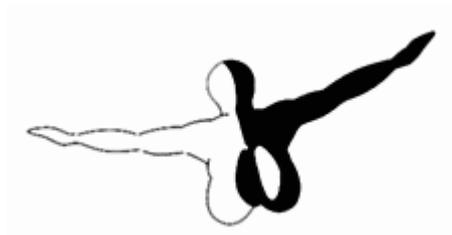


LimeSim's

# Antarctica X



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Testing: Several good folks who will all be getting a copy

Data from the following external providers has been used in this product:

- Terrain data of Casey, Mawson and Davis: *Data courtesy of the Australian Antarctic Division Data Centre © Commonwealth Australia 2008*  
If you are interested in a copy of an orthophoto or any other data provided by the Australian Antarctic Data Centre, please contact them directly. They have supported our project with one of the best datasets around for Antarctic bases and are extremely well organized: <http://data.aad.gov.au>
- Terrain data of Rothera, Halley and Sky Blu: © *British Antarctic Survey*: [www.antarctica.ac.uk](http://www.antarctica.ac.uk)
- Higher resolution elevation data in most mountainous areas based on modified ASTER GDEM data: *ASTER GDEM is a product of METI and NASA*
- Terrain data for area south of the Dry Valleys: *Sourced from LINZ, Crown Copyright Reserved*
- Land Information New Zealand: [www.linz.govt.nz](http://www.linz.govt.nz)
- Terrain data of McMurdo and Scott bases and Landsat imagery: *U.S. Geological Survey*: [www.usgs.gov](http://www.usgs.gov)
- Many, many thanks go to *Milton Shupe* for permission to use his superb *Dash 7* aircraft as static model in Rothera as well as *Aerosoft* for permission to use their *Twin Otter* model as static aircraft all over Antarctica.
- Animated Windsock 3D model by *Arno Gerretsen, Jörg Dannenberg and Jon Patch*  
[www.fsdeveloper.com](http://www.fsdeveloper.com)
- Aerial photo of SanaelV in this manual: Wikipedia

Disclaimer: Please note that although we have done our best to investigate information about real world Antarctica and flight operations, this manual is NOT supposed to be understood as a “Bible on Antarctic Flying”! Therefore we cannot be held responsible for information that is incorrect but we would be more than happy about to hear your feedback if you know more than we do.

## SYSTEM REQUIREMENTS

- Intel Core 2 Duo E6850 CPU (Core 2 Quad advised)
- 2 GB RAM
- Direct X 9 compatible Graphics Card with minimal 512 MB
- Microsoft FSX (with SP2 or Acceleration)
- Windows XP, Windows VISTA, Windows 7 (fully updated), 64 bits version highly recommended
- Adobe Acrobat® Reader 8 minimal to read and print the manual <sup>(1)</sup>

<sup>(1)</sup> Available for free, download at: <http://www.adobe.com/prodindex/acrobat/readstep.html>

## CONTACT SUPPORT

Support for this product is done by Aerosoft. We prefer to do support on the support forum for one simple reason, it is fast and efficient because customers help customers when we are sleeping.

Aerosoft forums: <http://www.forum.aerosoft.com/>

We feel strong about support. Buying one of our products gives you the right to waste our time with questions you feel might be silly. They are not.

## INSTALLING AND REMOVING

If you bought the download version unzip the file, start the setup.exe and follow the onscreen directions. If you have the DVD version, just pop in the disk and it should start the setup automatically. After the installation the Aerosoft Launcher will be installed (or updated when it is already installed). This small tool lets you register the product and also gives you quick access to the manuals and the tools that come with the product.

Appendix C covers the launcher.

Never remove this add-on by just deleting the files, always use the control panel add/remove software option!

## ABOUT FLYING IN ANTARCTICA (BY D. HARDIE)

*Much of the following text has been written by D. Hardie who was flying Twin Otters in Antarctica for a few seasons during the last years. He was the most valuable supporter of "Antarctica X". Based on his input and knowledge we created this scenery as close to the "real thing" as we could get.*



Flying in Antarctica is probably one of the most exhilarating environments on our planet. It is unique in that it is remote, and is almost uninhabited except for the few research stations, manned by scientists from the countries of the world. The climate is harsh and there are no roads, no trees, and no buildings to get any sense of scale to the place. The cold unpolluted air means that you can see for great distances, and have spectacular views.

There are several mountain ranges, the most interesting lying to the north on the Antarctic Peninsula. From a pilot's perspective, Antarctica is a challenging but immensely rewarding environment, and relatively few people ever get the opportunity to fly here. This new simulator brings maximum realism to a community of simulator pilots, and allows them to experience for themselves the scenery, logistics and the challenges of operating safely here.

The Antarctic season only lasts for a maximum of 6 months, as quickly the Austral summer changes to winter when it becomes too cold, windy, and eventually is in total darkness for a few months of the year. Flying cannot take place in these conditions so the opportunity is taken for maintenance to be carried out in Canada, and the crews given a well-earned rest. The flying season begins at the start of October, when the aircraft are ferried south from Calgary, down through North and South America, where they are then configured onto skis. The final hop is then made from Punta-Arenas over the Drake Passage and into Antarctica via Rothera Research Station-home to the British Antarctic Survey. The ferry trip takes about two weeks, and is an adventure in itself. Kenn Borek Air, currently the largest operator of Twin-otters in the world, send several aircraft down to Antarctica via this route. They have aircraft in support of the NSF or National Science Foundation-American science funded programme, as well as Antarctic Logistics Expeditions- a company which provide tours for climbers and tourists in the region. They also have a Basler- or turbine powered DC-3 on skis, which can carry the larger items of equipment, in Antarctica.

Once in Antarctica the Kenn Borek machines disperse, and the British Antarctic Survey aircraft operate from Rothera, and one aircraft from Halley-to the east of the peninsula. Kenn Borek aircraft continue to fly deeper into the continent, via the blue ice runway at "Sky-Blu", where they change onto board skis-much lighter and more rugged than the hydraulic wheel skis. From here they continue to Patriot Hills at the Ellsworth Mountains, and then more machines fly onto McMurdo Research Station.

Patriot Hills is a seasonal logistics centre and a depot for carrying climbers into the Vinson Massif, where they can then climb the highest mountain- Mount Vinson. The flight in here is a challenge and only contemplated in perfect weather.



## FLYING AS A PILOT

To fly in the Antarctic several extra skills are honed which are different from every other part of the world. Firstly the ability to drag skis is important. The technique involves landing in a suitable area, and then dragging the skis along the surface with just the right balance of power to keep the aircraft flying. The purpose of this is to dislodge any snow surface and expose any crevasses beneath thus ensuring the area is safe to land on. The skis are trailed for about 30 seconds, the luxury of flying in Antarctica is that runways are not limited by length, or obstacles for most of the time. Once this is completed the pilot gets airborne again and at a low height usually commences a 270 degree turn to the right, so as to put the freshly made ski tracks on his left hand side. A low circuit is then flown at a couple of hundred feet, and a close inspection is made- looking for crevasses before deciding that the location is safe to land on. The height is important, because if it is flown any higher, the subtle change in colour of the snow may be too difficult to see, if a crevasse lurks beneath.



It is worth mentioning that the skis are of sufficient area to maintain the aircraft safely on the surface, of even a soft snow surface. To step outside, it is possible for the pilot to sink up to the knees if the surface is soft. When the aircraft is landed, it is usual to continue to taxi along the surface, creating a taxi loop at each end of the newly formed runway, so as to create a preformed track to follow, when it is time to depart. Just before shutting down the engines, the aircraft is left to stand for a couple of minutes to allow the temperature of the ski to match that of the snow. The aircraft is then taxied forward another couple of meters and shutdown. The

reason for this is to allow the heat generated by the friction of the skis over the snow to dissipate. If this is not done, then the skis often melt the surface layer which then quickly refreezes and sticks the aircraft to the surface. No amount of power will dislodge the aircraft, and the only option is then to shut down and dig around the skis to dislodge them from the ice beneath.

Take off on the snow is easy, but again a couple of techniques are worthy of comment. The Twin-Otter is vulnerable in the nose-ski area due to the heavy nose ski structure and the small nose gear attachment point. To prevent damage over bumpy surfaces the control wheel is held full back whilst take-off power is applied. This is to keep the weight off the nose gear, and to ensure an earliest take off distance, as well as preventing damage to the nose structure. As soon as the aircraft becomes airborne, with the stall warner blaring, the pilot checks forward slightly, to allow airspeed to increase for the climb-out.

When flying in Antarctica, safety is uppermost in the pilot's mind as help is usually a long way off. As soon as a field party is dropped off, they establish HF communications by field radio, as this is the only means they have of summoning assistance if they need support. The pilot's job is not done when flying the aircraft, as the aeroplane must be safely unloaded, bringing skidoos, sledges, tents, fuel and supplies to the field camps. Depending on the distance to the camp, it is not impossible for a field party to be entirely self-sufficient for a couple of weeks, with the contents of one or two plane loads.

Some flights, the pilot is able to carry fuel for the entire round trip, -usually a three hour endurance, plus an hour of reserve fuel. Others, the fuel must be taken along as fuel drums, which are then deposited, so that they can be used on the return journey. The Twin-Otter will carry three 40 gallon fuel drums inside- or 300lbs of fuel-per drum. Careful planning uses the least amount of fuel, as the cost of transporting fuel into remote locations rises rapidly, the further away one flies.

## WEATHER

Unlike the rest of the world- weather reports can be tricky to obtain and at times unreliable. Satellite imagery is used and relayed verbally by radio to pilots either from met forecasters on station or else on location at the depots. Many sites do not have a manned presence, if even they have ever been visited before, so inputs are reserved until weather is perfect- clear blue skies, bright sunshine, and no overhead cloud cover. This is to enable the best chance of spotting crevassing as mentioned earlier.



Some useful weather links:

[http://www.aipchile.gob.cl/index.php/camara\\_ubicacion/show/designador/SCCI](http://www.aipchile.gob.cl/index.php/camara_ubicacion/show/designador/SCCI)

This is where you can get the actual weather for Chile as well as live links to the webcams. If you are lucky you may be able to see the BAS Twin-Otters here on their ferry flights during October and March. You can also access the live weather reports for Patriot Hills and the Union Glacier from here

<http://www.aipchile.gob.cl/>

Select Antarctica from the menu and then Patriot Hills or Union Glacier from the drop down menu.

[http://amrc.ssec.wisc.edu/data/view-data.php?action=view\\_animation&product=satellite/composite/IRHO](http://amrc.ssec.wisc.edu/data/view-data.php?action=view_animation&product=satellite/composite/IRHO)  
For real time satellite weather images

<http://amrc.ssec.wisc.edu/data/>

This one is the best for all sorts of weather information live from Antarctica

<http://www.antarctica.ac.uk/images/webcams/rothera/>

Live webcam for Rothera Research Station

[http://www.antarctica.ac.uk/met/rothera\\_forecast/realtime.html](http://www.antarctica.ac.uk/met/rothera_forecast/realtime.html)

Weather forecasts and current weather reports from the same base – in some cases even including cloud type information in addition to the cloud layers. A perfect source to create realistic Antarctic weather themes in FSX!

<http://www.wunderground.com/global/stations/89062.html?bannertypeclick=infobox>

For general weather situation at Rothera including forecasts and images.

<http://www.bom.gov.au/ant/handbook/handbook.shtml>

“The International Antarctic Weather Forecasting Handbook” is a perfect lecture for those interested in some more in depth knowledge about weather in Antarctica.

## RADIO REPORTS -FLIGHT FOLLOWING

No formal air traffic control exists as such. The position and therefore potential search area of an aircraft is radioed into base every 30 minutes until touchdown, so that the flight-follower is aware of where an aircraft is. No ground radar exists, so positions are plotted on a large plotting chart at the home base. Once on ground, the time of next call is transmitted before shutting down the aircraft.

Flying days are long due to the continuous hours of daylight, and at the end of the six months, the air crews are ready to begin the long ferry trip home, back for maintenance. Ferry fuel tanks are again installed for the flight home, and skis are removed and packed away for next season, once they reach Punta-Arenas airport, at the southern end of Chile, South America. It is an enjoyable journey home, flying along the coast of Chile, up through South America, Panama, Mexico, then across the US and into Canada.

## ANTARCTIC COMMUNICATIONS (BY D. HARDIE)

*Again mainly written by D. Hardie, this section focuses on communications around the Peninsula bases, which should be similar all over Antarctica. Please note that this chapter should be seen as guideline for online pilots because FSX will never be able to offer you an "ATC" like is realistic.*

## GENERAL

Some information on the way communications work in the Antarctic may prove to be of some interest generally, as well as specifically to the users of Antarctica X. Communications is perhaps the most important aspect of living and working in Antarctica, whether they be on an individual level- or at an international- base to base level. These are achieved by a variety of means, those mentioned here are by no means exhaustive, and several other specific technologies are available.

Interpersonal communications is achieved on base by using a series of handheld VHF radios between key personnel. These are also used for field scientific parties who may be spread a distance apart by a few hundred yards, when travelling by skidoo. The uniquely ultra-cold environment, coupled with exposure to sunspot activity due to the closer distance to sun radiation, can cause a lot of static interference with radios. In such cases, the VHF and HF radios may be affected as to be unusable. Satellite Iridium phones may sometimes be used, but they too can be affected by solar storms and are much more expensive to operate.

## AVIATION COMMUNICATIONS IN ANTARCTICA

The aircraft operating in the Antarctic are typically fitted with two VHF radios, and two HF radios, as well as an individual satellite phone, in the cockpit, which can be removed if required. During operations close to base- within about 50-80 miles, the VHF radios are used, much the same as in any normal air traffic control situation at any airport in the world.

All radios are tested on the ground, before flight, and after the engines started, so that any problems are recognised, and steps can be taken to correct any faults. Once the aircraft is airborne, the change to HF radios occurs and position checks are transmitted every 30 minutes flying time. Details given are current position, altitude, next waypoint position, estimated time of arrival, and then the next waypoint after that. This follows a set format, and is adhered to, so any other pilot flying in the vicinity will know that another aircraft is en-route and its approximate current location.

As times between transmissions may be as much as 30 minutes, there may be long silences on the radio, so any other aircraft getting into the air is given an update on any other aircraft activity by the "Flight Follower".

The Flight Follower is a communications expert at Rothera whose job it is to listen in to all aircraft transmissions and plot them on a large board in the Operations Tower, showing the Antarctic region. He can

then relay messages from other aircraft, provides updated in-flight weather reports, as well as logistical information to the pilots. The Flight Follower provides an Air-Ground Radio Information service which effectively provides all information that could be of help to air operations as well as boating operations around Rothera.



Once airborne a pilot must state "Airborne", and similarly when landing deep field must make a statement of intention to land with the ski status (usually skis down), along with the position.

The exception to this is at Sky Blu, where the blue ice runway is so hard that landings are usually carried out on the wheels with "skis-up". The Borek aircraft change onto Board skis shortly after arrival in Antarctica, offering a more rugged and lighter landing gear, which has not any associated problems of the hydraulically operated skis springing a leak. Once an aircraft has landed, he

transmits this to home base along with a time of next communication, so that the flight follower will know when to expect the next call, and the aircraft may then be shut down.

If the HF radios are not readable due to static then the same reports can be made by satellite phone to the Rothera operations tower, via the normal phone lines.

Sledge parties rely for their very survival on HF radios. Their very first task when dropped off by aircraft, and before it leaves, is for the field team to set up the radio and establish radio communications, as this is the only way the team can communicate with home base and summon assistance in an emergency, or to request more supplies or a pickup by aircraft. The Pilot will not leave the team until he is satisfied that they can communicate correctly with home base.

The position reports are usually by reference to pre-designated waypoints, or else by actual reference to GPS latitudes and longitudes, enabling a precise location to be found. Each international base has its own communication frequency as stated in the AFIM- Antarctic Flight Information Manual- a published document by agreement with all member states that have a claim to sectors of Antarctica.

Most bases respect the use of English the internationally agreed language, but not all adhere to it, depending on the ability and competence of the radio operator, to speak in English.

Requests by pilot for a runway report or weather can be quite subjective and open to interpretation, as some ground radio operators have very little formal training in aviation weather reporting. In fact this author flew one individual to a forward supply depot, at short notice, where he was to spend a few weeks manning the radios and carrying out resupply tasks and making weather observations.

When asked what training he had received the individual was surprised to hear of his forthcoming duties and replied that he had had "no training" at all. There then followed a brief crash course in meteorology and weather observation reporting, for the remaining duration of the flight.

#### TIBA- TRAFFIC INFORMATION BROADCASTS BY AIRCRAFT -126.90

This is exactly as it sounds and is used primarily as a listening frequency, on which pilots monitor other pilot's transmissions giving position reports and more importantly any weather conditions or reports on the surface condition- (i.e.- soft snow or hard polished slippery ice) which may be of interest. Fuel states may also be transmitted such as numbers of fuel drums remaining, if refuelling is to take place on arrival.

The frequency is generally used as a chat frequency between pilots (reports can be made of icing conditions in flight), but respect is made also so that it is not cluttered up with irrelevant chatter, when another aircraft may need it for transmitting some important information. The other frequency which is monitored is 121.5 MHz- the international distress frequency, and no transmissions may be made on this except for an emergency situation.

To summarise, VHF radios are used for aircraft comms close to base, and HF radios are used further away. Satellite phones are used when the VHF and HF radios are unusable for whatever reason. And they may make calls anywhere across the world.

## TYPICAL PHRASES

These are some typical phrases you might hear on a Twin Otter flight from Rothera to Fossil Bluff.

The flight begins once the pre-flight walk around has been completed, the fuel load has been entered in the aircraft technical log, and a copy of the load sheet has been handed to the ground crew.

Before engine start, a check of the VHF radio is made:

- Aircraft: "Rothera Radio, this is Victor Papa Foxtrot Bravo Bravo requesting radio check and airfield information."
- Rothera Ops Tower: "Roger Victor Papa Foxtrot Bravo, this is Rothera Radio reading you strength five, are you ready to copy the latest weather?"
- Aircraft: "Roger Rothera, go ahead."
- Rothera: "The latest weather ob ( abbreviation for observation) at time 1100 zulu ( note zulu is the aeronautical term for Greenwich Mean Time , which is the time set on the aircraft clock, and which is entered in the aircraft papers, log, tech log , etc.) is wind 360 at 12 knots, visibility 8 km, cloud few at 1000 feet, temperature zero, dew point minus 8, QNH 1012.  
Aircraft: "Roger weather copied, QNH 1012"



Note it is not necessary to read back all of the weather, but it is mandatory to read back any altimeter pressure setting – QNH value.

- Aircraft: "This is VP-FBB ready for start".
- Rothera: "Roger V-BB, start at your discretion, time check 1101 zulu."

Aircraft engines are now started, and the after start check-list is carried out, from memory using a panel scan technique, and then backed up with reading and confirming from a paper checklist, stowed in the map pocket just inside the pilots cockpit door. Once the generators are brought online and the aircraft is self-powered, the signal is given for the ground crew to disconnect the ground powers supply, and a radio check is made on the other radios.

- Aircraft: "This is V-BB radio check on fives" – this is referring to the HF frequency on the number one HF radio box selected to 5080.
- Rothera: "Roger V-BB , reading you strength five"
- Aircraft: "This is V-BB radio check on sevens" - this is the radio frequency selected to 7775.
- Rothera: "Roger V-BB reading you strength five"

Radio strength is graduated in five increments from one being the weakest and barely audible to five, being the loudest and clearest radio signal. There is no measure of this in the cockpit and is purely a subjective assessment done by the pilot.

- Aircraft: "Rothera Traffic this is VP-FBB entering and backtracking runway three six".
- Rothera: "V-BB, roger, there is no known traffic to affect you, report ready for departure."
- Aircraft : "Roger, wilco"

The aircraft now enters and back tracks the runway. Whilst taxiing, the pilot does some of the pre-take-off checks, and at the end of the runway, turns around and lines up along the take-off runway direction. He now completes system checks, flight controls checks, power run up, and checks that the auto feather and beta-back-up propeller systems are functioning correctly. See the Twin-Otter specific manual for exact details.



- Aircraft: "Rothera traffic this is V-BB ready for departure".
- Rothera: "Roger, V-BB, surface wind now 350 12 gusting 15 knots, take-off at your discretion.
- Aircraft : "Roger, V-BB rolling runway 36"

When airborne:

- Aircraft: "V-BB is airborne".
- Rothera: "Roger V-BB, your airborne time is at 1108 zulu, next report passing waypoint bravo."
- Aircraft: "Roger next call bravo".

Note: there is no Alpha waypoint, but the first waypoint is bravo a point to the south of Rothera about 40 minutes flying time by twin-otter. Successive waypoints are charlie, delta, and echo, which take the aircraft about 10 minutes flying time from the forward supply depot Fossil-Bluff.

Every 30 minutes the met office issue a weather "ob", obtained from the Rothera Met Office, who in turn get the information by HF radio or sat-phone from the various field camps or field supply depots. Again the weather is copied onto the pilots navigation log, and the QNH ( sea-level pressure reading) is read back.

Note that at some locations there is no reliable QNH setting, if no-one exists on the ground. In this case a best guess QNH is set, but more importantly great reliance is placed on the radio altimeter which gives the height above the surface up to 2500 feet. Above this height and the pressure altimeter is used, with a healthy margin for any high ground beneath.

- Aircraft: "This is V-BB with position report"
- Rothera: "Go-ahead"
- Aircraft: "V-BB is at position Bravo at time 1148 zulu, altitude 5000 feet, estimate charlie time 1228 zulu, delta next".
- Rothera: "Roger charlie time 1228 zulu, next report charlie"
- Aircraft: "Wilco".

Similar position reports are made at charlie, delta and echo, or if heading in a different direction then latitudes and longitudes will be read out every 30 minutes flying time. The purpose of this is to allow a "flight-follower" at Rothera to plot the position of the aircraft on a large board of the Antarctic in the ops tower, and therefore

know the general area the pilot is operating in at any one time, as there is no radar surveillance. The flight continues, and once VHF comms is lost, the position reports are made on the HF radio equipment, which are usually much noisier with static background hissing and crackles.

When approaching Fossil Bluff (in this case our destination), and within range- approximately 15 minutes flying time, the VHF radio is used to talk to the ground party to obtain their latest weather situation. Further mention may be made as to the on-board cargo, plus on-board passengers, as well as what cargo or personnel will be embarking for the next flight. On final approach a HF transmission is made to Rothera:

- Aircraft: "Rothera this is V-BB on finals for Fossil Bluff, skis are down".
- Rothera: "V-BB roger, next report on the deck."
- Aircraft: "Wilco".

Note the status of the skis (up or down) is always made to serve as a final check for the pilot to double check that his skis are actually in the required position, even though this should be ascertained in the landing checklist.

- Aircraft: "Fossil-Bluff this is V-BB on finals for the skiway, skis are down."
- Fossil Bluff Apple Hut: "V-BB -roger skis down".

Once on the ground the pilot taxis in towards the fuel drums where refuelling and offloading of cargo can take place and carries out the after -landing checklist.

- Aircraft on HF: "Rothera, this is V-BB, on the deck at Fossil-Bluff, shutting down, next radio call will be in one hour and thirty minutes from now."
- Rothera: "Roger Bravo Bravo, next call in one hour and thirty from now, time now 1330 zulu."

The aircraft is then shutdown, and further communications can be carried out using the aircraft radio, using the aircraft batteries, but for short periods of time to preserve the battery life in the ultra-cold environment. Once the engines are started again and the generators connected, the on-board battery will recharge, as there is no ground power supply at remote field stations away from Rothera.

## BRITISH FERRY FLIGHT FROM CANADA TO ANTARCTICA

This is a flight done by the BAS Twin Otters every season. If you want to re-fly this in Flight Simulator we highly recommend reading the recommendations for add-on sceneries and the "Flying in Antarctica" and "Flight plans" chapters. Please note that the Flight plan files supplied with "Antarctica X" do not exactly match the flights described here as the flight route can vary slightly from year to year. It's up to you which flight routing you choose. Furthermore we recommend that you have a look at the supplied Google Earth™ file showing the route, which can be found in your windows Start menu.

### FLIGHT REPORT (BY D. HARDIE)

The Antarctic Ferry-flights are the punctuation to the start and end of the flying season. A lot of preparations go into these flights, and the goal is simple: To fly the aeroplanes as quickly as possible from Canada to Punta Arenas, in readiness for the final leg over the Drake Passage, fully configured with Skis, and into Antarctica.

Pilots arrive in Calgary at the start of the trip to stock up on 2 weeks' worth of provisions which have to be loaded into the aircraft for the pilot and his mechanic. The flights start early in the morning and finish in the late afternoon/evening so there is seldom time to go to shops and buy food en- route. All of the food and equipment, including aircraft spares and personal clothing is carefully weighed and loaded into the aircraft. The two large ferry tanks are installed in the aircraft by now, and the equipment has to be carefully installed as there is very little room for manoeuvre inside the Twin-Otters.

First a couple of words about the fuel capacity of the Twin-Otter aeroplane:

The ferry tanks hold 1576 lb of fuel in each tank, which gives the aeroplanes an extra 6 hours of endurance.

This is in addition to the standard tanks which are located in the lower fuselage, under the cabin floor. The capacity of the two tanks are 1235 lbs in the forward tank and 1341 lbs in the rear tank.

The wing tip tanks hold a further 300lbs in each side, which adds another hour onto the endurance. (Note the Twin-Otter uses 600 lbs fuel per hour which makes the arithmetic easy. This is 10lbs per minute of flying, so all the pilot has to do is multiply the flight time in minutes by 10 and you have the required fuel for the flight).

Thus we have a total fuel capacity of 6334 lbs or 10 and a half hours of flight before the engines will stop.

When you are flight planning, don't forget to add in a contingency, as well as fuel for diversion and for taxiing on the ground too.

The flight plans are submitted at the flight briefing office on the morning of departure, but international clearances are usually arranged a few weeks in advance. A commercial company is used to obtain the "Overflight" clearance numbers to satisfy the various countries regulatory authorities, and the aircraft insurance certificates must also be in order to comply with this.

A few notes on Customs and Immigration are perhaps worthy of discussion. When planning to fly from one country to another, pilots cannot just decide to fly to wherever it suits them best. Each country has a "Port of Entry" or several "Ports of Entry" which are recognised first landing destinations. This is where the customs formalities are completed, and customs inspectors may inspect the contents of the aircraft to ensure that only recognised goods are being carried through the country. Consequently, if the weather deteriorates at the "Port of Entry", then a diversion must be nominated which is also a "Port of entry", or if this is not possible then the customs authorities must be notified so that special arrangements can be made. To do otherwise may incur a hefty fine and legal proceedings!

The first leg from "Springbank, Calgary" to Casper in Wyoming, is flown just as winter is beginning in the Northern Hemisphere, so there is an incentive to depart soon before the snow fall begins. The aeroplane is heavily laden and the aeroplane is very slow to climb, especially when departing Springbank, which is already 3937 feet above sea level.

On a clear day the view is enjoyable, flying over the forests of Canada -watch out for the view of the Rocky Mountains to the west, and then over the canyons and badlands into the US Border , passing some Native American Indian Reservations and down into Casper itself. Watch out for the site of the Little Bighorn Battlefield on your left as you pass Billings and head towards Sheridan.

Casper is situated at the base of an escarpment and there are always some interesting business jets here as well as executive military turboprops. There are also some Cessna Caravans based here which fly the mail for Fed-Ex. The airfield itself goes back to 1942 and was a large training airfield for WW2 bomber crews including B-17 flying fortresses, B-24's and B-29's. Many of the original war-time hangers and buildings still survive to this day.

The second day consists of two flights- Casper down into Liberal, Kansas for a refuelling stop. This is to comply with US regulations which do not permit any fuel to be carried in the ferry tanks. There is an aircraft museum here and several cold war jets are parked at the end of the parking ramp. You can take a closer look at these whilst you refuel. After a quick pit-stop, the journey continues from Casper down to Hobby Airport-one of the airports in Houston, Texas. Of note are the many oil wells and "nodding donkeys" to be seen through the state. The night is spent here, and the aircraft are parked up at the Atlantic Aviation executive terminal on the north-eastern side of the airfield. Departure in the morning will be early for the long leg over the Gulf of Mexico down to Cozumel, Mexico.

Day Three begins with a climb out amidst the busy early morning commercial jet departures from Hobby, Houston. Several oil platforms are seen on the initial climb out to cruising height over the sea. Much of the flight is over featureless ocean but usually in sunshine. There is no option for a quick diversion out here if things go wrong, so "Point of no return" calculations are made so that the pilot knows when to turn back or when to continue to destination.

A rest day is usually taken in Cozumel, before pressing on once again, crossing the sea, then the coast of Honduras and Nicaragua before making the spectacular arrival into Panama City airport alongside the Panama Canal. Be careful here as there are several airfields within close proximity, including one on the downwind leg. The arched bridge over the canal is a prominent landmark here. The airport was the scene of the attack by US forces against the drug funded Noriega administration in 1990. The city itself has many high rise buildings and is an impressive sight. Park your aircraft here and clear customs and pay your landing fees and fuel bill.

When departing Panama, watch out for the hill straight ahead on takeoff, if departing initially to the north. The hill has been systematically cut away in steps, as you fly towards it, in an effort to improve the terrain clearance for aircraft. The airport is busy and you will see other Twin Otters arriving and departing on schedules for Air Panama. After a few hours over the sea you will fly over equatorial jungle, and now land at Guayaquil in Ecuador. Congratulations, you have now crossed the equator into the southern half of our planet.

Guayaquil- an international airport used by jets as well as turboprops, is situated in the heart of an overcrowded city. An engine failure here on take-off with full ferry fuel is going to give marginal climb performance, and if there is no other option, then a ditching in the Guayas river adjacent to the airport seems the "best" course of action. Park your aircraft here, refuel and clear customs.

Watch out also for the giant tea-cup perched atop the hill to the side of the runway as you depart, before setting off towards Arica – the northernmost airport in Chile. En-route you pass Lima in Peru, which is a preferred tech-stop airport to take on more fuel if required. Also on this leg you will pass the famous Nazca lines in the Atacama Desert.

Arica lies on the coast but is on the edge of a desert. Chilean permits and customs formalities are carried out here which allows the journey to continue all the way down the Chilean coast- the longest country in the world. There are spectacular views of the Andes on the way along- they are situated well inland though, so the

distant volcanoes look quite serene when seen on the approach into Puerto Montt. Watch out for the Very Large Telescope on the hilltop at Cerro Paranal-they look like four large white cubes on the ridgeline, and also the recently famous Chilean volcano at Puyehue-Cordon Caulle. When you arrive at Puerto Montt, park here.

Flying the last leg from Puerto Montt to Puntas Arenas is one of the most spectacular segments of the journey, flying high up at 17000 feet on oxygen; you get a wonderful view of the Torres del Paine mountain peaks between waypoint Kilak and Puerto Natales, on the left hand side of the aircraft. If the weather is bad it can be hidden from view within the clouds. Strong winds from the west may bring turbulence over this area with strong up and downdrafts which can exceed the performance capability of a heavy weight ferry aircraft. Coupled with the potential for picking up clear and rime ice due to the moist supercooled air from the sea, rapid airframe ice build-ups are a further hazard of flying this section of the route. Careful study of the en-route weather systems is advisable here. If the weather looks bad, best to wait another day.

The last few hours of the flight fly over barren hills leading into boggy and rocky windswept landscapes which are a feature of the arrival into Punta Arenas. The airfield here is almost always windy, but there is a triangular pattern of runways which gives plenty of options for an into wind landing. Park here.

At Punta Arenas, a day is then spent fitting skis to the aircraft and making any final adjustments before heading out on the last long leg over the Drake Passage and down into the Antarctic. Chilean Air Force Dragonflys A-37Bs can be seen along with a residential Ilyushin IL76 transporter which runs expeditions from here down to the blue ice runway at Patriot Hills and the Union Glacier on behalf of Antarctic Logistics and Expeditions.

Once stocked up with last minute supplies, and the aircraft are fuelled up for the last long flight, take a last look back at Punta Arenas, as you climb up and head "south" over the bay. **It is the last look at civilisation, greenery and vegetation you will see for six months.**

The final ferry flight sector must be undertaken with special pre-flight care. The flight is a PNR or point-of-no-return flight, up to which point a turn-back may still be made. After the PNR, the flight must be continued come hell or high water, and if the weather at destination were to deteriorate, a landing on a clear patch on the Antarctic continent may have to be considered, until conditions improve. To this end, Antarctic survival equipment and survival rations are carried on board.

A careful study of the satellite weather charts is advisable, along with the meteorological forecast for the destination. The flight is usually carried out with the crew wearing survival suits and lifejackets, although a ditching in such a tempestuous sea would have a slim chance of survival for long, let alone a successful rescue. Radio position reports are made by high frequency HF radio, at designated 30 minute waypoints, once out of range of the shorter very high frequency VHF radios, used in commercial airspace.

After 8 hours of flying-welcome to the Antarctic, you have completed an amazing ferry trip and can now begin the hard work of the Antarctic flying season for the next 6 months.

Recommended addon sceneries for the way south are ORBX' "NA Northern Rockies" and "US Central Rockies" for coverage of the first leg from Calgary about half way down to the next touchdown. Unfortunately there are only few sceneries for the Latam area (yet) but add-ons like "FS Global – The Americas" offer a good chance to spice up the Rockies all the way down a bit (because they are not that soft hilly landscape south of the US as you see them in default FSX). "My Traffic" is a good product to bring you lots of typical local air traffic. Last but not least the freeware series "Photoreal Chile" seems to be the best scenery available for this flight, since it covers a large chunk of the route flown, is for free and has a resolution that looks very decent at the altitudes flown. Unfortunately most of this scenery's files seem to have been lost after the server crash at AVSIM.com and recovery of them in is doubtful.

## AIRCRAFT, “AIRLINES” AND COMMON FLIGHT ROUTES

Considering the number of government organizations and private tour operators actively flying in Antarctica it is not easy to gather some reliable information about who’s flying what. Still this list is probably the most complete available yet. What we describe here are the usual routes flown. Adding to that there is a substantial amount of scientific flights that often return to the same base after some “sightseeing” or touchdown in a remote area without any prepared strips.

- Canada based Kenn Borek Air is by far the largest contract operator here. They have a large fleet ski equipped Twin Otters and about two *Basler* BT-67/DC3-T (turbo equipped Dakota’s) flying all over Antarctica every season. The Twin Otter’s usually fly for the US Antarctic Programme (most of them are based in McMurdo), the Italian and French Antarctic Programmes (in a triangle between Concordia-Dumont-D’Urville and Mario Zuchelli Station + shuttle flights between Mario Zuchelli and McMurdo), the Australian Antarctic Division and some private Tour Operators. The Basler BT-67’s usually operate around McMurdo and within the DROMLAN Network (see below).  
<http://www.borekair.com/>
- The USA has without a doubt the largest and most independent fleet down in Antarctica. The backbone for intercontinental flights is the heavy C-17A Globemaster III operated by the US Air Force between Christchurch (New Zealand) and McMurdo. Sometimes even the aged Lockheed C-141 Starlifter is being used although it seems it has been taken out of service recently. From McMurdo on the backbone for long distance continental transportation (including to the South Pole) is the LC-130H Hercules operated by the New York Air Guard, sometimes equipped with JATOS (rockets that enable the aircraft to take off from runways that would otherwise be too short). Shorter fixed wing distances or those to locations without a prepared landing strip are served by Kenn Borek’s Twin Otters (see above). But even those aircraft fly all the way up to the South Pole. For flights to the other destinations around Ross Island (McMurdo) and scientific camps in the dry valleys, helicopters are used. Those helicopters bear liveries of the National Science Foundation but are operated by PHI Inc., a company based in Louisiana. Their fleet down here consists of Bell 212 and AS350 helicopters. There is a refuel base for helicopters called Marble Point (not part of the scenery yet).  
[http://photolibary.usap.gov/Portscritps/PortWeb.dll?quickfind=transportation\\_cat&catalog=Antarctica&template=USAPgovSmallThumbs&sorton=cataloged&ascending=0&offset=228](http://photolibary.usap.gov/Portscritps/PortWeb.dll?quickfind=transportation_cat&catalog=Antarctica&template=USAPgovSmallThumbs&sorton=cataloged&ascending=0&offset=228)
- The Royal New Zealand Air Force (RNZAF) uses C-130H Hercules aircraft for intercontinental shuttle flights from Christchurch and is often sharing them with their partner. A RNZAF Boeing 757 has also been seen at McMurdo but we don’t know if this is a regular visitor. To improve accessibility and to bundle resources, most nations having bases in Dronning Maud Land (that is south of South Africa) established the Dronning Maud Land Air Network, for short: DROMLAN. Among them are Germany, Russia, South Africa, Belgium, Norway, Sweden and Japan. There is a dizzying number of different operators and aircraft types active in that area,  
<http://www.scar.org/information/dromlan/dromlanflyer.pdf>
- Privately owned rather old IL-76 aircraft operated by ALCI (Adventure Logistics International) are the backbone of the DROMLAN Network. They fly cargo and passengers between Cape Town (South Africa) to the hubs Novolasarevskaya and/or Troll from where they are usually picked up by smaller aircraft to be brought to their final destinations. Russian Novolasarevskaya, also called “Novo Airfield”, is the main hub but usually suffers from extensive melting from the mid of December to the end of January making it unsuitable for the landing of a large and heavy IL-76. Therefore operations are moved to the Norwegian Troll Skiway during that time.  
<http://www.alci.info/>

- The German Alfred-Wegener-Institut (AWI) operates another Basler BT-67, called “Polar 5” and a DO-228 called “Polar 2” within the DROMLAN Network, which are a regular visitor of the Japanese and South African bases as well. The German Research ship “Polarstern” carries a BO 105 helicopter. [http://www.awi.de/de/infrastruktur/fluggeraete/forschungsflugzeuge/ehemalige\\_flugzeuge/](http://www.awi.de/de/infrastruktur/fluggeraete/forschungsflugzeuge/ehemalige_flugzeuge/)
- It is quite difficult to find some information about what the Russian Government is flying in Antarctica. It seems like they are not too eager to publish too much information about their programme. What can be said is that there is a group of AN-2’s (both default and turbo equipped) based at Novolasarevskaya. Other Russian aircraft recently seen in Antarctica are MI-18 helicopters (usually based on Russian Icebreakers), and Antonov AN-74.
- The Japanese Antarctic Research Expedition (JARE) uses ship based Sikorsky S-61A helicopters and two ski-equipped fixed-wing aircraft from their base in Syowa: A Pilatus Porter and a Cessna C182 Skywagon. The latter one was transported to Antarctica by ship because it doesn’t have enough range to fly directly to Antarctica from the next continent.
- The Norwegian Air Force flies a C-130H Hercules on its way from Cape Town (South Africa) to Troll as well as a P-3 Orion.
- The Swedish Air Force is using another C-130H-Hercules on the same route.
- Despite having a skiway at its base the South African National Antarctic Programme (SANAE) doesn’t have fixed-wing fleet. They use helicopters like the stylish Kamov KA-32 operated by Titan Helicopters and two M2 Onyx operated by the nation’s 22<sup>nd</sup> squadron: [http://www.titanhelicopters.com/index.php?page\\_id=11&msg\\_id=25#news-double](http://www.titanhelicopters.com/index.php?page_id=11&msg_id=25#news-double)  
[http://www.af.mil.za/bases/afb\\_ysterplaat/22sqn.htm](http://www.af.mil.za/bases/afb_ysterplaat/22sqn.htm)
- The British Antarctic Survey (BAS) owns a fleet of 4 Twin Otters with a wheel/ski combo and one Dash 7. The Twin Otters are used for all kinds of scientific flights and usually fly between Rothera, Fossil Bluff, Halley and Sky Blu. The Dash 7 is usually used to serve the long distance route from Punta Arenas (Chile) or RAF Mount Pleasant (Falklands) to Rothera and occasionally Sky Blu (since the ice runway there is hard enough to support wheels). All BAS aircraft are flown back to Calgary (Canada) during the Austral winter. Real-world flight plans for most BAS flights (including the ferry flight down from Canada to Antarctica) are part of “Antarctica X”. For more information read the “Flight Plans” and “Flying in Antarctica” chapters in this manual. The HMS Scott and other UK Navy ships have Westland Lynx helicopters based on them. There are no British helicopters based in Antarctica itself: [http://www.antarctica.ac.uk/living\\_and\\_working/aircraft\\_and\\_vehicles/aircraft/index.php](http://www.antarctica.ac.uk/living_and_working/aircraft_and_vehicles/aircraft/index.php)
- The Fuerza Aerea de Chile flies from Punta Arenas (Chile) to Teniente R Marsh Martin (SCRM) using a C-130H Hercules. Occasionally those aircraft are equipped with JATOS (rockets in each side) that enable it to take off from the short runway with heavy loads. In addition they operate their own Twin Otter that can land at the skiway of Bernardo O’Higgins, another Chilean base on the Antarctic mainland. A BO-105 helicopter with the same air force’s livery can also occasionally be spotted at Teniente R Marsh Martin Base.
- Similar to the Chileans the Fuerza Aerea Argentina also operates C-130H Hercules for flights from Ushuaia to Marambio and has another Twin Otter based in its own hangar at Marambio. A helicopter that can sometimes be seen here is an Air Force Huey.
- Privately owned Aerovias DAP offers charter flights from Punta Arenas to Teniente R Marsh Martin (SCRM). Customers can choose between a King Air 100 and a Bae 146. This is probably the quickest



and least expensive way for mere mortals to reach Antarctica by air.

<http://www.aeroviasdap.cl/antartica.html>

- Probably the biggest private tour operator in Antarctica is Adventure Network International (ANI). They offer various all-inclusive trips to their own base at Patriot Hills using an Ilyushin-76TD. From here Twin Otters are used to fly climbers to the Mount Vinson Base camp for example or a Basler BT-76 to fly other paying adventurers to the South Pole. ANI's main base has recently been moved from Patriot Hills to Union Glacier but the old runway at Patriot Hills remains open as a backup.  
<http://www.adventure-network.com/aircraft>
- Another operator of Twin Otter aircraft is the Institut polaire français (IPEV), which mainly uses them between Dumont D'Urville and Concordia. They also use helicopters like the *Eurocopter AS 350*.  
[http://en.wikipedia.org/wiki/Eurocopter\\_AS350](http://en.wikipedia.org/wiki/Eurocopter_AS350)
- South African Safair is probably the largest private operator of a C-130H Hercules fleet. They fly for various Antarctic programs as for the Italian one from Christchurch (New Zealand) to Mario Zucchelli Station's sea ice runway when the sea ice is still there.  
<http://www.safair.co.za/>
- Last but not least there is one more important player in Austral Aviation: The Australian Antarctic Division. In fact they are proud to offer the first comfortable shuttle to Antarctica using their own Airbus A319-115LR (long range) for which they set up a large runway called "Wilkins Aerodrome" on the ice shield southwest of Casey. Those flights start in Hobart (Australia) and fly directly to Wilkins. From there transiting passengers change planes to smaller CASA-212 to fly on to bases like Mawson (Rumdoodle Skiway) and Davis, which have smaller skiways. Another popular destination for the smaller "CASA's" is the picturesque Beaver Lake (see flight plans). The helicopters being used are Eurocopter AS350's. While all aircraft bear the Antarctic programme's liveries, the fixed-wing aircraft are operated by Skytraders Pty Ltd and the helicopters by Helicopter Resources Pty Ltd.  
<http://www.antarctica.gov.au/living-and-working/travel-and-logistics/aviation>
- Oops... looks like we forgot one: Quantas... A "normal" commercial airline you may ask? Yes! In fact they don't land there but Quantas offers very popular sightseeing flights over Antarctica either departing from Sidney or Melbourne using a Boeing 747 or the new Airbus A380.  
<http://www.antarcticaflights.com.au/>

## FLIGHT PLANS

We have added a set of of real-world flight plans to this product. To open them, just click “Flight Planner” in FSX and “Load”. All flight plans can be found in the following folder and its subfolders:

*FSXmainfolder\AeroSoft\AntarcticaX\Flightplans\*

Please note that these flight plans only represent small fragments of flights done in Antarctica (in fact only those we could get waypoint information for). Most others are mentioned in the previous chapter.

Continental flight plans within Antarctica (and aircraft models)

- DavisPlateau\_to\_RumdoodleMawson.PLN (CASA-212 or Twin Otter)
- DavisPlateau\_to\_RumdoodleMawson\_via\_BeaverLake.PLN (CASA-212 or Twin Otter)
- DavisPlateau\_to\_WilkinsCasey.PLN (CASA-212 or Twin Otter)
- DavisPlateau\_to\_WilkinsCasey\_via\_BungerHills.PLN (CASA-212 or Twin Otter)
- DavisPlateau\_to\_WilkinsCasey\_via\_Mirny.PLN (CASA-212 or Twin Otter)
- FossilBluff\_to\_Halley.PLN (Twin Otter)
- FossilBluff\_to\_Rothera.PLN (Twin Otter)
- FossilBluff\_to\_SkyBlu.PLN (Twin Otter)
- Halley\_to\_FossilBluff.PLN (Twin Otter)
- Halley\_to\_Neumayer.PLN (Twin Otter, Do-228 or Basler BT-67)
- Halley\_to\_Rothera.PLN (Twin Otter)
- Kohnen\_to\_Neumayer.PLN (Do-228 or Basler BT-67)
- Kohnen\_to\_Novolasurevskaya.PLN (Do-228 or Basler BT-67)
- Marambio\_to\_Rothera.PLN (Twin Otter)
- Neumayer\_to\_Halley.PLN (Twin Otter, Do-228 or Basler BT-67)
- Neumayer\_to\_Kohnen.PLN (Do-228 or Basler BT-67)
- Neumayer\_to\_Novolasurevskaya.PLN (Do-228 or Basler BT-67)
- Neumayer\_to\_SanaelV.PLN (Do-228 or Basler BT-67)
- Novolasurevskaya\_to\_Kohnen.PLN (Do-228 or Basler BT-67)
- Novolasurevskaya\_to\_Neumayer.PLN (Do-228 or Basler BT-67)
- PatriotHills\_to\_Rothera.PLN (Twin Otter)
- Rothera\_to\_FossilBluff.PLN (Twin Otter)
- Rothera\_to\_Halley.PLN (Twin Otter)
- Rothera\_to\_Marambio.PLN (Twin Otter)
- Rothera\_to\_PatriotHills.PLN (Twin Otter)
- Rothera\_to\_TenienteMarsh.PLN (Twin Otter)
- RumdoodleMawson\_to\_DavisPlateau.PLN (CASA-212 or Twin Otter)
- RumdoodleMawson\_to\_DavisPlateau\_via\_BeaverLake.PLN (CASA-212 or Twin Otter)
- RumdoodleMawson\_to\_S17Syowa\_via\_RichardsonLake\_and\_Molodezhnaya.PLN (CASA-212 or Twin Otter)
- S17Syowa\_to\_RumdoodleMawson\_via\_Molodezhnaya\_and\_RichardsonLake.PLN (CASA-212 or Twin Otter)
- SanaelV\_to\_Neumayer.PLN (Do-228 or Basler BT-67)TenienteMarsh\_to\_Rothera.PLN (Twin Otter)
- WilkinsCasey\_to\_DavisPlateau.PLN (CASA-212 or Twin Otter)
- WilkinsCasey\_to\_DavisPlateau\_via\_BungerHills.PLN (CASA-212 or Twin Otter)
- wilkinscasey\_to\_davisplateau\_via\_mirny.pln (casa-212 or twin otter)

#### Intercontinental flight plans to/from Antarctica (and aircraft models)

- Christchurch\_to\_McMurdoRunway.PLN (*C17A Globemaster III, LC-130H Hercules, C-141 Starlifter*)  
The usual supply route for the US Antarctic Programme.
- Hobart\_to\_McMurdoRunway.PLN (*A319-115LR*) Route usually flown when the ice at Wilkins Aerodrome is not suitable for Airbus landings because of heavy melting.
- Hobart\_to\_WilkinsCasey.PLN (*A319-115LR*) The usual supply route for Australia's Airbus.
- McMurdoRunway\_to\_Christchurch.PLN (*C17A Globemaster III, LC-130H Hercules, C-141 Starlifter*)  
The usual supply route for the US Antarctic Programme.
- McMurdoRunway\_to\_Hobart.PLN (*A319-115LR*) Route usually flown when the ice at Wilkins Aerodrome is not suitable for Airbus landings because of heavy melting.
- PatriotHills\_to\_PuntaArenas.PLN (*Ilyushin IL-76*) Used for tourist flights (see previous chapter "Adventure Network International")
- PuntaArenas\_to\_PatriotHills.PLN (*Ilyushin IL-76*) Used for tourist flights (see previous chapter "Adventure Network International")
- Rothera\_to\_St StanleyFalklands.PLN (*Dash 7, Twin Otter*) Stanley is an interesting STOL airfield on the Falklands. Note that way intersection "MIDAL" is the "point of no return". Once you pass it you have to finish the flight if you don't want to end in the cold South Atlantic waters.
- StanleyFalklands\_to\_Rothera.PLN (*Dash 7, Twin Otter*) Stanley is an interesting STOL airfield on the Falklands. Note that way intersection "MIDAL" is the "point of no return". Once you pass it you have to finish the flight if you don't want to end in the cold South Atlantic waters.
- WilkinsCasey\_to\_Hobart.PLN (*A319-115LR*) The usual supply route for Australia's Airbus.

#### British Antarctic Survey ferry flights

The British Antarctic survey flies its Twin Otters from Canada (Calgary) all the way down to Rothera (Antarctica) when the season begins and back north after the season is over. For more information about this flight read the chapter "British Ferry Flight from Canada to Antarctica".

We recommend to make these flights with real-weather activated.

The flight plans can be found in the following folders:

*FSX\Aerosoft\AntarcticaX\Flightplans\BASFerryFlights\Southbound* (Calgary to Antarctica)

*FSX\Aerosoft\AntarcticaX\Flightplans\BASFerryFlights\Northbound* (Antarctica to Calgary)

## HISTORY AND FURTHER READING OF ANTARCTIC AVIATION

The early history of Antarctic Aviation has been covered thoroughly in Malcom Mellor's **Notes on Antarctic Aviation**, which can be downloaded for free from the US Army Corps of Engineer's website:

[http://www.crrel.usace.army.mil/library/crrelreports/CR93\\_14.pdf](http://www.crrel.usace.army.mil/library/crrelreports/CR93_14.pdf)

Although quite out-dated this is probably the best lecture on Antarctic Aviation and also contains a lot of information on other areas of Antarctic Aviation than history. We tried to cover some other, more recent, events that have not been covered in this lecture on the following pages. But please note that this compilation doesn't claim to cover all events that have occurred during the past years. Many accidents are dealt with in some confidence and rarely find their way to the headlines.

Antarctica is probably the harshest environment to fly on the world. Aircraft that are severely damaged are often written off and left in the ice because a recovery and repair would be just too expensive. Contrary to that there have been some very impressive recoveries in the past years where crashed aircraft have been provisionally repaired and brought off the continent for further repairs. Don't be fooled with Kenn Borek Air having the most accidents in this list. This operator has the majority of planes stationed in Antarctica and is doing the toughest jobs. Considering that their accident quota seems rather low.

Please note that we haven't inserted any wrecks in the scenery for ethical reasons and as a matter of respect for those that have lost their lives and their families.

### 8<sup>th</sup> October 1970 – Super Conny crash near McMurdo

Sourced from the Aviation Safety Network: "Weather predictions were favorable for the Antarctic McMurdo Station as the Super Constellation departed Christchurch (CHC), New Zealand. By the time the C-121 arrived, visibility had deteriorated to zero. Blowing snow made the runway invisible. On the second attempt to land the right main landing gear hit a snow bank and separated. Then the right wing broke off, with the airplane sliding through the snow." The mostly intact aircraft wreckage can still be seen on the ice near McMurdo's Pegasus airfield. All of the 80 occupants survived.

Crash location (not verified):

S 77°57'59.55

E 166°25'52

### 1971 – US Coast Guard helicopter crashes at Mount Erebus

In 1971 a helicopter lost power and crashed into the slopes of Mount Erebus.

Photo: <http://avcblogs.blogspot.com/2011/01/final-chapter-boondoggles-and-bag-draggs.html>

### 15<sup>th</sup> February 1971 – LC-130F taxis into snow bank

Sourced from the Aviation Safety Network: "The Hercules was deployed at Antarctica during Operation Deep Freeze 71. The Hercules was taxiing on the skiway and maneuvered around the GCA. In poor visibility the left main ski went up over a 5.5 foot snow bank. The right wing hit the ground and broke between the two engines. The aircraft caught fire was destroyed."

### 28<sup>th</sup> November 1979 – The Mount Erebus Disaster

This was one of the worst disasters of aviation history in general. An Air New Zealand DC-10 departed from Christchurch during that day headed for a sightseeing flight over Antarctica. Because of bad visibility around the McMurdo area the pilots miscalculated their position and crashed into the upper slopes of Mount Erebus (that's the big volcano that you can see when looking north from McMurdo). While aviation communication is quite limited in Antarctica today it was even worse back then. No one knew about the aircraft to be lost. Half an hour after the aircraft would have run out of fuel



and was nowhere to be seen in Christchurch the airline informed the authorities. Search aircraft departed from McMurdo following the DC-10's flight route but found nothing at first until one saw some debris at Mount Erebus' slopes, which – of course – was not to be supposed the on original route. What followed was an extensive recovery but there were no survivors. 237 passengers and 20 crew lost their lives on the cold continent that day. This was the worst but unfortunately by far not the last aviation accident in Antarctica. Most of the wreckage of Air New Zealand Flight 901 still remains on the slopes of Mount Erebus (due to ethical reasons not visible in "Antarctica X", which also applies for all other accident wreckage).

More Information can be found at Wikipedia:

[http://en.wikipedia.org/wiki/Air\\_New\\_Zealand\\_Flight\\_901#Rescue\\_and\\_recovery](http://en.wikipedia.org/wiki/Air_New_Zealand_Flight_901#Rescue_and_recovery)

...and there is a good Kiwi TV report from the 80ies at YouTube in two parts:

<http://www.youtube.com/watch?v=JR1uZacgBZU>

Crash Location (not verified):

S 77°30'46

E 167°12'19

### **2<sup>nd</sup> January 1979 - Ilyushin Il-14 crash at Molodyozhnaya**

Earlier that year an Il-14 operated by the "22nd Soviet Antarctic Expedition" crashed at the Soviet Molodyozhnaya station killing 4 of its 7 passengers. The aircraft stalled on take-off due to wind shear causing the first fatal accident in Antarctica for the Soviets. The wreckage can still be seen today although the station has been closed and mothballed.

Crash location:

S 67°40'16

E 45°49'37

### **24<sup>th</sup> November 1994 – Kenn Borek Twin Otter crashes into iceberg at Rothera**

Sourced from the Aviation Safety Network: "The Twin Otter took off from Rothera Station runway 18 for a flight to Terra Nova Bay, Antarctica. The aircraft needed a 408m ground run before becoming airborne, reaching a height of 100 feet. The Twin Otter then began to descend and flew into a 30m high iceberg. The DHC-6 MTOW was 12,500 lb, while the accident aircraft had a weight of 18,500 lb. The crew had just performed two 7-hour flights with just 2 hours rest in between."

### **12<sup>th</sup> December 1999 – Kenn Borek Twin Otter struck skidoo**

Sourced from the Aviation Safety Network: "The pilots had just dropped off two researchers from McMurdo at a small scientific station (AGO-6) on the South Pole when they prepared for a STOL, 20deg flaps takeoff from the polar plateau located at an elevation of 7800 feet. During the takeoff the left ski dug into the snow causing the Twin Otter to swerve. The aircraft bounced into the air and struck a skidoo. The aircraft traveled for another 3000 feet before coming to rest. The wreckage was recovered and rebuilt."

### **7<sup>th</sup> January 2001 – German Do-228 near-accident touching the ground on "cruising altitude"**

After ascending the pilots activated the autopilot but both didn't note that it was set to a lower altitude causing the aircraft to descend in a contour-less white environment. The pilots didn't know about their error until the aircraft touched the ground. No damage occurred and they were able to pull up the aircraft and continue their flight. Source (German only): [http://www.bfu-web.de/cln\\_030/nn\\_223540/DE/Publikationen/Statistiken/Jahresberichte/BFU\\_20Jahresbericht\\_202001.html?\\_nnn=true](http://www.bfu-web.de/cln_030/nn_223540/DE/Publikationen/Statistiken/Jahresberichte/BFU_20Jahresbericht_202001.html?_nnn=true)

**17<sup>th</sup> January 2003 – NSF Bell212 helicopter crashes in Dry Valleys with sling load**

Sourced from the Aviation Safety Network: "The pilot's continued operation of the helicopter with an unstable external load, which resulted in damage to the cargo hook assembly, adjacent throttle controls, and subsequent loss of engine power, precipitating an emergency descent and impact with terrain. Factors associated with the accident were the load oscillations, and the separation of the fuel crossover lines."

Photo: <http://img714.imageshack.us/f/88652547.jpg/>

**7<sup>th</sup> November 2003 – BAS Twin Otter veering off the runway in Rothera**

Sourced from the Aviation Safety Network: "The aircraft was returning from a routine re-supply flight to Fossil Bluff, a remote field station situated on Alexander Island on the Antarctic Peninsula. The wind for the approach was reported as 360°/10 kt at the Rothera runway anemometer and 070°/20 knots at the area anemometer. The pilot was familiar with this type of condition and decided to make an approach to runway 36 using 20-25 degrees of flap. There was some turbulence on the approach and after landing the pilot had difficulty maintaining directional control and carried out a go-around from the runway. The pilot then decided to make an approach to runway 18, and if necessary, carry out another go-around. The second approach to Rothera appeared normal and touchdown was about 200 meters along the runway. After touchdown the pilot applied some braking, full right rudder, and full left aileron to keep the aircraft straight and the wings level. Bearing in mind that he might have to carry out another go-around from the runway, the pilot used little or no reverse thrust. Initially directional control appeared adequate, but as the aircraft approached the mid-point of the runway it started to veer to the left and at some point the pilot attempted to use nosewheel steering to assist with directional control. Shortly thereafter he decided to carry out a go-around, but the aircraft veered further left. The nosewheel detached and the aircraft tipped to the right to the point where the right wing touched the runway surface and the aircraft flipped over in a forward somersault pivoting about the nose and the right wing tip. The aircraft rapidly came to a halt, inverted, about 520 meters from the runway threshold. The pilot and his passenger, who was seated in the right pilot's seat, attempted without success to shut down the engines using the fuel levers. They vacated the aircraft through the right cockpit window having suffered minor abrasions and some bruising."

**25<sup>th</sup> January 2005 – German "Polar 5" DO-228 damaged fuselage and gear at Rothera Station**

Sourced from the Aviation Safety Network: "The Dornier 228 research aircraft named "Polar 4" entered a short and steep approach to the British Rothera Station on Antarctica. Weather conditions included low clouds and snow. The aircraft landed hard, causing substantial damage to the landing gear and fuselage. The aircraft was shipped back to Germany and after investigation declared irreparable in November 2005."

**December 2006 – Parked Antonov An-2 tipped over in Antarctic storm in Novolasarevskaya**

A demonstration of the powers unleashed in an Antarctic storm:

<http://www.airliners.net/photo/Untitled-%28ALCI%29/Antonov-An-2/1242956/L/&sid=e5c3b4a5492b2a0e4b642a606dd1d1b8>

**20<sup>th</sup> December 2007 – Kenn Borek BT-67 Basler "stumbles" over hard packed snow on take-off**

Sourced from the Aviation Safety Network: "The DC-3 Turbo plane was chartered by the U.S. National Science Foundation (NSF) providing support to a group of researchers at a remote location near Mt. Patterson in West Antarctica. (...) The captain said that during the takeoff run, as the airplane neared 70 knots, he moved the airplane's control column aft in an attempt to lower the tail, and attain a flying attitude. Just before the airplane became airborne, the right wing lifted and left wing struck the snow-covered terrain, which pivoted the airplane 90 degrees to the left. Both main landing gear assemblies collapsed and the airplane came to rest on the belly, sustaining substantial damage to the left wing and fuselage. The first officer reported that during the takeoff run, as the airplane neared 60 knots, and as the captain moved the control column aft, she felt the airplane's tail wheel contact the hard packed snow. The first officer said that other captains that she had flown with usually attain a higher airspeed before becoming airborne. The cockpit voice recorder revealed that the

highest airspeed that the first officer called out during the takeoff run was 60 knots, about 3 to 5 seconds prior to the crash. The airplane sustained damage to the underside of the nose, the tail wheel collapsed, both main landing gears separated and both propellers were damaged. PROBABLE CAUSE: "The captain's decision to lift off before attaining a proper airspeed, resulting in a loss of control during take-off." The aircraft was provisionally fixed the same season and brought back to Calgary via Rothera for further repairs.

### **2<sup>nd</sup> March 2008 – German BO-105 helicopter crashes killing two near Neumayer**

After departing from the Research Ship Polarstern, the helicopter gained altitude along the ice shelf where the ship was anchored. Before the crash it descended into an ice canyon, left it in a steep climb before pushing back down to the surface. It is assumed that the pilots followed the surface in a low altitude at high speed. Missing indicators to estimate the correct altitude in Antarctica (=white surface) may have caused the accident because the helicopter touched the ground at a high speed in good weather and crashed.

Accident report (German only): [http://www.bfu-web.de/cln\\_030/nn\\_223540/DE/Publikationen/Untersuchungsberichte/2008/Bericht\\_08\\_4X003\\_BO105\\_Antarktis.html?nnn=true](http://www.bfu-web.de/cln_030/nn_223540/DE/Publikationen/Untersuchungsberichte/2008/Bericht_08_4X003_BO105_Antarktis.html?nnn=true)

Polarstern diary about the accident:

[http://www.awi.de/en/infrastructure/ships/polarstern/weekly\\_reports/all\\_expeditions/ant\\_xxiv/ant\\_xxiv3/9\\_march\\_2008/](http://www.awi.de/en/infrastructure/ships/polarstern/weekly_reports/all_expeditions/ant_xxiv/ant_xxiv3/9_march_2008/)

### **3<sup>rd</sup> January 2009 – Kenn Borek Basler BT-67 hits ground off-base due to bad visibility**

In 2009 a team of adventurers left Novolasarevskaya headed for the South Pole using specially adapted Toyota Hilux Trucks. A few hundred kilometres south they requested spare parts from the base to be brought in via plane. A Basler BT-67 left the base and landed at the camp at 3240 MSL but it was decided that another flight was required. The Basler returned to Novolasarevskaya to come back later that day. By then the visibility deteriorated at the destination and after a few flight overs the pilot decided to drop the cargo from an altitude of about 40 meters. But before reaching the drop area the aircraft touched the ground with gear in up position. The aircraft hit the ground a total of three times, lost one power section on one side and the blades on the other. Two days later, after the weather improved, another Basler came to rescue the crew. Kenn Borek personnel returned to the site later that year (after the Antarctic winter) to fix the aircraft and bring it back to Calgary for further repairs.

Crash location:

S 74° 02'58

E 010° 54'33

### **28<sup>th</sup> October 2010 – French AS350 Eurocopter crashes in sea between icebreaker and base**

An Eurocopter AS350 departed from the ship Astrolabe 350km north-east of the French base Dumont d'Urville heading to the same, but crashed into the sea in bad weather about 100km from the base. All 4 occupants lost their lives in the cold seas despite a distress beacon being sent. American and Australian LC-130H Hercules aircraft were sent from McMurdo and Australia but could find nothing but debris and dead bodies.

Australian Newspaper Article: <http://www.heraldsun.com.au/news/antarctic-chopper-crash-kills-four/story-e6frf7jo-1225945567073>

## BACKGROUND INFORMATION ABOUT THIS SCENERY

We went through great lengths to get this scenery as real as it gets. One of the major problems has been to find suitable data. Data that is taken for granted in all other places of the world just isn't available for Antarctica or very, very, very difficult to obtain because every nation holds its own piece of data.

## ELEVATION DATA

While most of Antarctica is covered by a sometimes several kilometre thick ice shield, there are quite a few mountainous areas like the Antarctic Peninsula, the Transantarctic Mountains and the Vinson Massif. Here and there you can find so-called Nunataks peaking through the ice shield, which are the summits of mountain ranges covered under the ice. The South African Station Sanae IV is placed on top of such a Nunatak. Getting elevation data was one of the hardest parts of this project because there is just no good elevation data available for the whole continent. SRTM data used by most developers is not available for Antarctica. Recently NASA published some ASTER DEM files, which also cover Antarctica but are full of peaks and holes, especially in ice and snow covered areas (guess what: that causes a problem in Antarctica). LimeSim developed a technique to enhance this data to make it suitable for FSX. In other words: "Antarctica X" brings you a complete elevation terrain in a quality that wasn't available to anyone else before – including Government Organizations. In addition to this we have added some high definition elevation terrain by Government Organizations that we either received as digitalized DEM or maps that required a difficult (mostly manual) digitalization of contour lines.

## AIRSTRIP AND NAVIGATIONAL DATA

A great aid was the "Antarctic Flight Information Manual", also called AFIM in its latest version from 2008. Problem here is again that even this official manual is anything else than complete because the publishing organization relies on what the participating nations and organizations send them, which in many cases is out-dated or just incomplete. "Antarctica X" displays the most current status of airstrips and nav aids based on information from people who have been down there (including pilots) and information publicly available. Still it might be possible that the product is already out-dated here and there when published because unlike in other parts of the world runways are not static in Antarctica. Skiways are groomed again every year after the long Austral winter. Often at completely new locations, with new runway headings and a new apron layout. One example is Neumayer III. The base has recently been rebuilt at a new location but the navigational waypoints will still lead you to the old location a few kilometres north of the new base.

## AERIAL IMAGERY

For the continent-wide coverage we have used satellite images shot by Landsat satellites, which have a resolution of 15m/pix but are merged with custom made landclass files so they appear in a higher resolution. We have left out the satellite imagery at areas that are pure white to save you and us disk and download volume. The more detailed bases are mostly covered with high resolution aerial imagery that has specifically been orthorectified for this project. This means that you won't see this aerial imagery and elevation data anywhere else – including Google Earth™.

## FSX LIMITATIONS

You may have noticed that The South Pole Station is not part of "Antarctica X", which is due to FSX limitations. While FSX was the first Microsoft simulator that made the earth round (YES, it took Microsoft longer to admit that than the Catholic Church!), the terrain system itself is still based on a flat earth tile system. Landclasses are mapped in these tiles, like cities, forests and fields. Let's take a crop field as an example for a

landclass: This field is displayed as a nice square in the USA or Europe. 1.2km long, 1.2km wide. The same field at the equator (let's say in Tanzania) is displayed about 1.2km long but about 1.4km wide, meaning it's stretched a bit! Why is that you may ask? The circumference at the equator is longer than further north or south meaning that the tile is stretched to the sides. Microsoft created this tile mesh to look best around the areas where most customers live, meaning somewhere around Latitude 30 and 60, both north and southern hemisphere. The problem now is: The same number of tiles that cover the whole equator with a length 40,075 kilometres applies for the spot around the South Pole. Therefore the tiles are so heavily squeezed together here that the Poles can only be described as a weird looking place and are impossible to fly at. We are still working on a technique to avoid this but cannot promise anything. The Pole problem also means that the LOD technique gets a bit confused. FSX thinks you are further away from the landclass tiles in front of you than you actually are and therefore sharpens them a lot later than it would do the same on more common latitudes. The stretching problem also applies to – surprise! – CLOUDS! The further south you get, the more stretched/squeezed those nice fluffy clouds look. That's another reason why we didn't cover the Pole because things would just look odd there once you add some weather there.

Things become even weirder when talking about **navigation**. That's right, in times of GPS Flight Simulator X only recognizes the two magnetic poles for directions! No matter if it's a magnetic compass or a GPS. When flying "south" FSX always directs you to the magnetic South Pole, NOT the actual South Pole at S90°! This leads to some strange behaviour when flying in the southern- (or northern) most latitudes. VORs don't work properly anymore, the instructions of the ATC are not reliable anymore (don't let ATC direct you to your destination; you will never arrive there before fuel runs out!). Even the FSX default GPS won't tell you where true north/south is but it can still guide you to your destination if you use your autopilot's Nav mode to follow the magenta coloured line.

In fact there are some tools and add-ons whose developers are aware of the problem and have solved it: FSCommander as well as the panels of PMDG- and Level-D aircraft switch from magnetic to true headings when passing S72.5°. There may be more add-ons that solve the problem in a similar way – therefore it's always a wise decision to study the manual of your navigation tool or add-on aircraft before going out to the cold.

## ANIMATED ICEBREAKERS

There are 3 different icebreakers in this scenery that are sailing on predefined routes. All of them have landable helipads, smoke effects and engine sounds. Please note that when setting the times, they have to be in GMT, not the local time zone! Sometimes it can happen that FSX shifts the time by one hour when starting the flight. If you can't see the ship where it is supposed to be at that time, re-check the time again and check you have made all traffic settings correctly (see the settings chapter)

### RV POLARSTERN

The German Polarstern is one of the largest and famous research icebreakers and is based in Bremerhaven. Weblink: <http://www.awi.de/de/infrastruktur/schiffe/polarstern/> This scenery contains an extremely detailed 3D model of this ship, which can be found within two locations:

#### **Teniente R Marsh Martin (SCRM) – Rothera (EGAR)**

Arrives Rothera every Tuesday at 19:59 GMT, leaving the Thursday after at 14:00 GMT

Arrives Marsh every Friday at 19:00 GMT, leaving the Monday after at 15:00 GMT

#### **Neumayer – Halley**

Arrives at Neumayer every Friday at 22:02 GMT, leaving the Monday after at 10:00 GMT

Arrives at Halley every Tuesday at 22:02 GMT, leaving the Thursday after at 10:00 GMT

*Note that the ship anchors at the ice shelf north of the bases, which is quite a distance away from there. In case of Halley Twin Otters support unloading the ship because of the long distance between the anchoring point and the base. They shuttle in a low altitude between the ship and the base following the tracks of the vehicles (tracks are possibly to be added in a later version of Antarctica X)*

## USGC HEALY

The USGC Healy is a famous US Coast Guard Ice Breaker based in Seattle.

<http://www.uscg.mil/pacarea/cgcHealy/>

### **Terra Nova Bay (NZTB/AQ34) – McMurdo**

Arrives McMurdo every Tuesday at 21:46 GMT, leaving the Saturday after at 6:00 GMT

Arrives Terra Nova Bay every Sunday at 21:46 GMT, leaving the Monday after at 6:00 GMT

*Only active when sea ice is thin enough meaning McMurdo's and Mario Zuchelli's Sea Ice Runways have been deactivated! (see "Scenery Tool")*

## MS LIMESIM

This is not a real world-icebreaker, we call it the "MS LimeSim".

### **Casey – Mawson**

Arrives Casey every second Friday at 18:26 GMT, leaving the Sunday after at 6:00 GMT

Arrives Mawson every second Wednesday at 18:26 GMT, leaving the Monday after at 6:00 GMT

## BASES AND AIRPORTS - DESCRIPTION

Appendix A holds a complete list of all the airports covered in this product.

Appendix B includes charts for the airports that are most important.

## MCMURDO (USA)

McMurdo is what usually comes in mind first when people think about a base in Antarctica. It is without a doubt the largest base on the continent and can accommodate more than 1,200 residents in the summer season. The station itself is tucked between Arrival Heights to the northeast and Observation Hill (usually referred to as "Ob Hill") to the southwest. A road passing between both goes all the way to New Zealand's Scott Base. There is a little port facility called the Ice Pier offering access to a combination of icebreakers, cargoships and large tankers in the late season. West of the Ice Pier lies "Scott's Hut", a relict of the early Antarctic explorers. Inside the hut old equipment, cans and furniture can still be seen in their original locations, from a time before the Titanic was even built! Half way to the top of Ob Hill (right above the helipad) one can still see the foundations of a nuclear power plant (!), which housed a small reactor that wasn't much larger than an oil drum. It was erected in the early 60ies but decommissioned again 1972. The two buildings were torn down in the 2010/2011 season. Since then all power is generated by diesel generators brought in by tankers and stored in large tanks around the base. Last but not least "Mac-Town" houses more than one bar, a gym next to the helipad, a small supermarket, an ATM, a club and a church whose bells are ringing daily between 12am and 1pm in the scenery.

## HELIPAD

McMurdo has the busiest helipad in Antarctica with no less than 7 pads. Every summer season a fleet of helicopters operates from here to the Dry Valleys' and other camps, onto the tops of Mount Erebus, Mount Terror, ships helipads and all other locations within reach where a fixed wing aircraft can't go. They usually transport scientists, other personnel and/or larger cargo on sling loads. The helipad itself is uncontrolled but McMurdo Center provides traffic advisory for helicopters in immediate vicinity of the heliport. Helicopters have to remain at or below 500 ft AGL while in the Williams Field or Ice Runway class "D" airspace. Fixed wing aircraft are not allowed to overfly the heliport below 1500 ft MSL.

### NZIR – ICE RUNWAY

The ice runway is the closest to McMurdo itself and is the first to be active each season. All fixed wing flights operate from here in the early season (see scenery tool). The ice runway offers quite some spectacular views from the dorms in McMurdo with all the large and small aircraft taking off and touching down so close to the base. A marked trail goes from McMurdo to the runway and ends at “Ice Town”, a bunch of prefabricated towable buildings that serve as a terminal, fire station, offices, hangars, nav aids and a tower. The apron is a busy place with snow groomers, personnel vehicles, busses, trucks, vans and large and smaller aircraft alike. Despite its provisional layout the airport sees a lot more traffic than most other airports of a similar size.



Although most flights are done during 24hr (summer-) daylight there are some situations like bad visibility etc. when approach illumination can be switched on (see Scenery Tool). But keep in mind that the runways, taxiways and aprons around here itself are not illuminated for a simple reason: The glare of the snow makes it impossible to see them properly when on the ground. Black marker flags as used do a much better job here.

### NZWD – WILLIAMS FIELD AND NZPG – PEGASUS FIELD

Because of the melting ice in late season the annual Sea Ice Runway needs to be closed. This is the time when ship traffic kicks in and flight operations are moved to two new airports further to the south, located on permanent ice that doesn't melt in the summer. Both airports are very similar to the Sea Ice Runway in layout but have two instead of only one runway. Wheeled (mainly intercontinental) aircraft operations move to Pegasus. Aircraft on skies mainly operate from Williams Field (basically all flights within Antarctica). Similar to the Sea Ice Runway both bases are connected with McMurdo by long marked trails used by both wheeled and tracked vehicles. The track from Pegasus is ending right at the helipad, while the one from Williams Field ends at New Zealand's Scott base (there's a “Kiwi X-Ing” sign shortly before the base).

### SCOTT BASE (NEW ZEALAND)

Scott Base is located only 3kms down the road from McMurdo and is significantly smaller with a maximum of 85 people it can accommodate in the summer. Because of the close proximity the infrastructure is rather cross wired. McMurdo's airports and harbour are used for connecting the base to the outside world (vice versa American aircraft depart from Christchurch depending on the Kiwis) and one of their labs for example is actually located behind McMurdo at Arrival Heights. Scott base has two helipads that don't see too much traffic. During the past years they have become a supplier of power to the McMurdo base since New Zealand erected three large wind turbines above the base – the largest of their kind on the continent. Those three wind generators alone save both bases a substantial amount of diesel that is worth gold down here because of the high transportation costs for bringing it down in a tanker ship. Aircraft of course still rely on those imports to fuel their engines.

### ROTHERA STATION (UNITED KINGDOM)

Rothera is without a doubt the station in Antarctica with the most picturesque location! Located on a rocky cape peeking out from a massive glacier dotted with mountains to the west, it is surrounded by sea to all other directions with a line of the truly majestic mountains of the Antarctic Peninsula visible to the east on clear day. If that wouldn't be distracting enough the runway is tucked between base and hangar buildings to the left and right and sea water at both ends. In essence it's a smaller version of Gibraltar (which is – surprise! – British, too): A stunning approach, a runway that's crossed by a road with traffic lights and surrounded by water. Note the person talking to a Skua on the apron. It's dedicated to an employee working here for many seasons who

became best friend of that bird returning here every year from Mallorca (the bird, not the employee!). That same employee also places lights on the drums along the runway if there is an aircraft approaching in the dark. If you keep looking you will find a small zodiac steering to and from a group of islands to the southwest where it will meet a group of Orca whales. Higher up on the glacier is a long emergency skiway marked by drums. If the Dash 7 is flying from Punta Arenas to Rothera to bring in personnel and cargo and reaches the point of no return it has to land in Rothera come hell or high water. From that moment on the runway in Rothera has to stay clear until the Dash 7 touches down. If for whatever reason one of the Twin Otters comes in during that time period, it has to touch down at the emergency skiway on the glacier above the base and wait there until the Dash 7 has landed. The reason is simple: If the Twin Otter has an accident, an engine shutdown or anything else happens on the runway in Rothera, the runway would be blocked and the Dash 7 couldn't land anywhere else. Unlike a Twin Otter the wheeled Dash 7 can't touch down on the glacier!

As soon as the Dash 7 has landed and the pilots of the Twin Otter have finished their cup of tea they can take off again and land at Rothera. There was an incident at Rothera a few years ago, when a Basler blew a tyre on landing and swerved off the runway. Fortunately no serious damage was done but this incident has shown that with the sea at either end there is not much room for error.

### CASEY STATION (AUSTRALIA)

Casey is Australia's largest station in Antarctica and is a significant hub for flights since the new Wilkins Aerodrome was built 65kms to the southeast of the base. A long trail that has marker drums at each waypoint leads to the airport. On the way there it actually crosses the Antarctic Circle that is marked by a sign (compare that to how far away the Arctic Circle in Norway is from the North Pole and you get an idea of how big the ice sheet coverage in Antarctica is). Similarly to McMurdo's airports, Wilkins Aerodrome has a set of towable buildings that can be moved each year if necessary. An interesting feature is that Wilkins is connected to the outside world by an A319-LR. A type of aircraft you won't expect in Antarctica but which has proofed itself to work very well down here since its inaugural flight from Hobart in 2007. Unfortunately all Airbus flights had to be redirected to McMurdo on the 2010/2011 season because of heavy melting in Wilkins that made the runway unsuitable for large aircraft operations. A mishap that can happen every few years. The base of Casey itself is equipped with 2 helipads and one emergency helipad that is right in front of the main building called the "Red Shed". A pier helps to supply the base with essentials coming by ship but the ships can't dock directly because of shallow water. Everything has to be taken on a smaller boat that shuttles between the ship and the pier (not done in the scenery).

### NEUMAYER STATION III (GERMANY)

Unlike the bases described before Neumayer is located at a less picturesque but more typical location for this continent: Ice and snow! The new station has been erected in the 2009/2010 season and unlike the previous station it is not located in tunnels beneath the ice anymore. 16 hydraulic columns carry the station and each season the station is lifted above the snow that has fallen again. Similarly to most new bases, the German's have recently erected a wind turbine to save diesel fuel. The largest vehicles used here are Pistenbullys. The RV Polarstern anchors at the ice shelf to the far north (see "Animated Icebreakers").

### SANAE IV (SOUTH AFRICA)

Yet another spectacular location: South Africa's Sanae IV, that can accommodate up to 60, is located on top of a flat-topped Nunatak called Vesleskarvet. A Nunatak is the top of a usually large mountain that peaks out of the thick Antarctic ice sheet. It is rather far away from the sea and usually supplied by a traverse via the German base Neumayer. An interesting feature is the elevated layout of the base that does even include the helipad. It can be rather difficult to land here with the strong, gusty winds typical for a mountaintop.

### NOVOLASAREVSKAYA (RUSSIA)

For short called “Novo Airbase”, this is a major hub for the Dromlam Network and although under Russian flag it is run by their contractor called ALCI (Antarctic Logistic Centre International). The long ice runway is located south above the Schirmacher Oasis, a 25km long and 3km wide ice free plateau with many freshwater lakes. Most personnel from Germany, South Africa, Norway, Sweden, Finland, Belgium and Japan has to change planes in Novo when coming from Cape Town headed for their bases. If the ice melt gets too heavy in the mid season, most operations are moved to the new **Norwegian Troll Runway** further inland.

### PATRIOT HILLS

Patriot Hills is a hub for ANI (Adventure Network International), a tourist operator that offers adventure tours to Antarctica, as for example climbing Mount Vinson with included KBA Twin Otter flights from Patriot Hills to the Mount Vinson Base camp. If you liked Lukla, you don't want to miss this one! Recently most operations have been moved to a new ice runway at Union Glacier. Patriot Hills will remain active for the time being but all long distance flights from South America will go to Union Glacier, which is much closer to Mount Vinson.

### KUNLUN AIRPORT (CHINA)

Heavily expanding in Antarctica, China built a completely new base at the highest point of the Antarctic ice sheet assisted by Australian equipment and personnel. From an aviation point of view this is a very interesting location. It's not only at an altitude of more than 4000 meters / 13,000 ft but also one of the coldest. It is believed that temperatures here can go as low as -90°C/-130°F, which would be the lowest temperature ever measured on earth.

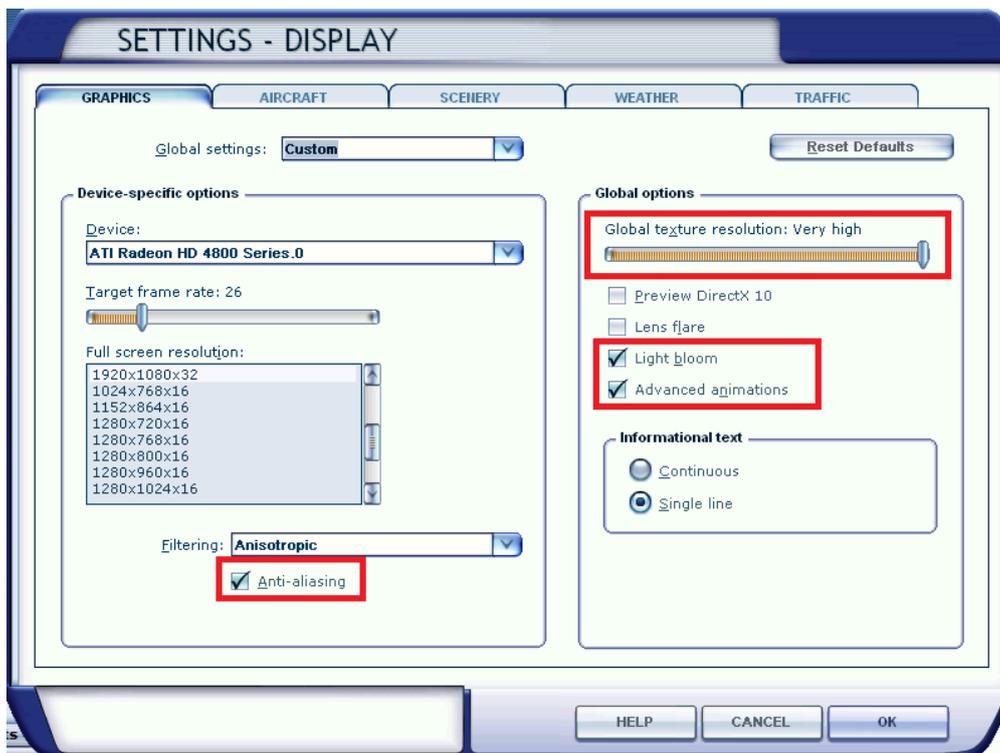


## ADVISED DISPLAY SETTINGS

To change your scenery settings, go to Settings -> Display

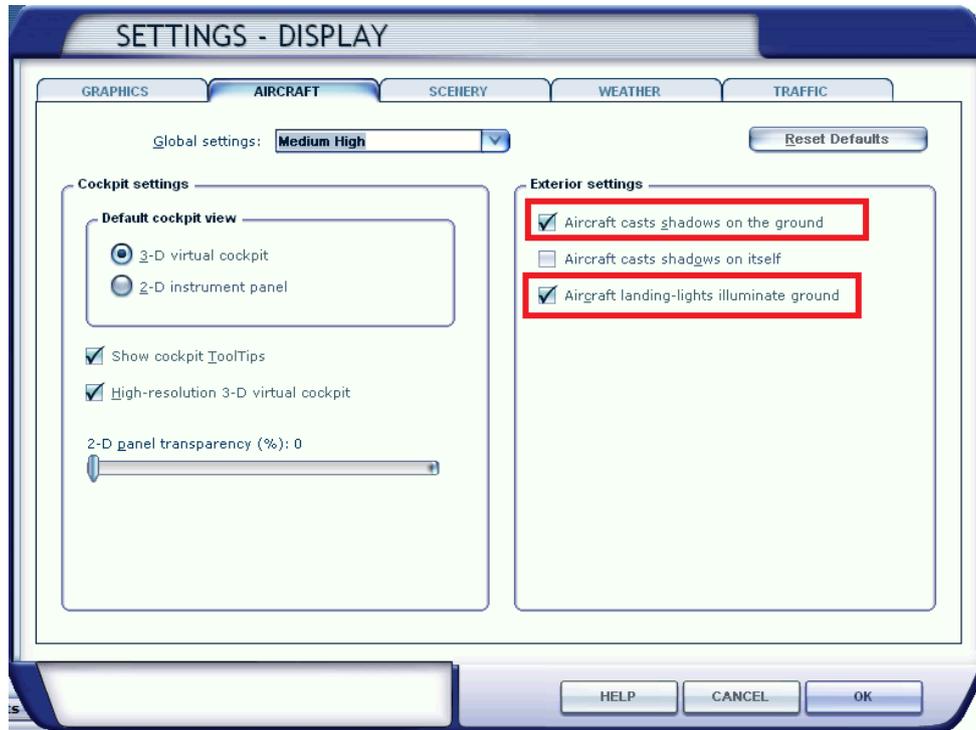
Note: All other settings not mentioned here are up to you. They don't actually affect the scenery very much. Keep in mind to do your settings with care otherwise you may overload your system.

## GRAPHICS MENU



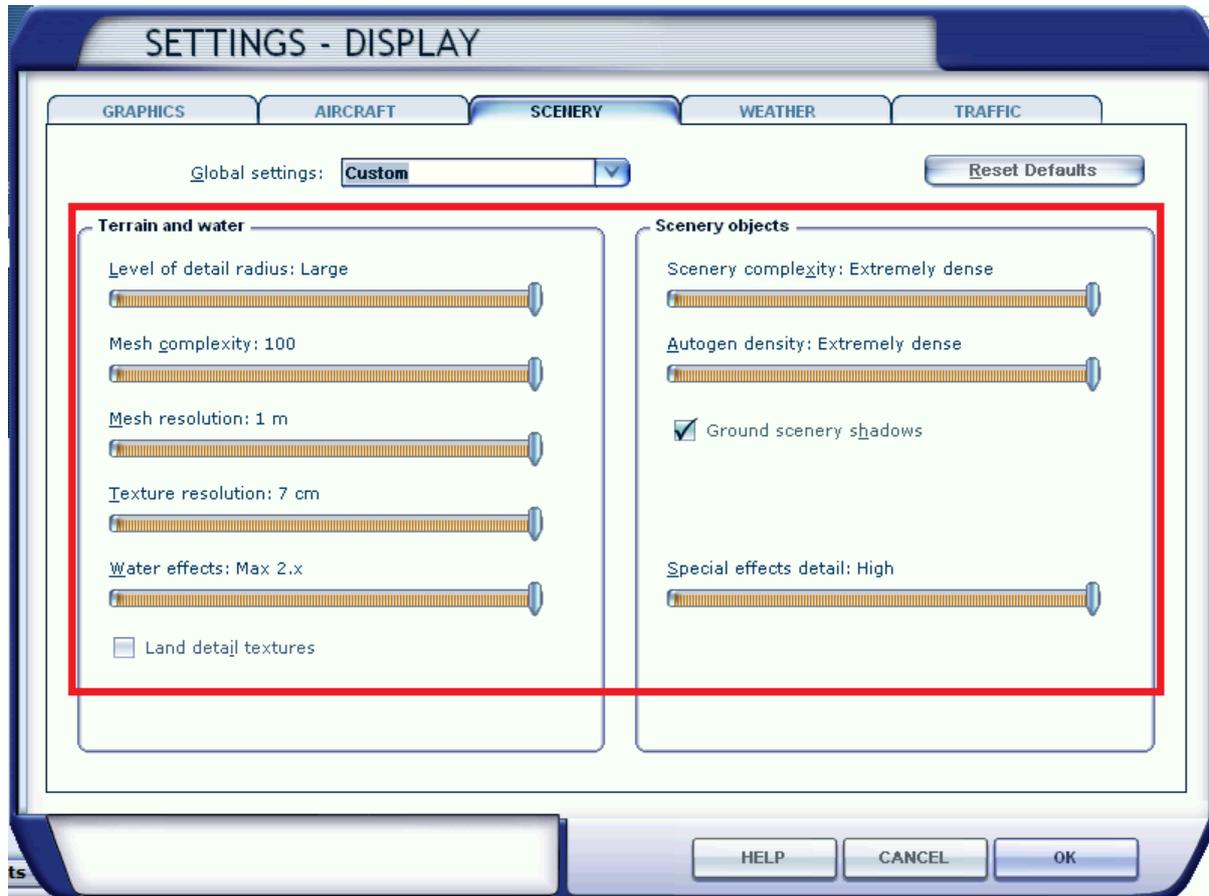
- **Global Texture resolution** should be at Very High to get the full detail in textures (aerial image, building walls etc.)
- **Light Bloom** and **Advanced Animations** should be activated so see McMurdo's skiway approach lights and other effects in full detail.

## AIRCRAFT MENU



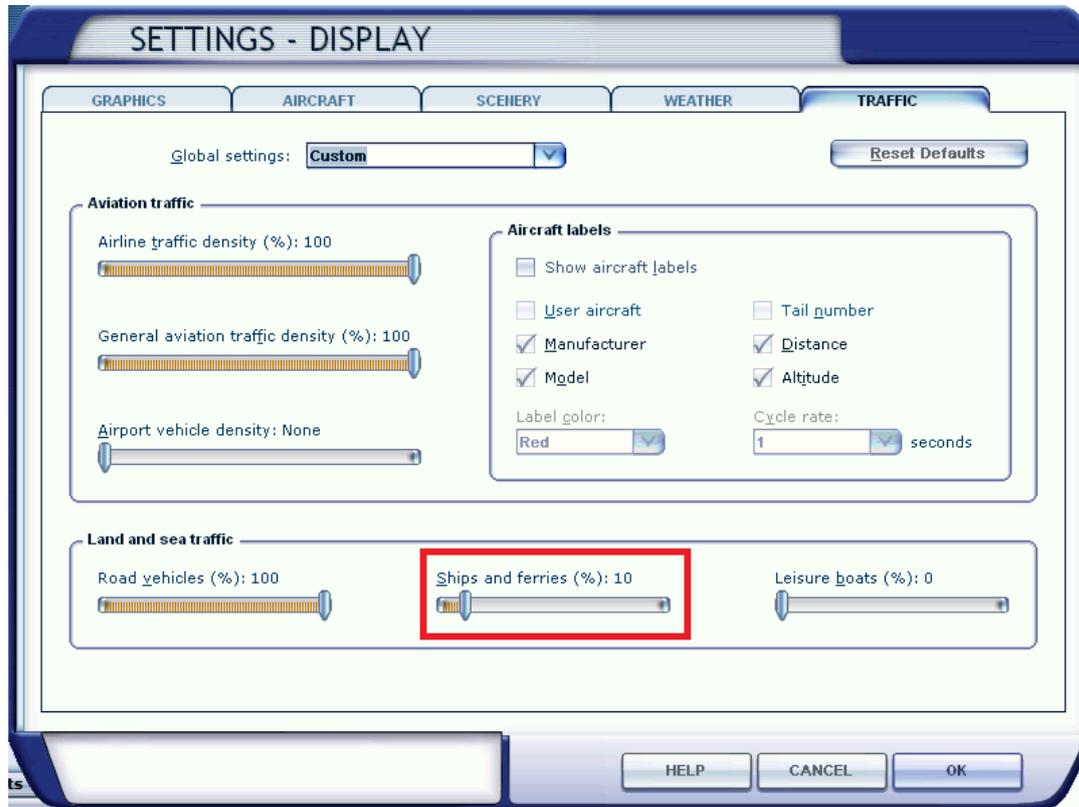
- **Aircraft shadows** should be activated because they help you a lot to estimate your altitude over white surface with few other reference points.
- There is no reason why **Aircraft landing-lights** shouldn't illuminate the ground.

## SCENERY MENU



- Ever seen that? Yes, with most systems you can max out all scenery settings in Antarctica!
- **Scenery complexity** can be reduced a bit if you struggle with performance around McMurdo, which is extremely detailed. This will remove the static aircraft.
- We recommend keeping **Land detail textures** deactivated. They usually add some structure to the ground surface making it easier for you to figure out your altitude when you land with an Ultralight or other small aircraft. This shouldn't apply for Antarctica because here you don't have those fine structures in grass and asphalt. What you mostly get is just pure white surface, which makes it harder for you to touch down. Because of that activating the land detail textures wouldn't be anything else than faking and making your life as a pilot down there as easy as it never will be in real world!

TRAFFIC MENU:

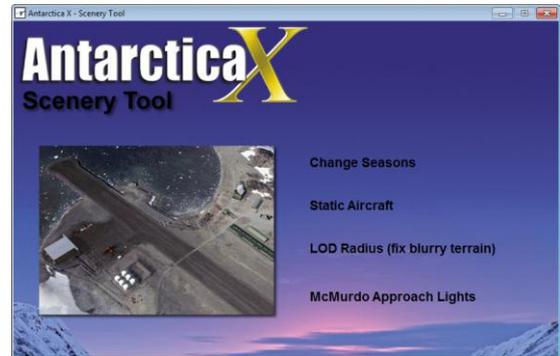


- **Ships and ferries** has to be set to a minimum of 10%. Otherwise you won't see the icebreakers in this scenery (see the Ship Traffic chapter)

## SCENERY TOOL

The “Antarctica X Scenery Tool” allows you to do some modifications to the scenery in seconds without having to rename or edit files. Info boxes give you additional information about what you are doing. This chapter explains what is done in detail when using the tool’s various features.

**IMPORTANT: Please note that FSX is not allowed to be running while using the tool!** Otherwise the changes made won’t work!



### CHANGE SEASONS:

#### Early Season:

**Active:**

- NZIR – McMurdo Ice Runway
- NZTB – Mario Zuchelli Ice Runways

**Not active:**

- AQ33 – Browning Pass
- AQ34 – Enigma Lake
- NZPG – McMurdo Pegasus Field
- NZWD – McMurdo Williams Field
- USCGC Healy (see “Animated Ships”)

#### Late Season:

**Active:**

- NZPG – McMurdo Pegasus Field
- NZWD – McMurdo Williams Field
- USCGC Healy (see “Animated Ships”)

- AQ33 – Browning Pass
- AQ34 – Enigma Lake

**Not Active:**

- NZIR – McMurdo Ice Runway
- NZTB – Mario Zuchelli Ice Runways

### STATIC AIRCRAFT:

Let’s you switch on/off all static aircraft in “Antarctica X”. There is no real reason however to disable them.

### MCMURDO APPROACH LIGHTS:

Let’s you switch on/off the approach lights McMurdo’s Ice Runway, Williams Field and Pegasus Field (see “Bases and Airports – Description”).

### LOD RADIUS (FIX BLURRY TERRAIN):

The header says it: This will enhance the LOD radius from 4.5 to 8.5, which means that terrain in the distance looks much crisper and not so blurry anymore. This is an important feature when flying close to the pole, for example around McMurdo. Please note that this setting should be used with caution because outside the Arctic it can cause your FSX to run out of memory easily! It is recommended to set it back to normal before flying somewhere else than Antarctica. The tool provides you with a sample screenshot that has been taken at an extreme latitude of S81° showing you the difference between blurry and crisp terrain. Important: Any changes in FSX’s settings menu set the LOD radius back to normal! The Scenery Tool should then be launched again to set the LOD Radius back to 8.5 (if desired).

## COMPATIBILITY WITH OTHER ADD-ONS

- **Dirk Stuck Designs – Antarctic Stations**

“Antarctica X” is currently NOT compatible with “Dirk Stuck Designs – Antarctic Stations” because the 3D models of this product are not placed at their actual locations. It is not known if it will be compatible in the future.

- **Scenery of Chile V9 by Juan Lucero (Flightsim.com Freeware)**

This scenery contains some modifications for SCRM – Teniente R Marsh Martin and SCPZ – Patriot Hills, which are in Antarctica and cause terrain problems here. It is recommended to deactivate the following files from the freeware mentioned to ensure compatibility (for example by renaming its extension from BGL to OFF):

SCRM\_ADE\_JLD.bgl

SCRM\_ADE\_JLD\_CVX.bgl

SCPZ\_ADE\_JLD.bgl

SCPZ\_ADE\_JLD\_CVX.bgl

## FAQS

**Q:** Why is the helicopter placed next to SanaelV’s helipad when I select that location?

**A:** Because of technical problems it wasn’t possible to add the start location on top of the elevated helipad – the volume shadows wouldn’t have worked then. The location where you get placed is still a realistic location for landing helicopters. From here you can always take off and land on the elevated pad.

**Q:** Some landclasses appear as big squared tiles!

**A:** This is most likely because you have an ORBX scenery active. As always ensure to deactivate all ORBX terrain using their FTX Central Tool when flying outside of ORBX areas.

**Q:** Sometimes there are some strange artifacts (like lines) on mesh terrain!

**A:** This is due to the high number of different elevation terrain sources we used. When merging different elevation data, all GIS programs we tried created some lines and steps here and there. Something, which can’t be avoided when merging various source files.

**Q:** Why do some runway markers tend to flicker from a certain distance?

**A:** This is because tiny objects in FSX usually start to flicker from a far distance if they’re not blend out first. Of course it wouldn’t make any sense to blend out those rather tiny runway markers from a distance because they are required to locate the run- or skiway from far away, which otherwise wouldn’t be possible without the markers.

**Q:** When I call ATC Center – why is it never called by its name?

**A:** There is plainly no ATC coverage for most of Antarctica. Although FSX by default covers Antarctica with some unrealistic center frequencies like Auckland and Johannesburg (!) it is not possible to remove existing frequencies in FSX. That’s why we decided to overwrite those frequencies with new fake ones, which was the only way to remove the “bad” ones. But not even that worked in some cases as for example the Auckland Center frequency for McMurdo seems to be kind of hard coded.

Note: Although you have the possibility to do so calling an ATC center in Antarctica is highly unrealistic because in most cases in the real world you won’t get a signal for hundreds of miles around...

Instead try to contact your destination airport as soon as you receive a signal. In addition we strongly recommend reading the Communications chapter in this manual.

**Q:** Here and there the terrain has a few color glitches!

**A:** While those glitches didn’t exist in our source files, they came up after converting them into FSX format. One problem of the compression algorithm in FSX is; when two totally different colors meet (in most cases

brown rocks and white snow), it creates color glitches along the line where both colors meet. In most cases this is a faint greenish/blue line where snow meets rock. We did our best to solve this issue but you might still discover them at high resolution aerial imagery areas like Casey and McMurdo.

**Q:** Sometimes I see small waterbodies in the very far distance that disappear when getting closer!

**A:** The reason is more or less the same as in the previous question. FSX's compression algorithm sometimes creates a few minor waterbodies around those areas that only appear in very low resolution, meaning in the very far distance. Antarctica is a continent where view distances are often extraordinary and therefore you see FSX issues here that you haven't seen anywhere else before. But we don't think this is a real issue because even in real world the white glare of the surface sometimes creates optical illusions as we know them from our planet's deserts (keep in mind that most of Antarctica is – despite all the snow and ice – one driest deserts, too!)

**Q:** Sometimes there is a slightly darker line running north-south/east-west through a terrain image!

**A:** This is due to the same problem described in the previous answer. Those lines sometimes appear along the coverage borders of two different files containing satellite imagery. Close to the edge the conversion to FSX format creates slight edges along the corners, which usually are not visible. Why you probably didn't see them in other FSX addons yet: Everything on the plain white surface of Antarctica is visible easily if it varies from the bright white of ice and snow.

**Q:** Why do the clouds look so stretched when getting closer to the South Pole?

**A:** See the chapter "FSX Limitations".

**Q:** Why the heck is the South Pole itself not included?

**A:** See the chapter "FSX Limitations".

**Q:** VORs, GPS systems and the ATC have mixed up headings!

**A:** See the chapter "FSX Limitations".

**Q:** There are almost no lights at night!

**A:** That's true. There is basically no flying in the dark in Antarctica because of the lack of proper nav aids. Only a few runways like McMurdo, Rothera and Marsh are illuminated at night but those lights are rather used for bad visibility than actually for night flying. In the past years McMurdo sometimes received flights shortly before the winter blackout was over (called "Operation Deep Freeze") but even then there are no runway lights (except approach lights) and everything is done using night vision gear. McMurdo basically being the only station receiving occasional flights in the dark, this is the only station in "Antarctica X" with some illuminated terrain around the base.

**Q:** There is a small straight waterway along West 180°/East 180°!

**A:** This waterway is probably less than 10 meters wide and is a minor FSX bug along the line where the western and eastern hemispheres meet. Usually you will never see this anywhere else in the world because the borderline between both hemispheres is mostly on water.

Further inland this waterway turns into a little mesh peak which looks a bit like the Chinese Great Wall from close up.

**Q:** The runway in Rothera is extremely bumpy!

**A:** Please ensure that you have set the mesh terrain settings as recommended in the "Advised Settings" chapter.

**Q:** Why is there no snow or spray effect when taxiing on Antarctic Skiways?

**A:** Those snow spray effects only appear when taxiing on snow or ice runways in FSX. Problem is that those runways are somewhat slippery (in an unrealistic scale) that we had to add more grip to them (which is more

realistic). Unfortunately FSX technically doesn't see them as ice/snow anymore after that and disables that effect. As we think a small price to pay for realistic flight (or rather taxi-) dynamics.

**Q:** Why are there trees on the rocks around Casey, Marsh and possibly some other bases?

**A:** Only one beta tester reported those trees showing on his system. We were able to figure out that some add-on added autogen files to some landclasses that didn't have trees before (and shouldn't have them). Unfortunately we were unable to locate the add-on itself causing this but the trees can be removed easily by deleting the following files (at your own risk!):

Folder: *YourFSXFolder\Scenery\World\Texture\*

Files:

*056a2an1.agn*

*056a2an2.agn*

*056a2an3.agn*

*056a2an4.agn*

*056a2an5.agn*

*056a2an6.agn*

*056a2an7.agn*

*056b2an1.agn*

*056b2an2.agn*

*056b2an3.agn*

*056b2an4.agn*

*056b2an5.agn*

*056b2an6.agn*

*056b2an7.agn*

**Q:** On low level flights I'm always follow by faint green/grey squares!

**A:** Please ensure that you have deactivated "Land Detail Textures" as recommended in the settings chapter. Those cause the discoloration and compromise realism.

**Q:** Why do the smaller objects around Wilkins Aerodrome have such a low visibility range?

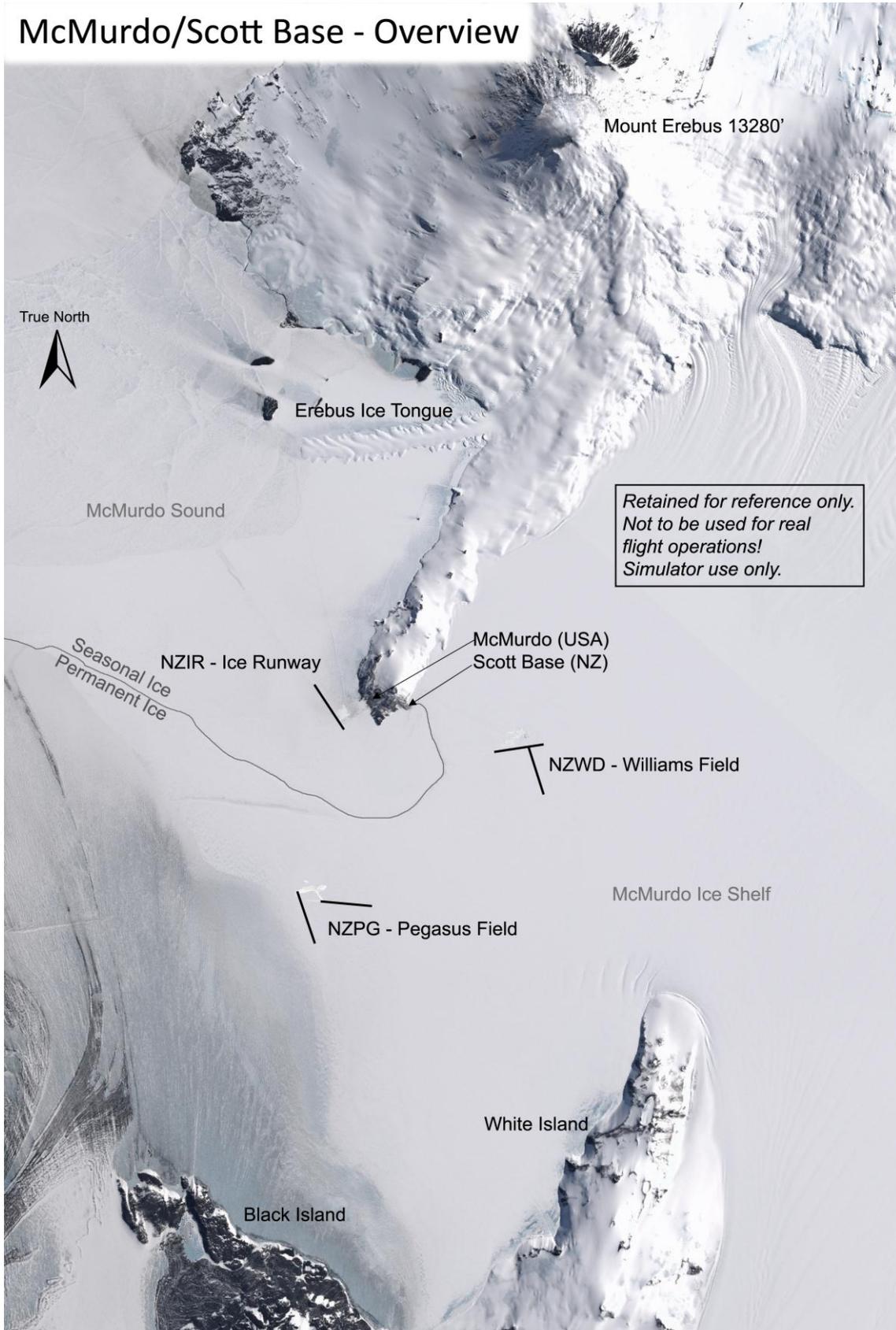
**A:** This is because of a bug in FSX. We had to reduce visibility to get their shadows displayed correctly (a problem in the southernmost latitudes in FSX).

**Q:** Why does the terrain look so blurry? Around McMurdo in particular.

**A:** See the "Scenery Tool" chapter -> LOD Radius.

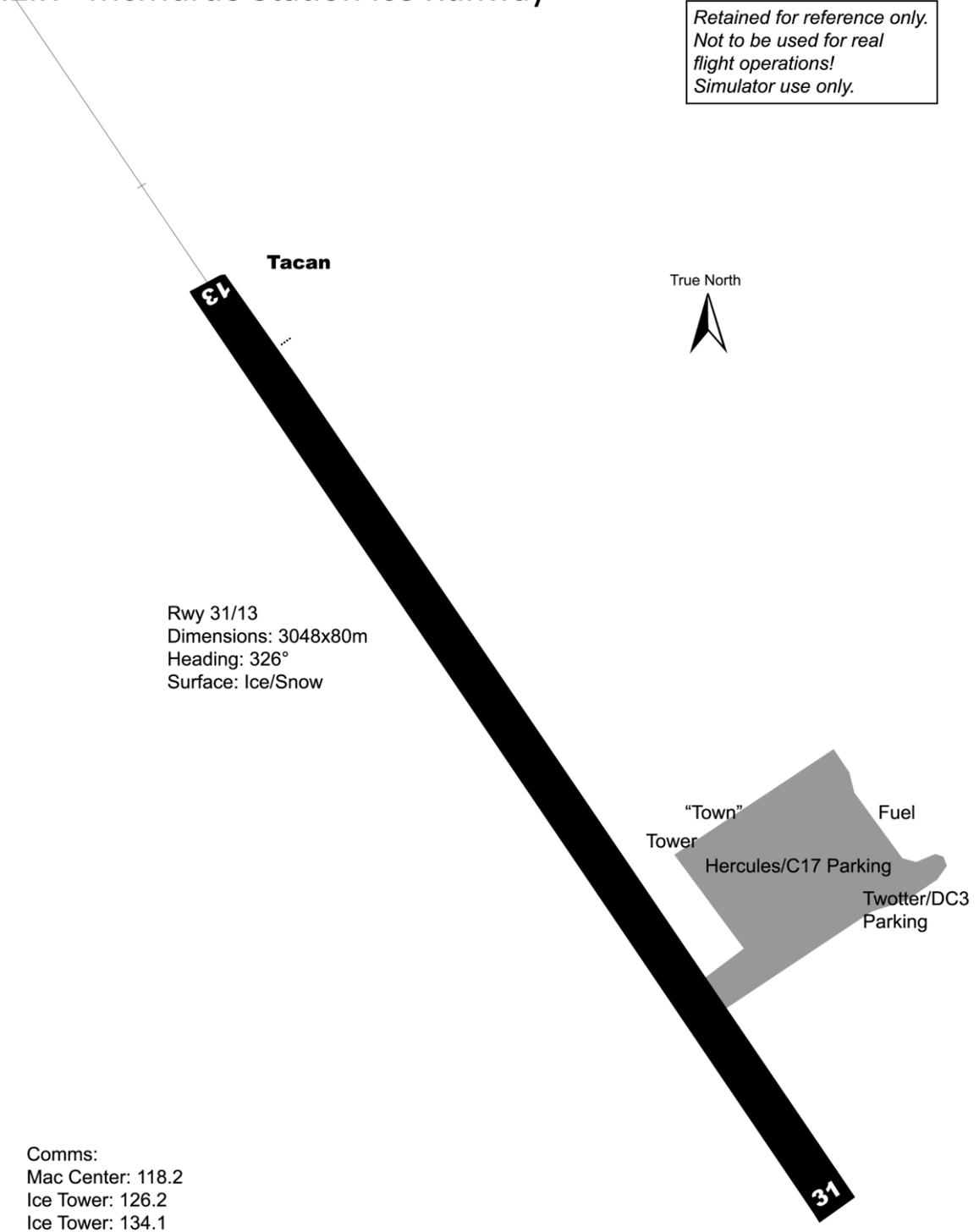
APPENDIX A CHARTS

# McMurdo/Scott Base - Overview



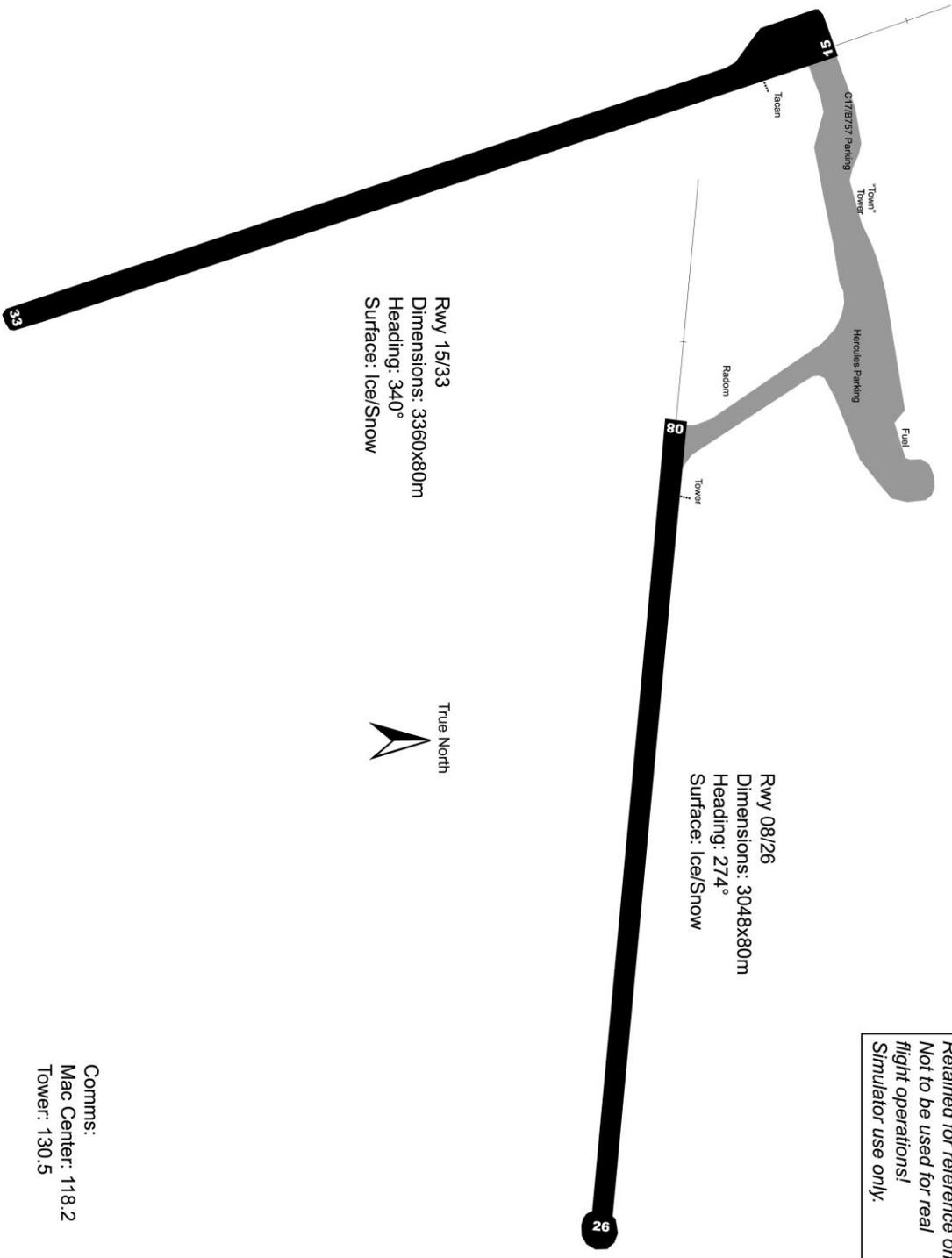
# NZIR - McMurdo Station Ice Runway

*Retained for reference only.  
Not to be used for real  
flight operations!  
Simulator use only.*



Comms:  
Mac Center: 118.2  
Ice Tower: 126.2  
Ice Tower: 134.1

# NZPG - McMurdo Station Pegasus Field

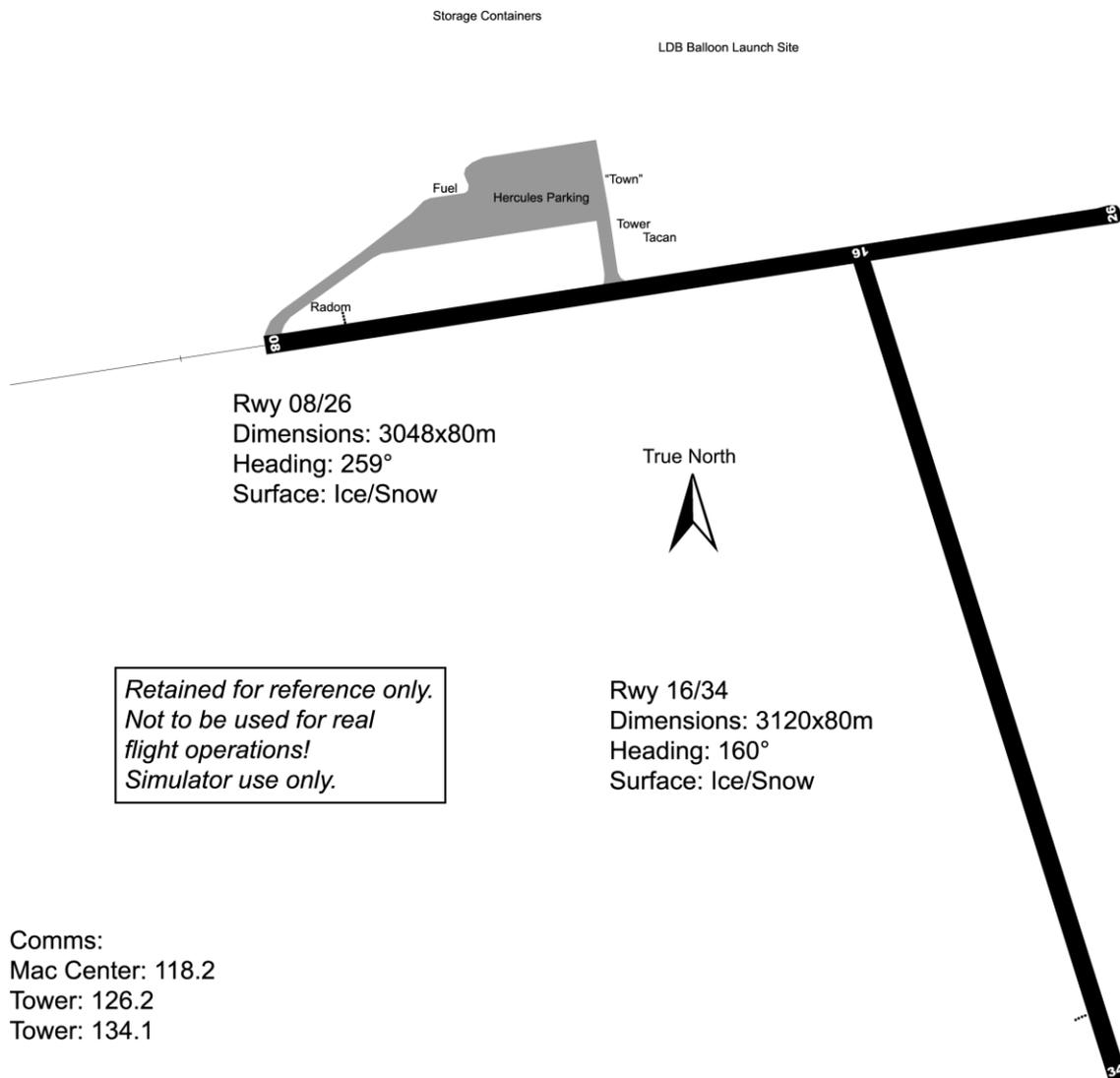


Retained for reference only.  
 Not to be used for real  
 flight operations!  
 Simulator use only.



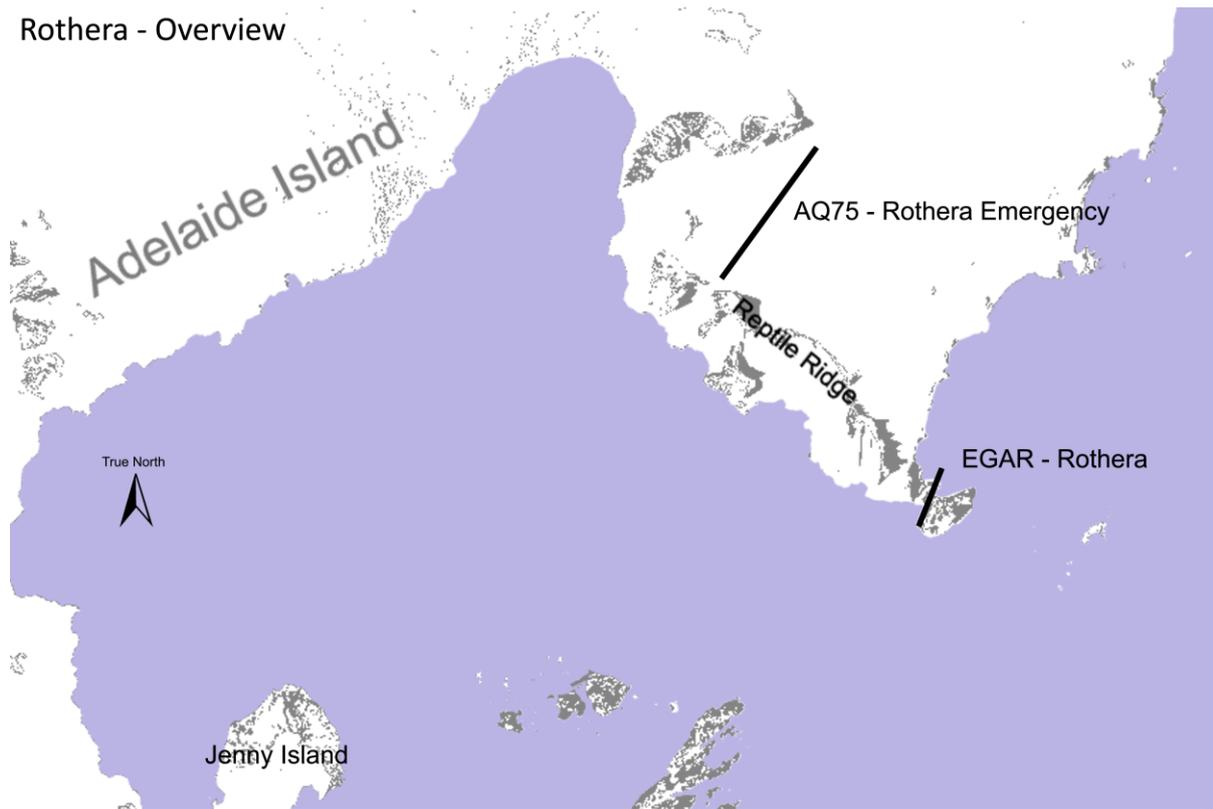
Comms:  
 Mac Center: 118.2  
 Tower: 130.5

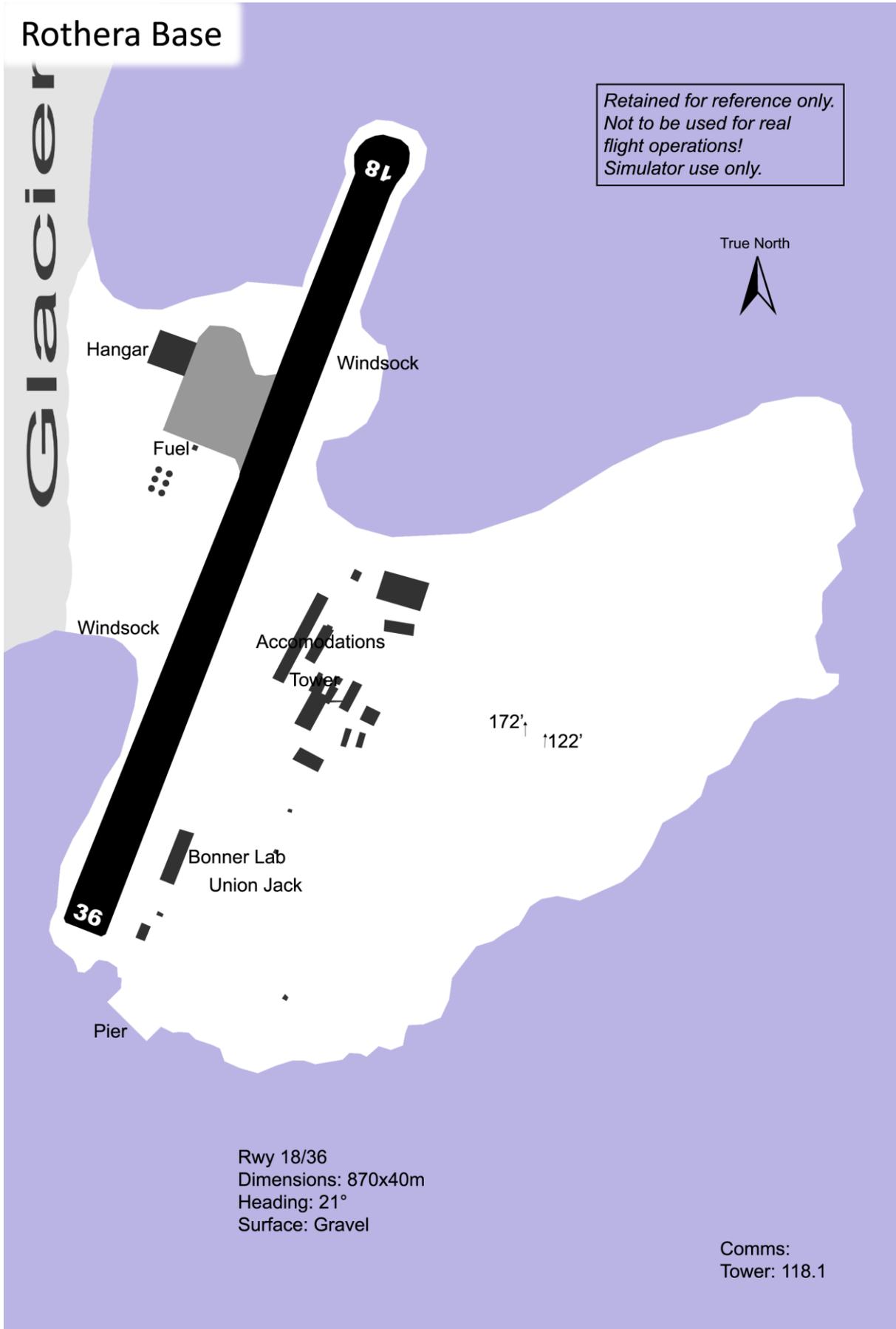
# NZWD - McMurdo Station Williams Field

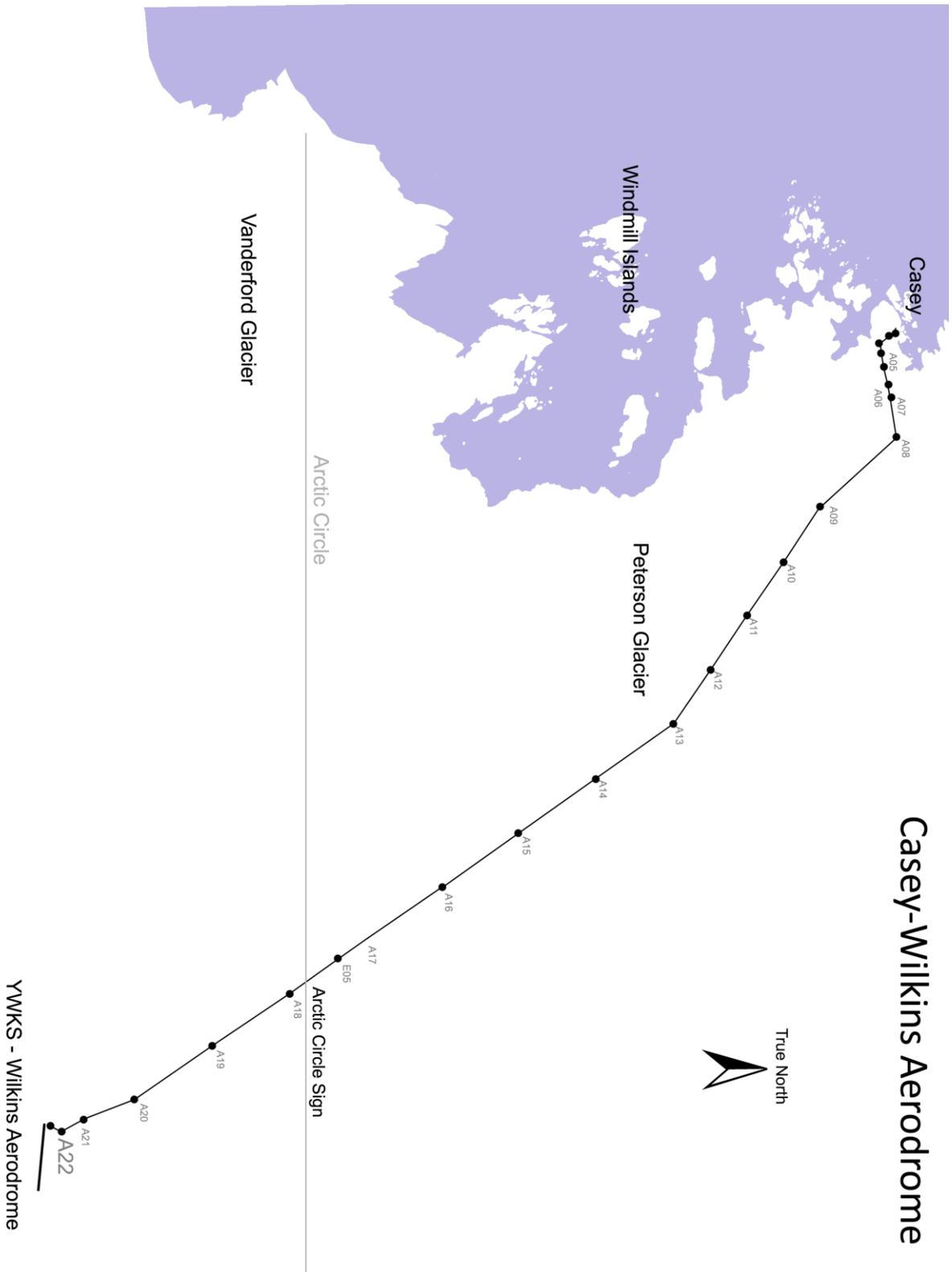




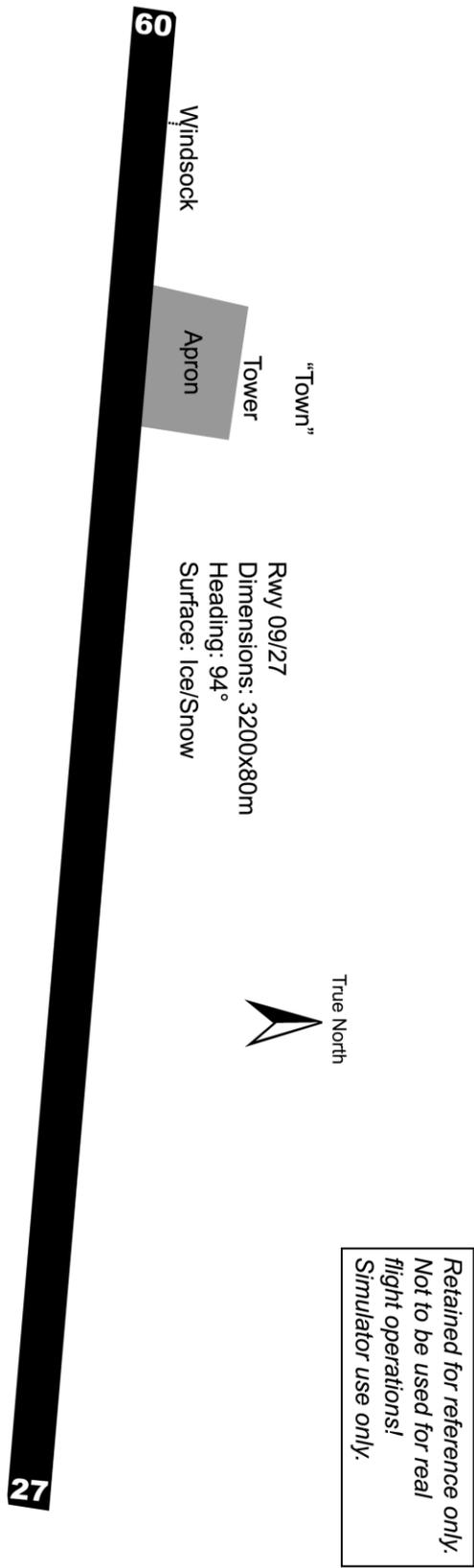
### Rothera - Overview



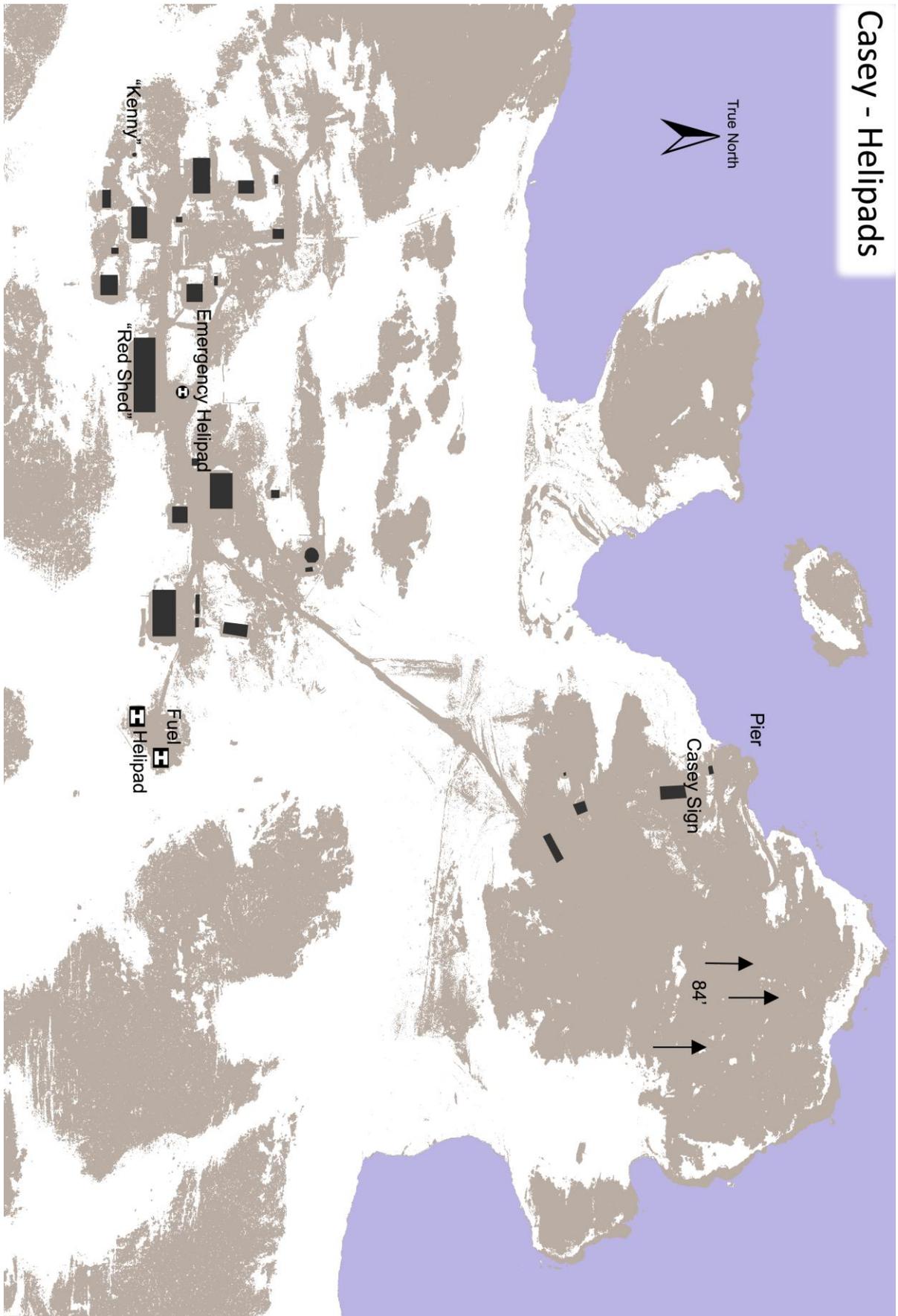


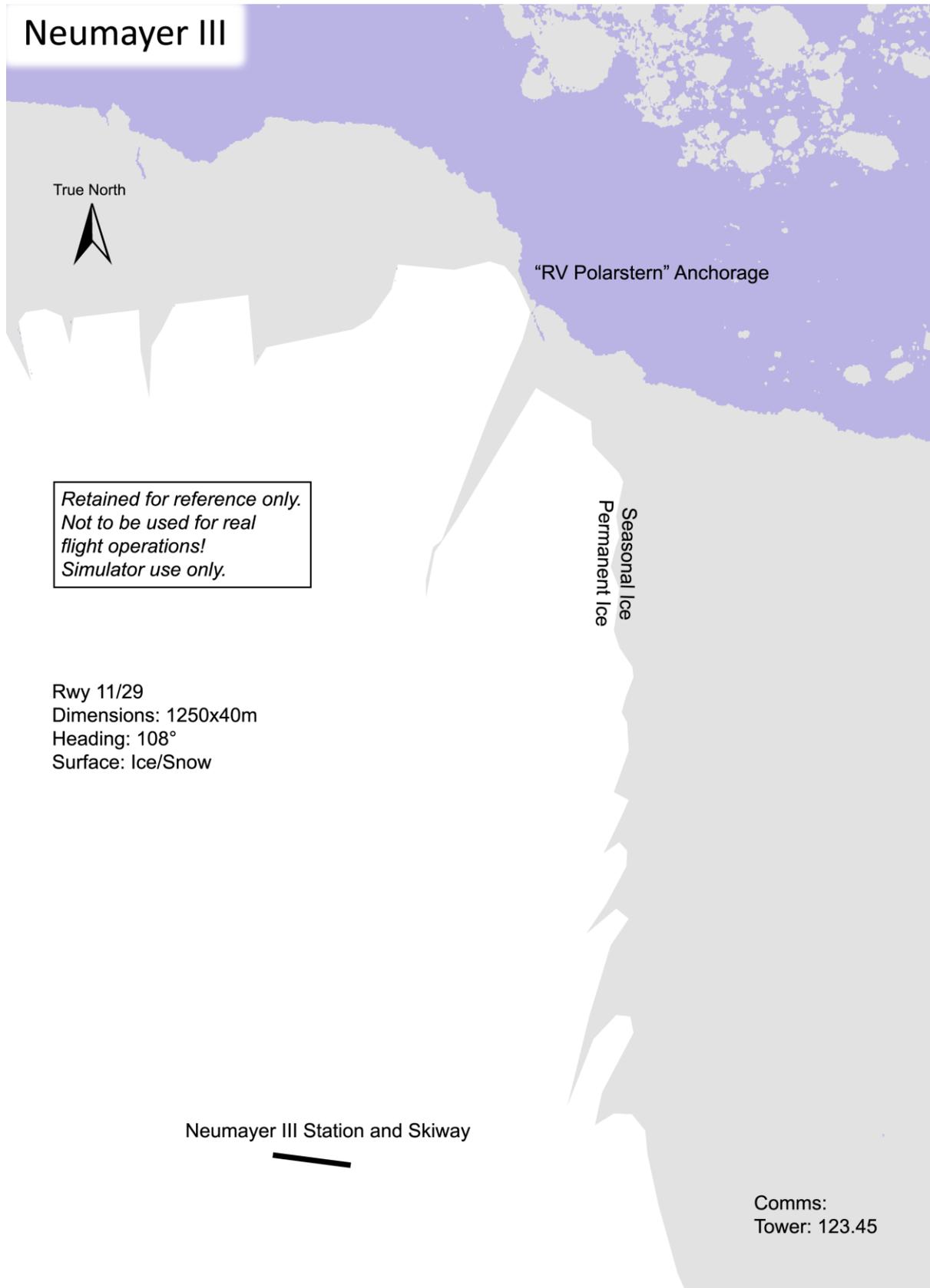


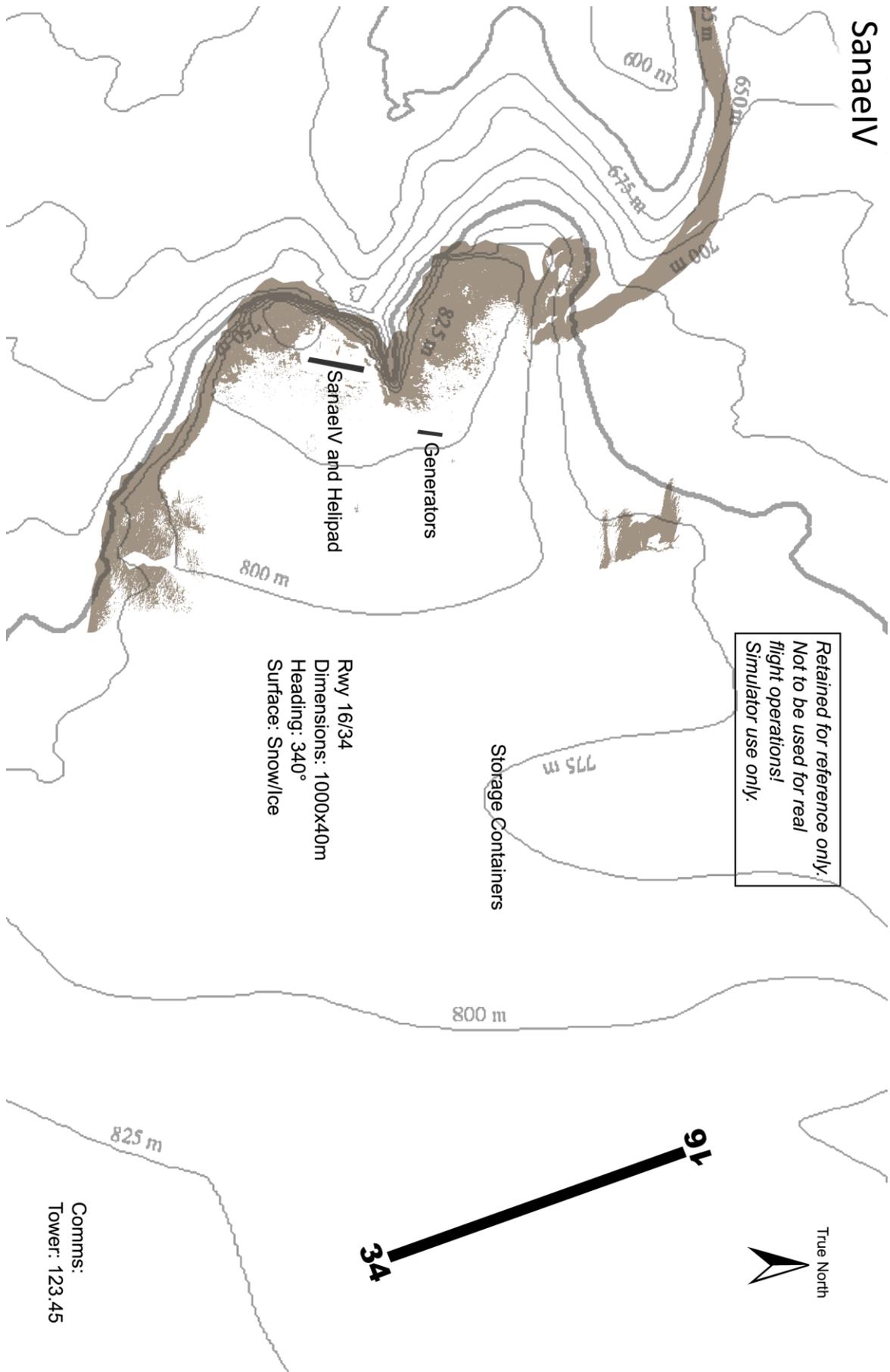
# YWKS - Wilkins Aerodrome



Comms:  
Tower: 129.7







# SCRM - Teniente R Marsh Martin

*Retained for reference only.  
Not to be used for real  
flight operations!  
Simulator use only.*

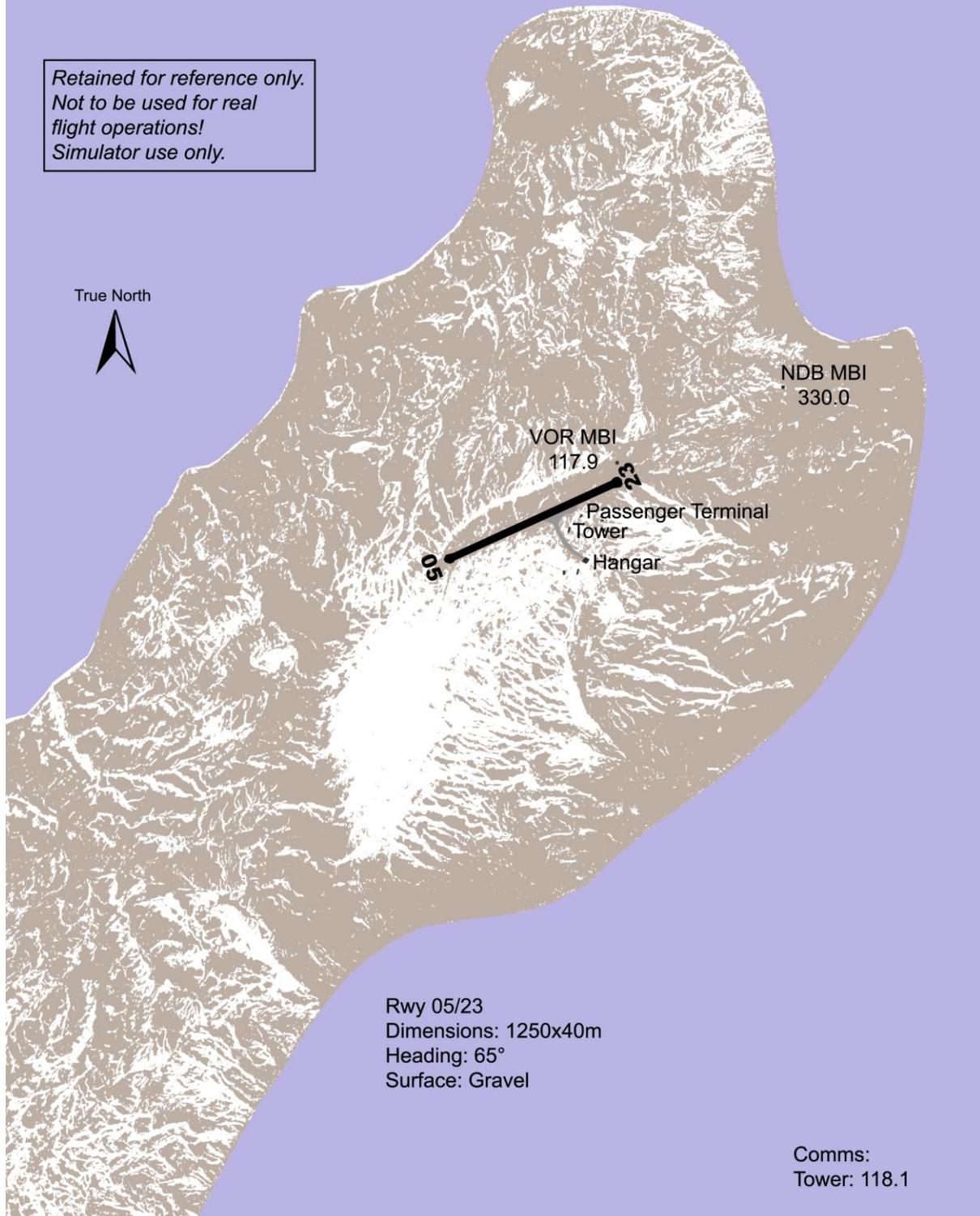
True North



## SAWB - Base Marambio

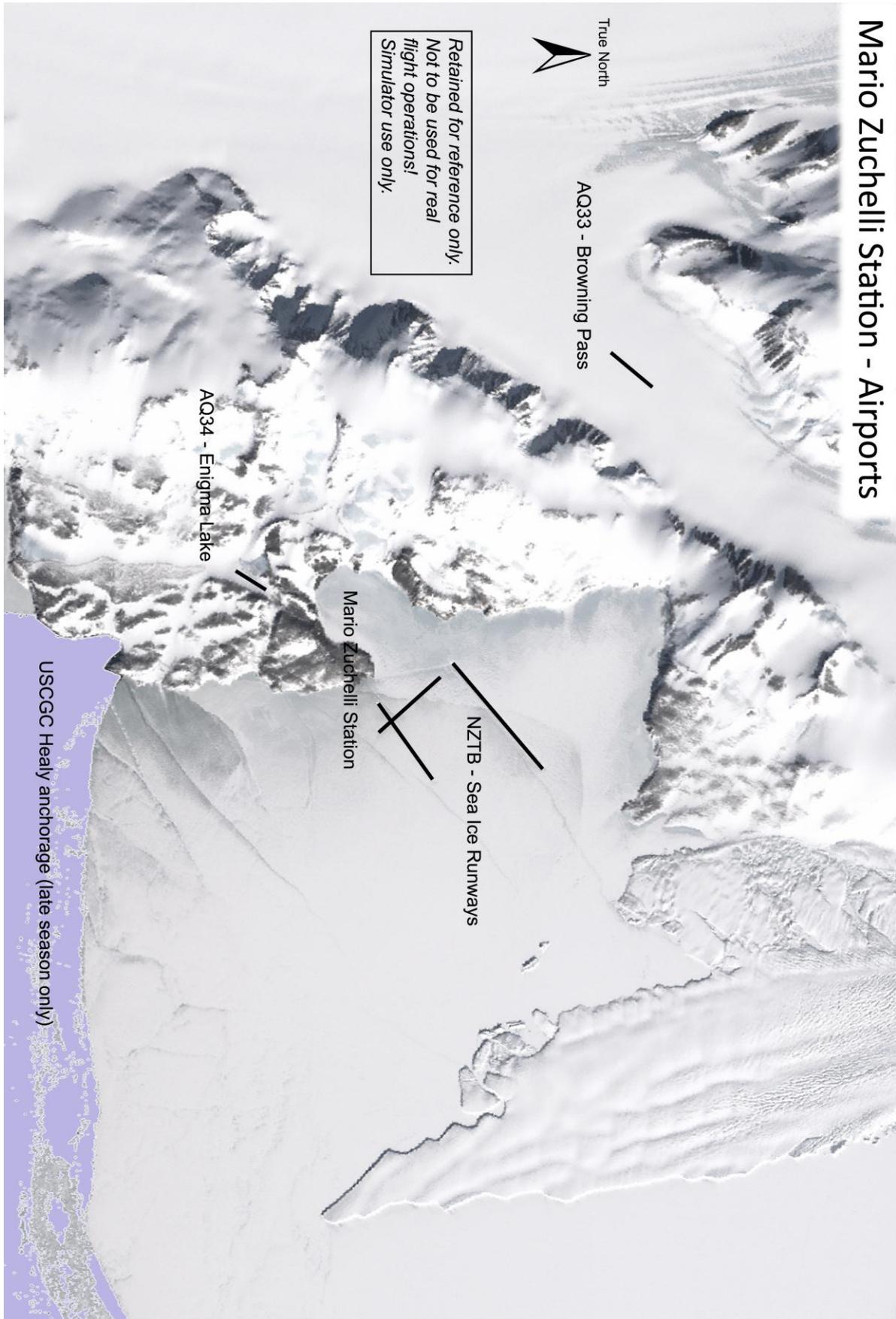
*Retained for reference only.  
Not to be used for real  
flight operations!  
Simulator use only.*

True North

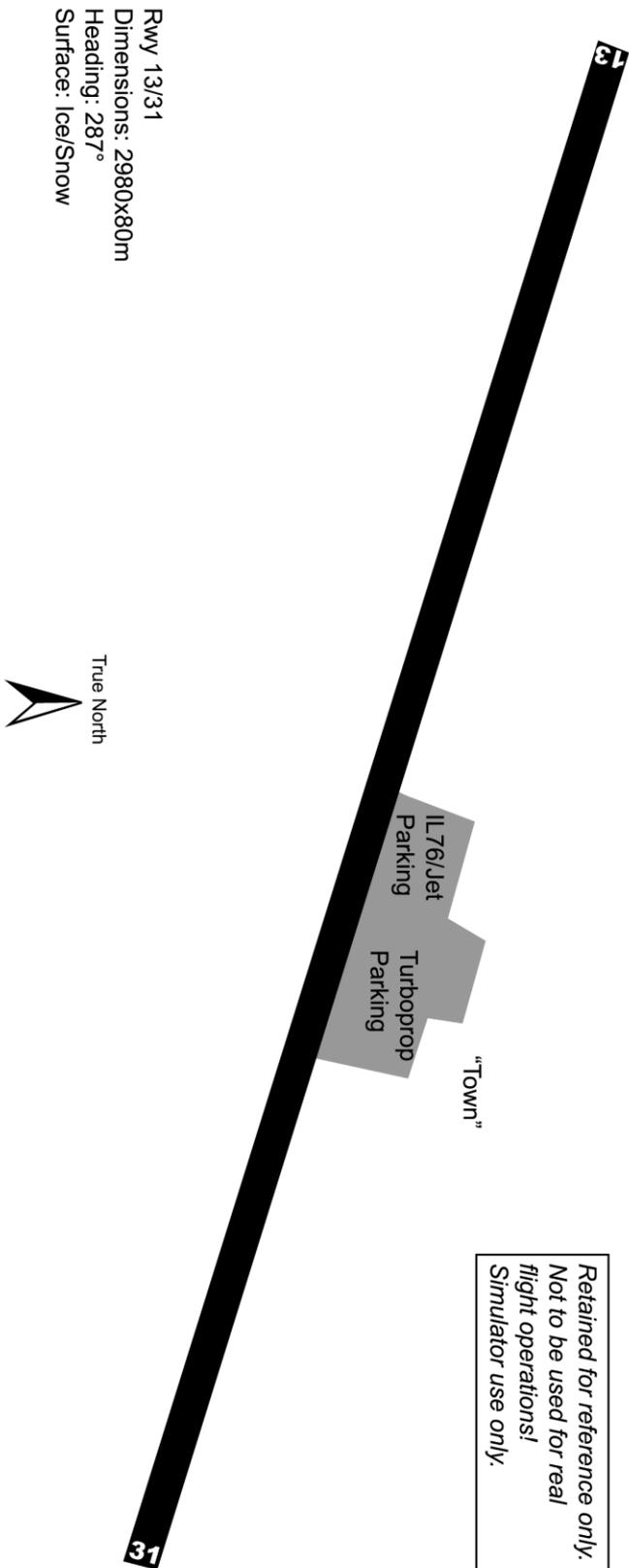


Rwy 05/23  
Dimensions: 1250x40m  
Heading: 65°  
Surface: Gravel

Comms:  
Tower: 118.1

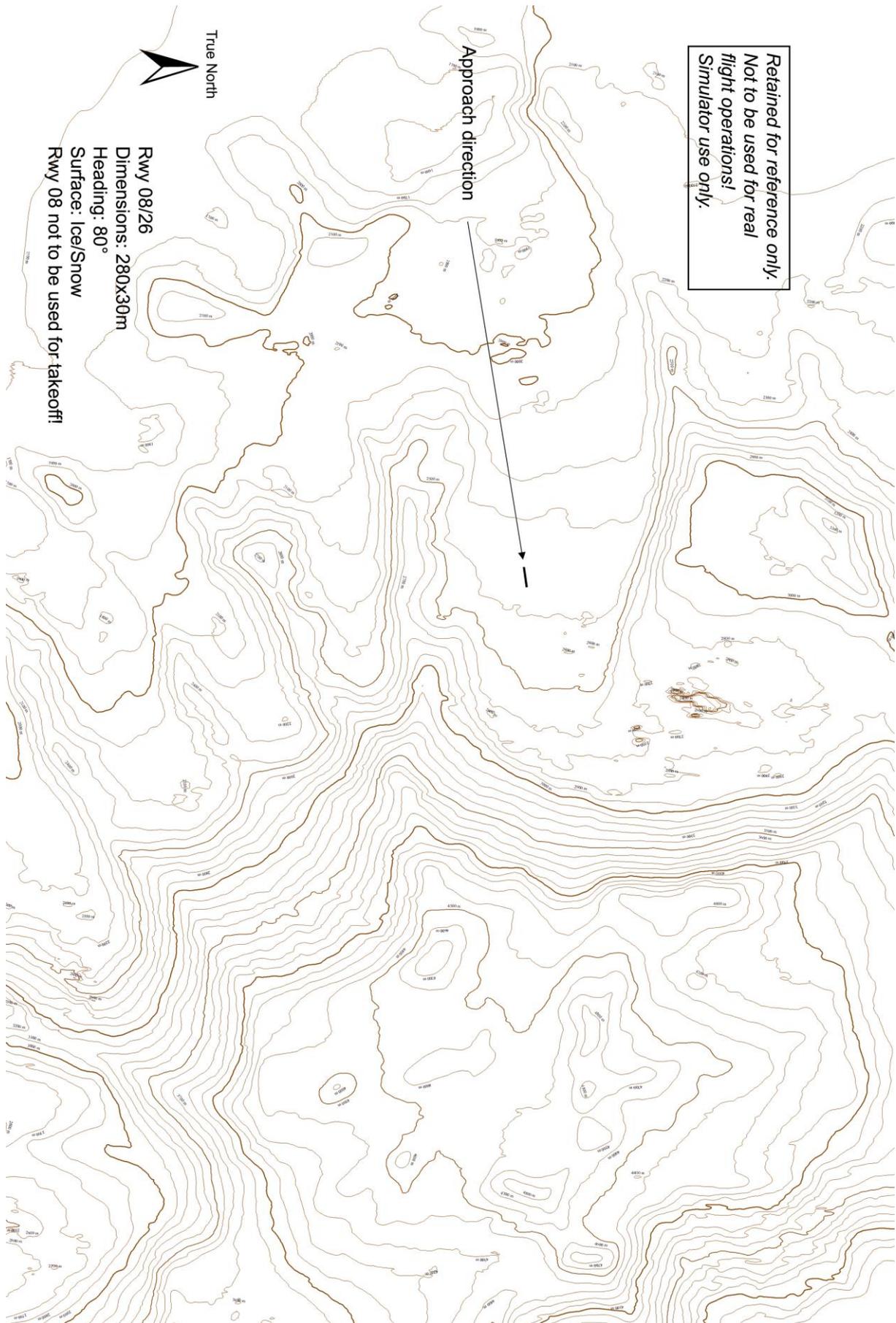


# AQ45 - Novo Air Base (Novolasarevskaya)



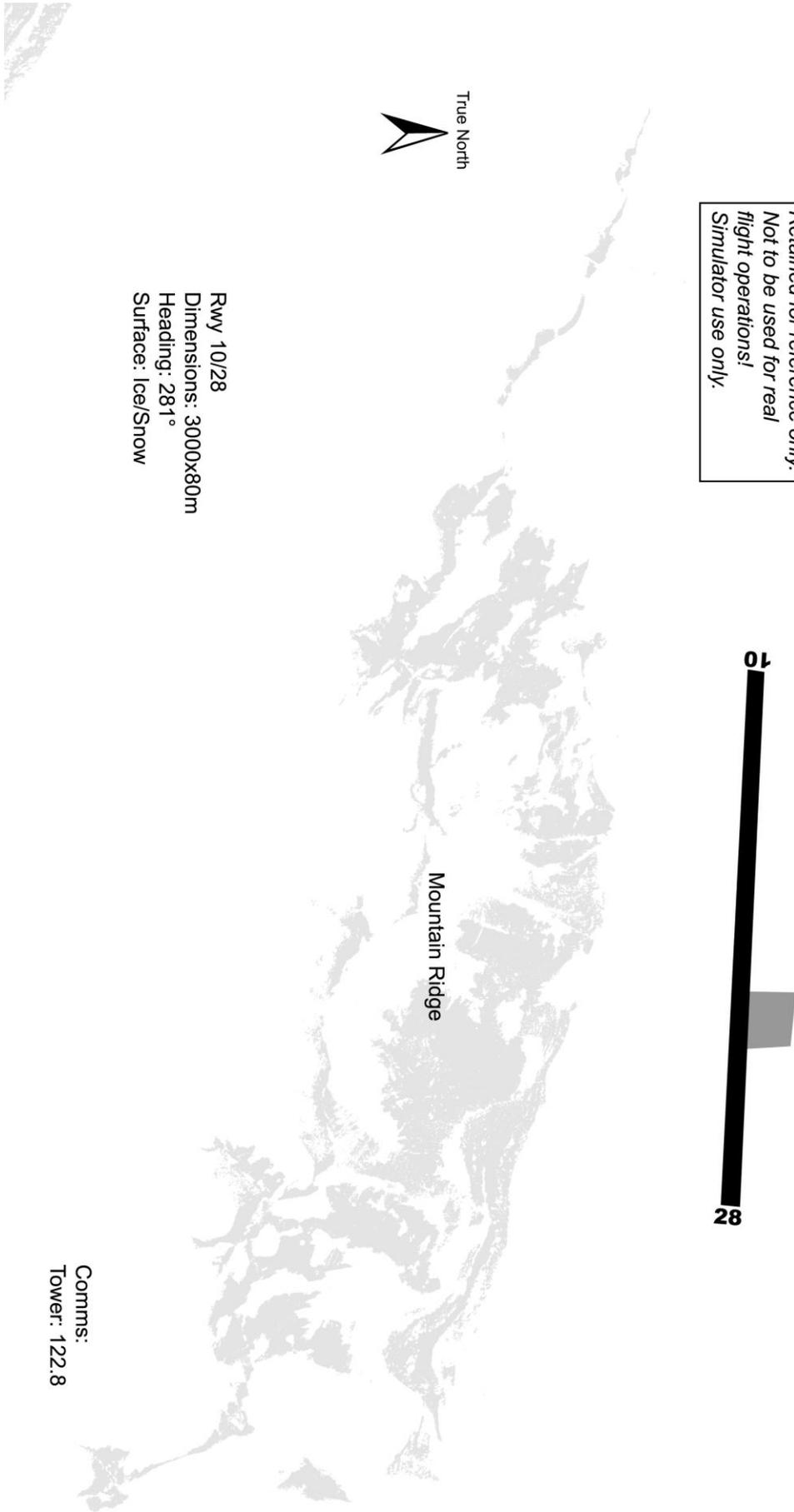
Rwy 13/31  
Dimensions: 2980x80m  
Heading: 287°  
Surface: Ice/Snow

Comms:  
Approach: 124.5  
Tower: 121.5



# SCPZ - Patriot Hills

Retained for reference only.  
Not to be used for real  
flight operations!  
Simulator use only.



## APPENDIX B LIST OF ALL BASES COVERED

ID	Name	Operator	Latitude	Longitude	Altitude	Surface	Dimensions	Heading	Approach	Tower	Sloped?	Detail
SAWB	Base Marambio	Argentina	64°14'18.71"S	56°37'42.99"W	600	Gravel	1250x40m	65	118.1	118.1	sloped	Medium
AQ10	Mawson/Rumdoodle Skiway	Australia	67°45'13.36"S	62°45'58.04"E	1,712	Slevelw/Ice	1000x40m	20	121.5	121.1	sloped	Medium
AQ07	Davis Plateau	Australia	68°28'20.14"S	78°50'22.66"E	1,582	Slevelw/Ice	1000x40m	80	121.5	121.1	sloped	Low
YWKS1	Casey Helipad	Australia	66°16'57.28"S	110°31'56.27"E	99	Metal	Helipad			121.1	level	High
YWKS2	Casey Emergency Helipad	Australia	66°16'56.34"S	110°31'31.46"E	117	Gravel	Helipad			121.5	level	High
YWKS	Casey Emergency Helipad	Australia	66°41'32.00"S	111°31'33.36"E	2,205	Slevelw/Ice	3200x80m	94.34	129.7	129.7	sloped	High
AQ17	Ulsteinen Airport (Princess-Elisabeth)	Belgium	71°57'1.88"S	23°16'7.90"E	4,160	Slevelw/Ice	1200x60m	90		118.1	sloped	Low
SCRM	Teniente R Marsh Martin	Chile	62°11'28.71"S	58°59'9.17"W	140	Gravel	1292x60m	116.85	119.7	118.1	sloped	Medium
AQ20	O'Higgins Skiway	Chile	63°19'38.99"S	57°50'34.99"W	649	Slevelw/Ice	800x40m	28		118.5	sloped	Medium
AQ02	Kunlun Airport	China	80°23'41.82"S	77° 2'58.19"E	13,262	Slevelw/Ice	2000x50m	120		130.1	sloped	Medium
AQ25	Dumont d'Urville D10 Skiway	France	66°42'17.45"S	139°49'17.11"E	720	Slevelw/Ice	1000x40m	338	121.5	125.4	sloped	Low
AQ37	D85 Skiway	France	70°25'30.02"S	134° 8'45.00"E	9,241	Slevelw/Ice	800x40m	140		133.7	sloped	Low
AQ30	Concordia Station - Dome C Skiway	France/Italy	75° 5'52.28"S	123°22'19.65"E	10,483	Slevelw/Ice	2740x60m	196/289		130.55	sloped	Medium
AQ41	Neumayer Station	Germany	70°40'59.39"S	8°17'11.24"W	49	Slevelw/Ice	1250x40m	108		123.45	sloped	High
AQ40	Kohnen Station	Germany	75° 0'4.01"S	0° 3'6.42"E	9,366	Slevelw/Ice	900x40m	65		123.45	sloped	Low
AQ38	Mid Point Skiway	Italy	75°32'26.76"S	145°49'7.26"E	10,483	Slevelw/Ice	1200x40m	16		125.8	sloped	Low
AQ39	Sitry Skiway	Italy	71°39'19.75"S	148°39'9.09"E	5,188	Slevelw/Ice	1000x40m	120		135.15	sloped	Low
NZTB	Mario Zuchelli Station Sea Ice Runways	Italy	74°41'16.55"S	164° 6'58.21"E	0	Slevelw/Ice	3250x60m	51/139/55		118.1	level	Medium
AQ34	Enigma Lake	Italy	74°42'57.33"S	164° 2'8.88"E	824	Slevelw/Ice	800x40m	34.6		132.875	sloped	Low
AQ33	Browning Pass	Italy	74°37'56.84"S	163°52'3.99"E	201	Slevelw/Ice	1260x40m	41.16		120.95	sloped	Low
AQ99	Dome Fuji	Japan	77°18'60.00"S	39°42'0.00"E	12,354	Slevelw/Ice	1200x40m	95		132.6	sloped	Low
AQ50	S17 Air Base Camp Skiway	Japan	69° 1'32.66"S	40° 6'30.28"E	2,010	Slevelw/Ice	1500x40m	95		130.6	sloped	Medium
NZWD1	Scott Helipad	New Zealand	77°50'54.79"S	166°46'20.10"E	28	Gravel	Helipad			126	level	High
AQ98	Troll Airfield	levelrway	71°57'25.30"S	2°27'13.68"E	3,911	Slevelw/Ice	3300x80m	69		128.1	sloped	Medium
AQ92	Mt. Vinson Base Camp	Private/Company	78°32'7.76"S	85°54'4.02"W	7,247	Slevelw/Ice	280x30m	80.2			sloped	Medium

SCGC	Union Glacier	Private/Company	79°46'39.75"S	83°19'9.02"W	2,383	Slevelw/Ice	3135x80m	39.95		131.325	sloped	Low
SCPZ	Patriot Hills	Private/Company	80°18'58.48"S	81°22'37.03"W	2,827	Slevelw/Ice	3000x80m	280.71		122.8	sloped	Medium
AQ45	levelvolasarevskaya (levelvo Air Base)	Russia	70°49'32.54"S	11°37'53.99"E	1,783	Slevelw/Ice	2980x80m	287.17	124.5	121.5	sloped	Medium
AQ60	Druzhnaya-4 Skiway	Russia	69°44'16.42"S	73°44'0.03"E	62	Slevelw/Ice	2000x60m	315		129.7	sloped	Low
AQ15	Progress Skiway	Russia	69°24'52.37"S	76°23'51.21"E	289	Unprepared	1000x40m	0		121.5	sloped	Low
AQ66	Vostok	Russia	78°28'4.63"S	106°50'28.82"E	11,180	Slevelw/Ice	3000x60m	35	124.5	121.5	sloped	Low
AQ70	Sanae IV Skiway	South Africa	71°40'1.20"S	2°45'56.54"W	2,581	Slevelw/Ice	1000x40m	340		123.45	sloped	High
AQ71	Sanae IV Helipad	South Africa	71°40'19.25"S	2°50'24.18"W	2,761	Slevelw/Ice	Helipad			123.45	level	High
AQ16	Wasa/Aboo Skiway	Sweden	73° 3'23.09"S	13°18'46.55"W	914	Slevelw/Ice	1200x40m	45		118.1	sloped	Low
EGAR	Rothera	United Kingdom	67°34'4.12"S	68° 7'38.62"W	13	Gravel	870x40m	21.13		118.1	level	High
AQ75	Rothera Emergency	United Kingdom	67°31'45.79"S	68°10'46.77"W	811	Slevelw/Ice	2340x40m	25.25		118.1	sloped	High
AQ80	Fossil Bluff Skiway	United Kingdom	71°19'45.60"S	68°16'2.00"W	316	Slevelw/Ice	1200x40m	353.25		118.1	sloped	Medium
AQ85	Sky Blu Runway	United Kingdom	74°51'25.57"S	71°34'9.21"W	4,447	Slevelw/Ice	900x40m	212.41		118.1	sloped	High
AQ90	Halley Station Skiway	United Kingdom	75°34'10.25"S	26°38'21.42"W	97	Slevelw/Ice	1112x40m	68.54		118.1	sloped	Medium
NZIR	McMurdo Ice Runway	USA	77°50'49.05"S	166°33'22.40"E	0	Slevelw/Ice	3048x80m	325.75	118.2	126.2	level	High
NZPG	McMurdo Pegasus Ice Runway	USA	77°57'53.00"S	166°31'1.00"E	0	Slevelw/Ice	3360x80m	340/274	118.2	130.5	level	High
NZWD	McMurdo Williams Field Skiway	USA	77°52'8.96"S	167° 3'35.72"E	0	Slevelw/Ice	3120x80m	160/259	118.2	126.2	level	High
NZIR1	McMurdo Heliport	USA	77°50'57.35"S	166°40'11.25"E	55	Gravel	Helipad		118.2		sloped	High
AQ88	CTAM Camp	USA	83°59'44.62"S	164°25'1.25"E	5,302	Slevelw/Ice	3335x80m	13.84		136.375	sloped	Low
AQ95	Siple Dome	USA	81°39'52.56"S	149° 0'44.02"W	1,994	Slevelw/Ice	3335x80m	26.44		118.4	sloped	Low
AQ89	Byrd Surface Camp	USA	80° 1'0.96"S	119°35'5.80"W	4,848	Slevelw/Ice	3335x80m	19.25		125.3	sloped	Low
AQ97	WAIS Divide	USA	79°28'25.01"S	112° 4'0.62"W	5,710	Slevelw/Ice	3335x80m	46.28		126.2	sloped	Low

**ID:** Please note that some (many) of the airports/helipads do not have ICAO codes, yet FSX requires them. The codes ending in a number are simulated.

**Detail:** High = All buildings, many vehicles, people animations, detailed mesh etc

Medium = Static aircraft, few structures, sometimes areal imagery

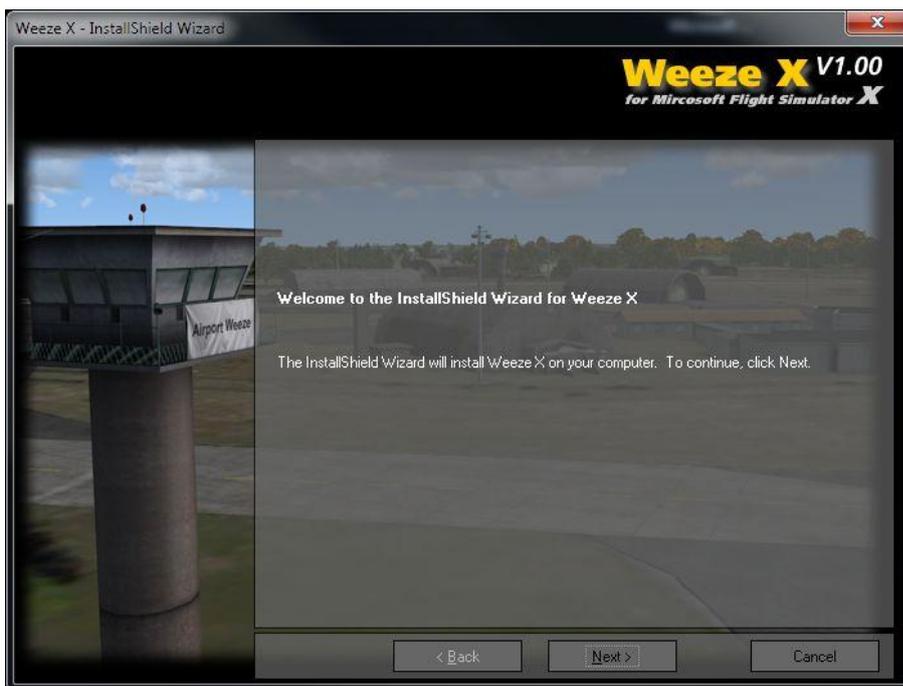
Low = Only runway/ helipad, few or no details

## APPENDIX C THE AEROSOFT LAUNCHER

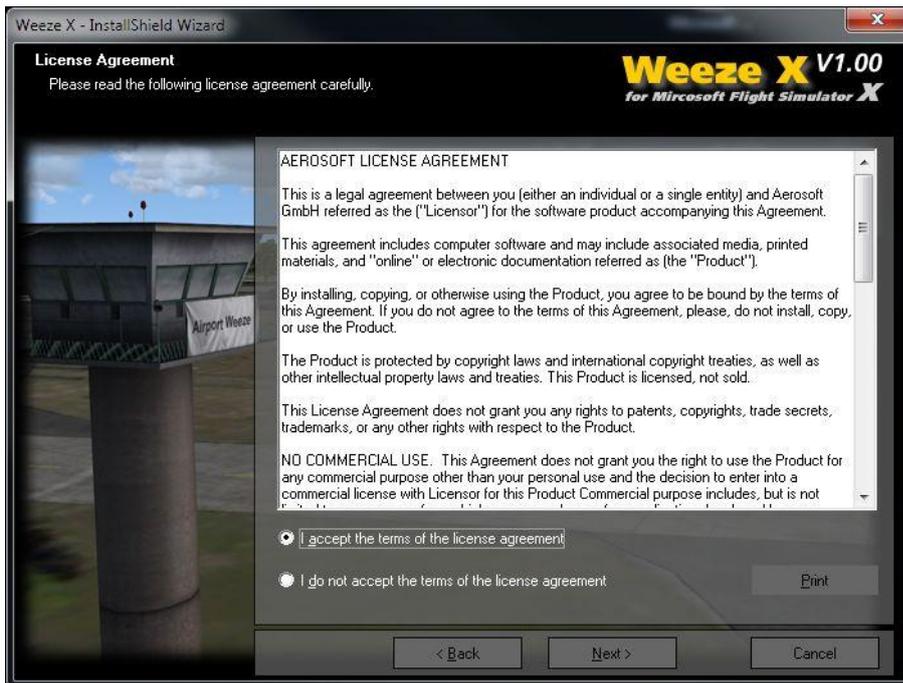
The new installer and launcher system has advantages for Aerosoft (it protects our copyrights better) and for the customers (makes it easier to see what is installed and what updates are available. Using the new system is simple and only adds a few steps to what was used before. There are however four things that you have to keep in mind.

- You need to **be connected to the Internet while the installing and activation takes place** (there is an offline option via email, more on that later).
- You need to be **logged on as Administrator** on your system.
- You need to understand that **the product needs to be activated before it can be used**. Scenery products will just not show until the files are activated and aircraft products will have other limitations.
- You need to know **the installed files are customized** to your order. Multiple files of the product will be marked so if they ever ended up on the Internet we know where they came from.

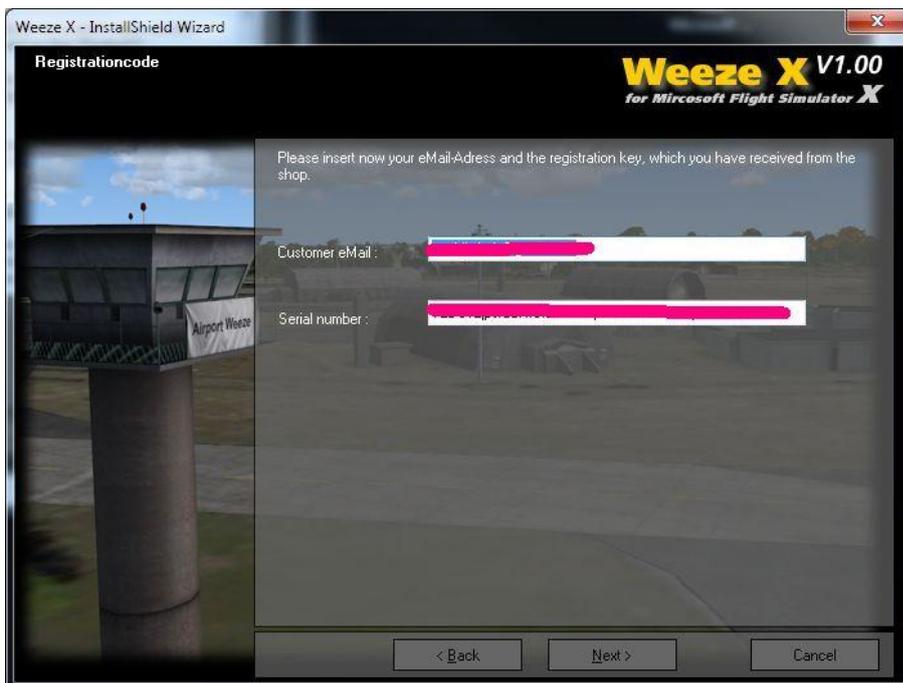
After the SETUP.EXE is started you will see this screen (of course the actual product might differ):



Click [Next] to continue, you expected that right?



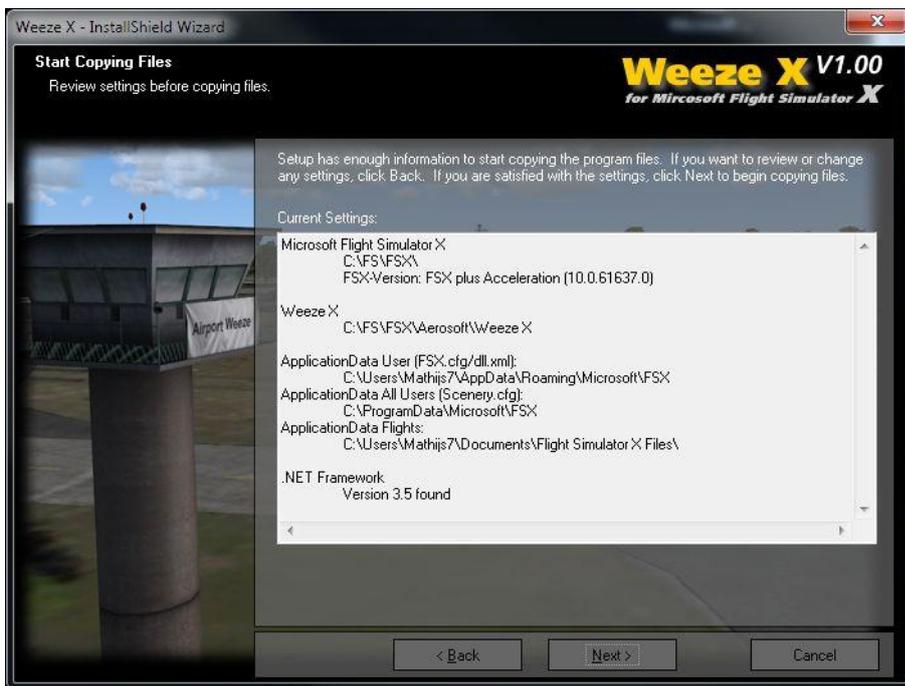
Now you have to accept the license agreement. Easy to click [I accept....] but you might like to read the text at least once, okay?



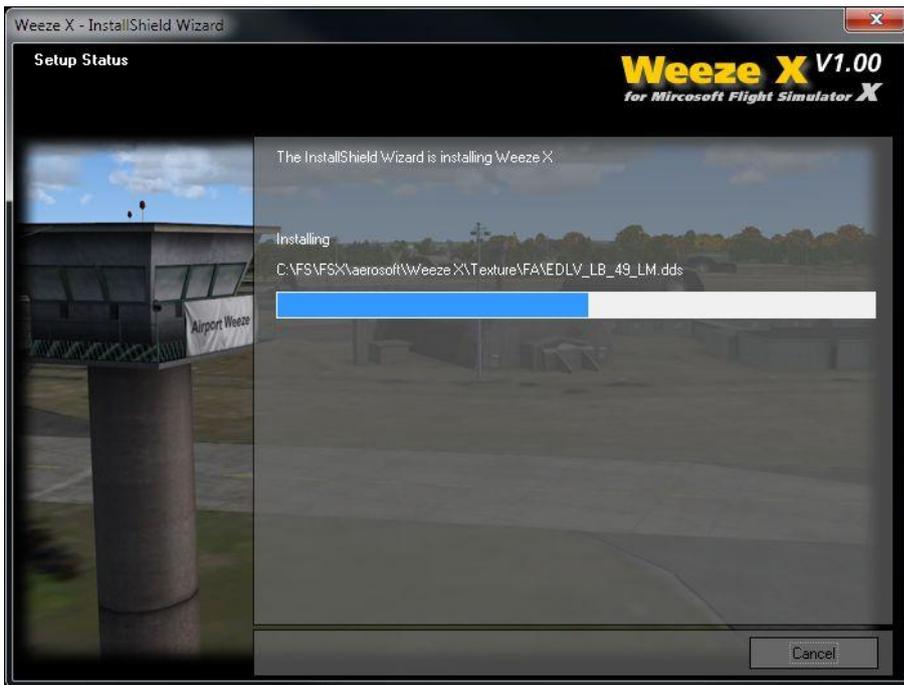
Enter your email address and the serial code we have sent you.



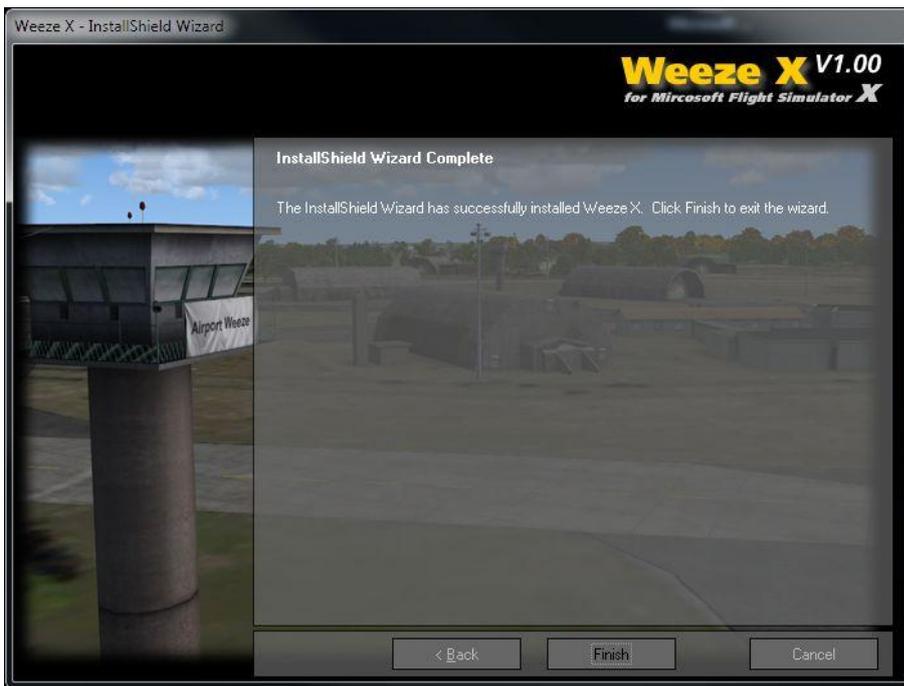
A few screens that tell you what will happen. Click [Next] unless you see an obvious issue.



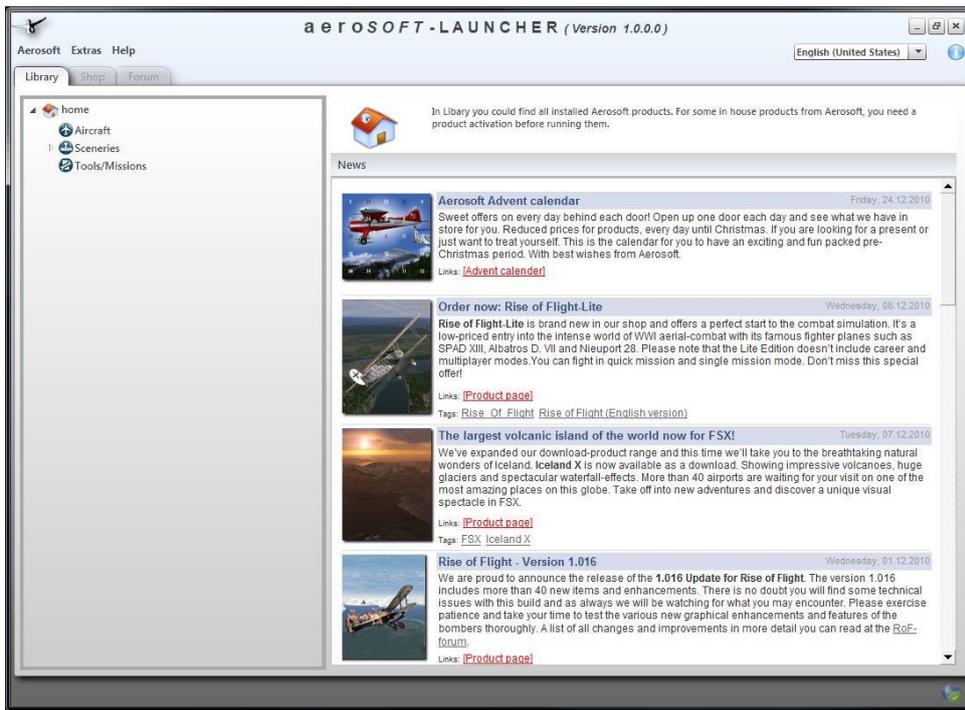
One more...



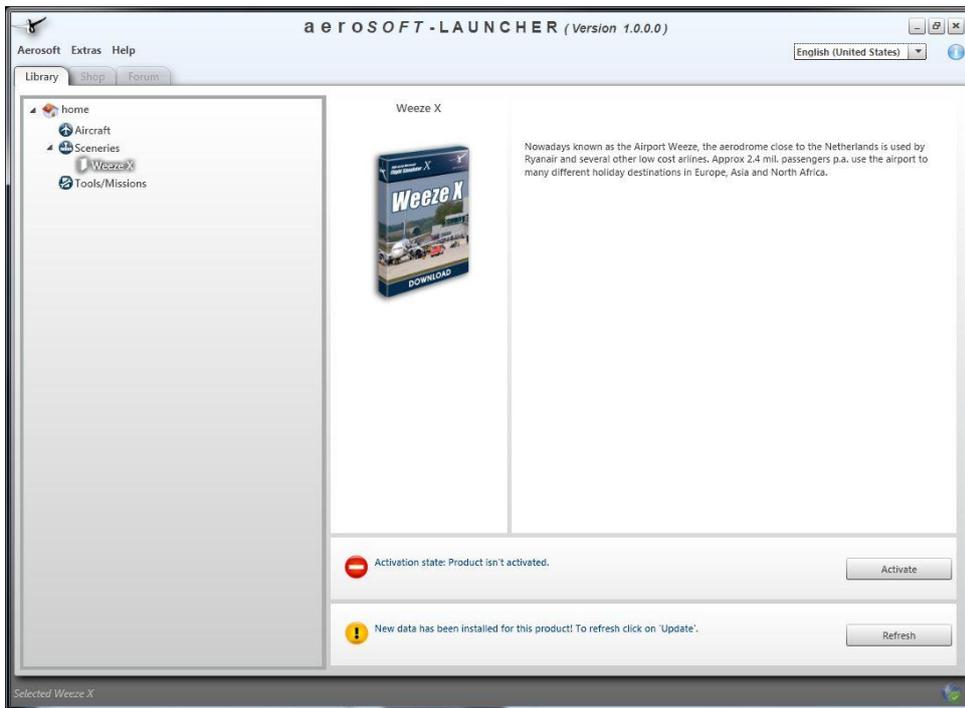
The files are now installed. Will take a few seconds.



And you're done. Click [Finish] to close the installation part of getting the software in FSX. Now Aerosoft Launcher will start and you will see this.



Click on the [Sceneries] to open that section of the product tree.



And there is the product we have just installed. By clicking on the [Activate] button the launcher will activate the software.