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Mainstreaming Disaster Risks in Planning Critical Facilities: The Case of Kaunlaran High School in Navotas City, Metro Manila

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Abstract

Schools are among the critical facilities that are significantly affected by disasters, not only because of the direct impact caused by disasters to the physical infrastructure, but also because they function as evacuation centers for displaced families. Based on the Hyogo Framework for Action and the Sendai Framework for Disaster Risk Reduction and Management, the Comprehensive School Safety (CSS) Framework was developed. CSS laid down three pillars that will ensure educational management information systems and disaster management plans, from the national to local levels, are anchored in evidence-based, multi-hazard risk assessment. While several planning guides and tools were developed to operationalize the CSS Framework, most of the conducted studies, assessments, and evaluations focused on integrating disaster preparedness and response into the school curriculum, as well as in strengthening existing instrumentalities to boost the resilience of schools to disasters. However, the existing literature is limited on the actual mainstreaming of disaster risks and hazards in school planning, construction, and facility management as espoused under the pillar on Safe Learning Facilities. Using the case of Kaunlaran High School in Navotas City, Metro Manila, this study assessed disaster risk mainstreaming in educational facilities planning and the extent of collaboration between the key actors involved. Specific avenues of collaboration between national and local governments were also identified and assessed to identify gaps and offer recommendations for improving collaborative safer schools planning in the local context.

Keywords: disaster risk reduction, mainstreaming, critical facilities, schools, local government

1. Introduction

Over the past few years, disasters have immensely affected the well-being and safety of people, communities, and countries. Within the enforcement of the Hyogo Framework for Action (HFA) from 2005 to 2014, which puts emphasis on boosting the resilience of critical facilities due to social, economic, and operational importance in society, total damage has been estimated to be at US$1.4 trillion, which affected more than 1.7 billion people globally. These disasters, which include strong typhoons, flooding, tsunamis, and earthquakes, among others, left almost 700,000 people dead in the affected areas. Over the same period, the Philippines experienced at least 181 disasters, which is the third among the greatest number of disaster events recorded globally, next to China and the United States, where at least 286 and 212 disasters were recorded, respectively. (UNISDR, n.d.)

Among those greatly affected by these disasters are schools, which, in turn, affect the safety and well-being of their users – the students, teachers, and other stakeholders. At the global scale, Hurricane Katrina closed down 700 school buildings in the United States in 2005 due to flooding and cost the government US$2.8 billion to accommodate displaced students. In 2010, two separate earthquakes destroyed and/or damaged 80 percent of schools in Port-au-Prince, Haiti, and more than 3,000 schools in Chile. The 2011 East Japan tsunami left 900 school buildings either destroyed or severely damaged, while the 2004 Indian Ocean tsunami left 15,000 students without school buildings. (UNESCO, et.al., 2015)

Typhoons that hit the Philippines over the last two decades have caused damage to school facilities. In total, 13 typhoons have caused PhP 8.061 billion in combined damages to schools from 2006 to 2016 alone, according to reports from the National Disaster Risk Reduction and Management Council (NDRRMC), with the highest damages to schools detailed in Table 1.

Table 1. Highest damages caused to schools by typhoons

Year	Typhoon	Damage to Schools
2006	TY Reming	P1.828-billion
2012	TY Pablo	P1.261-billion
2008	TY Frank	P1.092-billion
2016	STY Lawin	P660.125-million
2010	STY Juan	P376.247-million
2013	STY Yolanda	P174.077-million (Southern Luzon only)

On the other hand, tectonic earthquakes have also caused damage to schools. The 7.2-magnitude earthquake in Bohol in 2013 resulted in PhP 423.050 million worth of damage to schools (NDRRMC, 2013a), while the Magnitude 7.7 earthquake in Guiuan, Eastern Samar, caused around PhP 14 million worth of damage. A landslide in Guinsaugon, Southern Leyte, has also wiped out an entire elementary school, taking the lives of more than 200 elementary school students and six teachers (CDP, 2011).

Considering the impacts of disasters on schools and other educational facilities, policymakers at the global level have recognized the need to protect and strengthen critical public facilities and physical infrastructure, including schools, through proper designing, retrofitting, and rebuilding to ensure resilience to hazards. The HFA was adopted in 2005, and the succeeding Sendai Framework for Disaster Risk Reduction (SFDRR) was adopted in 2015, which emphasized the need for member-states to focus on implementing structural, non-structural, and functional disaster risk prevention and reduction measures for critical facilities, including schools (UN, 2015).

The Comprehensive School Safety (CSS) Framework was also adopted to operationalize the HFA and SFDRR priorities to ensure the disaster resilience of schools. The CSS focuses on three pillars, such as safe learning facilities, school disaster management, and risk reduction and resilience education, in order to produce a multi-hazard risk-sensitive educational management information system and evidence-based educational sector policy and management (UNISDR, 2017). While there have been guidance notes and roadmaps that were formulated to further put into force the CSS pillar on safe learning facilities, assessments of HFA implementation until 2013 have been focused on the integration of disaster preparedness and response in the school curriculum and less on the mainstreaming of disaster risks and hazards in school planning and construction (UNISDR, 2013).

The concept of safer schools planning and construction has since then been floated upon the formulation and adoption of the CSS and the operationalizing guidance notes and roadmaps. Among others, particular emphasis is given to the need for improved stakeholder involvement in the process of collaborative planning. However, limited attention is given to the assessment of stakeholder participation in pursuing disaster-sensitive school planning and construction. In the Philippines, the Department of Education (DepEd) is responsible for projecting enrollments, generating school site and building design plans, and implementing the school building program, with the support of the Department of Public Works and Highways (DPWH). On the other hand, local government units (LGUs) are mandated to undertake local planning activities, including comprehensive land use planning (CLUP) and zoning determination, enactment of local building and construction regulations, and local investment programming.

Several reports and publications in the United States noted that a certain level of disconnect that exists between school and city planning, resulting in little or no collaboration, has been affected by the independent operations of schools' divisions and local governments brought about by their respective sets of rules, procedures, and leaderships (Vincent, 2009; Lees, et al., 2008; ICMA, 2008; CCS, 2007; MAP, 2007; Salvesen, et al., 2006; Torma, 2004), thus failing to recognize the opportunity for information sharing and a more comprehensive and integrated spatial and development planning at the local level. The missed opportunity for collaborative planning should have facilitated the consideration of DRRM provisions, a crucial input for the two spatial planning systems.

2. Safer Schools

A safe school is defined as one that is "able to withstand extreme events without collapsing, where there is low risk to loss of life, and occupants can exit safely in the event of extensive damage to the building" (WB, et.al, 2017). In terms of good engineering practices, one can be considered a safe school if assessments in terms of hazards and site have been undertaken to influence the proper building and construction methodology that will be employed.

On the other hand, safer schools are those that were planned, designed, constructed, and maintained to be resistant to known hazards. This definition takes into account the consideration and anticipation of existing hazards, where students and other occupants of the school should be protected through safer construction techniques and a common understanding of safety among the users of the school. In times of emergencies and disasters, a school is considered safe if it does not sustain heavy damage and can be used as a shelter during and immediately after anticipated hazards (UNESCO et al., 2015).

At the international level, the adoption of the HFA 2005-2015 in Japan was the first and landmark international policy instrument that brought the need to strengthen the physical infrastructure of schools into the spotlight (UNISDR, 2007). The SFDRR 2015-2030 was adopted in response to the learning and gaps in the implementation of the HFA and to provide a post-2015 framework for DRR with seven defined global targets. However, it does not contain sanctions should state parties fail to attain said targets (Deeming, 2017).

The adoption of the HFA and subsequently the SFDRR triggered the formulation of various regional policies and declarations that will operationalize the

action steps based on localized contexts. This includes the Beijing Action for Disaster Risk Reduction during the 1st Asian Conference on Disaster Reduction (ACDR), the Ahmedabad Action Agency for School Safety, the Bangkok Action Agenda on School Education and DRR, the Delhi Declaration on DRR during the 2nd ACDR, and the Panama Declaration on Disaster Risk Reduction in the Education Sector.

3. Comprehensive School Safety Framework

To operationalize the global objective of boosting the disaster resilience of schools, the Comprehensive School Safety (CSS) Framework was adopted in 2014. The goals of the CSS include: 1) the protection of students and educators from death, injury, and harm in school; (2) the planning for continuity of education through all expected hazards and threats; (3) the safeguarding of education sector investments; and (4) the strengthening of risk reduction and resilience through education. To achieve these goals, the CSS rests on the following pillars:

a. Safe Learning Facilities – includes safe site selection, compliance with building codes, formulation of disaster-resilient designs and performance standards, continuous builder training, construction supervision, quality control, and remodeling and retrofitting of existing facilities, among others.
b. School Disaster Management – involves assessment and planning, provision of physical and environmental protection, response skills, the establishment of participatory institutional mechanisms, formulation of an educational continuity plan, standard operating procedures, and contingency plans, among others.
c. Risk Reduction and Resilience Education entails the integration of DRRM into the formal curriculum, the formulation of consensus-based key messages, the conduct of teacher training and staff development, as well as extracurricular and community-based information and education, among others.

The CSS, anchored on planning that involves multi-hazard risk assessment, should be part of the overall educational management information systems and disaster management plans from national to local levels as a basis for an evidence-based analysis of educational sector policy and management (UNISDR, 2017).

In 2016, the Association of Southeast Asian Nations (ASEAN) Committee on Disaster Management adopted the CSS as the major pillar of the ASEAN Common Framework for Comprehensive School Safety as part of the ASEAN Safe Schools Initiative. Upon contextualization and operationalization of the Global CSS Framework, the ASEAN Framework's primary goal under Pillar 1: Safe Learning Facilities is to make "schools a safer place for learning to safeguard school communities from death and injuries due to structural collapse, damage, or malfunctions" (ASEAN SSI, 2016).

Anchored on the first pillar of the CSS Framework, the Roadmap for Safer Schools in 2017, which aims to integrate safety into school infrastructure through mainstreaming of disaster risks in the school infrastructure project cycle from planning, design, construction, operation, and maintenance. The Roadmap gave particular attention to the important role of school buildings in the overall resilience of communities. As schools also serve as community refuges, distribution centers, or resource centers after a disaster, their safety and resilience should be given priority (WB et al., 2017).

The Roadmap uses a six-step framework that involves the diagnosis and analysis of disaster risks, identification of opportunities, and the engagement of investment for safe schools. The diagnosis portion comprises the first three steps, namely: 1) school infrastructure baseline; 2) construction environment; and 3) financial environment. The succeeding steps involve disaster risk analysis, the determination of safer school investment opportunities, and the engagement of financial institutions, as shown in Figure 1.

Source: WB, GFDRR, and ARUP 2017.

Figure 1. Steps in Safer Schools Planning under the Roadmap for Safer Schools

This study utilized the Roadmap as a diagnostic tool for the sampled school, guided by the suggested activities for each step, as detailed in Table 2. Step 5 on Opportunities was used to identify gaps and propose appropriate interventions, while Step 6 on Bank Engagement is not applicable in the present case.

Table 2. Detailed Activities under the Roadmap for Safer Schools

Step	Activities
School Infrastructure Baseline	Identification of natural hazards affecting school infrastructure, inventory of existing infrastructure, and demand for additional facilities
Construction Environment	Identification of planning and building regulations, mapping of stakeholders, and identification of procurement and construction processes/technology, if any
Financial Environment	Identification of historical, current, and planned investments for schools' infrastructure and funding mechanisms
Disaster Risk Analysis	Undertaking hazard analysis, analyzing exposure, and vulnerability to disaster risks
Safer Schools Investment Opportunities	Consideration of opportunities to address planning and design gaps, regulatory framework improvements, and implementation process adjustments

Source: WB, GFDRR, and ARUP, 2017.

4. Philippine Initiatives for Disaster Risk Reduction in Education

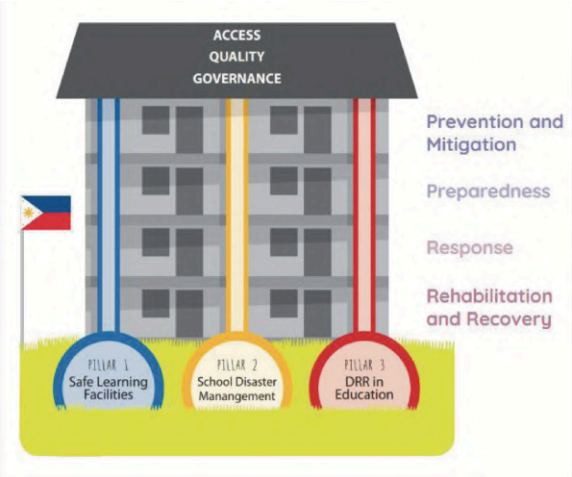
Republic Act No. 10121, or the "Philippine Disaster Risk Reduction and Management Act of 2010", was enacted to provide the policy framework to strengthen the Philippine DRRM System pursuant to the HFA. The law declared the state policy to mainstream DRRM and climate change in development processes such as policy formulation, socioeconomic development planning, budgeting, and governance of all agencies and instrumentalities of the government, including the education sector. The law also specifically provided for the integration of DRR education into the school curricula, as well as into the mandatory training of public sector employees.

The law also mandates the formulation of the National Disaster Risk Reduction and Management Framework, which shall guide the physical, social, economic, and environmental plans of communities and LGUs. The Framework for 2011-2028 envisions a "safer, adaptive, and disaster-resilient Filipino communities toward sustainable development." The said plan is divided into four mutually reinforcing thematic areas: 1) Disaster Prevention and Mitigation, 2) Disaster Preparedness, 3) Disaster Response, and 4) Disaster Rehabilitation and Recovery (NDRRMC, 2011).

In September 2010, President Benigno S. Aquino III issued Administrative Order No. 1 directing LGUs to adopt and use the DRR Guidelines formulated by the National Economic and Development Authority (NEDA) to ensure the integration of DRR in the local development planning process, including, among others, the proper siting of development undertakings and the identification of areas that are vulnerable to natural disasters.

On the part of DepEd, it formulated its Disaster Risk Reduction Resource Manual in 2008 as a guide to ensure the safety of schools during disasters. Anchored on the HFA, the manual provides mechanisms to analyze the condition of the school, identify potential hazards/threats, and suggest DRRM actions, including feedback instruments (DepEd, 2008). It has also integrated DRRM in school construction by updating its educational facilities manual in 2010 to mainstream DRRM in policies and standards for physical facilities planning, management, monitoring, and evaluation (DepEd, 2010). Further, it established its Disaster Risk Reduction and Management Office (DRRMO) to spearhead the establishment of mechanisms to prepare, guarantee protection, and increase the resilience of DepEd constituents during disasters, consistent with the provisions of Republic Act No. 10121 (DepEd, 2011b).

The Comprehensive DRRM in Education Framework was also adopted in 2015, institutionalizing structures, systems, protocols, and practices of DepEd offices and schools for DRRM, aligned with the four thematic areas of the Philippine DRRM Framework and the three education outcomes (i.e., Access, Quality, and Governance) as shown in Figure 2. The DRRM interventions under the Framework are further categorized using the three pillars of the CSS.



Source: DepEd, 2015

Figure 2. Comprehensive DRRM in Education Framework

Looking closer at the aspect of safe learning facilities, it can be observed that the DepEd framework primarily dealt with non-structural activities and interventions as it focuses its efforts at the school level. The DepEd Comprehensive DRRM Framework, although aligned with CSS, concentrated on the establishment of temporary learning spaces that can be used in times of actual disasters and/or emergencies, and not mainly on improving the structural integrity of new and existing classrooms and school buildings.

It is through a relatively older issuance where DepEd initiated actual structural interventions to ensure school safety through the Project ASSIST (Assessment of Schoolbuildings' Structural Integrity and Stability), an initiative that was initially launched in 2006 and reactivated in 2011 to conduct an inventory of school buildings to ensure hazard-free learning environments (DepEd, 2011a). However, Project ASSIST only dealt with the structural integrity of existing buildings that may be subject to repair and retrofitting. In recent years, data on the building profile have been captured through the National Inventory of DepEd School Buildings, which started in December 2014 (DepEd, 2014).

5. Philippine School Building Planning and Construction Process

The current setup that provides for the shared responsibility between DepEd and DPWH in the implementation of the National School Building Program (SBP) stems from the enactment of Republic Act No. 7880 on February 20, 1995 that provides for the fair and equitable allocation of the then Department of Education, Culture and Sports (DECS) budget for capital outlay based on student population and actual classroom shortage. Under the law, funds allocated for the construction, rehabilitation, replacement, completion, and repair of school buildings shall be directly released to and administered by the DPWH based on the approved work program of DECS (now DepEd).

While DepEd and DPWH have been implementing the SBP for years, with DepEd issuing its annual guidelines for SBP implementation pursuant to specific and special provisions of the General Appropriations Act (GAA) for each particular year, it was only in July 2003 when the two agencies entered into a Memorandum of Agreement (MOA) that provides for, among others, a monitoring and assessment system for the DPWH-constructed school buildings. The said system was institutionalized through DepEd Order No. 77 (s. 2003), and was eventually amended by DepEd Order No. 94 (s. 2011) when the Basic Educational Facilities Fund (BEFF) was institutionalized under the GAA to fund the SBP, furniture, and electrification programs.

The latest guidelines on the implementation and utilization of the BEFF were promulgated in July 2017 through DepEd Order No. 35 (s. 2017), which is anchored on the revised and updated MOA between DepEd and DPWH. The Agreement outlines the roles and responsibilities that each party has committed to undertake to ensure the implementation of projects funded through the annual BEFF, with DepEd mainly responsible for the identification of schools and DPWH as the engineering arm in charge of design, procurement, and construction (DepEd, 2017b).

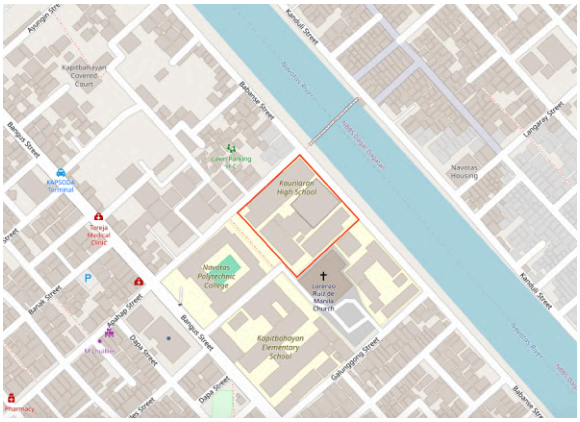
6. The Case of Kaunlaran High School in Navotas City

The City of Navotas is geographically located in the northwestern portion of Metro Manila, facing Manila Bay, and is exposed to some elements of risk, particularly those from typhoons, heavy monsoon rains, and tidal inundations. In general, all 14 barangays of Navotas are exposed to hazards that can be brought about by ground shaking, liquefaction, tsunamis, floods, severe winds, and storm surges (CPDO, 2016).

6.1. School Infrastructure Baseline

In terms of flooding, almost 90% of Navotas City is prone to high tides, especially given the worst-case scenario of an increased flood height level of two meters. An overlay of the flood hazard map reveals that around 20,000 individuals and 31 hectares of land will be affected in areas with high and very high susceptibility to flooding. For ground shaking, Navotas would generally experience a Low VIII to High VIII Intensity based on the 7.2 magnitude earthquake scenario as projected in the 2004 Metro Manila Earthquake Impact Reduction Study. Although there is low susceptibility when it comes to ground rupture due to the absence of fault lines within the city, it remains at risk from other earthquake-induced hazards like ground shaking, liquefaction, and tsunamis. Using a 5.5-meter inundation scenario, the entire city is exposed to the risks and hazards that a tsunami can bring, and it has a high susceptibility to liquefaction following an earthquake (CPDO, 2016).

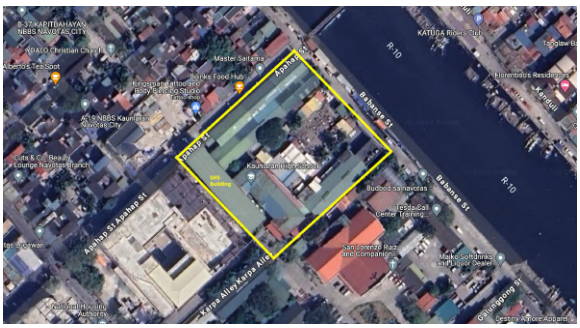
Kaunlaran High School (KHS) is an existing junior high school located in Barangay North Bay Boulevard, which also offers Senior High School (SHS) classes. It is the biggest secondary school in the City of Navotas in terms of enrollment, with a total of 3,915 students as of School Year (SY) 2016-2017 from Grades 7 to 11. It is situated within the reclaimed Dagat-Dagatan Lagoon, the resettlement site chosen for the informal settlers affected by the Foreshore Development Program in the 1970s. KHS is located beside other educational institutions, namely Kapitbahayan Elementary School and Navotas Polytechnic College, as well as the San Lorenzo Ruiz and Companion Martyrs Parish Church. As shown in Figure 3, one side of KHS rests beside the Navotas River.



Source: Open Street Map

Figure 3. Location Map of Kaunlaran High School

The KHS SHS Building, a 4-storey, 20-classroom building, was constructed within the remaining open space of the school to cater to its SHS Program offering. The aerial view of KHS with the completed SHS building is shown in Figure 4.



Source: Google Maps

Figure 4. Aerial View of Kaunlaran High School

There are five existing buildings at KHS, with a total classroom capacity of 36, prior to the construction of the SHS building. The majority of the classrooms are located in the DPWH and DepEd buildings, which were constructed in 1995 and 2009, respectively. The latest repairs were made in 2013, covering the replacement of pipes, damaged roofs and ceilings, and the rehabilitation of computer/e-classrooms, as detailed in Table 3.

Table 3. Inventory of School Buildings and Repairs at KHS

Building Description	Capacity	Repair/s Made
SEDP Building Built in 1993	2 storeys, 5 classrooms	- Repair and replacement of the damaged roof and rehabilitation of the computer laboratory (2003) - Rehabilitation and improvement of E-classroom (2003)
DPWH Building Built in 1995	2 storeys, 16 classrooms	Installation of additional pipes and rehabilitation and improvement of 4 makeshift classrooms (2003)
Sandoval Building Built in 2005	1 storey, 1 classroom	
Cookery Room/ MUTYA Built in 2005	1 storey, 2 classrooms	Repair of roofing and rehabilitation of the ceiling (2008)
DepEd Building Built in 2009	1 storey, 12 classrooms	Installation of additional pipes (2013)

Source: KHS, 2015

Given these facilities, the school accommodates 3,700-4,000 students prior to the implementation of the SHS Program, or a classroom-to-student ratio (CSR) ranging from 1:103 to 1:111, contrary to the DepEd standard CSR of 1:45 established under Republic Act No. 7880. Upon completion of the SHS Building, the CSR dropped to 1:85, but still above the DepEd standard, thus the need for double shifting.

Based on its enrollment, the DepEd Educational Facilities Manual (2010) provides that the minimum size of the school site should be at least 30,000 square meters; however, its current site actually measures less than 10,000 square meters (DepEd SDO Navotas, 2018).

According to Engr. Noel Ecle (2018), Division Engineer of DepEd – SDO Navotas City, KHS, was originally allotted a 3-storey, 12-classroom building for its SHS Program and a separate 4-storey, 8-classroom building as an addition for the existing Junior High School (JHS) classrooms. However, upon validation of the available buildable site, the DepEd and the DPWH resolved to request the combination of the two requested buildings to form a 4-storey, 20-classroom school building.

6.2 Construction Environment

Before the implementation of the SHS Program, the DPWH adopted the existing Detailed Engineering Designs (DEDs) for School Buildings, which were approved in 2014 as the base design for the KHS Building. It was only in March 2017 that the standard DEDs were updated to make the structures more resilient to calamities. Modifications were then made to the 2017 DEDs to include other layout options, depending on the facilities that would be hosted by the school building (i.e., Home Economics, Computer, or Science Laboratories).

The 2018 Updated Calamity Resilient Design is expected to withstand wind velocities up to 350kph and earthquakes up to Magnitude 8 to 9, based on simulations conducted by the DepEd and DPWH, with the support of the Japan International Cooperation Agency.

Source: DPWH, 2018

Figure 5. Perspective of the Modified Standard DPWH-DepEd Four-Storey, 20 Classroom School Building

Although the KHS SHS building was designed in accordance with the 2014 standards, it can be observed that improvements were already incorporated in line with the 2017 updated DEDs and 2018 calamity-resilient designs to strengthen the structural capacity of the buildings, particularly in terms of wind load and concrete strength, in anticipation of possible earthquakes. The wind load capacity of the 2018 modified design was increased to 270 kph for buildings constructed in areas with closely spaced obstructions and 340 kph for unobstructed areas, compared to the 2017 updated standard design with a 250 kph wind load.

In terms of concrete strength, the designed minimum expected concrete strength was raised for the uniform template designs, and the prescribed column sizes were expanded throughout the building. The concrete will also be supported by stronger reinforcing steel bars, which now have higher prescribed design stresses compared to those in the 2017 design. The designed foundation of the building was also strengthened across the template designs by widening the breadth and the depth of the footing tie beams, notably for the design that can withstand a wind load of 340 KPH, to be supported by an increased number of reinforcement steel bars.

Another notable feature of the three different designs that has a positive effect in mitigating flood risk is the required minimum elevation above the ground, which is at least 0.325 meters as per the 2014 standard design and the 2017 updated design. The required minimum elevation is slightly reduced to 0.3 meters from the ground line in the 2018 calamity-resilient design. The widening of the stairways from 2.95 meters in 2014 to 3.25 meters in the 2018 calamity-resilient design is also a welcome development that will have a positive implication for the disaster preparedness of the building, especially during evacuations (DPWH, 2014; DPWH, 2017; DPWH, 2018).

According to Engr. Barrister J. Reyes (2018), Chief of the Planning and Design Section of the DPWH DEO Malabon and Navotas Cities, since the standard design approved by DepEd and DPWH is implemented across the country, the only modification that the DPWH will accommodate in the design is the type of

foundation to be used in the building, which will be based on the result of the site-specific soil investigation reports commissioned by the DPWH and/or the DepEd, as well as the ground floor line elevation based on the historical flooding information. In the case of KHS, the ground floor line elevations were further raised to 1.00 meter, respectively, as compared to the required 0.325-meter ground floor line elevation under the 2014 standard designs.

On the other hand, acquisition and titling of lands for public school purposes are primary responsibilities of the LGU (DepEd, 2010). As to the site of the SHS buildings, Dr. Zenaida SD. Singson (2018), the former Principal of KHS, highlighted that the LGU played a significant role in acquiring the remaining open space of the Dagat-Dagatan Resettlement Site to pave the way for the construction of the SHS Building, including the acquisition of adjacent land for possible school expansion. She also disclosed that the LGU is closely working with the NHA to acquire an adjacent property as a site for the future expansion of KHS.

Aside from the standard design for the school buildings, all educational facilities shall also consider the parameters set under the Educational Facilities Manual of DepEd and shall comply with all relevant regulatory instruments, including, among others, the National Building Code of the Philippines (NBC) as provided under Presidential Decree No. 1096, as amended, and the CLUP and Zoning Ordinance of the LGU where the school building is constructed.

Under the NBC, school buildings are classified under Division C-2 of the Educational and Recreation Occupancy classification and are subject to a zoning regulation of General Institutional for low-, medium-, or high-rise buildings/structures used for educational and other related activities. Meanwhile, the revised Educational Facilities Manual, issued by DepEd in 2010, which integrates DRRM in school construction, provides specific regulations for school siting/location, as well as building construction standards. Aside from the structural provisions lifted from the NBC, the Educational Facilities Manual provides that secondary schools should follow the required size of land based on the actual number of students, which KHS failed to comply as it is only situated in an area with less than 10,000 square meters, contrary to the minimum requirement of at least 30,000 square meters (DepEd, 2010; DepEd SDO Navotas, 2017).

On the other hand, the prevailing CLUP in Navotas at the time of the construction of the SHS buildings was the one approved on September 22, 2003, under Municipal (Zoning) Ordinance No. 2003-11. It is also worth noting that the City's CLUP was being reviewed and updated during the construction period. Although the updated Zoning Ordinance of the City does not provide any significant amendments or provisions regulating institutional zones, the provision for overlay zones was noted, particularly for two major disaster risks to which the city is susceptible – flooding and liquefaction. In general, the 2016 Zoning Ordinance provides that buildings shall be made flood-proof by employing any of the following:

- Raising the lowest floor line at/or above the Flood Protection Elevation (FPE) as determined by the DPWH, either through fill or by using stilts;
- Providing roof decks that can be used for evacuation purposes, if applicable;
- Building utility connections, such as those for electricity, potable water, and sewage, shall be located at elevations higher than the FPE;
- Natural drainage patterns should not be altered; and,
- Use sustainable urban drainage systems to include rainwater storage tanks and green roofs that can decrease the flow and make productive use of stormwater runoff (City of Navotas, 2016).

For areas susceptible to/or with a risk of liquefaction, the 2016 Zoning Ordinance requires the conduct of soil testing to verify soil suitability and the application of appropriate soil mitigation and structural mitigation methods, such as mat foundations or piles, if necessary (City of Navotas, 2016). Although the standard designs and procedures involved in the school building program generally satisfy these new provisions of the updated zoning ordinance, the introduction of the provisions on overlay zones was not directly influenced by the mainstreaming of disaster risks in educational facilities planning by DepEd and DPWH. Rather, the introduction of the provisions on overlay zones was primarily prompted by the results of the risk and vulnerability assessments made by the LGU under the CDRA. Engr. Reyes (2018) maintains that even in the absence of the provisions on overlay zones in the 2016 Zoning Ordinance, the prescribed measures were observed as part of the standard operating procedures in the planning and designing of school buildings, including that of KHS, which was designed before the enactment of the 2016 Zoning Ordinance.

Comparing national planning and building regulations with local zoning ordinances is imperative, as the local zoning ordinance provides the context within which the plans and designs are drawn according to the local setup. In the case of the sample SHS buildings, while it can be seen that the designs mostly complied with the structural elements of the regulations, the modifications of the ground floor line elevation and the type of foundation are the significant compliance with the hazard/risk element given the overall profile of city as recognized by the introduction of the overlay zones in the revised Zoning Ordinance. The consideration of local zoning ordinances is necessary to ensure that building and zoning regulations are attuned to local development patterns and risk profiles, especially when the NBC, which was adopted in the early 1970s, is still being reviewed to incorporate measures that will ensure that buildings throughout the country can withstand strong earthquakes and typhoons (Marasigan, 2017).

A cross-examination of KHS's actual compliance and/or non-compliance with existing planning, building, and zoning regulations reveals that it failed to meet the

prescribed land area and open space requirements set by the DepEd for secondary schools. This is primarily due to limited land in urban and urbanizing areas allocated for schools and similar facilities, which prompted Navotas City Mayor John Reynald M. Tiangco to personally request the DepEd in 2015 to ensure that all succeeding school building projects must be at least four storeys to maximize the available space, given the limited land in the city. DepEd eventually granted this and has affected the design, planning, and budgeting of all subsequent school buildings in the city.

However, the vertical development and construction of schools in the city, including the KHS SHS buildings that followed the standard DPWH designs, led to the construction of buildings that exceeded the building height limit (BHL) provided under both the NBC and the Local Zoning Ordinance. The KHS SHS building has a building height of 16.30 meters above the natural ground line, which is beyond the prescribed BHL of 15.00 meters under the NBC and the local zoning ordinance. Interestingly, even the 2018 Calamity Resilient Designs for four-storey classroom buildings are pegged to have a BHL of 16.05 meters, still exceeding the BHL provided under the NBC.

Despite these glaring variances in building height and open space requirements that will also have an effect in the mobility of building occupants in times of emergencies, existing DepEd and LGU regulations were not revisited due to the absence of a post-design review in cases where the prescribed conditions are not met, especially in urban and urbanizing areas where land is limited and vertical development is the last option to meet the demand for school buildings. Moreover, LGU informants contend that since their participation in the school building design and construction process is minimal, they usually defer to the expertise of engineers from DepEd and DPWH, who are primarily involved in the project. Engr. Rufino M. Serrano (2018), City Planning and Development Officer and concurrent Zoning Administrator, further disclosed that it was only recently that the City Mayor instructed him to look into the spatial implications of the school building program, considering the issue of limited land available for further expansion and development activities in the city. However, this initiative was ad hoc in nature and was not institutionalized in any of the regulatory or development instruments of the city.

6.3 Financial Environment

Another important consideration for safer school planning is the availability of resources for disaster-resilient construction and repair, as well as the retrofitting of existing buildings. In the Philippines, the budget for the SBP, which was eventually covered by a more comprehensive BEFF beginning Fiscal Year (FY) 2011, was appropriated as a lump-sum fund under the annual GAA. The release of the same to the respective implementing units [i.e., DEOs of the DPWH] is made upon submission of the final list of priority schools jointly validated by DepEd and DPWH (DepEd, 2017b; Pangan, 2018).

DepEd appropriated between P1 million and P2 million annually from FY 2000 to FY 2012 for its SBP/BEFF, representing roughly less than half of 1% of total new appropriations under the GAA of the given years. It was only beginning FY 2013 when allocation for the SBP/BEFF gradually increased both in nominal and percentage share terms, breaching the 2% share mark in FY 2014, alongside a new special provision that requires DepEd to submit to Congress plans and targets for Basic Educational Facilities, taking into consideration the K-12 Basic Education Program. The term "master plan" was then used, beginning in FY 2016, and has continued up to the present GAA.

Engr. Pangan (2018) further noted that while the law requires the submission of plans for educational facilities, the first 5-year Comprehensive School Facilities Development Plan (CSFDP) was only formulated in 2018 and will cover projected constructions until FY 2022. At the onset of the construction of the SHS buildings in 2014, Engr. Pangan revealed that no specific guiding framework was formulated, similar to the CSFDP 2018-2022 that guided the SBP, except for the Secretary of Education's commitment to build the initially identified more than 6,000 SHSs in preparation for the roll-out of Grade 11 by 2016.

On the other hand, Engr. Pangan clarified that the allocation from the BEFF budget can only be used for the construction of the school building itself, including other fixtures and furniture. DepEd has a very limited appropriation for land acquisition, consistent with the provision that LGUs shall acquire sites for use in public schools. It was only in FY 2015 when the DepEd was given a specific appropriation for school site acquisition, although it is a very small fraction of what is being appropriated for the BEFF annually. Conversely, since the enactment of the Enhanced Basic Education Act in 2013, the allocation for the repair and rehabilitation of classroom buildings from the BEFF has increased, accounting for around 4.20 to 6.45% of the total BEFF budget for the given fiscal year.

The trend is attributable to the Special Provision on the 2018 BEFF, which states that the DepEd will implement a "Repair All Policy" beginning FY 2018. The new policy allocated funds for the repair and rehabilitation of classroom buildings, as well as for multi-purpose buildings, gymnasiums, stages, courts, fences, walkways, and other non-classroom facilities. Meanwhile, LGUs also provide financial resources for educational facilities through the share of the special education fund (SEF) from real property taxes (RPT). However, its use is not limited solely to the construction and repair of school buildings.

In the City of Navotas, an examination of the Local School Board (LSB)-approved SEF budget of the city from FY 2015 to 2018 showed that the share of allocations for repair and maintenance and construction of new school buildings ranges from 16 to 26% of the total SEF budget (or an average of 17.32%). It was also noted that in 2015, funds for land acquisition were set aside, while the entire allocation for FY 2018 was

allocated for the construction of new school buildings.

Meanwhile, the Commission on Audit (COA) reports noted that funds amounting to P30.949 million, allocated from the SEF for the construction and repair of various school buildings and educational facilities in the City of Navotas, remained unimplemented as of 31 December 2017. This includes a P8-million provision for the acquisition of a school site in 2015, a P1.5-million provision for the construction of a classroom in 2016, and a P21.449-million budget for the construction and repair of classrooms in 2017 (COA, 2017). Despite this, the City of Navotas continues to receive portions of the BEFF on an annual basis.

Since schools are considered critical infrastructures, another local fund that can be tapped to mitigate the potential adverse impacts of disasters is the Local Disaster Risk Reduction and Management Fund (LDRRMF), created pursuant to Republic Act No. 10121. The LDRRMF is equivalent to at least 5% of the estimated LGU revenue for the year, which should be set aside for disaster management activities. The LDRRMF is further divided into two components: 30% for the Quick Response Fund (QRF) and the remaining 70% for disaster prevention and mitigation, preparedness, response, rehabilitation, and recovery (NDRRMC, DBM, and DILG 2013). All unexpended/unobligated balance LDRRMF at the end of the fiscal year is transferred to a Special Trust Fund, which can be used for DRRM activities within the next five years before it is reverted to the General Fund (COA, 2012).

According to existing guidelines on the utilization of the LDRRMF, the 70% component and the accumulated prior years' unexpended balances may be used for disaster prevention and mitigation activities, including hazard-resilient construction to reduce the vulnerability and boost the resilience of schools as critical facilities during disasters. The same funding may also be used for the construction and rehabilitation of infrastructure facilities damaged during disasters.

However, a review of the investment and expenditure pattern of the LDRRMF of Navotas City revealed that the operation of the flood control system, the purchase of various equipment, and the repairs and maintenance of various assets are the top three expenditure items. According to local government informants, the LDRRMF was not tapped for the repair and retrofitting of school buildings, as these expenditure items are commonly shouldered by the SEF when necessary. The focus on the operation of the flood control system is based on the priority development intervention identified by the city to mitigate the overall flood risk in the city. However, even if the focus on the flood control system is maintained, there is still enough room to allocate funds for other purposes such as increasing the resilience of other critical facilities in times of disaster since the actual obligation/utilization rate of the LDRRMF is decreasing over the last seven years, with an average annual obligation/utilization rate of 65.08% of the current year appropriations as shown in Table 4.

Table 4. COA-Audited Utilization of LDRRMF Allocation of Navotas City from 2011 to 2017

Year	Current Year LDRRMF Allocation	Obligation/ Utilization	% Utilization
2011	30,551,707.0	26,528,579.0	86.83%
2012	30,230,339.0	25,920,000.0	85.74%
2013	31,007,085.0	22,786,549.0	73.49%
2014	33,847,468.0	18,483,579.0	54.61%
2015	40,919,437.0	26,080,972.0	63.74%
2016	44,122,987.0	29,547,962.0	66.97%
2017	47,766,155.0	11,534,188.0	24.15%
		Average	**65.08%**

The decreasing annual obligation/utilization rate can be attributed to the non-utilization of the 30% QRF earmarked annually, particularly in FY 2016 and 2017, in addition to the non-utilization of the full allocation for the remaining 70% DRRM Fund. The unexpended balance of the LDRRMF, which accounts for around 36.71% of the prior year's appropriations, is treated as a Special Trust Fund that can be utilized for other DRRM activities for the next five years. The COA, in its Annual Audit Report for Navotas City, also flagged the limited focus of LDRRMF utilization for FY 2017, where it was observed that LDRRMF utilization was limited to one hazard under the Disaster Prevention and Mitigation area of the NDRRMP. The COA further noted the absence of a long-term DRRM plan that would ensure the alignment of DRRM activities with the city's priority development agenda, as espoused in its development plans and investment programs (COA, 2018).

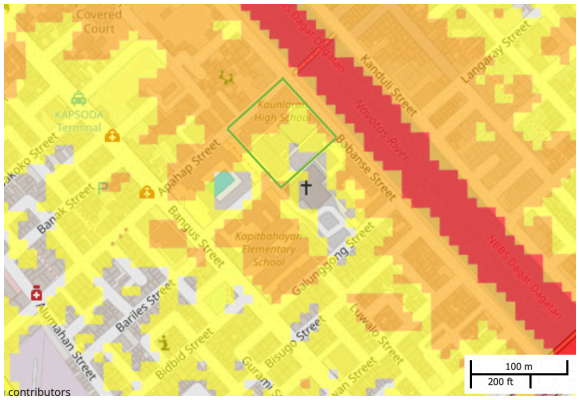
Although both the SEF and LDRRMF can be tapped for the construction and rehabilitation of disaster-resilient school buildings, studies and references are limited with regard to the actual utilization of such funds for the construction and repair of school buildings nationwide.

6.4. Disaster Risk Analysis

The City Government, through the City Planning and Development Office, generated hazard and risk maps as a result of the Climate and Disaster Risk Assessment (CDRA) processing that is mainstreamed in the updating of Navotas City's Comprehensive Land Use Plan (CLUP). Among the generated maps are flood risk maps, storm surge hazard maps, liquefaction hazard maps, and strong winds hazard maps as of 2016. These are available to the public and form part of the baseline information that can be considered in planning for development, including the construction of school buildings. Aside from the actual hazards of the locality, the CDRA process also considered the actual exposure, sensitivity/vulnerability, and adaptive capacity of both the population and infrastructure in relation to the identified hazards to estimate the risk level and identify/prioritize risk management options and interventions (HLURB, 2015).

According to the 25-year flood hazard map generated by LIDAR shown in Figure 6, KHS is exposed to medium and high flood risks, particularly in the areas

near the Navotas River. Meanwhile, the Flood Risk Map generated by the City Government of Navotas provides that the area of Barangay NBBS, where KHS is located, has low flood risk despite having high to very high susceptibility and high to very high likelihood of occurrence of flooding due to the presence of a 'Bombastik' pumping station and river wall along the riverside. Meanwhile, KHS is not exposed to any hazard from storm surge.



Source: LiDAR Portal for Archiving and Distribution
Figure 6. 25-year Flood Hazard Map Overlay on KHS

On the part of the national government, the DPWH DEO utilized its own historical flooding data and maps provided by other national government agencies, such as the Department of Science and Technology and the National Mapping and Resource Information Authority. For liquefaction, the DPWH DEO commissioned site-specific soil investigations to determine the soil condition that would have implications for the actual foundation to be designed by the DPWH for the school building. In the case of KHS, the actual soil investigation report revealed that the grounds have an extremely loose silty/clayey sand layer that will require additional engineering intervention, such as matte footing and micro-filling (ABP Drilling and Geotechnical Services 2014), which is attributed to the nature of the location as a reclaimed site. Although the construction of the school building itself follows standard design and costing, Engr. Reyes (2018) disclosed that the type of foundation predominantly affects the final cost of the proposed school building, as mat footing and micro-filling can account for as high as 20% of the total project cost.

6.5 Institutional Mechanisms - Safer Schools Investment Opportunities

On the part of DepEd – SDO Navotas City, Engr. Ecle (2018) reported that even before the list of school buildings for funding is finalized, it is presented, though informally, to the LGU to avoid duplication of funds and to determine whether there will be infrastructure projects within the area of the school that might affect the smooth implementation of the project.

On the part of the DPWH, Engr. Reyes (2018) confirmed that they also present, though informally, the tentative lists of schools for construction to the LGU to avoid conflicts in the scope of work with existing projects. This process will also ensure that no other ongoing construction activities are taking place at the construction site, thereby avoiding the double handling of materials. Representatives from the LGU are also invited as observers in all stages of the procurement for school buildings.

Engr. Serrano (2018), for his part, noted that representatives from the DepEd – SDO Navotas City are invited in the regular planning exercises of the LGU including the updating of the CLUP, Comprehensive Development Plan (CDP) and Annual Investment Plan (AIP), to consider the inputs from DepEd – SDO Navotas City in the Social Development aspect of the said plans. However, considering the variance between the timeframe of the LGU and DepEd planning activities, not all school building programs are accurately and timely incorporated into the LGU plans.

Engr. Virgilio de Leon, Jr. (2018), City Engineer of Navotas, added that since the construction of school buildings follows a standard set of designs approved by the DPWH and the DepEd, the LGU does not usually submit adverse inputs on the plans whenever the same are presented to them during the early procurement activities, being one of the invited observers by the DPWH DEO. It is worth noting that in the construction of the KHS SHS Building, the plans and designs prepared by the Malabon and Navotas DPWH DEO were approved and concurred upon by Engr. Pangan of the DepEd Central Office - EFD. The LGU only requests the 'as-built' plans for inventory, insurance, and reference purposes in case of repair, maintenance, or installation of other utilities.

Dr. Singson (2018) recalled how the City Government assisted her in acquiring the open space of the Dagat-Dagatan Resettlement Site, adjacent to KHS, to cater to the SHS Building, which used to serve as a drive/walkway for residents heading to the San Lorenzo Ruiz and Companion Martyrs Parish Church. Engr. Serrano further disclosed that in an effort to decongest KHS, the City Government of Navotas has recently acquired an adjacent land (Venterdeck Property) from the National Housing Authority through a Deed of Exchange, which will then be offered to DepEd as a site for additional classrooms in KHS. Furthermore, to maximize the existing school sites, Engr. Serrano (2018) recalled that the Mayor had requested the DepEd – SDO Navotas City to submit the Site Development Plans to the LGU, in addition to the usual Construction Work Program furnished to the LGU.

On top of this, Engr. Reyes (2018) highlighted that the DPWH also requests the assistance of the LGU for the immediate turnover of the ownership documents of the site and the clearing of informal settlers occupying the proposed site. The support of the LGU is also essential for the condemnation and demolition of old school buildings whose sites will be used for future construction, as this requires prior approval from the Local Building Official. The LGU also plays a mediating

role whenever domestic or internal issues arise before, during, or after the construction of the school building.

Although site acquisition is primarily a responsibility of the LGU, Engr. Pangan (2018) mentioned cases where issues arise during the tenure of the school site due to sudden changes in priority by the local administration. There are instances where the LGU intends to revoke the Deed of Usufruct that it previously issued in favor of DepEd, in order to utilize the land for other public purposes. Clearly, the commitment and support of the LGU in terms of land acquisition and provision are necessary for the success of any school building project. Engr. Pangan further noted that in FY 2015, approximately P500 million worth of funds for SHS buildings were reverted to the National Treasury due to the unavailability of land for school buildings.

In the City of Navotas, the LGU also complements the efforts and funding for the repair, rehabilitation, and maintenance of schools through the SEF. In the case of KHS, Dr. Singson (2018) noted that since the approved funding from the BEFF includes only the electrical connections within the building itself, the upgrading of the service entrance of the electrical connection was requested and funded by the LGU through the SEF. Engr. De Leon (2018) added that other requests, such as grilles for old school buildings, fences, entrance gates, and other minor repair works, are also accommodated under the SEF and are designed, estimated, and implemented by the City Engineering Office.

The points of collaboration among the DepEd, DPWH, and the LGU in the process of safer schools planning based on the informants are summarized in Figure 7. However, some of these points of collaboration appear to happen in an informal manner and are not required under existing planning and regulatory instruments.

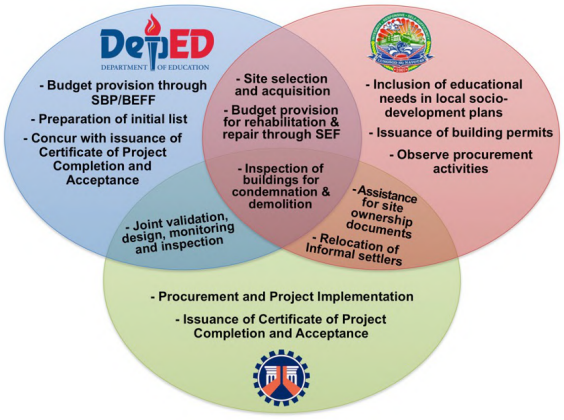


Figure 7. Points of collaboration between DepEd, DPWH, and LGU on safer schools planning

On the part of DepEd, the established School Governing Council (SGC) plays an integral role in charting the future paths of the school, including the improvement and development of educational facilities as reflected in the School Improvement Plan (SIP) and the School Mapping Exercise (SME). The SIP process includes the assessment of the current situation of the school, from which proposed improvements will be based. The SME, on the other hand, involves diagnosing the current demand and existing supply, as well as developing proposals based on projections and future requirements. Both the SIP and the SME serve as inputs for the Division Education Development Plan (DEDP), which is mandated by the Government of Basic Education Act of 2001 (Republic Act No. 9155) to be regularly prepared by the SDS as a medium-term plan for the key educational reform agenda.

In the DEDP for SY 2017-2022, one of the 14 key targets of the SDO-Navotas City is the adoption of a single-shift scheme to ensure adequate learning spaces and eliminate classroom congestion. Among other things, the Plan aims to build an additional 659 classrooms, with at least 10 schools implementing a single-shift scheme by 2022. The DEDP 2017-2022 also emphasizes the importance of greater cooperation and linkages of the DepEd with the DPWH and the local government of Navotas to achieve the target which includes the following strategies: (1) Oplan Demolish Makeshift Classrooms; (2) building replacement to 4-storey buildings; (3) upgrading of electrical and water and sanitation facilities; (4) site development of schools; (5) provision of ancillary services; (6) schools' security enhancement; and, (7) establishment of new schools (SDO-Navotas City 2017). However, the DEDP 2017-2022 did not elaborate on the spatial implications of these strategies.

Meanwhile, the LGU formulates several socioeconomic and spatial development plans where the state of education in the locality is measured and considered for planning purposes. Under the long-term CLUP, education is a sub-sector of the social aspect of sectoral studies, where data on school types and facilities are considered, juxtaposed with historical enrollment, student-teacher, and student-classroom ratios to generate projected facility requirements. In terms of its spatial implications, existing guidelines provide that the CLUP, through its sectoral studies, shall include discussions on the availability, location and condition of educational facilities; the adequacy of facilities and manpower according to national standards and mandatory legal requirements; the accessibility of educational facilities to the target population; and, the comparative analysis of existing enrollment, participation, drop-out and literacy rates, among others (HLURB, 2014).

The sectoral studies are essential components of the CLUP as these intend to diagnose the prevailing issues of each sub-sector, analyze the causes, effects, and/or implications, establish the potential development needs, and determine the possible spatial requirement for identified facilities and infrastructures to meet the demands of increased accessibility, levels, and efficiency and equity (HLURB, 2014). In the case of the education sub-sector, the sectoral studies aim to incorporate the demand for additional educational facilities in the spatial development plan of the LGU for the nine-year period

covered by the CLUP. In case of the updated CLUP of the City of Navotas for 2016 to 2025, the need for additional educational facilities was raised, noting the CSR of 1:72 for elementary schools and 1:105 for secondary schools, which is far from the standard CSR of 1:45 provided by the DepEd (CPDO, 2016).

The demand for additional facilities to implement the SHS Program was also cited, although specific strategies to meet this demand were not elaborated. A closer look at the proposed land use under the CLUP 2016-2025 reveals that the proposed expansion of KHS has already been converted from its previous residential use to the proposed institutional use. Furthermore, although the City Government and the DepEd already have an understanding that all future school buildings should have at least four storeys, this policy could have been institutionalized and/or emphasized in the updated CLUP of the city as one of the spatial strategies to meet the classroom targets despite the limited land available in the city.

Another plan that promotes collaboration between the LGU and DepEd is the CDP, a six-year plan that outlines sectoral and cross-sectoral programs and projects to achieve the desired form of community development (DILG, 2008). The CDP encompasses five development sectors: economic, physical, environmental, institutional, and social development. Educational programs and projects are usually reflected under the social development sectoral plan.

According to Engr. Serrano (2018) notes that representatives from DepEd SDO Navotas City are regularly invited to CDP preparation and revisiting workshops. The representatives are grouped with all other stakeholders in the social development sector to discuss and elaborate on the current state and ways forward for the city's educational system. However, an examination of the Navotas City CDP (2017-2022) reveals that the spatial requirements of the education sub-sector were not taken into consideration in the overall development framework for the education sector (CPDO, 2016).

Approximately the same level of expected deliverables was also identified as the contribution of DepEd-SDO Navotas in the overall disaster risk reduction and management strategy of the City. According to the Local DRRM Plan 2016, which should be anchored on the CDP, the commitments of DepEd-SDO Navotas City mainly concentrate on information, education, and communication campaigns, training, seminars, and workshops, as well as the conduct of appropriate prevention drills (City of Navotas, 2016). The construction of disaster-resilient infrastructures for education was not identified as a key strategy to enhance the city's disaster resilience. This limitation was addressed by the inclusion of provisions on overlay zones in the 2016 Zoning Ordinance after mainstreaming of climate and disaster risks in the CLUP updating process, although the latter, along with the CDP and the LDRRMP, hardly recognized the importance of schools as critical facilities in times of disasters.

Another mandated avenue for possible collaboration between the national government and the LGU for safer schools planning and construction is the LSB through the SEF, which may be used for a wide range of expenditures, including salaries and wages, furniture and fixtures, computers, sports equipment, and other capital outlays.

Meanwhile, Engr. Serrano (2018) and Engr. de Leon (2018) noted that while the LGU, through the LSB, significantly contributes to the operation and maintenance of schools through the SEF, the planning system of the LSB may be further improved to boost the collaboration between DepEd and the LGU by strengthening the membership of the LSB to foster smooth policy and planning coordination. Given that the construction, repair, and maintenance of school buildings and other facilities are considered a priority for funding through the SEF, the current LSB membership does not provide adequate representation for technical personnel with expertise in administering infrastructure projects.

Aside from the City Mayor, the Chair of the Sangguniang Panlungsod Committee on Education, and the President of the Sangguniang Kabataan Federation who are all elected individuals, only the City Treasurer serves as a technical representative of the LGU to the LSB, whose function is limited to the certification of the amount available for budgeting and the disbursement of funds according to the approved SEF budget annually. The rationalization of the LSB membership by including the City Planning and Development Officer and the City Engineer will ensure that the investment plans are complementary with the long and medium-term plans of the LGU and that the recommended budgets for infrastructure projects are based on accurate estimates.

The harmonization and synchronization of national and local planning and budgeting for educational facilities projects becomes imperative as the income/ shares of the SEF from the collected RPT constantly increase, while DepEd also pours in more resources for the repair and rehabilitation of school facilities, a priority item chargeable against the SEF. Harmonizing and synchronizing the planning and budgeting process for educational facilities will optimize the use of available government resources in addressing the limited number of school sites and buildings. Consistent with the mandate of the law that prioritizes the construction and repair of school buildings for funding by the SEF, the actual utilization of the SEF should reflect this priority.

Shown in Figure 8 is the summary of all the planning outputs of the identified avenues of collaboration and the timeline within which such planning outputs were formulated and implemented. The figure illustrates not only the temporal disconnection between national and local spatial and development planning activities, but more importantly, the limitation of these plans to foster integrated and collaborative planning for educational facilities, as decision-making and policymaking remain fragmented and isolated in the absence of incentives for collaboration and sanctions for non-collaboration. The

disconnect becomes more evident in the administration and management of national and local funds for educational facilities, which can be utilized to address nationwide classroom shortages while also being responsive to local disaster risk profiles.

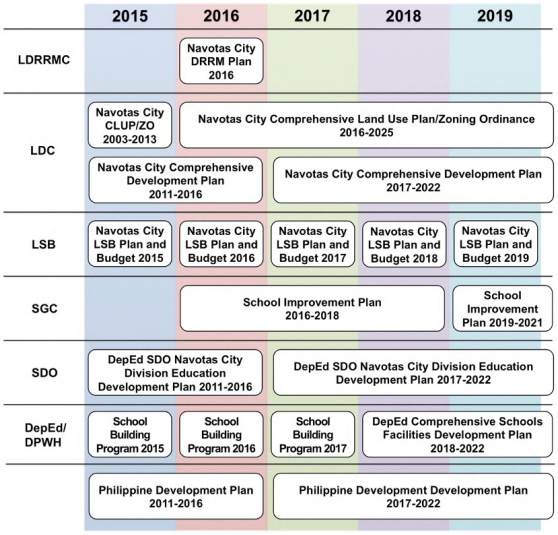


Figure 8. Timeline of the adoption of different planning outputs of various planning bodies

Another factor that affects collaboration/non-collaboration is the different levels of consideration and appreciation given to schools as critical facilities in times of disasters among the stakeholders. While DepEd ensures that school buildings can withstand specific risks through improved and calamity-resilient designs, the LGUs' perspective on the role of schools in DRRM remains limited to non-structural aspects, such as drills and information campaigns, and is oriented towards the preparedness of the actual users and internal stakeholders of the school in times of emergencies. This discounts the fact that schools, especially in Navotas City, are the most common and accessible choice as evacuation centers for displaced families in times of emergencies and disasters, and may eventually affect educational continuity.

The temporal and substantive disconnect between these policies can be effectively addressed by leveling the framework consideration for schools as critical facilities and by ensuring that both the LGU and DepEd representatives are committed to shared information and policy- and decision-making for educational facilities since they can both influence national and local spatial and development planning activities through their membership in the avenues of collaboration as illustrated in Figure 9.

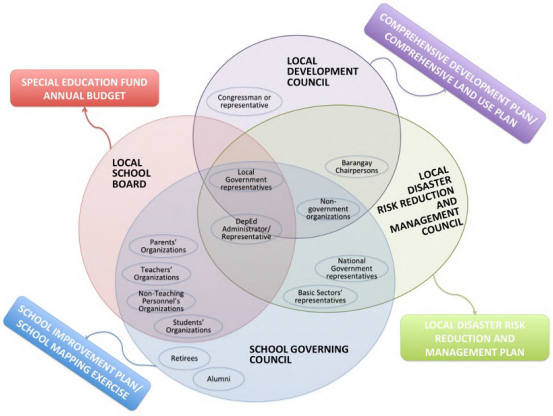


Figure 9. Composition, Dynamics, and Outputs of Avenues for Collaboration at the Local Level

7. Conclusion and Recommendations

In view of the foregoing, it can be established that the general disaster risks common throughout the country (i.e., storm surge, strong winds, and earthquakes) were already mainstreamed in the latest standard template designs and plans for school buildings used by DepEd and DPWH. This means that even if specific sites and/or localities are not exposed to such disaster risks according to historical data and projections, the reinforced design will still be used and uniformly applied nationwide.

With the uniform designs and plans, what is left for customization under normal circumstances are the determination of the final building orientation, the necessary engineering interventions needed to strengthen the foundation, as well as the floor height of the building from the ground, which is dependent on the result of site-specific soil investigations for every school building project and the historical flood height levels of the community, respectively. Another significant input on the final design of the school building is the presence of existing plans for future hazard mitigating equipment and/or facilities that will boost the disaster resilience of the school building, some of which are provided and/or constructed by the LGU, like the 'Bombastik' Pumping Stations located beside KHS in Navotas City.

Hence, in terms of mainstreaming disaster risks in safer schools planning, it can be established that risks/ hazards posed by the soil type/configuration of the school type, as elaborated in the site specific soil investigation reports, serves as the primary profile mainstreamed in the school building designs and plans since considerations for flooding, strong winds and earthquakes were already made integral to all school building designs and plans regardless of general disaster/risk profile of the locality following the 2018 Calamity-Resilient Designs.

On the other hand, disaster/risk profiles in specific localities other than those already mainstreamed still need to be considered to ensure the construction of multi-hazard resilient school buildings, as well as equipment and facilities that will raise the resilience of schools to disasters that the LGU and the national

government may share. Towards this end and in consideration of the trend on vertical development for educational facilities, especially in urban and urbanizing areas, national and local planning and regulatory frameworks shall be continuously revisited to provide more stable guideposts in disaster-resilient educational facilities planning, including provisions for remedial measures that can be applied to existing buildings and those under construction.

In terms of collaboration between national and local governments, the planning and design of school buildings are heavily concentrated on national government agencies, such as DepEd and DPWH, primarily due to the fact that funding is provided by the national government for implementation by these agencies. While DepEd and DPWH maintain that information is provided to LGUs through informal coordination to avoid duplication of projects and non-accessibility of proposed sites, LGU representatives claim limited involvement in the overall process of planning and design of the school buildings, except in special circumstances when specific issues and concerns are elevated to their level, like the need for additional land, as in the case of KHS. On the other hand, DepEd, through its SDO, works closely with the LGU in relation to the repair and maintenance of school buildings and other facilities funded through the SEF.

It was also established that while the LGU and its officials play a vital role in acquiring lands for school building purposes and for site development of schools, as in the case of Mayor Tiangco, who had an active involvement in the school building planning process. However, the political side of local governance has also adversely affected school building projects, especially when lands owned by the LGU and previously assigned for DepEd's use as usufructuary are suddenly taken back by the LGU under a new set of local officials, who may have differing priorities and governance strategies.

Thus, while informal communication and short-term understanding and cooperation between national and local governments produce immediate results, institutionalizing collaboration between stakeholders will provide stability not only to the physical infrastructure and facilities but also to the entire educational system. Being a basic social service, education should not be interrupted nor affected by politics and power struggles since it is a policy of the State to "establish, maintain and support a complete, adequate, and integrated system of education relevant to the needs of the people, the country and society-at-large" (Congress, 2013).

Revisiting and harmonizing national and local building and planning regulations. At least four formal structures were established, anchored in the respective mandates of national and local governments, where collaborative planning should have taken place. Several planning documents are also produced by both DepEd and the LGU, which involve schools and educational facilities, where representatives from both the national and local governments are allowed to contribute. However, these plans are disconnected due to the different timing and periods of preparation for the individual plans, as well as the varying consideration of the role of schools as critical facilities in times of disaster. This is further exacerbated by the absence of both incentives for collaboration and sanctions for failing to collaborate with one another.

The case of the building height of KHS cannot be considered as an isolated case since the latest standard template plans approved by both the DepEd and DPWH for four-storey school buildings have exceeded the BHL of both the NBC and DepEd Educational Facilities Manual, and isolated updating of individual framework, policy, or regulation may lead to more disconnects and discrepancies.

Towards this end, a systematic approach in revisiting and harmonizing national and local building planning regulations shall be employed to address both vertical and horizontal inconsistencies resulting from disaster mainstreaming. Among the critical issues to consider are provisions for accessibility and mobility, as well as ingress and egress, especially for medium- and high-rise critical facilities like schools, among others.

Revitalizing the role of the LSB. To ensure that local education matters are addressed consistent with the local development framework of the province, city, or municipality, the LSB may be strengthened and transformed into a Subsectoral Committee of the LDC so that plans addressing educational matters, including the educational infrastructure program, are incorporated in the comprehensive spatial and socioeconomic development plans of the LGUs. The Education Subsectoral Committee under the Social Development Sector may then serve as the institutionalized clearinghouse for proposed school building construction and repairs in the locality. With this, duplication of funds will be avoided, and infrastructure projects within the locality will be coordinated.

Hence, the current LSB membership may be reconstituted as the Educational Subsectoral Committee, which will work on the educational needs assessment based on historical and projected data and propose medium-term plans and investment programs to address such needs, which will be incorporated in the CLUP, the CDP, and the LDIP, with the SEF as local funding source and the BEFF as national counterpart.

Streamlining national and local spatial and development planning processes for educational facilities. With the revitalized LSB, the LDC, through the Educational Subsectoral Committee, will serve as a clearinghouse of proposed school building construction and repair projects in the locality. Under this arrangement, the Educational Subsectoral Committee shall discuss all proposed school building construction and repair projects, and only those endorsed to and approved by the LDC will be included in the priority investment program, which can be funded through the SEF and/or the BEFF. This will save the DepEd from the mandatory furnishing of the approved lists of

proposed school building projects to the LGUs, as they are already involved in the process of determining demand and prioritizing the much-needed educational infrastructure over others.

Due to the need to integrate the local educational roadmap into the more comprehensive local development plans, the preparation of the DEDP may also follow the timing and period of effectivity of the CDP – 6 years – to complement the CDP. Laying down a medium-term projection of the demand for educational infrastructure will also aid the national government, through the DepEd, to efficiently allocate its resources and support its budgetary requests from Congress, since at an early stage, the medium-term demand for educational facilities will be estimated together with the corresponding investment programming that is mutually adopted by both the national and local governments.

Furthermore, having the school building program as part of the CDP, which the LDC will approve and subsequently be approved by the local Sanggunian, will also satisfy the prior consultation requirement of the LGC for national projects. A proposed harmonized spatial and development planning process, insofar as the education sector is concerned, is shown in Figure 10. The proposed process highlights the significant role of the revitalized LSB in bridging the national educational facilities and local government planning system to implement a risk-informed school building program.

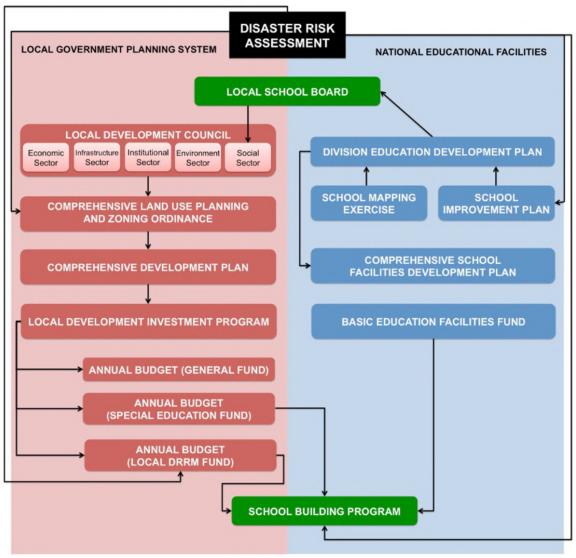


Figure 10. Proposed Integrated Risk-Informed Educational Facilities Planning System

With the setting aside of the allocation formula under Republic Act No. 7880, the funding allocation for every SDO/Legislative District from the lump sum BEFF cannot be estimated for purposes of planning and the LSB cannot also ascertain specific infrastructure projects to be funded by the limited SEF in any given year, not to mention the absence of a technical person in the LSB membership to deal with school infrastructure projects.

Co-financing and sharing of responsibilities for educational facilities. To ensure that resources are optimized and gaps are effectively addressed, specific co-financing mechanisms and the sharing of responsibilities may also be strengthened, as already espoused under existing rules and regulations. For the SEF to prioritize school building and repair in terms of budgetary allocation, it is proposed to set a minimum requirement as to the percentage of the annual SEF budget to ensure contributions for school building construction and repair.

For example, suppose the minimum budget allocation for school building and construction and repair will be 15% of the annual SEF budget (which is the percentage of DepEd's Budget for Building Repair and Rehabilitation as a portion of the SEF in 2016). In that case, the LDCs can already project in their respective LDIPs which educational infrastructure projects may be funded locally and which projects will be requested for funding by DepEd, as shown in Figure 11.

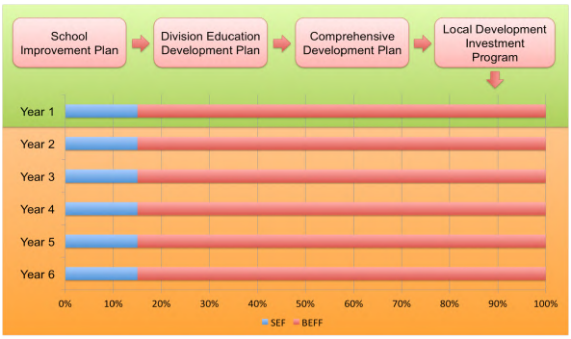


Figure 11. Proposed medium-term planning and investment programming for local educational facilities

On the part of DepEd, it can only accommodate requests for funding that are included in the LDIP but are not covered by the 15% minimum SEF allocation for school building and repair. Further, since DepEd can already estimate the total demand for educational infrastructure in the medium term, it can forecast which projects will be funded by how much, still adhering to its existing prioritization criteria. This way, the BEFF funding for a given fiscal year will already be supported by a detailed breakdown per legislative district once submitted for approval by Congress. This will facilitate early procurement activities that will address the issues of delayed implementation due to the tedious approval process and release of funds under the current setup, where the BEFF is appropriated as a lump-sum fund.

The proposed arrangement will also make access to national funds for educational facilities more equitable since LGUs with higher income classes will have to spend the minimum percentage of their SEF on school construction and repair, and be enjoined to implement locally-funded projects before they can avail of additional subsidies from the national government. This does not even include the potential use of the LDRRMF for the repair and retrofitting of school buildings to make them more resilient to disasters.

While some of the recommendations will entail the amendment of existing laws (i.e. the revitalizing of the role of the LSB) as well as other existing planning rules, regulations, and guidelines (i.e. the utilization of the SEF and the co-financing scheme for educational facilities), existing mechanisms such as the LDC may be maximized to initially implement stronger intergovernmental collaboration to mainstream DRRM not only in local spatial development planning but also in educational facilities planning, which also should form part and parcel of the comprehensive socioeconomic plan of each local government. This is where the role of the LPDC is emphasized as the facilitator of local development planning activities, including the educational sector. While budgeting at the national and local levels is still not insulated from politics, LPDCs still have the responsibility to ensure that plans of LGUs are not only comprehensive by virtue of their name but are also based on updated and realistic data and information across all sectors.

On a final note, it can be said that the legal foundations, policies, and institutions are in place to promote both DRRM mainstreaming and collaboration in educational facilities planning to produce a multi-hazard risk-sensitive and evidence-based educational sector policy and management. However, despite the existence of as many institutionalized vehicles of collaboration, intergovernmental planning will only be possible, as McDonald (2005) puts it, **"for as long as the intent for collaboration is genuine."**

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