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San Diego International Airport
East County Working Group - Aircraft Noise Concerns

Meeting #4

PRESENTED TO:
SDIA East County Working Group

PRESENTED BY:
Stephen C. Smith

PRESENTED ON:
July 25, 2019

Agenda

- Introductions
- Meeting Objective
- ECWG Airline Pilot Comments and Concept
- Extended Approach Design Review
- Draft Design Concepts
- Eliminated Design Concepts
- Next Steps

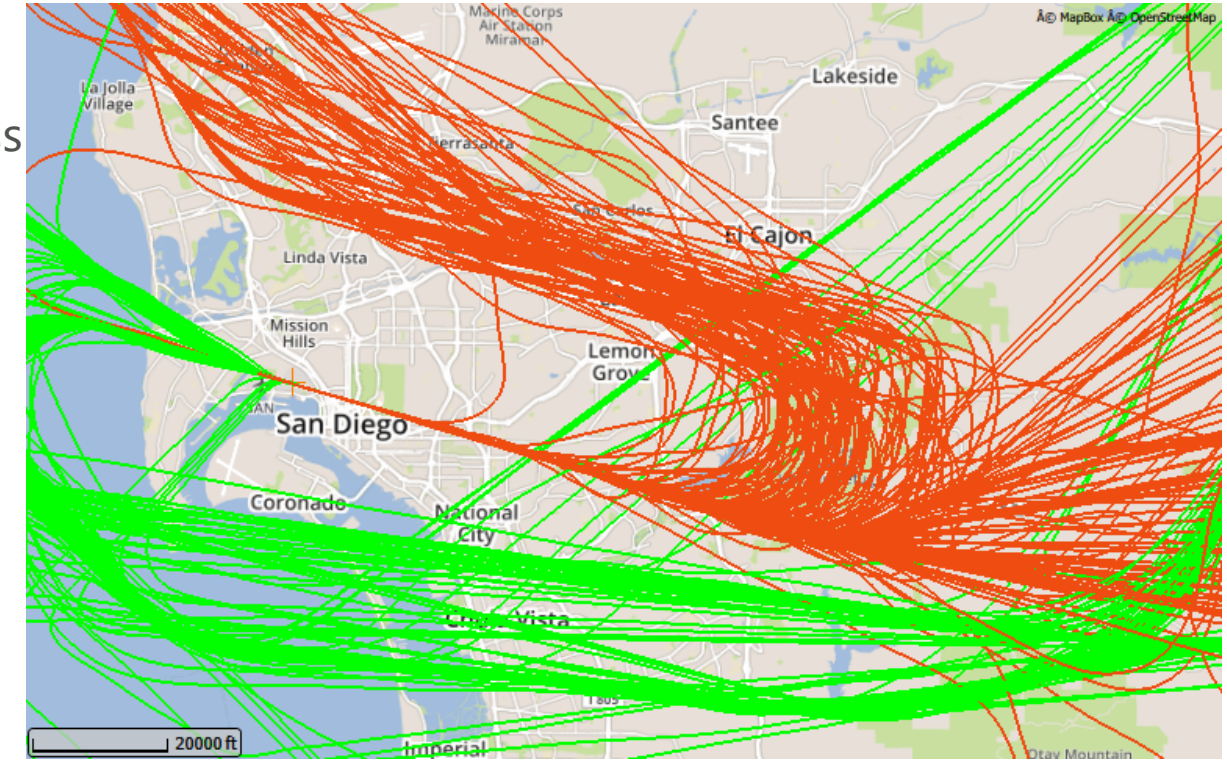
Meeting Objective

- Review ECWG proposed design concepts
- Review extended approach design results
- Review draft design concepts based on ECWG feedback

ECWG Airline Pilot Member Comment and Concept

ECWG Airline Pilot Member Comments

- Desirable traits of north arrival operations:
  - Track dispersion
  - Higher altitude on downwind over populated areas
  - Turn south to join final approach (crosswind) over less populated areas.
- Limitations include:
  - Airspace limits
  - Controller flexibility to merge north arrivals with east arrivals
  - Commercial airliner operational limitations.



SOURCE: San Diego County Regional Airport Authority, July 2019 (Airport Noise and Operations Monitoring System track data for June 27, 2019).

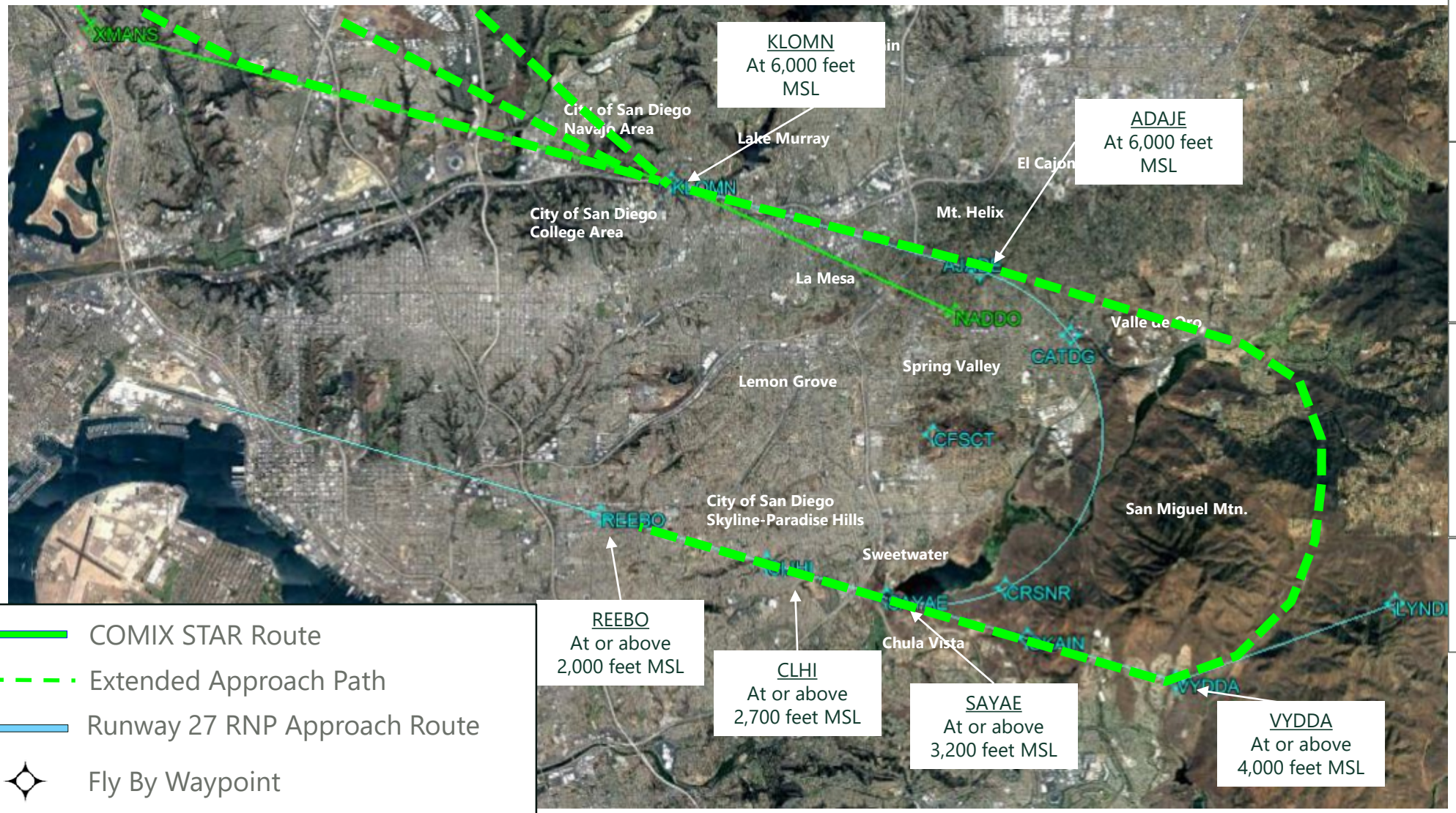
ECWG Airline Pilot Member Comments (continued)

- All major operators routinely fly RNAV/VNAV arrivals to an approaches throughout the US and the world - it reduces the workload for the cockpit crew
- Visual approach is not preferred for most pilots:
  - Requires pilot responsibility of traffic separation, terrain clearance and staying within the confines of the Class B airspace while calculating how best to get on the proper descent profile.
  - Visual approaches are notorious for unstable approaches
  - RNAVs are often easier than visuals

ECWG Airline Pilot Member Proposed Concept

- Combination of three arrival concepts used based on demand
- Provide greater arrival track dispersion and an overall reduction in aircraft noise exposure

Extended RNAV Approach from KLOMN to VYDDA (Low Demand Period)



Intent: Reduce noise levels by raising jet arrival altitude and moving traffic further east

Concept: Keep jet arrival altitude at 6,000 ft. MSL at KLOMN waypoint, thence follow RNAV approach further east

Objectives:
1. Raise Altitude on Downwind: Yes
2. Maintain Dispersion: No
3. Turn South Over Less Populated Areas: Yes

Potential Limitations: May not be applicable when demand levels are high

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground
SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (COMIX STAR route, Runway 27 RNP Approach route); Ricondo & Associates, Inc., July 2019 (proposed extended approach path).

Keep Arrivals at 6,000 ft up to KLOMN (Medium to Low Demand Periods)

COMIX STAR Route

6,000 at NADDO Flight Path

Runway 27 RNP Approach Route

Fly By Waypoint

Intent: Reduce noise levels by raising jet arrival altitude and prevent closer turns to airport

Concept: Keep jet arrival altitude at 6,000 ft. MSL at KLOMN waypoint, thence descend to join final approach

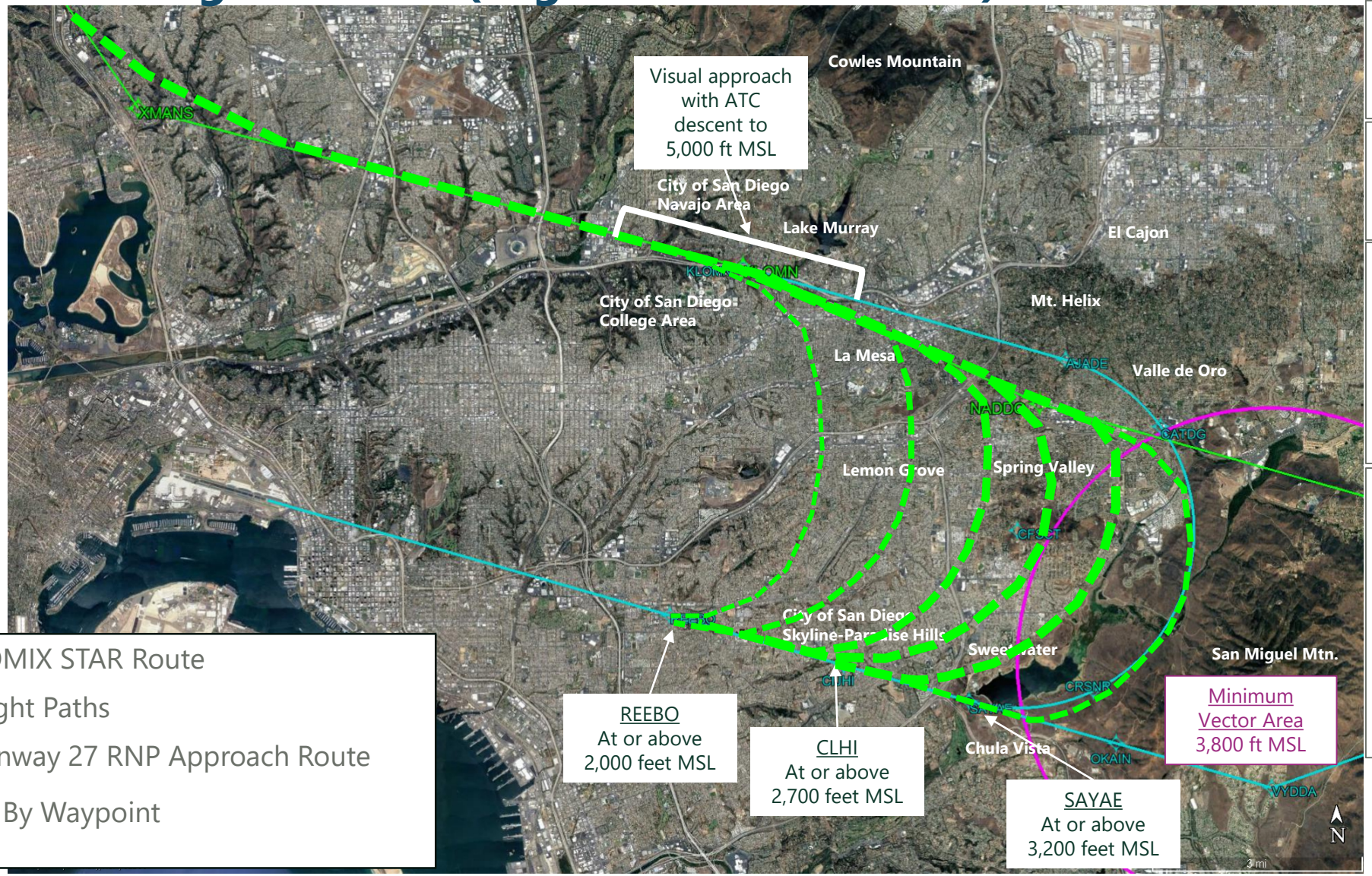
Objectives:
1. Raise Altitude on Downwind: Yes
2. Maintain Dispersion: Yes
3. Turn South Over Less Populated Areas: No

Potential Limitations:
Limits area for FAA ATC to manage traffic to join the final approach.

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground

SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (COMIX STAR route, Runway 27 RNP Approach route, Minimum Vector Area); Ricondo & Associates, Inc., April 2019 (NADDO at 6,000 ft MSL concept)

FAA ATC Managed Arrival (High Demand Periods)



COMIX STAR Route

Flight Paths

Runway 27 RNP Approach Route

Fly By Waypoint

Intent: Maintain dispersion as aircraft turn south to join the final approach

Concept: Maintain dispersion procedures when air traffic demand is high

Objectives:
1. Raise Altitude on Downwind: No
2. Maintain Dispersion: Yes
3. Turn South Over Less Populated Areas: No

Potential Limitations: No limitations. Represents existing ATC operating procedures. Does not address current noise concerns, but maintains FAA ability to efficiently manage traffic

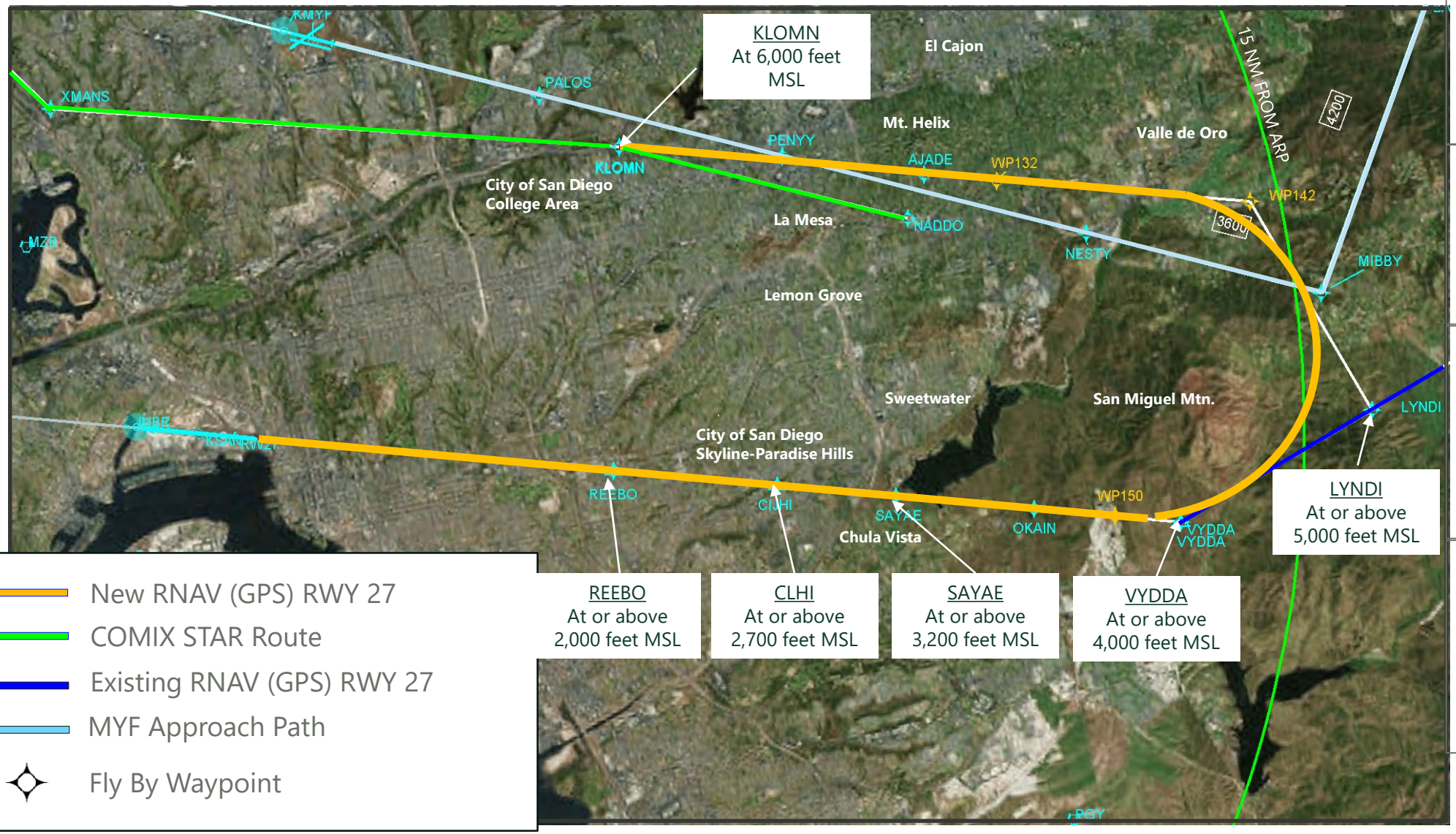
NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground
SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (COMIX STAR route, Runway 27 RNP Approach route); Ricondo & Associates, Inc., April 2019 (modified COMIX STAR concept and flight path).

Extended RNAV Approach from KLOMN to VYDDA Design

ECWG Extended RNAV Approach Design

- Started with proposed concept to join final approach at VYDDA:
  - Considered terrain and obstructions
  - Considered maintaining descent to avoid level segments
  - Considered other published procedures
- If not feasible, consider modified concept to join final at modified waypoint

Extended RNAV Approach from KLOMN – Iteration 1



Intent: Reduce noise levels by raising jet arrival altitude and moving traffic further east

Concept: Keep jet arrival altitude at 6,000 ft. MSL at KLOMN waypoint, thence follow RNAV approach further east

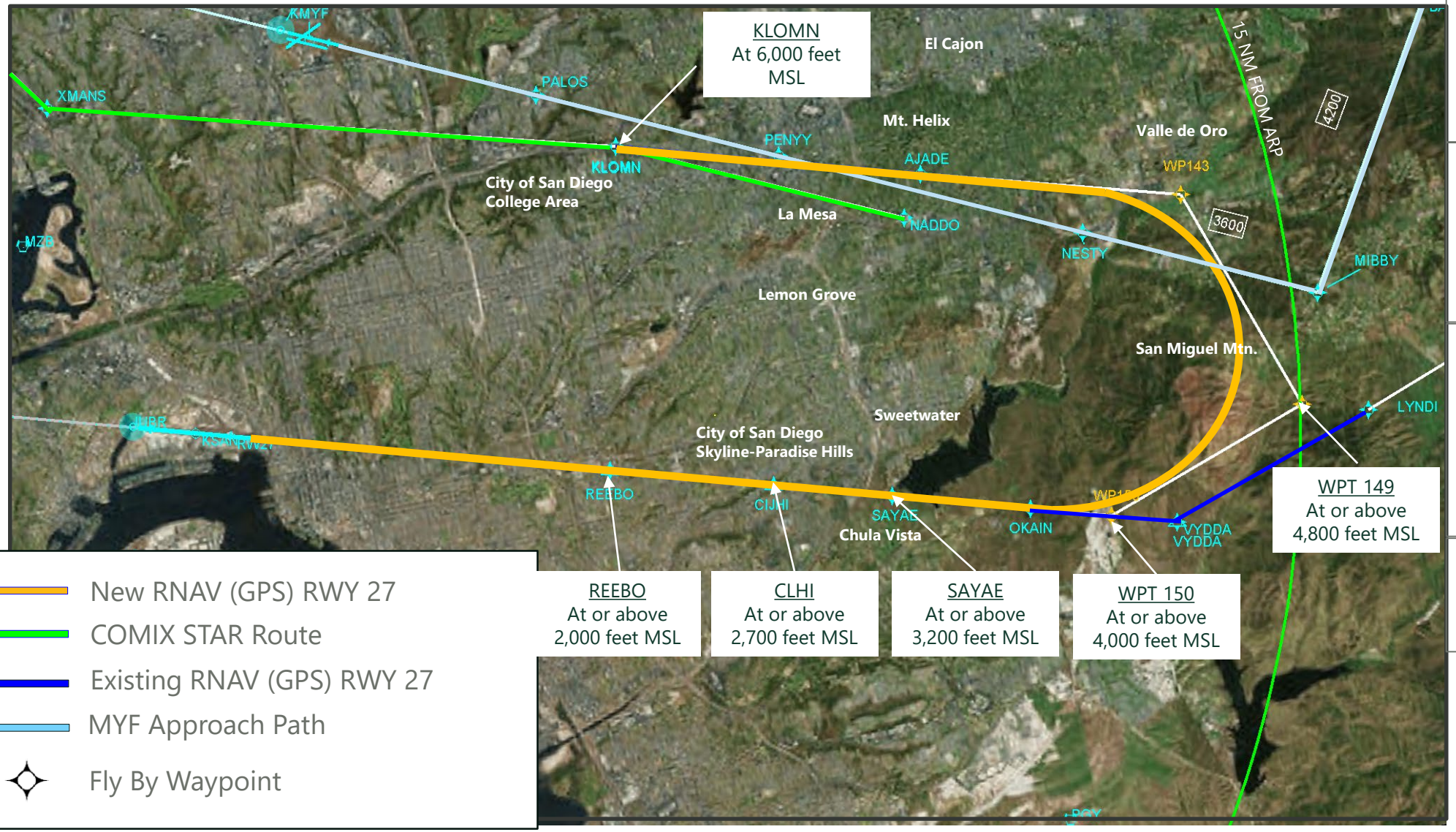
Objectives:
1. Raise Altitude on Downwind: Yes
2. Maintain Dispersion: No
3. Turn South Over Less Populated Areas: Yes

Limitations: Conflict with Montgomery Field approach and LYNDI STAR. Requires waiver to allow for a longer intermediate segment.

Extended RNAV Approach from KLOMN to VYDDA – Iteration 1 Notes

- Procedure ties into existing RNAV (GPS) Y RWY 27 Approach
  - Converging at LYNDI
  - Allows for a stable transition into the final straight segment
- Requires waiver
  - Intermediate Segment is longer than 15 NM and is beyond 15 NM from the Airport Reference Point (ARP)
  - Several adjustments (i.e., speed) were attempted but all would require a waiver
- Increases ATC complexity
  - Conflicts with Montgomery Airport approach to Runway 28L
  - Conflicts with LYNDI RNAV STAR
- Increased flight miles versus RNAV (GPS) Z RWY 27
- **Design is not feasible due to waiver requirement**

Extended RNAV Approach from KLOMN – Iteration 2



Intent: Reduce noise levels by raising jet arrival altitude and moving traffic further east

Concept: Keep jet arrival altitude at 6,000 ft. MSL at KLOMN waypoint, thence follow RNAV approach further east

Objectives:
1. Raise Altitude on Downwind: Yes
2. Maintain Dispersion: No
3. Turn South Over Less Populated Areas: Yes

Limitations: Conflict with Montgomery Field approach and LYNDI STAR.

Extended RNAV Approach from KLOMN to New Waypoint – Iteration 2 Notes

- Procedure intercepts existing RNAV (GPS) RWY 27 **east of VYDDA**
- No waivers required
- Increased ATC complexity
  - Conflicts with Montgomery Airport approach to Runway 28L
  - Conflicts with LYNDI RNAV STAR
  - Creates a new approach route to Runway 27
- Increased flight miles versus RNAV (GPS) Z RWY 27
- **Primary concern is increased complexity added to ATC**

Consultant Recommendations

- Concerns
  - Likelihood of FAA approval – low
    - Additional complexity related to procedure conflicts
    - Increase in flight distance may encounter user concerns during FAA RNAV process

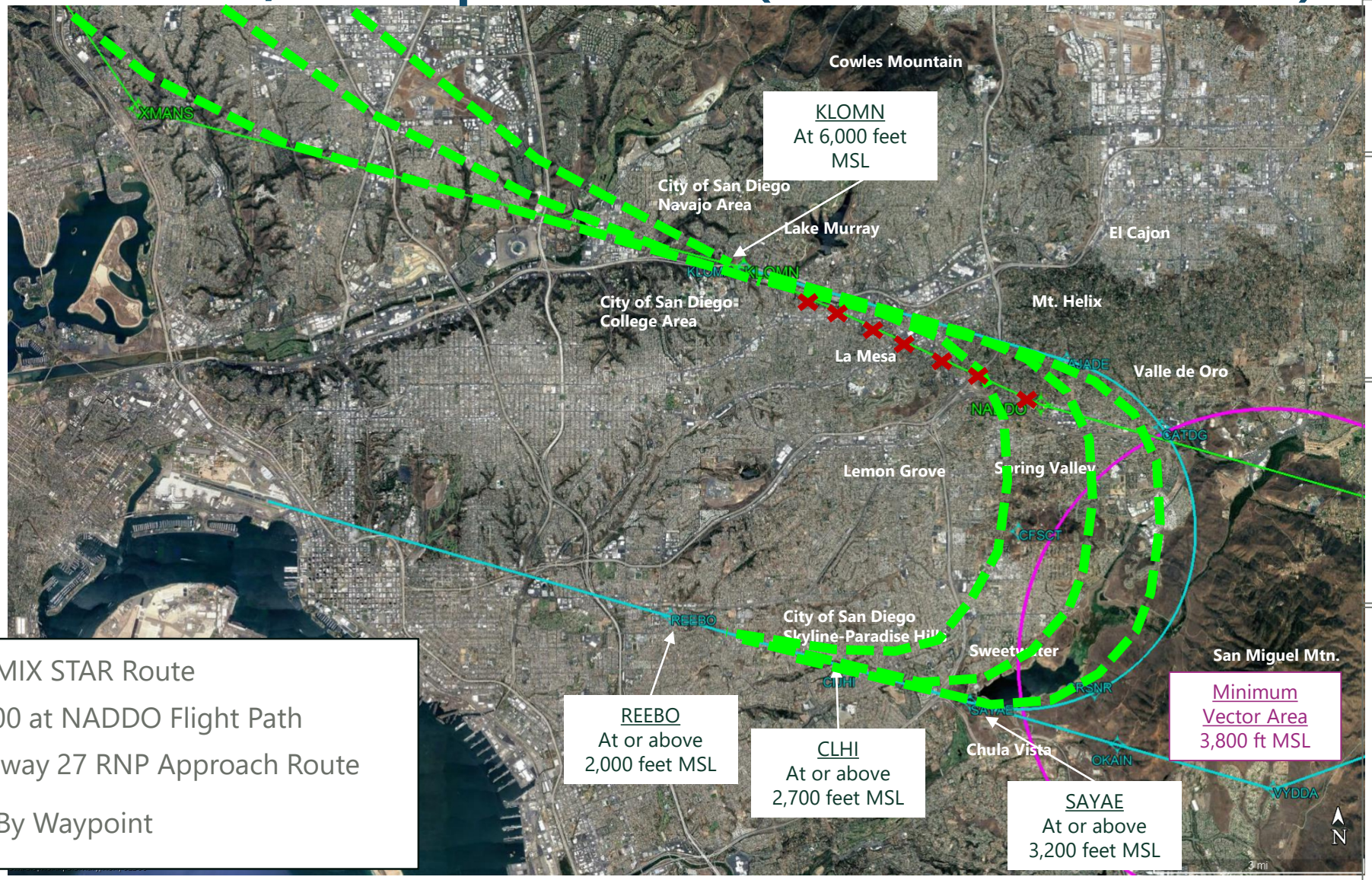
Note: Need to discuss design and potential complexity with FAA to confirm

Draft Design Concepts

Draft Concept Overview

- A single draft concept is proposed – made of multiple procedures based on when FAA can accommodate
- Includes two existing procedures (Runway 27 RNP Approach and ATC Radar and Visual Approach)
- One design concept involves a new RNAV approach procedure and one that involves a modification to the existing COMIX RNAV STAR
- Procedure concepts are intended to be used when possible during a given day based on demand – provides opportunities for dispersion, higher altitudes on the downwind path and turning south over more compatible areas when able.
- Procedures will not prohibit FAA ATC from re-directing flight.
- Will require encouragement to increase use of procedures.

Keep Arrivals at 6,000 ft up to KLOMN (Remove NADDO Route)



COMIX STAR Route

6,000 at NADDO Flight Path

Runway 27 RNP Approach Route

Fly By Waypoint

Intent: Reduce noise levels by raising jet arrival altitude and prevent closer turns to airport

Concept: Remove route to NADDO and keep jet arrival altitude at 6,000 ft. MSL at KLOMN waypoint, thence descend to join final approach

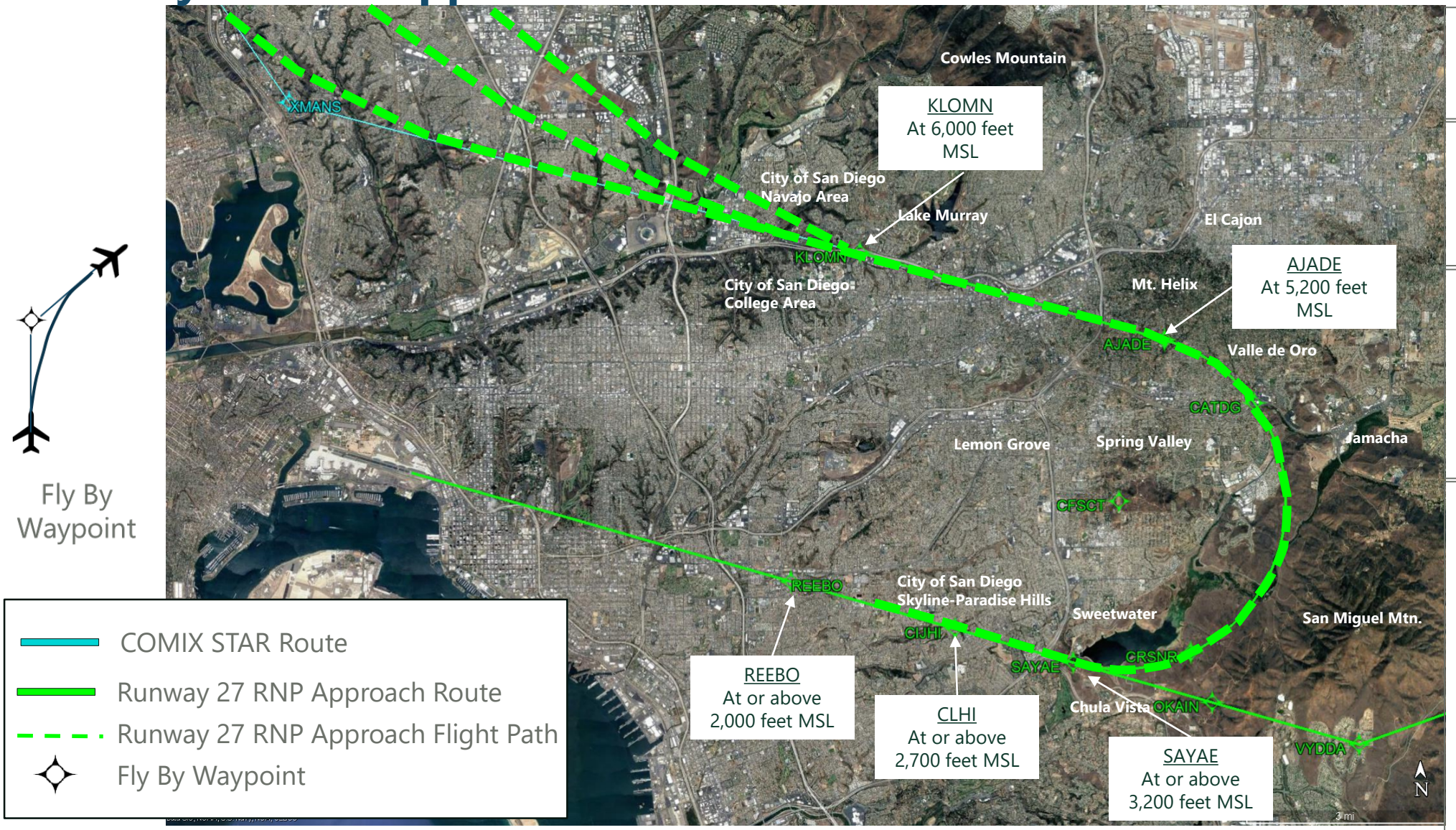
Objectives:
1. Raise Altitude on Downwind: Yes
2. Maintain Dispersion: Yes
3. Turn South Over Less Populated Areas: No

Potential Limitations:
Limits area for FAA ATC to manage traffic to join the final approach. FAA may require the proposed Class B airspace be implemented prior to removing the KLOMN to NADDO route

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground

SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (COMIX STAR route, Runway 27 RNP Approach route, Minimum Vector Area); Ricondo & Associates, Inc., April 2019 (NADDO at 6,000 ft MSL concept).

Runway 27 RNP Approach



Fly By Waypoint

COMIX STAR Route

Runway 27 RNP Approach Route

Runway 27 RNP Approach Flight Path

Fly By Waypoint

Intent: Reduce noise levels by locating arrivals over more compatible areas

Concept: Emphasize use of the Runway 27 RNP approach over ATC directed visual approach

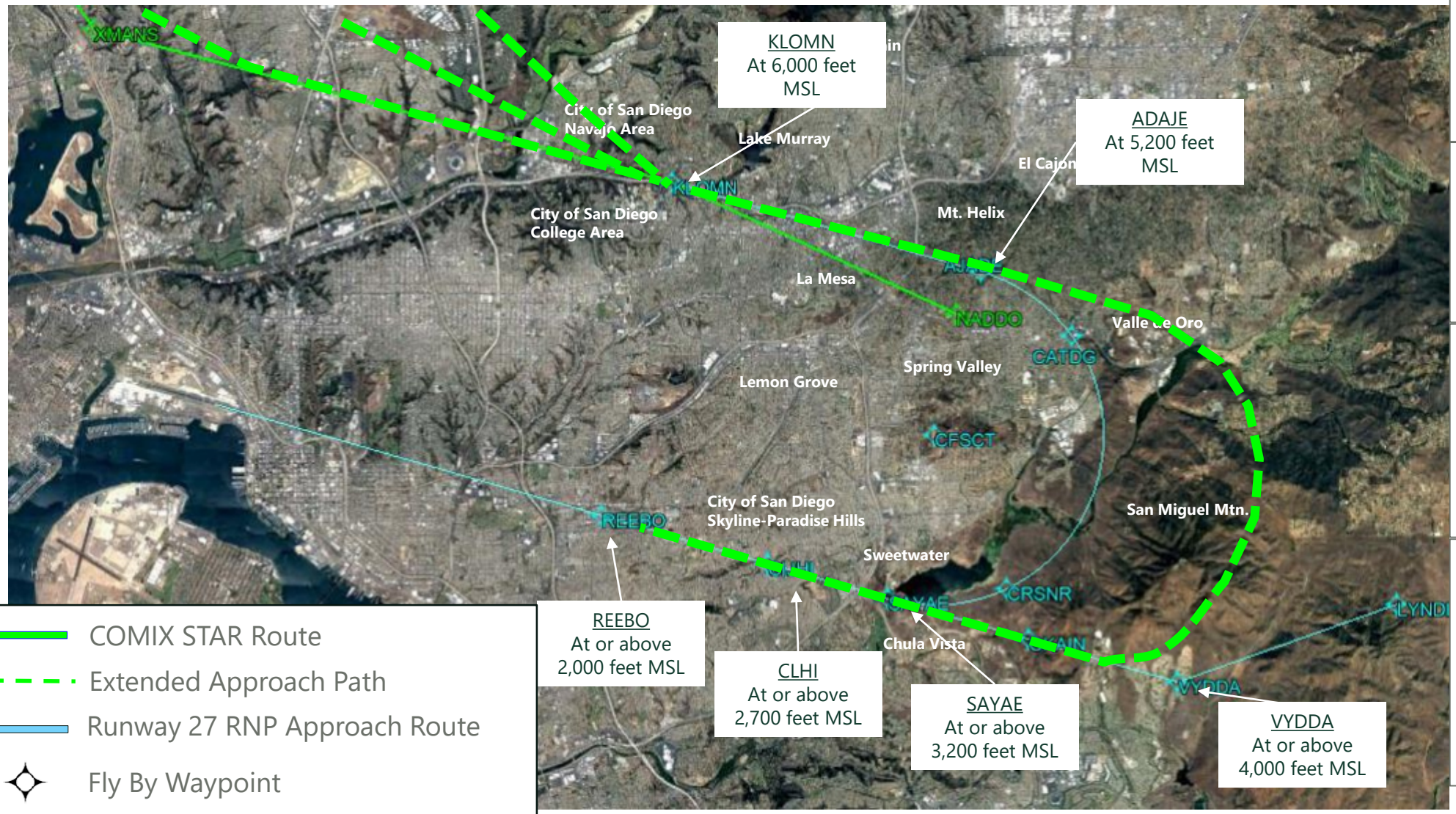
Objectives:
1. Raise Altitude on Downwind: Yes
2. Maintain Dispersion: No
3. Turn South Over Less Populated Areas: Yes

Potential Limitations: RNP approach is limited to aircraft with required equipment and pilots authorized to fly the approach.

Would concentrate more arrivals over areas underneath the RNP flight path

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground
SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (COMIX STAR route, Runway 27 RNP Approach route); Ricondo & Associates, Inc., April 2019 (RNP approach flight path).

Extended RNAV Approach from KLOMN to Waypoint Close to VYDDA



Intent: Reduce noise levels by raising jet arrival altitude and moving traffic further east

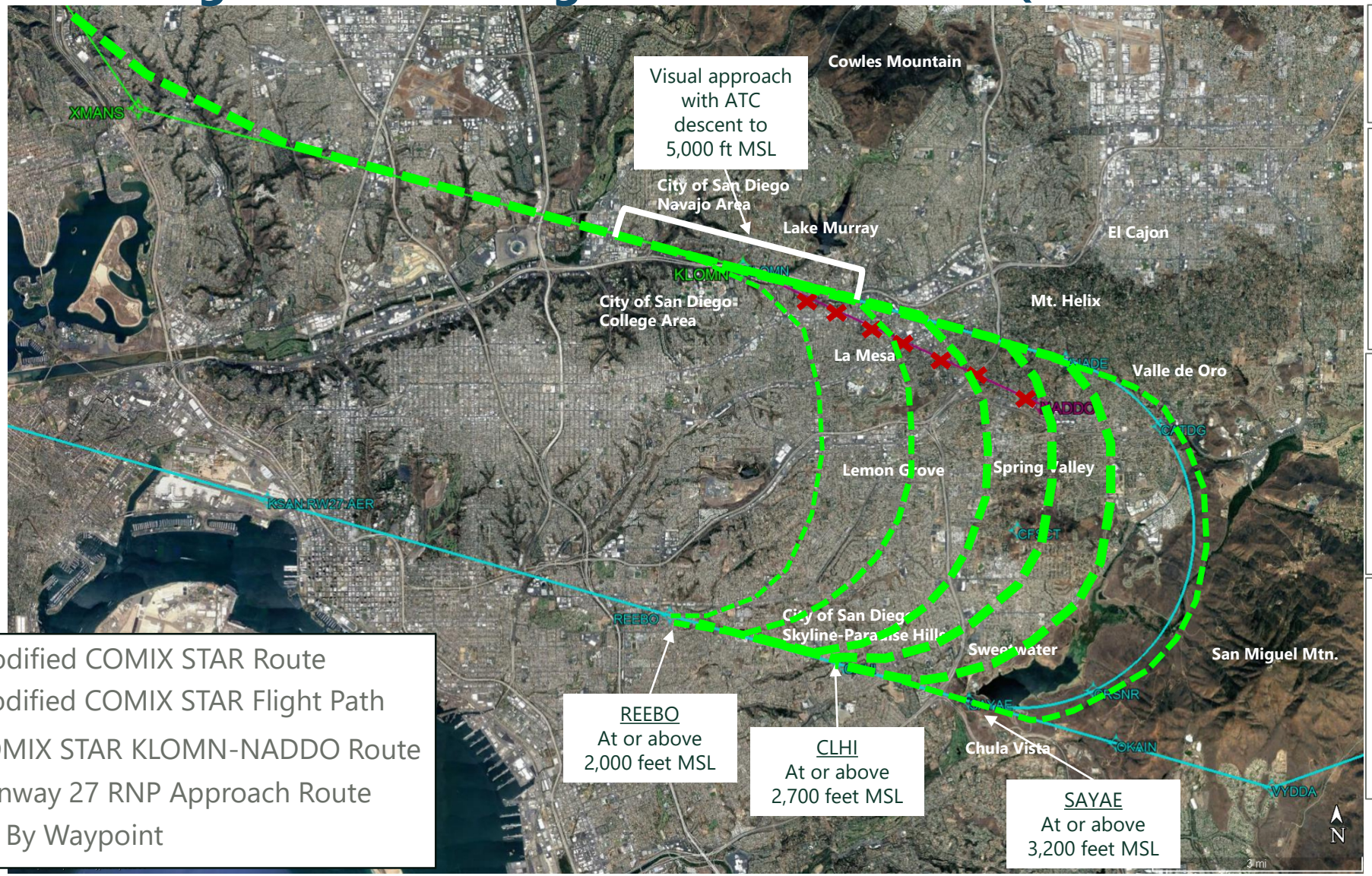
Concept: Keep jet arrival altitude at 6,000 ft. MSL at KLOMN waypoint, thence follow RNAV approach further east

Objectives:
1. Raise Altitude on Downwind: Yes
2. Maintain Dispersion: No
3. Turn South Over Less Populated Areas: Yes

Potential Limitations:
Adds complexity to ATC and increases distance. May be applicable when demand levels are low during nighttime hours (11pm to 6am).

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground
SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (COMIX STAR route, Runway 27 RNP Approach route); Ricondo & Associates, Inc., July 2019 (proposed extended approach path).

FAA ATC Managed Arrival – High Demand Periods (Remove NADDO Route)



Modified COMIX STAR Route
Modified COMIX STAR Flight Path
COMIX STAR KLOMN-NADDO Route
Runway 27 RNP Approach Route
Fly By Waypoint

REEBO
At or above 2,000 feet MSL

CLHI
At or above 2,700 feet MSL

SAYAE
At or above 3,200 feet MSL

Intent: Maintain dispersion as aircraft turn south to join the final approach

Concept: Discontinue use of the route between the KLOMN and NADDO waypoints and maintain dispersion procedures when air traffic demand is high

Objectives:
1. Raise Altitude on Downwind: No
2. Maintain Dispersion: Yes
3. Turn South Over Less Populated Areas: No

Potential Limitations: FAA may require the proposed Class B airspace be implemented prior to removing the KLOMN to NADDO route

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground
SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (COMIX STAR route, Runway 27 RNP Approach route); Ricondo & Associates, Inc., April 2019 (modified COMIX STAR concept and flight path).

Eliminated Design Concepts

Keep Arrivals at 6,000 ft up to NADDO

Fly By Waypoint

- COMIX STAR Route
- 6,000 at NADDO Flight Path
- Runway 27 RNP Approach Route
- Fly By Waypoint

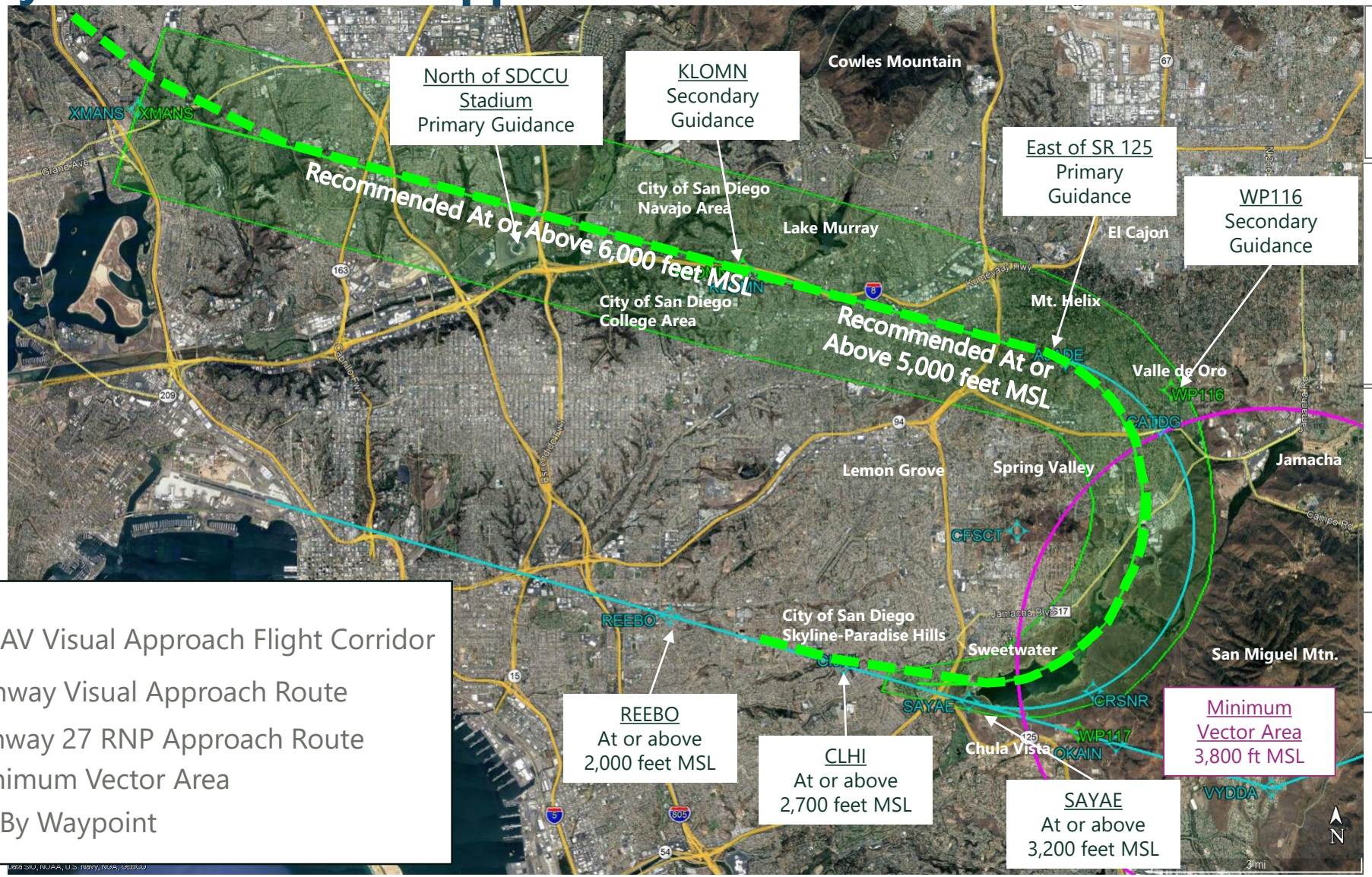
Intent: Reduce noise levels by raising jet arrival altitude

Concept: Keep jet arrival altitude between KLOMN and NADDO waypoints at 6,000 ft. MSL, thence descend to join final approach

Eliminated: Preference is to remove route between KLOMN and NADDO; therefore, a design concept maintaining NADDO waypoint is no longer considered. Would also reduce area for ATC to manage and merge arrivals with traffic from the east. Terrain would also limit ATC ability to efficiently manage traffic.

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground
SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (COMIX STAR route, Runway 27 RNP Approach route, Minimum Vector Area); Ricondo & Associates, Inc., April 2019 (NADDO at 6,000 ft MSL concept).

Runway 27 RNAV Visual Approach



Fly By Waypoint

RNAV Visual Approach Flight Corridor

Runway Visual Approach Route

Runway 27 RNP Approach Route

Minimum Vector Area

Fly By Waypoint

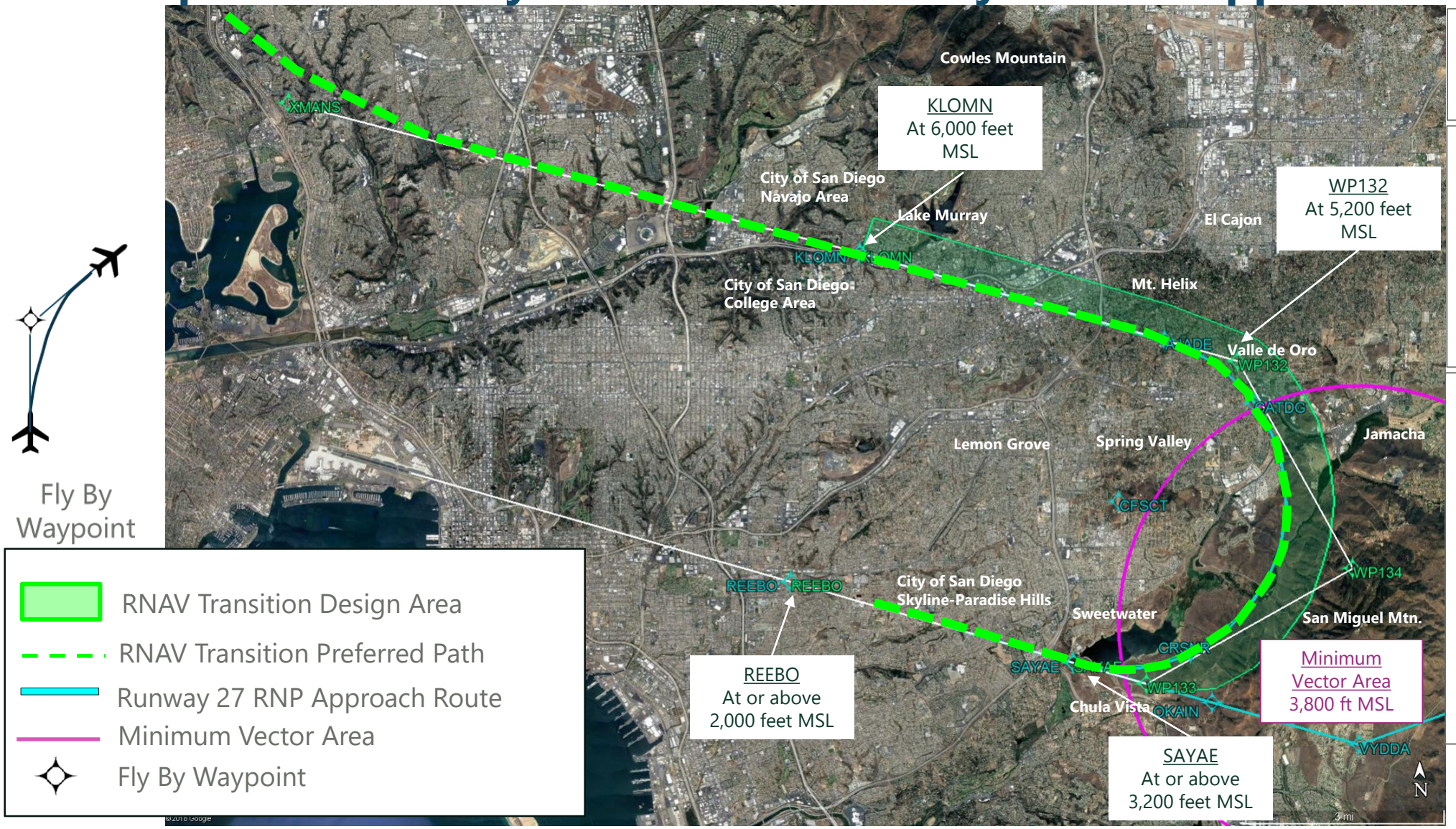
Intent: Reduce noise levels by locating arrivals over more compatible areas with some dispersion

Concept: Keep jet arrivals a visual approach along an eastbound path at RNP approach altitudes and turn south over more compatible area

Eliminated: Based on input from the ECWG airline pilot member, the likelihood that the visual approach would be requested over an RNAV approach is very low due to increased workload and increased possibility for an unstable approach.

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground
SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (Runway 27 RNP Approach route, Minimum Vector Area); Ricondo & Associates, Inc., April 2019 (RNAV Visual approach concept route and corridor).

Develop RNAV Runway Transition to Runway 27 Final Approach



Fly By Waypoint

- RNAV Transition Design Area
- RNAV Transition Preferred Path
- Runway 27 RNP Approach Route
- Minimum Vector Area
- Fly By Waypoint

Intent: Reduce noise levels by locating arrivals over more compatible areas

Concept: Provide RNAV runway transition that mimics Runway 27 RNP approach and does not require additional navigation equipment and pilot authorization

Eliminated: An RNP approach is currently published and implementing an RNAV approach over same area may increase more frequent concentration, which conflicts with ECWG's objective to maintain as much dispersion as possible.

NOTE: Mean Sea Level (MSL) – height above sea level; Above Ground Level (AGL) – height above the ground
SOURCE: Google Earth, April 2019 (aerial photograph); Federal Aviation Administration, November 2018 (Runway 27 RNP Approach route; Minimum Vector Area): Ricondo & Associates, Inc., April 2019 (RNAV Runway Transition concept flight path).

Next Steps

Next Steps

- Meet with FAA SCT TRACON to discuss extended approach and the feasibility of managing arrivals differently based on demand
- Refine design concepts as necessary
- Conduct noise screening analysis on design concepts
- Review final design concepts and noise screening results with ECWG