

PROPOSED LEGISLATION FOR 3D CADASTRE IN MALAYSIA¹

Chan Keat Lim, Teng Chee Hua, David Loo Kean Beng

Director of Survey-Cadastral Legislation, JUPEM, Deputy Director General II for the Department of Survey and Mapping Malaysia (DSMM), Company Secretary for Mass Rapid Transit Corporation Sdn. Bhd (MRT Corp)

Key words: Stratum, Spatium, 2D and 3D cadastre, volumetric lot

SUMMARY

Malaysia is fortunate to be acknowledged as having some of the best practises amongst the cadastral systems in the world. Even though the cadastral system is predominantly 2D based, with the introduction of Part Five (A) of the National Land Code 1965 (NLC) on Disposal of Underground Land in 1990², it is now possible to own a separate title over a "stratum" or 3D (volumetric) of underground land. In order for the cadastral system to support the emerging trend of overlapping or stacking developments due to scarcity and the exorbitant price of land for development in major cities such as Kuala Lumpur, Johor Bahru and George Town, titles for 3D parcels above (in addition to below) ground should also be legally recognised.

In the Malaysian context, one of the key missing pieces to complete the 3D Cadastre jigsaw puzzle is the lack of provisions for titles for air space (i.e. 3D volumetric air space lot) coupled with the corresponding limitation to the height of the surface land below the air space lot. In other words, with the proposed legislation, (1) a 3D volumetric lot may consist wholly of air space, or (2) surface land (together with specific limits to enjoyment of air space above and underground land below), or (3) underground land, each of which may take any shape that is geometrically known as polyhedron.

This paper proposes to introduce proposed legislation for a 3D air space title in Malaysia. It draws on Part Five (A) of the NLC on Disposal of Underground Land with the aim of introducing the concept of "spatium" lots with measurements in 3D. A new part in the NLC, called Part Five (B), is proposed with consequential amendments to several existing sections as a starting point for the relevant authorities to deliberate further with respect to the introduction of 3D cadastral legislation for the establishment and registration of properties under and above surface land to support sustainable development in the country.

¹ This paper was presented at the FIG Congress 2018 in Istanbul, Turkey

² National Land Code (Amendment) Act 1990 (A752/90) came into force on 23-02-1990

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1. INTRODUCTION

Kuala Lumpur and its environs has grown significantly over the years. It is ranked 50th in the list of largest built-up urban areas in the world³. Like the rest of the world, the pressure on limited land available for development has led to more dense and innovative land utilisation.

The essential challenge is to address the various issues relating to land by creating a more resilient and sustainable city by innovatively creating development land from the finite resources. As construction technology advances, developers and urban designers in densely populated and crowded cities have begun to create overlapping developments by going under or above existing development.

³ Demographia World Urban Areas 13th Annual Edition: 2017:04

Figure 1: The Hangover: Cantilevered Buildings of New York

<http://cdn.archinect.net/images/650x/a8/a87156746965e9d06a32fc9d4d4585c4.jpg>

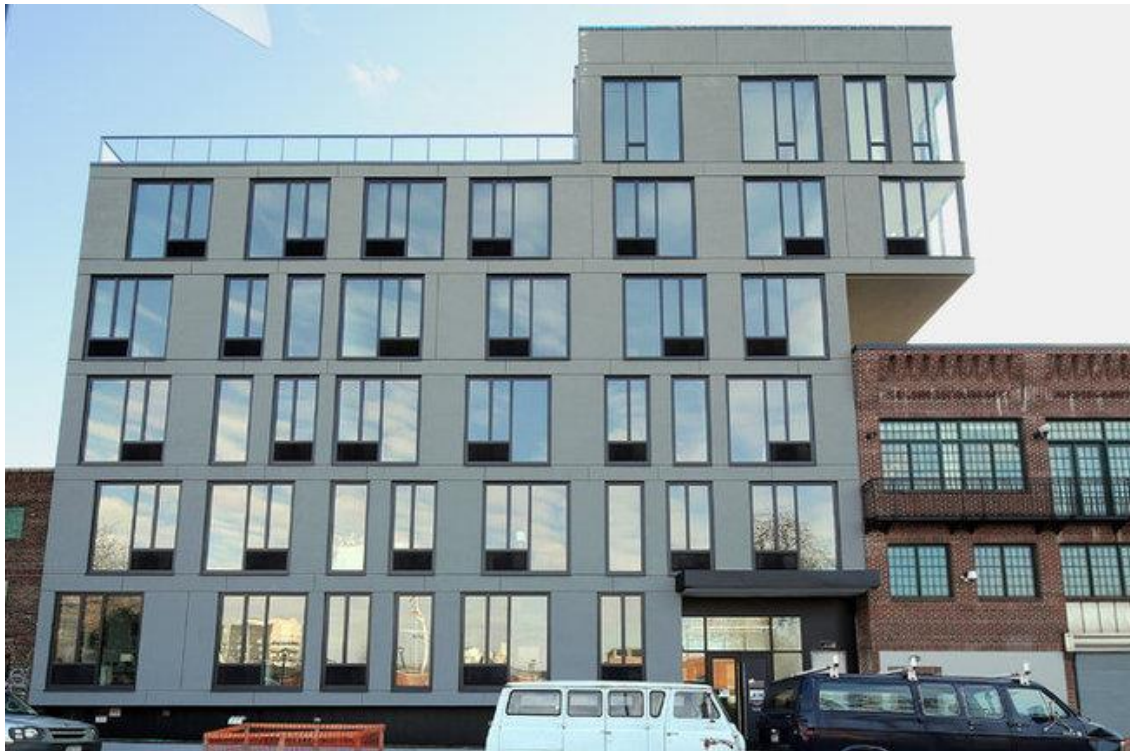


Figure 2: Unilever Building in Rotterdam, The Netherlands
Unilever wasn't permitted to tear down the traditional Dutch architecture so they built up and over it.
https://c1.staticflickr.com/3/2129/1541194486_ca07c2ad75_z.jpg?zz=1



Figure 3: 3Box on the rooftops in Paris by Malka Architecture

Nested on the edge of the river Seine in Paris, these housing units are now possible thanks to « la Loi Alur », a new legislation that allows urban heightening.

<https://www.stephanemalka.com/?portfolio=3box-i-on-the-roof-tops-i-paris-661881>



Malaysia as an emerging economy has been undergoing rapid economic development over the past five decades and is beginning to experience the same pressure to her land resources.

In order for the cadastral system to support the emerging trend of overlapping or stacking developments due to scarcity and exorbitant price of land for development in major cities such as Kuala Lumpur, Johor Bahru and George Town, 3-dimensional (3D) land parcels below and above ground should be legally recognised. Situations

have emerged where the dimensions above and below the ground surface, besides those on the ground, are important considerations for the ability to establish separate ownership of different tiers of land within the same horizontal plane.

2. OBJECTIVES

In the Malaysian context, one of the key missing pieces to complete the 3D Cadastre jigsaw puzzle is the introduction of provisions for titles for air space (i.e. 3D volumetric air space lot) coupled with the corresponding limitation to the height of the surface land below the air space lot. In other words, with the proposed legislation, (1) a 3D volumetric lot may consist wholly of air space, or (2) surface land (together with specific limits to enjoyment of air space above and underground land below), or (3) underground land, each of which may take any shape, geometrically known as polyhedron.

This paper proposes to introduce legislation for a 3D air space title in Malaysia. It draws on the Part Five (A) of the NLC on Disposal of Underground Land with the aim of introducing the concept of "spatium" lots with measurements in 3D. A new part in the NLC, called Part Five (B), is proposed with consequential amendments to several existing sections as a starting point for the relevant authorities to deliberate further with respect to the introduction of 3D cadastral legislation for the establishment and registration of properties under and above surface land to support sustainable development in the country.

3. THE CURRENT SCENARIO

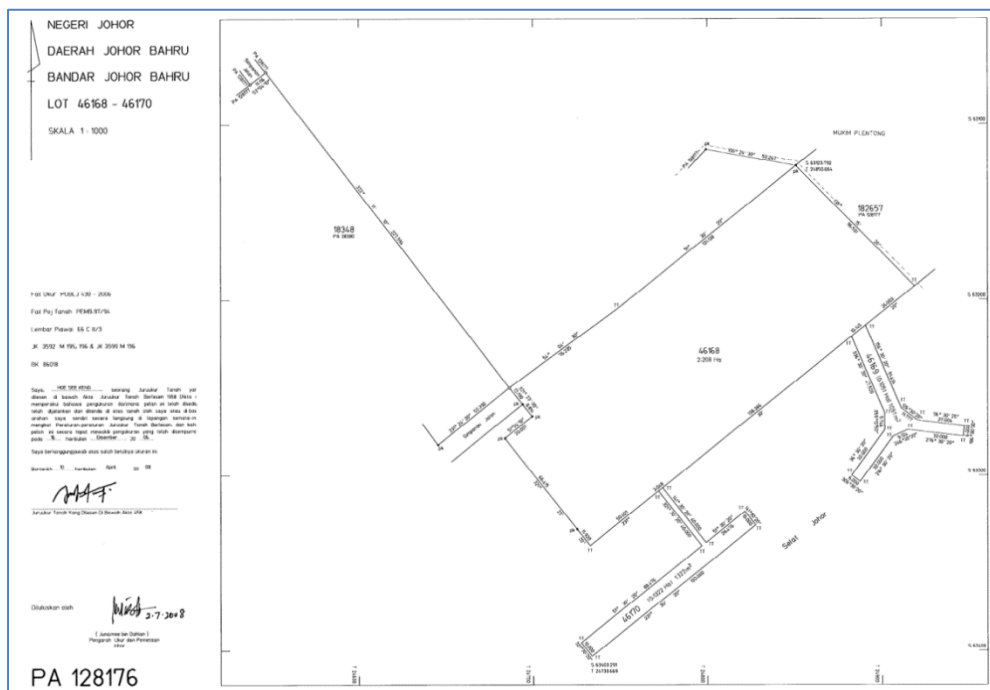
Malaysia is fortunate to be acknowledged as having some of the best practises amongst cadastral systems in the world. Even though the cadastral system is predominantly 2D based, with the introduction of Part 5A of the NLC on Disposal of Underground Land in 1990⁴, it is now possible to own a separate title over a "stratum" or 3D (volumetric) lot of underground land.

⁴ National Land Code (Amendment) Act 1990 (A752/90) came into force on 23-02-1990

After the introduction of Part 5A of the NLC, Malaysia currently recognizes titles for 3 types of lots or parcels of land, namely:

- i. traditional or "normal" land lot which is 2D (area) based, i.e. surface land
- ii. strata parcel and land parcel in strata scheme which is 2D based with height definition
- iii. stratum lot which is 3D (volumetric) based, for underground land only

Figure 4: Certified Plan (Surface land)



4. THE 3D CADASTRE CONCEPT

Conceptually, the owner of a 2D lot of land must have the right to enjoy some or all of the air space above as well as the underground land below the owner's 2D lot. It is often believed that the Latin brocard *cuius est solum, eius est usque ad coelum et ad inferos* (meaning whoever owns the soil, it is theirs all the way to Heaven and all the way to the depths below) applied to the land laws in the United Kingdom may not necessarily be the case⁵. In Malaysia, section 44 (1)(a) of NLC⁶ set limits to the extent of disposal of land to the proprietor. The proprietor enjoys the "exclusive use and enjoyment of so much of the column of airspace above the surface of the land, and so much of the land below that surface, as is reasonably necessary to the lawful use and enjoyment of the land" without setting any specific height or depth.

The concept of 3D cadastre simply defines a 3D lot of having limitations in all three dimensions duly registered in the cadastre providing the Rights, Restrictions and Responsibilities (3Rs) of the said 3D lot. This principle means that a 3D lot may extend from a specified level and as far into the ground defined by its depth or upwards into the air defined by its height.

⁵ See *Bocardo SA v. Star Energy UK Onshore Ltd and another* [2010] UKSC 35

⁶ 44 Extent of disposal: general

(1) Subject to the provisions of this Act and of any other written law for the time being in force, any person or body to whom (under this Act or a previous land law) land has been alienated, reserved land has been leased or temporary occupation licence (including a licence so styled under a previous land law) has been granted in respect of any land, shall be entitled to –

(a) the exclusive use and enjoyment of so much of the column of airspace above the surface of the land, and so much of the land below that surface, as is reasonably necessary to the lawful use and enjoyment of the land;

Figure 7: 3D Conceptual Model

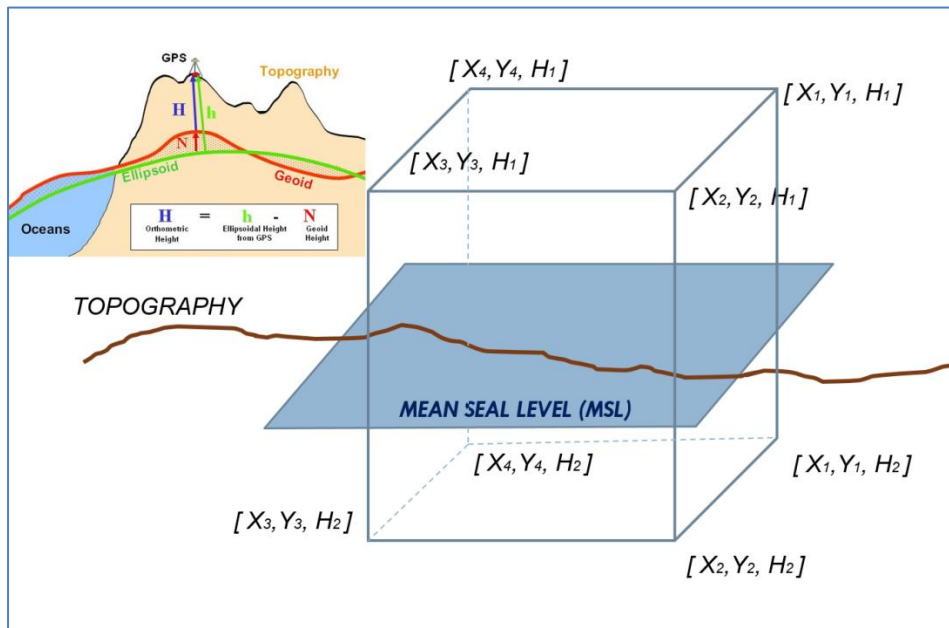


Figure 8: Stratum Conceptual Diagram

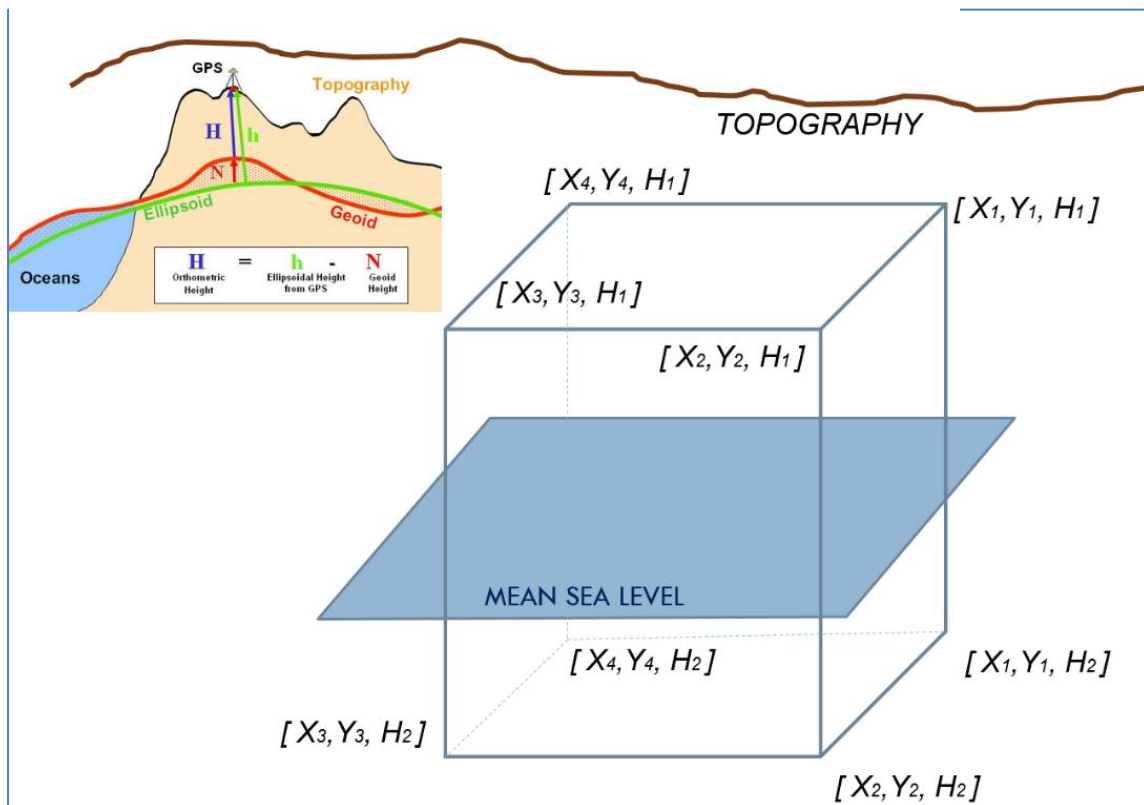


Figure 10: Overlapping development



Figure 11: Oblique view of the possible 3D Parcel

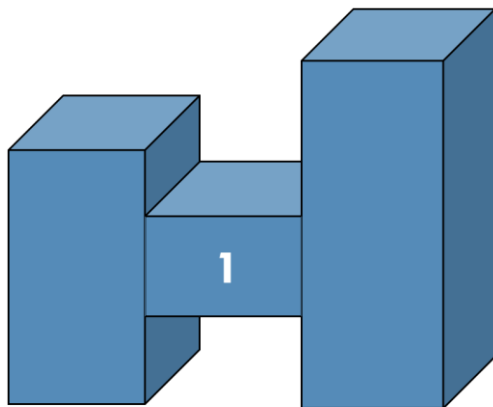
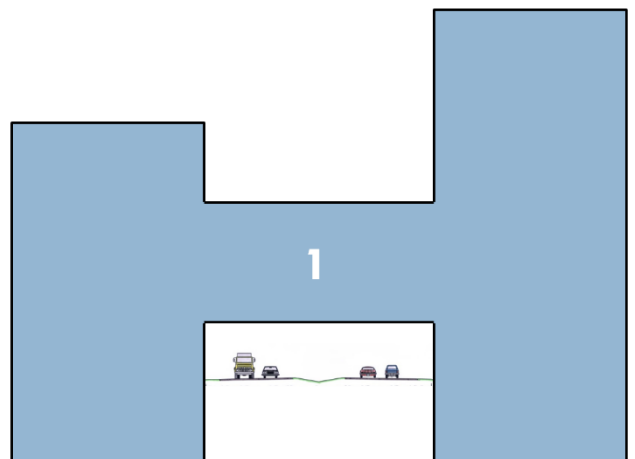


Figure 12: Cross-section of the 3D Parcel



5. RECENT DEVELOPMENTS IN MALAYSIA ON STRATUM MATTERS

In 2016, amendments to the NLC⁷ and the Land Acquisition Act 1960⁸ (LAA) were introduced. Among other things, it is now possible to compulsorily acquire a stratum or 3D lot of underground land. Another significant change is that it is now possible to alienate and issue qualified title for a stratum or 3D (volumetric) lot of underground land. Some of these developments have been facilitated by various national infrastructure projects, such as the Kuala Lumpur – Singapore High Speed Rail and the East Coast Rail Link (which are ongoing projects) and the Klang Valley Mass Rapid Transit system (of which the first line opened in December 2016).

As a result, the measurement of height and depth has become significant. In early 1977, the Department of Survey and Mapping Malaysia (JUPEM) began to undertake definitive steps to prepare for a new vertical control network to replace the old one that had numerous inadequacies. The field operation commenced in 1985 and the Precise Levelling Network (PLN) was completed in 1999. At around the same time, in 1983, JUPEM began to re-determine the precise mean sea level (MSL) value in conjunction with the establishment of the new PLN for Peninsular Malaysia. This was carried out by the setting-up of a Tidal Observation Network which consists of 12 tidal stations. Subsequently, Port Klang was selected for the adoption as a reference level for the new vertical datum origin, based upon a 10-year tidal observation (1984-93). This new datum is known as the Peninsular Malaysia Geodetic Vertical Datum (PMGVD). The new mean sea level is adopted as 3.624 m above the zero-tide gauge.⁹

It is envisaged that the extent of underground land to be compulsorily acquired will be expressed by reference to the mean sea level. The development of the PLN and PMGVD are crucial to support the 3D cadastre system.

6. THE PROPOSED LEGISLATION

In the Malaysian context, one of the key missing pieces to complete the 3D Cadastre jigsaw puzzle is the introduction of provisions for titles for air space (i.e. 3D volumetric air space lot) coupled with corresponding limitation to the height of the

⁷ National Land Code (Amendment) Act 2016

⁸ Land Acquisition Act (Amendment) Act 2016

⁹ TS08I - GNSS Processing and Analysis, Paper no. 5410 Hasan Jamil GNSS Heighting And Its Potential Use In Malaysia; FIG Working Week 2011 Bridging the Gap between Cultures, Marrakech

surface land below the air space lot. In other words, with the proposed legislation, (1) a 3D volumetric lot may consist wholly of air space, or (2) surface land (together with specific limits to enjoyment of air space above and underground land below), or (3) underground land, each of which may take any shape, geometrically known as polyhedron.

First, the issue of nomenclature. It is proposed that the 3D volumetric lot of air space be called "spatium". The Oxford Dictionary Online lists the origin of "space" as 'shortening of Old French *espace*, from Latin *spatium*.' Currently, Malaysia calls a 3D volumetric lot of underground land stratum¹⁰. Whilst it is possible to extend the meaning of the traditional land title to include stratum and spatium titles, it was felt that the concept of 3D volumetric lots is still too new to the public. As such, it is appropriate to differentiate them to avoid any misunderstanding. For the same reason, it is felt that there is a need to distinguish between stratum and spatium. Such an approach makes it possible for the land administrators to differentiate between the traditional (surface) title, stratum title and the new spatium title, so as to make each type of title mutually exclusive.

An approach to the legislation for spatium titles would be to draw on the provisions of Part Five (A) of the NLC on Disposal of Underground Land. Even though the NLC entitles the owner of a land to have "the exclusive use and enjoyment of so much of the column of airspace above the surface of the land ... as is reasonably necessary to the lawful use and enjoyment of the land"¹¹, the current definition of "land" does not expressly include air space. As such, the definition of "land" in the NLC¹² would have to be amended to include reference to all or any portion of the airspace as well as the aquatic environment or underground space, in each case between two elevations (reduced levels).

It should be noted that the National Land Code (Amendment) Act 2016 has enabled qualified title to be issued for a 3D volumetric or stratum lot of underground

¹⁰ Stratum title should not be confused with strata titles even though in Latin, strata is the plural of stratum. The former refers to a 3D volumetric lot of underground land, while the latter refers to a title for a subdivided parcel within a building. Unlike stratum title, strata titles can only be issued after the building has been built and completed.

¹¹ See section 44(1)(a) of the NLC.

¹² See section 5 of the NLC.

land. Previously, only final titles for underground land could be issued, which meant that the underground land had to be surveyed before it could be alienated. In practice, this meant that the structures within the underground land had to be constructed to enable the survey to be carried out before the final title can be issued. Further, the lenders in the project would not have the benefit of charging the title to the underground land before disbursing their loans. On the other hand, for spatium title, the significance of this issue is diminished since it is possible to survey an airspace.

Due to the nature of 3D volumetric lots, it is necessary to regulate the inter-relationship of adjacent lots in matters such as support, ingress/egress, utilities and the drainage of rain water. These provisions are envisaged in connection with stratum titles¹³. In the case of underground land, we are reminded of the State Authority's rights to impose conditions on the title relating to the disposal of minerals, rocks materials and forest produce¹⁴ as well as the rights of the State Authority for access and use of alienated land¹⁵. In the case of air space lots, it may be necessary to legislate for situations that are unique to air space, such as the fact that rain water will have to be flow through the air space down to the surface land below until a structure has been developed within the air space if it diverts the rain water away from its natural path.

There is one other issue to be considered in the proposed legislation. The current concept of reserved land (such as for roads, railways and forest) appears to be confined to 2D. In other words, it would be possible for a spatium of air space lot to exist above a road reserve. It would be logical if the provisions of the NLC were amended to cater for 3D reservation of land.

The ultimate aim is for the laws of Malaysia to allow for ownership of 3D lots of underground land and air space, resulting in a 3D parcel consisting of air space, surface land, water, underground land or any combination of the foregoing.

¹³ See sections 92C (2) and 92D (5) of the NLC.

¹⁴ See section 45 of the NLC.

¹⁵ See section 58 of the NLC.

REFERENCE

1. National Land Code 1965
2. TS08I - GNSS Processing and Analysis, Paper no. 5410 Hasan Jamil GNSS Heighting And Its Potential Use In Malaysia; FIG Working Week 2011 Bridging the Gap between Cultures, Marrakech

TABLE OF GLOSSARIES

2D	two dimensions
3D	three dimensions
LAA	Land Acquisition Act 1960
NLC	National Land Code 1965 of Malaysia

BIOGRAPHICAL NOTES

Chan Keat Lim graduated from the University of Nottingham with a Master of Science in Geographical Information Systems (Distinction) and University Teknologi Malaysia with a Bachelor of Science (Hons) in Land Surveying. Currently, he is the Director of Survey (Cadastral Legislation) in the Cadastral Division, Department of Survey and Mapping Malaysia (JUPEM)

Teng Chee Hua recently retired as Deputy Director General II for the Department of Survey and Mapping Malaysia (DSMM). He holds a Doctorate from the University of Newcastle Upon Tyne, United Kingdom, a Master's Degree in Survey Engineering from University of New Brunswick in Canada, a Postgraduate Diploma in Photogrammetry (Distinction) from ITC, Netherlands and a Bachelor's Degree in Land Surveying from University Teknologi Malaysia.

David Loo Kean Beng is currently the Company Secretary for Mass Rapid Transit Corporation Sdn Bhd (MRT Corp). Mr. David Loo read law at Downing College, Cambridge, the United Kingdom and was conferred his Bachelor of Arts (Hons) degree in 1986. He was called to the English Bar by the Honourable Society of the Middle Temple in 1987 and was called to the Malaysian Bar in 1991.

CONTACTS

Chan Keat Lim & Teng Chee Hua

Department of Survey and Mapping Malaysia (DSMM), Wisma JUPEM, Jalan Semarak, 50578, Kuala Lumpur, MALAYSIA. Email: klchan@jupem.gov.my , tengcheehua88@gmail.com

David Loo Kean Beng

Mass Rapid Transit Corporation Sdn Bhd, Level 5, Menara I & P 1, No. 46, Jalan Dungun, Bukit Damansara, 50490 Kuala Lumpur. Email: david.loo@mymrt.com.my