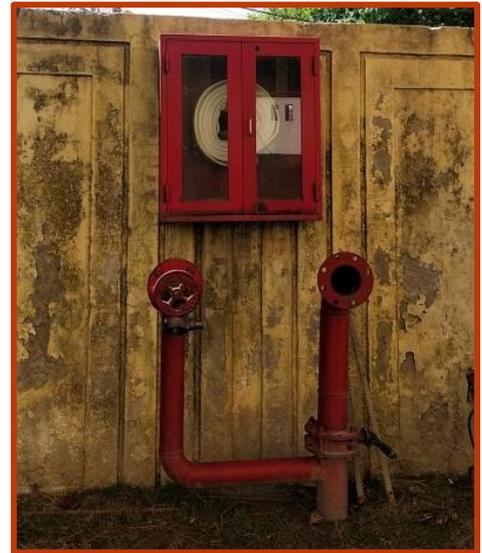


Located on the main road of Sanepa, and close to the UN house, various NGOs, and INGOs' offices, the Bajra and Sangrila Residency is quite famous among foreigners, expats, and business circles. Consequently, multiple foreign families, especially from India, Bangladesh, Korea, Sri Lanka, and China, are currently residing in the residency. Built on around 5 roapni 14 aana one paisa of land, the apartments currently accommodating 100 families and their approximately 400 family members.

For management purposes, the residency has a Societal Team along with security guards from Garud Securities manning two main gates one in the North and another in West 24/7. Like other high-rise buildings, as it is also vulnerable to fire hazards, the Bajra and Sangrila Residency has provisioned the followings for fire risk management:

- The building is equipped with fire hydrant system with 50 thousand liters of (20000 overhead and 30000 underground) reserve water for firefighting purpose. Besides, the residency also has a deep-boring water supply system.
- The outlets of hydrants are placed in the basement, at open space in front of the buildings and in each floor.

- The buildings are surrounded with 15 to 20 feet wide road for the movement whereas the main entrance has the axis of 20 feet road that is adjoined to the main road.



- Hardly an open space has been designated in the building. Only a small patch of land can be found in the Southern part of the building which can hardly accommodate 10/15 families during crisis situation.
- Altogether there are two lifts in the building for commuting purpose. Such lifts have the capacity of accommodating 8 people at a time or carrying 544 KG payload.
- An emergency fire escape stairs have been built inside the building in the Eastern side of the building. Besides, the normal staircase in the buildings is of 4 feet wide.
- For emergency monitoring purpose, the building has installed 8 CCTV cameras around the premises.
- One fire extinguisher of 6 KG has been placed in each apartment for fire suppression purpose.
- The Northern gate, which is the main entrance, is opened 24 hours whereas the secondary Western gate is closed from 6 PM to 6 AM.
- The Residency has its own plumbers, electricians and other technical staffs for its maintenance purpose.
- Two generators (160 KVA and 163 KVA) have been placed in the basement of the building for the alternative power supply.
- The high rise residency is also equipped with a swimming pool facility with around 150 square feet area in total.
- The fire hydrant system has been time and again practiced by the security guard company. The last practice was occurred on 1st February 2024. On the same day, the Garud Security provided awareness session the residents as well as the society office officials.

Gaps in fire risk management

- There is not any written fire safety protocol established in the residency. Thus would remain confusing among the residents, societal committee and guards during the time of fire emergency.
- The installed CCTV cameras are not functional. There is not installed any monitoring system in the guardroom neither in society office thus monitoring of hazard is impossible. Even installed cameras are few in numbers that can't cover the entire buildings and their critical areas.
- Currently the underground water boring system is not functional thus water storage is dependent on water supply tankers.
- There is no inter-com telephone system or any other means for the internal communication among the residents and the management.
- The emergency exit for fire staircase has been locked all the time thus can't be used at the time of real emergency. Even the residents are unknown of whereabouts the keys.
- There is no fire alarm or siren or PA system in the residency, therefore, alerting the residents during emergency seems hardly possible.
- Even the open space of the building has been used for vehicle parking that hinders its usage at the time of real emergency.
- There is not at all medical back up system in the building for any fire/other emergency.
- One of the lifts in the building is out of order since long, thus will make the evacuation problematic during the time of emergency.
- There is not any smoke detector installed in the building for fire detection.
- Although both the high rise residential buildings are attached with an entrance, are remained closed all the time. Thus those entrances can't be used during the time of emergency.
- The residency does not have the contact numbers of any emergency services (police, hospital and fire brigade), nor the residents neither the security guards have.
- Although there are two lifts, none of them are dedicated as the fire lift with required capability.

2.5.2 Grandy Towers

Developed by CD Developers, the Grandy Towers is the tallest residential high-rise building in Nepal. Located in Tokha Municipality, Ward No. 3, Dhapasi, the towers were built in B.S. 2068 on an area of 54 ropani of land. Altogether, seven towers (high-rise buildings) are within the premises, with six towers having 13 stories each and one tower having 20 stories. These towers can accommodate a total of 384 families, with four separate apartments on each floor. Currently, 280 families, comprising nearly 900 members, reside in these seven towers.

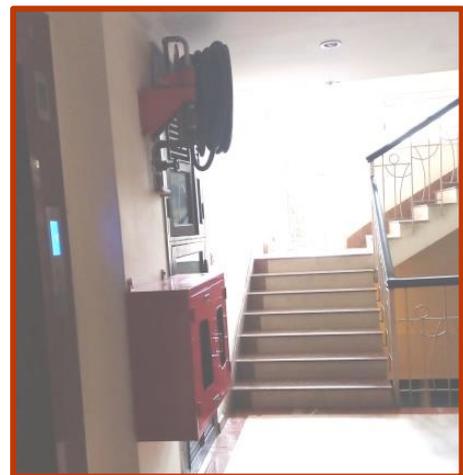


Managed by the Management Committee, the towers have a facility manager, plumbers, electricians, and a lift mechanism for maintenance and administration. Likewise for security purposes and to man the main entrance gate, a 10-man security team is assigned to guard the towers 24/7. Furnished with amenities such as central air conditioning and lifts (two in each tower with a carrying capacity of 13 persons or 600 kg payload), in house canteen and grocery shop for the residents' facility, the Grandy Towers are among the most popular residences for both



national and foreign residents in the country. Besides, amidst such growing fire risk, the towers have arranged following provisions to reduce fire risk and to suppress if fire occurs:

- Since the Grandy Tower premises are connected with a wide axis to the main road leading to Tokha, there is no problem for the movement of heavy fire trucks and ambulances.
- There is an open space of about 5,085 square meters (10 ropanis or 30% of the total land of the premise) provisioned in the center of all seven towers that can be used as an assembly point during an emergency.
- A fire hydrant system has been established on the premises with water outlet points in the open space, on all floors, and in the basement. Overhead water tanks of 20,000 liters and an underground tank of 50,000 liters are available for firefighting purposes, which are refilled by an underground boring system.
- Emergency exits along with external staircases have been established at the back of all buildings, which are marked, easily accessible, and open at all times. Similarly, there are two operational elevators in all towers that can be used for emergencies in crisis situations.
- A total of 78 fire extinguishers of 4 kg each have been placed in all critical locations, including each floor of the towers. The management maintains and refills these extinguishers.
- For fire monitoring and security purposes, 73 CCTV cameras have been installed, covering all critical locations of the Grandy Towers. A central monitoring system has been installed in the guard's office at the gate, where the cameras are monitored 24/7 by security personnel.
- Grandy Hospital, located nearby, is the primary means of medical backup in any emergency.
- Two 125 KVA generators are operational in the towers for alternative power supply.



Gaps in fire risk management

- There is a lack of a written fire risk reduction and firefighting protocol in Grandy Towers.
- There is no fire detection system in the towers. Smoke detectors are not installed in the apartments/units.
- The hydrant system has hardly been tested since its installation.
- Fire risk reduction and firefighting awareness among residents and staff is inadequate. Residents are heavily dependent on the management team, and staff which are also merely trained and aware of fire safety protocols.
- There is no emergency communication system, such as an intercom, among the management team, security, and residents.
- There is no smoke/fire curtailing or damper system in the central air conditioning system, which is imperative for controlling the spread of smoke and fire among the apartments.
- There is no central siren or emergency alert system, nor a public announcement system for emergency purposes.
- The management team has hardly established coordination with the local municipality/fire brigade to ensure an effective response during an emergency.
- Fire safety signs and symbols are lacking in the apartments and open spaces. Additionally, there are no fire safety instructions written or placed anywhere in the towers.
- Security guards lack fire safety training, awareness, and drills, making their effective response during a fire questionable.
- The lifts are not designed for fire lift with required capability.

2.5.3 Silver City Apartment



Silver City Apartment, established in Dillibazar, Kalikasthan, Ward No. 29 of Kathmandu Metropolitan City, is a luxurious residential project developed by Silver Valley Developers Pvt. Ltd. This project spans an area of 10 ropani, 6 anna, and 3 paisa. Built in B.S. 2070, the apartment complex consists of three towers, with one 19 stories and two 16 stories each, totaling 166 residential units, with 6 units per floor.



This residential project offers various facilities, including a swimming pool, gym, garden, and a banquet hall. Additionally, an onsite grocery store, laundry, beauty parlor, and café are available within its premises. Although it was partially affected by the 2015 earthquake, the building has since been repaired and renovated. Today, the complex is home to 120 families, comprising 370 members. Located in a prime area of Kathmandu city, the apartment is well-known among business circles, as well as national and international residents.



For fire risk management and fire suppression, the apartment has managed following provisions and protocols:

- A management team has been formed for the administration and management of the apartment. The team includes a manager, electrician, and plumber. The manager works during the daytime, while the plumber and electrician remain on standby 24/7.
- A 100 KVA generator has been installed for alternative power supply, managed by the electrician and security guards.
- The main entrance gate is manned by security guards and remains open only during the daytime.
- The apartment has a 1.5 million-liter underground tank and a 22,000-liter overhead tank for water supply, but does not have a separate tank for firefighting.

- A fire hydrant system has been established, with water outlets on every floor up to the 16th floor, in open spaces, at the main entrance, and at the back of the compound.
- Fifty-eight fire extinguishers, weighing 6 to 9 kg each, have been placed in various parts of the building, including the floors.
- Two smoke detectors have been installed on each floor.
- The apartment also has a fire alarm detection panel for fire monitoring.
- Every floor is covered with CCTV cameras, monitored by security guards at the main entrance gate.
- A fire alarm system has been installed to alert residents during emergencies, with the main switch located in the guard's room.
- Handheld radio sets are used by the security guards and management team for better communication. Additionally, an intercom telephone system is available to facilitate communication between residents, the management team, and security guards.
- The premises are connected to the main road and have adequate access for fire brigades and ambulances.
- There are two elevators for the movement of residents in the building.
- The hydrant system and alarm system have been tested randomly since the apartment's development.



Gaps in fire risk management

- There is a lack of written protocols for fire risk management and firefighting.
- There is hardly enough open space within the premises of the apartment, making it difficult to assemble residents during a disaster.
- There are no external fire escape doors or external emergency staircases for emergency purposes.
- Fire extinguishers are insufficient to cover all the residential units on each floor.
- There is no fire hydrant system for the top most two floors.



- There is void of road access around the building. Thus, fire truck doesn't not reach to the backside of the building.
- There is no medical backup for any emergency purpose.
- Although emergency drills are claimed to be conducted, residents and security guards are generally unaware and not competent in firefighting. Similar to other apartments, the residents here are heavily dependent on the management team and security guards for emergency response.
- Emergency contact numbers are not readily available to the management team or residents.
- There is minimal coordination between the management team and the municipality, its fire brigade, and other emergency services, which is crucial for a swift response during emergencies.
- Residents have rarely been involved in fire safety drills or evacuation drills.
- None of the lifts are specifically designed as fire lift with required capability.



2.5.4 Cityscape Apartment

A combination of high-rise residential apartments and individual villas, the Cityscape Apartment is located in Hattiban, Lalitpur Municipality, Ward no. 15 near Little Angels School. Developed in B.S. 2077, the Cityscape Apartment complex comprises four high-rise buildings for residential purposes. Tower A and Tower D consist of 17 floors, Tower B has 11 floors, and Tower C has 15 floors. All the floors have three to four separate units of 2BHK and 3BHK apartments. Spanning over 81 ropani of land, that includes four tower, 51 individual villas, and apartment management offices, the high-rise towers of apartment complex have the capacity to accommodate 183 individual families at a time. Currently, 170 families, including 22 foreign families from neighboring countries, are living in the four towers of Cityscape Apartment.

With amenities such as a gym, swimming pool, and underground parking, the towers of the apartment complex are also vulnerable to fire hazards. Therefore, the following mechanisms have been established for fire risk management and fire suppression:

- The main entrance of the apartment is manned 24/7 by three security guards at a time. The entrance gate can be accessed throughout the day.
- For management and maintenance purposes, the apartment has established a society office with the necessary electricians, plumbers, and other maintenance staff.
- For 24/7 monitoring of the building, including fire hazards, 14 CCTV cameras have been installed within the premises.
- There are two elevators with an eight-person capacity have been installed in all towers for movement purposes.
- For emergency communication, intercom telephones are installed on every floor of the towers, connected to the security guard room and management office.



- A 20-foot road adjoins all the towers for easy movement of vehicles and persons.
- Limited open space, approximately 9000 square feet is available in the premises of the apartment, which can hold very limited numbers of family during emergency situations.
- The apartment has 50000 liters overhead tanks in each tower whereas one lakh liters of underground water tanks for firefighting purposes.
- A fire hydrant system has been installed in the apartment, with its outlet in the open space and on each floor.
- Fire extinguishers of 5 KG capacity have been placed on all floors of all four towers.
- A central emergency siren has been installed in the apartment for alerting residents during emergencies. The switch for the siren is in each flood.
- Additionally, all the towers have separate fire alarm panels for alerting residents during fire hazards.
- The guard room is furnished with an intercom telephone that has access to every apartment and unit. The contact numbers of emergency services are also placed on the wall of the guard's room.
- Guards receive fire safety refresher training every three months from their company.
- All the floors in the towers have emergency access connected to the external emergency fire staircase.
- Two generators of 325 KVA and 225 KVA capacities have been placed in the basement of the apartment for an alternative power supply.



Gaps in fire risk management

- There is not enough open space to accommodate large numbers of residents during an emergency.
- Smoke detectors have not been installed as part of the fire detection system.
- Very few CCTV cameras have been installed in the towers, and there is no coverage of all critical parts of the towers.
- There is no written fire safety protocol established for fire risk management and fire suppression.
- The installed fire alarm panels are out of order and have not been repaired for a long time.
- The fire hydrant system has not been tested since its establishment.
- Fire safety instructions for the residents are hardly found in the towers.
- The residents are not given any kind of fire safety awareness programs. They are highly dependent on the society office, guards, and maintenance team for emergency response.
- The residents are unaware of the protocol to follow when the siren blares or fire occurs.
- There is no medical backup established in the apartment for emergency purposes.
- The lifts are not equipped with the capacity to work as fire lift.

2.5.5 Sunrise City Homes

Built by Sunrise City Homes Developers Pvt. Ltd., the Sunrise City Homes high-rise building was constructed in 2011. Located in Anamnagar, Bijulibazar, Ward No. 10 of Kathmandu Metropolitan City, the apartment complex consists of a single high-rise building with 9 floors. Featuring 5 penthouses and 46 luxurious flats (six flats on each floor up to the 8th floor), the apartment can accommodate a total of



51 families at a time. Currently, 45 flats are occupied by local residents.

Built on approximately five ropani of land, the apartment complex includes a fitness center, a small garden, and parking space for its residents. Situated in the heart of the city and in one of the busiest areas, the apartment is also prone to fire hazards. Therefore to counter this risk, Sunrise City Homes has established the following fire safety provisions:



- The building is guarded by 3 security guards at all times.
- A fire hydrant system is installed in the building, with outlets on each floor.
- A 10,000-liter overhead water tank and a 10000 liter underground water tank have been established for firefighting purposes.
- Two lifts are available in the building for transportation, each with an 8-person capacity.
- A total of 9 CCTV cameras have been placed in various parts of the premises for observation.
- An administrative office has been established for administrative purposes. Plumbers, electricians, and maintenance teams are called upon as needed.
- Fire extinguishers have been installed on each floor for fire suppression.
- A generator of 100 KVA has been installed for emergency purposes, though not functional.



Gaps in fire risk management

- There is no open space available on the premises for emergency purposes.
- Only a limited number of CCTV cameras have been installed in the building, thus they cannot cover all critical locations and areas.
- There is no emergency door as well as emergency staircase in the build.
- There are no smoke detectors installed for fire detection.
- Although a fire hydrant system has been installed, it has never been tested or practiced since its installation. Even the fire extinguishers have never been practiced or inspected by the authorities.

- The water storage for fire hydrant is also very limited.
- There is a lack of fire alarm or siren to alert residents during fires and emergencies.
- The residents, including security guards, are not aware of fire safety and fire suppression measures. They have neither been made aware of such issues nor trained in them.
- There are no emergency communication means available to facilitate communication between residents, the management team, and security guards during emergencies.
- Although a generator has been installed, it has been unserviceable for a long time. Therefore, alternative means for electricity during emergencies are not available.
- There are no fire safety instructions available for residents in the building.
- The residents are entirely dependent on the guards and administration team for fire safety management and suppression.
- The residents are unaware of the protocol to follow in case of a fire.
- There is no medical backup established in the apartment for emergency purposes.
- Both the guards and the residents do not have emergency services' numbers with them, making it difficult to deal with emergencies and fire situations.
- Lifts are not suitable for fire rescue purpose since they don't have required capacity.



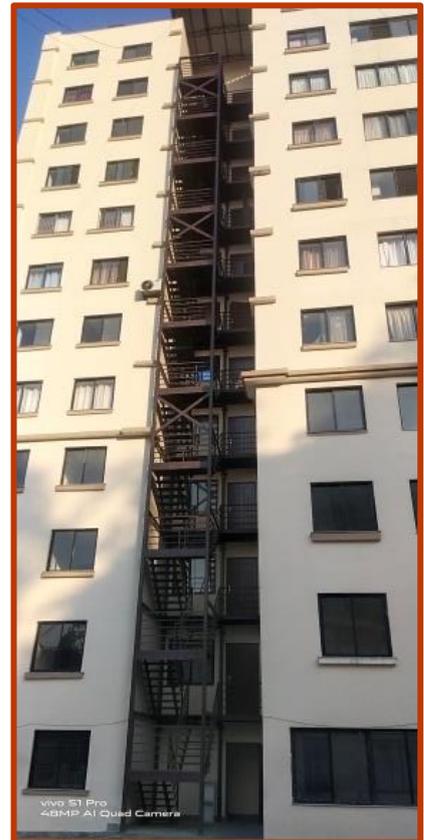
2.5.6 Sunshine Apartment

Built by Super Builders Pvt. Ltd., the Sunshine Apartments are located at Sukhedhara, Budhanilkantha Municipality, Ward No. 10. Spanning 4.5 ropani of land, the apartment is situated by the side of Ring Road. It has two buildings, namely Block A and Block B, each with 12 floors. Altogether, the apartment complex has 96 residential units ranging from 1 BHK and 2 BHK to 3 BHK, out of which 45 are currently occupied. Built in 2079 B.S., the apartment features a 40 ft. long and 20 ft. wide swimming pool, a gymnasium, and a community hall for its residents. It also has a car parking space on the ground floor.



Furnished with two lifts in each block and guarded by a security personal 24/7, the Sunshine Apartments are quite popular among domestic residents for their central location and easy access to hospitals, shopping malls, educational centers, banks, and more. Like other high-rise apartments, the Sunshine Apartments have also implemented the following provisions for fire risk management and fire safety:

- The apartment premises are guarded by a single security guard 24/7.
- There are four CCTV cameras installed within the premises to monitor the most vital areas, with the monitor located in the guard room.
- Both high-rise buildings are surrounded by a 24 ft wide road network.
- Two water tanks, a 25,000-liter underground tank and a 20,000-liter overhead tank, are available for firefighting purposes. And underground water boring system is there for water supply.



- Fire hydrants are placed in the premises as well as on each floor, equipped with the required hose pipes.
- An emergency door and an emergency staircase are available in both buildings for emergency evacuation.
- There are two elevators in each building that may also be used for emergency purposes.
- A generator has been placed in the basement for emergency electricity supply.
- The management of the apartment is responsible for maintenance and emergency services for its residents.



Gaps in fire risk management

- There is no written fire risk management plan for the buildings.
- There is not a single fire extinguisher placed in the apartment.
- The CCTV cameras are insufficient (only four) and cannot properly monitor all critical areas of the premises.
- The CCTV monitoring system is placed in the guard room, and having only one guard is insufficient for proper monitoring.
- There is no management team or committee established in the apartment, nor are there dedicated plumbers, electricians, or other maintenance staff.
- The entire building's security relies on a single security guard, which is highly inadequate.
- There are no smoke detectors in the buildings for fire detection.
- The hydrant system has not been tested since its establishment. Even, 45000 liters of water storage for firefighting for both the high-rise buildings is not sufficient for large scale fire suppression.
- There is no siren or alarm system to alert residents in the event of a fire or other emergency.
- Although there is a provision for emergency doors, they are kept closed at all times, and the residents are unaware of the whereabouts of the keys.
- The guards are hardly trained or aware of fire safety protocols, and neither are the residents.
- Neither the guards nor the residents have the contact numbers for emergency services such as the fire brigade, hospitals, or nearby police stations.
- The residents have never been sensitized about fire safety protocols and are thus unaware of such critical issues.
- There is no provision in the buildings for emergency communication.



- There are no fire safety awareness signs, signals, or instructions placed in the building to alert the residents.
- The high-rise buildings have hardly left any open space for emergency purposes.
- Lifts are not suitable for fire evacuation since they don't have the required capacity.

2.6 Historical heritage



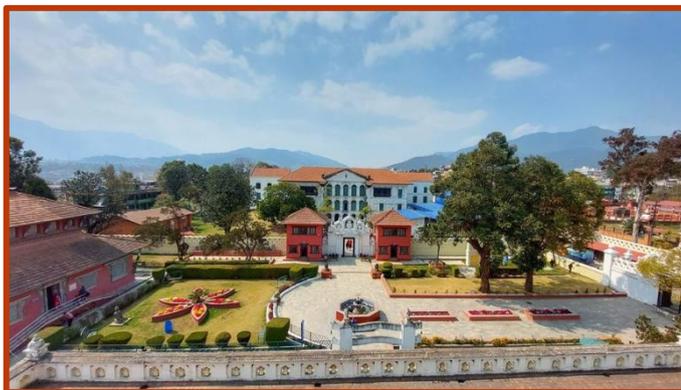
The Kathmandu Valley is a living museum, replete with historical and heritage sites. Out of ten UNESCO World Heritage sites located in Nepal, seven are situated within the Kathmandu Valley. Hanumandhoka Durbar Museum, Patan Museum, and National Art Museum Bhaktapur are among the museums located in the world heritage sites. Additionally, the National Museum and Numismatic Museum, also known as the Chhauni Museum, located at the foothill of Swayambhunath, is another repository of heritage, boasting a wealth of historical collections and evidence.

All four of these historical treasures fall under the jurisdiction of the Department of Archaeology, an entity of the Ministry of Culture, Tourism, and Civil Aviation. Established in 1952 A.D. (2009 B.S.), the Department is primarily responsible for the protection and management of such sites throughout the country. It also regulates all archaeological activities in accordance with the provisions of the Ancient Monument Preservation Act, 2013 (A.D. 1956).

2.6.1 National Museum and National Numismatics Museum

1. National Museum:

The National Museum, located at the foothill of Swayambhunath, was established in B.S. 1824 by Prime Minister General Bhimashen Thapa. It was initially created as an arsenal house to store arms and armories. Later, in A.D. 1926, Prime Minister Chandra Shumsher added two more



wings to the main building and named it Silkhana Museum. After 12 years, in A.D. 1938, it was formally opened to the public by Prime Minister Juddha Shumsher, who renamed it the National Museum.⁵

Also known as the Chhauni Museum, the National Museum occupies nearly fifty ropani of land and is divided into three buildings: the Historic Building, the Juddha Jatiya Kala Bhavan, and the Buddhist Art Gallery. The gallery was established with support from the Japanese government. The museum also features an auditorium with audiovisual and lighting capabilities and a seating capacity for 142 participants.

2. National Numismatics Museum:

Inaugurated by the late King Mahendra Bir Bikram Shah, the National Numismatics Museum was initially established in the Hanuman Dhoka Palace in Basantapur before being relocated to the National



Museum's location in Chhauni in 1993. Later, on March 2, 2021, the Numismatics Museum became a separate entity, with its building handed over to its authority.⁶

The museum aims to collect, preserve, interpret, and display coins for public study and education. Today, the museum possesses coins from Ancient Nepal, ranging from the Kirant and Licchavi rulers to the birth of Buddhism, and coins from Medieval Nepal from the 11th

⁵ <https://nationalmuseum.gov.np/>

⁶ <https://numismaticsmuseum.gov.np/introduction>

century until the Malla Dynasty period, including currencies from the Shah Dynasty. It also contains mud and leather currencies, 'half-cut' coins used for trade in Tibet during ancient times, coin-made jewelry, and foreign currencies. Additionally, the museum promotes Nepal's historical coins worldwide, providing information about the economic, social, political, and religious aspects of the time. The museum serves as a research center for researchers, historians, and academics from various fields. However, today the Numismatics Museum remains an open exhibition, displaying the living history of Nepal and its currency to the entire world.

Fire safety measures:

- A platoon of the Nepali Army has been deployed for perimeter security as well as for firefighting.
- A Fire Safety Officer has been assigned to both museums, remaining on duty during the day while the museums are open.
- The entry of fire-related materials or objects is prohibited in the museum.
- The electric wiring has been renovated, and an emergency cut-off switch has been installed in all galleries. Additionally, the entire electricity supply is shut down once the museums close in the evening.
- CCTV cameras with night vision capability have been installed in both museums. These are monitored by the Fire Safety Officer in a special monitoring room. Access to the cameras is also provided to the responsible officers and the chief of the Nepali Army Security team.



- Portable fire extinguishers are installed in every gallery of both museums. The staff practices using extinguishers once a year during the time of refilling.
- An underground water reserve tank has been constructed for firefighting purposes, and a normal water pump has been installed for this purpose.
- Earthing systems have been installed in all museum buildings.
- Smoke sensors have been installed in the galleries of the Numismatics Museum.
- The historic objects and materials placed in the museums are fitted with touch alarms, which sound a siren if touched or vandalized.
- An auto cut-off switch for preventing short circuits is only available in the National Museum and Numismatic Museum. The rest of the museums don't have this provision.



2.6.2 Hanumandhoka Durbar Museum

Established between the 15th and 20th centuries, Hanumandhoka served as the royal palace for the monarchs until the reign of Prithivi Bir Bikram Shah Dev. After the king relocated the palace to Narayanhiti, Hanumandhoka remained a part of the royal office for



important functions until the time of Mahendra Bir Bikram Shah Dev. As Narayanhiti Palace developed into the center for national administration, Hanumandhoka Palace was converted into the Numismatics Museum in 2019 B.S., which was later moved to Chauni in 2050 B.S..

Thereafter, the museum evolved to preserve biographical monuments of King Tribhuvan and his successors. It features artifacts related to the lives of various Shah kings, from their infancy to marriage and coronation, as well as historical ornaments and documents for exhibition. Nasal Chowk, Sundari Chowk, Mohankali Chowk, Kotilingeshor, Jagannath, Taleju, and the Nine Storied Palace are among the museum's main attractions. The museum complex includes three memorial museum galleries and ten courtyards, though only four are open to the public.

The museum, which was damaged by the B.S. 2015 earthquake, is currently under reconstruction and is administered by Hanumandhoka Herchaha Adda (Hanumandhoka Palace Management and Conservation Office). Additionally, the Hanumandhoka Development Committee was established in B.S. 2076 to assist in the museum's

development and administration. Together, these entities, with a combined staff of around 100, work to conserve, restore, and manage the museum.

Despite recent reconstruction using Surki mortar, wooden beams, and lumbers, the historical infrastructure remains vulnerable to fire hazards. Narrow galleries and corridors, small windows (mostly Akhi Jhyal and Biman Jhyal), wooden doors, and box-type wooden staircases increase its susceptibility to fire.



Fire safety measures:

- The Nepali Army's Sarduljung Gulma (Guruju ko Paltan) has been deployed along the perimeter for protection, including fire risk management.
- Fire-protective electrical wiring was installed during reconstruction.
- Separate staircases have been established for emergency evacuation purposes.
- Around 65 CCTV cameras have been installed within and outside the museum, with monitoring access provided to the Sarduljung Gulma's duty room and the Museum Chief's office.

- During the daytime, when the museum is open, gallery attendants are present for vigilance and supervision.
- Smoke detectors are currently being installed in all galleries and sensitive areas.
- Even the fire hydrant system has been installed in the premises of the museum.



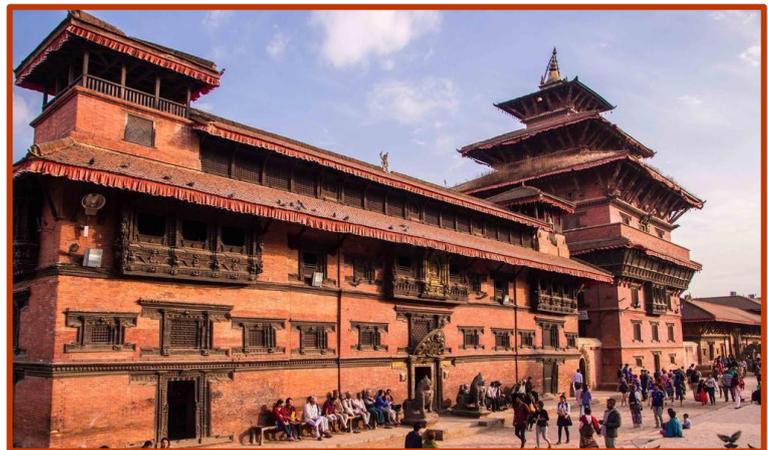
- Fire extinguishers have been installed in all corners, galleries, and corridors.
- All museum staff practice using fire extinguishers once a year while refilling them.
- Simple first aid boxes for medical backup have been placed in the museum offices.
- During festivals such as Indra Jatra, when mass gatherings occur in the courtyard of the museum, a formal security mechanism is established. This mechanism comprises a fire brigade, an ambulance with medical teams, and security teams, all on full standby within the museum premises.



- Firefighting buckets filled with sand and shovels are placed in the corridors of the museum.
- A PA system is currently being installed to alert people during emergencies.

2.6.3 Patan Museum

Located in the heart of Mangal Bazar, Patan, the historical buildings of the museum were built between the 15th and 17th centuries during the Malla dynasty. In 2019 B.S., it was first established as Dhatu Kala Sangralaya (Metal Art Museum). Renovated in B.S. 2039, the authority of the museum was transferred to the



Patan Museum Development Committee once established in B.S. 2053. Thereafter, from B.S. 2054, the doors of the museum were opened to the general public.

The museum is housed in the courtyard of the Northern building complex of the Patan Durbar Area. In addition, Keshav Narayan Chowk and Keshav Narayan Temple, a teaching museum for the dissemination of knowledge on Buddhism that prevailed in Patan, have also added value to the museum. Indeed, this is the first public museum in Nepal created as an

autonomous institution managed by its own Board of Directors. Today, the museum is acclaimed by visitors as one of the finest museums in South Asia, with collections of ancient and historic artifacts, art, and objects made of wood, stone, metal, and paper. Typically visited by 700 to 800 visitors each day, the museum is currently economically self-sustained.

Partially destroyed by the 2015 earthquake, the museum has recently undergone a reconstruction process. Around 45 staff members manage the museum, which includes a restaurant and two souvenir shops within its premises. Believed to have been gutted by fire during the Malla dynasty, it is now guarded 24/7 by 13 Nepal police personnel.

Like other museums, the Patan Museum, which has more than thirty rooms and galleries, is also susceptible to fire hazards. Its construction, made up of Surki Chuna, with excessive use of wood and lumber, small and narrow wooden doors and windows, narrow wooden staircase and narrow corridors, has increased its fire vulnerability to a certain level.

Fire safety measures:

- The outer perimeter, including disaster management, is the responsibility of a thirteen-member team of Nepal Police stationed in the premises of the museum.
- Fire extinguishers have been placed in some of



- corners and galleries of the museum. And need to strengthen the numbers.
- The museum is adequately covered by CCTV cameras that are monitored by the Museum Chief in her office.
- Besides, the gallery staff remains present at all times while the museum is open to visitors.
- Periodically, the electrical system is maintained and repaired to protect against short circuits.



- Although a separate firefighting water tank is not available, the ancient pond at the back of the museum has been earmarked as a water reservoir for firefighting purposes.
- Once a year, the staff is allowed to practice using the fire extinguishers. Additionally, Nepal Police and other agencies occasionally provide fire-related awareness sessions to the staff. However, only handful of staffs are only well convergent to use fire extinguishers.
- During national functions such as Shree Krishna Janmashtami, when the public crowd tends to be overwhelming, the Lalitpur Metropolitan City takes the lead in forming a security committee to manage emergencies and fire hazards. At that time, a fire truck, ambulance, and security teams are on standby for any unforeseen eventualities.
- The museum has provisioned a separate place outside the museum building for kitchen purposes to facilitate staff dining.
- Through the LMC Alert App, the museum is also connected to the Lalitpur Metropolitan City's emergency management system, including fire suppression, which adds value to the entity's fire suppression capabilities.



2.6.4 National Art Museum, Bhaktapur

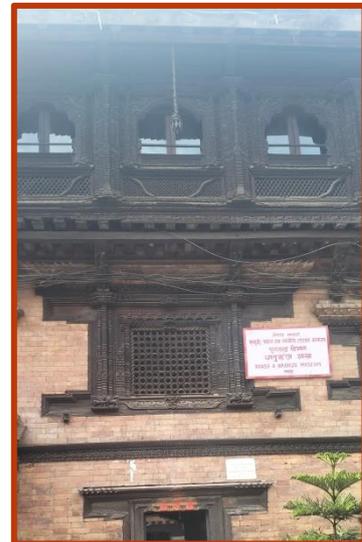
The National Art Museum, also known as Bhaktapur Museum, is located in the heart of Bhaktapur city. Established in the historical Malla dynasty's palace, Singha Dhwaka (Lion's Gate), it was inaugurated by the late Prime Minister Bisheswar Prasad Koirala in B.S. 2017. Guarded by Hanu Bhairav (a tantric legend) and Nrisimha at the main entrance, the palace was built by King Bhupatindra Malla in 1697 AD.



Initially housing preserved historical paintings, the museum was first named the National Picture Gallery when it was established. But as stone sculptures, metal crafts, and wood carvings were also preserved, the museum was renamed the National Art Museum in B.S. 2024. Today, the museum has three wings. The main wing is located in the Singha Dhwaka palace and the other two wings are situated in Dattatreya, some ten minutes' walk from the main museum building. One of Dattatreya's buildings has a collection of wooden crafts, while another houses a

collection of metal crafts along with historical objects and crafts related to the Newari religion and culture.

Earlier, Pachpanna Jhyale Durbar (Palace with 55 windows) was also a part of the museum since the building itself was historic and contained many ancient wall paintings within its premises. However, since B.S. 2055 the ownership of the building was transferred to Bhaktapur Municipality. Likewise, the Lal Bakhtak (Red Hall), the prime gallery of the museum, is also currently under reconstruction as it was damaged by the 2015 earthquake. For the time being, the arts and crafts of the gallery have been moved to the new building of the museum. The museum has a total of around twenty galleries that are managed by thirty-one staff members, 18 short-term contract and 13 permanent staff members. According to records, the museum has been hosting more than 400 visitors from around the world on a daily basis.



Fire safety measures:

- The museum is staffed 24/7. Two staff members remain in the museum at night.
- Twenty Nepal Police personnel have been deployed to secure the Bhaktapur Durbar Square, who are also responsible to assist the museum during emergency, including firefighting. Five police personnel are deployed in Dattatraya Museum for this purpose.
- Five-liter fire extinguishers have been placed in all corridors and galleries of the museum.
- All galleries, corridors, entrances, and other vital areas are covered by CCTV cameras that are monitored by the museum chief in her office. The cameras can



also be monitored through her mobile phone.

- The electrical wiring system is maintained and replaced as needed to prevent short circuits.
- An electric power cut-off switch has been placed at the ticket counter to prevent any unwanted incidents.
- Three water ponds are available around the main museum: Nag Pokhari, Duemaju Pokhari, and Bhandar Pokhari. They can be used for firefighting purposes if required.



- The museum staffs practice using fire extinguishers once a year when the extinguishers are refilled.
- Visitors are prohibited from bringing fire-related materials inside the museum

2.6.5 Overall challenges for fire risk management in museums

- There are hardly any available firefighting SOPs, plans or policies for all museums. The Department of Archaeology does not have any firefighting policy to guide museums' fire risk management.
- Most museums are located in the heart of urban cities, with some even adjoining public buildings. There is a high risk that a fire occurring in public buildings could spread to the museums.



- All the museum buildings are made of combustible materials. Interior columns, beams, floors, roofs, staircases, doors, and windows (mostly Akhi Jhyal and Biman Jhyal) are entirely made of wood and lumber.



- The roads leading to Bhaktapur Museum and Dattatreya Museum are so narrow that it is difficult to drive a fire brigade vehicle into the museum premises.
- Piles of wooden materials, and parts and parcels of windows, doors, and beams are stored inside the Dattatreya Museum building, which has significantly increased the fire vulnerability.
- Besides the National Museum, Numismatics Museum, and Hanumandhoka Palace Museum, other museums (Bhaktapur and Patan) have placed their CCTV monitoring systems in the museum chief's office, which are hardly monitored regularly.

- Smoke detectors have only been installed in Hanumandhoka Palace Museum, and Numismatic Museum.
- All museums lack fire alert sirens to caution visitors against any emergencies.
- Only Hanumandhoka Durbar Museum is installing a Public Announcement system to alert visitors during emergencies.
- None of the museums have a fire sprinkler system or fire hydrant system.
- Firefighting drills hardly occur in any of the museums. Most of the staff members are not trained or aware of fire risks and fire risk management systems. Even most of staffs don't know how to use fire extinguishers.

- Due to a limited budget, the museums are hardly able to run firefighting training and awareness programs for their staff.



- A small kitchen has been established in Bhaktapur and Dattatreya Museums. These kitchens are furnished with LP gas cooking facilities, which are very vulnerable to fire hazards.

- Although water storage capacity (overhead tanks and ponds) has been established in the museums, they lack firefighting portable pumps. The Hanumandhoka Durbar Museum lacks any water storage provision for firefighting.

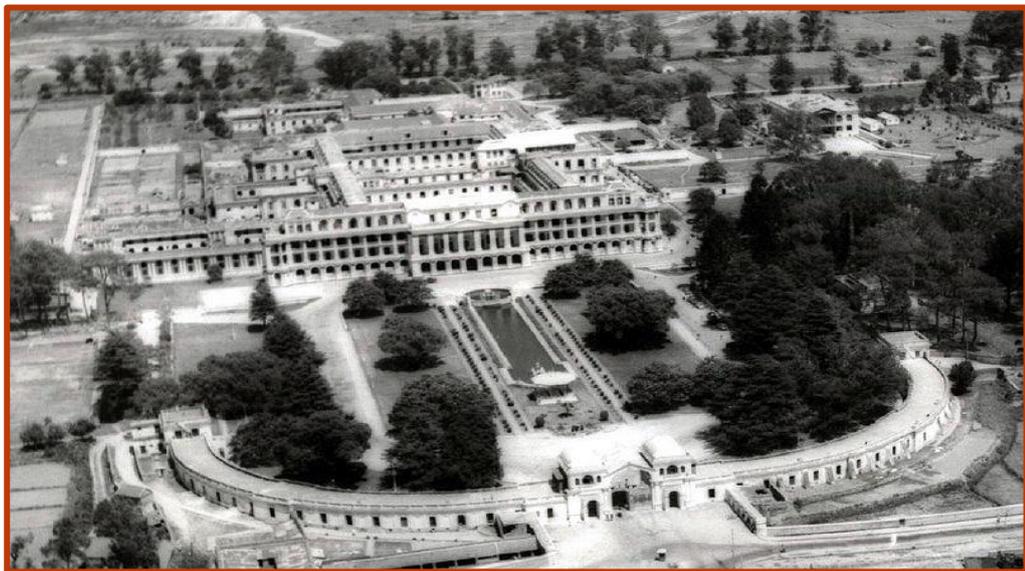


- Fundamental fire safety equipment such as fire helmets, leather gloves, boots, and fire-protective vests are lacking in the museums.
- There are no fire alert signs or posts to caution visitors to remain fire alert.
- Besides the National Museum and Numismatic Museum, other museums don't have a safety officer designated to man the operation room. In fact, other museums don't have an operation room to monitor, observe, and handle emergency situations.
- Since the gallery staff is only present during open hours, the museums are left unattended by staff during the night and off hours. However, NA and Nepal police perimeter security remains there for 24/7.

- None of the museums have dedicated fire escapes for emergencies. Even the doors and exits are narrow and short, which may lead to a stampede if a disaster occurs. Only Hanumandhoka Palace Museum has established an emergency staircase for emergencies.
- Since the electric wirings in the museums are decades long and repaired time and again needs replacement. And there needs to establish electric cut off system for short circuit prevention.
- The restaurant and two souvenir shops established within the premises of the Patan Museum do not have fire extinguishers, despite frequently working with fire sources.



2.7 Singha Durbar 'the Lion's Palace'



Singha Durbar, denoting 'The Lion's Palace,' was built by the late Prime Minister Chandra Shamsheer in B.S. 1908.⁷ Constructed over a period of three years, the grand palace was once the private residence of Chandra Shamsheer and his family. With seven courtyards and 1700 rooms equipped with all amenities and reflecting British

⁷ 'Singha Durbar: NRA Started Retrofitting', Spotlight, April 2019

artifacts, the palace was claimed to be the biggest and most luxurious in South Asia at the time of its establishment.⁸

After the abolition of the Rana Regime from the country, the palace was retained by the state and became the seat of the Government of Nepal. Since then, it has housed various ministries and government's entities. Destroyed by fire in B.S. 2030, the palace was subsequently reconstructed to its original structure. Additionally, its frontal part was partially damaged by the 2015 earthquake and has since been reconstructed.

Spanning over 65 hectares of land, Singha Durbar today houses a total of 21 ministries (refer to Annex 'D') where around 5000 bureaucrats, staffs and personals work regularly. Guarded by the Nepali Army 24/7 on the perimeter along with National Investigation Division and the Nepal Police in the inner circle, the palace is surrounded by a heavy wall with four gates for access. Besides the ministries, the Supreme Court, Federal Parliament, National Vigilance Office, National Disaster Risk Reduction and Management Authority, National ID and Civil Registration, Security Printing, Nepal Television, Radio Nepal, the Government Integrated Data Center and nine other offices are also located within the perimeter.

2.7.1 Singha Durbar fire



The neo-classical palace, built in European style, was once gutted by fire a century ago. On Monday, 9 July 1973 (B.S. 2030 Asar 25), at around 10 PM, the fire started. Although the exact reason for the fire was unknown, the post-investigation report

⁸ Sabina Tandukar, 'Historic Preservation Singha Durba', November 2017. <https://spacesnepalblog.wordpress.com/2017/11/16/singha-durbar/>

speculated it was due to a short circuit. The fire burned for three days, destroying the northern, southern, and western wings of the palace. Despite the efforts of the entire security forces of the Kathmandu Valley, the Judda Fire Brigade, and other resources, the fire could not be brought under control. Ultimately, the Nepali Army used cannons and explosives to destroy the wings to establish a firebreak and prevent the main frontal eastern wing from catching fire. This strategy succeeded in controlling the fire.⁹ Then Prime Minister Kirti Nidhi Bista offered his resignation to the late King Birendra, citing his inability to protect the national property. Subsequently, the destroyed wings were reconstructed to their original shape and size.

2.7.2 Mass movement and mass gathering in Singha Durbar

Being the center of the federal government and its entities, Singha Durbar is always under the pressure of human influx. The daily movement of more than 3,000 staff



members and approximately 2,000 visitors makes the situation there both dynamic and challenging. Additionally, during annual functions and ceremonies such as Republic Day, National Constitution Day, Bada Dashain, and others, mass gatherings of political leaders, activists, bureaucrats, civil servants, and diplomats often occur. Furthermore, with the National Parliament and National Supreme Court also moving into the premises, the frequency and extent of such mass gatherings will increase in the future, posing threats to emergency situations, including fires. Thus, it is imperative that the authorities remain vigilant, cautious, and prepared to mitigate such risks and carry out effective responses if required.

⁹ 'The Military History of Nepal', Nepalese Army Headquarters, 1992, p.508.

2.7.3 Current fire risk management and fire suppression mechanism of Singha Durbar

- A Singha Durbar Security Committee has been established under the chairmanship of the Joint Secretary of MoHA, with representatives from all four security forces and concerned ministries as members.
- A Nepali Army battalion and a unit of Nepal Police are located inside the premises of Singha Durbar. Certain units of the forces are always on standby for firefighting purposes.
- The Nepali Army and Armed Police Force guard the perimeter, while Nepal Police man the entrance gates and carry out access control, preventing unwanted intruders from entering the premises.
- A pond in the western part of the premises, as well as various overhead and underground water tanks are situated in the buildings of Singha Durbar. Such infrastructures may be used for firefighting purposes.
- All ministries, authorities, and offices have placed fire extinguishers, though not sufficient, in their critical locations.
- All ministries, authorities, and offices have installed CCTV cameras for continuous vigilance and monitoring for fires.
- Most of the buildings have elevators that can be used for emergency purpose.
- All buildings inside the durbar premises constructed after the 2015 earthquake have followed NBC 107, which requires them to fulfill fire safety requirements.

2.7.4 Challenges for fire risk management and fire fighting in Singha Durbar

- There is a void of fire risk management and fire suppression written protocol for Singha Durbar as a whole.
- There are insufficient fire monitoring systems such as CCTV cameras, and lack of fire detection systems such as smoke detectors and fire detection boards in the premises as well as in the buildings.
- There is a lack of automated fire suppression devices and mechanisms such as fire sprinkler and hydrant systems to manage fires.
- The premises and buildings lack signage and posts for emergency exits, evacuation routes, assembly areas, and water storage sites.
- There is a lack of emergency sirens or alerting protocols for staff and visitors during critical situations, including fires.
- Poor electrical wiring in the buildings, huge and unsystematic paper storage, discarded and broken furniture piled up in the stores, and

haphazardly run canteens and small kitchens in the ministries and offices have also increased the fire risk to a large extent.

- There is no dedicated elevator with required capacity for fire rescue as well as there is no fire escape exit as well as the external staircase for evacuation.
- The absence of a standby fire brigade arrangement and a committee-based response mechanism has also made firefighting efforts less effective in the Singha Durbar premises.
- The lack of firefighting and emergency management protocols during mass gatherings and functions has also increased the chances of crises during such occasions.
- A lack of fire safety awareness among the officials, staff, and visitors has also made the situation more complicated.

2.8 Current firefighting capacity of the Kathmandu Valley

2.8.1 Local Governments' firefighting capacity



Mandated by law and prioritizing the service of the people, local governments are the primary bodies responsible for responding to disasters, including firefighting. Consequently, they should have their fire risk management laws, provisions, and fire suppression mechanisms. However, due to limited capacity, only nine local governments out of twenty one in the Kathmandu Valley have established some sort of firefighting mechanism. However, they don't have any written protocols. Except for the Lalitpur Sub-Metropolitan City, the other eight local governments don't have dedicated human resources for the purpose. Either they are manned by municipal police, Armed Police Force personnel or long term contracted (karar) staff by Ministry of Home Affairs.

Having latest fire trucks, Lalitpur municipality has its own firefighting brigade with dedicated human resources and required facilities. The brigade possesses five fire trucks, including two newly acquired high-tech trucks, one old and two small fire vehicles with water pump. It has a control room, two ambulances backup during firefighting, and a mobile app for quick information collection and timely response. Although lacking adequate training and high-rise firefighting capacity, the firefighters are moderately competent to deal with fires in the sub-metropolitan city.

The Juddha Fire Brigade, the oldest one in the country, established in A.D. 1937 by late Prime Minister Juddha Samsher, is responsible for suppressing fires within Kathmandu Metropolitan City. Divided into three locations—New Road Basantpur, Balaju Industrial Area, and Bouddha—the brigade altogether has seven fire trucks out of them two are nonfunctional. Earlier owned by the Ministry of Home Affairs the brigade that was established in B.S. 1994 was handed over to Kathmandu Metropolitan City in B.S. 2066. Currently the brigade is running by few dedicated firefighters that falls under the jurisdiction of Kathmandu Metropolitan Police and supported by thirty seven APF's firefighters.

However, the brigade does not have sufficient storage of foam and firefighting chemicals thus is not adequately equipped to handle industrial and chemical fires. With high-rise buildings proliferating in Kathmandu, the brigade lacks the necessary capacity to address fires in such structures. Additionally, its limited search and rescue capability during fire incidents is also a significant drawback in the course of urban firefighting.

Another oldest fire brigade of the country, the Bhaktapur Municipality's fire brigade, also known as Judda Fire brigade, is still owned by the Ministry of Home Affairs. Despite having three fire trucks, among them two are contributed by Madhyapur Thimi, Changunarayan and Suryabinaya municipalities, the brigade suffers from limited human resources, inadequate training and exercise facilities, a lack of high-tech and modern equipment. Thus the fire brigade has limited industrial and chemical firefighting capacity, and adequately equipped to fight fires in high-rise buildings.

Likewise, Budhanilkantha Municipality, Chandragiri Municipality, and Dakshinkali Municipality each have one fire truck for firefighting. These trucks are operated by their respective municipal police and lack dedicated firefighters.

However, in the Kathmandu Valley, a total of 18 fire trucks, including 4 operated by security forces, are currently in use to suppress fires. This is indeed under capacity compared to the escalating fire threats. These fire trucks are only capable of fighting fires in general houses, stores, and small industries. They have limited capacity for chemical and fuel firefighting, including high-rise building fires.

Lacking cranes, lifting machines, adequate foam and chemical reserves, sufficient search and rescue capacity, in sufficient SCBAs and fire entry suits, lacking drones, and thermal imaging for information collection, the fire suppression efforts in Kathmandu Valley are merely effective whereas industrialization, rapid urbanization, increasing numbers of high-rise buildings, and vulnerably located fuel pumps and depots have significantly escalated the fire threats of the valley.

The details of the firefighting capacity of Kathmandu Valley are given in Annex 'E'.

2.8.2 Security forces



Security forces are the key disaster responders in Nepal. All three forces—the Nepali Army, Nepal Police, and Armed Police Force Nepal—have dedicated formations and units for disaster response, including firefighting. The Nepali Army has the Disaster Management Directorate with two dedicated Disaster Management Battalions and one training center, while the Armed Police Force Nepal has a Disaster Management Division, a specialized battalion, and a dedicated training center at Kurintar. The Nepal Police also has the Disaster Management Office at Samkoshi, Kathmandu, and is currently establishing company-strength disaster management units in all seven provinces.

However, although mandated by the constitution and the DRRMA Act, the firefighting capacity of these forces is merely adequate. The Nepali Army, despite having three firefighting trucks in the Kathmandu valley, lacks sufficient reserve foam capacity and water resources for refilling purposes. As a result, these fire trucks are hardly useful in fuel and industrial fires. Similarly, the Armed Police Force does not have any firefighting trucks. Its trained personnel assist the Juddha Fire Brigade in operating the fire trucks. Likewise, the Nepal Police has only one fire truck located at the Police Headquarters in Naxal, which is also barely useful in industrial and chemical fires.

The limited firefighting equipment, especially the fire entry suits, firefighting suits, portable pumps, and other safety equipment, along with old and rundown fire trucks, inadequate training in fire search and rescue, limited reserves of foam and dry chemical powder, and the lack of high-tech reconnaissance capabilities such as

drones and thermal imaging systems for information collection, have constrained the firefighting capacity of these forces. On the other hand, since they are legally bound by laws, striking a balance between their mandate and capacity is very challenging for the forces.

2.8.3 Current Modality of running Fire Brigades in Kathmandu valley

Currently, fire brigades in the Kathmandu Valley operate under three different modalities. In B.S. 2066, the MoHA handed over the Judda Fire Brigade to Kathmandu Metropolitan City. Before that the fire brigade was operated by MoHA. Currently the metropolitan city has been running the fire brigade with assistance from the APF fire fighters. Thus, in this modality, although the fire brigade is owned by the local government, human resources are provided by the security forces.

Similarly, in the same year, MoHA also handed over the fire brigade to Lalitpur Sub-Metropolitan City. Unlike Kathmandu Metropolitan City, Lalitpur established its own 'firefighters' to operate the fire brigade. Additionally, other municipalities, such as Budhanilkantha, Chandragiri, and Dakhsinkali although have their own fire trucks are operated by their metropolitan police. Therefore, in this modality, the local government either have their own fire fighters or operated by their respective municipal police, who are somehow trained by agencies such as Nepal Red Cross Society (NRCS) or APF.

In the third modality, the fire brigade is still owned by MoHA. Bhaktapur Municipality follows this provision. Although three fire trucks carry out firefighting operations in the municipality, legal ownership still remains with the ministry. All staff, required resources, facilities, and provisions are handled by the ministry itself.

2.8.4 Operational command and control of firefighting

Due to the limited capacity of fire brigades in the Kathmandu Valley, all fire suppression operations are conducted in a cooperative environment. A fire brigade from one municipality assists the fire brigade of another municipality as needed. Even the fire brigades of security forces also provide assistance during firefighting. However, such cooperation has been based on mutual understanding. At times, the absence of legal protocols and mechanisms has led to some difficulties.

The Incident Command System (ICS) is a well-known and established protocol that most nations in the world today follow for effective coordination, command, control, and swift disaster response. Established in 1974 by Southern California, the protocol has five components: Incident Command, Operations, Planning and Intelligence, Logistics, and Finance and

Administration¹⁰ . These components ensure an effective response during disasters including firefighting. In the absence of such a mechanism, and without a unified command and control over resources, the different fire brigades, including those of security forces, are facing many problems while fire suppressing in the country. Problems such as duplication of effort, lack of coordinated effort, superiority and inferiority complexes, hesitation in sharing and requesting information are common glitches in the combined firefighting effort.

Although the National Emergency Operations Center (NEOC) is the supreme body for establishing coordination, communication, and command control for effective disaster response, lacks required capability. Additionally, the absence of District Emergency Operations Centers (DEOC) and Local Emergency Operations Centers (LEOC) in the Kathmandu Valley has also led to void in overall command, control, and in effectiveness of the fire response system. However, to fill such gap, there needs an effective implementation of the Incident Command System, which is currently under consideration at the national level. Besides, effective enhancement of EOCs is also another requirement to ensure robust fire risk reduction and fire suppression in the capital.

2.8.5 Current challenges for firefighting in Kathmandu Valley

Although the fire risk in Kathmandu Valley is growing and getting dynamic day by day the firefighting capacity of the municipalities has remained limited. Unfortunately still fourteen among twenty-one municipalities do not have any fire brigade in their constituencies. They are completely dependent upon their neighboring constituencies and security forces. Even the total numbers of fire brigade in the valley is just eighteen and among them most are old and heavy, that can't run through the narrow road networks of the valley. On other hand, the chemical and fuel fire suppression capacity is also very limited. Likewise, there are so many challenges for firefighting which has been listed down subsequently:

- Only one third of the municipalities in the Kathmandu Valley have fire trucks for fire suppression.
- Altogether, there are 14 fire trucks in the Kathmandu Valley, besides 4 fire trucks belonging to security forces and 7 fire trucks belonging to the TIA Rescue and Firefighting Division. Most of these trucks are old and heavy, making it difficult for them to navigate narrow and congested lanes.
- Most of the municipalities don't have dedicated firefighters. Fire trucks are handled by either municipal police or APF firefighters. Some municipalities don't even have dedicated drivers for fire trucks.

10 <https://firescope.caloes.ca.gov/SiteCollectionDocuments/ICS%20History%20and%20Progression.pdf>

- The firefighting capacities of these trucks are very limited. Many of them can't suppress fires in buildings beyond medium-rise (up to 8 floors).
- The brigades have limited capacity to suppress industrial fires, particularly those involving chemicals and fuel.
- The storage of foam and dry chemical powder is very limited in fire brigades in the Kathmandu Valley. Even the security forces' fire trucks use only water due to the lack of foam.
- Due to depleting water resources in and around the Kathmandu Valley and the lack of adequate water reservoirs for firefighting, the fire trucks face difficulties in refilling water for firefighting.
- Limited Fire Entry Suits and Self-Contained Breathing Apparatuses (SCBA) are available for firefighters. Most firefighters are not trained in Fire Search and Rescue.
- Many of the municipalities have not provided any insurance for their firefighters, nor have they provisioned any incentives for them. There is also variation among the few municipalities that have provisioned incentives.
- Due to the lack of an Incident Command System, firefighting efforts have become disorganized. The role of NEOC needs to be enhanced to coordinate firefighters during fire incidents.
- Different administrative modalities of fire brigades in the Kathmandu Valley have hindered the generation of a synergistic effort. Therefore, there is a need to establish a single national modality for their administration

BIPAD SAMBAD



3. BIPAD SAMBAD

3.1 Bipad Sambad One: Focused on fuel and inflammable materials fire safety

3.1.1 Introduction:

On May 26, 2024, the National Disaster Risk Reduction and Management Authority (NDRRMA) organized the first Bipad Sambad (disaster dialogue) at its meeting hall. The discussion focused on the compounded and complex hazards posed by fuel and inflammable materials. The event was chaired by the Chief Executive of NDRRMA and attended by approximately 35 participants. These included representatives from relevant ministries and departments, security agencies, the NOC, the CAAN, the Petroleum Dealers' Association, the LP Gas Dealers' Association, and scholars specializing in fire hazards.

3.1.2 Scenario:

Kathmandu Valley, a rapidly urbanizing and unplanned capital city of Nepal, covers 902 square kilometers and is home to over six million residents in its two metropolitan cities, sixteen municipalities, and three rural municipalities. The TIA, located centrally in the valley, consumes 450 kiloliters of aviation fuel daily. Additionally, the 133 fuel stations in the area consume an average of 4,000 kiloliters each day. To manage the fuel supply for Kathmandu, including TIA, there are two major fuel depots located in Thankot and Sinamangal. Beyond the substantial fuel storage, consumption, and transportation, there is also a significant number of LP gas stations and distributors that sell, store, transport, and supply gas cylinders for daily consumption.

The NOC, a government-owned public enterprise, is the leading agency responsible for operating and regulating fuel and gas sellers. It operates under the guidance of a governing board chaired by the Secretary of the Ministry of Industry, Commerce, and Supply (MoICS). The NOC employs 800 staff members who oversee operations across the country from twenty-four depots and offices.

The governing board of the NOC issued its fourth set of bylaws in 2075 B.S. to regulate petroleum dealers, replacing previous versions issued in 2064, 2053, and 2039 B.S., respectively. However, some petrol pumps had been in operation prior to these regulations being established.

3.1.3 Identified Constraint:

The NOC faces several limitations that hinder its ability to effectively regulate the 1,563 petroleum dealers serving customers at strategic service centers daily. It struggles with insufficient legal, institutional, and human resources. Additionally, hundreds of private transport tankers operate within the supply chain without being governed by a Petroleum Act or Highly Inflammable Materials Transportation Regulations. The bylaws issued by the NOC do not adequately cover the operations and management of fuel and inflammable materials.

3.1.4 Recommendations:

Based on the discussion during Bipad Sambah, the following recommendations are made:

- **Need for a Petroleum Act:** The NOC should initiate the drafting of an Act, with support from the NDRRMA, relevant ministries, security agencies, the CAAN, and the Petroleum and LP Gas Dealers Association. The MoICS should then proceed with the necessary steps to endorse the Act.
- **Need for a Highly Inflammable Materials Transportation Management Act:** The NOC should lead the drafting process, with assistance from the NDRRMA, relevant ministries, security agencies, and the Fuel Tankers Transportation Association. The MoICS should assist during endorsement. Currently, foreign standards are applied for transporting fuel and inflammable materials due to the lack of corresponding legal provisions in Nepal.
- **Required Petroleum Pumps Operation Manual:** This manual should detail requirements for land, location, structures, equipment, human resources, insurance, and procedures for filling, storing, and selling. The NOC should develop this manual in cooperation with the Petroleum Dealers Association and relevant agencies, and the NOC governing board should have the authority to endorse it or forward it to the MoICS for approval.
- **Required LP Gas Factory and Sales Operation Manual:** The NOC should draft this manual for manufacturing, storing, filling, transporting, and selling affairs in collaboration with the LP Gas Dealers Association and relevant agencies. The NOC governing board should have the authority to endorse it or forward it to the MoICS for further approval.
- **Need for a Fuel and LP Gas-based Hazards Risk Reduction and Management Manual:** The NDRRMA should develop this manual in cooperation with the NOC, the Petroleum and LP Gas Dealers Association, security agencies, and local governments. The NDRRMA should then present it to the Executive Committee for DRRM for its approval.

3.2 Bipad Sambad Two: Focused on Heritage Sites and Industrial Areas



3.2.1 Background:

On June 12, 2024, the second Bipad Sambad was also held at NDRRMA. This time, the discussion was divided into two parts. The first part focused on fire risk management of heritage sites, specifically the five museums in the Kathmandu Valley. The second part focused on fire risk management of the Balaju Industrial District. The Chief Executive of NDRRMA chaired both sessions, which were attended by approximately 30 participants. These included representatives from offices responsible for managing museums and industrial areas, especially BID, along with representatives from security agencies and local governments.

3.2.2 Scenarios:

a. Heritage sites: The Kathmandu Valley hosts six heritage sites within its ancient, indigenous, and central urban areas. Additionally, there are five museums, along with temples and collection centers, that offer insights into ancient history and archaeology. The Department of Archaeology and its associated branches oversee these museums, which fall under the jurisdiction of the Ministry of Culture, Tourism, and Civil Aviation (MoCTCA). These museums are open to all visitors according to their operating schedules. Security forces provide security and required assistance, while the core staff of the respective museums are responsible for their maintenance, operation, and preservation. The structures of these museums are predominantly traditional, primarily constructed from combustible materials such as wood, lumber, and other flammable materials, and lack adequate spaces for emergency exits and

evacuation during disasters, including fires. Certain museums, such as Patan Museum, have souvenir shops within their buildings, whereas the Dattatraya Museum has a small kitchen and a salvage store full of waste wood and frames in its structure, posing a high fire risk. Additionally, all museums have limited fire suppression capacity along with monitoring and detection.

b. Industrial areas: The BID encompasses 670 ropanies of land and hosts 126 operational industries. A component of the Juddha Fire Brigade and a small unit of the APF's troops are stationed there to manage fire hazards. Despite these efforts, the industries have very limited capacity to suppress fire incidents, and fire disasters have occurred repeatedly in BID. The NBC 107, which provides basic standards for fire safety, is not adequately implemented. Although most industries are operating at full capacity, they have not installed systems to meet the minimum requirements for fire monitoring, detection, and automated suppression to effectively address fire emergencies.

3.2.3 Constraints:

Due to the absence of other national laws, NBC 107 solely serves as a fundamental standard for maintaining safety in both heritage and industrial areas. However, there is a lack of sufficient resources, training, and exercises for the staff and officials of both Museums and Industries to enhance their capacity to manage the potential risk of fire as well as risk reduction. Museums particularly lack the utilization of appropriate tools and techniques for fire monitoring, detection, and suppression, whereas industries have been overlooking fire hazards and risks, thus installing only a minimal number of basic fire extinguishers, often left unmaintained, as the means for fire suppression. Consequently, both entities heavily rely on security forces for fire risk management.

3.2.4 Recommendations:

Followings are the recommendation based on discussion occurred during Bipad Sambad:

- **Need for an Archaeology (Protection) Act:** The MoCTCA should initiate the drafting of this act, with support from the Department of Archaeology, relevant ministries, NDRRMA, security agencies, and stakeholders. The MoCTCA should then proceed with the necessary steps to endorse the act.
- **Need for the Industrial Areas' Operation Manual:** This manual should detail requirements for land, location, structures, equipment, human resources, insurance, and procedures for filling, storing, and selling. The Ministry of Industry, Commerce, and Supply (MoICS) should develop this manual in cooperation with the relevant agencies, and the Industrial Areas' Governing Board should have the authority to endorse it or forward it to the MoICS for approval.

- **Required an Integrated Fire Hazards Risk Reduction and Emergency Service Management Manual:** The NDRRMA should develop this manual in cooperation with the MoICS, security agencies, local governments, and stakeholders. The NDRRMA should then present it to the Executive Committee for DRRM for its approval.

3.3 Bipad Sambaad Three: Focused on High Rise Residential Building and Singha Durbar Premises



3.3.1 Background:

On Friday, June 21st, 2024, the NDRRMA organized the third and final disaster dialogue program in its meeting hall. This time, the discussion focused on two issues. The first dialogue addressed the fire risk management measures for high-rise residential buildings in Kathmandu Valley, and the second dialogue centered on the fire risk management of Singh Durbar, the nation's administrative center. As before, the event was chaired by Chief Executive Mr. Anil Pokhrel and attended by approximately 40 participants from various agencies and organizations such as OPMCM, MoUD, DUDBC, NA, NP, APF, NEA, local governments and their fire brigades, and owners and residents of high-rise residential buildings.

3.3.2 Scenarios:

a. High-rise buildings: The Kathmandu Valley has a total of sixty-eight high-rise residential buildings with 6,655 resident units, which can accommodate about 27,000 people at once. Till now, the tallest high-rise residential building in the Kathmandu Valley is the Grandy Tower. However, a few more high-rise buildings are currently under construction in Kathmandu.

The development procedure of high-rise residential buildings warrants engagement from multiple government agencies, including KVDA, DUDBC, respective local governments, the Ministry of Forest and Environment, the Kathmandu Valley Water Supply Management Board, the Nepal Electricity Authority, and CAAN. Various NBCs must be followed while developing high-rise residential buildings, specifically NBC 107 for fire risk management procedures.

During the discussion, a few participants claimed that high-rise buildings are the safest locations for residency since all safety measures are followed during construction. However, the most challenging part identified was ensuring the safety functions of the building once it is handed over to the residents. Besides, many other vital issues of fire safety measures, including provisions of NBCs and their requirement for review, were also discussed during the occasion.

b. Singh Durbar: Singha Durbar, built by the late Prime Minister Chandra Shamsher in B.S. 1908, was once the largest and most luxurious palace in South Asia. Partially destroyed by fire in B.S. 2030, the palace, which is now the administrative center of the country, features seven courtyards and 1,700 rooms equipped with all amenities and reflecting British artifacts. Spanning over 65 hectares of land, Singha Durbar today houses a total of 21 ministries, where around 5,000 bureaucrats, staff, and personnel work regularly. Guarded by the Nepali Army 24/7 on the perimeter and the Nepal Police in the inner circle, the palace will soon house the Supreme Court and the Federal Parliament. Additionally, the National Planning Commission, National Vigilance Office, National Disaster Risk Reduction and Management Authority, National ID and Civil Registration, Security Printing, Nepal Television, Radio Nepal, and the Government Integrated Data Center are also located within the perimeter of the palace.

Indeed, Singha Durbar, which daily entertains heavy movement of staff, visitors, security personnel, and even diplomats and delegates, is always prone to fire hazards. Furthermore, annual programs, functions, and celebrations held on the premises tend to have mass gatherings also warrant an effective fire risk management system, which has hardly been achieved so far.

3.3.3 Constraints:

NBC 107 serves as a fundamental standard for maintaining safety in both high-rise buildings and Singha Durbar. However, it is not sufficient to mitigate the current threat of fire hazards. Other NBCs also do not meet the needs as the issues have been addressed superficially.

Officials and staff working in Singha Durbar, as well as residents and management of high-rise residential buildings, lack sufficient fire safety awareness and the required resources for training and exercises, including mock drills.

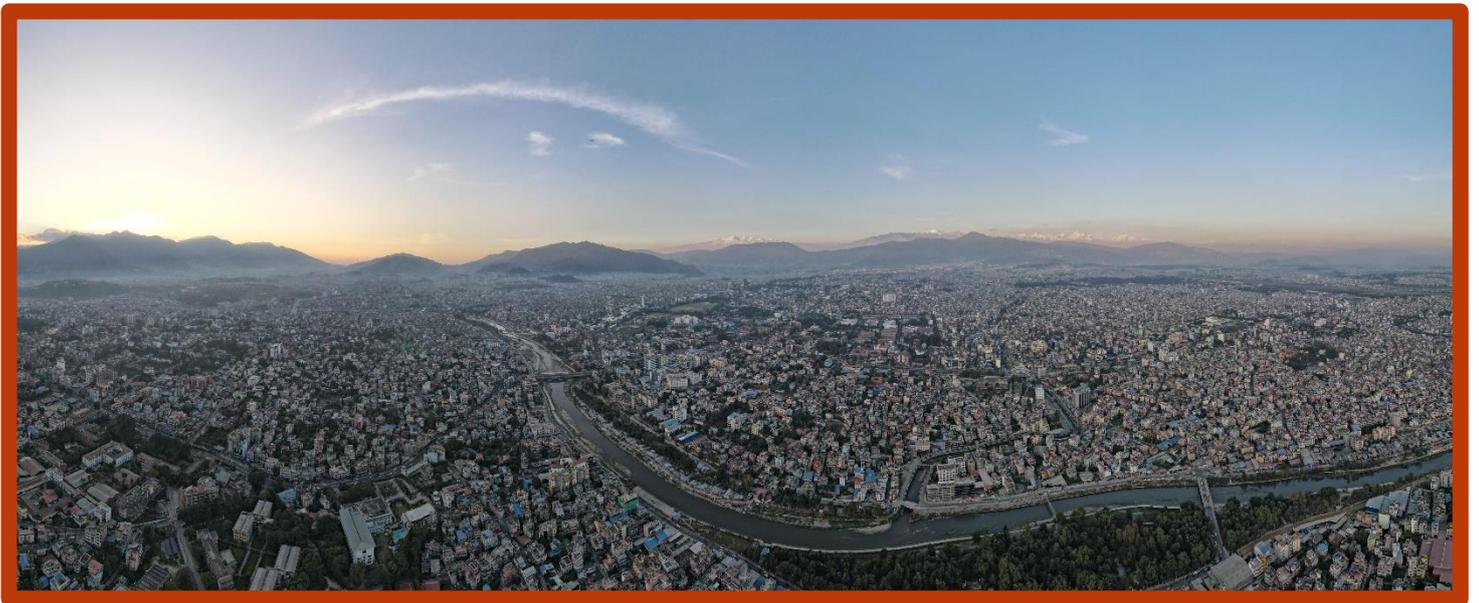
High-rise buildings have been installed with basic fire detection, monitoring, and suppression mechanisms, but they often fail to maintain the quality of the equipment, such as fire extinguishers. Consequently, they heavily rely on fire brigades, security personnel, and their concerned local government to manage fire emergencies if they occur.

3.3.4 Recommendations:

Based on the discussion, following are the recommendations derived at the end of the program:

- **Revise the NBC 107:** The DUDBC should initiate the revising of the NBC 107, with support from the relevant ministries, NDRRMA, security agencies, fire brigades, and stakeholders. The MoUD should then proceed with the necessary steps to revise the NBC 107.
- **Formulate a master piece of manual for fire response:** This manual should detail requirements on how to respond during fire incidents. The NDRRMA should develop this manual in cooperation with the fire brigades, security agencies and stakeholders, and the Executive Committee for DRRM shall approve it.
- **Formulate an Integrated Fire Hazards Risk Reduction and Emergency Service Management Manual:** The NDRRMA should develop this manual in cooperation with concerned ministries, secretariats, security agencies, fire brigades, local governments and stakeholders. The NDRRMA should then present it to the Executive Committee for DRRM for its approval.
- **Awareness program should be launched:** The NDRRMA should launch an awareness program for fire risk management and response for the high -rise buildings' communities as well as for the incumbents of Singha Durbar.

OUTCOME AND RECOMMENDATION



4. OUTCOME AND RECOMMENDATION

4.1 Background:

Indeed, urban areas of the country, including Kathmandu Valley, is today under immense threat of fire hazards. Growing urbanization, industrialization, infrastructure development, depletion of water resources, excessive use of highly combustible fuels, and unsystematic wiring and poor electrification have contributed to this situation. Additionally, the threat is compounded by global warming, as the days in summer are becoming increasingly hot, dry and prolonged.

However, the data from the last few years regarding urban fires in the country is truly alarming. In one way or another, it serves as a caution to the responsible authorities to take prompt action to reduce fire risks and establish effective fire suppression mechanisms. As a result, the rigorous study conducted on the four pillars of fire risk management, with a focus on the Kathmandu Valley, has come up with following results:

4.2 Policy

Unfortunately, to date, Nepal doesn't have any national policy for fire risk management. All policies related to fire are thematic and ad hoc. Time and again, voices have been raised that there needs to be a 'fire-related Act' in the country. Besides, institutions also lack written protocols for their fire risk management. NBC 107 is the only legal tool to guide them for this purpose, but it is also constricted and needs revision. However, the following policy gaps were identified during this study, which need to be addressed in the coming days:

- It is imperative to establish a fire-related federal Act, along with the Petroleum Act, Highly Inflammable Materials Transportation and Management Act, and Archaeology (Protection) Act, as these are currently missing in the country. The respective ministries (MoHA, MoICS and MoCTA) should lead the formulation of these acts, with NDRRMA, as the national leading agency for disaster risk management, providing necessary assistance.
- The national building codes, particularly NBC 206 and NBC 207, related to fire risk management, require revision. Most critically, NBC 107, which specifically addresses fire hazards, needs immediate updating. The DUDBC should initiate the revising this code with support from the relevant ministries, NDRRMA, security agencies, fire brigades, and stakeholders. The MoUD should then proceed with the necessary steps to revise the NBC 107.

- There is required to establish an Integrated Fire Hazards Risk Reduction and Emergency Service Management Manual. The NDRRMA should take lead to develop this manual in cooperation with concerned ministries, secretariats, security agencies, fire brigades, local governments and stakeholders. The NDRRMA should then present it to the Executive Committee for DRRM for its approval.
- Municipalities lack comprehensive fire risk management policies and provisions, including for their fire brigades. All activities and operations are conducted on a temporary basis or based on individual understanding. Therefore, a comprehensive national policy for fire risk management and fire suppression at the municipal level is needed.
- There is an urgent need for a Museum Act to ensure the safety, security, and fire risk management of museums. The MoCTCA, supported by NDRRMA, should take the initiative.
- Precise fire risk management and firefighting plans are required across all sectors, including NOC depots, fuel farms, petrol pumps, gas dealers and distributors, museums and historical sites, industrial districts and industries within them, high-rise buildings, and most importantly, Singha Durbar and its entities. Such plans or SOPs will systematically reduce fire risk and manage fires effectively.
- A unified guideline or policy is needed for governing fire brigades within the country. The currently adopted various models for firefighting management may not ensure a synergistic effort among fire brigades.
- Responsibilities for facilitating the construction of high-rise residential buildings should be clearly defined for DUDBC, KVDA, and the municipality. The current provisions regarding the monitoring and supervision of construction are ambiguous. Furthermore, as a local government, the municipality has a very limited jurisdiction over high-rise building construction procedures.
- There is no provision for conducting Disaster Risk Assessments prior to establishing any business or industry. Only IEE and EIA are currently required. Thus, conducting Disaster Risk Assessments (DRA) based on the principles of Business Continuity Management should be made compulsory.
- There is a need for a sole master law/guideline for establishing and operating petrol pumps in the country. Currently, the NOC, Road Division, and respective Municipality have different laws and provisions for this purpose. This has resulted in difficulties in the establishment, monitoring, and regulation of petrol pumps including ensuring their fire safety.
- A unified directive is needed for governing LP Gas production, storage, transportation and their vending within the country. The MoICS, supported by NDRRMA, should take the initiative for the formulation.

- A unified directive is needed for maintaining the quality and standard of electrical goods and services in the market in the country. The NEA, supported by MoEWRI and NDRRMA should take initiative to establish the directive.

4.3 Risk reduction, preparedness and response mechanism

Today, fire risk monitoring and detection systems have almost been overlooked by institutions in the country. Although high-tech tools and technologies such as heat detectors, flame detectors, carbon monoxide detectors, gas detection systems, video-based fire detection, advanced fire alarm panels, remote monitoring systems, and wireless fire detection systems are exponentially adopted around the world, they have hardly been applied in Nepal. Only smoke detectors, CCTV cameras, and fire detection panels are randomly used by the public and private sectors.

Additionally, fire suppression systems are also at a fundamental stage in the country, relying more on basic fire extinguishers and handheld devices. Sophisticated and automated fire hydrant and sprinkler systems, robotic and drone-based firefighting, and fireproof curtains, dampers, walls, and doors have hardly been introduced yet. The lack of priority given to using such advanced tools, techniques, and systems has simply increased fire risk on one side while increasing the loss of human lives and property damage during fire incidents on the other side. In this regard, this assessment has identified the following gaps and their remedies

- Since most urban fires are caused by short circuits and electric fault, electrification including wiring should be timely maintained and kept up dated. Time and again, issues arise regarding the quality of electrical appliances and materials found in the market been mere standard and not of good quality, causing problems even in newly built houses or infrastructures. Ensuring the safety and quality of electrical materials such as wires, plugs, switches, bulbs, and so on should be the prime concern of the respective government. Nepal Electricity Authority, support from NDRRMA may remain helpful on this regard.
- As described earlier, the establishment of modern fire risk monitoring and detection systems is missing in all researched thematic areas. Moreover, there is no ample of legal provision to make such installations compulsory. Therefore, there should be a mandatory legislative provision, along with promotion mechanism from both public and private sectors, to install such monitoring and detection systems to reduce fire risk and fire hazards.
- As water resources in and around the Kathmandu Valley are depleting, urgent action is needed to protect and revive them. Historic stone taps, ponds, and wells are drying up, along with exhaustion of underground water, posing difficulties for firefighting.

Appropriate protocols need to be established at national and sub-national levels, with leading roles of local government/communities and interest groups for the preserve of such water resources.

- Concrete fire suppression systems were found lacking in all thematic areas of assessment. Fire hydrant system and automated sprinkler systems are almost missing in industrial areas, where they are crucially needed. Similarly, museums, high-rise buildings, and the Singha Durbar also require effective hydrant systems as well as sprinklers. As many infrastructures today have underground or overhead water reserve tanks, possessing portable fire pumps would be advantageous for dousing fires in their preliminary stages. Additionally, placing appropriate fire extinguishers in sensitive areas may help to suppress fires if it is of small nature.
- During emergencies, having open space in and around high rise buildings, residential areas, and industries is critical. However, the culture of providing such space has not been established yet, as observed during the assessment. It is recommended that there should be a legal provision for creating such open spaces on the premises of critical infrastructures, especially in the high-rise building, with definite size based on scientific calculation rather than arbitrarily.
- According to the national building code, high-rise buildings should have a separate emergency lift/elevator with special protective features such as fire resistance for about two hours, running on backup power, spacious enough for carrying stretchers, disabled-friendly, controllable by firefighters, and equipped with emergency communication and automated fire suppression systems. However, hardly any high-rise buildings have fulfilled such prerequisites. Some high-rise buildings also lack standard fire escape doors and external fire escape staircases.
- Central AC systems in almost all infrastructures lack fire/smoke dampers or curtains. Since such systems unfortunately assist in passing smoke and fire from one apartment to another, they need to be curtained in between. Need for such dampers and curtains should be provisioned in the law related to high rise building.
- Conducting fire audits, inspections, and fire risk assessments has hardly been a cultural practice in the country, nor has it been regulated by law. As a result, only a handful of audits and inspections have been occurring, despite the increasing fire threats in critical infrastructures such as petrol pumps, industries, LP gas depots and distributors, and high-rise buildings. Appropriate legal mechanisms need to be established by local governments and relevant government agencies.
- Drill, simulation, and practice are very important for retaining effective fire suppression capability. However, the use of hydrants, sprinklers, and fire extinguishers should be practiced and drilled by end-users periodically, which was found to be hardly occurring in industries, high-rise buildings, and museums in the valley. Nevertheless, TIA

fuel farm, fuel depots and handful of high rise buildings are somehow carrying out such activities.

- There is required dedicated firefighting team with required authority, capacity and resources to operate fire trucks in the NOC fuel depot and TIA fuel farm.
- The NOC Thakot depot needs to be manned by its staff 24/7. However, to date, none of the staff remain in the depot after office hours. Additionally, a complete maintenance team is also required at the Thankot depot. The current provision of a single mechanical engineer is not sufficient to oversee the maintenance of such a large and sensitive infrastructure.
- Petrol pumps are required to strictly adhere to the fire safety provisions of the Petroleum Supplier Regulation 2075, as it is crucially connected to the safety and security of the general public, as well as their own safety.
- Although medical backup is imperative during fire response, its practice has hardly been occurring in our context. From fuel depots to petrol pumps, industries, high-rise buildings, and beyond, the provision of medical assistance, along with detailed medical backup provisions, needs to be stipulated by law as well as required to establish as a safety culture.
- Since security forces are key responders during disasters, including fires, lacking required resources and technologies is a significant issue. Therefore, it is imperative that they are equipped with the necessary tools and techniques, and the concerned authorities should prioritize fulfilling these needs. APF Industrial Security Units should be equipped with appropriate resources and system.
- It is imperative that the fire vulnerability assessment of all museum buildings, including heritage sites of the country, be carried out by experts. As they are made of combustible materials such as woods and lumbars, they are much more prone to fire hazards.
- As fire risk is increasing in Kathmandu Valley, along with industrial fires, the foam and DCP reserve capacity of fire brigades as well as the security forces is very low. Thus there is immediate need to enhance the capacity. Current capacity is not sufficient to deal with any large scale industrial and fuel fire.
- Since fire brigades are operating in three different modalities in the country, with variations in operational capacity, it is wise to establish a single/unified firefighting and emergency services' formation/division in the country. This unit would delegate/designate its firefighters to all municipalities as per requirement. This approach will help strengthen the firefighting capacity of the country itself and eliminate all disparities in facilities and incentives received by firefighters in today's context.

- There is lack of narrow body firefighting trucks in Kathmandu Valley resulted the old and heavy trucks are not able to enter into narrow roads and gullies for firefighting.
- As medium rise and high rise building are mushrooming in the valley, demands the necessity of having 'fire brigade cranes' to reach to multi story buildings. At least two/three cranes that can reach up to 75/80 meters is required for Kathmandu Valley.

4.4 Human resource and capacity

Competent human resources are critically important for fire risk management and fire suppression. As timely response is of paramount importance during a fire disaster, the capacity and efficiency of responders, as well as those involved, truly matter. There have been occasions where responders lacking competency resulted in catastrophe. To enhance competency, the following measures have been identified by this assessment:

- Fire safety awareness, along with fire risk reduction and management, has been found to be limited among the people from thematic areas who were involved in the survey. Especially the residents of high-rise buildings, security guards, laborers, and workers in industries, as well as staff in petrol pumps and their owners, are among the list. Therefore, there is a requirement for standard programs, including awareness sessions and training, to be conducted for the staff and incumbents of these critical areas. Public-private partnership is required for this venture.
- The firefighting capacity is critically important for the residents of high-rise buildings. Since reaching a professional response team to the upper floors of a high-rise building is hardly possible, there should be a legal provision for enhancing fire risk reduction and firefighting capacity for such residents. The respective municipality should take the lead for this purpose.
- As there are no fuel fire experts in the country, there is a need to produce some. Either security forces personnel or staff from NOC should be sent for foreign fuel fire specialized training programs. Alternatively, the promotion of expertise can also be encouraged within the public sector.
- Since firefighting is a very sensitive job that risks lives, insurance and hazard allowances are prerequisites for them. Insurance should also be made compulsory for workers and laborers working in fire-sensitive areas such as fuel depots, fuel farms, LP gas depots, dealers, chemical industries, etc.
- Current understrength situation of the TIA Rescue and Firefighting Division needs to be fulfilled sooner the better since aviation fire risk is increasing with the increment of domestic and international flights along with expansion of airports in the country.
- The current quota for foreign training especially in TIA Rescue and Firefighting Division is not sufficient to meet the need for producing experts in the field. Thus, such quota

needs to be increased. Additionally, knowledge exchange programs among fire fighters need to be launched within and beyond the country.

- Since most fire brigades today operate on an ad hoc basis, staffed either by Armed Police Force personnel or Municipal Police, provisions have not yet been made by local governments to establish dedicated and professional firefighting units within their organizational structure. Therefore, it is suggested to have a single formation and unit in the country that produces and designates required firefighters to the respective municipalities on an as-needed basis.

4.5 Financial resources

When it comes to the sustainability of fire risk reduction and fire suppression regulation of financial resources becomes imperative. And yet, management of financial resource for such cause has hardly been a priority in most of the institutions that the assessment was conducted. On top of that, currently, heavy dependency is on the foreign aid for disaster risk management, which is again questionable for its long term sustainability. Thus it's very important that the national financial resources should be secured and allocated for the reason. In terms of plugging such gaps following issues have been identified that requires appropriate protocols and provisions:

- All surveyed institutions within Singha Durbar, NOC, BID, and high-rise buildings lacked the necessary financial resources to maintain fire safety and suppression capacity. Only a few institutions have allocated budgetary provisions for conducting training and awareness programs for their staff, officials, workers, and tenants.
- In fire-risk working fields, such as industries, depots, and petrol pumps, funds should be allocated to provide incentives such as hazard allowances for their workers and staff.
- Municipalities should offer financial incentives for their firefighters, and the current disparity among hazard allowances based on municipal policies should be eliminated, ensuring equality for all firefighters.
- Municipalities and relevant authorities should allocate an annual budget for conducting fire risk audits of petrol pumps and industrial areas. Given the costly and sensitive nature of the process, a legal provision is required.
- Industries within BID should establish a fund to enhance fire risk management and firefighting capacity within their own institutions, as well as to support fire brigades and security forces working for their fire safety and security.
- The government shouldn't hesitate to form a DRR Budget Code as soon as possible, which will help to allocate an annual budget in its LMBIS for disaster risk reduction and management purposes. This will help encourage all government agencies to work wholeheartedly for DRM. After all, financial resources act as fuel to function the system.

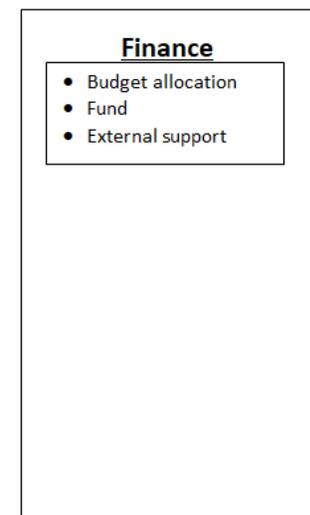
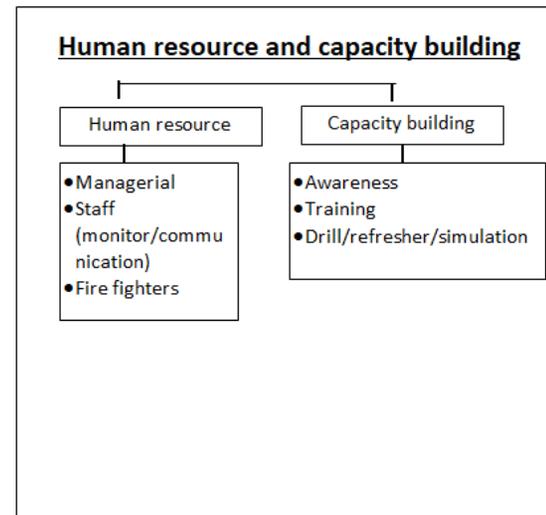
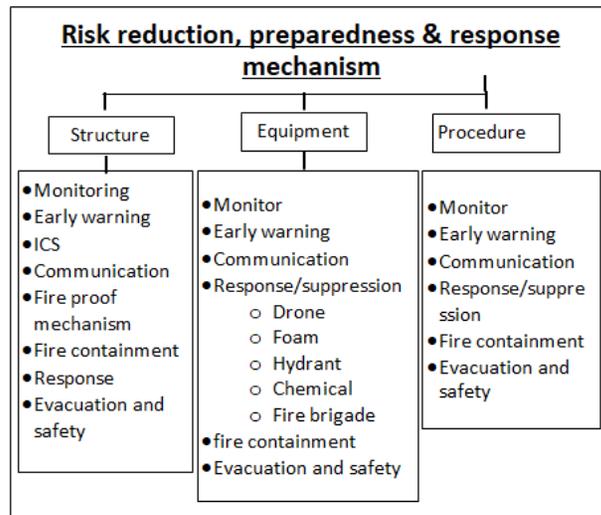
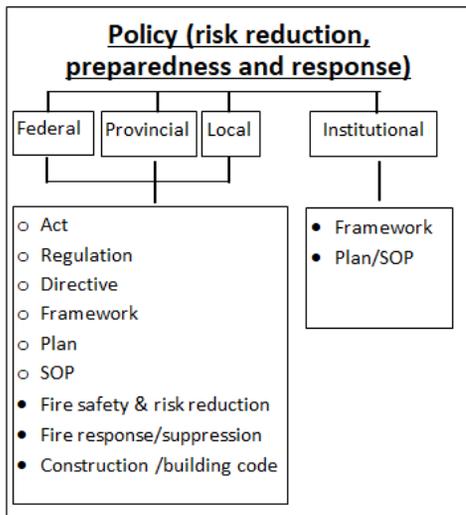
5 CONCLUSION

Indeed, fire risk management in the Kathmandu Valley and other urban areas is not an easy task, especially as hazards are increasing manifold. The most intricate job is to make people aware of fire risk and to gain their attention and involvement in the process of fire risk management. However, as the disaster management system in the country is in its nascent stage, fire risk management is also progressing slowly. Obviously, there are many hurdles to overcome. From a policy aspect, the lack of any concrete fire-related policy in the country is the biggest fissure. It also proves how neglected the state has been in terms of fire risk management until now. Similarly, the limited number of fire trucks in the valley, having handful of dedicated firefighters, lack of rules and regulations for fire safety for industries, commercial areas, public and private houses, limited fire-related regulations for high-rise buildings, lack of budget for fire management in institutions, and deficiency of competent human resources to work for the venture are some critical issues that need immediate attention to address.

In such a dire situation, this assessment, including the conduct of three subsequent Bipad Sambads, has tried to pave one more stone in the path of making Kathmandu Valley fire resilient. This initiative has not only identified the gaps but also brought relevant and responsible stakeholders to the same platform for in-depth discussions on the critical issues, making a significant precedent in the history of the country. Obviously, these assessments and dialogues have shed light on and exposed many issues related to fire hazards and fire risk management that have remained in the shadows till now. This comprehensive report is definitely an eye-opener for all directly or indirectly involved in fire risk management and suppression. However, the adaptation of the recommendations is imperative; sooner, the better, as fire hazards are increasing in the valley and time is ticking.

Annex 'A'

Four Pillar of the Study Area



Annex 'B'

Detail result of the survey of petrol pumps

S.No.	Name of the petrol pump	Location	Established Year (B.S.)	Total area coverage		Installed digital and auto stop fuel dispensers	Earthing	Fire Safety Measures																	
				Area	Standard as per Biniyamawali			Bonding system		Emergency cut off switch		Concealed wiring	Vent pipe at standard height	Standard Fire extinguisher	Basic fire safety equipment	Firefighting water tank	Reserve tank's safety distance from generator	Staffs' fire safety awareness		Emergency services' contact Number	Safety instructions for custom		Card Swipe machine in safety location	First Aid Box	Insurance for all staffs and workers
								Available	Regular used	Available	Easily Accessible							Aware	Trained		Instru ctions	Signa ge			
1.	Shree Satya Narayan Pvt. Ltd.	Banashthali, Balaju	2079	4 ropani	√	√	√	√	X	√	X	X	√	√	X	√	X	X	X	√	√	√	X	√	
2.	Sita Fuel Pvt. Ltd.	Maharajgunj	2042	2 ropani	√	X	√	√	X	√	X	√	√	X	X	√	√	X	X	X	X	NS	√	X	X
3.	Gayatri Devi Oil Pvt. Ltd.	Yekantakuna	2057	10 ana	X	√	√	√	X	√	X	√	√	X	X	√	X	X	X	X	NS	X	√	Health	
4.	Mahalaxmi Oil Pvt. Ltd.	Satdobato	2054	1 ropani	X	X	√	X	X	√	X	√	√	X	X	√	X	X	√	X	X	--	√	X	
5.	Rajdhani Oil Store	Dhumbarahi	2057	15 ana	X	√	√	√	√	√	X	√	√	X	X	√	√	X	√	X	X	--	√	X	
6.	New Puspanjali Oil Traders	Jaybageswori	2058	10 ana	X	√	√	√	X	√	X	√	√	X	X	√	√	√	√	X	NS	X	√	√	
7.	Shyama Oil Pvt. Ltd.	Kalanki (Below high-tension line)	2058	1 ropani	X	√	√	√	X	√	X	√	√	X	X	√	√	X	√	X	NS	√	√	√	
8.	Puja Kohi Pvt. Ltd.	Gongabu	2051	1 ropani	X	X	√	√	X	X	X	√	√	√	X	√	X	X	X	√	√	√	√	X	
9.	Ganapati Oil Trading. Ltd.	Sitapaila	2054	2 ropani	√	√	√	√	X	√	X	√	√	√	X	X	X	√	X	√	√	√	√	X	√
10.	Bagalamukhi Petrol Pump	Sano Bharyang	2055	2 ropani	√	√	√	√	X	X	X	√	√	√	X	√	√	X	X	√	√	NS	X	X	X
11.	S P International	Pulchowk	2047	14 ana	X	√	√	√	X	√	X	X	√	X	X	√	---	X	X	X	X	NS	√	√	X
12.	Valley Fuel Center Pvt.Ltd	Gyaneshowr	2050	10 ana	X	X	√	√	X	√	X	√	√	X	X	√	X	X	X	X	X	√	√	√	
13.	Valley Baba Suppliers	Tinkune	2050	10 ana	X	√	√	√	X	√	X	√	√	X	√	X	X	X	√	X	√	X	√	X	
14.	Machindra oil	Kumaripati	-----	6 ana	X	X	√	√	X	√	√	X	√	X	X	√	X	X	X	X	NS	--	X	X	
15.	Harishiddhi Oil Store	Minbhawan	2055	10 ana	X	X	√	√	X	√	X	√	√	X	√	√	X	X	√	√	NS	√	√	√	
16.	Kanak Trade Center	Teku	2040	12 ana	X	√	√	X	X	√	X	√	√	X	X	√	√	X	X	X	X	√	√	√	

Annex 'C'

Survey result of the Industries of Balaju Industrial District

Name of the industry	Established year	24/7 supervision	Fire safety measures																				
			Earthing system	Fire escape route	Designated assembly area	Fire alert system/siren	Concealed wiring	Availability of electricity cutoff switch in accessible location	Generator located in safe distance from fuel storage	Fire extinguisher	Fire hydrant system	Basic PPE for firefighting	Separate Firefighting water tank	Fire alert sign	Availability of emergency services contact numbers	Fire safety awareness among staffs and labors	Practice of fire firefighting drills	Fire hazard monitoring system (CCTV)	24/7 monitoring of CCTV	Fire detection system	Firefighting SOP	Basic First Aid	Insurance (life and health)
Nepal Gas Pvt.Ltd.	2026	√	√	√	x	√	√	√	√	√	√	x	√	√	√	√	√	x	x	x	√	√	
Polythene and Plastic Industries Pvt.Ltd.	----	x	√	x	x	x	x	x	---	x	x	x	√	x	x	x	x	√	x	x	x	x	√
Ganesh Metal	2078	√	√	x	x	x	x	√	---	√	x	x	x	x	x	x	√	x	x	x	x	x	
Mahindra Auto	2041	√	x	x	x	√	√	√	√	√	x	x	x	x	x	x	√	x	x	x	√	√	
Hilltake industries Pvt. Ltd.	---	√	√	x	x	x	x	√	√	√	x	√	x	x	x	x	√	x	x	x	√	√	
Shankar Oxygen Gas Industry	2058	√	√	x	x	x	x	x	x	√	x	x	x	x	x	x	√	√	x	x	x	x	
Balaji Hiloft Non Oven Pvt. Ltd.	2070	√	√	x	x	x	√	x	x	√	x	√	√	x	√	√	√	x	x	x	√	√	
Neysha Plastic Industry	2069	x	√	x	x	x	√	x	---	√	x	x	x	x	x	√	x	√	x	x	√	√	
Trikod Beverage Industry	2006	√	√	x	x	x	x	x	x	x	x	x	x	x	x	x	√	x	x	x	√	√	
Nebiko Pvt. Ltd.	2021	√	√	x	x	x	√	√	√	√	x	x	√	√	x	√	x	√	√	x	x	√	√
Bindhyabasini Plastic Factory	2066	√	√	x	x	x	x	√	√	√	x	x	x	x	x	x	√	x	x	x	√	x	

Annex 'D'

List of the Ministries and Offices located inside Singha Durbar

Name of Ministries

- 1- Office of Prime Minister and Cabinet of Ministers
- 2- Ministry of Finance
- 3- Ministry of Industry, Commerce, and Supply
- 4- Ministry of Energy, Water Resources and Irrigation
- 5- Ministry of Law, Justice, and Parliamentary Affairs
- 6- Ministry of Agriculture, and Live Stock Development
- 7- Ministry of Drinking Water
- 8- Ministry of Home Affairs
- 9- Ministry of Foreign Affairs
- 10- Ministry of Land Management, Cooperative and Poverty Alleviation
- 11- Ministry of Physical Infrastructure and Transport
- 12- Ministry of Women, Children, and Senior Citizen
- 13- Ministry of Youth and Sport
- 14- Ministry of Defense
- 15- Ministry of Forest and Environment
- 16- Ministry of Urban Development
- 17- Ministry of Education, Science, and Technology
- 18- Ministry of labor, Employment, and Social Security
- 19- Ministry of Culture, Tourism, and Civil Aviation
- 20- Ministry of Federal Affairs and General Administration
- 21- Ministry of Communication, Information Technology

22- Ministry of Health and Population

Total staffs in 22 ministries: 2698

Name of Offices

- 1- Supreme Court (nearby by Singh Durbar)
- 2- Federal Parliament
- 3- Office of the Attorney General (nearby Singh Durbar)
- 4- National Planning Commission
- 5- Secretariat of the National Security Council
- 6- National Natural resources and Fiscal Commission
- 7- National Vigilance Office
- 8- NDRRMA
- 9- National ID and Civil Registration
- 10- Department of Archaeology (nearby Singh Durbar)
- 11- Security Printing
- 12- Nepal Television
- 13- Radio Nepal
- 14- Government Integrated Data Center
- 15- Everest Bank Limited
- 16- Rastriya Banijya Bank
- 17- Employees Provident Fund

Annex 'E'

Detailed Firefighting capacity of Kathmandu Valley

DISTRICT/SF/TIA	S. No.	Constituency/ organization		Number of Fire Truck Available		Type		Reserve foam capacity	Water stream reaching Height of fire truck	Provision for Reserve water in fire brigade (underground/overhead)	Firefighting human resource		Capacity			Fire rescue capacity	Insurance	Hazard Allowance	Firefighting suit	Fire entry suit	SCBA	Other resources/ remarks
				Functional	Non functional	Water	Water with foam				Specialized	Ad hoc	Through training	Gained by practice	Regular drill							
KATHMANDU	1.	KTM Juddha Fire Brigade	New Road	2	1	√	√	500 lt.	15 stories	3 lakhs lt. UG		21 Apf 6 MP	√	√	√	√ APF	√ Life insurance (10 lakhs)	√ (50%)	94	2	1	<ul style="list-style-type: none"> ●5 Fire Fighting motorbike ●2 Fire rescue vehicle
			Bouddha	2		√	√	x	15 stories	1 lakh lt. UG		8 APF 3 MP							15	x	1	
			Balaju	1	1	√	√	x	15 stories	X		8 (Apf)							15	x	1	
	2.	Budhanilkantha Municipality	1	---	√	√	300/400 lt.	9/10 stories	x	x	20 MP	√ NRCS/JFB/TIA	√	√	√	x	x	7	x	2	<ul style="list-style-type: none"> ●No dedicated driver to drive FF truck 	
3.	Chandragiri Municipality	1	--	√	x	x	9 stories	x	x	24 MP	√ By APF	√	√	x	x	x	x	x	x	x		
4.	Dhakshinkali Municipality	1	---	√	x	x	6 stories	x	x	6 MP	√ APF	√	x	x	x	x	x	x	x	x	Heavy FF truck can't go into narrow road.	
LALITPUR	1.	Lalitpur Metro. Fire brigade	3		√	√	500 lt.	10 stories	50000 lt. UG	19	X	√	√	x	Limited	x	√ (28%)					<ul style="list-style-type: none"> ●2 new Fire brigade ●2 small Fire Bde. only with fire pump ●2 Ambulance

																						<ul style="list-style-type: none"> •Control room •LMC Alert App
BHAKTAPUR		Bhaktapur, Madhyapur Thimi, Chagu Narayan and Surya Binayak	3		√	√	300/400 lt.	3/4 stories	80,000 lt. UG	23 (15 FF)	x	√	√	√	x	Health	x	50	2	13	<ul style="list-style-type: none"> •One water tanker •One compressor •(1 MoHA, 1 Madhyapur Thimi and 1 Chagunarayan+Suryabinayak) 	
SECURITY FORCES	1.	Nepali Army	3	--	√	√	x	9 stories	x	29	x	√	√	√	Limited	--	x	29	x	3		
	2.	Nepal Police	1	--	√	√	500 lt.	6 stories	x	250	x	√	√	√	Limited	--	---	104	2	44	<ul style="list-style-type: none"> •Portable Fire pump •Thermal imaging 	
	3.	Armed Police Force	x	x	x	x	x	x	x	147	x	√	√	√	Limited	--	--	64	x	13		
TOTAL			18	2			2300 lt.	15 stories											6			
TIA	1	TIA Firefighting Division	7		√	√	8000 lt.	----	100000 lt.UG 50000 lt. OH	55+8 mechanics	x	√	√	√	√	x	x	√	√	√	<ul style="list-style-type: none"> •Two ambulance •One rescue van •Maintenance workshop 	

Abbreviations: Lt. = Liters; UG = underground; OH= overhead; APF= Armed Police Force; MP=Municipal Police; FF= Fire Fighters; NRCS= Nepal Red Cross Society; JFB=Juddha Fire Brigade; TIA=Tribhuvan Int. Airport Rescue and Firefighting Division; SCBA=Self Controlled Breathing Appratus; MoHA = Ministry of Home Affairs; LMC=Lalitpur Metropolitan City.

Annex 'F'

List of interviewed people during survey

S.No.	Name	office	Designation	Contact
1.	Mr. Manoj Thakur	NOC	Spokes person	9841312527
2.	Mr. Rajkumar KC	NOC, Thankot Depot	Officer	9851135919
3.	Mr. Binod Lohani	NOC, Thankot Depot	Officer	9841302338
4.	Mr. Bashudev Ojha	NOC, Thankot Depot	Officer	9841700955
5.	Mr. Radhakrishna Pandit	CANN	Director, Department of Airdrome Safety	9841964601
6.	Mr. Niraj Thapa	CANN	Officer/fire fighter	NA
7.	Mr. Narayan Bahadur Rawat	Rescue and Firefighting Division, TIA	Chief of RFD	9851076045
8.	Mr. Prashant Bohara	Department of Industry	Director	9841264496
9.	Mr. Kishor Kumar Pandey	Balaju Industrial Area Management Office	Chief Executive Officer	9845030931
10.	Mr. Buddhi Amrit Pandit	Nepal Gas	Marketing Officer	
11.	Mr. Arun Risal	Nepal Gas	Plant Supervisor	9861025451
12.	Mr. Dhruva Bhakta Manandhar	Balaju Industrial Development Federation	Chairman	9851026247
13.	Mr. Birendranath Bhattarai	Balaju Industrial Development Federation	Former Chairman	9851008949
14.	Mr. Bhes Raj Regmi	Kiran Shoes Manufacturing Pvt. Ltd.	Chief Technical Officer	NA
15.	Mr. Rajendra Bhattarai	Nebiko Biscuit Pvt. Ltd.	Chief Production Officer	9801223465
16.	Mr. Navaraj Bhattarai	Hilltake Industries Pvt. Ltd.	Manager	NA
17.	Mr. Pramod Kharbhuj	TIA Fuel Farm	Senior Technical Assistance	9841912468
18.	Mr. Jayram Shrestha	National Museum	Director	9851121779
19.	Mr. Subash Krishna Dangol	National Numismatic Museum	Director	9851118002
20.	Mrs. Manju Bhandari Pathak	Patan Museum	Director	9851207934
21.	Mr. Suresh Man Lakhe	Patan Museum	Museum Officer	9851013743
22.	Mrs. Jayanti Shrestha Pradhan	Bhaktapur Museum	Director	9841579790
23.	Mr. Sandeep Khanal	Hanuman Dhoka Museum	Director	9856036767
24.	Mr. Anupam Parajuli	TIA Fuel Farm	Safety officer	9843215463
25.	Mr. Rajendra Khatiwoda	DUDBC	Senior Official	NA
26.	Mr. Harish Chandra Lamichane	Lalitpur Metropolitan City	Senior Engineer/DR focal person	9851052073
27.	Ms Archana Shrestha	Kathmandu Metropolitan City	Senior Engineer/ Chief of Division	9841231799
28.	Mr. Ramchandra	Fire Brigade, Lalitpur Metropolitan City	Fireman	NA
29.	Mr. Ekdev Adhikari	Ministry of Home Affairs	Under Secretary	9851277012

30.	Mr. Kabindra Nepal	Ministry of Federal affairs and General Administration	Under Secretary	9841287872
31.	Mr. Pradip Kumar Koirala	Ministry of Forest and Environment	Joint Secretary	9851216111
32.	Lt. Col. Nanada Gurung	Disaster Management Directorate, Nepali Army	DR Focal Person	9841361705
33.	S.P. Dinesh Malla	Disaster Management Division, Armed Police Force Nepal	Chief of DMD	9851259703
34.	S.P. Heramba Sharma	Disaster Management Officer, Nepal Police	Chief of DMO	9851280711
35.	Mr. Harish Chandra Lamichane	Lalitpur Metropolitan City	Engineer officer/DR focal person	NA
36.	Mr. Ramchandra	Fire Brigade, Lalitpur Metropolitan City	Fireman	NA
37.	Mr. Sanu Ram Dahal	Fire Brigade, Bhaktapur	Chief of Fire Briagde	9841542374
38.	Mr. Ramesh Kumar Khatiwoda	Budhanilkantha Municipality	Chief of Municipal Police	NA
39.	Mr. Suman Adhikari	Nagarjuna Municipality	DR Focal Person	NA
40.	Ms. Shuvadra Pudasaini	Shankarpur Municipality	Information Officer	NA
41.	Mr. Sagar Mishra	Kageshori Manahara Municipality	Chief Administrative Officer	9851250014
42.	Mr. Bhakta Prasad Kuikel	Gokerneshor Municipality	Information Officer	NA
43.	Mr. Shekhar BC	Tokha Municipality	Chief Administrative Officer	NA
44.	Mr. Dinesh Raj Panta	Tarkeshor Municipality	Chief Administrative Officer	NA
45.	Mr. Suman Adhikari	Nagarjun Municipality	Chief Administrative Officer	9851268111
46.	Mr. Hemraj Aryal	Chandragiri Municipality	Chief Administrative Officer	9851353213
47.	Mr. Prakesh Chandra Shrestha	Kritipur Municipality	Information Officer	NA
48.	Mr. Dipak Kumar KC	Dakshinkali Municipality	Information Officer	NA
49.	Dr. Suraj Gurung	Konjyosom Rural Municipality	Information Officer	NA
50.	Mr. Milan Silwal	Godawari Municipality	Spokes Person	NA
51.	Mr. Ashok Bista	Mahankal Rural Municipality	Chief Administrative Officer	NA
52.	Mr. Rmamani Kafle	Bagmati Rural Municipality	Chief Administrative Officer	NA
53.	Mr. Ram Bahadur KC	Madhyapur Thimi Municipality	Chief Administrative Officer	NA
54.	Mrs. Sarita Timsina (Bhattarai)	Suryabinayek Municipality	Deputy Mayor	NA
55.	Mr. Anup Lamichanne	Changunarayan Municipality	Information Officer	NA