Before an Independent Hearings Panel of Wellington City Council

In the matter	of the Resource Management Act 1991 (the **Act**)
And	
In the matter	of hearing of submissions and further submissions on the Wellington City Proposed District Plan (**PDP**)

Statement of Evidence of
Lachlan Thurston for Wellington International Airport Limited

Dated: 1 July 2024

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1. INTRODUCTION

Qualifications and Experience

1.1 My full name is Lachlan Richard Thurston. I have been employed by Wellington International Airport Limited (**WIAL**) since 2011, having previously been employed by WIAL from its inception in 1989 to 1999.

1.2 My current role is Head of Operational Readiness, responsible for overseeing our airport operational regulatory requirements, operational policies and procedures, project management for the operational introduction of new systems and equipment, and training of airport operational staff. I am also responsible for emergency and business continuity planning for WIAL.

1.3 Until December 2023 I was a member of the Aviation Community Advisory Group (**ACAG**) representing New Zealand Airports, a position I fulfilled for a period of 8 years. ACAG is a representative sector body which has been formed to provide technical and strategic advice to the Director of Civil Aviation. ACAG members represent the views of the aviation community or sectors that they are representing. The role, function and scope of ACAG, supports the Civil Aviation Authority (**CAA**) as an active regulatory steward.

1.4 I have 39 years' experience in the aviation industry in roles encompassing commercial pilot, airport management, airport consultancy as well as airport and airspace regulatory roles. I have worked in South Korea, Philippines, China and the United Arab Emirates, the latter as Chief of Air Navigation Service Regulations for the General Civil Aviation Authority being the Federal Regulatory body overseeing aviation activity in the UAE.

1.5 I am presently an adjunct lecturer for Massey University School of Aviation, teaching Airport Master Planning, a position I have held since 2019.

1.6 I am also a notified subject matter expert representing New Zealand on the ICAO Asia Pacific Aerodrome Design and Operations Task Force.

2. SCOPE OF EVIDENCE

2.1 The purpose of my evidence is to provide a guide to Obstacle Limitation Surfaces (**OLS**) in the context of WIAL's modified OLS Designation (WIAL1) and in doing so explain:

(a) why OLS are a required and important safety feature of an airport operation;

(b) the regulatory background to OLS;

(c) OLS as they relate to Wellington Airport;

(d) some minor amendments that are required to WIAL1.

2.2 In her evidence Ms Lester explains how a property owner and Council staff can find out to what extent the OLS affects a property. She also explains WIAL's process for assessing and giving approval to OLS penetrations via the WIAL1 designation.

3. INTRODUCTION

3.1 WIAL as the owner and operator of Wellington International Airport (**Wellington Airport** or **Airport**) is a Requiring Authority under the Resource Management Act 1991. It is therefore able to apply to designate land to control the heights of obstacles to enable aircraft to maintain a satisfactory level of safety while manoeuvring at low altitudes in the vicinity of the Airport and to protect against collision. These controls are defined by "obstacle limitation surfaces" which I describe in more detail below.

4. WHAT ARE OBSTACLE LIMITATION SURFACES?

4.1 OLS are defined conceptual three-dimensional surfaces that exist in the airspace above and around an airport.

4.2 From a technical perspective these surfaces should be free of obstacles, and subject to controls to prevent objects such as buildings, structures and trees from penetrating them. OLS are therefore used as a tool to impose height limitations on buildings, structures and other objects around an airport.

4.3 The term OLS is used to describe each of the surfaces which together essentially define the lower boundary of navigable airspace above and in the vicinity of an airport.

4.4 The easiest way of envisaging the concept is that the OLS surfaces create what could be thought of as a bowl shape with the runway being at the bottom of the bowl. The figure below depicts the OLS "bowl' shape showing each of the surfaces:

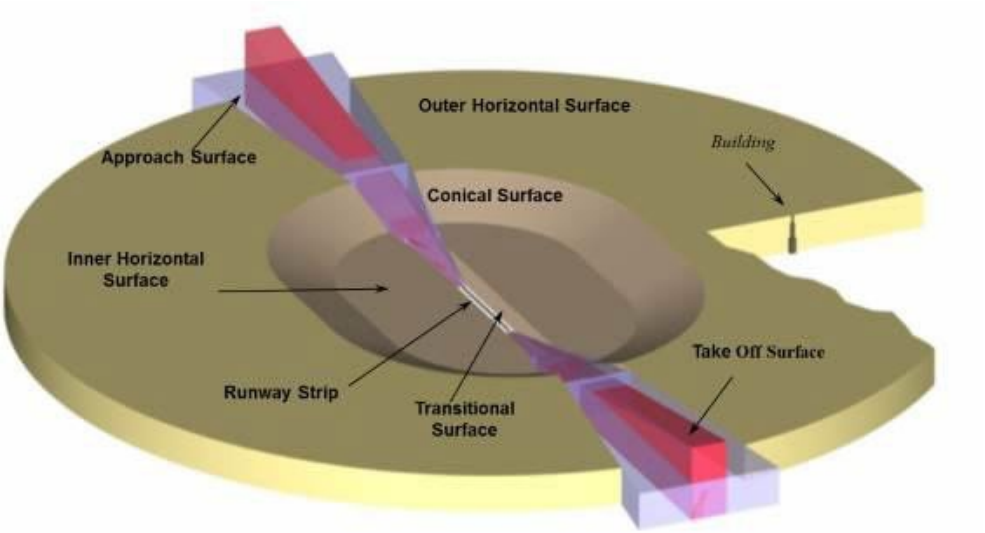


Figure 1: Obstacle Limitation Surfaces

4.5 While each of the OLS surfaces has a technical description in terms of its geometric shape[1], the paragraphs below describe these surfaces in a way that is more easily understood.

Takeoff surface

4.6 The take-off surface, also commonly referred to as the takeoff fan, starts essentially from the end of the runway that is the declared takeoff distance, and fans out directly in the line of the runway to a point where it is 1200m in width, and then continues at this width to a distance 15000m from the end of the runway. The slope is quite shallow, and its purposes is to create space for the aircraft to climb to a safe altitude, taking into account a variety of circumstances such as aircraft performance capability or ambient atmospheric conditions that can impact climb performance.

[1] Defined by Civil Aviation Rules and Guidance – refer to paragraphs 5.1 – 5.10 below

4.7 In addition, international guidance dictates that airports should also monitor the area directly below this slope to ensure features such as tree growth will not cause this area to be impeded in the future and/ or to notify flight procedure designers and aircraft performance engineers of any other structure that might need to be taken into consideration should the aircraft climb performance become compromised for any reason.

Approach surface

4.8 Commonly referred to as the approach fan, this surface extends out from the end of the runway strip and is wider than the takeoff fan. The slope is also quite shallow and encapsulates a special area to allow aircraft to descend safely on a 3 degree glide slope to a minimum altitude where pilots must then be able to continue their approach visually to the runway.

Transitional Surface

4.9 The purpose of this surface is to protect an area immediately around the runway strip and the final stages of the approach fan and to the sides of the runway in case the aircraft deviates from its takeoff or approach flight path for any reason. Its purpose is also to ensure that fixed and mobile objects do not protrude into a navigable airspace nearest the runway (i.e. buildings/structures/trees/cranes). This surface rises up from the edge of the runway strip at a rate of 1:7 until it reaches a height of 45m above the level of the runway nearest portion of the runway strip. The outer edge of the transitional surface intersects with the Inner Horizontal Surface.

Inner Horizontal Surface

4.10 The purpose of this surface is to create an area in which to protect the aerodrome traffic circuit, mainly used by aircraft flying Visual Flight Rules. It extends 4000m from the edges of the runway strip and is a flat surface 45m above the level of the runway strip. The aerodrome traffic circuit or commonly just known as the "circuit" is a race track type pattern, associated with every runway, and is used to provide an orderly flow of aircraft positioning for landing while avoiding other aircraft.

4.11 At Wellington the circuit is positioned so that aircraft essentially fly around the harbour entrance. There is also an area to the west of the runway where aircraft flying Visual Flight Rules can self-navigate to, should they experience a communication failure whilst in the aerodrome traffic circuit and are unable to communicate with the Control Tower. In these instances, the race-track pattern to

the west of the runway would be utilised and instructions provided by light signals from the Control Tower.

Conical surface

4.12 This surface commences at the outer periphery of the inner horizontal surface and extends upwards at a slope of 1:20 to a height 150m above the airport reference elevation. This essentially forms the "sides of the bowl" as mentioned earlier. Its purpose is to create an area of safe airspace further out from the runway so that aircraft may safely descend as they get closer to the airport.

Outer Horizontal Surface

4.13 This surface is another flat surface, similar in design to the inner horizontal surface but at a height of 150m above the airport reference elevation. It extends from its inner edge being the outside edge of the conical surface to a point 15,000m measured from the mid-point of the runway. This area creates a space for aircraft to navigate safely at low level as they prepare to intercept the final instrument approaches to the runway

4.14 The Outer Horizontal Surface is particularly pertinent to Wellington Airport operation given the terrain that surrounds the airport environs.

4.15 Both CAA and ICAO indicate that as a broad specification for the outer horizontal surface, tall structures can be considered to be of possible significance in as far as being a hazard to air navigation if they are both higher than 30 m above local ground level, and higher than 150 m above aerodrome elevation.

4.16 In this regard WIAL is cognisant of the existence of existing structures e.g. wind turbines to the west of the airport and seeks to ensure that the areas within the area bounded by the outer horizontal surface is also monitored and controlled so to preserve the safety and efficiency of aircraft operations in the near vicinity of the airport.

5. WHY ARE OBSTACLE LIMITATION SURFACES NECESSARY

5.1 OLS are necessary to ensure that aircraft can maintain a satisfactory level of safety whilst manoeuvring at a low altitude in the vicinity of an airport through the avoidance of obstacles.

5.2 Their provision assists not just to provide an area for aircraft to safely approach and depart the airport under normal circumstances, but importantly also when the flight performance of the aircraft is impaired, such as when an engine is inoperative.

5.3 The effective utilisation of an airport can be considerably influenced by terrain and man-made construction both inside and outside of its property boundary. Such objects can result in collisions and aircraft operational limitations in using the runway.

5.4 For these reasons certain areas of the local airspace must be regarded as integral parts of the airport environment. The degree of freedom from obstacles in these areas is as important to the safe and efficient use of the airport as are the physical attributes like the runway.

5.5 These surfaces are intended by Civil Aviation Rules to be more permanent in nature and hence seek to be incorporated in local zoning provisions or in most cases in New Zealand, they are designated in District Plans. Mr Kyle discusses this in his evidence. From my own experience, having the designation in place provides good information to the community about the limitations that apply to airspace around the airport and enables the airport company to avoid or limit the potential for obstacle intrusions into these very important surfaces.

5.6 It is important to understand that many accidents happen at low altitudes during a departure from or approach to an airport so there is a need for sufficient air space in order for an aircraft to safely manoeuvre especially if it has lost some of its performance capabilities and has to return to the runway.

5.7 OLS are particularly important at Wellington given its hilly terrain where parts of the OLS surfaces are already infringed which increases the importance of the remaining OLS space.

5.8 While the intention is that the OLS is to retain these surfaces free of obstacles, this is not always achievable due to existing terrain penetrating the surfaces. In such cases the airport operator (i.e. WIAL) is required under Civil Aviation Rules to either eliminate existing obstacles, such as the removal of trees, or ensure that further penetrations of the surface are avoided to preserve the required margin of safety for aircraft operation.

5.9 When WIAL is unable to eliminate an obstacle(s), it is obligated under Civil Aviation Rules to notify the aircraft operators of all obstacles that penetrate the surfaces so that they in turn can undertake the necessary aircraft performance calculations applicable for each phase of flight.

5.10 It is also important to understand that Airlines build their aircraft performance calculations for the airport using this obstacle information, taking into account the known performance characteristics of the aircraft, including when performance is impaired. This ultimately determines what commercial payload can be carried for any given flight, i.e. how many passengers, baggage or cargo can be carried.

5.11 An OLS designation is the only process through which airport operators such as WIAL, can control obstacles in its environs. The modified OLS designation proposed aligns with current national and international standards and dovetails with other regulatory standards and processes used to ensure the safety of aircraft in flight, such as the design of instrument flight procedures.

5.12 The WIAL1 designation seeks to preserve the margin of safety for continued aircraft operation to and from the Airport and enables WIAL to be advised and respond where a proposed building, object or structure is proposed to penetrate the OLS above the specified maximum height levels.

6. REGULATORY CONTEXT

International Civil Aviation Organisation (ICAO)

6.1 Globally, Civil Aviation activity is governed by the International Civil Aviation Organisation (**ICAO**), a sub-organisation of the United Nations. ICAO set Standards and Recommended Practices (**SARPs**) as well as provide guidance material for various aspects of global aviation activity in the interests of promoting aviation safety and consistency of standards across the international aviation community.

6.2 These SARPs are published in the form of Annex documents and are used by ICAO member states (such as NZ) to ensure that their local civil aviation operations and regulations conform to global norms to ensure that the global aviation network operates safely and reliably worldwide.

6.3 The specific Annex that relates to the preparation of OLS is Annex 14. Volumes I & II of this Annex outline the standards and recommended practices required of Aerodrome Design and Operations as well as Heliports. In respect to Aerodromes, it is specifically Annex 14 Volume 1 (Chapter 4) and the associated guidance material that provide the overarching international requirements for the protection of airspace around aerodromes, otherwise known as OLS. Reference to these international standards is used where local regulations have not been aligned (or defined).

New Zealand Civil Aviation Authority (CAA)

6.4 New Zealand is a member state and signatory to ICAO Convention. Civil Aviation activity in New Zealand is governed by the Civil Aviation Act 1990 [2] and Civil Aviation Rules which are administered by the Ministry of Transport and the Civil Aviation Authority (**CAA**) respectively.

CAA Civil Aviation Rules

6.5 New Zealand's Civil Aviation Rules (**CAR**), take into consideration the SARPs published by ICAO amongst other matters that contribute to the safe and secure aviation environment within New Zealand.

6.6 OLS are a required feature of an airport with scheduled aircraft traffic under the certification requirements of CAR Part 139 Aerodromes Certification, Operation and Use.

6.7 CAR Part 139 is the primary Rule Part that governs the regulatory requirements relating to the certification and operation of Airports serving scheduled aircraft traffic whether they be international or domestic scheduled services. Every CAA certified airport with scheduled aircraft traffic in New Zealand is required to have set obstacle limitation surfaces commensurate with the type of aircraft operation that it serves.

6.8 The requirement for the instigation of Obstacle Limitation Surfaces is contained in Rule Part 139, specifically CAR Part 139.51 and its cross-reference to Appendix D, D1 & D2. These address the design requirement for an aerodrome operator certificate

[2] Civil Aviation Act 2023 comes into effect on April 5 2025

but do not describe in any detail the specifications for the design of the OLS. These are contained in Advisory Circular AC-139-06 Chapter 4.

CAA Advisory Circulars

6.9 Advisory Circular AC139-06 – "*Aerodrome Design Requirements (All Aeroplanes Conducting Air Transport Operations, All Aeroplanes above 5700 kg MCTOW*)", specifically chapter 4, provides the descriptions/specifications for OLS whereas AC139-10 "*Control Of Obstacles*" provides guidance as to the control of obstacles.

6.10 Although not specifically stipulated in the Rule Part itself, it is considered best practice for airport operators such as Wellington Airport to work with territorial authorities to ensure that these surfaces are incorporated into land use planning documents as height zoning protection. This is mentioned in the CAA Advisory Circular AC139.10 Clauses 2.3 and 2.4 which is largely derived from the ICAO guidance material.[3] This document has been the primary point of reference for the preparation of WIAL1 for Wellington Airport.

7. WELLINGTON AIRPORT CONTEXT/ COMPLIANCE

7.1 I understand that Wellington Airport has had airspace protections in place since before 1984 (Operative District Scheme 1984 - Appendix H Operative District Plan Designation G2, Appendix F). When first introduced the standard OLS were considered to be impracticable for Wellington because of the rugged nature of the terrain and its closeness to the airfield as well as being too restrictive on development within the city.

7.2 This is reflected in the Designation G2 provisions in the Operative District Plan (**ODP**) which do not conform with the CAA Rules or ICAO Standards discussed and described above, but instead were formed by a compilation of compromises. The ODP G2 designation was referred to as "Airspace in the vicinity of Wellington International Airport."

7.3 The compromised surfaces within the ODP G2 designation were largely composed to avoid the surrounding terrain and existing obstacles thereby minimising the necessity for WIAL to engage more resources to assess potential obstructions to air

[3] Doc 9137-AN898 Airport Services Manual, Part 6 - Control of Obstacles.

navigation given the available technology at the time and reduce the impact on city development.

7.4 I also note that the naming convention of these surfaces were also not strictly in conformance with CAA Rules and ICAO standards, instead utilising much simplified generic terms such as transitional or horizontal surfaces. The consequence of this is that the actual ODP G2 designation definitions and descriptions cannot be directly compared today.

7.5 WIAL now considers it is important to address these non-compliances as is the intent of CAR Part 139 while also taking into account the city's urban form and terrain through conditions on the Designation which allow for penetrations into the OLS in certain circumstances. This is discussed further in Ms Lester's evidence.

7.6 The need to address these non-compliances stems from the Airport's designation as an international airport and the now increasing importance that the CAA places on conforming to agreed international standards, ensuring that New Zealand itself is meeting its international obligations with ICAO as far as is practicable in the context of Wellington. In these circumstances it is no longer considered acceptable for WIAL to continue with the previous designated surfaces and to continue to do so could result in restrictions being imposed on the Airport operation.

7.7 From a safety perspective, new structures that might not have penetrated the previous designated surfaces and to which WIAL would not have been made aware of their existence, would today potentially be considered to have an adverse impact upon the airport operations and to the safety of aircraft navigating to and from the airport.

7.8 An indication of the actual difference between the ODP G2 Designation and the PDP WIAL1 designation is depicted in cross sections contained in **Appendix A**.

7.9 The following Table shows the regulatory genesis of the OLS proposed in WIAL1.

OBSTACLE LIMITATION SURFACEs				
CATEGORY	**ELEMENT**	**CAA Regulatory Requirement**	**ICAO SARPS**	**WIAL Compliance**
OUTER HORIZONTAL SURFACE	Height above Aerodrome Datum (m)	150	100	CAA
	WLG RL Height (m)			161.98
	Radius (m), from the centre point of airport runway	15,000	15,000	✓
CONICAL SURFACE	Slope	1:20 (5%)	1:20 (5%)	✓

	Upper height above Aerodrome Datum (m)	150	100	CAA
	WLG Upper RL Height (m) above			161.98
	Lower height above Aerodrome Datum (m)	45	45	✓
	WLG Lower RL Height (m)			56.986
INNER HORIZONTAL SURFACE	Height above Aerodrome Datum (m)	45	45	✓
	WLG RL Height (m)			56.986
	Locus from strip edge (m)	4,000	4,000	✓
TRANSITIONAL SIDE SURFACE	Slope	1:7 (14.3%)	1:7 (14.3%)	✓
APPROACH SURFACE	Length of inner edge (m)	300	280	ICAO compliance
	Distance from threshold (m)	60	60	✓
	Divergence each side	1:6.6 (15%)	1:6.6 (15%)	✓
	Total Length (m)	15,000	15,000	✓
	Slope	1:50 (2%)	Varies between 0% and 2.5%	CAA
TAKE-OFF SURFACE	Length of inner edge (m)	180	180	✓
	Minimum distance of inner edge from runway end	60	60	397 because incorporates a clearway (so complies with CAA)
	Rate of divergence (each side)	1:8 (12.5%)	1:8 (12.5%)	✓
	Final width	1,800	1,800	✓
	Overall length	15,000	15,000	✓
	Slope	1:50 (2%)	1.6% – 2%	CAA

8. FURTHER REFINEMENTS TO WIAL1

8.1 Since WIAL1 was included in the Proposed District Plan three matters have come to my attention where further amendments are required:

(a) The Overview section, paragraph 3 refers to CAR 139-7. This is incorrect and should be deleted.

(b) Clause 1 references the Take-Off and Approach Surface (clause 1.a.ii) and specifies that the rising slope of this surface is at a gradient of 1.2%. Although this slope gradient is the ICAO standard for the notification and charting of significant obstacles used for aircraft performance calculation purposes, it is not intended for the control of obstacles. This should be amended to adjust this slope to a more permissive 2% (1:50) being the CAA and ICAO standard for control of obstacles.

(c) Clause 2 references the Visual Segment Surface. This surface was originally requested to be included by Aeropath (a subsidiary of Airways New Zealand responsible for the design of instrument flight procedures). However, WIAL has since been informed by Aeropath that this is no longer required and therefore Clause 2 should be deleted.

8.2 Mr Kyle sets out these amendments in his evidence.

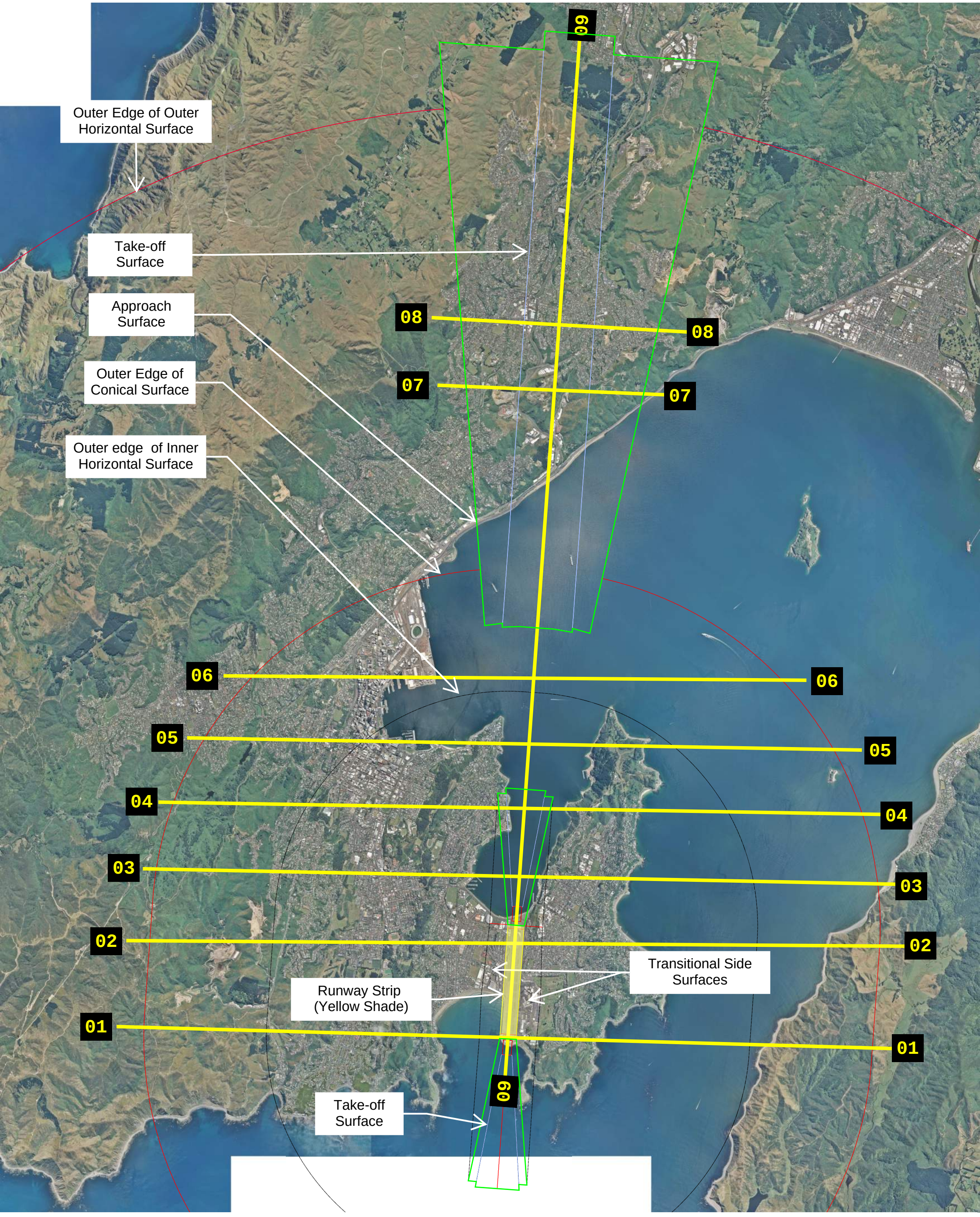
Dated 1 July 2024

Lachlan Thurston

Head of Operational Readiness.

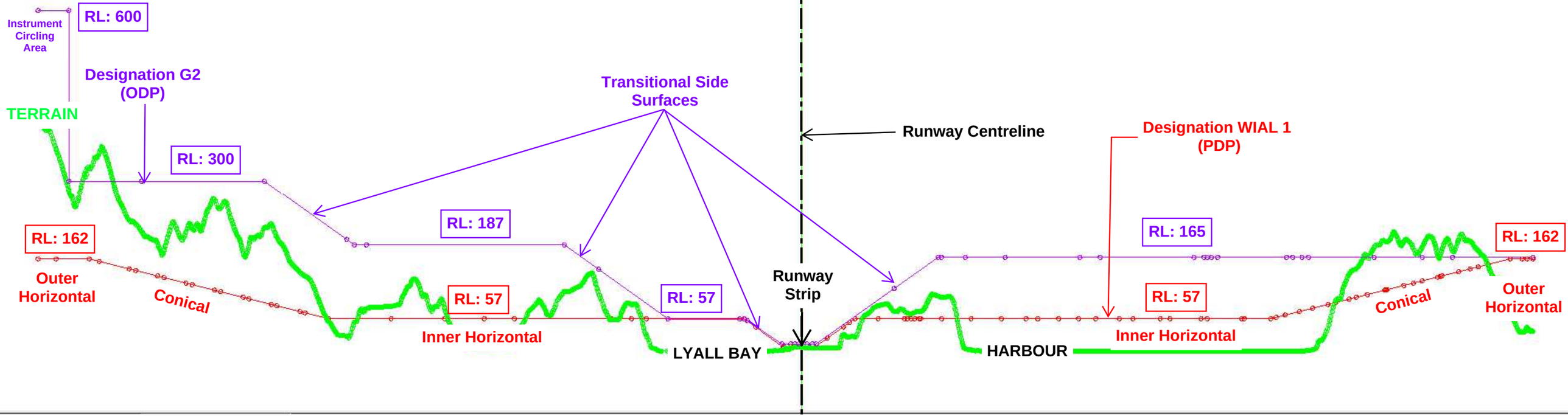
APPENDIX A

26 JUNE 2024

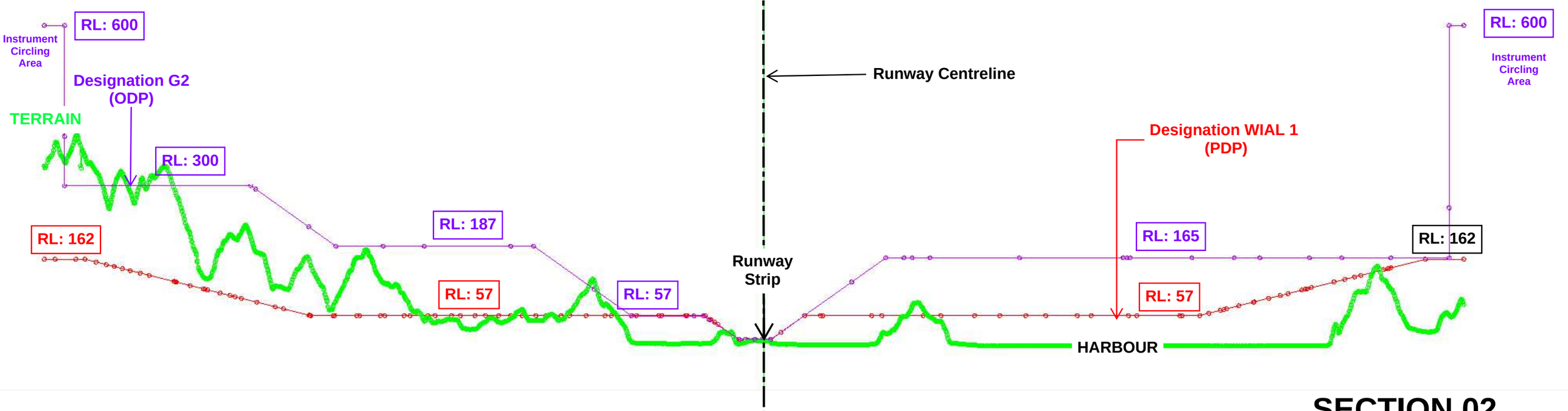


Note: On the following Sections -
Purple Text describes Designation G2 (ODP) OLS Surfaces
Red Text describes WIAL 1 (PDP) OLS Surfaces

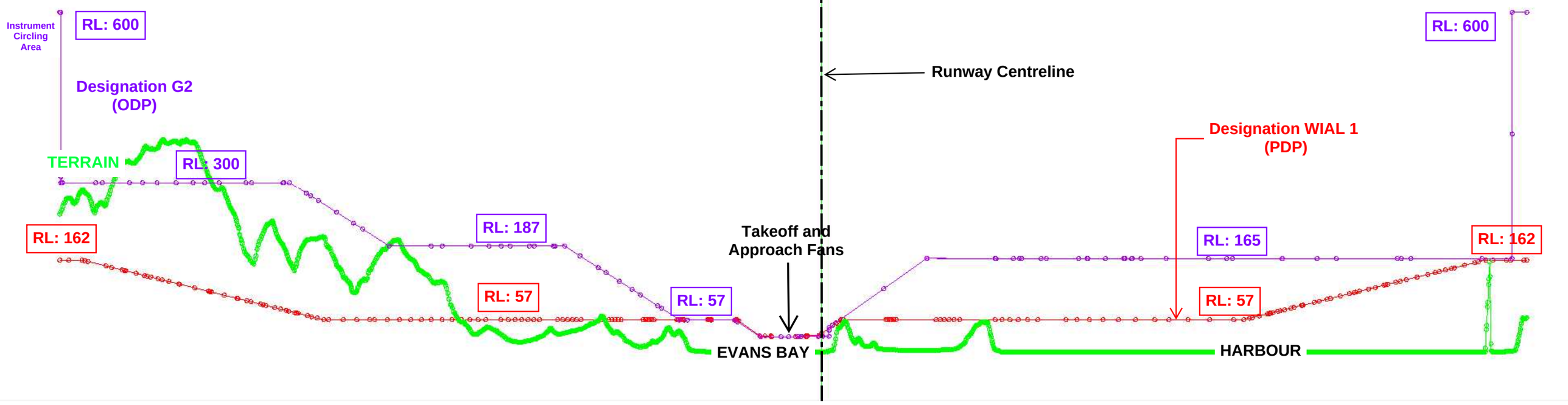
Comparison of Designation G2 (ODP) with Designation WIAL1 (PDP) Cross-Section Locations
Note: Surfaces shown in this figure are WIAL 1 (PDP) - based on CAA AC139


Instrument Circling Area
RL: 600
Designation G2 (ODP)
TERRAIN
RL: 300
Transitional Side Surfaces
Runway Centreline
Designation WIAL 1 (PDP)
RL: 187
RL: 165
RL: 162
RL: 162
Outer Horizontal
Conical
RL: 57
Inner Horizontal
RL: 57
Runway Strip
RL: 57
Inner Horizontal
Conical
Outer Horizontal
LYALL BAY
HARBOUR

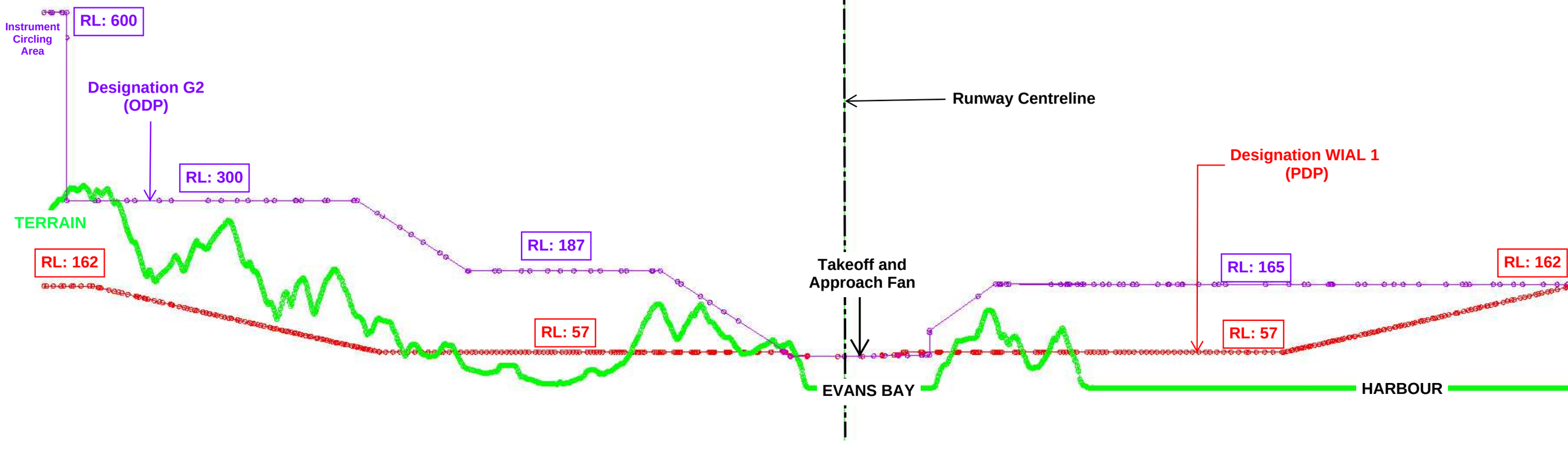
SECTION 01


RL: 600
Instrument Circling Area
Designation G2 (ODP)
TERRAIN
RL: 300
RL: 187
RL: 162
RL: 57
RL: 57
Runway Centreline
Runway Strip
Designation WIAL 1 (PDP)
RL: 165
RL: 57
RL: 600
Instrument Circling Area
RL: 162
HARBOUR

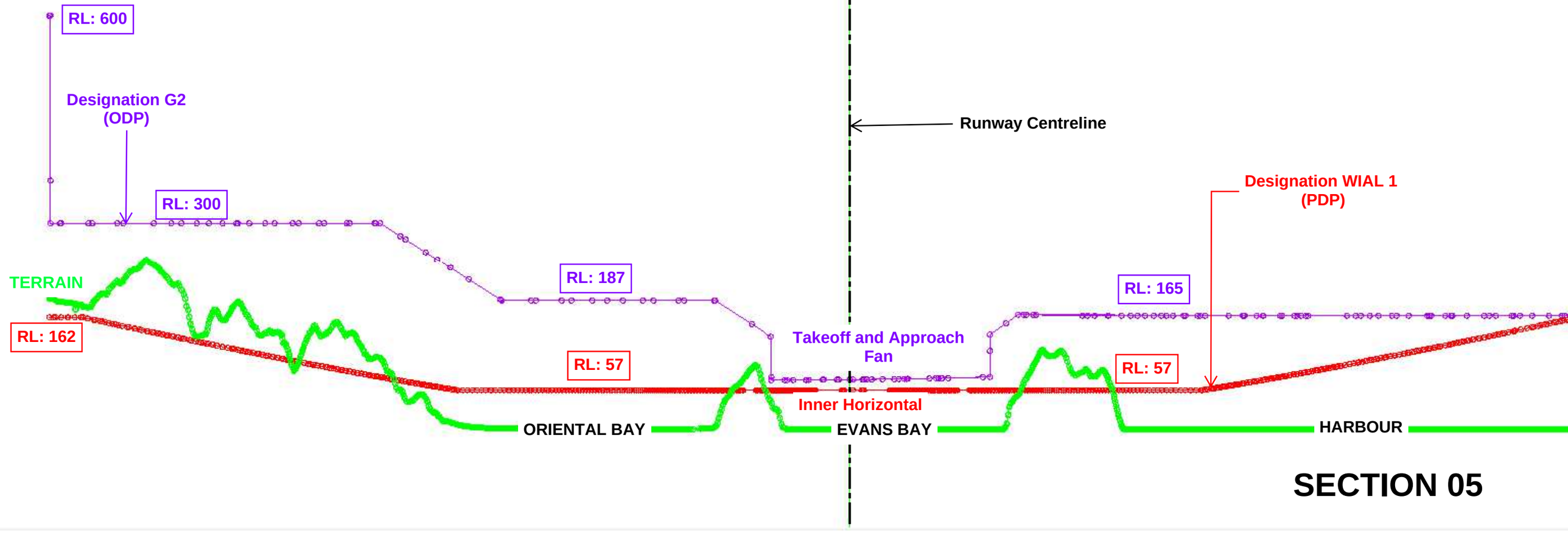
SECTION 02


Instrument Circling Area
RL: 600
Designation G2 (ODP)
TERRAIN
RL: 300
RL: 162
RL: 187
RL: 57
RL: 57
Takeoff and Approach Fans
EVANS BAY
Runway Centreline
RL: 600
Designation WIAL 1 (PDP)
RL: 165
RL: 57
RL: 162
HARBOUR

SECTION 03


Instrument Circling Area
RL: 600
Designation G2 (ODP)
RL: 300
TERRAIN
RL: 162
RL: 187
RL: 57
Runway Centreline
Takeoff and Approach Fan
EVANS BAY
Designation WIAL 1 (PDP)
RL: 165
RL: 57
RL: 162
HARBOUR

SECTION 04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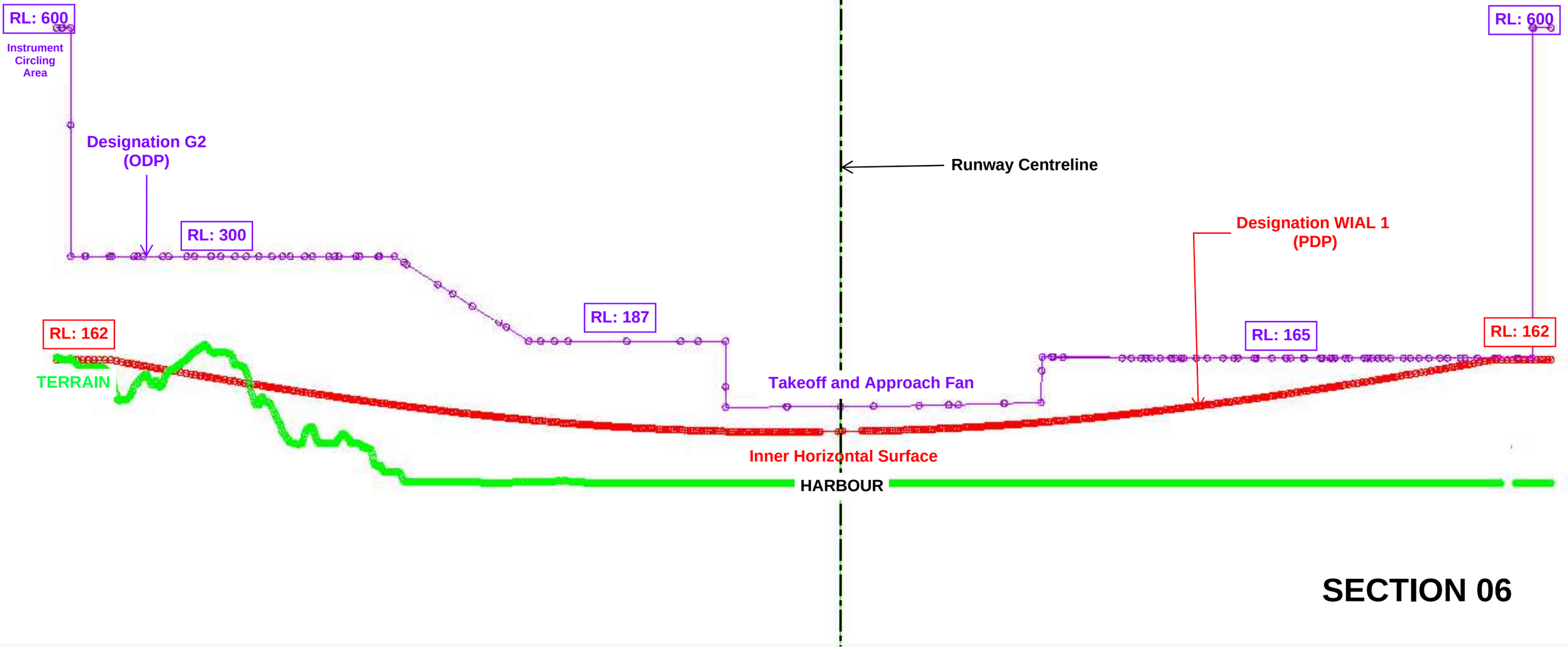
Designation G2
(ODP)
RL: 300
RL: 187
TERRAIN
RL: 162
RL: 57
Runway Centreline
Takeoff and Approach
Fan
Designation WIAL 1
(PDP)
RL: 165
RL: 57
Inner Horizontal
ORIENTAL BAY
EVANS BAY
HARBOUR
SECTION 05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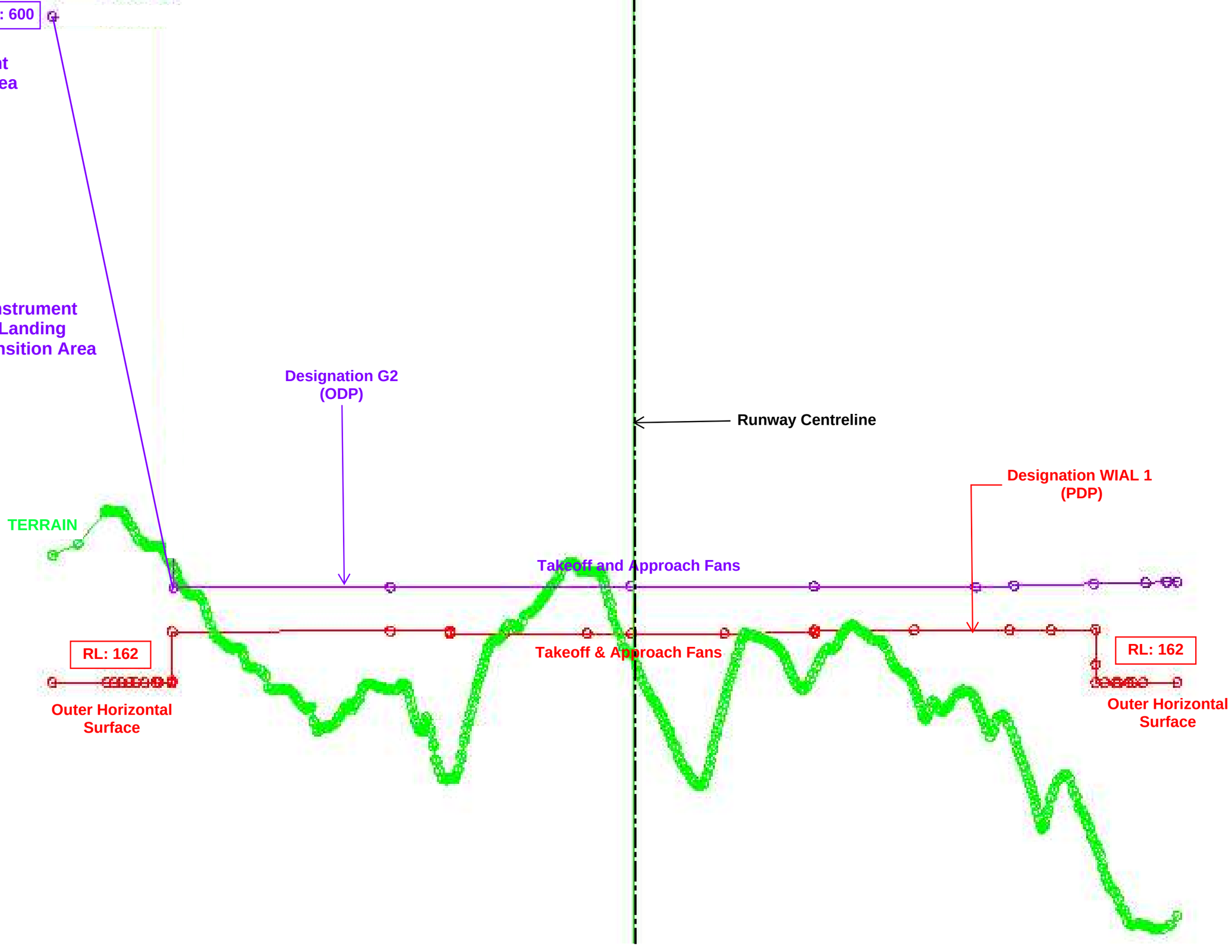
Instrument Circling Area
Designation G2 (ODP)
RL: 300
RL: 187
RL: 162
TERRAIN
Runway Centreline
Takeoff and Approach Fan
Designation WIAL 1 (PDP)
RL: 165
RL: 600
RL: 162
Inner Horizontal Surface
HARBOUR
SECTION 06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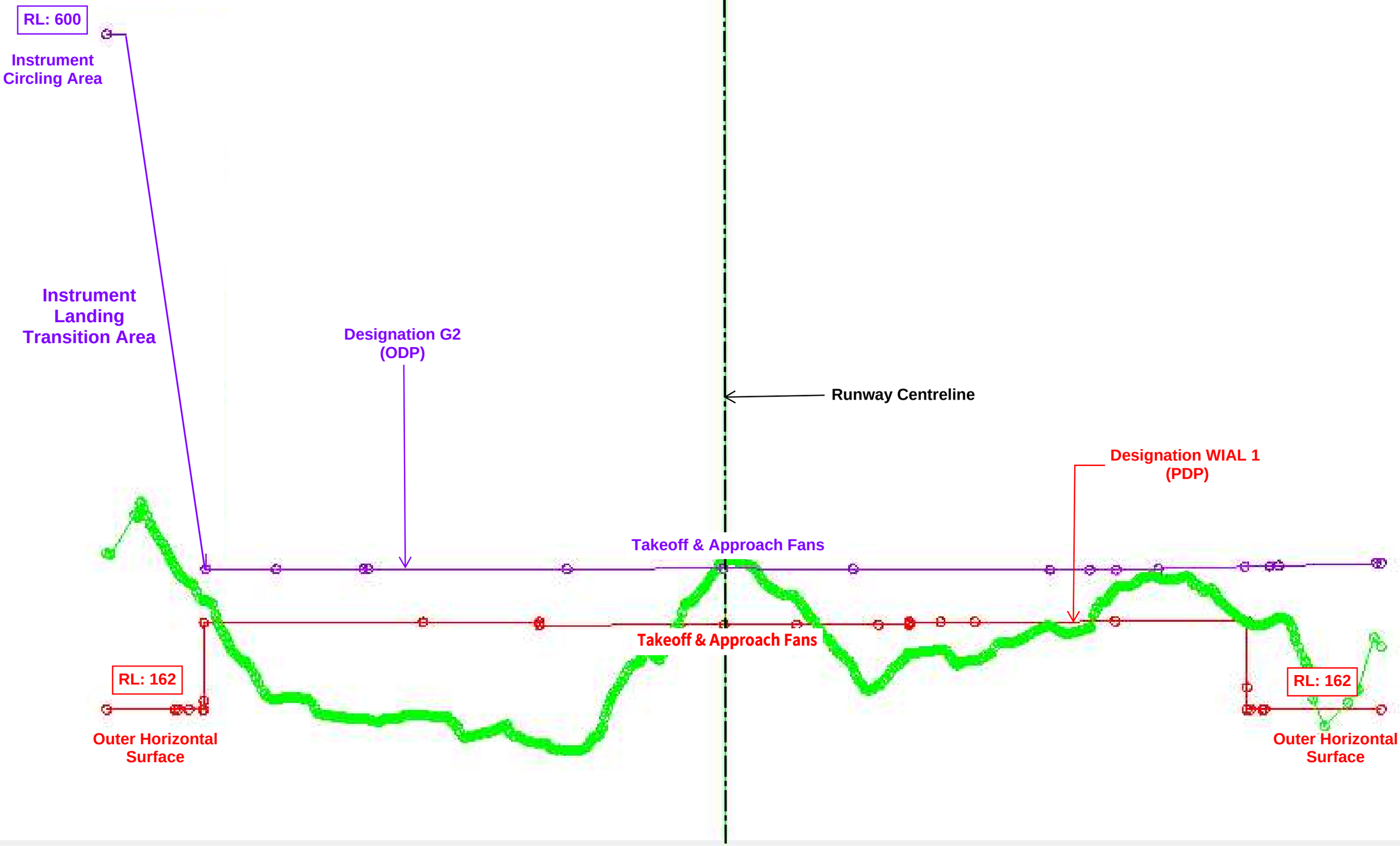
Instrument Circling Area
Instrument Landing Transition Area
Designation G2 (ODP)
Runway Centreline
Designation WIAL 1 (PDP)
TERRAIN
Takeoff and Approach Fans
Takeoff & Approach Fans
RL: 162
Outer Horizontal Surface
RL: 162
Outer Horizontal Surface

SECTION 07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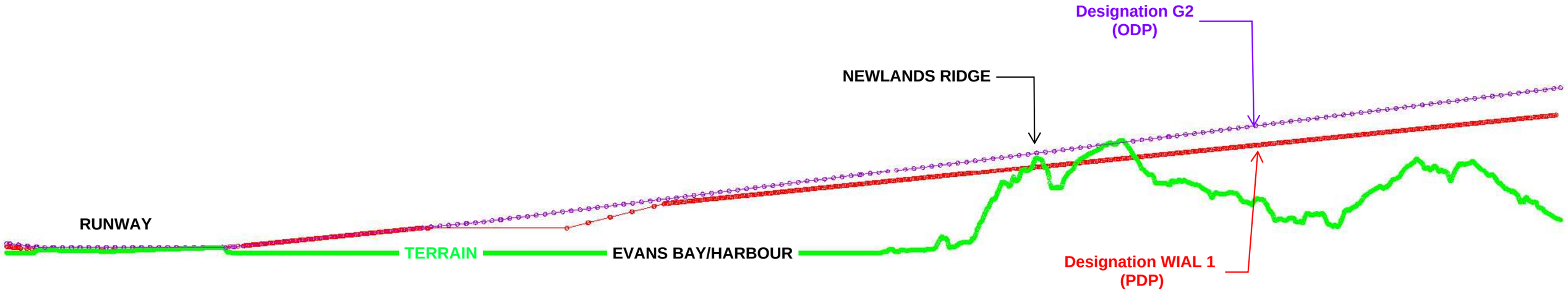
Instrument Circling Area
Instrument Landing Transition Area
Designation G2 (ODP)
Runway Centreline
Designation WIAL 1 (PDP)
Takeoff & Approach Fans
Takeoff & Approach Fans
RL: 162
RL: 162
Outer Horizontal Surface
Outer Horizontal Surface

SECTION 08


Designation G2
(ODP)
NEWLANDS RIDGE
RUNWAY
TERRAIN
EVANS BAY/HARBOUR
Designation WIAL 1
(PDP)

SECTION 09