EMPLOYMENT USE FLOORSPACE DEMAND AND LAND REQUIREMENTS FOR REFERENCE (REVISED) AND ALTERNATIVE SCENARIOS

GHK (Hong Kong) Ltd

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This paper is prepared by GHK (HK) Ltd for information and discussion purposes. The findings and recommendations do not necessarily represent the views of the HKSARG.
EMPLOYMENT USE FLOORSPACE DEMAND AND LAND REQUIREMENTS
FOR REFERENCE (REVISED) AND ALTERNATIVE SCENARIOS

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1 INTRODUCTION

1.1 Background

This technical paper has been prepared as part of the reporting on the economic planning services component of the current Territorial Development Strategy (TDS) Review – Hong Kong 2030: Planning Vision and Strategy (HK2030 Study). It is the fourth of four technical papers covering each of the four stages of work as set out below:

Stage 1 - Land Use Typology

Stage 1 comprised three main tasks as detailed below:
- Task 1.1 – future economic structure and key economic activities;
- Task 1.2 – property and land requirements for future economic activities;
- Task 1.3 – review of existing land use typology.

Stage 2 - Model Establishment

Stage 2 comprised three main tasks as detailed below:
- Task 2.1 – review of existing forecasting models;
- Task 2.2 – preparation of a short / medium term forecasting model;
- Task 2.3 – preparation of a long term forecasting model.

Stage 3 - Floorspace Demand and Land Requirements for Reference Scenario

Stage 3 comprised three main tasks as detailed below:
- Task 3.1 – development of a reference scenario;
- Task 3.2 – estimate of floorspace demand for reference scenario;
- Task 3.3 – projection of land requirements for reference scenario.

Stage 4 - Floorspace Demand and Land Requirements for Alternative Scenarios

Stage 4 comprised three main tasks as detailed below:
- Task 4.1 – development of alternative development scenarios and options;
- Task 4.2 – estimate of floorspace demand for alternative scenarios;
- Task 4.3 – projection of land requirements for alternative scenarios.

1.2 Scope

This technical paper will revisit the findings of Stage 3 work. Its primary purpose is to apply the modelling approach developed in Stage 3 and estimate the floorspace demand and assess the land requirements for employment land uses under the reference scenario and alternative scenarios using the currently available data and assumptions.

The scope of this technical paper builds on the work of the preceding technical papers. WP1 set out the recommended land use typology which has been followed here and WP3 (which superseded WP2) recommended the preferred modelling approaches for use in the short, medium and long term. The main objective of WP4 is to apply these
approaches and prepare medium and long term forecasts for the HK2030 strategic planning process.

Forecasts for years 2010, 2020 and 2030 have been prepared for the reference scenario and alternative scenarios taken into account the planning assumptions provided by the Planning Department in May 2005.

1.3 Structure

This technical paper is set out in three further chapters following this introduction. The coverage and purpose of each chapter is set out below.

- Chapter 2 on “Reference Scenario and Alternative Scenarios”, outlines the development scenarios developed for the HK2030 strategic planning process and presents the current planning assumptions under the scenarios.
- Chapter 3 on “Forecasting Models and Results” contains the forecasting models for the medium and long term, as well as the floorspace demand forecasts prepared using these models and the planning assumptions under the various development scenarios.
- Chapter 4 on “Projection of Land Requirements” estimates the demand for additional floorspace and converts the demand for additional floorspace into additional land requirements.
2 REFERENCE SCENARIO AND ALTERNATIVE SCENARIOS

2.1 Background

2.1.1 Reference Scenario (RS)

Stage 3 of the HK2030 Study drew on the findings of Stage 1 (Agenda Setting, Baseline Review and Identification of Key Issues) and Stage 2 (Examination of Key Issues) to create a base for constructing possible development scenarios for the future. A RS was constructed on the basis of prevailing policies and socio-economic trends by the Planning Department in late 2002 to translate the long term vision targets into planning assumptions. The preliminary planning assumptions under the RS were employed for the preparation of demand forecasts and estimation of land requirements for employment uses (see WP3).

The planning assumptions under the RS were subsequently revisited and reviewed after the completion of a public consultation exercise (HK2030 Study Stage 3 Public Consultation) carried out in the period from late 2003 to mid 2004. Demand forecasting in this technical paper has employed the revised planning assumptions under the RS (as at May 2005), which considered both public views collected and the latest policies and socio-economic trends.

2.1.2 Alternative Scenarios: “What-If Scenarios”

“What-if” scenarios, i.e. alternatives to the RS, have been developed in view of the likelihood of unexpected changes. The planning parameters under the RS have been varied for assessing the potential impacts of the alternative situations. Response plans will be devised to respond to these situations as necessary.

Two “what-if” scenarios, which have direct implications for strategic development planning and are more likely to happen in the future, have been selected by the Planning Department for more detailed examination and quantitative assessment under Stage 4 of the HK2030 Study. To derive the two alternative scenarios, two key planning parameters on population and economic growth have been varied. These planning assumptions have been employed for the preparation of demand forecasts and the estimation of additional land requirements for alternative scenarios in this technical paper.

The selected alternative scenarios are:

- **Low Population Growth Scenario (LPGS)** – a low population growth and steady economic growth situation. It is assumed that Hong Kong will move more rapidly towards a high-value added, non-worker intensive, knowledge-based economy, thereby maintaining the same level of economic growth under the RS. It is also assumed that some of the less skilled workers and more of the elderly population will retire to the Mainland and those who cannot afford the high costs of living will be displaced, resulting in a lower population compared with the RS. More workers are likely to live in the Pearl River Delta (PRD) and commute to Hong Kong to work, as a result of the future improvements in living conditions in the PRD and cross-boundary infrastructure. It is therefore assumed that there will be more cross-boundary workers, who are counted as employment but not resident population in Hong Kong.

- **High Population Growth Scenario (HPGS)** – a high population growth and high economic growth situation. It is assumed that Hong Kong will maintain high levels of
economic growth to the long term. More jobs will be created and more people will be attracted to live in Hong Kong, compared with the RS.

### 2.2 Key Planning Assumptions

The key planning assumptions under the reference scenario and the two “what-if” scenarios are presented in Tables 2.1 to 2.3. These assumptions have been used to prepare demand forecasts for employment uses in this technical paper.

#### Table 2.1 Population Assumptions (in million)

<table>
<thead>
<tr>
<th>Year</th>
<th>RS</th>
<th>LPGS</th>
<th>HPGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>6.8</td>
<td>6.8</td>
<td>6.8</td>
</tr>
<tr>
<td>2010</td>
<td>7.2</td>
<td>7.1</td>
<td>7.2</td>
</tr>
<tr>
<td>2020</td>
<td>7.8</td>
<td>7.6</td>
<td>8.0</td>
</tr>
<tr>
<td>2030</td>
<td>8.4</td>
<td>8.0</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Source: Planning Department (as at May 2005)

#### Table 2.2 Economic Growth Assumptions (% Real Growth)

<table>
<thead>
<tr>
<th>Year</th>
<th>RS</th>
<th>LPGS</th>
<th>HPGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hong Kong</td>
<td>Guangdong</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>2003</td>
<td>3.2</td>
<td>13.0</td>
<td>3.2</td>
</tr>
<tr>
<td>2003-2010</td>
<td>4.0</td>
<td>10.0</td>
<td>4.0</td>
</tr>
<tr>
<td>2011-2020</td>
<td>3.5</td>
<td>8.0</td>
<td>3.5</td>
</tr>
<tr>
<td>2021-2030</td>
<td>3.0</td>
<td>--</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Source: Planning Department (as at May 2005)

#### Table 2.3 Employment Assumptions (in million)

<table>
<thead>
<tr>
<th>Year</th>
<th>RS</th>
<th>LPGS</th>
<th>HPGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>2010</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>2020</td>
<td>3.7</td>
<td>3.7</td>
<td>3.9</td>
</tr>
<tr>
<td>2030</td>
<td>4.0</td>
<td>4.0</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Source: Planning Department (as at May 2005)

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1 The GDP growth assumptions for Guangdong have also been revised upwards taking into account the latest strong performance of the Guangdong economy.
3 FORECASTING MODELS AND RESULTS

3.1 Introduction

The road to economic recovery from the Asian financial crises in late 1990’s has been bumpy (Figure 3.1). Following the strong rebound in 2000, the pace of economic recovery was dampened by a slowdown in the global economy in 2001 and 2002. In early 2003, Hong Kong was hit hard by the outbreak of SARS (severe acute respiratory syndrome) disease which virtually shut down many economic activities in the second quarter of the year. This unprecedented event was followed by a full-fledged upturn in late 2003 and 2004, marked by thriving exports and offshore trade, vibrant inbound tourism, a return of consumer confidence, and visible rebound in investment.

Figure 3.1  Hong Kong GDP (2000 to 2004)

Source: C&SD
The Closer Economic Partnership Arrangement (CEPA) signed between the Chinese Mainland and the Hong Kong Special Administrative Region governments in 2004 (CEPA I) has also supported economic growth. The free trade agreement essentially brings forward WTO commitments to support the integration of Hong Kong and the Mainland economies, easing trade in goods and services, and facilitating investment. A key focus is to improve Hong Kong’s access to Mainland services’ markets. CEPA offers easier market access to a wide range of service industries, either by relaxing equity and capital requirements for foreign investors, offering early liberalisation or by opening up sectors not included in the WTO accession.

The Hong Kong economy is expected to sustain steady growth to the long term, building on the strong and comprehensive economic expansion in 2004.

We consider that the negative impacts of the SARS event and the strong rebound immediately following the incident are exceptional cases, and we recommend excluding 2003 and 2004 data in model development. Nevertheless, the baseline for forecasting has been updated to year 2003 in this technical paper.

3.2 Medium Term Forecasting Models and Results

The medium term forecasting models developed in WP3 have been calibrated to include 2002 data (2002).

The equation of Model 1 developed based on 1978-1996, 1998 and 2000-2002 data is:

\[
TDC = -18525423 + 66939 \times (\sqrt{HKGDP}) - 236984 \times (\sqrt{GDGDP})
\]

Model 1

where

- \(TDC\) = Total floorspace demand for employment uses
- \(HKGDP\) = GDP of Hong Kong at 1990 prices in million HK$
- \(GDGDP\) = GDP of Guangdong Province at 1978 price level in 100 million yuan

Another model was developed based on 1978-1996, 1998 and 2000 data to cross check the accuracy of this forecasting approach. The statistical performance of both models is presented in Appendix A. Table 3.1 and Figure 3.2 summarise the medium term forecasts prepared using these two models under the RS and the two alternative scenarios, and compare the forecasts with historical data. All projected values are within the 95% confidence interval, the error of about 1% is considered reasonable and acceptable (see Appendix A).
### Table 3.1  Medium Term Forecasts (Model 1 and Model 1a)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Demand (million sq.m. IFA)</td>
<td>Demand (million sq.m. IFA)</td>
<td>Error (within 95% Confidence Interval)</td>
</tr>
<tr>
<td>2001</td>
<td>31.0</td>
<td>31.3</td>
<td>0.7% (yes)</td>
</tr>
<tr>
<td>2002</td>
<td>30.7</td>
<td>31.1</td>
<td>1.4% (yes)</td>
</tr>
<tr>
<td>2003</td>
<td>30.8</td>
<td>31.2</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>34.8</td>
<td>34.3</td>
<td>34.3</td>
</tr>
</tbody>
</table>

### Figure 3.2  Medium Term Forecasts (Model 1 and Model 1a) under RS

Model 1a (Based on 1978-1996, 1998 & 2000 data)

The equation of Model 2 developed based on 1979-1991, 1993-1995 and 1997-2002 data is:

\[
TDC = -39974860 + 4.86 \text{Population} + 16.8 \text{PE}
\]

Model 2

where

Population = Population of usual residents in Hong Kong

PE = Persons engaged in selected sectors (HSIC 2 to 9)\(^2\)

Like Model 1, another model, Model 2a, was developed based on 1979-1991, 1993-1995 and 1997-2000 data to cross check the accuracy of this forecasting approach. The statistical performance of both models is presented in Appendix A. Table 3.2 and Figure 3.3 summarise the medium term forecasts prepared using these models under the RS and the two alternative scenarios, and compare the forecasts with historical data. The projected values for 2001 and 2002 using model 2a fall outside the 95% confidence interval - the error of about 4% is considered too high and unacceptable. As discussed in WP3, an adjustment ratio has been applied to the modelling results to correct the overestimation of floorspace demand by model 2. The adjusted projection is presented in Table 3.3.

\(^2\) The persons engaged in employment sectors are assumed to grow at the same rates as the employment under the RS.
Table 3.2 Medium Term Forecasts (Model 2 and Model 2a)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Demand (million sq.m. IFA)</td>
<td>Demand (million sq.m. IFA)</td>
<td>Error (within 95% Confidence Interval)</td>
</tr>
<tr>
<td>2001</td>
<td>31.0</td>
<td>32.1</td>
<td>3.6% (no)</td>
</tr>
<tr>
<td>2002</td>
<td>30.7</td>
<td>31.9</td>
<td>4.0% (no)</td>
</tr>
<tr>
<td>2003</td>
<td>30.8</td>
<td>30.8</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>37.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.3 Medium Term Forecasts (Model 2 and Model 2a) under RS


Table 3.3 Medium Term Forecasts (Model 2) – Adjusted Projection

<table>
<thead>
<tr>
<th>Year</th>
<th>Adjustment Ratio</th>
<th>Demand (million sq.m. IFA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>RS</td>
</tr>
<tr>
<td>2010</td>
<td>5.0%</td>
<td>34.9</td>
</tr>
</tbody>
</table>

As recommended in WP3, the results of model 1 and model 2 have been averaged to produce a single forecast as required by the Planning Department for the estimation of land requirements (Table 3.4).

Table 3.4 Medium Term Forecasts*

<table>
<thead>
<tr>
<th>Year</th>
<th>Demand (million sq.m. IFA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RS</td>
</tr>
<tr>
<td>2010</td>
<td>34.6</td>
</tr>
</tbody>
</table>

* by averaging the results of model 1 and model 2

3.3 Long Term Forecasting Models and Results

The long term forecasting adopts a more qualitative approach which focuses on employment and worker density as the main drivers of employment land use demand. A range of other factors and relationship determining employment is also emphasised.

The equation for the long term forecasting model is:
Floorspace = Employment \times \% \text{Employment Accommodated in HK's Employment Land Uses} \times \text{Worker Density}

WP3 detailed our recommended approach for long term forecasting where year 2001 situation was used as a baseline for projection.

Considering the unprecedented SARS event in early 2003 and strong rebound in late 2003 and 2004, we do not see the need to update the baseline situation and forecasting assumptions derived based on the past and baseline situation. The key forecasting assumptions and results are presented in Table 3.5.

<table>
<thead>
<tr>
<th>Table 3.5</th>
<th>Long Term Forecasting Assumptions and Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RS/LPGS (million sq.m. IFA)</td>
</tr>
<tr>
<td></td>
<td>2020</td>
</tr>
<tr>
<td>Hong Kong Employment</td>
<td>3.7</td>
</tr>
<tr>
<td>% Employment accommodated in HK's employment land uses$^3$</td>
<td>48.0%</td>
</tr>
<tr>
<td>Worker density (sq.m. IFA per person)$^*$</td>
<td>20.0</td>
</tr>
<tr>
<td>Employment Use Floorspace Demand (sq.m. IFA)</td>
<td>35.9</td>
</tr>
</tbody>
</table>

Source: * Consultant’s assumptions

3.4 Summary of Forecasting Results

The medium and long term forecasting results are summarised in Figure 3.4. The results suggest a steady increase in the demand for employment uses to the long term, attributed to anticipated population and economic growth. The floorspace demand is expected to be growing at a slower pace in the long term under the LPGS, compared with the RS and HPGS.

\[^3\text{As a result of continuous economic restructuring, advances in technology and rising office rentals, there is a growing trend for outsourcing, relocation of back office activities to less prime locations or outside Hong Kong, \"hot-desk\" working practices and working from home etc. A likely consequence could be less demand for floorspace in the three land use categories being assessed. On this basis the proportion of the total activity to be accommodated by the economic land in Hong Kong is expected to decrease marginally from 50% in 2001 to an assumed level of 47.5% in 2030. \text{(*A desk that is not assigned to a particular employee, but rather is available for use and can be reserved in advance by a mobile worker whenever they are required to be in the office)}}\]
3.5 **Disaggregation of Floorspace by Typology**

WP3 presented our recommended approach to the disaggregation of floorspace. The assumptions for the disaggregation have been reviewed by the Planning Department in the light of public views collected from their Stage 3 Consultation. Factors that could affect the share amongst the three types of economic floorspace uses are summarised below.

**Factors Affecting Office Demand**

Under the vision of the HK2030 Study, Hong Kong’s role as an international financial centre and the “gateway to China” is expected to be maintained. Hong Kong will continue to attract foreign firms to set up their regional headquarters or offices here. The latest survey conducted by C&SD (June 2004) recorded a total of 3,609 overseas companies having established their regional operations in Hong Kong. The number of regional headquarters increased from 966 in 2003 to 1,098; the number of regional offices increased by 12% from 2,241 to 2,511, both being all time highs. InvestHK initiatives have helped to maintain this growth and will continue to boost demand for high-grade offices.

**Factors Affecting Demand for General Business Accommodation**

Acting as the “Mainland’s springboard to the world” is another important role of Hong Kong. Since 2003, the central government has introduced a series of new policies and measures to support Mainland enterprise seeking to access international markets and do
A draft policy was issued in 2004 with a focus on further liberalisation of the existing regulatory regime and increased autonomy for Mainland enterprises with regard to the use of their own foreign exchange funds. The signing of CEPA I and II in 2003 and 2004 has brought further benefits to the Hong Kong economy. 4.26 million Mainland resident trips were made and an estimated additional $6.5 billion tourist spending was generated in 2004 under the Individual Visit Scheme, with related impacts on the tourism sector and demand for accommodation. CEPA also facilitates the setting up of operations in Hong Kong by Mainland private enterprises. As advised by CITB, many of those already established here tend to be small and medium-sized enterprises demanding less prime locations. In this regard, it could be assumed that in future, there will be relatively higher demand for land for General Business uses, as compared to previous estimate.

**Factors Affecting Special Industrial Floorspace**

In the past few decades, Hong Kong’s economy has been changing rapidly, from a manufacturing base to a logistics and hi-tech services hub. It is envisaged that there would be a growing demand for special industrial floorspace from the logistics sector and, less significantly, from some higher value-added industries. As understood from CITB, there has been a recovery in the take-up rate for land at the existing industrial estates. We could therefore assume that the share of accommodation for special industries in future would be slightly higher than previously anticipated.

**Revised Forecast Results**

In the light of the above new circumstances, the models have been recalibrated with new input data. The revised inputs are shown in Table 3.6 and the disaggregation results in Table 3.7.

**Table 3.6 Split Factors for Disaggregation of Floorspace Demand**

<table>
<thead>
<tr>
<th>Year</th>
<th>CBD Grade A Offices</th>
<th>General Business</th>
<th>Special Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>11.0%</td>
<td>77.0%</td>
<td>12.0%</td>
</tr>
<tr>
<td>2020</td>
<td>12.0%</td>
<td>75.5%</td>
<td>12.5%</td>
</tr>
<tr>
<td>2030</td>
<td>13.0%</td>
<td>74.0%</td>
<td>13.0%</td>
</tr>
</tbody>
</table>

---


<table>
<thead>
<tr>
<th>Year</th>
<th>CBD Grade A Offices</th>
<th>General Business</th>
<th>Special Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RS</td>
<td>LPGS</td>
<td>HPGS</td>
</tr>
<tr>
<td>2010</td>
<td>3.8</td>
<td>3.8</td>
<td>3.8</td>
</tr>
<tr>
<td>2020</td>
<td>4.3</td>
<td>4.3</td>
<td>4.5</td>
</tr>
<tr>
<td>2030</td>
<td>5.0</td>
<td>5.0</td>
<td>5.5</td>
</tr>
</tbody>
</table>
4 PROJECTION OF LAND REQUIREMENTS

4.1 Introduction

Our recommendations on the estimation of additional land use requirements have been presented in WP3 (Addendum 2). In this technical paper, the baseline of existing stock has been updated from 2001 to 2003, and the various assumptions on planning parameters have been reviewed by the Planning Department.

4.2 Assumptions on Planning Parameters and Results

The planning parameters used for the estimation of additional land requirements are presented in Table 4.1. The additional land requirements are presented in Table 4.2. The additional land requirement by 2030 is estimated to be in the order of 293ha under the HPGS.

Table 4.1 Assumptions on Planning Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>CBD Grade A Offices</th>
<th>General Business</th>
<th>Special Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>vacancy rate</td>
<td>10%</td>
<td>10%</td>
<td>6%</td>
</tr>
<tr>
<td>IFA to GFA</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>plot ratio(^6)</td>
<td>14</td>
<td>11</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Consultant’s assumptions taken into account Planning Department’s input as at May 2005. For vacancy rates, reference is also made to R&VD’s vacant stock from 1999 to 2003.

Table 4.2 Land Requirements (on top of 2003 stock in ha) to Meet Project Demand

<table>
<thead>
<tr>
<th>RS</th>
<th>CBD Grade A Offices</th>
<th>General Business</th>
<th>Special Industries</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 to 2010</td>
<td>7</td>
<td>22</td>
<td>84</td>
<td>113</td>
</tr>
<tr>
<td>2004 to 2020</td>
<td>12</td>
<td>29</td>
<td>108</td>
<td>148</td>
</tr>
<tr>
<td>2004 to 2030</td>
<td>19</td>
<td>49</td>
<td>146</td>
<td>215</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RS</th>
<th>CBD Grade A Offices</th>
<th>General Business</th>
<th>Special Industries</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 to 2010</td>
<td>6</td>
<td>21</td>
<td>82</td>
<td>109</td>
</tr>
<tr>
<td>2004 to 2020</td>
<td>12</td>
<td>29</td>
<td>108</td>
<td>148</td>
</tr>
<tr>
<td>2004 to 2030</td>
<td>19</td>
<td>49</td>
<td>146</td>
<td>215</td>
</tr>
</tbody>
</table>

\(^6\) The plot ratios are derived on the basis of the following: (a) plot ratios (PR) 15 under the Building Planning Regulations (BPR) for non-domestic developments in Hong Kong Island, (b) PR 12 for commercial zones in OZPs for Kowloon, (c) PR 9.5 for non-domestic developments in new towns and (d) PRs of industrial park type developments (i.e. PRs 1.5 and 2.5 of Science Park and Tseung Kwan O Industrial Estate respectively). For CBD Grade A Offices, the PR is derived by averaging (a) and (b). For General Business, the PR is obtained by assuming that 50%, 30% and 20% of the supply will be in the New Territories (PR 9.5), Kowloon (PR 12) and Hong Kong Island (PR 15) respectively. For Special Industries, the PR is the average of the PRs of the industrial park type developments in (d).
<table>
<thead>
<tr>
<th></th>
<th>Offices</th>
<th>Business</th>
<th>Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 to 2010</td>
<td>7</td>
<td>22</td>
<td>84</td>
</tr>
<tr>
<td>2004 to 2020</td>
<td>14</td>
<td>47</td>
<td>124</td>
</tr>
<tr>
<td>2004 to 2030</td>
<td>25</td>
<td>87</td>
<td>181</td>
</tr>
</tbody>
</table>

Floorspace = \(-18525423 + 66939 \text{SqRtHKGDP} - 236984 \text{SqRtGDGDP}\)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>(-18525423)</td>
<td>1596925</td>
<td>11.60</td>
<td>0.000</td>
</tr>
<tr>
<td>SqRtHKGDP</td>
<td>66939</td>
<td>3402</td>
<td>19.68</td>
<td>0.000</td>
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<tr>
<td>SqRtGDGDP</td>
<td>(-236984)</td>
<td>31986</td>
<td>(-7.41)</td>
<td>0.000</td>
</tr>
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</table>

\(S = 633934\) \(\text{R-Sq} = 99.0\%\) \(\text{R-Sq(adj)} = 98.9\%\)

Analysis of Variance

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2</td>
<td>(8.33301\times10^{14})</td>
<td>(4.16650\times10^{14})</td>
<td>1036.77</td>
<td>0.000</td>
</tr>
<tr>
<td>Residual Error</td>
<td>20</td>
<td>(8.03745\times10^{12})</td>
<td>(4.01873\times10^{11})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>(8.41338\times10^{14})</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Durbin-Watson statistic = 1.72560
Model 1a (Based on 1978-1996, 1998 and 2000 data)

Floorspace = -18174281 + 65985 \sqrt{HKGDP} - 224642 \sqrt{GDGDP}

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-18174281</td>
<td>1824061</td>
<td>-9.96</td>
<td>0.000</td>
</tr>
<tr>
<td>\sqrt{HKGDP}</td>
<td>65985</td>
<td>4079</td>
<td>16.18</td>
<td>0.000</td>
</tr>
<tr>
<td>\sqrt{GDGDP}</td>
<td>-224642</td>
<td>42360</td>
<td>-5.30</td>
<td>0.000</td>
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</tbody>
</table>

S = 663784  R-Sq = 98.9%  R-Sq(adj) = 98.8%

Analysis of Variance

<table>
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<tr>
<th>Source</th>
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<th>P</th>
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<tbody>
<tr>
<td>Regression</td>
<td>2</td>
<td>7.21713E+14</td>
<td>3.60857E+14</td>
<td>819.00</td>
<td>0.000</td>
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<tr>
<td>Residual Error</td>
<td>18</td>
<td>7.93095E+12</td>
<td>4.40609E+11</td>
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<tr>
<td>Total</td>
<td>20</td>
<td>7.29644E+14</td>
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</tbody>
</table>

Durbin-Watson statistic = 1.69707

Residual Plots for Floorspace

[Normal Probability Plot of the Residuals]

[Residuals Versus the Fitted Values]

Floorspace = - 39974860 + 4.86 Population + 16.8 PE

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-39974860</td>
<td>1840737</td>
<td>-21.72</td>
<td>0.000</td>
</tr>
<tr>
<td>Population</td>
<td>4.8554</td>
<td>0.4887</td>
<td>9.94</td>
<td>0.000</td>
</tr>
<tr>
<td>PE</td>
<td>16.825</td>
<td>1.422</td>
<td>11.83</td>
<td>0.000</td>
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</tbody>
</table>

S = 763301  R-Sq = 98.5%  R-Sq(adj) = 98.3%

Analysis of Variance

<table>
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<tr>
<th>Source</th>
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<th>P</th>
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</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2</td>
<td>7.22479E+14</td>
<td>3.61240E+14</td>
<td>620.02</td>
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<tr>
<td>Residual Error</td>
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<td>1.10699E+13</td>
<td>5.82629E+11</td>
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<tr>
<td>Total</td>
<td>21</td>
<td>7.33549E+14</td>
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</table>

Durbin-Watson statistic = 1.59242

Residual Plots for Floorspace

- Normal Probability Plot of the Residuals
- Residuals Versus the Fitted Values

Floorspace = -41249269 + 5.38 Population + 16.0 PE

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-41249269</td>
<td>1936361</td>
<td>-21.30</td>
<td>0.000</td>
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<tr>
<td>Population</td>
<td>5.3811</td>
<td>0.5638</td>
<td>9.54</td>
<td>0.000</td>
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<tr>
<td>PE</td>
<td>16.037</td>
<td>1.459</td>
<td>11.00</td>
<td>0.000</td>
</tr>
</tbody>
</table>

S = 743276  R-Sq = 98.5%  R-Sq(adj) = 98.4%

Analysis of Variance

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
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<th>MS</th>
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<th>P</th>
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</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2</td>
<td>6.32802E+14</td>
<td>3.16401E+14</td>
<td>572.71</td>
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<tr>
<td>Residual Error</td>
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<td>9.39180E+12</td>
<td>5.52459E+11</td>
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<tr>
<td>Total</td>
<td>19</td>
<td>6.42194E+14</td>
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</tbody>
</table>

Durbin-Watson statistic = 1.76277

Residual Plots for Floorspace

- Normal Probability Plot of the Residuals
- Residuals Versus the Fitted Values

![Residual Plots](image)