



WELLINGTON NEW ZEALAND

PURSUANT to Section 28 of the Civil Aviation Act 1990

I, JENNIFER MARY SHIPLEY, Minister of Transport,

HEREBY MAKE the following ordinary rules.

SIGNED AT Wellington

This **17th** day of **February** 19**97**

by **JENNIFER MARY SHIPLEY**

A large, stylized handwritten signature in black ink, appearing to read 'J. Shipley'.

Minister of Transport

Civil Aviation Rules

Part 77

Objects and Activities Affecting Navigable Airspace

Docket Nr. 1056

Civil Aviation Rules

Part 77

**Objects and Activities Affecting Navigable
Airspace**

RULE OBJECTIVE, EXTENT OF CONSULTATION AND COMMENCEMENT

The objective of Part 77 is to ensure that the Director—

- (a) is notified of objects and activities which can affect Navigable Airspace; and
- (b) carries out an aeronautical study and, according to laid down standards, makes a determination as to whether—
 - (1) marking or lighting is required; or
 - (2) the aviation industry needs to be given prior notification of the activity.

In May 1990 the Air Transport Division of the Ministry of Transport published a notice of intention to carry out a complete review of the aviation regulatory system. This notice, in Civil Aviation Information Circular Air 3, listed the areas in which rules would be made and invited interested parties to register their wish to be part of the consultative process. The Register was identified as the Regulatory Review Consultative Group.

A draft of Part 77 was developed by the rules rewrite team in consultation with members of the consultative group. An informal draft was published and distributed in 19 December 1995 and a period of informal consultation followed. This culminated in the issue of Notice of Proposed Rulemaking 96-3 under Docket 1056 on 11 May 1996.

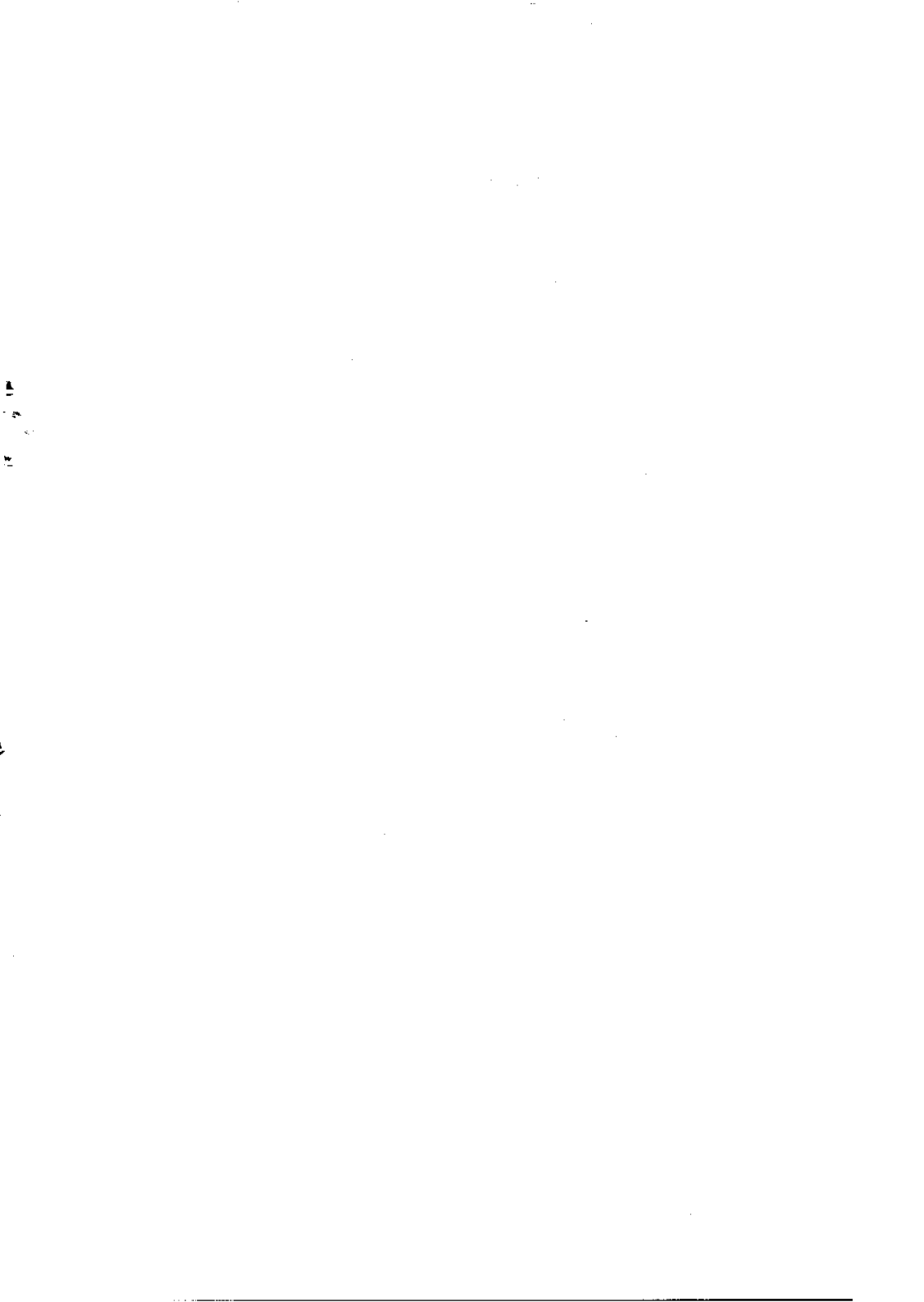
The publication of this notice was advertised in the daily newspapers in the five main provincial centres on 11 May 1996. The notice was mailed to members of the Regulatory Review Consultative Group and to other parties, including overseas aviation authorities and organisations, who were considered likely to have an interest in the proposal.

A period of 60 days was allowed for comment on the proposed rule.

The submissions and verbal comments were considered and where appropriate the proposed rules amended to take account of the comments made.

The rules as amended were then referred to and signed by the Minister of Transport.

Part 77 comes into force on 1 April 1997.



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77.1 Applicability

(a) Subject to paragraph (b), this Part prescribes rules for persons within the territorial limits of New Zealand, including the New Zealand Defence Force, proposing—

- (1) to construct or alter a structure that could constitute a hazard in navigable airspace; or
- (2) the use of a structure, lights, lasers, weapons, or pyrotechnics, that could constitute a hazard in navigable airspace.

(b) This Part shall not apply to—

- (1) any member of the New Zealand Defence Force or any aircraft operated by the New Zealand Defence Force acting in connection with—
 - (i) any war or other like emergency; or
 - (ii) the defence of New Zealand and other New Zealand interests; or
 - (iii) aid to the civil power in time of emergency; or
 - (iv) the provision of any public service; or
 - (v) any operation performed within a restricted, danger, or military operational area designated under Part 73 for military purposes; and
- (2) activities to which Part 101 applies.

[Until Part 73 comes into force restricted, danger, or military operational areas are prescribed in Part 19]

77.3 Definitions

In this Part—

Aerodrome means an aerodrome that is promulgated in the current Visual Flight Guide of the NZAIP:

Ground level at its site means the highest ground within a 600 m radius of the site:

High power transmitter means a transmitter that operates at a frequency above 30 megahertz and with an effective radiated power above 10 kilowatts:

ICAO document 8168-OPS/611 means the procedures for air navigation services and aircraft operations, approved and published by decision of the Council of the International Civil Aviation Organisation:

Navigable airspace means airspace at or above the minimum flight altitudes prescribed by or under the Civil Aviation Rules, including all legitimate low level operations but not including restricted, danger, and military operations areas activated for use by the New Zealand Defence Force:

NZS/AS 2211 means the New Zealand standards for laser safety approved by the Standards Authority under the provisions of the Standards Act 1988:

Obstacle limitation surface means airspace defined around an aerodrome that enables operations at the aerodrome to be conducted safely and that prevents the aerodrome from becoming unusable by the growth of obstacles around the aerodrome:

Visual Flight Guide means a guide, forming part of the NZAIP, that provides essential aerodrome information for pilots performing VFR operations.

77.5 Notice of construction or alteration of structure

Each person proposing to construct or alter a structure shall notify the Director of the proposal in accordance with 77.13 if—

- (1) the structure will extend more than 60 m in height above the ground level at its site; or
- (2) the structure will exceed the general tree height in the area by 18 m and be located in an area of low level aerial activity or other low flying activity, or in a low flying area or low level route as prescribed in Part 73; or
- (3) for each aerodrome, the structure is or will be located below the approach or take-off surfaces specified in Part 139 and as outlined in figures A.1 and A.2 of Appendix A, and will extend to a height greater than a surface, outlined in Appendix A, extending outward and upward at one of the following—
 - (i) a slope of 1:83 from the fan origin of the takeoff surface of each runway where the runway is used or intended to be used by aircraft with a MCTOW above 5700 kg; or
 - (ii) a slope of 1:50 from the fan origin of the takeoff surface of each runway where the runway is used or intended to be used by aircraft with a MCTOW at or below 5700 kg; or
 - (iii) a slope of 1:25 from the nearest point of the safety area of each heliport; or
- (4) for each aerodrome, the structure would penetrate the conical, inner horizontal or transitional side surface—

- (i) outlined in figure A.1 of Appendix A; or
- (ii) specified in Part 139; or
- (iii) as defined in the local district scheme.

[Until Part 73 comes into force low flying areas are prescribed in Part 19]

77.7 Notice of use of a structure, light, or laser

(a) Each person proposing to use a structure shall notify the Director of the proposal in accordance with 77.13 if—

- (1) the structure will or may discharge efflux at a velocity in excess of 4.3 m per second through the obstacle limitation surfaces of an aerodrome; or
- (2) the structure will or may discharge efflux at a velocity in excess of 4.3 m per second higher than 60 m above ground level.

(b) Each person proposing to operate a light or laser shall notify the Director in accordance with 77.13 if—

- (1) because of its glare or affect on a pilot's vision, the light or laser is liable to endanger aircraft; or
- (2) for a laser, it would produce exposures in navigable air space exceeding the maximum permissible exposure defined for that laser in NZS/AS 2211; or
- (3) it is likely to endanger aircraft by being mistaken for—
 - (i) a light or part of a system of lights established or approved for display at or near an aerodrome; or
 - (ii) a light marking a hazard in navigable airspace.

77.9 Notice of use of weapons

Each person, or each person representing an organisation, proposing to use weapons that will fire or launch a projectile that will have a trajectory higher than 60 m shall notify the Director of the proposal in accordance with 77.13.

77.11 Notice of use of pyrotechnics

Each person proposing to stage a pyrotechnics display that will involve the firing or launching of a projectile that will have a trajectory higher than 60 m shall notify the Director of the proposal in accordance with 77.13.

77.13 Notice requirements

(a) Subject to paragraph (b) and (c), each person required by 77.5, 77.7, 77.9, or 77.11 to provide notice to the Director shall complete form CAA 24077/01 and submit it to the Director at least 90 days prior to the proposed date of commencement of construction, alteration, or use.

(b) In the case of an emergency involving essential public services, public health, or public safety, that requires immediate construction or alteration of a structure, or use of a structure, lights, lasers, weapons, or pyrotechnics—

- (1) the notice requirements in paragraph (a) shall not apply; and
- (2) the person responsible for the construction, alteration, or use shall complete form CAA 24077/01 and submit it to the Director within 5 days after the use, construction, or alteration.

(c) A person proposing to use lights, lasers, weapons, or pyrotechnics, in a control zone prescribed in Part 71 during times when the appropriate ATS is on watch—

- (1) is not required to provide notice under paragraph (a); and
- (2) shall complete form CAA 24077/01 and submit it to the Director at least 14 working days prior to the commencement of the use.

[Until Part 71 comes into force control zones are prescribed in Part 19]

77.15 Additional notice requirements

(a) Each person who is required to give notice under 77.5 and 77.7 shall, if and when required by the Director, notify the Director in writing of the actual commencement date of the construction, alteration, or use, as applicable.

(b) Each person who is required to give notice under 77.5 shall notify the Director in writing—

- (1) that the construction or alteration has reached 60 m in height above the ground level at its site, within 5 days of it doing so; and
- (2) that the construction or alteration has reached its greatest height, within 5 days of it doing so.

(c) The notice required by paragraph (b), when the structure reaches its greatest height, shall include a registered surveyor's determination of structure height and position and proof of compliance with marking and lighting requirements as determined by the Director.

(d) Each person who abandons a construction or alteration project that is the subject of a notice under this Part shall notify the Director in writing within 5 days after the project is abandoned.

(e) Each person who dismantles or suffers the destruction of a structure that is the subject of a notice under this Part shall notify the Director in writing, within 5 days after the construction or alteration is dismantled or destroyed.

77.17 Aeronautical study

(a) On receiving a notification under 77.5, 77.7, 77.9, or 77.11 the Director shall conduct an aeronautical study to determine whether the specific proposal, if executed, will constitute a hazard in navigable airspace.

(b) In conducting the aeronautical study, the Director shall consult with such persons, industry representatives, representative groups, and organisations as the Director considers appropriate.

77.19 Standards for determining hazards

(a) The Director shall determine a structure to be a hazard in navigable airspace if—

- (1) it is 120 m or higher above ground level at its site; or
- (2) it is 60 m above ground level at its site and located within 1 km of a defined VFR transit lane or area or a defined VFR helicopter lane or area.

(b) The Director shall determine the use of a structure to be a hazard in navigable airspace if the structure will or may discharge efflux at a velocity in excess of 4.3 m per second through the obstacle limitation surfaces applicable to an aerodrome.

(c) The Director shall determine the use of a structure to be a hazard in navigable airspace if the structure will or may discharge efflux at a velocity in excess of 4.3 m per second higher than 60 m above ground level.

(d) The Director shall determine the use of lights to be a hazard in navigable airspace if an analysis discloses that it will constitute a hazard in navigable airspace.

(e) The Director may determine, based on the circumstances of each proposal, the use of lasers to be a hazard in navigable airspace if it will produce exposures in navigable airspace exceeding the maximum permissible exposure defined for that laser in NZS/AS 2211.

(f) The Director shall determine the use of weapons to be a hazard in navigable airspace if an analysis discloses that it will constitute a hazard in navigable airspace.

(g) The Director shall determine the use of pyrotechnics to be a hazard in navigable airspace if an analysis discloses that it will constitute a hazard in navigable airspace.

(h) The Director may determine, based on the circumstances of each proposal, a structure to be a hazard in navigable airspace if—

- (1) it is 60 m above ground level at its site and stands in a flat plain area; or
- (2) it is located within an instrument flight procedures area that is specified in ICAO document 8168-OPS/611, including standard arrival routes, initial, intermediate, final, visual and missed approach segment areas, departure areas and standard instrument departure routes, and would result in—
 - (i) the vertical distance between any point on the structure and an established minimum instrument flight altitude within that area or segment being less than obstacle clearance required under 19.155; or
 - (ii) additional or new ceiling or visibility restrictions or a change in flight procedures applicable to departures within that area; or
- (3) it is located within an IFR en-route obstacle clearance area, including evaluated routes on NZ en-route and area charts but excluding charted routes as published in the NZAIP instrument flight guide, and would necessitate an increase in an existing or planned minimum obstacle clearance altitude; or
- (4) it exceeds the general tree height by 18 m and is located in an area of low level aerial activity or other low flying activity, or in a low flying area or low level route as prescribed in Part 73; or
- (5) it is in the vicinity of an aerodrome and protrudes through the obstacle limitation surfaces.

[Until Part 73 comes into force low flying areas are prescribed in Part 19]

77.21 Determinations

(a) The Director shall, within 28 working days of receiving any notification under 77.13(a) for construction, alteration, or use of a structure, make a determination as to whether the proposed construction, alteration, or use, if executed, will be a hazard in navigable airspace and shall advise the notifier and any other person the Director considers could be affected by the determination.

(b) The Director shall, within 10 working days of receiving any notification under 77.13(a) for use of lights, lasers, weapons, or pyrotechnics, make a determination as to whether the proposed use, if executed, will be a hazard in navigable airspace and shall advise the notifier and any other person the Director considers could be affected by the determination.

(c) The Director shall, within 4 working days of receiving any notification under 77.13(c), make a determination as to whether the proposed use of lights, lasers, weapons, or pyrotechnics, if executed, will be a hazard in navigable airspace and shall advise the notifier and any other person the Director considers could be affected by the determination.

(d) The Director shall base each determination upon the aeronautical study findings and may—

- (1) impose any conditions or limitations—
 - (i) for marking or lighting a structure as outlined in Appendix B; and
 - (ii) that ensure the hazard in navigable airspace is minimised; and
 - (iii) in determinations of no hazard in navigable airspace, considered necessary to minimise potential problems, such as the use of temporary construction equipment; and
- (2) specify additional notice requirements.

77.23 Compliance

Each person required by 77.5, 77.7, 77.9, or 77.11 to provide notice to the Director shall comply with any requirement, condition, or limitation imposed under 77.21(d).

77.25 Determination effective dates and periods

- (a) A determination regarding a proposed—
- (1) construction, alteration, or use of a structure notified under 77.13(a) shall become final 28 days after the date the determination is made under 77.17(d), unless a petition for review is received by the Director in accordance with 77.27(b); and
 - (2) use of lights, lasers, weapons, or pyrotechnics notified under 77.13(a) shall become final 65 days prior to date of commencement of use indicated to the Director on form CAA 24077/01, unless a petition for review is received by the Director in accordance with 77.27(b); and

- (3) use of lights, lasers, weapons, or pyrotechnics notified under 77.13(c) shall become final 4 days prior to the date of commencement of use indicated to the Director on form CAA 24077/01, unless a petition for review is received by the Director in accordance with 77.27(b).
- (b) Unless reviewed or extended under 77.29, each final determination of no hazard in navigable airspace made under this Part—
- (1) in respect of construction, alteration, or use of a structure, expires 18 months after the determination becomes final, or on the date the proposed construction, alteration, or use is abandoned, whichever is earlier; and
 - (2) in respect of use of lights, lasers, weapons, or pyrotechnics, expires upon completion of use as indicated to the Director on form CAA 24077/01, or on the date the proposed use is abandoned, whichever is earlier.
- (c) A determination of hazard that has become final—
- (1) under 77.25(a)(1) or 77.27(f)(2), regarding construction, alteration, or use of a structure, shall not expire but may be revoked, in writing, by the Director; and
 - (2) under 77.25(a)(2) or 77.27(f)(2), regarding use of lights, lasers, weapons, or pyrotechnics, shall expire upon completion of use as indicated on form CAA 24077/01 or the day after the date of use granted by way of extension by the Director.

77.27 *Petitions for review of determinations of hazard*

- (a) Each person proposing the construction or alteration of a structure, or use of a structure, lights, lasers, weapons, or pyrotechnics, may petition the Director for a review of a determination of hazard made by the Director.
- (b) Each petition for a review of a determination shall be submitted in writing, to be received by the Director prior to a determination becoming final under 77.25(a), and shall—
- (1) contain a full statement of the aeronautical basis upon which the petition is made; and
 - (2) present new information or facts not previously considered or discussed during the aeronautical study, including valid aeronautical reasons why the determination, revision, or extension made by the Director shall be reviewed; and

- (3) identify and explain the basis of the petition, if the petition for a review is based upon an error in reasoning, interpretation of procedures, application of hazard standards, or assumptions of fact.
- (c) A determination shall not become final until any petition for review filed in accordance with paragraph (b) has been dealt with by the Director.
- (d) The Director shall examine each petition, submitted in accordance with paragraph (b), and decide whether a review will be granted.
- (e) If a review is granted the Director shall—
 - (1) inform the petitioner of the issues to be studied and reviewed if different to the issues presented in the petition or the determination; and
 - (2) take no longer to complete the review than was taken to make the determination under 77.21(a), (b), or (c) as applicable.
- (f) If the Director determines that a review is denied—
 - (1) the petitioner shall be notified of the basis for the decision; and
 - (2) the determination shall become final at the time the review is denied or as prescribed under 77.25(a), whichever is the later.

77.29 *Petition for review or extension of determinations of no hazard*

- (a) Any person may petition the Director, in the case of a determination of no hazard in navigable airspace under this Part, to review the determination based on new facts that change the basis upon which it was made, or to extend the effective period of determination, if—
 - (1) where applicable, the proposed construction or alteration of a structure has not started by actual structural work, such as the laying of a foundation, but not including excavation; and
 - (2) the petition is submitted at least 30 days before the expiration date of the final determination of no hazard in navigable airspace.
- (b) The Director, having made the determination of no hazard in navigable airspace, shall examine each petition presented and review the determination, or extend or affirm the original expiry date of the determination.
- (c) A final determination of no hazard in navigable airspace expiring—
 - (1) under 77.25(b)(1) may be extended by the Director for periods of not more than six months at a time; and

- (2) under 77.25(b)(2) may be extended by the Director for periods of not more than 14 days at a time.

Appendix A — Obstacle Notification Surfaces

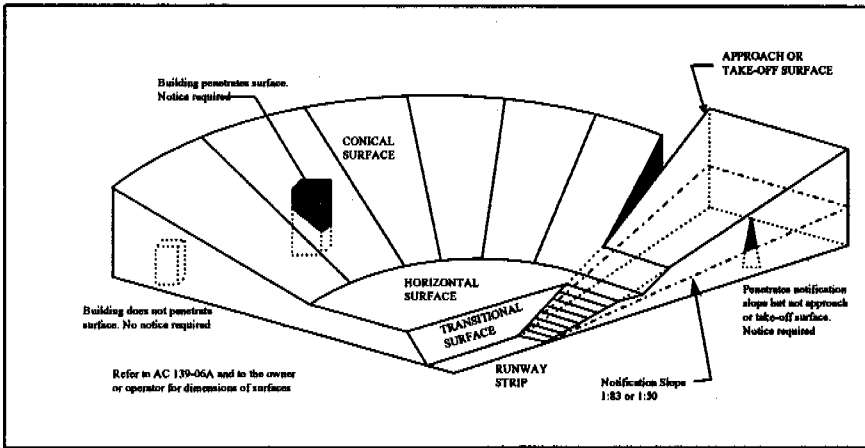


Figure A.1 - Aerodrome Notification Requirements

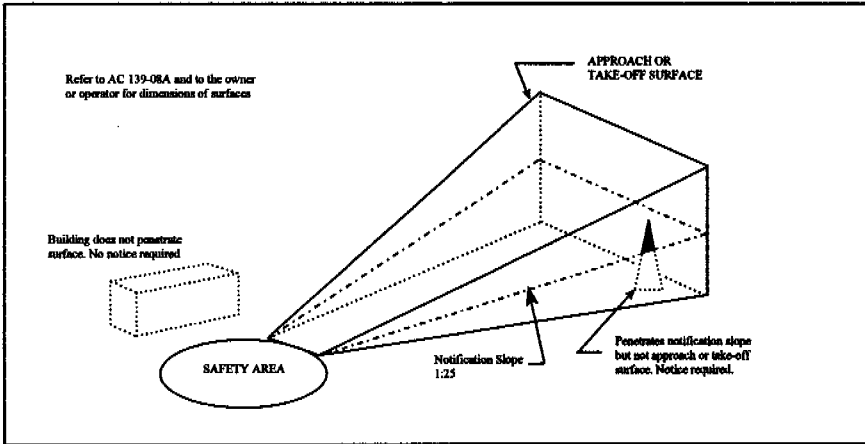


Figure A.2 - Heliport Notification Requirements

Appendix B — Visual Aids for denoting obstacles

B.1 Obstacles

For the purpose of this Appendix the term obstacle is used to refer to those objects that the Director has determined to be a hazard under 77.21.

B.2 Obstacles to be marked or lighted

(a) A fixed obstacle that extends above the obstacle limitation surfaces required by Part 139 shall be marked and, if the aerodrome is used at night, lighted, except that—

- (1) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and
- (2) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient; and
- (3) such marking or lighting may be omitted when—
 - (i) the obstacle is shielded by another fixed obstacle already marked or lighted; or
 - (ii) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths; or
 - (iii) an aeronautical study shows the obstacle not to be of operational significance.

(b) A fixed obstacle that meets or exceeds any of the standards for determining hazards under 77.19, not included in paragraph (a), shall be marked or lighted except that—

- (1) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and
- (2) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient; and
- (3) the marking or lighting may be omitted when—
 - (i) the obstacle is shielded by another fixed obstacle already marked or lighted; or
 - (ii) an aeronautical study shows the obstacle not to be of operational significance.

B.3 General

All fixed obstacles to be marked shall be coloured, but if this is impracticable, markers or flags shall be displayed on or above them, except that the obstacles that are sufficiently conspicuous by their shape, size, or colour need not be otherwise marked.

B.4 Use of colours

(a) An obstacle, if its projection on any vertical plane has both dimensions less than 1500 mm, shall be marked by a single conspicuous colour being orange or red, unless those colours merge with the background.

(b) An obstacle, if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4500 mm in both dimensions, shall be marked by—

- (1) orange and white, or red and white, except where such colours merge with the background; and
- (2) a chequered pattern of squares of not less than 1500 mm and not more than 3000 mm on a side, the corners being of the darker colour. See figure B.1.

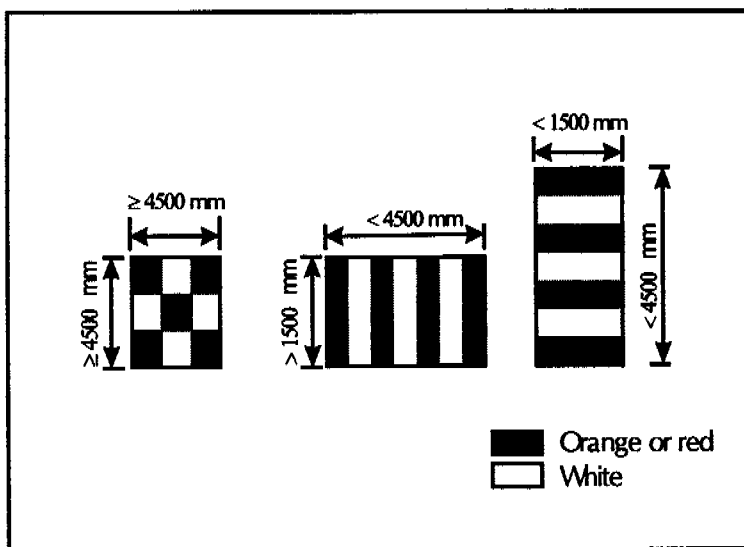


Figure B.1 - Basic marking patterns

- (c) An obstacle shall be marked by alternating contrasting coloured bands if—
- (1) it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1500 mm, and the other dimension, horizontal or vertical, less than 4500 mm; or
 - (2) it is of skeletal type with either a vertical or a horizontal dimension greater than 1500 mm. See figure B.1.
- (d) The bands referred to in paragraph (c) shall—
- (1) be perpendicular to the longest dimension; and
 - (2) have a width approximately one seventh of the longest dimension or 30 m, whichever is less; and
 - (3) be coloured orange and white unless those colours are not conspicuous when viewed against the background; and
 - (4) be so placed that the bands on the extremities of the obstacle are of the darker colour.
- (e) Table B.1 shows a formula for determining band widths to ensure an odd number of bands, thus permitting the extreme bands to be of the darker colour. Also see Figure B.1.

Longest dimension		Band width
Greater than	Not exceeding	
1.5 m	210 m	1/7 of longest dimension
210 m	270 m	1/9 of longest dimension
270 m	330 m	1/11 of longest dimension
330 m	390 m	1/13 of longest dimension
390 m	450 m	1/15 of longest dimension
450 m	510 m	1/17 of longest dimension
510 m	570 m	1/19 of longest dimension
570 m	630 m	1/21 of longest dimension

Table B.1 - Band Widths

B.5 Use of markers

Markers displayed on or adjacent to obstacles shall—

- (1) be located in conspicuous positions so as to retain the general definition of the obstacle; and
- (2) be recognisable in all directions in which an aircraft is likely to approach the object, in clear weather, from a distance of at least—
 - (i) 1000 m for an obstacle to be viewed from the air; and
 - (ii) 300 m for an obstacle to be viewed from the ground; and
- (3) have a distinctive shape to the extent necessary to ensure they are not mistaken for markers employed to convey other information; and
- (4) be such that the hazard presented by the obstacle they mark is not increased.

B.6 Use of flags

(a) Flags used to mark obstacles shall be—

- (1) displayed around, on top of, or around the highest edge of, the object; and
- (2) be such that the hazard presented by the obstacle they mark is not increased.

(b) When flags are used to mark extensive obstacles or groups of closely spaced obstacles, they shall be displayed at least every 15 m.

(c) Flags used to mark fixed obstacles shall—

- (1) not be less than 600 mm by 600 mm; and
- (2) be orange in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white, except that where such colours merge with the background other conspicuous colours shall be used.

(d) Flags used to mark mobile obstacles shall—

- (1) not be less than 900 mm by 900 mm; and
- (2) consist of a chequered pattern—
 - (i) each square having sides of not less than 300 mm; and
 - (ii) the colours of each square contrasting with each other and with the background against which they will be seen; and

- (iii) coloured orange and white, or red and white, except where such colours merge with the background.

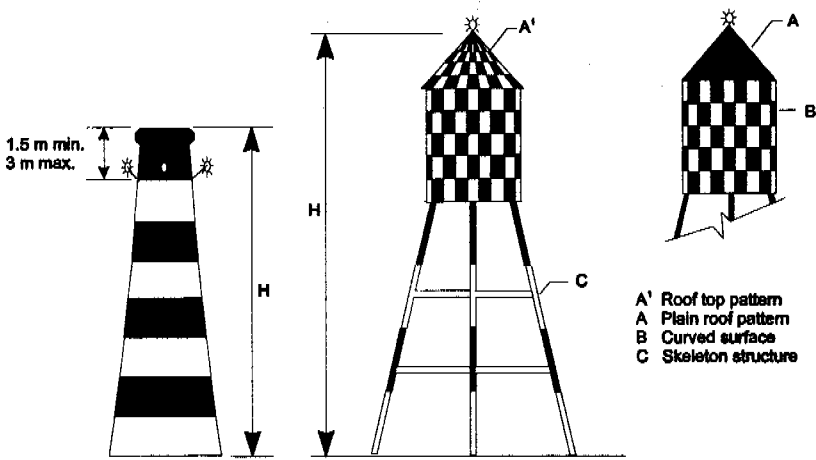
B.7 Use of obstacle lights

- (a) Where an obstacle is required to be lighted, it shall be by low-, medium-, or high-intensity obstacle lights, or a combination of such lights.
- (b) Light intensity shall be such that the hazard presented by the obstacle they mark is not increased.
- (c) Where the use of low-intensity obstacle lights would be inadequate or an early special warning is required, then medium or high-intensity obstacle lights shall be used.
- (d) Medium-intensity obstacle lights shall be used, either alone or in combination with low-intensity obstacle lights, where the obstacle is extensive or its height is greater than 45 m.
- (e) High-intensity obstacle lights are intended for day use as well as night use.
- (f) High-intensity obstacle lights shall be used to indicate the presence of an obstacle, if its height exceeds 150 m; or

B.8 Location of obstacle lights

- (a) Where lighting is required, at least one obstacle light shall be located at the top of the obstacle except in the case of a chimney type structure where the top lights shall be placed sufficiently below the top so as to minimise contamination by emissions.
- (b) Where the top of an obstacle is more than 45 m above the level of the surrounding ground, lights shall be provided at intermediate levels that—
 - (1) shall be spaced as equally as practicable between the top light and ground level; and
 - (2) if low-intensity or medium-intensity lights are used, are spaced no more than 45 m apart.
- (c) Where high-intensity obstacle lights are used on an obstacle the lights shall be spaced no more than 105 m apart.
- (d) The number and arrangement of lights at each level to be marked shall be such that the obstacle is marked from every angle in azimuth.
- (e) Where a light on an obstacle is shielded in any direction by another object, an additional or substitute light shall be provided on the obstacle in such a way as to retain its general definition.

- (f) The top light shall be placed—
- (1) to indicate the points or edges of the obstacle that are highest in relation to the obstacle limitation surface; and
 - (2) to indicate the points or edges of the obstacle that are highest in relation to sea level; and
 - (3) in the case of a chimney type structure, between 1500 mm and 3000 mm below the top (See Figs B.2 and B.3); and
 - (4) in the case of a guyed tower or antenna that should have a high intensity obstacle light at the top but where it is impracticable to do so, at the highest practicable point, and a medium-intensity obstacle light showing white mounted on the top.
- (g) An extensive obstacle or a group of closely spaced obstacles shall—
- (1) display top lights on the points or edges of the obstacles highest in relation to the obstacle limitation surface, so as to indicate the general definition and extent of the obstacles; and
 - (2) if two or more edges are of the same height, display lights on the edge nearest the landing area; and
 - (3) where low intensity lights are required, be spaced no more than 45 m apart; and
 - (4) where medium-intensity lights are required, be spaced no more than 90 m apart.



H is less than 45 m for the examples shown above.
For greater heights intermediate lights must be added as shown below.

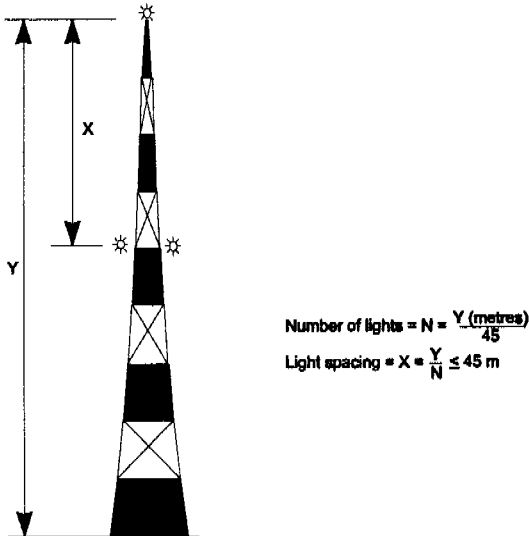


Figure B.2 - Examples of marking and lighting of tall structures

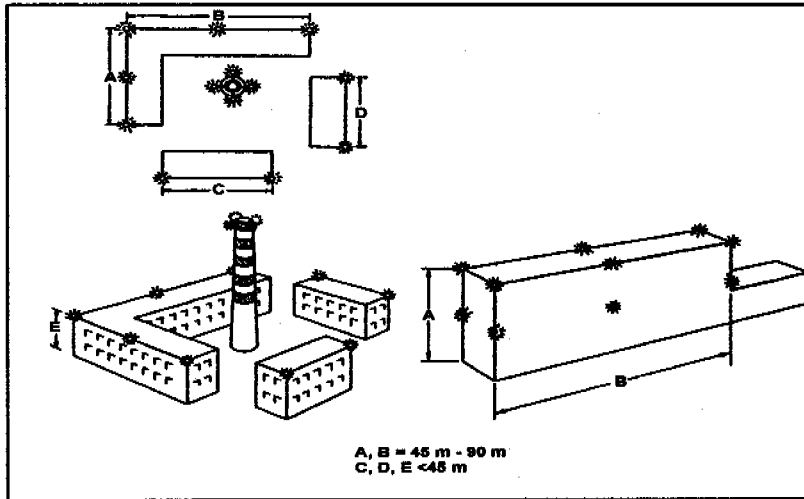


Fig B.3 - Lighting of buildings

B.9 Low-intensity obstacle light characteristics

(a) A low-intensity obstacle light on a fixed obstacle shall be a fixed red light having an intensity that is—

- (1) conspicuous in the surroundings in which it is placed; and
- (2) not less than 10 cd of red light.

(b) A low intensity obstacle light on a mobile obstacle shall—

- (1) be yellow or, if yellow is not suitable, red; and
- (2) flash at a frequency between 60 and 90 per minute; and
- (3) have an effective intensity not less than 40 cd of yellow or red light.

B.10 Medium-intensity obstacle light characteristics

A medium-intensity obstacle light shall—

- (1) be red except when used in conjunction with a high-intensity obstacle light, in which case it shall be white; and

- (2) flash at a frequency between 20 and 60 per minute; and
- (3) have an effective intensity of not less than 1600 cd of red light.

B.11 High-Intensity obstacle light characteristics

A high-intensity obstacle light shall—

- (1) be white; and
- (2) flash simultaneously at a rate between 40 and 60 per minute; and
- (3) except when located on a tower supporting overhead lines, have an effective intensity that is variable and dependent on the background luminance as follows:

Background luminance	Effective intensity
above 500 cd/m ²	200 000 cd minimum
50 to 500 cd/m ²	20 000 cd ± 25%
less than 50 cd/m ²	2000 cd ± 25%

Appendix C — Shielding

- (a) An object that is determined by the Director to be a hazard in navigable airspace may not be required to be marked or lighted if the Director considers the object to be shielded.
- (b) An object that is a lower height than another object—
 - (1) already considered to be a hazard in navigable airspace; and
 - (2) that is marked by standard obstacle marking or lighting—may be considered to be shielded by the other object.
- (c) An aeronautical study may be required to determine whether an object that penetrates an obstacle limitation surface is shielded.
- (d) A shielding object shall be permanent.
- (e) For the purposes of paragraph (c) an object may be classed as permanent only if, when taking the longest view possible, there is no prospect of removal being practicable, possible, or justifiable, regardless of how the pattern, type, or density of air operations might change.
- (f) Where the obstacle being shielded lies within the approach or take-off surface, or the transitional side or inner horizontal surface, it shall meet the criteria illustrated in figures C.1 and C.2 in relation to the shielding object.
- (g) Where the obstacle lies outside of the areas referred to in paragraph (e) it may be considered shielded if located within 600 m of the shielding object.

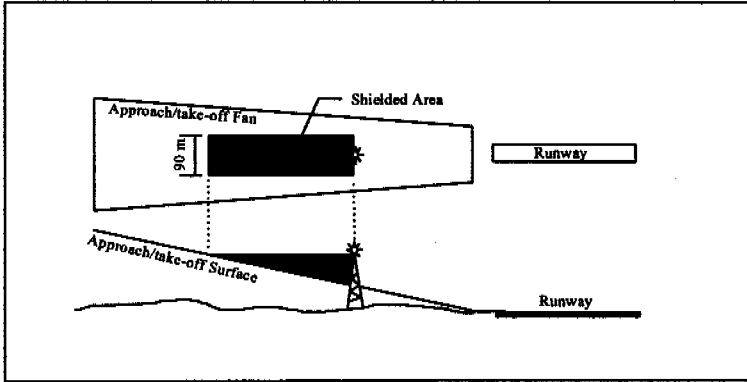


Figure C.1 - Shielding Approach and Take-off Surfaces

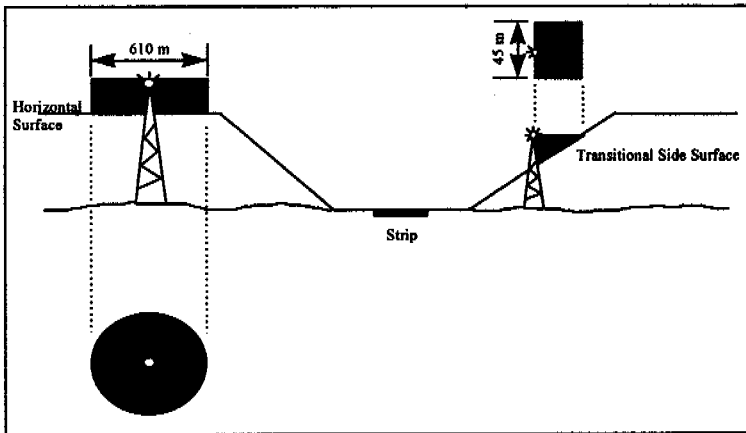


Figure C.2 - Shielding Transitional and Horizontal Surfaces

CONSULTATION DETAILS

(This statement does not form part of the rules contained in Part 77.
It provides details of the consultation undertaken in making the rules.)

Background to the Rules

In April 1988 the Swedavia-McGregor Report on civil aviation regulation in New Zealand was completed. Following the recommendations contained in that report, the Civil Aviation Authority (CAA) (formerly the Air Transport Division of the Ministry of Transport) commenced a complete review of all existing civil aviation legislation. The existing legislation that is still appropriate is being rewritten into the new *Rules* format. New legislation is being generated where necessary for the areas not presently covered.

Considerable research was carried out to determine the format for the new legislation. It was decided that the legislative framework should incorporate the advantages of the regulatory system of the Federal Aviation Administration (FAA) of United States of America and the system being developed by the European Joint Aviation Authorities and published as Joint Aviation Requirements (JAR).

The new rules are structured in a manner similar to the Federal Aviation Regulations (FAR) of the FAA, and aim to achieve maximum harmonisation whilst allowing for national variations. Close co-operation is also being maintained with the Civil Aviation Safety Authority of Australia to ensure maximum harmonisation with their regulatory code.

New Zealand's revised legislation is published as Civil Aviation Rules (CAR) which is divided into Parts. Each Part contains a series of individual rules which relate to a particular aviation activity.

Accompanying most Parts will be at least one associated Advisory Circular (AC) which will expand, in an informative way, specific requirements of the Part and acceptable means of compliance. For instance an AC may contain examples of acceptable practices or procedures which would meet the requirements of a particular rule.

The CAR numbering system is based on the FAR system. As a general principle the subject matter of a rule Part will be the same or similar to the FAR although the title may differ to suit New Zealand terminology. Where a CAR Part does not readily equate with a FAR number code, a number has been selected that does not conflict with any existing FAR Part.

The objective of the new rules system is to strike a balance of responsibility between the State authority and those who provide services and exercise privileges in the civil aviation system. This balance must enable the State

authority to set standards for, and monitor performance of, aviation participants whilst providing the maximum flexibility for the participants to develop their own means of compliance.

Section 12 of the Civil Aviation Act 1990 requires participants in the aviation system to carry out their activities safely and in accordance with the relevant prescribed safety standards and practices. Section 28 of the Act allows the Minister to make ordinary rules.

Notice of Proposed Rule Making

To provide public notice of, and opportunity for comment on the proposed new rules, the Authority issued Notice of Proposed Rule Making 96-3 under Docket Number 1056 on 11 May 1996. This Notice proposed the introduction of Civil Aviation Rules Part 77 to provide a regulatory safety boundary for Objects and Activities Affecting Navigable Airspace.

Supplementary Information

All comments made on the Notice of Proposed Rule Making are available in the rules docket for examination by interested persons. A report summarising each substantive contact with the Civil Aviation Authority contact person concerning this rule making has been filed in the docket.

Availability of the Document

Any person may view a copy of these rules at Aviation House, 1 Market Grove, Lower Hutt. Copies may be obtained from Publishing Solutions Ltd, PO Box 983, Wellington 6015, Telephone 0800 800 359.

Summary of Comments on Docket Number 1056 NPRM

1. General comments on the NPRM

1.1 From the 109 submissions received, 81 companies or individuals gave very strong support for the line marking requirement while 13 power companies were against the requirement because of cost implications.

CAA response: After receiving comments from the various power companies it became evident that the line marking requirement, as stated in the NPRM, might impose an unreasonable cost burden on the power companies. A meeting between representatives of the Authority and the power industry was held at Transpower's offices in Wellington on 20 August 1996 to discuss the comments received. At this meeting it was decided to form a 'working group' consisting of representatives of the Authority, the AIA, Transpower, and certain electricity distribution companies. The purpose of the 'working group' would be to carry out preliminary investigative work into the line marking issue and determine a set of criteria that could be used to assess whether a line needs

to be marked or not. Recommendations will then be made to all interested or affected parties by way of another NPRM dealing specifically with the marking of hazardous lines. The criteria will have to comply with the Act's requirement of the benefit to the nation outweighing the cost. This process is likely to take some time and, so as to not hold up the rest of the rule, all reference to the marking of lines has now been removed from Part 77 and will be reintroduced by means of another NPRM when agreement on the criteria has been reached. Several 'working group' meetings have already taken place and some progress has been made.

Although all reference to the marking of lines has now been removed from Part 77 a summary of the comments received on the NPRM, as well as the Authority's initial response, will be given in the following paragraphs for record purposes.

2. Specific comments on the NPRM

Specific comments received from the 109 submissions are discussed as follows:

2.1 NPRM aim

One commenter misunderstood the aim of the new rules to be the aim of Part 77.

CAA response: The purpose of the aim was to explain the aims of all the rules and not just those contained in Part 77.

Auckland Federated Farmers stated that since one of the aims was to establish an environment where the participants in the civil aviation system assume responsibility for their safety actions the participants should bear the cost of marking or illuminating obstacles, especially if this obstacle does not penetrate navigable airspace.

Auckland Federated Farmers also expressed concern that with changes in the power reticulation industry, as well as OSH regulations, they could be deemed to be the persons responsible for all overhead wires and cables and must therefore bear the cost of notification and marking such hazards.

CAA response: The Authority's view is that the person responsible for the obstacle should bear the cost of marking or illuminating the obstacle.

A joint submission, submitted by Trans Power, The Electricity Supply Association of NZ and The Electricity Engineers Association of NZ Ltd., generally supported the aim (a) but did not see themselves as participants in the civil aviation system. A very broad definition, which would cover many others besides themselves, is likely to impose unfair financial and accountability burdens and could be considered as an abrogation of responsibility of the civil aviation business.

CAA response: The Authority does not consider that it would be imposing unfair financial or accountability burdens by asking the power industry to commence with a reasonable marking program. This will be discussed with the power companies.

The above joint submission also stated that there was uncertainty as to what aim (b) meant as it was not clear what aspects were covered by compliance. Excessive is a subjective evaluation and they do not see why any necessary costs should be removed from the civil aviation system simply because they are considered high.

CAA response: The intention of (b) is to remove the excessive cost of complying with aviation regulations so that we can achieve 'safety at a reasonable cost'.

The above joint submission generally supported aims (c) and (d) which would seem to benefit the country and are in line with the general move towards performance based rather than prescriptive legislation. However, the proposed rules seem to be highly prescriptive and in conflict with aim (d).

CAA response: The proposals might well be prescriptive but are seen as necessary requirements that are being introduced in the interests of safety. Provided they do not result in unreasonable cost there is no reason why they should not be implemented.

The above joint submission expressed concern about the limitation of the powers of the Director in purpose (c). The issues of fairness or right of appeal through an appropriate arbitration system do not seem to have been addressed.

CAA response: Part 77 does include a right for review on each determination that the Director has made.

2.2 Economic Analysis

Mount Cook Airline stated that the economic analysis was incomplete and does not allow for proper evaluation as to the economic effects on the nation.

CAA response: The economic analysis stated clearly that the Authority did not have sufficient information on the cost implications of the line marking proposal and was relying on the persons responsible for such wires or cables to include information on the costs involved when they submitted comments on the NPRM. A thorough assessment of the economic consequences would then be made.

2.3 77.1

Headquarters New Zealand Defence Force recommended that Part 77 should not apply to—

(a) any member of the New Zealand Defence Force or any aircraft operated by the NZDF acting in connection with—

- (1) any war or other like emergency; or
- (2) the defence of NZ and other NZ interests; or
- (3) aid to civil power; or
- (4) other specific operations as agreed between the Authority and NZDF.

CAA response: 77.1 has been amended as recommended except for (4) which can be dealt with through the normal exemption process.

Headquarters New Zealand Defence Force also recommended that a statement be added to limit applicability to 'within territorial limits'.

CAA response: 77.1 has been amended as recommended.

2.4 77.1(2)

Mount Cook Airline suggested that paragraph 77.1(2) be added to the opening sentence.

CAA response: The Authority does not agree. However, all reference to the marking of lines has now been removed from Part 77 and will be reintroduced by means of another NPRM when agreement on the criteria has been reached as stated above in the Authority response to 1.1.

2.5 77.3

Headquarters New Zealand Defence Force recommended that Navigable Airspace be defined. This commenter added that the Authority had advised in previous correspondence that Restricted, Danger, and Military Operations areas activated for use by NZDF are not navigable airspace, yet this is not stated within the rule.

CAA response: Navigable airspace has now been defined as meaning airspace at or above the minimum flight altitudes prescribed by or under the Civil Aviation Rules, including all legitimate low level operations but not including restricted, danger, and military operations areas activated for use by the New Zealand Defence Force.

2.6 77.4

Mount Cook Airline disagreed with this requirement and said that we should start at 500 feet which is also the lawful requirement. Pilots operating lawfully below 500 will be involved in aerial work or in a low flying area and should be

totally responsible for obtaining detail of potential obstacles including wires and taking the necessary steps for avoidance.

CAA response: The Authority does not agree with this, pre flight preparation and training are important elements but the marking of lines is also a very important element that should be considered. It is also worth remembering that the Authority's role is to promote safety at a reasonable cost, not to say 'too bad' about the person flying below 500 ft. However, all reference to the marking of lines has now been removed from Part 77 and will be reintroduced by means of another NPRM to enable further consultation and consideration of the issues.

The New Zealand Gliding Association strongly supported the marking of lines but felt that the height above ground level should be 20m and not 45m. Their reason is that they are permitted by CASO 17 3.2.2 and the proposed 104.113 to do ridge soaring.

CAA response: It appears that the 45 metre requirement without reference to any other criteria might involve unreasonable cost. All reference to the marking of lines has now been removed from Part 77 and will be reintroduced by means of another NPRM when agreement on the criteria has been reached as stated above in the Authority response to 1.1.

Mercury Energy Management stated that the 400/45 marking proposal could well cause problems for a number of power companies in rural areas where the compliance cost could be quite significant.

CAA response: This will be discussed at a meeting with the power companies and will not be done unless an economic analysis shows that the benefit will exceed the cost.

Airways Corporation of New Zealand Ltd stated that with respect to a structure that comprises overhead wires or cables the word 'and' is used to link the two criteria. It was suggested that a better word would be 'or' as the structure may have a smaller than 400m span but cable height in excess of 45m and will be as big a hazard because of the height factor.

CAA response: This would mean that all spans longer than 400m would have to be marked regardless of height, as well as all spans higher than 45m above ground or water, regardless of span length. This would be far more strict than the present proposal. This will be discussed with the power companies and will not be done unless an economic analysis shows that the benefit will exceed the cost.

A joint submission, submitted by Trans Power, The Electricity Supply Association of NZ, and The Electricity Engineers Association of NZ Ltd, stated that inadequate evidence was provided to support the reduction to 45m.

CAA response: There was only one comment on this issue after the draft comments closed and this company asked for the reduction to 45m. In the absence of any other comment, the requirement was lowered as requested. Also, according to the Electricity Division study (done after the Tory channel crash) 9 of the 22 accidents they referred to fell into this category - almost 41%. Appendix F of the ED study also says the following—

(a) Of the 14 strikes involving ED Transmission lines, the following are the span lengths involved— 182, 184, 190, 361, 383, 396, 409, 411, 450, 450, 533, 641, 744, 1083. (57% of these accidents involved spans of more than 400 metres)

(b) Of the 14 strikes involving ED Transmission lines, the following are the available span heights involved— 21, 22, 36, 37, 43, 46, 49, 50, 62, 100, 100. (54% of these accidents involved spans higher than 45 metres)

The above joint submission also stated that a conservative cost estimate of the proposed rule to the electricity industry is \$25 million with an annual maintenance cost of \$2 - 3 million.

CAA response: This will be discussed with the power companies. It is not known how this figure was arrived at but at an approximate cost of \$600 to buy and fit a marker by helicopter, the \$25 million would be sufficient for 41666 markers. Assuming an average of 13 markers per span that would make 3205 spans. (This would probably cover a very large proportion of the hazardous spans) \$25 Million is a lot of money but it is a lot less than the loss of \$62 million to the nation over the last 16 years. Of the \$62 million almost \$40 million was due to powerline strikes (64.5% of the fatalities). It would also be interesting to know how the figure of \$2 - 3 million annual maintenance cost was arrived at as the lines have to be inspected on a regular basis anyway.

The above joint submission also stated that no consideration had been given to other legislation that impacts on the proposed rules.

CAA response: Further consultation will take place, under a revised NPRM for the marking of overhead wires or cables, with persons that are considered to have a possible impact on, or a possible legal interest in, the proposal to require marking of overhead wires or cables.

The above joint submission also stated that they do not believe there is a case to change the current line marking criteria.

CAA response: The Authority does not agree. Since the Tory Channel crash another 7 people have died as a result of flying into powerlines. The Authority feels that there is a need to reconsider the situation.

The above joint submission also stated that there was a lack of consultation prior to the proposed rule and apparently no review of the 1987 ED study.

CAA response: The NPRM is the method of consulting with industry; it is an effective means of stating a view and getting written comment. The 1987 ED study has been considered as part of that consultation once it was raised as a consequence of the NPRM.

The above joint submission also stated that there was an arbitrary reduction from the present guidelines to new spans and conductor heights.

CAA response: The present guidelines need to be revisited. There were 26 wirestrike accidents since CAIC GEN A13/87 was sent out on 7/12/87 - Half of these were due to powerlines. 13 powerline strikes in 8 and a half years is a matter of concern. The ED study carried out in 1987 indicated that 9 of the 22 accidents they referred to fell into the 400/45 category - almost 41%. A 41% decrease in the strike rate would be a significant achievement but if all spans longer than 400m were marked regardless of height (according to the same graph in Appendix F of the ED study) it would affect 15 of the 22 accidents - 68%. The economic analysis will determine where the line is to be drawn. This will be discussed with the power companies.

The above joint submission also stated that, according to information extracted from past wirestrike data, the number of wirestrikes peaked in the 1970's and has been trending down ever since under the present height/span criteria. It is now less than 2 per year, and this has been achieved without marking.

CAA response: In 1979 there were 5 powerline strikes, in the 5 years 1980 - 1984 there were 7 powerline strikes (average of 1.4 per year). In the 5 years 1985 - 1989 there were 13 powerline strikes (average of 2.6 per year). In the 5 years 1990 - 1994 there were 10 powerline strikes (average of 2 per year). The present height/span criteria that the submitter refers to does not exist. The total wirestrike rate (all wires) over the last 3 five year periods has never been less than 3 per year.

The above joint submission also stated that applying the proposed 45/400 span criteria on the spans that had been hit in the past indicates that only 14% of the spans would have been marked. They assume that if the strike rate is constant at 2 per year, the effect would be to prevent 1 strike every 4 years and this has to be weighed against \$25-30 million and the ongoing \$2-3 million per year for maintenance.

CAA response: The ED study carried out in 1987 indicated that 9 of the 22 accidents they referred to fell into the 400/45 category - almost 41%. A 41% decrease in the strike rate would be a significant achievement. Assuming that the PL strike rate is constant at 2 per year, the effect of a 41% decrease would be to prevent over 3 strikes every 4 years. But if we marked all spans longer than 400m regardless of height (according to the same graph in Appendix F of the ED study) it would affect 15 of the 22 accidents - 68%. The effect of this

would be to prevent 5.4 accidents every 4 years. The economic analysis will determine where the line is to be drawn. Another way of looking at this is that over the period 1979 - 1994 there were 68 strikes total of which 35 were powerline strikes and 20 lives were lost during the 35 powerline strikes. We have therefore lost more than 1 life for every 2 powerline strikes over this period. 20 lives equals \$40 million at \$2 million per life - a lot of marking could be done with \$40 million. This will be discussed with the power companies.

The above joint submission also stated that the proposed rules ignore the other relevant NZ legislation which impacts on the issue of line marking.

CAA response: Refer to the comment made at page 7.

The above joint submission also stated that there was inadequate supporting information for the line marking requirement in the NPRM. They also refer to the Swedavia McGregor report's concerns about night flying and wirestrikes and state that ball marking does not assist for night flying.

CAA response: The NPRM would be too bulky if it contained all the supporting information for all the proposals contained therein. The submitter misunderstands the statement in the Swedavia McGregor report. Paragraph 7.2.3 of the Swedavia - McGregor Report (Page 75) discusses SPECIAL AREAS OF CONCERN and states that **there are too many accidents during night flying, and as a result of hitting (unmarked) wires - wire marking is particularly unsatisfactory.** Two issues are mentioned in this sentence, the one that we are concerned with has been **highlighted**. The Authority is well aware that standard line markers will not help during night flying. The authors of this joint submission are perhaps not aware of the fact that the Swedavia McGregor report was a catalyst to rewrite NZ Aviation legislation.

The above joint submission also stated that the economic argument was inadequate. Without an economic argument the change cannot be supported.

CAA response: The Economic Analysis, on page 7 of the NPRM, stated that the Authority does not have sufficient information on the cost implications of the line marking proposal. The Authority is relying on the persons responsible for such wires or cables to include information on the costs involved when they submit comments on the NPRM. A thorough assessment of the economic consequences will then be made.

The above joint submission also stated that there was a lack of international comparison in the NPRM. They also stated that their review of the Australian standards indicated that the minimum height for marking is 90 metres. This confirms their opinion that not enough consideration had been given to the marking criteria.

CAA response: The NPRM is not the place for detail such as international comparisons. However, Eskom South Africa marks every structure higher than 165 ft (50m) above ground level with day and night markings. Powerlines that span a valley shall be marked if the lines are higher than 45m above ground level. The Australian Standard recommends markers above 90 metres and markers and lights above 150 metres (also when spans exceed 1500 metres). The Australians have additional standards for the marking of cables for low level flying such as agricultural, mustering, media and ballooning. If New Zealand were to adopt the Australian standard only 18% of the wirestrike accidents would be prevented, compared to 54% if we were to mark from 45 metres upwards. The FAA recommends marking of lines that cross the end of a runway, regardless of height. Otherwise they use a 200 ft criteria i.e. over rivers etc they take into consideration the height of the lines above the river or valley. They don't consider the length of the span, they are only concerned with the height from the bottom of the catenary. It is not clear what the FAA achieves with only marking from 200 feet (60 m) upwards as, according to NTSB statistics, nearly all their rotary wing strikes occur below 200 feet.

The above joint submission also stated that there was no evidence that ball marking reduces the wirestrike record. A statistically significant reduction (30%) should be demonstrated before consideration should be given to ball marking. A smaller % would be within the limits of statistical probability.

CAA response: During the same period in which New Zealand lost 31 lives, the Bonneville Power Administration in the USA did not have a single wirestrike at a marked crossing. They have been marking for 30 or 40 years, with the only major change being to the size of the markers from 24 inches to 36 inches in the mid 1980's.

The above joint submission also stated that the evidence from the Tory Channel enquiry and the subsequent incidents supported the premise that wirestrikes cannot be eliminated altogether as pilot error and inattention were significant contributors to accidents.

CAA response: Pilot error and inattention are, and always will be, significant contributors to accidents, but that does not mean that we should not take every reasonable precaution to try to reduce accidents as much as is humanly possible.

The above joint submission also stated that according to their evidence there had been a very substantial downward trend in wirestrike accidents since 1987, yet there has been no additional line marking.

CAA response: During the period January 1979 up to the end of 1987 there were 22 powerline strikes (a 9 year period). During the period January 1988 to the end of 1994 there were 13 powerline strikes (a 7 year period). The

Authority does not regard this decrease as very substantial. In fact, since the Tory Channel crash another 7 people have died as a result of flying into powerlines.

The above joint submission also stated that there had been no consideration of where the burden of costs will lie. Reasonable costs can be passed on to the consumer but what about the farmer who will have to absorb all their costs?

CAA response: It is the Authority's view that the owner of the obstacle should bear the cost of marking or illuminating obstacles.

Power New Zealand asked for clarification regarding spans 100m wide and 55m above water, and 800m wide and 55m above water? The submitter stated that this clause is not clear and should be clarified.

CAA response: The Authority considers the clause quite clear, if a span is greater than 400m and the height of the cable above water exceeds 45m then it must be marked. If either of these two requirements do not exist then there is no need to mark. However, all reference to the marking of lines has now been removed from Part 77 and will be reintroduced by means of another NPRM when agreement on the criteria has been reached as stated above in the Authority response to 1.1.

Power New Zealand stated that if 1300mm markers were installed then 9 items would be necessary on a 400m span. The only satisfactory method of installing these would be by lowering the conductors and fitting the markers before erection or erect new conductors with markers prefitted.

CAA response: The markers can be fitted by helicopter.

Marlborough Electric stated that all attempts to mark have been unsuccessful, totally ineffective, impossible to mount, and too costly to design for. They are completely against any form of marking.

CAA response: The Authority feels that marking, if it is considered a reasonable requirement and is imposed, can be successful and effective. Other parts of the world do have marking requirements that do appear effective, for example, Mr R Melzer of the Bonneville Power Administration in the USA states that in the 17 years that he has been with the BPA they have not had a single strike on a marked span.

Marlborough Electric states that areas where there are limitations on land use due to navigable airspace should be identified in the appropriate district plan.

CAA response: The Authority is not laying down limitations on land use, merely stating that certain lines should be marked.

Alpine Energy stated that half of their long spans (about 20 would exceed 400m) would be over 45m agl and are operating near their maximum capacity and could not accommodate marker balls. They would need to reconductor and restay at a cost of some \$250 000. Another \$250 000 for marker balls. Plus there would be an annual cost of \$50 000 to inspect and maintain.

CAA response: The strength of the conductors and the restaying of structures as well as the inspection of the markers will be discussed at a meeting with the power companies. \$250 000 for markers would pay for about 416 markers at \$600 per marker installed by helicopter. 416 markers, 24 inch (600mm) would be sufficient for 32 spans. At \$600 per marker installed the 20 spans that they are talking about (13 markers per span) would cost \$156 000, not \$250 000.

Alpine Energy wanted to know how many of the 31 deaths related to the 400m span and 45m height requirement.

CAA response: According to the Electricity Division study, 9 of the 22 accidents they referred to fell into this category - almost 41%.

Alpine Energy also wanted to know how many of the 31 accidents (deaths) were due to electric fence lines rather than powerlines?

CAA response: The Authority does not believe that much will be achieved by determining how many deaths were due to electric fence lines rather than powerlines. However, it is worth noting that 46% of all strikes and 64.5% of all strike fatalities over the period 1979 - 1994 were due to powerline strikes.

Alpine Energy stated that it is likely that the increased cost will be passed on to farming customers in rural areas which would make the supply to these people uneconomic.

CAA response: This will be discussed at the meeting with the power companies.

Alpine Energy suggests that if the Authority did the funding then the project (marking of lines) may be viable.

CAA response: The Authority does not believe it should be responsible for the funding of line marking and neither does it believe that it should be a cost on aviation.

Bay of Plenty Electric assumes that balls are only required on the portions of the spans that exceed 45m?

CAA response: A line that requires marking would have to have markers along the entire length of the span, at the required spacing according to the size of the marker, to make the entire catenary visible.

Bay of Plenty Electric stated that they are concerned about wind loading as some towers are only designed to a safety factor of 2. It would be necessary to consider the effects, using NZS 4203 as a guide.

CAA response: The Authority appreciates the fact that some of the smaller lines would have difficulty coping with the increased wind loading. This will be discussed at the meeting with the power companies.

Bay of Plenty Electric stated that it is likely that lines have been erected so that maximum design tension will be neared during adverse conditions. Balls may well exceed this tension. Some wires are only 13mm with 1 or 3 wire spans (maximum span width 1200 metres).

CAA response: This will be discussed at a meeting with the power companies.

Bay of Plenty Electric stated that they have 113 spans of either 1 or 3 wires that exceed 400m.

CAA response: If these spans meet or exceed the agreed upon criteria for marking of lines then they will have to be marked. This will be discussed at a meeting with the power companies.

Bay of Plenty Electric stated that they are concerned that markers will require replacement after a few years due to ball movement, disintegration or colour fade.

CAA response: The Authority does not believe that there is much cause for concern. Wiremarkers NZ's PAM markers have a 10 year replacement warranty and can be expected to last more than 20 years in the most inhospitable situations. Heliflite are promoting aluminium balls designed to last 30 years.

Bay of Plenty Electric stated that they are concerned about the environmental impact, there may even be pressure from landowners to remove lines.

CAA response: This will be discussed at a meeting with the power companies.

Bay of Plenty Electric suggested only one marker per 400m and added that it is likely that existing hazardous spans would accept this additional loading with minimal rebuilding.

CAA response: The Authority believes that only marking a portion of a span will not be effective as the catenary needs to be well defined. The ICAO standard [(Annex 14 Chapter 6 para 6.2.9(a)(b) and (c)] states that the spacing between two consecutive markers or between a marker and a supporting tower should not exceed 30 metres in the case of a 60 cm diameter marker, 35 metres in the case of a 80 cm diameter marker and 40 metres in the case of a 130 cm

marker. Paragraph 6.2.7 of the same standard states that markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object.

Bay of Plenty Electric stated that pilot education and marked maps should reduce the risk.

CAA response: The Authority agrees but feels that marking of hazardous spans must be considered as a possible element of the solution to this problem.

Bay of Plenty Electric stated that they may need to rebuild or reconductor in some cases.

CAA response: This will be discussed at a meeting with the power companies.

Bay of Plenty Electric stated that they were concerned that the \$5000 - \$8000 per 500m span may need to be passed on to the consumer.

CAA response: This will be discussed at a meeting with the power companies.

Buller Electricity stated that there would be considerable cost to mark their three hazardous spans. The conductor is of insufficient strength to carry markers and will have to be replaced.

CAA response: The following will be discussed at a meeting with the power companies—

(a) On the smaller distribution lines that cannot cope with the increased wind loading consider the installation of two new poles with a high strength cable adjacent to the current carrying span, equal to or higher in elevation.

(b) Use high intensity obstacle lights where it is impracticable to install markers on the lines - see NPRM Appendix B paragraph 7(f)(2) and 8(d). Where high intensity obstacle lights cannot be placed on towers to indicate the levels of the catenary (maybe a very long high span, two towers at very different levels) then we would have to revert to the alternate mentioned in (a) above, or as stated in ICAO Annex 14 Chapter 6.3.13 the lights may, in some cases, have to be located off the tower. See NPRM Appendix B paragraph 11(b) for effective intensities of the lights and paragraph 11(c) for flash sequence and time intervals.

Buller Electricity stated that the height rule should be more specific and wanted to know if the 45m vertical distance was measured at midspan or at any point along the span?

CAA response: The Authority's view is that if, at any point along the span, the height exceeds 45 metres above ground level then the whole span is to be marked. This will be discussed at a meeting with the power companies.

Buller Electricity stated that paragraph 5 of Appendix B should specify spacing, size and colour of the markers.

CAA response: Appendix B paragraph 5 (c) explains this quite clearly. However, the possible amendment of Appendix B paragraph 5 (c) to reflect the recommendation contained in the Bonneville Power Administration report (36 inch balls at 200 feet spacing) will be discussed at a meeting with the Power Companies.

Central Electric stated that Section 22 of the Electricity Act protects all existing works, therefore the power companies would be seeking a financial contribution from the Authority.

CAA response: The Authority does not believe it should be responsible for the funding of line marking and neither does it believe that it should be a cost on aviation. Further consideration will be given to the affect of section 22.

Central Electric stated that the cost for a 400m catenary span, structures, guys and markers could exceed \$6000 per crossing.

CAA response: This is possible and will be discussed at a meeting with the power companies.

Central Electric stated that 13 markers on a 400m span (14mm conductor) would increase the wind loading by 40% and this may exceed the safe working load of the structures or conductors.

CAA response: According to available information the increased loading is likely to be in the order of 22% with 13 (600mm) balls.

Central Electric stated that the 400/45m rule is too broad and is unreasonable.

CAA response: A cost benefit analysis will be done after meeting with the power companies and this will determine what is reasonable.

Central Electric feels that the operators must shoulder the responsibility and control their activity to avoid serious harm.

CAA response: The operators do have to act responsibly but many owners of obstructions are required to mark their obstructions in such a way that they can be seen. Whether power lines should be marked is the object of another NPRM,

Central Electric stated that the effectiveness of marker balls during certain weather and time of day conditions can be seriously challenged.

CAA response: The Authority agrees that there will be times when markers will be difficult to see but if the right size and right colours are used they can be effective.

Central Electric stated that the Electricity Act 1992 no longer requires the reporting of structures which occupy navigable airspace. The Authority may need to approach the Ministry of Commerce in order to draft a new regulation under the Electricity Act.

CAA response: The Ministry of Commerce shall be given the opportunity to consider and comment on the proposed NPRM on the marking of overhead lines.

Central Electric stated that the environmental impact of marker balls on lines was a matter of some concern. There are presently several district plans being proposed by District Councils which are attempting to remove the visual impact of overhead wires from the landscape. This could lead to the gaining of a resource consent to fit marker balls in sensitive areas.

CAA response: All the District Councils were invited to consult on the issue but few took the opportunity. It is envisaged that the next NPRM will promote more discussion as the focus of it will be far more concentrated on the marking issue than the previous NPRM.

Central Power stated that the cost of fitting markers to a 400m span would be approximately \$6250.

CAA response: This will be discussed at a meeting with the power companies.

Central Power stated that if modifications to structures are required then it could cost an additional \$3000 per span.

CAA response: This will be discussed at a meeting with the power companies.

Central Power stated that wind loading could lead to structural degradation, the load on a 400m span would increase by 12.5% at the recommended spacing.

CAA response: The Authority is of the opinion that a 12.5% increase is not excessive. This will be discussed at a meeting with the power companies.

Central Power stated that wind induced harmonic vibration of the conductors may lead to mechanical fatigue on the conductor and its associated fittings. This issue is so important that Transpower have commenced a program of fitting vibration dampers to key transmission lines. Central Power does not wish to bear this cost to offset the effects of line markers.

CAA response: The Authority is informed by Wiremarkers NZ that their markers do not slip, oscillate, chafe, cause electrolysis or harmonic vibration. This will be discussed at a meeting with the power companies.

Egmont Electricity stated that this will create an overload situation on the poles as well as create a possible failure situation later through breaking of the wire by rubbing at the marking sphere edges.

CAA response: The Authority is informed by Wiremarkers NZ that their markers do not slip, oscillate, chafe, cause electrolysis or harmonic vibration so it is highly unlikely that markers will create a possible failure situation later through breaking of the wire.

Egmont Electricity stated that this will cost a lot of money to strengthen structures, and will also cost hundreds of thousands of dollars if they lose their major supply line from their generating station.

CAA response: This will be discussed at a meeting with the power companies.

Electra stated that the reduction of the spans from 600m to 400m and the height from 200ft to 45m is arbitrary and irrelevant.

CAA response: Aviation Industry comment on the informal draft, to the effect that the span length should be 400 metres and the height of the cable or wire should be 45 metres, was adopted for the NPRM. There was no other comment on this issue in respect of the draft. It is also worth noting that the ED study carried out in 1987 indicated that 9 of the 22 accidents they referred to fell into the 400/45 category - almost 41%.

Electra stated that this would have an adverse environmental impact and, unless it can be shown that certain lines do in fact represent a hazard, the resulting visual impact cannot be justified.

CAA response: There is no doubt that environmental impact is an important factor but if a line or a particular span is considered, after consultation through a further NPRM, to require marking then it will have to be marked. This will be discussed at a meeting with the power companies.

King Country Energy stated that reticulation in the King Country was made possible by the use of single No 8 steel wire stretched from hilltop to hilltop. 365 spans are longer than 400m and higher than 45m. The markers will have a considerable wind resistance.

CAA response: The following will be discussed at a meeting with the power companies—

(a) On the smaller distribution lines that cannot cope with the increased wind loading consider the installation of two new poles with a high strength cable adjacent to the current carrying span, equal to or higher in elevation.

(b) Use high intensity obstacle lights where it is impracticable to install markers on the lines - see NPRM Appendix B paragraph 7(f)(2) and 8(d). Where high intensity obstacle lights cannot be placed on towers to indicate the levels of the catenary (maybe a very long high span, two towers at very different levels) then we would have to revert to the alternate mentioned in (a) above, or as stated in ICAO Annex 14 Chapter 6.3.13 the lights may, in some cases, have to be located off the tower. See NPRM Appendix B paragraph 11(b) for effective intensities of the lights and paragraph 11(c) for flash sequence and time intervals.

King Country Energy stated that 10% of their system would have to be rebuilt at considerable cost to their customers.

CAA response: This, and the alternatives mentioned in (a) and (b) above, will be discussed at a meeting with the power companies. Sufficient information will have to be gained so that a thorough cost benefit analysis can be done.

King Country Energy stated that the environmental impact would be considerable. If the spans are shortened then bush clearing would be necessary, otherwise brightly coloured markers would be required.

CAA response: There is no doubt that environmental impact is an important factor. This will be discussed at a meeting with the power companies.

King Country Energy stated that the stronger wires required to support markers are more likely to bring down aircraft than the comparatively flimsy wires used at present.

CAA response: The Authority disagrees, if the stronger wire is well marked then no-one is likely to fly into it.

Power New Zealand asked who decides what size markers will be fitted?

CAA response: Appendix B of the NPRM contains the ICAO International Standard regarding visual aids for denoting obstacles. However, the Authority feels that it would be wise to consider the recommendations made in the Bonneville Power Administration study (36 inch spheres at 200 feet spacing). The FAA has followed these recommendations.

Power New Zealand asked, in order to standardise, where are the markers to be purchased and at what cost?

CAA response: There are two companies in New Zealand that can supply markers : Wiremarkers NZ and Heliflite. This will be discussed at a meeting with the power companies. The 36 inch spheres are likely to cost in the region of US\$350 each.

Power New Zealand asked who is to pay, the cost could be \$80 000 per structure.

CAA response: The owner of the obstacle should bear the cost of marking or illuminating obstacles. The cost of the marker plus installation by helicopter is not likely to exceed \$600 per 24 inch marker, ie 13 markers = \$7800 per span, NOT \$80000. Note - if we follow the Bonneville Power Administration recommendation and use the 36 inch spheres at 60 metre spacing we will only need 6 in a 400 metre span. The cost is likely to be lower while there is not likely to be a much increased wind loading when compared to the 24 inch spheres. This will also be much better from a flight safety point of view.

Waitomo Energy Services stated that this would involve substantial cost.

CAA response: The cost of the marker plus installation by helicopter is not likely to exceed \$600 per 24 inch marker, ie 13 markers = \$7800 per 400 metre span. The 36 inch spheres will no doubt cost more but at 60 metre spacing we will only need 6 in a 400 metre span. This will be discussed at a meeting with the power companies.

Waitomo Energy Services stated that this would involve a substantive survey of their 3000km of line.

CAA response: The Authority suspects that much of this information would be stored on computer or on file but is prepared to discuss this at a meeting with the power companies.

Waitomo Energy Services stated that the only practical method of installing markers is by helicopter, a very expensive method.

CAA response: The cost of markers plus installation by helicopter is likely to be in the region of \$7800 per 400 metre span. This will be discussed, and compared with the cost of fitting markers by conventional means, at a meeting with the power companies.

Waitomo Energy Services asked why is it now necessary to mark lines when the Minister has, to date, failed to identify any of their lines as hazards ?

CAA response: The Authority feels that it is necessary to consider the issue to see whether there can be a reduction to the loss of human life through accidents involving overhead lines.

Waitomo Energy Services asked how many of the wirestrike accidents referred to involved wires which would be marked under the new rules?

CAA response: According to the Electricity Division study (done after the Tory channel crash) 9 of the 22 accidents they referred to fell into this category - almost 41%. Appendix F of the ED study also says the following—

(a) Of the 14 strikes involving ED Transmission lines, the following are the span lengths involved— 182, 184, 190, 361, 383, 396, 409, 411, 450, 450, 533, 641, 744, 1083. (57% of these accidents involved spans of more than 400 metres)

(b) Of the 14 strikes involving ED Transmission lines, the following are the available span heights involved— 21, 22, 36, 37, 43, 46, 49, 50, 62, 100, 100. (54% of these accidents involved spans higher than 45 metres)

Waitomo Energy Services stated that the type and size of marker specified would be impossible to retrofit to most of their existing lines. Their company has no legal right to reconfigure lines crossing private land (never mind the awesome cost). In some cases the only way of complying with the proposal would be to remove the said lines - meaning in some cases removal of electricity supply to substantial sectors of the community.

CAA response: The Authority will need more information on this, ie what configuration are they talking about that will not allow markers? This will be discussed at a meeting with the power companies. The right to reconfigure lines crossing private land will be further considered.

Waipa Power stated that it would involve significant cost, the increase in wind loading coupled with increased phase separation may well require new support structures for those spans.

CAA response: The Authority would prefer it if the words may and if could be eliminated from these equations. These statements need to be supported by fact so that a thorough cost benefit analysis can be carried out. This will be discussed at a meeting with the power companies.

Waipa Power stated that the proposed span dimensions appear to have been set arbitrarily. Is there any research evidence which can be cited in support of these dimensions?

CAA response: According to the Electricity Division study (done after the Tory channel crash) 9 of the 22 accidents they referred to fell into this category - almost 41%. Appendix F of the ED study also says the following—

(a) Of the 14 strikes involving ED Transmission lines, the following are the span lengths involved— 182, 184, 190, 361, 383, 396, 409, 411, 450, 450,

533, 641, 744, 1083. (57% of these accidents involved spans of more than 400 metres)

(b) Of the 14 strikes involving ED Transmission lines, the following are the available span heights involved— 21, 22, 36, 37, 43, 46, 49, 50, 62, 100, 100. (54% of these accidents involved spans higher than 45 metres)

Waitomo Energy Services stated that they are dismayed that the Authority feels it can balance the benefits in terms of money saved largely by Governments against costs imposed on private individuals and companies.

CAA response: The loss of a life is calculated to be a cost of \$2 million to the nation, and the owner of the obstacle should bear the cost of marking his obstruction in order to prevent this loss of life. This will be discussed at a meeting with the power companies.

Power New Zealand asked what penalties are likely to be imposed through non compliance with the new rules?

CAA response: The penalties have yet to be determined.

Power New Zealand asked whether there will be a time period for compliance.

CAA response: The Authority realises that marking of lines cannot happen overnight and is in favour of a time period for compliance. This will be discussed at a meeting with the power companies.

Power New Zealand is currently assessing the number of spans and location of existing long spans likely to be affected by the proposed rules.

CAA response: This information will be essential in order to do a thorough cost benefit analysis.

Power New Zealand stated that they see no real difficulty with new works but are not keen on having to mark existing spans.

CAA response: The Authority appreciates what is being said but there is not much point in only marking new spans, which might produce a greater hazard than that being remedied.

Wairarapa Electricity stated that they are not too concerned about the approach taken as they do not have any situation known to them where these rules would pose any unreasonably onerous conditions.

The Airways Corporation suggested that the word 'and' should be 'or' as the structure may have a smaller than 400m span but cable height in excess of 45m, and will be as big a hazard because of the height factor.

CAA response: This is a valid suggestion. We could change to all spans higher than 45 metres and just leave it at that, no-one else stipulates length of

span. Changing the wording as suggested would not, however, achieve that outcome. This will be discussed at a meeting with the power companies.

2.7 77.5 (a)(1)

Wairarapa Electricity stated that they are very concerned about their windfarms, and whether they would have to mark them. They were put under a lot of pressure during the resource consent application stage to make them as visually discrete as possible.

CAA response: The matter will be given very careful consideration during the aeronautical study. There is a need for persons proposing to construct a windfarm, that will extend more than 60 metres above ground level at its site, to notify the Director in accordance with 77.5(a)(1). A possible solution could be a medium intensity obstacle light on a mast in the centre of the windfarm, slightly higher than the maximum height of the blades. The light could be shielded - visually discrete. The light could also be on one of the structures or on the 4 corners. The Authority could not impose marking conditions that did not comply with the Resource Management Act.

2.8 77.5 (a)(2)

Mount Cook Airline suggested the deletion of reference to Agricultural Operations as that description could apply to a vast area of NZ.

CAA response: The term 'Agricultural Operations' has been replaced with the term 'low level aerial activity' so as to include all forms of 'aerial work'. The 15 metres has been changed to 18 metres to make it the same as the standard in 77.21(b)(4), now 77.19(h)(4) in the final rule.

2.8 77.5 (a)(3)

Central Power stated that they object to the notification requirement of 77.5(a)(3)

CAA response: The Director has a right to be notified of structures that could affect navigable airspace. However, meetings between the various power companies, the Aviation Industry Association, and the Civil Aviation Authority will be held to determine a set of criteria that could be used to assess whether a line needs to be marked or not. The requirement in 77.5(a)(3) has been deleted until further consultation is complete.

2.9 77.5 (a)(4)

Ardmore Airport Ltd questioned the need for another layer i.e. "notification slope" below the approach and take off surfaces. The concept of approach and take off slopes already provides clearance from obstacles and this new requirement is not consistent with the aims of the new rules.

CAA response: The Authority feels that there is a need for a "notification slope" below the approach and take off surfaces, as there could be an obstacle that does not actually penetrate the obstacle limitation surface but is close enough to warrant marking. If the Authority was not notified of such obstacles the Director would not be in a position to say that the obstacle should be marked.

2.10 77.5 (a)(4) and (5)

Auckland International Airport Ltd stated that these clauses need to be specific on the requirements for structures which are proposed on ground which is naturally about or above the specified surfaces. Our designation for Obstacle Limitation Surfaces specifies that the critical surface is the higher of the obstacle surface or ground level plus 21 metres.

CAA response: 77.5(a)(5) has been amended to include-- 'or as defined in the local district scheme'. 77.5(a)(4) will not contain reference to the local district scheme as the 21 metre provision does not apply under the approach or take-off surfaces. But, 77.5(a)(4)(i) will be amended to reflect a 1:83 slope originating from the fan origin for the takeoff surface of each runway where the runway is used or intended to be used by aircraft with a MCTOW above 5700kg. 77.5(a)(4)(ii) will have similar wording but will remain at a 1:50 slope.

2.11 77.5 (a)(4)(i)

Wellington International Airport stated that they are not happy with the 1:100 slope and would prefer the 1.2% slope referred to in the ICAO Annex 4 paragraph 3.8.1.1. Therefore, the wording in 77.5(a)(4)(i) should be—1:83 originating from the fan origin for the takeoff surface of each runway where the runway is used or intended to be used by aircraft with a MCTOW above 5700kg.

CAA response: The wording has been amended as suggested.

2.12 77.5 (a)(5)

Auckland International Airport stated that there appears to be a conflict relating to obstacle limitation surfaces in regard to the requirement of 77.5(a)(5) and what is required of an aerodrome operator under CAR Rule 139.51(a)(2). 77.5(a)(5) appears to tolerate obstacles protruding through those surfaces provided that they are notified and subsequently are marked and lit in an appropriate manner. From a safety perspective an obstacle may be accepted provided that the obstacle is marked and lit appropriately and recorded on aeronautical charts, BUT such an obstacle may however significantly compromise the efficient use of the surrounding airspace. That is an RMA issue and is why AIAL, and other airport operators, have designations related to

obstacle control which may appear more severe than the controls being promulgated under Part 77.

CAA response: Part 77 is just a marking and lighting rule. Part 77 does not allow the Director to prohibit the construction of any structure. If an obstacle will penetrate any of these surfaces and its construction is allowed for by the local authority, the Director will require it to be marked or lit. The Director is not granting permission for the construction to proceed, he does not have that authority - the local district council is the body that will make that decision.

2.13 77.5(b)

Mount Cook Airline stated that many of the unlisted aerodromes are valuable resources and require the protection of this Part. Where any of the notification surfaces are penetrated at any aerodrome or heliport then notice of construction or alteration of structure is required.

CAA response: The Authority does not agree. An operator who wishes to have the protection of Part 77 should apply to have the aerodrome promulgated in the current VFG of the NZAIP. 77.5(b) has, however, been removed as a definition of 'aerodrome' is now included in 77.3.

2.14 77.5(c) [Final rule 77.5(b)]

Mount Cook Airline suggested that the 600m radius be scrapped because it was based on the 2000 feet radius of Regulation 38(2A) which was not carried over to the new rules.

CAA response: The Authority does not agree, the 600 metre radius would still be worth keeping in so that, if there is high ground next to the obstacle, the height of the obstacle will be measured from the top of the high ground and not the base of the obstacle. However, 77.5(c) has been altered to read: 'In determining the height of a structure, other than overhead wires or cables, the ground level at its site shall be the highest ground within a 600 metre radius of the site'. The reason for this is to cater for a long span across a valley where at mid span the height of the wires might be 200 metres above the ground directly beneath it. If the wording is not altered to exclude overhead wires or cables then the height of the wires would also be subject to the 600 metre radius rule, and that would result in many high spans being determined 'no hazards'.

2.15 77.7(a)(2)

Mount Cook Airline stated that for consistency in obstacle identification height the level should be 120m.

CAA response: After further consultation within the Authority it was decided to reduce this height to 60m to be consistent with other notification requirements.

2.16 77.9

Headquarters New Zealand Defence Force stated that this and other rules, needs to be expanded to permit one person representing an organisation to give notice. Also, the statement requires a person/s to make a safety decision in the first place. The rule does not contain any detail on what would actually constitute a hazard. The term 'hazard' needs to be defined.

CAA response: The Authority agrees and has amended paragraphs 77.9 and 77.11. These paragraphs now also contain detail on what would actually constitute a hazard.

Headquarters New Zealand Defence Force also asked whether the community at large was expected to be aware of these rules? What about a hunter discharging a high powered rifle up the side of a mountain? How are gun clubs affected? The scope of the rule needs to be determined, NZDF must be advised of the scope, and the scope must be included in the rule.

CAA response: The Authority has amended paragraph 77.9. This paragraph now contains detail on what would actually constitute a hazard.

2.17 77.9 and 77.11

Airways Corporation of New Zealand stated that, with respect to weapons and fireworks, the decision as to what constitutes a hazard and whether or not to notify is still left to the originator of the event.

CAA response: The Authority agrees and has amended paragraphs 77.9 and 77.11. These paragraphs now also contain detail on what would actually constitute a hazard.

2.18 77.9 and 77.13

Headquarters New Zealand Defence Force stated that they do not have 30 days notice of the requirement to conduct military operations. A maximum of one week's notice is more likely in most cases. They recommend that existing procedures be retained for normal notification of the use of NZDF weapons that may constitute a hazard in navigable airspace. They also referred to previous discussions regarding the need to formalise a system of providing very short notice to Authority which permits restricted or Danger areas to be established almost immediately, such as for SAR and volcanic activity.

CAA response: The New Zealand Defence Force has now, to a very large extent, been exempted from the requirements of this Part - see the amended applicability in 77.1. However, 77.13 has been amended to allow 14 working days notification of a proposed operation involving the firing or launching of a projectile that will have a trajectory higher than 60 metres, in a control zone, prescribed in Part 71, during times when the appropriate ATS is on watch.

Regarding the need to formalise a system of providing very short notice to Authority which would permit restricted or Danger areas to be established almost immediately, such as for SAR and volcanic activity, this will not be covered by Part 77, but will be part of the Airspace Rules.

2.19 77.13 and 77.17 [Final rule 77.13 and 77.15]

Central Power stated that they feel that the onus to identify potential aviation hazards needs to lie with the Authority.

CAA response: The Authority agrees, which is why it is proposing that certain lines be marked.

2.20 77.13(1) [Final rule 77.13(a)]

The New Zealand Gliding Association stated that, in the case of the erection of wires and structures, and the use of lasers and fireworks, they feel that the information should be promulgated by AIP Supplement. No other method of promulgation can ensure that all users are advised of the hazard. They recommend that the notice requirements of 77.13(1) be amended to 90 days.

CAA response: The notice requirement has, with some exceptions, been changed to 90 days.

2.21 77.11 and 77.15

Aerospace Education stated that these rules need to be amended to exclude consumer rocketry activities covered by Part 101 from notification requirements.

CAA response: 77.1 *Applicability* has been amended to exclude the activities which will be covered by Part 101. 77.15 has been removed and is not included in the final rule.

2.22 77.13(2)(ii) [Final rule 77.13(b)(2)]

Headquarters New Zealand Defence Force stated that there may be less potential for confusion if the rule was amended to read 'within 5 days after the.....' In any case there would seem to be little benefit to the safety of civil air traffic by providing notification up to 5 days after the event.

CAA response: 77.13(b)(2) now reads as follows— the person responsible for the construction, alteration, or use shall complete form CAA 24077/01 and submit it to the Director within 5 days after the use, construction, or alteration.

2.23 77.15(2)

Mount Cook Airline stated that all obstacles must be notified to the Director as all can have an effect on the operation of aircraft. i.e. arresting devices, localiser aerials etc. It is essential that these items be assessed for the effect on

aircraft operations as any obstacles in the take-off and approach fans must be taken into account by aircraft operators whether or not marked or lit.

CAA response: The Authority agrees and has deleted 77.15.

2.24 77.17 [Final rule 77.15]

Mount Cook Airline stated that there needs to be a requirement for notice some days in advance of commencement of construction to give operators time to assess the effect on their operations and to revise take-off weights or operational minima where these may be affected. Similarly the Director must be required to provide timely notification to operators of the construction.

CAA response: This is covered by 77.13 which has changed to 90 days.

2.25 77.17(c) [Final rule 77.15(c)]

Waipa Power stated that the requirement for a registered surveyor's determination should be omitted in the case of aerial conductors and cable.

CAA response: The wording of 77.17(b), renumbered 77.15(b) in the final rule, has been altered to read— 'Each person who is required to give notice under 77.5 shall submit a notice in writing to the Director within 5 days of the construction or alteration reaching 60 m in height above the ground level at its site and again within 5 days'. There is no need to make an exception for aerial conductors and cables at this point as **all** reference to the marking of lines has now been removed from Part 77 and will be reintroduced by means of another NPRM when agreement on the criteria has been reached.

2.26 77.19(a) [Final rule 77.17(a)]

Ardmore Airport Ltd asked whether notification is also required for activities such as parachuting or will this be covered by Rule Parts 71 or 73?

CAA response: Parachuting will be covered by Part 105.

2.27 77.21 [Final rule 77.19]

The Airways Corporation of New Zealand Ltd stated that there are no standards for fireworks, and those listed for weapons are left to the discretion of the originator who may get it wrong. They suggest that this clause be expanded, certainly within an appropriate circular, to ensure that an originator can look up a list of criteria, contact personnel with the necessary expertise, and make a correct decision.

CAA response: 77.11 has been amended to clarify the notification requirement and 77.19(g) now includes a statement regarding fireworks.

New Zealand Gliding Association stated that no guidance has been given as to what type of fireworks constitutes a hazard in navigable airspace. A definition of hazardous fireworks needs to be included.

CAA response: 77.11 has been amended to clarify the notification requirement and 77.19(g) now includes a statement regarding fireworks.

Airways Corporation of New Zealand Ltd stated that they have reservations about the heights quoted in this clause. Many Telecom and BCI towers on hilltop or ridge top sites are in the order of 30-60 metres and are a hazard for aircraft operating under Regulation 38(3)(a), (b), and (ba). Many are sited close to commonly used flight paths. They consider it necessary that these obstacles be charted accurately with correct obstacle height data shown. At present there appears to be no legislation that compels notification of such obstacles and because of the height figures quoted in this clause this rule will not compel notification.

CAA response: The Authority considers that 60 meters is an acceptable threshold for this notification rule.

Airways Corporation of New Zealand Ltd stated that when designing instrument flight procedures, an obstacle allowance of 30m is used to cover all those obstacles that have not been surveyed. Therefore, it may well be necessary for obstacles over this height to be known for the purpose of instrument flight procedure design. In effect, this means that any obstacle over 30m constitutes a hazard.

CAA response: The Authority considers that 60 meters is an acceptable threshold for this notification rule.

Central Power stated that the standards should only apply to 'reasonably foreseeable' aviation requirements that are not excessively onerous upon power companies.

CAA response: Meetings between the various Power Companies, the Aviation Industry Association, and the Civil Aviation Authority will be held to determine a set of criteria that will be used to assess whether a line needs to be marked or not. A thorough cost /benefit analysis will then be done to ensure that the line marking requirement will not be excessively onerous upon power companies.

2.28 77.21(a)(2) and (b)(1) [Final rule 77.19(a)(2) and (h)(1)]

Mount Cook Airline stated that these heights should be standardised at 120 metres as normal safe operation of aircraft is at a minimum of 500 feet.

CAA response: The Authority disagrees. Aircraft that fly below 500 feet lawfully should also be protected.

2.29 77.21(b)(2) [Final rule 77.19(h)(3)]

Mount Cook Airline stated that it will be essential for airport authorities to specify height limits and areas in the District Schemes to protect instrument approaches as these could be rendered inoperative by structures whether or not marked or lit. Standard aerodrome protection surfaces do not protect non precision instrument approach surfaces.

CAA response: Airport authorities should arrange with Local Authorities for these areas to be protected.

2.30 77.21(b)(5) and (d) [Final rule 77.19(h)(6) and (b)]

Mount Cook Airline stated that 'certificated' should be deleted as all aerodromes require this protection regardless of certification status. Certification is not a mandatory requirement in NZ and this Part should not require aerodromes to be certificated for hazard protection.

CAA response: The Authority agrees. 77.21(b)(5) and (d) have been amended.

2.31 77.21(e) [Final rule 77.19(c)]

Mount Cook Airline stated that this height should be 120m.

CAA response: After further consultation the Authority has decided to reduce this height to 60m to be consistent with other requirements.

2.32 77.21(h) [Final rule 77.19(f)]

Headquarters New Zealand Defence Force stated that this does not list any standards, it simply advises that a study will be carried out to determine whether or not a hazard exists.

CAA response: The notification requirements in 77.9 and 77.11 have been amended. There is no need to change this as well.

2.33 77.23 [Final rule 77.21]

Ardmore Airport Ltd stated that this does not appear to give the Director the authority to prevent any of the specified objects or activities from occurring.

CAA response: This is correct, the Director will only have the power to declare the object or activity a hazard and state any marking or lighting requirements.

2.34 77.27 [Final rule 77.25]

Central Power stated that it seems unfair that a determination of 'no hazard' expires after 18 months whereas a determination of 'hazard' does not expire.

CAA response: The reason for the 18 month expiry date on a determination of no hazard is to ensure that the airspace is not held hostage forever. After 18 months the Authority can assume the airspace again.

2.35 77.29 [Not included in final rule]

Central Power stated that this clause needs to bind the Director to 'not unreasonably' withhold a revision or extension of the determination.

CAA response: 77.29 has not been included in the final rule. 77.27 in the final rule (77.31 in the NPRM) deals with petitions for review of determinations of hazard. Legal remedies such as Judicial Review are available if the Director does unreasonably withhold or deny a review.

2.36 77.31 [Final rule 77.27]

Central Power stated that there needs to be a time limit (eg 14 days) in which the Director must respond with a definite answer. An open ended review period as proposed is simply not acceptable.

CAA response: The Authority agrees and has included a provision in 77.27(e) to limit the time in which a review will be completed.

Mount Cook Airline stated that there must be a requirement for the Director to acknowledge receipt of a petition for review in order that the applicant is assured of receipt. With Part 139 this does not occur and there needs to be a rule to ensure compliance by the Director.

CAA response: It is Authority policy to acknowledge receipt of applications made to it.

2.37 77.33 [Final rule 77.29]

Central Power stated that there needs to be a provision for ensuring that "new facts" are genuinely new, in the sense of being original and undiscovered, rather than because the original investigation was too limited in scope or simply forgot to investigate this area.

CAA response: The term "new" is considered to be the right one in this instance. A matter will be new if has not previously been considered or discussed during the aeronautical study.

2.38 77.33(a)(1) [Final rule 77.29(a)(1)]

Central Power stated that sub paragraph (a)(1) needs to include rather than exclude excavation as this can be an expensive phase of construction.

CAA response: The fact that the excavation has been done means that its not too late to state a marking or lighting requirement. However, if the structure is

already partially complete it could be awkward to then suddenly state a marking or lighting requirement.

2.39 Appendix A

Mount Cook Airline stated that the diagrams showing the obstacle notification surfaces have a reference to AC 139 - 06A for surface dimensions. It is essential that reference be made to the owner of the aerodrome as the designation in the District Schemes may well protect for an aerodrome of greater size that could not be ascertained by reference to the AC only.

CAA response: The Authority agrees and has amended the diagram to include a reference to the aerodrome operator and owner.

2.40 Appendix C

Mount Cook Airline stated that sub paragraph (b) states that an aeronautical study may be required to determine whether an object is shielded but rule 77.15(1) states that if the object is shielded then the Director need not be notified. If that is the case then who is going to do the study? They recommend that the applicant should not determine whether shielding is adequate and the project should be notified for the Director to determine.

CAA response: The Authority agrees and has removed 77.15. The rule numbering has been altered accordingly.

2.41 General

A commenter stated that the rule is relevant and has his support.

CAA response: Nil.

Mercury Energy stated that the land used for micro-light and similar activities may need consideration. If there is an intention of bringing such activities into the licensing regime then there could be major problems and costs involved.

CAA response: Microlight and similar activities will be considered during aeronautical studies.

Headquarters New Zealand Defence Force stated that form CAA 24077/01 does not contain information relevant to the use of weapons but is styled towards construction and/or alteration of structures. The Authority needs to collect all relevant data as early as possible. The form does not give sufficient guidance and does not refer the person to Part 77 which probably should be studied before giving notice to the Authority.

CAA response: These points have been taken into account in the revised form CAA 24077/01.

Headquarters New Zealand Defence Force stated that they were concerned that some general aviation operators do not read NOTAM's or Supplements. As the 30 day notice requirement of Part 77 provides for safety advisory notices to be issued through the NOTAM system, failure of operators to read Notams will mean that Part 77 will not increase safety of civil or defence air operations.

CAA response: 90 days is the minimum notice under normal circumstances that the Authority should receive to be able to promulgate the pertinent information by AIP Supplement as required by ICAO Annex 15, Appendix 3 (Information to be promulgated by AIRAC). The 30 day notification period has been changed to 90 days.

Headquarters New Zealand Defence Force stated that there is some confusion about the legal requirement to read NOTAMs. They recommend that all civil operators be required to obtain and read NOTAMs applicable to their intended flight paths.

CAA response: The requirement to read NOTAMs is not a Part 77 concern.

Aerospace Education stated that consumer rockets are classified in the NZ Explosives Legislation as Class 7 fireworks. They should be exempted from the requirements of Part 77.11. This could be done by adding a paragraph to Part 101.5 exempting consumer rocketry from the requirements of Part 77. In addition, 77.11 and 77.15 need to be amended to exclude consumer rocketry activities covered by Part 101 from notification requirements.

CAA response: 77.1 *Applicability* has been amended to exclude the activities which will be covered by Part 101.

Waipa Power stated that in the event that the new rule is adopted and includes some requirement for aerial wires to be marked, a reasonable period should be provided in which to achieve the desired outcome for existing lines which will need to be retrofitted with marker spheres. A suggested minimum period would be 5 years.

CAA response: A compliance period will have to be determined. This will be finalised at a meeting with the power companies in due course.

Central Power stated that many territorial authorities regard constructing powerlines up to and including 110kv as a permitted activity. The District Scheme is the preferred means of control rather than have individual authorities establishing and enforcing their own rules.

CAA response: The Authority is entitled to specify marking and lighting requirements of objects that are determined to be hazards in navigable airspace. Establishing and enforcing rules regarding aviation safety is the Authority's responsibility.

Headquarters New Zealand Defence Force requested that the Authority advise the level to which it envisages the Director imposing limits and conditions on NZDF in order to minimise a possible hazard.

CAA response: The Director will not be imposing any limits or conditions on the NZDF where their activities are excluded in the applicability section.

Conclusion

The Authority concludes from this consultation that the majority of the aviation industry participants favour the direction of the new rules. Specific issues that were identified in the comments received from the consultative group have been addressed. The comments and all the background material used in developing the rules are held on the docket file and are available for public scrutiny. Persons wishing to view the docket file should call at Aviation House, 1 Market Grove, Lower Hutt and ask for docket file 1114.

Regulatory activities

Part 77 will replace existing requirements in regulations 33(12) and 190C of the Civil Aviation Regulation 1953, as well as the standards referred to in Civil Aviation Information Circular - Gen A13/87.

Specific amendments to the Regulations will not be necessary. Section 14(2) of the Civil Aviation Amendment Act 1991 (as amended by section 34 of 1996 No. 91) deems the Civil Aviation Regulations 1953 that are continued in force by section 8 of that Act to be revoked on the close of 31 March 1997.

Section 14(3) states that any order, notice, requirement, circular, or other publication continued in force by section 8 shall expire on the close of 31 March 1997.

Commencement

Part 77 comes into force on 1 April 1997.