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## **TELECOMMUNICATIONS ORDER, 2001**

# **ADVISORY GUIDELINES ON THE APPLICATION PROCESS OF WIRELESS COMMUNICATIONS STRUCTURES (WCS)**

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## 1. PRELIMINARY

### 1.1 Citation and Commencement

- 1.1.1 This Advisory Guideline describe the application process associated with the Code of Practice for the Development, Operation, Inspection and Maintenance of the Wireless Communications Structures 2021 (hereinafter referred as the “WCS Advisory Guideline”).
- 1.1.2 WCS Advisory Guideline applies to all Infrastructure Provider for the Telecommunication Industry (InTi) Licensees and shall take effect from **5 November 2021**.
- 1.1.3 The Authority reserves the right to change, revise and/or revoke the WCS Advisory Guideline from time to time as it sees fit and without prior notice.

### 1.2 Purpose of the WCS Advisory Guideline

- 1.2.1 WCS Advisory Guideline specifies:
  - (a) the guidance and the control of the placement of WCS and its associated infrastructures that must be observed by the telecommunication licensees.
  - (b) the duties that must be observed by the telecommunication licensees who deploys and operates its installation, plant or systems within the telecommunications structures pursuant to WCS Advisory Guideline or previous guidelines;

### 1.3 Definitions

- 1.3.1 As used in the WCS Advisory Guideline:
  - (a) **“Ancillary structures”** refers to minor supporting structures constructed or erected intended for the placement of telecommunication equipment to enable the provision of info-communications services;
  - (b) **“Antenna”** refers to any apparatus designed for telephone, data, radio, or television communications through the sending and/or receiving of electromagnetic waves;
  - (c) **“ABCI”** refers to Authority for Building Control and Construction Industry, Ministry of Development;
  - (d) **“Authority”** refers to the Authority for Info-communications Technology Industry of Brunei Darussalam established under Section 3 of the AITI Order, 2001. Also known by the acronym as AITI;
  - (e) **“BIA”** refers to the Brunei International Airport;
  - (f) **“Co-location”** refers to the placement of transmission equipment owned by a telecommunications provider in the premises of another telecommunications provider for interconnection to that telecommunications provider’s network;
  - (g) **“Compliance”** refers conformity with the requirements;
  - (h) **“Construction”** refers to a building or structure, means the earthworks, erection, extension of, alteration and/or addition to the building or structure, and “construct” and “constructed” shall be construed accordingly;
  - (i) **“DARe”** refers to Darussalam Enterprise, Ministry of Energy, Manpower and Industry;

- (j) **“DCA”** refers to Department of Civil Aviation, Ministry of Transport and Infocommunications;
- (k) **“Development”** refers to the process of converting land to a new purpose by constructing buildings or making use of its resources;
- (l) **“DES”** refers to the Department of Electrical Services;
- (m) **“Earthing”** refers to the proper connection of exposed metal parts of an electrical circuit to the ground;
- (n) **“EMF”** refers Electromagnetic Field whereby the waves of electric and magnetic energy moving together through space;
- (o) **“Equipment”** refers to any appliance, apparatus or accessories used or intended to be used for telecommunication purposes;
- (p) **“Government gazette”** refers to an official publication for the purpose of notifying the actions and decisions of the government;
- (q) **“Height”** refers to the distance measured from the finished grade of the parcel of land to the highest point on the wireless communications structure, including the base pad and any antenna or lightning rod;
- (r) **“ICAO”** refers to International Civil Aviation Organisation;
- (s) **“Infrastructure”** refers to the underlying systems, networks and facilities which enable the provision of info-communications services. This may include access to other related utility services as per referred to **Appendix A**;
- (t) **“Infrastructure Sharing”** refers to the joint use of network facilities by two or more telecommunications licensees subject to agreement specifying relevant technical and commercial conditions;
- (u) **“InTi”** refers to Infrastructure Provider for the Telecommunication Industry;
- (v) **“Licensee(s)”** refers to an entity to whom license has been granted under the Telecommunication Order, 2001;
- (w) **“MoD”** refers to the Ministry of Development;
- (x) **“QoS”** refers Quality of Service whereby the totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service;
- (y) **“QP”** refers to a Qualified Person who is appointed by the Ministry of Development under the Building Control Order(BCO), 2014 to prepare plans of any building works in accordance with the ‘Fourth Edition of Piawai Brunei Darussalam (PBD): BUILDING Guidelines and Requirements (4<sup>th</sup> Edition 2017)’ developed by the Ministry of Development;
- (z) **“Relevant authorities”** refers to any other external authorities appointed from time to time pursuant to any guidelines or any existing committee who has the responsibility for approving any matters pertaining to this code;
- (aa) **“Siting”** refers to situate or locate on a site;
- (bb) **“Separation”** refers to the distance between any two objects;
- (cc) **“Structural integrity”** refers to the ability of an item – either a structural component or a structure consisting of many components – to hold together under a load, including its own weight, without breaking or deforming excessively;
- (dd) **“TCP”** refers to Department of Town and Country Planning Department, Ministry of Development;
- (ee) **“Telecommunications”** refers to a transmission, emission or reception of signs, signals, writing, images, sounds or intelligence of any nature by wire, radio, optical or other electro-magnetic systems whether or not such signs, signals, writing, images, sounds or intelligence have been subjected to rearrangement, computation or other processes by any means in the course of their transmission, emission or reception;

- (ff) **“Wind loading”** refers to any pressures or forces that the wind exerts on a building or structure; and
- (gg) **“WCS”** refers to Wireless Communication Structures where it denotes any structure, including base and foundation components, designed and constructed primarily for the purpose of supporting one or more antennas, including monopoles, guyed masts, towers, rooftop pole and mast, mounting structures and others;

#### **1.4 Regulatory Powers**

- 1.4.1 The WCS Advisory Guideline are issued under Section 28 of Telecommunications Order, 2001 to provide guidance and the control placement of WCS and its associated infrastructures.

#### **1.5 Licensees compliance to the WCS Advisory Guideline**

- 1.5.1 Unless otherwise stated, the provisions of the WCS Advisory Guideline shall apply only to InTi Licensees and such other undertakings or enterprises as the Authority may designate, given the impact in Brunei Darussalam.
- 1.5.2 All Licensee who intend to develop new WCS, either for permanent or temporary use, and or modify existing WCS must comply to the WCS Advisory Guideline.
- 1.5.3 Nothing in the WCS Advisory Guideline shall limit the Authority’s power to issue a direction under the Telecommunications Order, 2001.

#### **1.6 Modification of Provisions**

- 1.6.1 The Authority may modify the provisions of the WCS Guideline in the following manners to reflect changing market conditions:
  - (a) The Authority may review the WCS Guideline at regular intervals after the issuance of the WCS Guideline. Once a review is conducted, the Authority may amend or modify relevant Sections of the WCS Guideline; or
  - (b) The Authority may modify the WCS Guideline on its own initiative at any time.

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## 2. TYPES OF WIRELESS COMMUNICATIONS STRUCTURES (WCS)

### 2.1 General

2.1.1 This chapter specifies the general types of wireless communications structures that are commonly deployed within Brunei Darussalam as per **Figure 1**.<sup>1</sup>

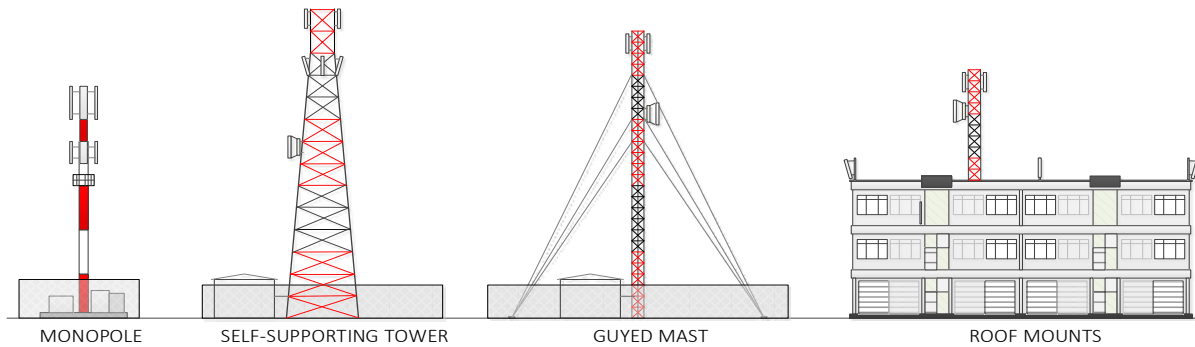


FIGURE 1: TYPES OF WIRELESS COMMUNICATIONS STRUCTURES (WCS)

### 2.2 Monopole

2.2.1 Monopole consists of tapered steel tubes that fit over each other to form a stable pole. The design could be of slip-in joint or bolted flange splices. Further illustration can be referred to **Figure 2**.

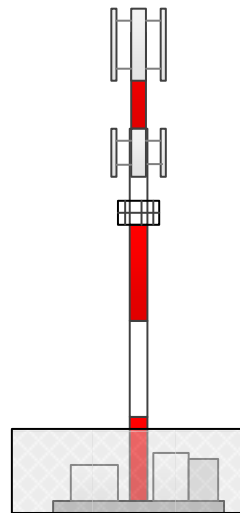


FIGURE 2: Monopole Structure

2.2.2 A monopole is self-supported and fitted with climbing ladder, with the following features:

- i. Sections of the tower shall be made from hollow, heavy duty, thick steel tubes, flanged steel tubes or low-alloy, high-strength steel.
- ii. Each shaft section shall be a constant-tapered hollow steel section.

<sup>1</sup> The diagrams above are for illustration purposes only on the examples of the types of WCS. There are other models or designs of the types of WCS available, which are not featured in the WCS Advisory Guideline.

- iii. Slip joints shall be designed as per ANSI/TIA-222G design code.
- iv. Monopole are to be made from galvanised hollow steel pipes or high strength steel and designed for a variety of multi-user configurations and finishes to meet local aesthetic requirements.
- v. The pipes shall be tapered to ensure that the base pipe of the 1<sup>st</sup> section shall fit into the next section of another tapered pipe until the desired height is achieved. A joint in the arrangement should have an overlay between the two adjacent pipes.
- vi. The depth of the overlay, the base width and the number of pipes in a particular monopole shall be determined by expected height of a tower, the thickness of the pipe walls and the base diameter.

2.2.3 Each completed monopole shall have a name plate bolted to its bottom section of the monopole, which shows the following information:

- i. Fabricator.
- ii. Owner.
- iii. Operator.
- iv. Permit number.
- v. Location.
- vi. Date of Completed Construction.

## 2.3 Guyed Mast

2.3.1 These towers are stabilised by tethered wires. Further illustration can be referred to **Figure 3**.

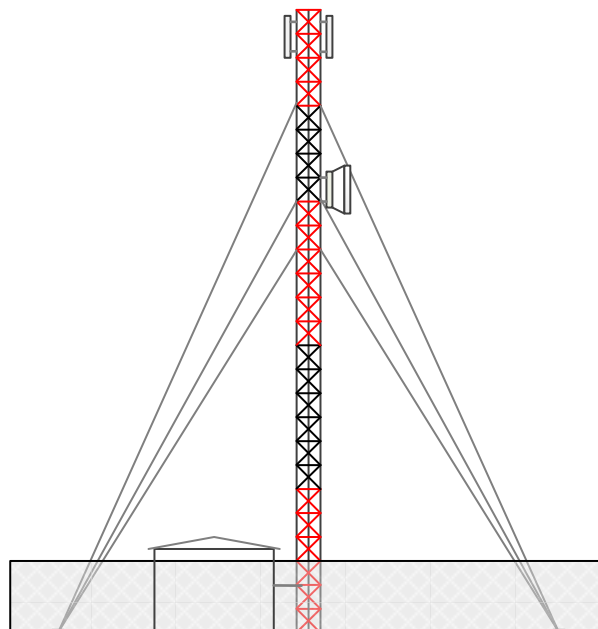


FIGURE 3: Guyed Mast Structure

2.3.2 Guyed towers shall be designed by following specifications and recommended practices:

- i. Guyed masts may be in lattice, triangular or square, tapered or straight, as well as monopole structural forms, supported and held in position by guy wires.



- ii. Mast guy wires shall be made from pre-stretched steel only. For every mast, the specified minimum strength of the guy wire shall be the maximum tension likely to occur in the worst loading condition.
- iii. Guy wires shall not be over tightened in the installation of guy masts in order to avoid excessive tension, which may cause alignment problems, cable rupture and permanent warping of tower structural parts.
- iv. Guy wires shall be tensioned in accordance with manufacturer's recommendations and performed using the proper tools and equipment.
- v. All sections shall be straight square sections to eliminate potential problem associated with twisting or the need to shim the legs.
- vi. The structure shall be made wholly of steel, modular and hot-dip galvanised. All fittings shall also be hot dip galvanised.
- vii. Sections can be of the same face width but in the event that the tapered type is considered, the design should be with junction flanges.
- viii. Guyed masts shall have tube or solid legs with solid bracing which increases the tower rigidity to allow for the twist and sway. Solutions using deformed reinforcing bar for the bracings are not allowed.
- ix. The design, based on the load calculations would determine the working load and the break strength required by the guy wire and ultimately result in the choice of the size and grade of the wire.
- x. The choice of each guy screw anchor would be dependent on its holding power in the reinforced concrete foundation block.
- xi. As a general rule, guys shall be planted in three directions at 120° apart from each other. The ideal Base/Height ratio is 1:1; however, this means the site has to be large. The distance from the base of the tower to the guy anchor base is solely the Designer's responsibility to recommend.

2.3.3 Each completed mast shall have a name plate bolted to its leg, which shows the following information:

- i. Fabricator.
- ii. Owner.
- iii. Operator.
- iv. Permit number.
- v. Location.
- vi. Date of Completed Construction.

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## 2.4 Self-Supporting Towers

- 2.4.1 Self-supporting towers are freestanding lattice structures. Further illustration can be referred to **Figure 4**.

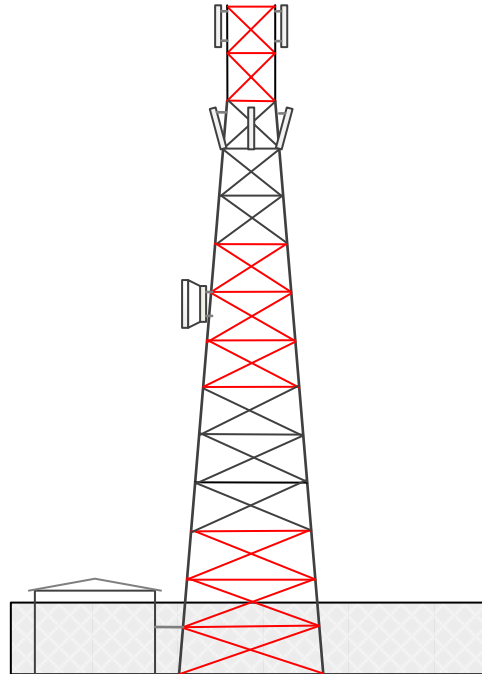


FIGURE 4: Self-Supporting Structure

- 2.4.2 The use of self-supporting towers with tapered sections, and face width that vary according to height and load capacity is recommended when land availability is limited provided that it is technically feasible to install them.
- 2.4.3 Self-supporting towers designed and constructed as lattice structures shall have the following features, where applicable:
- i. Triangular or square structure.
  - ii. Tube legs, angle legs or solid round legs.
  - iii. Sections in steel angle steel or steel tubes.
  - iv. Steel angle cross bracing.
  - v. Tapered sections.
  - vi. Face widths vary according to height and load capacity.
  - vii. Work platforms provided every twenty metres (20M) of height.
  - viii. Fitted with climbing ladder inclusive of safety cages and/or fall arrest system.
  - ix. Standard support forms for lattice structures are specified as follows:
    - a) Angle Leg.
    - b) Tube Leg / Solid Round Leg.
  - x. Design shall be based on the design codes of ANSI/TIA-222G.

2.4.4 Each completed tower shall have a name plate bolted to its leg, which should have the following information:

- i. Fabricator.
- ii. Owner.
- iii. Operator.
- iv. Permit number.
- v. Location.
- vi. Date of Completed Construction.

## 2.5 Roof Mounts or Mounts On Ancillary Structures

2.5.1 Roof mounts or mounts on ancillary structures are an inexpensive way of putting mobile equipment to alleviate signals obstruction. Further illustration can be referred to **Figure 5**.

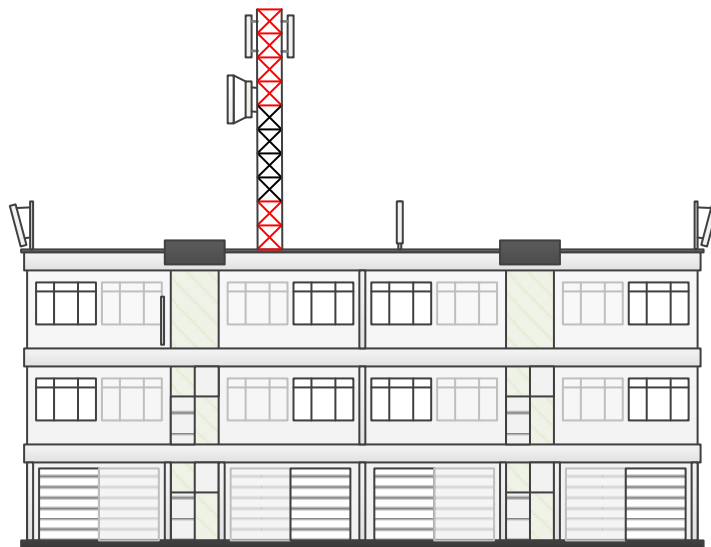


FIGURE 5: Roof Mounts or Mounts on Ancillary Structures

2.5.2 The design and installation of roof mounts or mounts on ancillary structures shall meet the following specifications and recommended practices:

- i. Structural checks shall be made to ascertain the capability of a chosen roof or ancillary structures to withstand the additional load being imposed on it by the structure and the entire antenna array it will support.
- ii. All roof mounted masts or towers or mounts on ancillary structures shall be endorsed by MoD's registered QP and approved by ABCi before installation.
- iii. As a general rule, roof mounts or mounts on ancillary structures shall be limited to lightweight structures of low height and support minimal dead and dynamic loads.
- iv. All roof mounted masts or towers shall have a security fence erected around it. Any mounts on ancillary structures shall have a security mechanism to prevent unauthorised access.

2.5.3 Each completed roof mounts shall have a name plate bolted to its leg, which should have the following information:

- i. Fabricator.
- ii. Owner.
- iii. Operator.
- iv. Permit number.
- v. Location.
- vi. Date of Completed Construction.

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### 3. WCS SITES SEPARATION REQUIREMENT

#### 3.1 General

- 3.1.1 The WCS site shall have adequate safety zone based on the separation requirements of its structure against the other WCS or building development to safeguard the general public and its surrounding properties.
- 3.1.2 In the situation, that the WCS site is allocated on a slope or part of it, proper drainage system shall be constructed and structural re-enforcement/measures to stabilise the slope shall be implemented. This is to ensure the safety and stability of the slope and the WCS site by preventing soil erosion.
- 3.1.3 If the ideal location is limited and the required separation distance between the towers are not able to adhere to, the Licensee shall provide valid justifications to the relevant authorities for consideration.

#### 3.2 Tower to Government/Private Development Separation Criteria

- 3.2.1 This section explains the separation distance criteria between the WCS site and the government and/or private building development during construction, which shall be **case-by-case basis**, under the consideration of the relevant authorities with valid justifications.
- 3.2.2 The boundary of the WCS's land shall be of a **minimum of twenty metres (20M)** from the boundary of the nearest government/private-owned plot of land. In an exceptional situation, the minimum distance between the WCS's land boundary and the boundary of the nearest government and/or private-owned plot of land shall **not be less than six metres (6M)** apart. Further illustration can be referred to **Figure 6** and **Figure 7**.

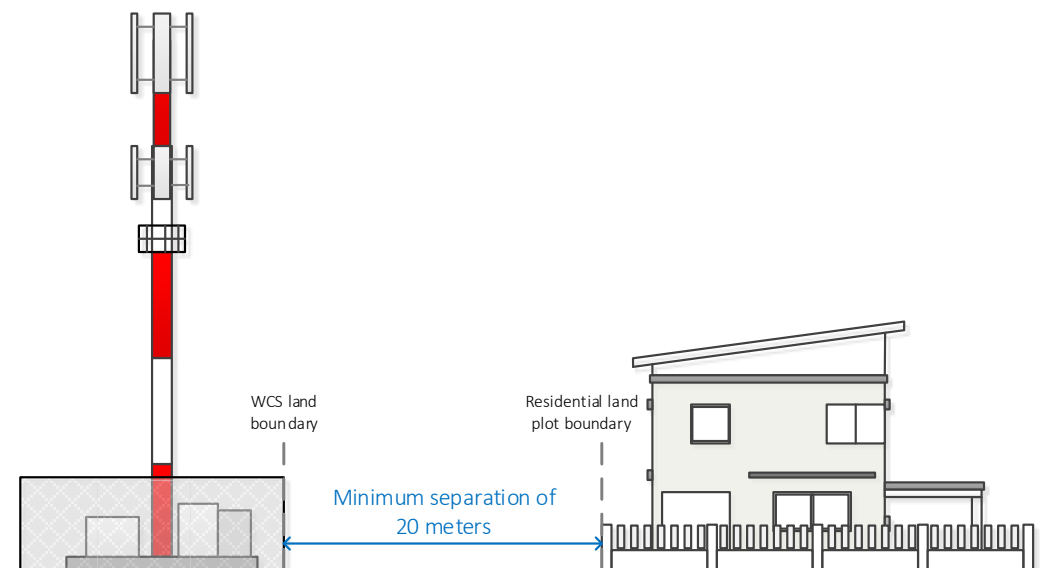


FIGURE 6: MINIMUM SEPARATION BETWEEN WCS LAND BOUNDARY AND PRIVATE LAND PLOT BOUNDARY (E.G. RESIDENTIAL)

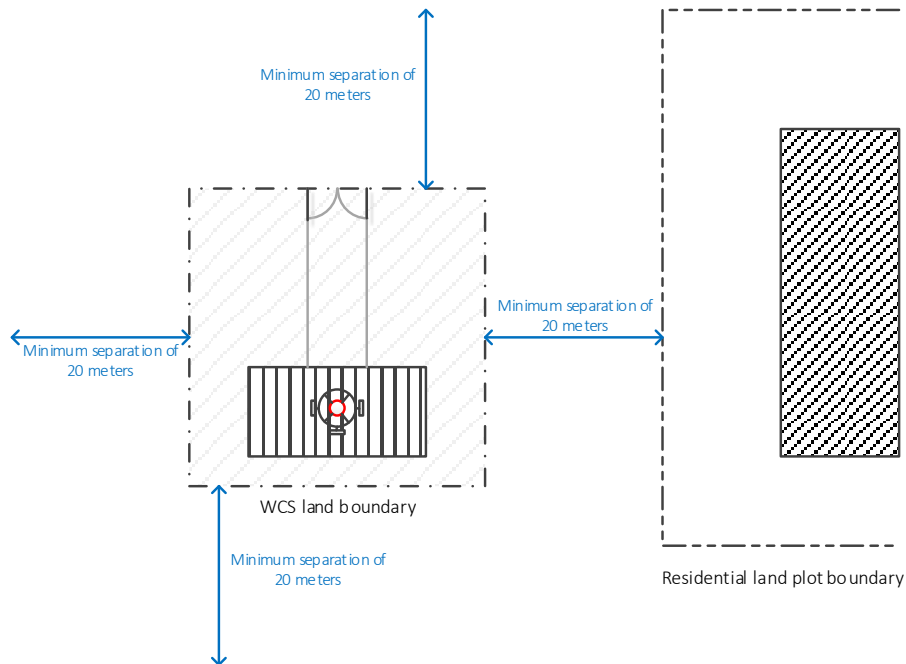


FIGURE 7: OVERVIEW OF MINIMUM SEPARATION BETWEEN WCS LAND BOUNDARY AND PRIVATE LAND PLOT BOUNDARY (E.G. RESIDENTIAL)

- 3.2.3 For any private or government utility facilities, the boundary of the WCS's land shall be of a **minimum of three metres (3M)** from the boundary of the private and/or government utility facilities plot of land. Further illustration can be referred to **Figure 8**.

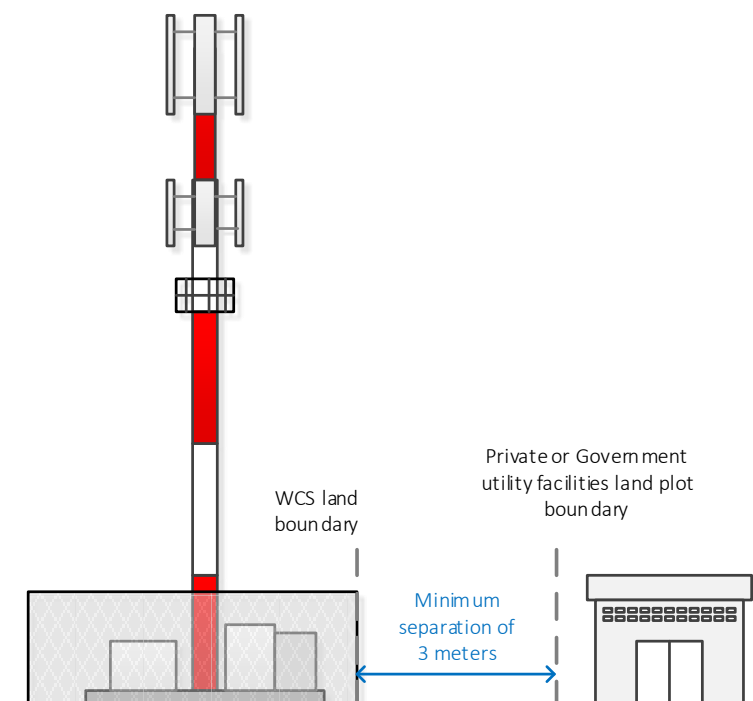


Figure 8: Minimum separation between WCS land boundary and private and/or government utility facilities land plot boundary

- 3.2.4 In keeping with international recognition of common public perception concerns, it is recommended to avoid installing the WCS in “**public-sensitive areas and buildings**” – i.e. existing children’s parks and playground, schools, nurseries, place of worships, government and private hospitals, where possible. If unavoidable due to technical aspects, the recommended minimum distance **shall not be less than two hundred metres (200M)**<sup>2</sup> from the nearest entity in all cases.

### 3.3 Tower to Tower Development Separation Criteria

- 3.3.1 The recommended minimum separation distance between two or more adjacent towers, with the height of the towers is in excess of fifty (50) metres, shall **not be less than one kilometre (1KM)** apart. Further illustration can be referred to **Figure 9**.

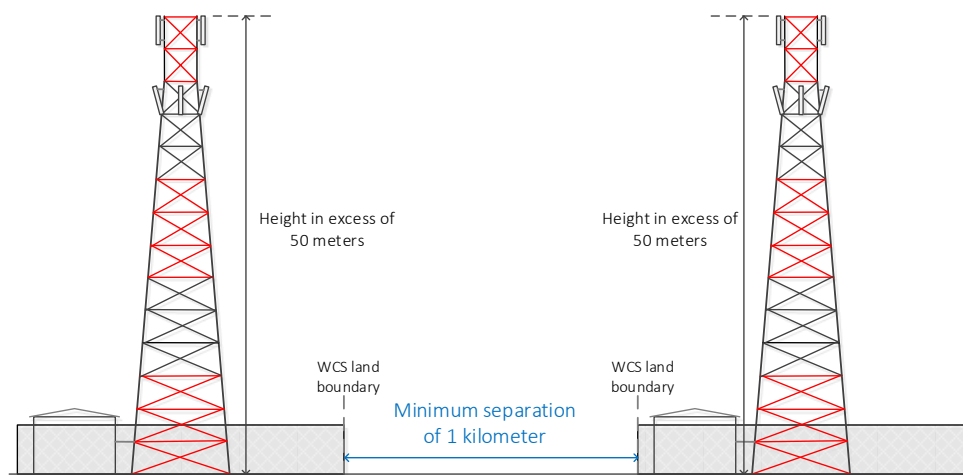


FIGURE 9: TOWER TO TOWER SEPARATION DISTANCE

- 3.3.2 The siting of towers shall apply to the following space requirements:

- i. Any tower site shall be served by a parking, loading space, drainage system and an access road with six metres (6M) outward from the site fencing gate.
- ii. The access road shall be made of pre-mix concrete for ease of light truck vehicular access.

### 3.4 Monopole to Monopole Separation Criteria

- 3.4.1 The recommended minimum separation distance between two or more adjacent monopoles, with the height of the monopoles is up to forty-five (45) metres, shall **not be less than two hundred metres (200M)** apart. Further illustration can be referred to **Figure 10**.

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<sup>2</sup> The distance separation of two hundred meters (200M) between a WCS and public-sensitive areas and buildings shall be based on case-by-case basis, under the consideration of the relevant authorities with valid justifications.

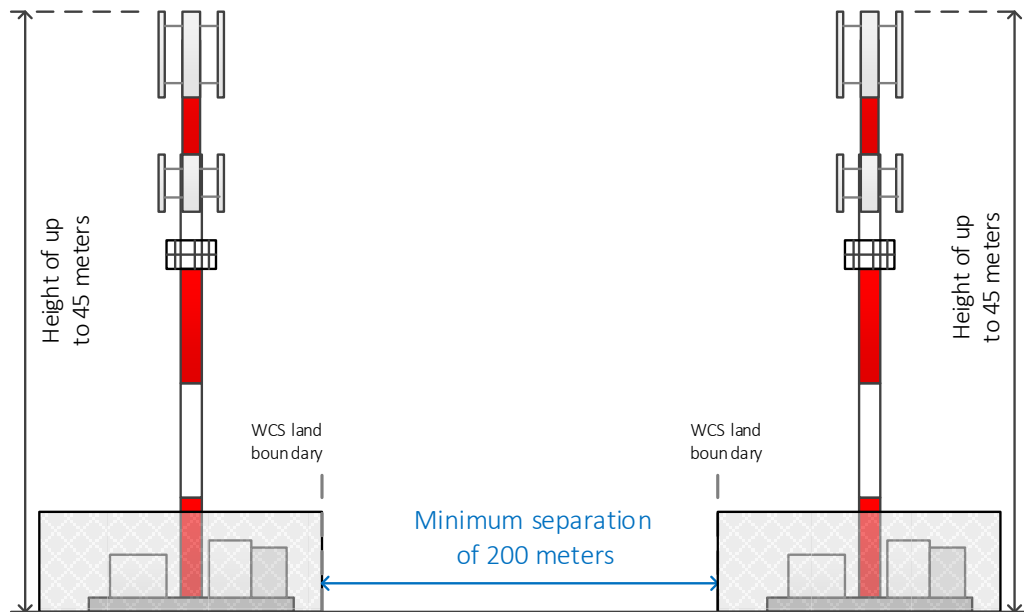


FIGURE 10: MINIMUM SEPARATION DISTANCE BETWEEN TWO OR MORE ADJACENT MONOPOLES

- 3.4.2 This shall also be applicable to the recommended minimum separation distance of **not less than two hundred metres (200M)** between adjacent tower and monopole. Further illustration can be referred to **Figure 11**.

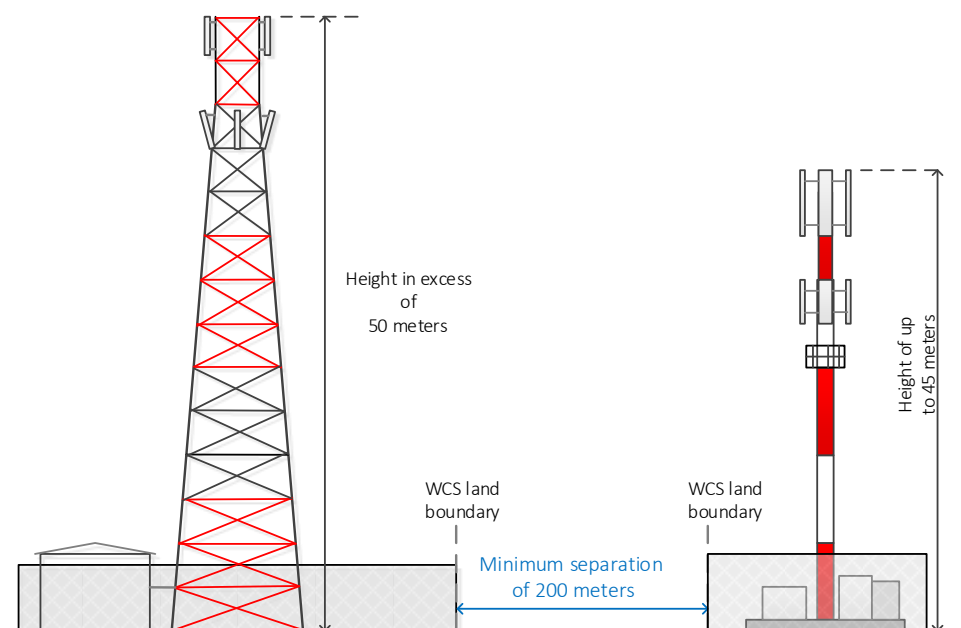


Figure 11: Minimum separation distance between adjacent tower and monopoles

- 3.4.3 The siting of monopoles shall conform to the following space requirements:
- Any tower site shall be served by a parking, loading space, drainage system and an access road with six metres (6M) outward from the site fencing gate.
  - The access road shall be made of pre-mix concrete for ease of light truck vehicular access.



### 3.5 Tower to Power Lines and Stations Separation Criteria

- 3.5.1 No wireless communications structures shall be constructed in close proximity to the **rating of 11Kv and above of High Voltage** electrical power transmission lines and main power stations. The nearest distance of a WCS to a High Voltage electrical power transmission line or main power stations, must be the equivalent of one hundred and twenty per cent (120%) of the height of the structures from the wayleave boundary. Further illustration can be referred to **Figure 12**.

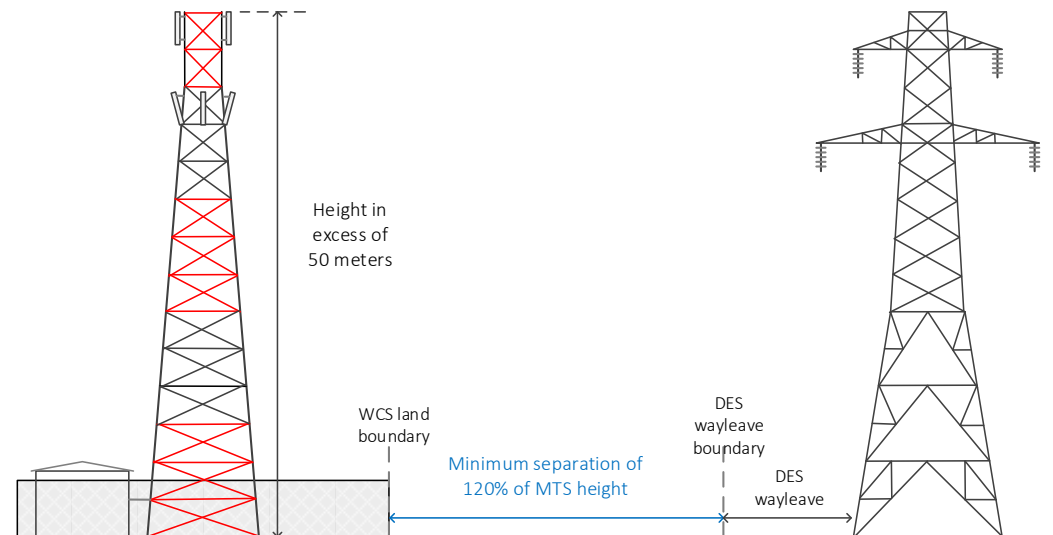


FIGURE 12: MINIMUM SEPARATION DISTANCE BETWEEN WCS AND POWER LINES

- 3.5.2 For DES wayleave, the Licensee is to engage with DES for the requirement.
- 3.5.3 The Licensee shall conduct its own signal propagation test to avoid any impact towards the quality of its signal coverage from the WCS's antennas due to EMF emitted by the high voltage power grid.
- 3.5.4 WCS installed in contravention to the above specifications may result in the decommissioning, dismantling and/or removal of the WCS, which the expense shall be borne by the Licensee itself.

### 3.6 Rooftop/Ancillary Mount Separation Criteria

- 3.6.1 It is recommended to have appropriate safety measures upon performing installation and/or maintenance of the WCS's antennas on the rooftop's parapet to prevent installer or maintenance personnel exposed to unnecessary risks.
- 3.6.2 Designated walkways and signage shall be clearly marked and erected, warning occupational workers of the dangers EMF risks and preventing them from walking in front or through the 'Near Zone' of any emitting antenna.

- 3.6.3 The installation of the WCS's antenna, at a height comparable to the nearby building, pointing directly towards any building shall follow the specified requirements in the **Table 1** below. Further illustration can be referred to **Figure 13**.

TABLE 1. ADVISORY DISTANCE FOR NUMBER OF ANTENNA IN THE SAME DIRECTION FROM ANY BUILDING OR HUMAN HOUSING STRUCTURE<sup>3</sup>

Number of antenna(e) pointing towards the same direction	Building/Structure safe distance from the antenna(e) at the same height (in metres)
1	20
2	35
3-4	45
5-6	55

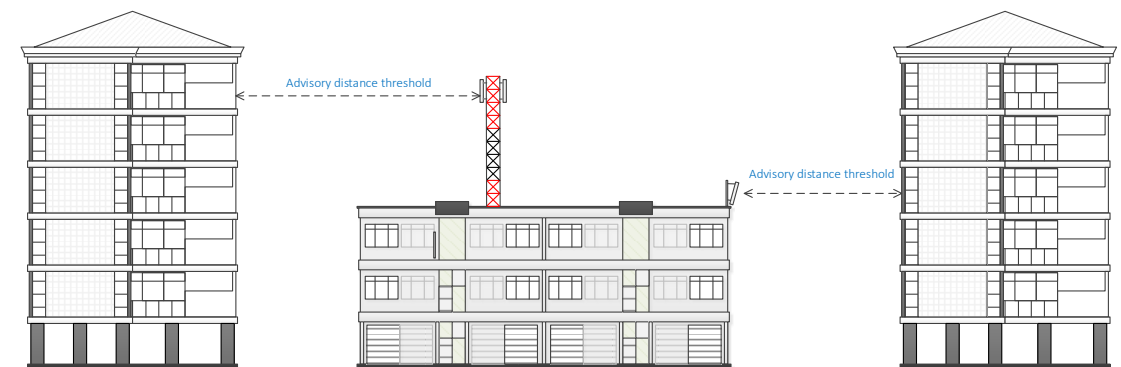


Figure 13: Advisory distance threshold for antenna(e) in the same direction from any building.

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<sup>3</sup>The antennae at the same height only are to be counted, as beam width of the cellular antennae, in the vertical direction, is very narrow;

The distance figures in the above table are based on empirical estimation considering that all the antennae are emitting at their maximum RF power of 20 watts and exactly in the same direction with same height (a worst case scenario);

In practice, the values of safe distance of buildings will depend upon actual deployment scenarios and mostly, may be far less than the depicted value above. Correction factor shall be applicable for Low Power Radio techniques.

## **4 GENERAL WCS DEVELOPMENT REQUIREMENT**

### **4.1 General**

- 4.1.1 The design philosophy shall take into account both the strength limit; which considers the loading of WCS under extreme conditions, and the serviceability limit; which ensures that the WCS will provide service considering the co-location and infrastructure sharing requirement at the site.
- 4.1.2 The design, fabrication materials and methods, installation accessories, safety factor and WCS loading must comply to such standards <sup>4</sup> or any other equivalent international standards.
- 4.1.3 Before the construction and operation of the WCS and its associated infrastructures, the licensee shall obtain approval from the relevant authorities.
- 4.1.4 All WCS sited shall be secured with security fencing along the perimeter boundary of the land site with a clear identifiable warning signs to prevent unauthorised entry. Access shall be made accessible at all times, subjected to prior approval from the Licensees.

### **4.2 Structural Criteria**

- 4.2.1 All WCS designs and constructions, concerning the Structural Integrity aspects, requires ABCi's approval. The Licensee shall consult ABCi's for approval before commencing the deployment of the WCS.
- 4.2.2 In designing the WCS, wind loading and equipment loading shall be taken into consideration.
- 4.2.3 The WCS shall be designed to resist various pressures including wind load:
  - i. The structure shall be designed to withstand forceful wind speeds, considering that wind speed escalates with height.
  - ii. The design of the structure shall incorporate the gust factor to account for the varying nature of wind.
  - iii. The calculation of wind speed shall be based upon information provided in the Wind Flow Map of Brunei from the Brunei Meteorological Service Department and be submitted to ABCi.
- 4.2.4 A proportionate amount of over design shall be applied to take care of the safety issue, which defines the impact a failure would have on the operational integrity of a WCS, human life and property.

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<sup>4</sup> Telecommunications Industry Association's (TIA) TIA – 222, Revision H: Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures, Effective 1 January 2018.

### 4.3 Height Criteria

- 4.3.1 All WCS designs and constructions, concerning on Obstacle Limitation Surfaces, requires DCA's approval. The Licensee shall consult DCA's for approval before commencing the deployment of the WCS.
- 4.3.2 The Licensee shall comply with the local standards guideline on height limitations<sup>5</sup>.

### 4.4 On Rooftop Criteria

- 4.4.1 The design and construction of WCS shall take into account the structural integrity aspects while constructing the WCS on the roofs of buildings. Structural drawings of the building shall be examined to determine the amount of structural works required to accommodate heavy loads from the new structure.
- 4.4.2 The use of self-supporting roof mount structures shall be preferred compared to Lattice or Guyed structures for the safety reasons.
- 4.4.3 The design and construction of the WCS on a rooftop shall be endorsed by MoD's registered QP and approved by ABCi before installation.
- 4.4.4 The total numbers of antenna installed shall not exceed the maximum allowable loading on the WCS.
- 4.4.5 Approval for the Obstacle Limitation Surfaces Approval from DCA is required for the WCS height clearance.
- 4.4.6 Overall height of WCS from ground (Height of the building + Height of WCS) shall conform with ICAO obstruction criteria and shall be limited to forty-five (45) metres from the ground. The WCS shall be painted and aviation obstruction lights shall meet ICAO guidelines. Further illustration can be referred to **Figure 14**.

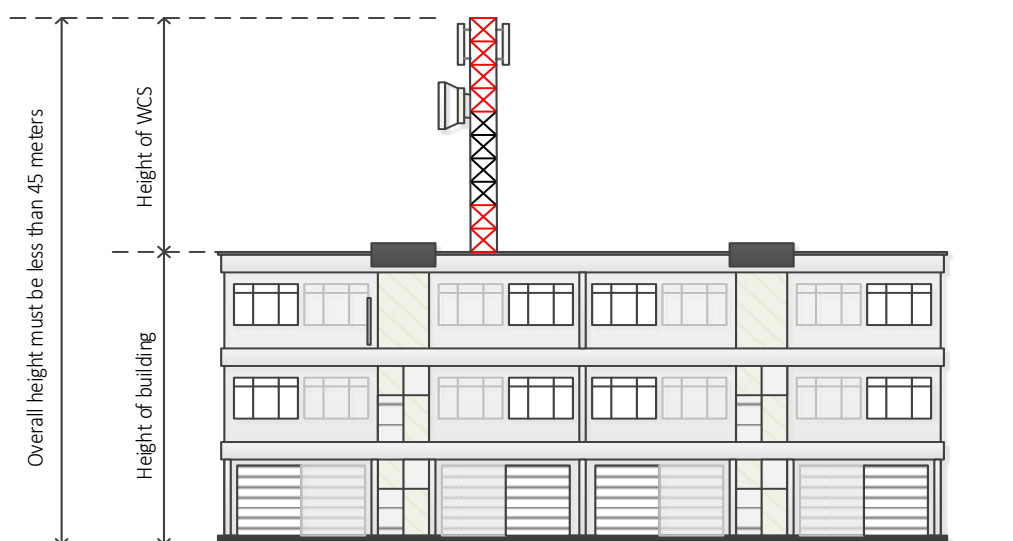


FIGURE 14: OVERALL HEIGHT OF WCS FROM GROUND

<sup>5</sup> Aviation Safety Circular 05/2016 for the Rules and Regulations on High Structure in Brunei Darussalam by Department of Civil Aviation.

- 4.4.7 The height of the WCS on a rooftop shall be **limited to fifteen metres (15M)** from the floor of the building's roof.
- 4.4.8 WCS are attraction for lightning discharged; therefore, it is **mandatory** to install "Lightning Protection" to protect from possible lightning surge.

#### **4.5 Ancillary Structures Criteria**

- 4.5.1 The Licensee shall consider the architectural aspects while constructing WCS on any ancillary structures, such as water tank tower or any other high-rise structures.
- 4.5.2 Prior to designing any WCS on an ancillary structure, structural integrity of the structures shall be observed very carefully. Structural drawings of the ancillary structure shall be examined to determine what further structural works are required to accommodate heavy loads from a new structure.
- 4.5.3 The proposed design of the WCS and its ancillary structure structural reports shall be endorsed by MoD's registered QP, approved by the owner, ABCi and/or other relevant authorities.
- 4.5.4 Approval for the Obstacle Limitation Surfaces Approval from DCA is required for the WCS height clearance.
- 4.5.5 The overall numbers of antenna installed shall not exceed the maximum allowable loading on the WCS.
- 4.5.6 WCS are attraction for lightning discharged; therefore, it is **mandatory** to install "Lightning Protection" to protect from possible lightning surge.

#### **4.6 Electrical Earthing and Lightning Protection Criteria**

- 4.6.1 Proper earthing and lightning protection shall be provided in all completed WCS sites to protect equipment from damage and personnel from harm, which may result from sudden power surge or lightning strike.
- 4.6.2 All WCS shall be grounded and earth resistance measured at the earth terminal block shall be less than five (5) ohms.

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#### 4.7 Visual Marking Criteria

- 4.7.1 The Licensee shall comply to the requirements of the BIA<sup>6</sup>.
- 4.7.2 The Licensee shall paint the WCS according to the ICAO's stipulations on obstruction painting<sup>7</sup>:
- i. For structures greater than one and half metres (1.5M) and not exceeding two hundred and twelve (212M), the structure shall be given seven (7) equal bands of red and white or orange and white paint.
  - ii. For structures above two hundred and ten metres (210M) and not exceeding two hundred and seventy metres (270M), nine (9) equal bands of red and white or orange and white paint.
  - iii. For structures above two hundred and seventy metres (270M) and not exceeding three hundred and thirty metres (330M), eleven (11) equal bands of red and white or orange and white paint.
  - iv. For structures above three hundred and thirty metres (330M) and not exceeding three hundred and ninety metres (390M), thirteen (13) equal bands of red and white or orange and white paint.
  - v. In all cases, the top and bottom of the WCS must be painted red or orange.
  - vi. White and orange or red paint shall be used except where such colours merge with the background that it may found necessary to use different colour from orange or red to obtain sufficient contrast.
  - vii. Paint shall be non-gloss finish (matt).
- 4.7.3 WCS shall in addition, be painted with base primer paint, one (1) suitable under coat of red and white or orange and white followed by two (2) coats of non-gloss (matt) paint.
- 4.7.4 Cable ladders and other associated accessories, e.g. antenna mounting brackets, climbing ladders, work platform decking; shall not be painted.

#### 4.8 Aviation Obstruction Lighting Criteria

- 4.8.1 All WCS shall conform to **ICAO and DCA guidelines** with respect to aviation obstruction lighting of tall structures. The installation of the lighting shall meet the requirements, which stipulates among others of having red aviation obstruction light at the top of the WCS, which should be preferably dual LED type lamps (N+1).
- 4.8.2 The purpose of aviation obstruction lighting, which shall be preferably dual LED type lamps (N+1), is to ensure that an obstruction to air navigation remains visible at a range sufficient to permit a pilot to take appropriate action in order to avoid the unobstructed visibility from aircraft at any normal angle of approach. Further illustration can be referred to **Figure 15**.

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<sup>6</sup> Aviation Safety Circular 05/2016 for the Rules and Regulations on High Structure in Brunei Darussalam by Department of Civil Aviation.

<sup>7</sup> Sub-Section 6.2.3, Fixed Objects under Annex 14, Volume 1 of Aerodrome Design and Operations, Seventh Edition, July 2016

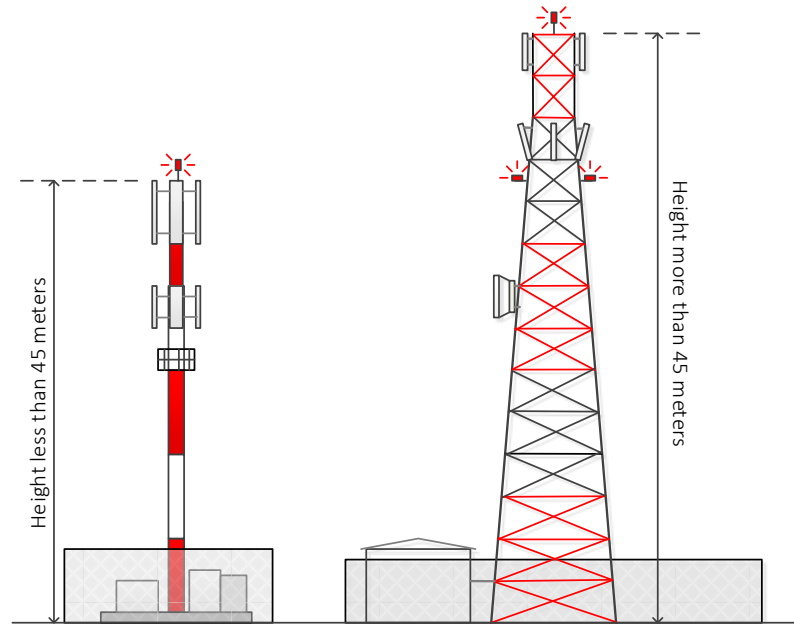


FIGURE 15: AVIATION OBSTRUCTION LIGHTINGS ON WCS

- 4.8.3 WCS of more than ten metres (10M) but less than forty-five metres (45M) above the level of the ground shall have at least, one (1) aviation obstruction lighting at the top of the structure.
- 4.8.4 For every fifty metres (50M) of height above ground level, WCS shall have installed on it, one (1) lamp on top and two (2) lamps at the sides.
- 4.8.5 The aviation obstruction light shall be supplied, with uninterruptible power supply in form of battery, solar energy or any other technology, to ensure that lights are always on during main power outage and automatically switch on and off via photo cells, which sense low light conditions.

#### 4.9 Antenna Face Mounting Frame Criteria

- 4.9.1 Frames for mounting antennas on the WCS shall be designed upon consideration of the type of WCS structure and the type, weight and size of the antenna.
- 4.9.2 The frames shall be made from galvanised steel, stainless steel or aluminium. Care must be taken to ensure that there are no welded parts, and that bolts and nuts are not used for implementing joints.

#### 4.10 Safety Device Criteria

- 4.10.1 Safety devices shall be installed on every WCS, where applicable, comprising of the following:
  - i. Fall arrest systems.
  - ii. Climbing ladders or step bolts.
  - iii. Guard rails.
  - iv. Work platforms.
  - v. Anti-climb systems.

4.10.2 A complete fall arrest system shall consist of the rail and trolley.

4.10.3 The Trolley:

- i. is a locking brake pawl attached to the harness of a climber.
- ii. moves freely along the safety rail with climber in normal climbing position.
- iii. in case of slip, trolley brakes shall remain locked until the force is removed. Falls are instantly arrested when a sudden downward motion is applied to the trolley. Trolley remains stationary once disconnected from the harness.

4.10.4 Access ladders must be made from hot dip galvanised steel sections mountable on all tower types and monopoles amenable to inside or outside mounting.

4.10.5 Climbing ladders must be of steel depending on the WCS material and shall be provided with safety cages, landing area (rest and work platforms) and protective finishes.

4.10.6 Ladders must be attached to the tower structure and the lowest point on the ladder shall be at a height of not less than 1.5 metres (1.5M) above ground level and shall run all through to the top of the structure.

4.10.7 The guardrails design shall include an intermediate rail and a toe-board along all platforms, stairways and horizontal members used as walkways. The width of the walkways and platforms shall not be less than 650mm and shall be an anti-slip surface. Guardrails and toe boards must be attached at each stanchion and secured to prevent rotation.

4.10.8 All work platforms shall be located at points where antennas are to be installed and be readily accessible from the climbing ladder. The access to all platforms and walkways from the vertical climbing ladder shall be from one direction only.

4.10.9 Anti-climb shields or systems, with metal sheets bolted to tower legs, shall be provided on the structure to prevent access except from the climbing ladder.

#### **4.11 Aesthetic Criteria**

4.11.1 Aesthetic consideration on the WCS site are encouraged. If required, the Licensee shall approach DCA and TCP for the design and approval.

4.11.2 The Licensee shall co-operate with the relevant authorities to camouflage all equipment within the site from public view if required.

4.11.3 All equipment within the site, visible to the public shall be consolidated, to reduce the amount of telecommunications equipment visible to the public.

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#### 4.12 Security Fence and Warning Sign Criteria

- 4.12.1 All WCS site shall be secured with security fencing of wrought iron, barbed wire, or steel chain link not less than 1.8 metres (1.8M) in height, along the perimeter boundary of the land site. Site Access shall be made accessible at all times, subject to prior approval from the Licensee.
- 4.12.2 Clear identifiable warning signs shall be in-place to prevent unauthorised entry and to provide early warning to workers in the presence of radio emission within the demarcated point. Further illustration can be referred to **Figure 16**.

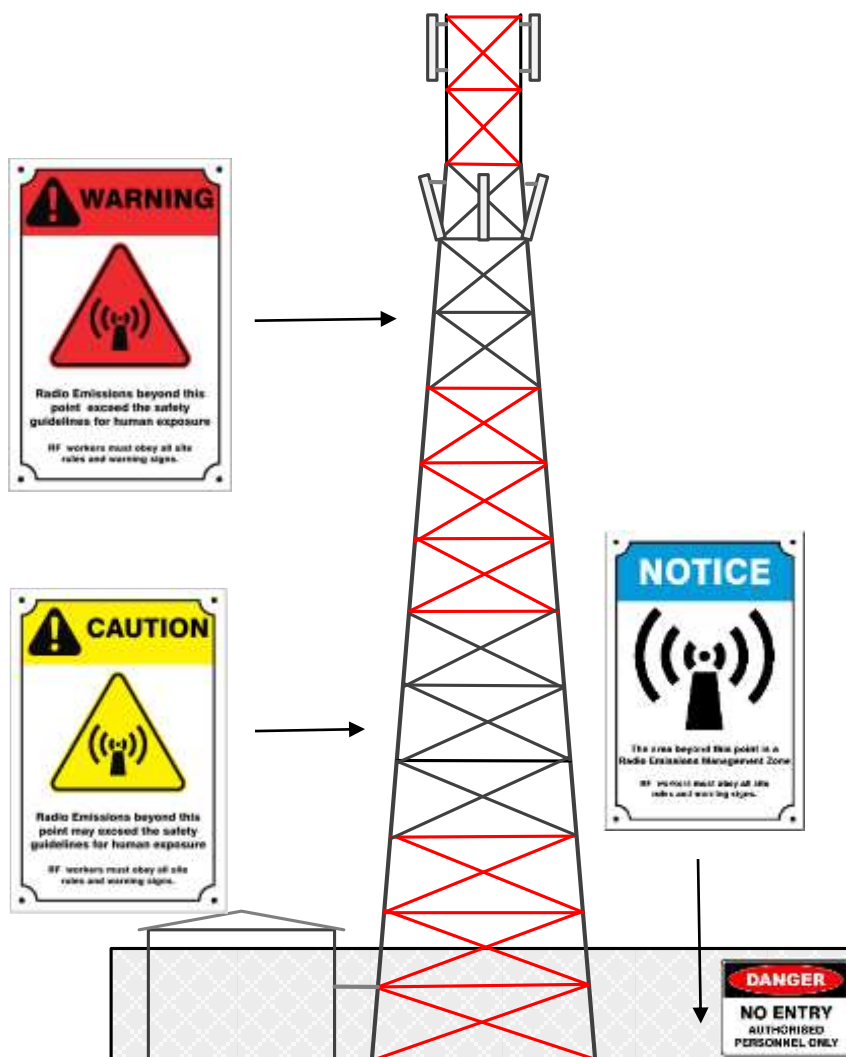


FIGURE 16: SAMPLES OF WARNING SIGNAGE

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## 5 SUBMISSION OF INFORMATION BY LICENSEES

### 5.1 General

- 5.1.1 The Licensee who intend to construct and deploy a new, either permanent or temporary, and or modify existing WCS under the WCS Advisory Guideline, shall ensure that the relevant authorities are informed and consulted before radio apparatus is deployed.
- 5.1.2 The Licensee shall ensure that the WCS proposal and deployment plans are fully and accurately incorporate with the requirements of WCS Advisory Guideline, before construction commences and after construction completed.
- 5.1.3 The Licensee shall demonstrate compliance with the requirements prior to the construction of any WCS according to the application process. The Licensee shall submit the documents in hardcopy format and electronically as well.

### 5.2 Submission of Pre-Requisite Details and Documentations

- 5.2.1 The Licensee intending to develop a new, either permanent or temporary use, and or modify existing WCS shall submit individual application to the Authority, TCP, DARE, DCA and/or ABCi, where applicable.
- 5.2.2 The Licensee shall submit the proposal and deployment plans using the WCS Application form (refer to **Appendix B**) with other associated information below:
  - i. A geographical map showing the proposed site location with GPS coordinates and nearby adjacent existing WCS sites, owned by both applicant and other telecoms service providers, within **fifteen hundred metres (1,500M)** from the proposed site;
  - ii. A geographical map showing the intended mobile coverage plan sector from the proposed site;
  - iii. Actual site photo of the proposed site with the indication of the WCS location and site layout plan indicating the boundaries of the site area;
  - iv. Structural drawings and schematics showing full details of the design of the proposed WCS (monopole, tower, guyed mast, rooftop antenna and mounting structures and others), antenna and mounting equipment, including size and colour;
  - v. Schematics showing the locations and methodology of the proposed antenna to be affixed to a particular building or structure. For the rooftop antenna mounting poles, the proposed detailed fixing method to the roof, must be shown clearly;
  - vi. A copy of written evidence relating to the engagement with other telecoms service providers on the possibility of co-locating on the newly proposed WCS or on the other existing WCS, where applicable;
  - vii. A copy of the height clearance proposal approval letter from DCA;
  - viii. For roof-top or ancillary structure WCS deployment, building structural reports endorsed by MoD's registered QP to be submitted to ABCi for approval and a copy to the Authority for reference;
  - ix. Any other information as per required by the Authority, ABCi, DARE, DCA and TCP, where applicable.

### 5.3 Submission of WCS Reports

- 5.3.1 The Licensee shall provide the Authority with a database of the WCS comprising of currently deployed WCS, as well as proposed WCS on a **quarterly basis**. The submission shall be in Excel database format and Google Earth and/or GIS format.

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## 6 WCS DEVELOPMENT APPLICATION PROCESS

### 6.1 General

- 6.1.1 The Licensee who intent to construct and deploy a new, either for permanent or temporary, and or modify existing WCS under WCS Advisory Guideline, are to observed and follow the application processes **before the construction** of the WCS.
- 6.1.2 The new WCS processes, depending on the types of site selection for the construction of the WCS, are to be categorised as below-
- i. Government State Land.
  - ii. Government Gazetted Land.
  - iii. Private Land.
  - iv. Building Rooftops or Ancillary Structures.

### 6.2 NEW WCS DEVELOPMENT: Site Selection Process

#### 6.2.1 TCP: Site selection on Government State Land

- 6.2.1.1 The Licensee shall first engage TCP to determine the land availability **before** applying for the land through the mobile site application process. This is applicable for both permanent and temporary WCS deployment. The new WCS site selection process on **Government State Land**, is illustrated as in **Appendix C**.
- 6.2.1.2 For temporary WCS deployment, the Licensee shall state the definitive duration, in which the temporary structure will be deployed. Upon expiry of the permissible duration, the Licensee must re-apply for extension with justification. The Authority, ABCi, DCA and TCP shall have the discretion on the final approval, extension and duration for the deployment of the temporary structure.
- 6.2.1.2.1 The Licensee shall apply the 'Obstacle Limitation Surface Approval application' from DCA, for the proposed location of the new WCS development.
- 6.2.1.2.2 Where the Licensee's submission of the documentations required by DCA is complete, the application shall be processed by DCA. Whereby, if the submission of the documentations required by DCA is incomplete, DCA shall return the application back to the Licensee with relevant comments for re-submission.
- 6.2.1.2.3 DCA shall review and process the application, submitted by the Licensee after the complete submission received. The process duration is subjected to DCA's procedure.
- 6.2.1.2.4 DCA shall officially response to the Licensee, in writing, on the outcome of the Obstacle Limitation Surfaces Approval application. If the application is approved, Licensee can proceed on the site application to the Authority and TCP. If the approval is denied, the Licensee shall re-propose alternative locations and re-submit to DCA.

- 6.2.1.2.5 Licensee shall then submit the site application, concurrently to the Authority and TCP, with the documents below:
- i. a copy of DCA's Obstacle Limitation Surfaces Approval letter.
  - ii. a copy of the WCS form and the Authority's supporting documentation.
- 6.2.1.2.6 Where the Licensee's application with the pre-requisite documents are complete, both the Authority and TCP shall process the application concurrently for the approval. Whereby, if the documentation required is incomplete, the Authority and/or TCP shall return the application back to the Licensee with relevant comments for re-submission.
- 6.2.1.2.7 The Authority shall review and process the site application by the Licensee within ten (10) working days at the earliest, whereas TCP's process duration shall subject to TCP's procedure and also depend on the progress stipulated in paragraph 6.2.1.2.9.
- 6.2.1.2.8 The site application with the Authority's site findings shall be copied to the Licensee for their reference.
- 6.2.1.2.9 In conjunction with the processing of the site application from the Licensee, TCP shall also circulate and consult with other relevant government agencies for approval or comments on the site application.
- 6.2.1.2.10 The Authority and TCP shall convene to discuss on the application findings, at the earliest after the complete submission is received.
- 6.2.1.2.11 After convening to discuss on the site submission findings, TCP shall inform the Licensee in writing of the outcome. In the event of any issues, Licensee is required to resolve and re-submit the application. Otherwise, Licensee shall proceed the formal application for site selection to TCP.
- 6.2.1.2.12 Licensee shall proceed with formal application for site selection to TCP, including relevant documents as per paragraph 6.2.1.2.5.

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## **6.2.2 TCP: Site selection on Government Gazette and/or Leased Land**

- 6.2.2.1 The new WCS site selection process on **Government Gazette and/or Leased Land**, is illustrated as in **Appendix D**. This is inclusive of DARE's industrial site and parks. The process is applicable for both permanent and temporary WCS deployment.
- 6.2.2.2 For temporary WCS deployment, the Licensee shall state the definitive duration, in which the temporary structure shall be deployed. Upon expiry of the permissible duration, the Licensee shall re-apply for extension with justification. The Authority, ABCi, DCA and TCP will have the discretion on the final approval, extension and duration for the deployment of the temporary structure.
- 6.2.2.2.1 The Licensee shall engage with the land owner for their consent of utilising the land available for the deployment of WCS.
- 6.2.2.2.2 Where the land owner agrees to the deployment of the WCS on the premises, the owner shall response to the Licensee in writing, inclusive of signatory endorsement, of their consent. Whereby, if the owner disagreed to the Licensee's request to deploy the WCS on the land, the Licensee must seek for alternative location for the deployment of the WCS.
- 6.2.2.2.3 The Licensee shall apply to DCA for the Obstacle Limitation Surface Approval on the proposed location for the new WCS development.
- 6.2.2.2.4 Where the Licensee's submission of the documentations required by DCA is complete, the application will be processed by DCA for approval. Whereby, if the submission of the documentations required by DCA is incomplete, DCA shall return the application back to the Licensee with relevant comments for re-submission.
- 6.2.2.2.5 DCA shall review and process the Obstacle Limitations Surface Approval application after the complete submission is received. The process duration is subjected to DCA's procedure.
- 6.2.2.2.6 DCA shall officially response to the Licensee, in writing, on the outcome of the application. If the approval is granted, Licensee can proceed on the site application to the Authority and TCP. If the approval is denied, the Licensee shall re-propose and re-submit an alternative location to DCA.
- 6.2.2.2.7 Licensee shall then submit the site application, concurrently to the Authority and TCP, with the documents below:
- (a) the land owner's consent letter.
  - (b) a copy of DCA's Obstacle Limitation Surfaces Approval letter.
  - (c) a copy of the WCS form and the Authority's supporting documentation.
- 6.2.2.2.8 Where the Licensee's submission of the required documentation is complete, both the Authority and TCP shall process the application concurrently. Whereby, if the submission of the documentations required is incomplete, the Authority and/or TCP shall return the application back to the Licensee with relevant comments for re-submission.

- 6.2.2.2.9 The Authority shall review and process the site application of the Licensee within ten (10) working days at the earliest, whereas TCP's process duration shall be subjected to TCP's procedure and also depend on the progress stipulated in paragraph 6.2.2.2.11.
- 6.2.2.2.10 The Licensee shall be forwarded (copied) with the Authority's site findings for their reference.
- 6.2.2.2.11 In conjunction with the processing of the site application from the Licensee, TCP might also circulate and consult with other relevant government agencies for approval or comments on the site application.
- 6.2.2.2.12 The Authority and TCP shall convene to discuss on the site submission findings, at the earliest after the complete submission is received.
- 6.2.2.2.13 After convening to discuss on the site application findings, TCP shall inform the Licensee in writing of the outcome. In the event of any issues, Licensee is required to resolve and re-submit the application. Otherwise, Licensee shall proceed the formal application for site selection to TCP.
- 6.2.2.2.14 Licensee to proceed with formal application for site selection to TCP, including relevant documents as per paragraph 6.2.2.2.7.

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### 6.2.3 TCP: Site selection on Private Land

- 6.2.3.1 The new WCS site selection and development process on **Private Land**, is illustrated as in **Appendix E**. This is applicable for both permanent and temporary WCS deployment.
- 6.2.3.2 Site selection on private land **shall only be applicable** upon prior TCP's direction and approval for the alternative of utilising private land due to the **scarcity and unavailability of government state land** within or surrounding the proposed location.
- 6.2.3.3 For temporary WCS deployment, the Licensee shall state the definitive duration, in which the temporary structure shall be deployed. Upon expiry of the permissible duration, the Licensee shall re-apply for extension with proper justification. The Authority, ABCi, DCA and TCP shall have the discretion on the final approval, extension and duration for the deployment of the temporary structure.
- 6.2.3.3.1 In the event, whereby the proposed WCS location are exhaustive of available government state land, upon acknowledging the scarcity of government state land within the surrounding of the proposed site, TCP shall permit the Licensee to seek for available private land to be proposed for the deployment of the WCS.
- 6.2.3.3.2 Licensee to seek for available private land for the WCS deployment upon TCP's approval.
- 6.2.3.3.3 The Licensee shall engage with the land owner and other relevant parties (such as village head, district office, etc.) for their consent of utilising the private land available for the deployment of WCS.
- 6.2.3.3.4 Where the land owner and other relevant parties agrees to the deployment of the WCS on the premises, the owner and relevant parties shall response to the Licensee in writing, inclusive of signatory endorsement, of their consent. Whereby, if the owner and/or other relevant parties disagreed to the Licensee's request to deploy the WCS on the land, the Licensee shall seek for alternative location for the deployment of the WCS.
- 6.2.3.3.5 The Licensee shall apply to DCA for the Obstacle Limitation Surface Approval on the proposed location for the new WCS development.
- 6.2.3.3.6 Where the Licensee's submission of the documentations required by DCA is complete, the application will be processed by DCA for approval. Whereby, if the submission of the documentations required by DCA is incomplete, DCA shall return the application back to the Licensee with relevant comments for re-submission.
- 6.2.3.3.7 DCA shall review and process the Obstacle Limitations Surface Approval application after the complete submission is received. The process duration is subjected to DCA's procedure.
- 6.2.3.3.8 DCA shall officially response to the Licensee, in writing, on the outcome of the application. If the approval is granted, Licensee can proceed on the site



application to the Authority and TCP. If the approval is denied, the Licensee shall re-propose and re-submit an alternative location to DCA.

6.2.3.3.9 Licensee shall then submit the site application, concurrently to the Authority and TCP, with the documents below:

- i. a copy of the land owner's consent letter and other relevant parties' consent such as village head, district office, etc.
- ii. a copy of DCA's Obstacle Limitation Surface Approval letter.
- iii. a copy of the WCS form and the Authority's supporting documentation.

6.2.3.3.10 Where the Licensee's submission of the required documentations is complete, both the Authority and TCP shall process the application concurrently. Whereby, if the submission of the documentations required is incomplete, the Authority and/or TCP shall return the application back to the Licensee with relevant comments for re-submission.

6.2.3.3.11 The Authority shall review and process the site application of the Licensee within ten (10) working days at the earliest, whereas TCP's process duration shall subject to TCP's procedure and also depend on the progress stipulated in paragraph 6.2.3.3.13.

6.2.3.3.12 The site application with the Authority's site findings shall be copied to the Licensee for their reference.

6.2.3.3.13 In conjunction with the processing of the site submission from the Licensee, TCP might also circulate and consult with other relevant government agencies for approval or comments on the site application.

6.2.3.3.14 The Authority and TCP shall convene to discuss on the site submission findings, at the earliest after the complete submission is received.

6.2.3.3.15 After convening to discuss on the site application findings, TCP shall inform the Licensee in writing of the outcome. In the event of any issues, the Licensee is required to resolve and re-submit the application. Otherwise, the Licensee may then proceed the formal application for WCS site development to ABCi, via MoD's registered QP.

6.2.3.3.16 Licensee to proceed with formal application for WCS site development to ABCi, via the Licensee/MoD's registered QP, including the documents below:

- i. A copy of the land owner's consent letter and other relevant parties' consent such as village head, district office, etc.
- ii. A copy of DCA's Obstacle Limitation Surface Approval.
- iii. A copy of the WCS form and the Authority's supporting documentation.
- iv. A copy of TCP's consent letter.
- v. The proposed structural report endorsed by MoD's registered QP.

#### **6.2.4 ABCi: Site Selection on Rooftop and on Ancillary Structure**

- 6.2.4.1 The new WCS site selection and development process **on the rooftop and on ancillary structure**, such as water tank tower and any high rise structures, is illustrated as in **Appendix F**. This is applicable for both permanent and temporary WCS deployment.
- 6.2.4.2 For temporary WCS deployment, the Licensee shall state the definitive duration, in which the temporary structure shall be deployed. Upon expiry of the permissible duration, the Licensee shall re-apply for extension with proper justification. The Authority, ABCi and DCA shall have the discretion on the final approval, extension and duration for the deployment of the temporary structure.
- 6.2.4.2.1 The Licensee shall engage with the building's or ancillary structure's owner for their consent of utilising the space and area available for the deployment of WCS on top of the building or on an ancillary structure.
- 6.2.4.2.2 Where the owner of the building or ancillary structure agreed to the deployment of the WCS on the roof top or on the ancillary structure, the owner shall response to the Licensee in writing, inclusive of signatory endorsement, of their consent. Whereby, if the owner disagreed to the Licensee's request to deploy the WCS on the rooftop or on the ancillary structure, the Licensee shall seek for alternative location or buildings for the deployment of the WCS.
- 6.2.4.2.3 The Licensee shall apply to DCA for the Obstacle Limitation Surface Approval on the proposed location for the new WCS development on the rooftop or on ancillary structure.
- 6.2.4.2.4 Where the Licensee's submission of the documentations required by DCA is complete, the application will be processed by DCA for approval. Whereby, if the submission of the documentations required by DCA is incomplete, DCA shall return the application back to the Licensee with relevant comments for re-submission.
- 6.2.4.2.5 DCA shall review and process the Obstacle Limitations Surface Approval application after the complete submission is received. The process duration is subjected to DCA's procedure.
- 6.2.4.2.6 DCA shall officially response to the Licensee, in writing, on the outcome of the application. If the approval is granted, Licensee shall proceed on the site application to the Authority. If the approval is denied, the Licensee shall re-propose and re-submit an alternative location to DCA.
- 6.2.4.2.7 Licensee shall submit the site application to the Authority, which includes the documents below:
- i. A copy of the building's or ancillary structure's owner consent letter.
  - ii. A copy of DCA's Obstacle Limitation Surface Approval letter.
  - iii. A copy of the WCS form and the Authority's supporting documentation.
- 6.2.4.2.8 Where the Licensee's submission of the required documentations is complete, the Authority shall process the application. Whereby, if the submission of the

documentations required is incomplete, the Authority shall return the application to the Licensee with relevant comments for re-submission.

- 6.2.4.2.9 The Authority shall review and process the site application of the Licensee within ten (10) working days.
- 6.2.4.2.10 The Authority shall respond to the Licensee, in writing, on the outcome of the site application. If the Authority have no objection for the site, Licensee can proceed to apply the site development application to ABCi, via MoD's registered QP. If the proposed site is not supported, the Licensee shall re-proposed and re-submit an alternative site to DCA and the Authority.
- 6.2.4.2.11 Licensee/ MoD's registered QP shall submit the WCS site development application to ABCi, via MoD's registered QP, which include the documents below:
- i. A copy of the building's or ancillary structure's owner consent letter.
  - ii. A copy of DCA's Obstacle Limitations Surface Approval letter.
  - iii. A copy of the Authority's WCS Application form and other supporting documentation.
  - iv. The building's or ancillary structure's structural reports endorsed by MoD's registered QP.
- 6.2.4.2.12 Where the Licensee/ MoD's registered QP's submission of the required documentations are complete, ABCi shall process the application. Whereby, if the submission of the documentations required is incomplete, ABCi shall return the application to the Licensee with relevant comments for re-submission.
- 6.2.4.2.13 ABCi shall review and process the WCS site development application of the Licensee/ MoD's registered QP. The process duration is subjected to ABCi's procedure.
- 6.2.4.2.14 ABCi shall respond to the Licensee/ MoD's registered QP, in writing, on the outcome of the application. If the approval is granted, the Licensee/ MoD's registered QP shall proceed on the WCS site development. If the approval is denied, the Licensee shall resolve and re-submit the application to ABCi.
- 6.2.4.2.15 Licensee/MoD's registered QP shall then proceed with the WCS site development.

## **APPENDIX A**

Infrastructure consists of the underlying systems, networks and facilities, which enable the provision of info-communications services shall include access to other related utility services, but not limited to, as per listed below:

- i. physical sites;
- ii. right of way;
- iii. poles, masts, monopoles and towers;
- iv. antenna structures;
- v. ducts, manholes and trenches;
- vi. buildings, shelters and containers;
- vii. general lighting, aviation obstruction lightings and air-conditioning;
- viii. electrical components, earthing and lightning protection system;
- ix. access tracks and paths;
- x. signboard, warning signs; and
- xi. security fencing.

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## APPENDIX B

### WIRELESS COMMUNICATIONS STRUCTURE (WCS) SITE APPLICATION FORM

#### 1.0 CONTACT DETAILS

1.1	NAME / POSITION:	1.2	CONTACT No.:
1.3	OPERATOR:	1.4	EMAIL @:
1.5	ADDRESS:		

#### 2.0 SITE INFORMATION

2.1	LOCATION ADDRESS: (where applicable)	SIMPANG:	KAMPONG:
		JALAN:	MUKIM:
2.2	WGS84 COORDINATES:	LATITUDE:	LONGITUDE:
2.3	PROPOSED SITE AREA / DIMENSIONS:		

#### 3.0 WIRELESS COMMUNICATIONS STRUCTURE (WCS) INFORMATION

3.1	WCS STATUS:	PERMANENT / TEMPORARY *	3.3	HEIGHT OF WCS:
3.2	TYPE OF WCS:		3.4	WCS MAXIMUM LOADING:
3.5	PROPOSED WCS BE ABLE TO CATER FOR CO-LOCATION BY OTHER TELECOMS SERVICE PROVIDER:		YES / NO *	
	IF CO-LOCATE POSSIBLE, AT WHICH HEIGHT?		IF CO-LOCATE POSSIBLE, WHAT IS THE AVAILABLE LOAD?	
3.6	DISTANCE FROM THE NEXT NEAREST EXISTING WCS:			
3.7	ENGAGEMENT WITH OTHER TELECOMS SERVICE PROVIDER ON POSSIBILITY OF SHARING ON EXISTING OR PROPOSED WCS:		YES / NO *	

#### 4.0 PRE-REQUISITE DETAILS & DOCUMENTS

4.1	A geographical map showing the site location with GPS coordinates and nearby adjacent existing WCS sites, for both applicant and other telecoms service providers, within 1500 metres from the proposed site.	Attached <input type="checkbox"/>
4.2	A geographical map showing the intended mobile coverage sector from the proposed site	Attached <input type="checkbox"/>
4.3	Actual site photo of the proposed site with the indication of the WCS location and site layout plan indicating the boundaries of the site area.	Attached <input type="checkbox"/>
4.4	Structural drawings and schematics showing full details of the design of the proposed WCS, antenna and mounting equipment, including size and colour.	Attached <input type="checkbox"/>
4.5	Schematics showing the locations and methodology of the proposed antenna to be affixed to a particular building or structure.	Attached <input type="checkbox"/>

4.0 PRE-REQUISITE DETAILS & DOCUMENTS		
4.6	Additional information relating to the engagement with other telecoms service providers on the possibility of co-locating on the newly proposed WCS or on the other existing WCS.	Attached <input type="checkbox"/>
4.7	A copy of the height clearance proposal approval letter from DCA.	Attached <input type="checkbox"/>
4.8	For rooftop or ancillary structure WCS deployment, a copy of building structural reports endorsed by MoD's registered QP.	Attached <input type="checkbox"/>

5.0 CONSTRUCTION REQUIREMENTS		
5.1	The boundary of the WCS's land shall be of a <b>minimum distance of 20 metres</b> from the boundary of the nearest residential building's plot of land.	Compliance <input type="checkbox"/>
5.2	The boundary of the WCS's land and the boundary of private or government utility facilities plot of land shall <b>not be less than 3 metres</b> apart.	Compliance <input type="checkbox"/>
5.3	In keeping with international recognition of common public perception concerns, the Licensees is to avoid installing the WCS in " <b>public-sensitive areas and buildings</b> " – i.e. existing children's parks and playground, schools, nurseries, place of worships, government and private hospitals, where possible. If unavoidable due to technical aspects, the recommended minimum distance shall <b>not be less than 200 metres</b> from the nearest entity in all cases.	Compliance <input type="checkbox"/>
5.4	The recommended minimum separation distance between two or more adjacent towers, in excess of 50 metres in height, shall be <b>not less than one (1) kilometre</b> apart.	Compliance <input type="checkbox"/>
5.5	The recommended minimum separation distance between two or more adjacent monopoles, with the height of the monopoles is up to 45 metres, shall be <b>not less than 200 metres</b> apart.	Compliance <input type="checkbox"/>
5.6	The recommended minimum separation distance between adjacent tower and monopole, shall be <b>not less than 200 metres</b> apart.	Compliance <input type="checkbox"/>
5.7	No mobile telecommunications structures shall be constructed in close proximity to High Voltage (11Kv and above) electrical power transmission lines and main power stations. The nearest distance of a WCS to a High Voltage electrical power transmission line or main power stations, shall be the equivalent of 120% of the height of the structures from the wayleave boundary.	Compliance <input type="checkbox"/>

Note: 1) \* Please select which is applicable.

2) Application refer to the "WCS Advisory Guideline" for further details on the WCS Development Requirements.

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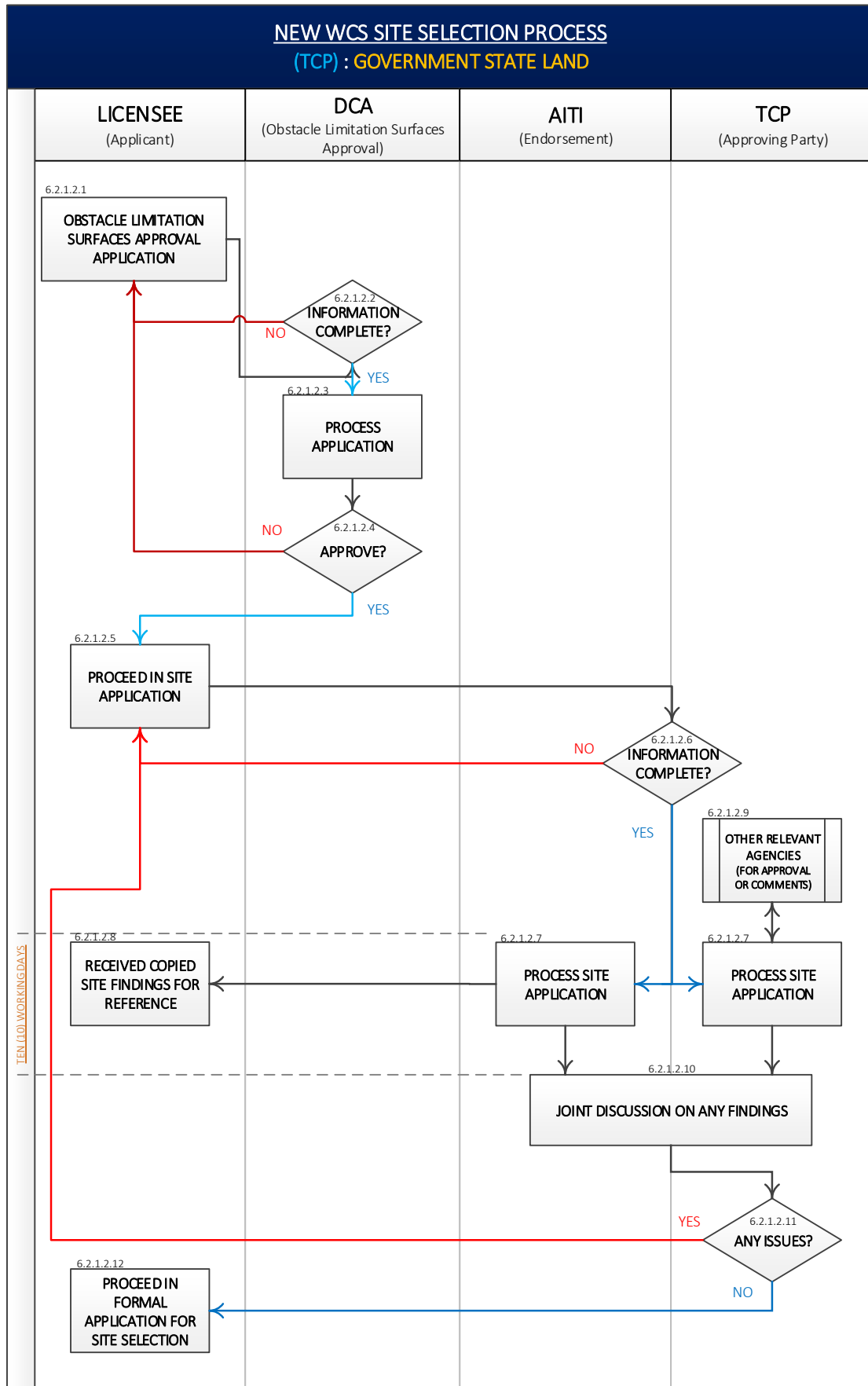
REVIEWING DETAILS		(FOR TCP/DARe/ABCI/AITI OFFICIAL USE ONLY)
ORGANISATION NAME:	TCP / DARe / ABCi / AITI	
CHECKED BY:	Name:	<input type="checkbox"/> YES. Submission in compliance <input type="checkbox"/> NO. Submission not in compliance <input type="checkbox"/> Request for further details or modifications:
	Designation:	
	Signature:	
REVIEWED BY:	Name:	
	Designation:	
	Signature:	
APPROVED BY:	Name:	
	Designation:	
	Signature:	

*Note:*

*Each application must be submitted in soft copy via email and hard copy via correspondence. A scanned copy of all attachments and cover letter needs to be included in the soft copy format.*

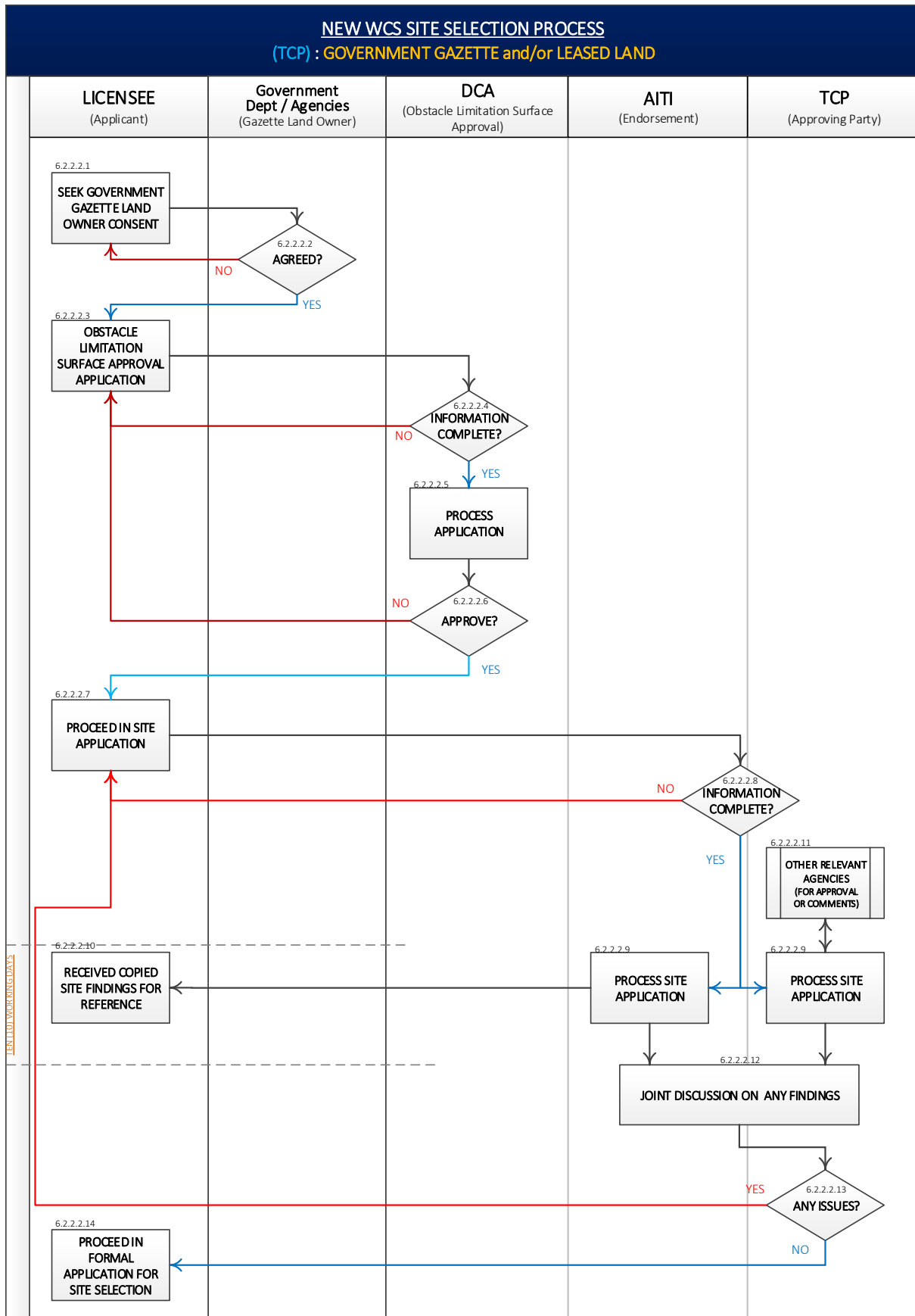
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## APPENDIX C

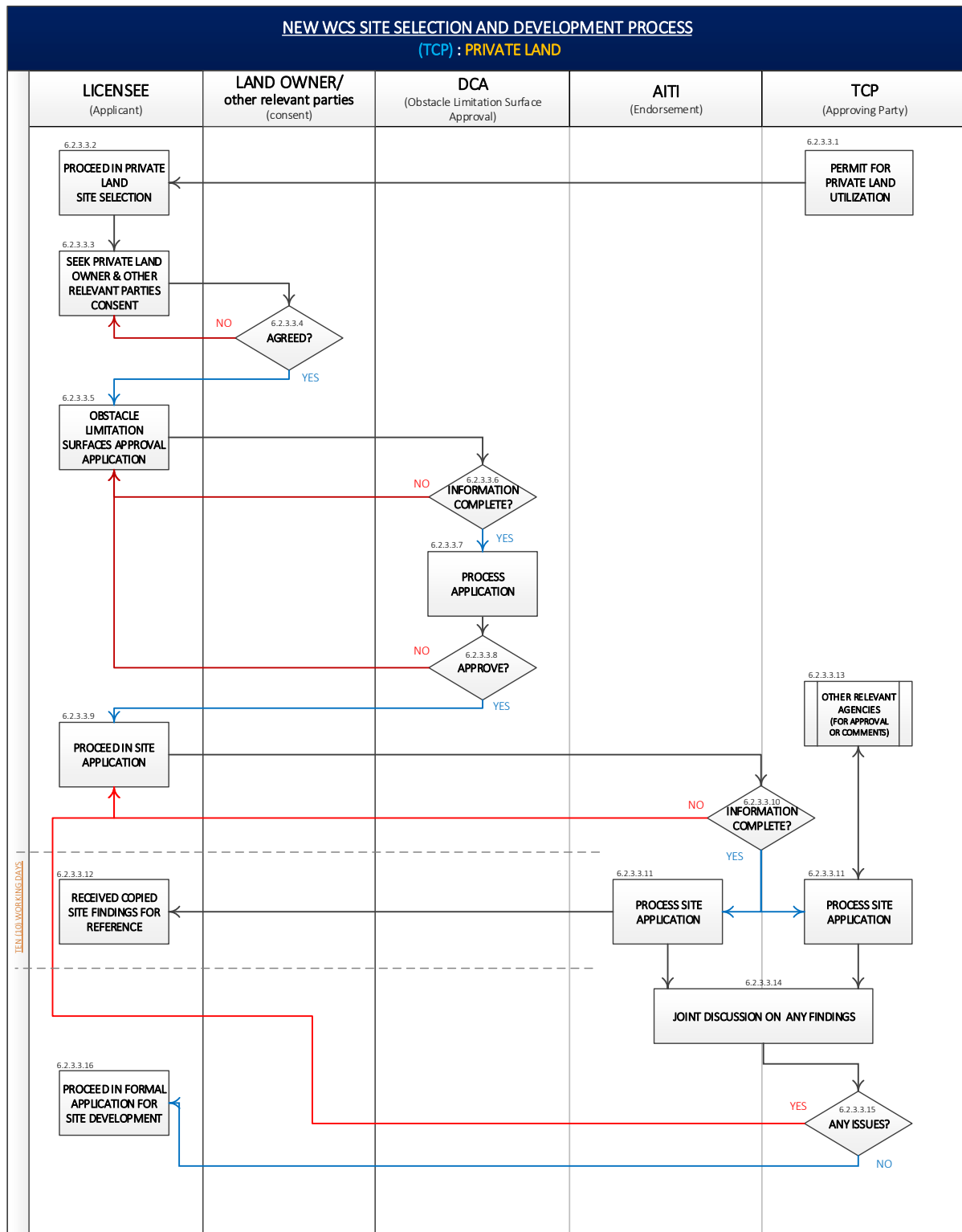




## APPENDIX D



## APPENDIX E



## APPENDIX F

