

**THE 19<sup>TH</sup> ASIACONSTRUCT CONFERENCE**  
**SINGAPORE-COUNTRY REPORT**

*Prepared by*  
BUILDING AND CONSTRUCTION AUTHORITY  
SINGAPORE

**EXECUTIVE SUMMARY**

Despite a slightly weaker than expected growth in the advanced economies in the first half of the year, global macroeconomic conditions are expected to pick up gradually in the second half. Buoyed by improved performance in the services sector, the Singapore economy grew by about 2% in the first half of 2013 as compared to 1.3% in 2012. The construction sector grew by an average of about 6% in the first half of 2013, underpinned by robust construction activities in the private sector. Against this macroeconomic backdrop, Singapore's growth outlook is expected to improve slightly and grow by between 2.5% to 3.5% in 2013.

Coming off from a high base in 2011, total construction demand<sup>1</sup> in 2012 decreased by 13.4% year-on-year to \$30.7 billion<sup>2</sup>. The public sector construction demand shrank in 2012 due to reduction in total value of contracts awarded for public housing and civil engineering construction works. However, the strong year-on-year growth in the institutional construction demand was able to partially make up for it. Additionally, the private sector construction demand in 2012 was resilient despite slower economic growth.

For 2013, total construction demand is projected to lie between \$28 billion and \$34 billion. The mid-range of 2013 construction demand forecast (at \$31 billion) is comparative to 2012's level, reflecting a continued and sustained level of workload.

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<sup>1</sup>Construction demand is measured by total value of contracts awarded which exclude reclamation projects.

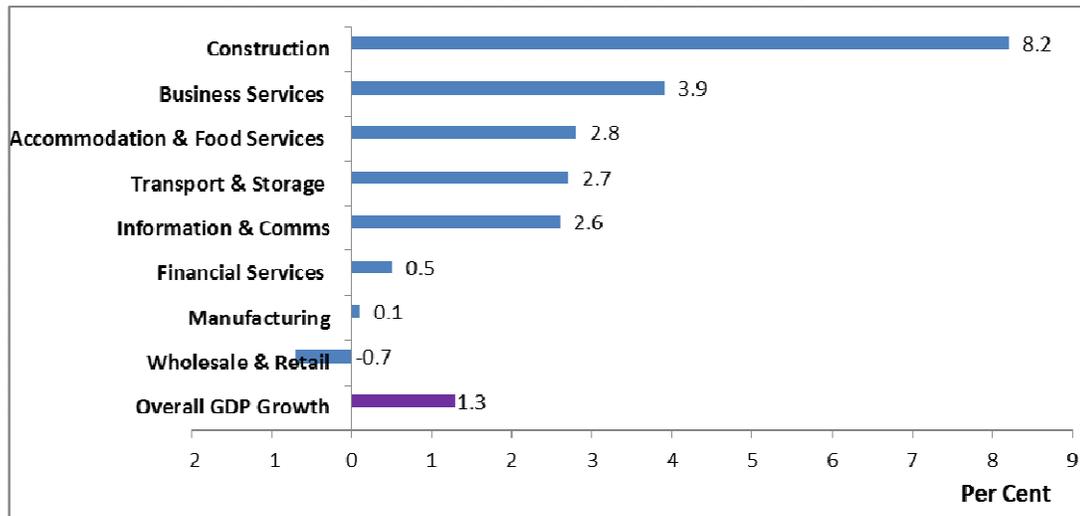
<sup>2</sup> All currencies stated in this paper are in nominal Singapore dollars unless otherwise stated.

## 2.1 Macro Economic Review and Outlook<sup>3</sup>

### 2.1.1 Overview of the Singapore Economy in 2012

In 2012, the Singapore economy expanded by 1.3%, moderating from the 5.2% growth in 2011. The slower growth was mainly due to the weaker externally-oriented sectors such as manufacturing and wholesale and retail trade. In 2012, the wholesale and retail trade sector posted a negative growth of -0.7% and the manufacturing sector posted a mere growth of 1% (Chart 2.1.1).

**Chart 2.1.1: GDP and Sectoral Growth Rates in 2012**



### 2.1.2 Economy in the First Half of 2013

The Singapore economy registered a growth rate of about 2% in the first half of 2013 as compared to the 1.3% growth in 2012. This was due to improved growth in sectors such as finance & insurance and business services. The external macroeconomic conditions have also started to stabilise since late last year and global economic growth is expected to improve. Additionally, the construction sector has been expanding yearly since emerging from its previous downturn in 2005, and continued to record positive growth in the first half of 2013, at an average of about 6%.

Taking into account of the stabilisation and the outlook of the external macroeconomic conditions, the Ministry of Trade and Industry (MTI) expects the Singapore economy to grow by between 2.5% to 3.5% in 2013.

<sup>3</sup> Source: Economic Survey of Singapore, second quarter 2013, Ministry of Trade and Industry Singapore.

### 2.1.3 Main Economic Indicators

Year	2009	2010	2011	2012
<b>GDP and Components</b>				
GDP at real prices (Base Year=2005) (S\$Million)	249,560	286,447	301,228	305,202
GDP at current market prices (S\$Million)	274,655	315,921	334,093	345,561
GDP growth (%)	-0.8	14.8	5.2	1.3
Manufacturing sector (Base Year=2005) (S\$Million)	58,218	75,493	81,357	81,426
% growth	-4.2	29.7	7.8	0.1
Wholesale & Retail Trade Sector (Base Year=2005) (S\$Million)	40,279	45,893	46,625	46,291
% growth	-4.0	13.9	1.6	-0.7
Transport & Storage Sector (Base Year=2005) (S\$Million)	22,722	24,217	25,137	25,818
% growth	-9.4	6.6	3.8	2.7
Financial Services (Base Year=2005) (S\$Million)	30,118	33,584	36,575	36,742
% growth	2.0	11.5	8.9	0.5
Business Services (Base Year=2005) (S\$Million)	29,395	31,765	32,716	33,997
% growth	3.0	8.1	3.0	3.9
Construction sector (Base Year=2005) (S\$Million)	10,511	10,920	11,603	12,556
% growth	17.1	3.9	6.3	8.2
<b>Demographic Indicators</b>				
Population – Singapore Residents <sup>1</sup> (‘000)	3733.9	3771.7	3789.3	3818.2
Population growth rate (%)	2.5	1	0.5	0.8
Total labour force (‘000)	3030.0	3135.9	3237.1	3361.8
Labour force growth rate (%)	3.1	3.5	3.2	3.9
Unemployment rate (%) – Seasonally adjusted as in June	3.2	2.2	2.1	2.0
<b>Financial Indicators</b>				
Savings deposits (%) (Average quotes from 10 leading banks)	0.15	0.13	0.11	0.11
Prime lending rates (%) (Average quotes from 10 leading banks)	5.38	5.38	5.38	5.38
Changes in consumer price index (Base period = 2009, % change over previous year)	0.6	2.8	5.2	4.6
Annual average exchange rate with \$US (S\$ Per US\$)	1.4545	1.3635	1.2579	1.2497

Sources: *Economic Survey of Singapore 2012, Ministry of Trade and Industry*

<sup>1</sup>Singapore resident population comprises Singapore citizens and permanent residents.

### **3.1 Overview of the Singapore Construction Sector (Table 3.1.1)**

#### **3.1.1 Construction Demand Review for 2012**

Following an outstanding performance in 2011, total construction demand moderated by 13.4% to \$30.7 billion in 2012. The overall public sector construction demand fell by 37.8% year-on-year to \$9.5 billion with lesser residential contracts due to re-scheduling or adjustments in launching dates. However, institutional building construction demand was very strong due to major healthcare facilities such as Ng Teng Fong Hospital, Integrated Building for Changi General Hospital & Saint Andrew's Community Hospital etc.

By contrast, the private sector construction demand was resilient beyond expectations in 2012 despite the slower economic growth. Total private sector construction demand rose by 5% year-on-year to \$21.2 billion, mainly driven by strong buying momentum for residential developments and strong industrial building demand bolstered by large Engineering, Procurement and Construction (EPC) projects.

#### **3.1.2 Construction Demand Forecast for 2013**

Based on the preliminary actual construction demand at \$14 billion in the first half of this year and the latest feedback from developers and public sector agencies, the total construction demand forecast in 2013 is anticipated to be between \$28 billion and \$34 billion. Driven by the ramping up of public housing and infrastructure works, the share of public sector's construction demand is projected to increase to 46%, from 31% in 2012.

#### **Residential Construction Demand**

In tandem with the government's move to ramp up housing supply on the back of a larger population, the total public housing construction demand is projected to increase to between \$5.3 billion and \$6.0 billion, from \$3.3 billion recorded in 2012. Although the private residential construction demand is projected to be lower than the record high of about \$9 billion yearly in 2011 and 2012, it is estimated to sustain at between \$6.5 billion and \$8.0 billion in 2013 due to the resilient private home sales observed in the first six months.

### **Commercial Construction Demand**

With the increasing total international visitor arrivals since 2009<sup>4</sup>, coupled with Singapore's open and pro-business environment, the total commercial construction demand in 2013 is expected to hold up to between \$3.1 billion to \$3.7 billion, comparable to last year's \$3.0 billion worth of contracts awarded.

### **Industrial Construction Demand**

The total industrial construction demand has maintained at slightly more than \$6.0 billion over the past two years. However, it is expected to be moderated to between \$3.3 billion and \$4.6 billion in 2013 due to the lingering macro-economic uncertainty and the slow pace of global recovery.

### **Institutional & Other Building Construction Demand**

Total institutional & other building construction demand is anticipated to sustain at between \$3.8 billion and \$4.8 billion in 2013, with approximately 60% contributed by the public sector, underpinned by campus expansions, recreational facilities developments for the general public and MOE's school upgrading programme.

### **Civil Engineering Construction Demand**

Total civil engineering construction demand is anticipated to increase to between \$6.0 billion and \$6.9 billion. The increase is fueled notably by the award of Thomson Line MRT contracts and major infrastructure works. Although the private civil engineering construction demand is expected to fall from the high base due to the award of the underground transmission cable tunneling contracts by SP Powerassets in 2012, total demand will be supported by port/berth facilities and utilities works.

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<sup>4</sup> Source: Singapore Tourism Board Annual Report 2011/2012  
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**Table 3.1.1: Breakdown of Construction Demand**  
**Contracts Awarded (2009 to 2013)**  
**(excluding Reclamation Works)**

	2009	2010	2011	2012	2013 Forecast		
	(in \$m)				(in \$b)		
<b>Both Sectors</b>	<b>22,518.38</b>	<b>27,564.59</b>	<b>35,487.91</b>	<b>30,722.57</b>	<b>28.0</b>	<b>-</b>	<b>34.0</b>
Building Work	13,499.06	24,541.18	28,746.59	25,912.27	22.1	-	27.1
<i>Residential</i>	6,733.87	11,487.03	15,298.07	11,823.56	11.8	-	14.1
<i>Commercial</i>	1,649.82	3,236.83	4,209.59	2,985.07	3.1	-	3.7
<i>Industrial</i>	2,040.48	4,789.69	6,220.92	6,397.68	3.3	-	4.6
<i>Institutional &amp; Others</i>	3,074.89	5,027.63	3,018.01	4,705.96	3.8	-	4.8
Civil Engineering Work	9,019.32	3,023.41	6,935.79	4,810.30	6.0	-	6.9

Source : BCA as at 27 August 2013

### 3.2 Construction Companies (Table 3.2)

As of June 2013, the total number of companies registered under BCA Contractors Registry was 9,104 companies. Of these, 114 firms were A1 contractors with unlimited tendering limit for public sector projects.

**Table 3.2: Trend of Registered Contractor**

Year (calendar)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013*
No. of registered contractors	5,167	5,621	5,942	6,346	7,021	7,975	8,827	9,573	8,995	9,104

Note: Firm with multiple workheads registered is considered as a single registered entity.

\*No. of registered contractors as at June 2013

### 3.3 Construction Manpower

The construction sector is expected to see strong job creation due to major projects such as the continuing construction of the Downtown MRT and Thomson MRT lines as well as public and private sector housing projects. According to the latest employment statistics released by the Ministry of Manpower (MOM), construction employment grew by 16,900 in the first half of 2013 to 458,800 as at June 2013. Moving forward, the labour market is expected to remain tight as the government is taking progressive steps to moderate foreign employment growth.

### 3.4 Construction Costs

#### 3.4.1 Tender Price Index

Tender prices remained stable in 2012. This was reflected in the average of the overall BCA Building Work Tender Price Index (TPI) in 2012, which at 114.2, was comparable to 2011's level.

However, as contractors start to factor in higher labour and preliminaries overhead costs arising from tightened manpower policies and general cost inflationary pressures into their tender bids, construction tender prices have been on an uptrend since late 2012 and the overall TPI index was at 118.9 in the second quarter of 2013.

#### 3.4.2 Average Construction Material Prices (Table 3.4.2)

##### Concrete

Underpinned by the higher level of structural works arising from the relatively strong construction demand in 2012, the demand for ready-mixed concrete rose 22.4% to 14.2 million m<sup>3</sup>. Moving forward, the level of structural works in 2013 is expected to be moderated and the demand for ready-mixed concrete is expected to reduce marginally to 13.7 million m<sup>3</sup> in 2013. Due to rising material costs, the average market price of Grade 40 pump ready-mixed concrete<sup>5</sup> was \$110.4 per m<sup>3</sup> in December 2012. With the softening of raw materials cost, the average market price of Grade 40 pump ready-mixed concrete has gradually reduced to \$105 per m<sup>3</sup> in August 2013.

##### Reinforcement Bars (Rebars)

The higher level of construction activities sustained the demand for rebars in 2012 which led to a year-on-year increase of 2.4% in rebar demand<sup>6</sup> to about 1.3 million tonnes. Demand for steel rebars in 2013 is estimated to sustain at around 2012's level. The average market price of rebar<sup>7</sup> hovered around an average of \$915 per tonne in the first five months of 2012. It started to drop below \$900 per tonne since the second half of last year and subsequently lowered to \$827.50 per

<sup>5</sup> The market prices are based on contracts with non-fixed price, fixed price and market retail price

<sup>6</sup> Demand for steel rebar is measured in terms of local production and net imports.

<sup>7</sup> The prices refer to 16mm to 32mm High Tensile rebar and are based on fixed price supply contracts with contract period 6 months or less.

tonne in December 2012 due to steel overcapacity woes in China and the uncertain global conditions. Rebar prices have continued the downtrend in 2013 and was at an average of about \$754 per tonne in August 2013.

**Table 3.4.2: Basic Construction Materials**

Demand				
Year	Ready-Mixed Concrete (Mil m <sup>3</sup> )	% Change	Steel Rebars (Mil tonnes)	% Change
2011	11.6	-	1.27	-
2012	14.2	22.4%	1.3	2.4%
2013 (f)	13.7	-3.5%	1.3	-
Current Market Prices				
Year	Ready-Mixed Concrete (Grade 40 Pump) (\$ per m <sup>3</sup> )	% Change	Steel Rebars (16-32mm) (\$ per tonne)	% Change
Dec 2011	\$108.0	-	\$913.4	-
Dec 2012	\$110.4	2.2%	\$827.5	-9.4%

f: Forecast

### 3.4.3 Construction Industry Salaries and Wages

The construction sector's median gross monthly income (including employer's contribution to the Central Provident Fund (CPF)) in 2012 stood at \$3,263, similar to the level in 2011. In tandem with the sustainable and strong performance since 2007, the construction sector had enjoyed positive annual growth ranging from 3.7% to 4.4% in its median monthly gross income in the past few years.<sup>8</sup>

**Table 3.4.3: Construction Industry Monthly Income**

Industry	Average Monthly Earnings Per Employee (\$m per month)				Median Gross Monthly Income <sup>9</sup>
	2008	2009	2010	2011	2012
Total	3,977	3,872	4,089	4,334	3,480
Manufacturing	3,955	3,966	4,263	4,484	3,770
<b>Construction</b>	<b>2,861</b>	<b>2,948</b>	<b>3,113</b>	<b>3,268</b>	<b>3,263</b>
Wholesale and Retail Trade	3,441	3,418	3,546	3,758	3,000
Transport and Storage	3,989	3,914	3,953	4,222	2,500
Hotels & Restaurants	1,504	1,463	1,506	1,546	1,740
Information & Communications	5,304	5,253	5,338	5,604	4,838
Financial Services	7,153	6,890	7,656	8,170	5,751
Retail Estate and Leasing Services	3,513	3,273	3,051	3,380	3,915
Community, Social & Personal Services	4,168	3,857	4,292	4,604	2,289

Source: Data for 2008 – 2011: Singapore Yearbook of Statistics, 2011, Report on Wages, Singapore 2011.<sup>10</sup> Data for 2012: Singapore Yearbook of Manpower Statistics 2013

<sup>8</sup> Source: Singapore Yearbook of Manpower Statistics 2013

<sup>9</sup> Including employer's contribution to the Central Provident Fund (CPF)

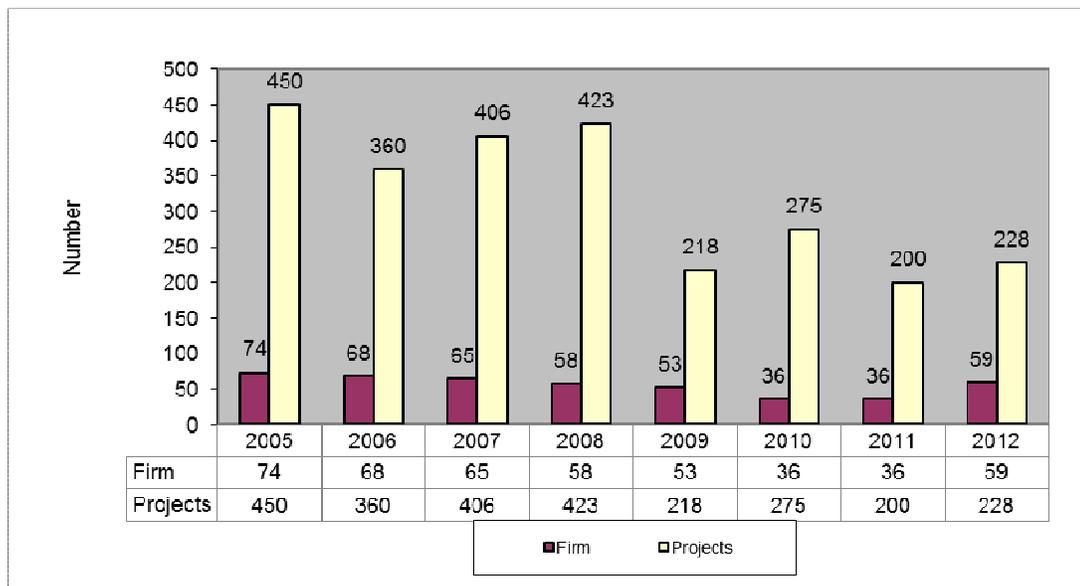
## 4.1 Overseas Performance of Singapore’s Consultants and Contractors in 2012

From 2008 to 2011, Singapore’s construction export market shrank mainly due to the global financial crisis coupled with the fall of Dubai. However, the trend reversed in 2012 as Singapore consultants and contractors were more active in participating in overseas projects in spite of the significantly larger domestic construction market.

### 4.1.1 Exports by Consultants (Chart 4.1.1)

Singapore firms experienced a sharp decline of nearly 45% in their overseas consultancy projects, reaching an average of 230 projects annually from 2009 to 2012. Nonetheless, the number of projects clinched increased from 200 in 2011 to 228 in 2012. Likewise, the number of Singapore firms in overseas consultancy services, though declined from 74 in 2005 to 36 in 2011, had increased to 59 in 2012.

Chart 4.1.1: Number of Consultancy Firms and Projects, 2005 - 2012

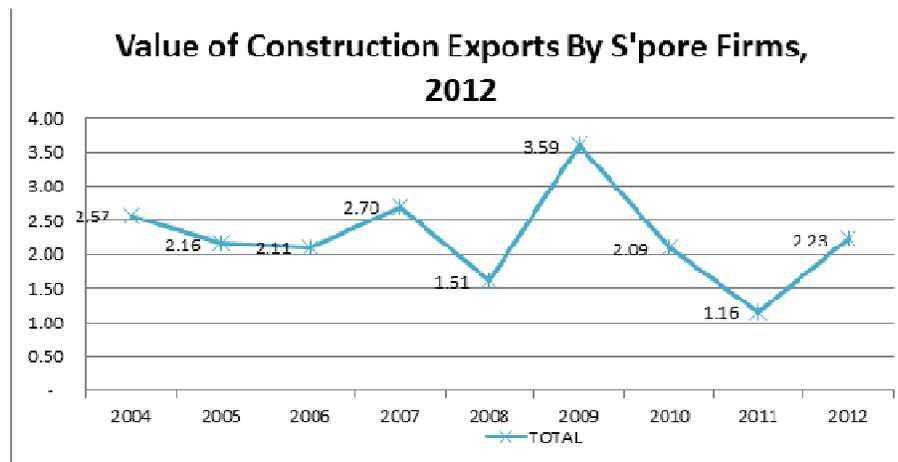


<sup>10</sup> Ministry of Manpower has discontinued the 'Report on Wages, Singapore' from 2012 onwards  
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#### 4.1.2 Exports by Contractors (Chart 4.1.2)

After registering the peak volume of S\$3.59 billion in 2009, construction exports fell by 42% in 2010 to S\$2.09 billion and fell further by another 45% to S\$1.16 billion in 2011. The trend changed in 2012 and Singapore construction and engineering firms clinched S\$2.23 billion worth of overseas contracts in 2012, a sharp increase of 92% from 2011.

Chart 4.1.2: Value of Construction Exports by Singapore Firms, 2004-2012



#### 5.1 Conclusion

The Singapore economy grew by about 2% in the first half of 2013 on the back of an improved performance in the services sector. The construction sector continued its expansion which has started since 2005 and grew at an average rate of 6% in the first half of 2013. As the global macroeconomic conditions are expected to pick up gradually in the second half of 2013, MTI expects Singapore GDP growth to reach between 2.5% to 3.5%.

Over the medium-term, the outlook for Singapore construction industry is positive in view of the upcoming strong public housing and civil engineering construction demand in the next two years. Hence, the average construction demand for 2014 and 2015 is likely to sustain at between \$22 billion and \$30 billion per annum.

# Sharing Experiences in Flood Management



# Topics of Presentation

*Flood Prone  
Areas & Flash  
Flood*

*3 key Strategies for flood management*

*Multi-Prone  
Drainage  
Solution*

*Other Measures*

*Conclusion*



# Floods in Singapore 60s & 70s



Braddell Road, December 1978



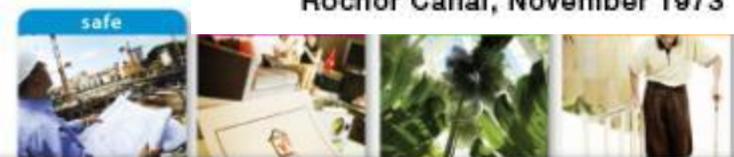
Newton Circus, December 1969



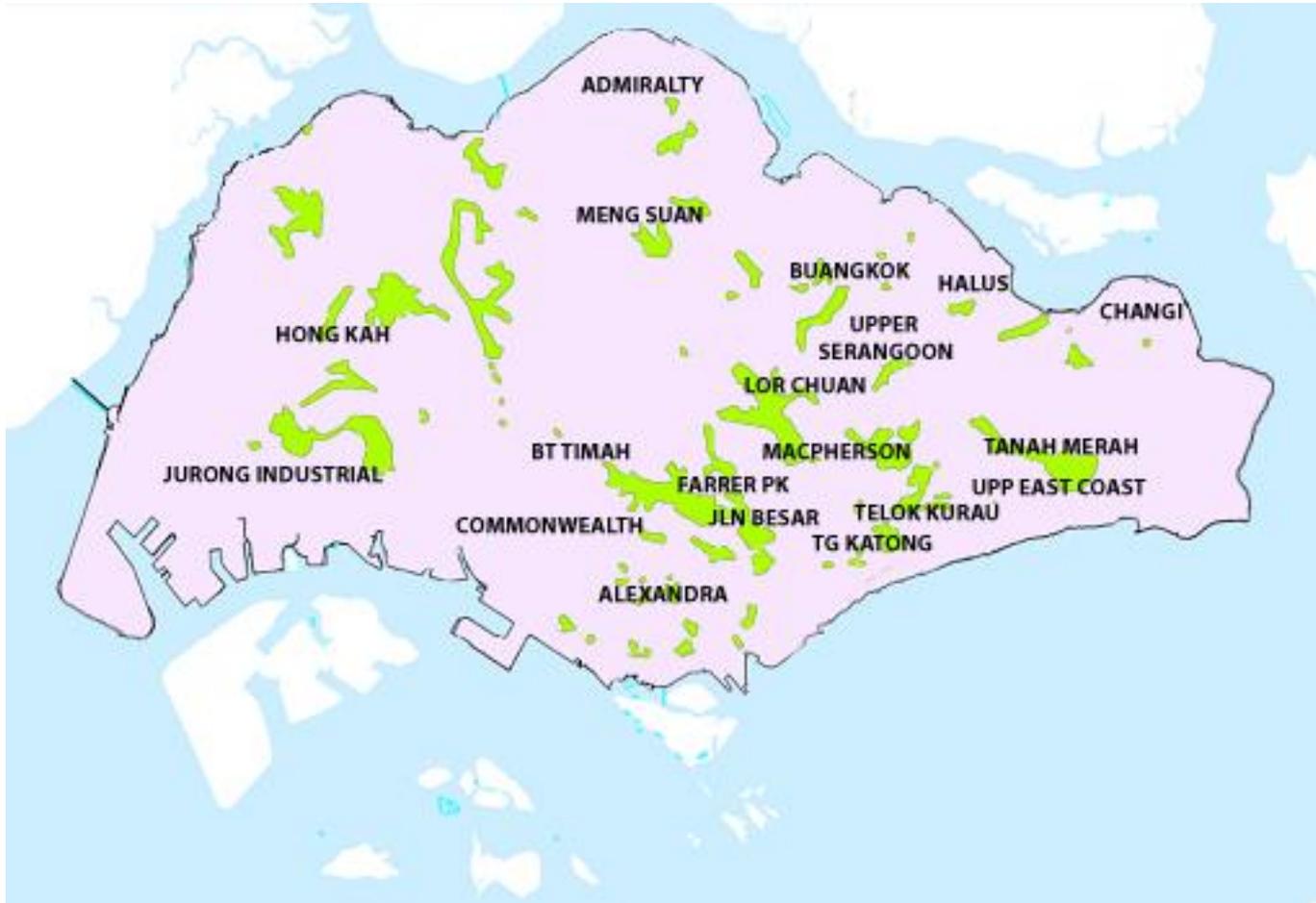
Rochor Canal, November 1973



Bideford Road, December 1969



# Flood Prone Areas in 60s & 70s ~ 3200 ha



# 8,000km of Drains, Rivers and Canals channel rainwater into reservoirs or sea



safe

high quality

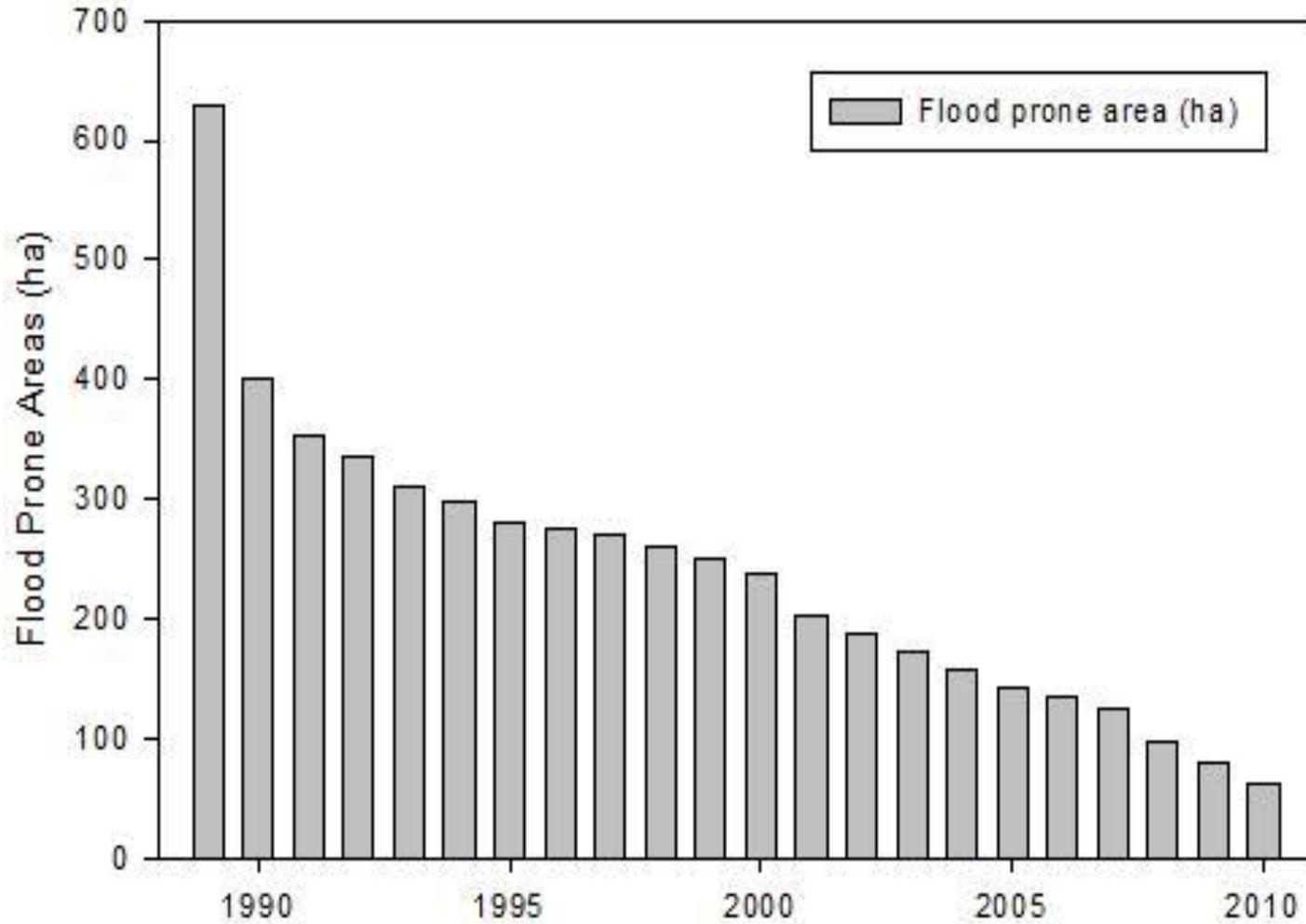
sustainable

friendly

# Flood Prone Areas in 2012 ~ 40ha



# Reduction in Flood Prone Area over Years



# Flash Flood in the Recent Years

In 1960s and 1970s, Singapore experienced wide-spread flooding during the monsoon seasons, especially in the city centre, which was built on relatively low-lying land.

Singapore has been relieved of prolonged floods as the drainage can cope. However, extremely heavy rainfall in the recent years can exceed the capacity of the drains. Hence, flash floods – small and localised floods that come and go quickly, may occur

# Flash Flood in the Recent Years

## **4 Nov 2013**

Western Sunset Drive / Sunset Square (Junction)

Depth: 100mm/Width: 2 lanes

Length: 50m

Passable to traffic

Western Lorong Kismis

Depth: 100mm/Width: 2 lanes

Length: 50m

Passable to traffic

Western Slip road from Clementi Road to Ulu Pandan Road

Depth: 200mm/Width: 3 lanes

Length: 50m

1 lane impassable for 15 mins

# Flash Flood in the Recent Years

## **4 Nov 2013**

Western Dunearn Road (Yarwood Ave to Binjai Park)

Depth: 150mm/Width: 2 lanes

Length: 30m

Passable to traffic

Western Clementi Ave 4 / Commowearth Ave West (Junction)

Depth: 150mm/Width: 1 lane

Length: 40m

Passable to traffic

## **3 Nov 2013**

Eastern Chai Chee Rd / New Upper Changi Rd

Depth: 300mm/Width: 2 lanes

Length: 30m

2 lanes impassable for 10 mins

# Flash Flood in the Recent Years

## **30 Oct 2013**

Eastern Chai Chee Rd near junction of New Upper Changi Rd

Depth: 300mm/Width: 2 lanes

Length: 100m

2 lanes impassable at Chai Chee Road for 15 mins

Eastern ECP Slip Road towards City at Bedok South Ave 1

Depth: 150mm/Width: 2 lanes

Length: 50m

Passable to traffic

## **28 Oct 2013**

Eastern Chai Chee Rd near junction of New Upper Changi Rd

Depth: 300mm/Width: 2 lanes

Length: 100 m

2 lanes impassable at Chai Chee Road for 20 mins

## 1 Providing adequate drainage ahead of new developments

Prior to any new land development, PUB works with agencies such as URA, HDB and the LTA to map out necessary drainage measures.

In addition, to ensure that roads are built to the required levels for flood protection and drainage systems along the roads are adequate.



## 2 Implementing flood protection measures

To provide additional flood protection measures, PUB has put in place a Code of Practice on Surface Water Drainage that stipulates drainage requirements. This includes minimum platform and crest levels for buildings and entrances to underground facilities (e.g. basement carparks, underground MRT stations, etc).

PUB also work closely with building owners to advise on appropriate measures to protect the buildings from floods.



### 3. Continuous drainage improvement in flood prone areas

It includes widening and deepening of drains and canals to ensure adequacy of the drainage. For low-lying areas, drainage improvement projects are effective only if the surrounding ground level is also raised.

For existing low-lying and flood-prone roads, the road levels would be raised during drainage upgrading works or road upgrading works. When an area is for redevelopment, PUB will review the drainage system and raise the building and road levels.



# Multi-Prone Drainage Solution

## (i) Source SOLUTIONS

### Facilitating the implementation of measures to slow down runoff

The feature helps to retain or slow down water runoff, and reduce the volume of water in the drainage system during heavy rain. Eg, a detention tank built at Tyersall Avenue to temporarily store excess rainwater from the drains along Holland Road. After the rain subsides, the water will be pumped back to the drains for subsequent discharge into the Reservoir.

When the drain overflows during heavy storms, the excess water goes into the detention tank next to the drain. After the storm, the water stored in the tank is pumped back into the drainage.



## (ii) RECEPTOR SOLUTIONS

### Measures to protect buildings from flash floods

The Code of Practice (COP) on Surface Water Drainage specifies minimum drainage requirements such as min height of platform, land reclamation and crest levels for new developments.

To meet the challenges of greater weather uncertainties and increasing urbanisation, the revised COP 2013 to require new developments to slow down the runoff that would be discharged into the public drainage system during heavy storms.

Photo: Raised platform



## (iii) Pathway SOLUTIONS

### Expanding Drain and building of new canals

Over the coming years, PUB will carry out more projects to improve drainage infrastructure and increase flood protection. These include increasing the capacity of 6 major canals at Bukit Timah, Geylang River, Alexandra Canal, Rochor Canal, Sungei Bedok and Sungei Kallang by 30 to 45%.

#### e.g. Bukit Timah and Stamford Diversion Canals

The first 2 diversion canals were built in 1972 and 1991 at the Bukit Timah catchment. These have helped to alleviate the perennial flooding problem in Bukit Timah. Works are ongoing to upgrade the Bukit Timah 1st Diversion Canal.

A new diversion canal will also be built at the upstream of Stamford Canal catchment to divert rainwater from more than 1/3 of the catchment to the Singapore River. Together with the new detention tank, the diversion canal will enhance the drainage capacity of the Stamford Canal catchment.



# Other Flood Protection Measures

## Buildings

Buildings can add structural measures such as humps and flood barriers to protect their basement levels from floodwaters. They can also link the water-level sensors in the basement carpark to their alarm systems in order to warn their users of flooding.



## Residential Premises

Apart from storing belongings on high levels, home-owners in the low-lying areas can look into having floor boards or sand bags on standby.



## Water Level Sensors / CCTVs

### Water Level Sensors

158 water level sensors around Singapore for monitoring of the drainage system. Updated every 10 min, the sensors provide data on water levels in the drains & canals to enhance the monitoring of real-time conditions during heavy storm.

### CCTVs

Located in areas like Orchard, CBD, Bukit Timah, Upper Thomson, AMK, Little India, Queenstown, etc, to provide up-to-date pictures of the conditions. Updated every 5 min.



## Subscribe to SMS Alerts

### Heavy Rain Warning

Subscribers will receive an SMS alert from NEA whenever heavy rain is expected. The alert will include location of the rain and tidal change data.

The Heavy Rain Warning information is also available on NEA websites.

### High Water Level Alert

The 158 sensors in key canals and drains are used to track the water levels. Subscribers will receive progressive SMS alerts if the water level in the selected canal rises above 50%, 75%, 90% and 100%.

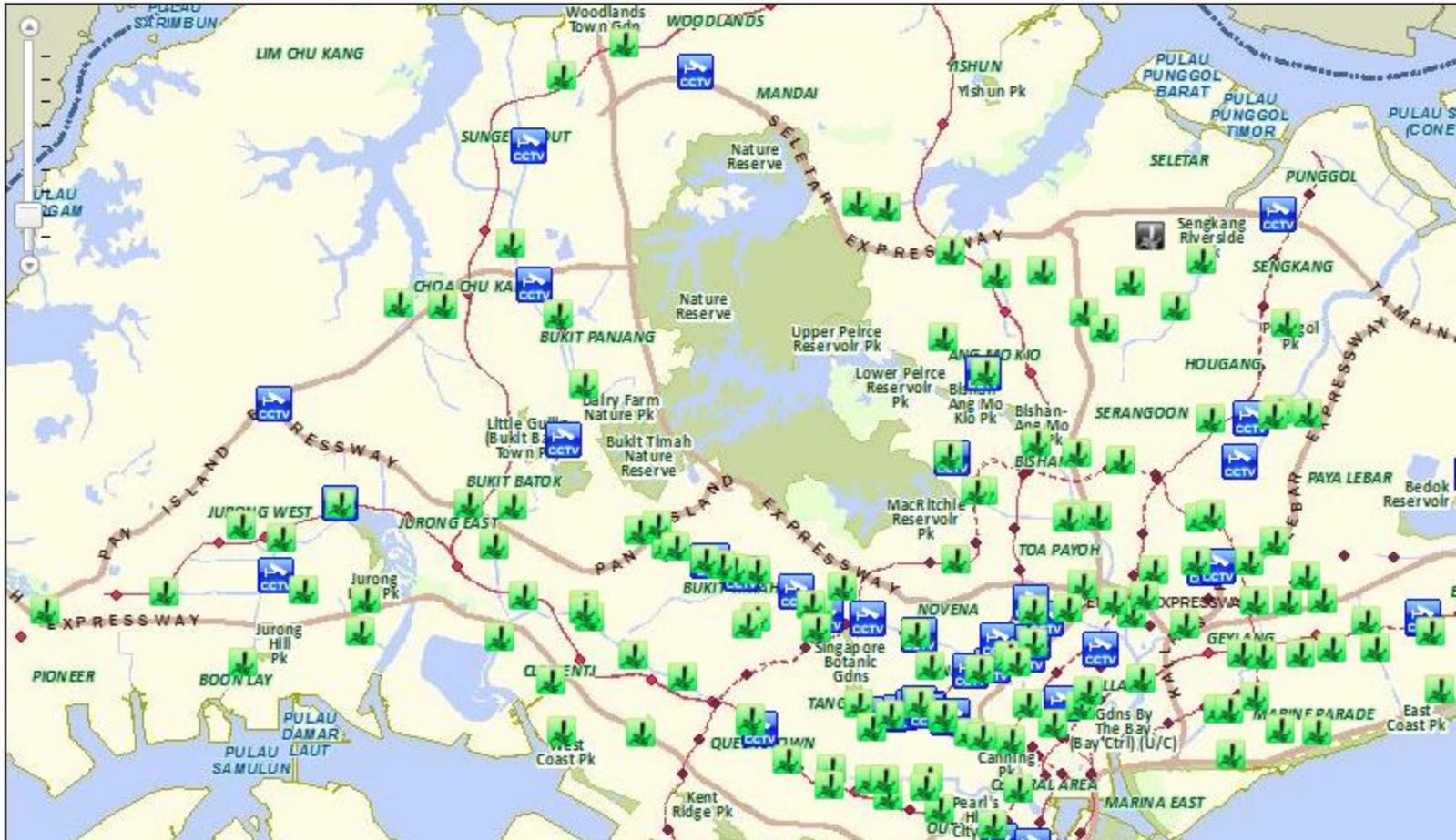


# Other Flood Protection Measures

Interactive Map, search by building or street name.

Search  Go

Water Level Stations  CCTVs  Both



<http://app.pub.gov.sg/WaterLevel/LargeMap.aspx>

# Other Flood Protection Measures

## 24 hr Hotline

Building and residential owners can contact PUB via 1800-2846600

## NEA Radio Broadcasts

The latest weather reports, including heavy rain warnings, available over radio broadcasts or through NEA weather forecast hotline at 6542 7788.



# Marina Barrage



Singapore's Latest Downtown Icon



# Marina Barrage for Flood Control

The Marina Barrage is part of a comprehensive flood control system to alleviate flooding in the low-lying areas such as Chinatown, Jalan Besar and Geylang.

During heavy rain, the series of 9 crest gates at the dam will be activated to release excess storm water into the sea during low tide.

During high tide, giant pumps will drain excess storm water into the sea.



The change in the climate is one of the prime factors for the flash flood. More has to be done to improve the drainage but the long term solution is to reduce carbon emission and going green for the construction sector would be a step forward in the right direction.



Thank you



We shape a **safe**, **high quality**, **sustainable** and **friendly** built environment.

