Environmental Impact of High Speed Rail in California

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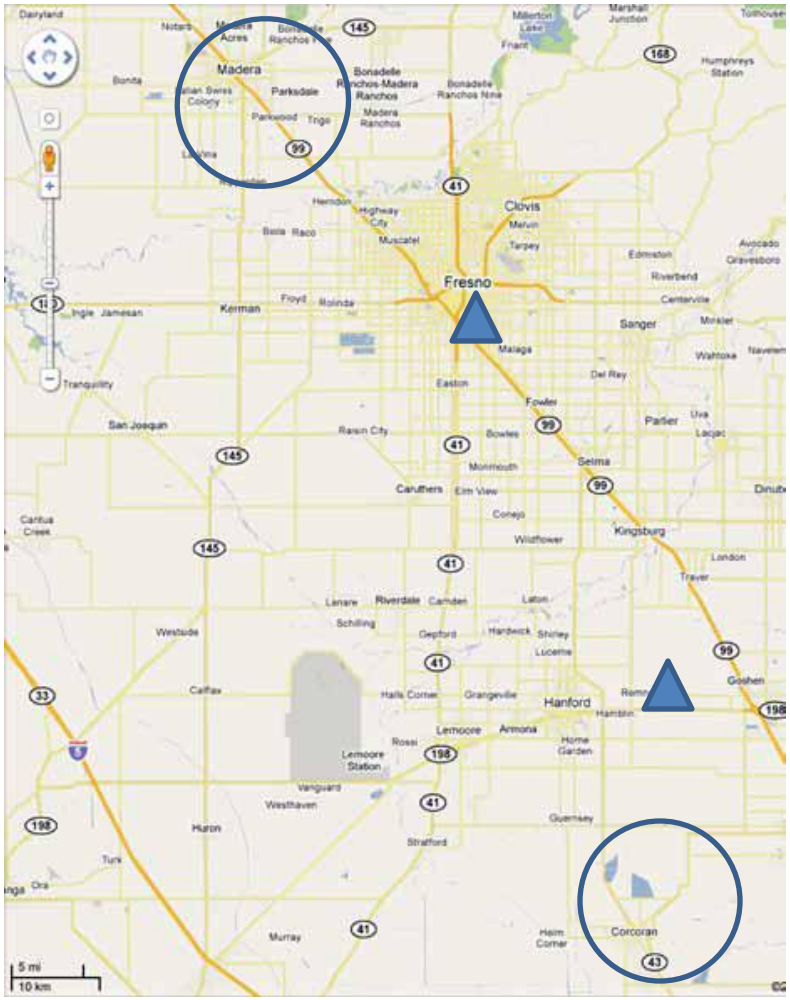
The CHSRA Proposal

- Up to 800 mi of rail lines – 500 mi in first phase, San Francisco to LA/Anaheim
- Construction to begin ~2012; passenger service on first phase ~ 2020
- Trains : up to 1000 passengers each
- Speeds: up to 220 mph
- Stations: up to 24
- Headways l as low as 5 min. in peaks
- Fares: $100+ SF-LA
- Ridership estimate: ~100 M a year by 2030 (max. est.)
- Costs – $40B (2008 est.), $42.6 billion in year-of-expenditure dollars for phase one only (2009)

Source: CHSRA website

HSR First Phase for Construction

- Federal Railroad Administration: stimulus funding & FY 2010-11 dollars must go to a **single section** of the project in the Central Valley.
- Staff recommendation: 65 mile segment Madera to Corcoran ; two stations –downtown Fresno and east of Hanford
- Estimated costs: $4.15 billion – leaves enough money to connect tracks to existing rail lines if necessary (per federal "independent utility" requirement.)
- Will allow next link to go either direction



Source: CHSRA press release

Station locations

2- Planning and Environmental Review Process: Multi-phased, Ongoing

- **Scoping** – determining the project, alignment and station options (done for all segments)
- **Alternatives Analysis** – added by CHSRA - not legally required for HSR but being used to get public input on choices (some segments still underway, 2d round)
- **Draft and Final EIR/EISs**:
  - Statewide system environmental review (completed 2005)
  - Section by section environmental reviews (10 sections! - underway)

FOLLOWED BY

- Right of way acquisition, construction procurement, construction, testing, commissioning
- Operations (could be on usable segments)

Environmental Issues Being Addressed

- Air quality
- Energy use
- Greenhouse gas emissions
- Water quality
- Impacts on wetlands, streams
- Impacts on habitat
- Impact on flora and fauna – endangered and threatened species: takings, other special concerns
- Noise and vibrations – effects on natural environment use and enjoyment (parks, wildlife)

Transportation and Utilities Impacts

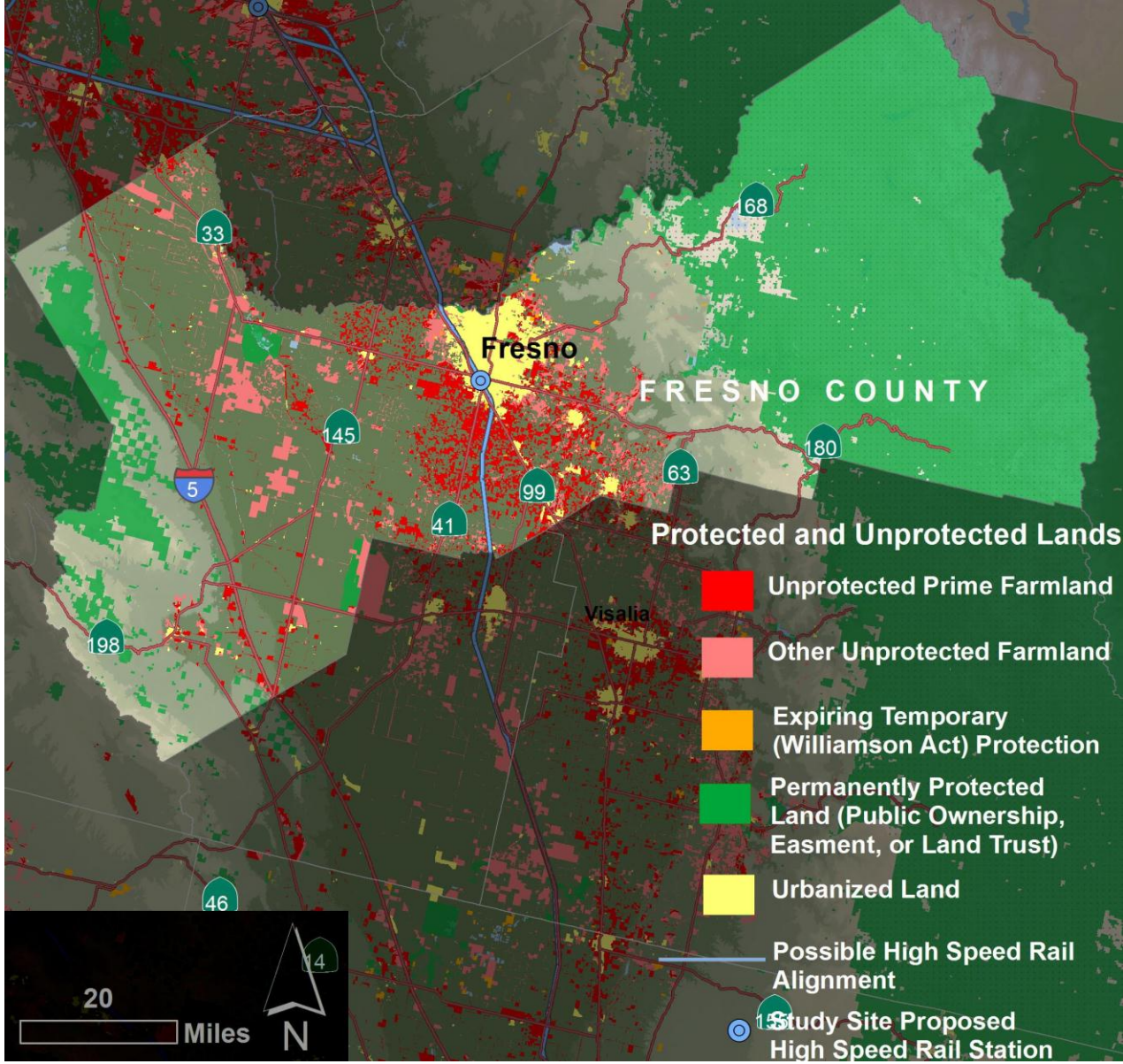
- Disruption to rail and road transport during construction
- Permanent impacts on rail operations due to, e.g., loss or relocation of sidings
- Permanent changes to traffic circulation - increased circuity and delay due to protection of ROW
- Traffic and parking impacts around stations
- Disruption, relocation of utilities
- New multimodal terminals and feeders services – transit improvements for broad catchment area could be induced or added as traffic mitigation

Land Use Impacts

- Takings of homes and businesses – full and partial
- Loss of access to urban and rural parcels; severance
- Waterways, wetlands and nature preserves or biologically sensitive habitat areas affected
- Parklands lost, trails crossed
- Prime and unique farmland and farmland of statewide or local importance within limits of disturbance
- Encroachment into areas of highly erodable or otherwise sensitive soils
- Visual impacts of elevated structures, sound walls, other elements – can affect property values, enjoyment of open space
- Noise and vibration affects on built environment
- New opportunities for infill, higher densities around HSR stations
- New businesses, economic development to serve travelers

Example: Protected and Unprotected Farmlands in Fresno County

- Most of the farmland in the County is unprotected
- Will HSR spur further development or help create plans and impetus for more compact growth?



Particular Concerns about Environmental Impacts Raised by Stakeholders

- Noise (>90dBA at high speeds) and visual intrusion of elevated structures and/or sound walls, fences in urban areas
- Access restrictions due to protection of ROW
- Impact on farming – severance, access restrictions
- Impact on parks, recreation areas (intrusion)
- Adverse effects of noise on wildlife
- Adverse effects on endangered and threatened species from noise, barriers, road kill
- Public acceptability, costs and timing of compact growth and transit feeders to support ridership and reduce traffic impacts

Air quality, GHG, energy issues are big for researchers & state agencies but do NOT appear to top the list for stakeholders

CHSRA's Anticipated Benefits

Transportation	Employment	Environmental Quality	Urban Vitality
Congestion relief on freeways and at airports	Up to 100,000 construction-related jobs	Improved air quality	Revitalized communities, economic development around stations
Faster travel between major metropolitan areas	Up to 450,000 permanent new jobs over 25 yrs created by HSR economic growth	Improved energy efficiency: 1/3 energy use of planes, 1/5 that of cars	Transit- and pedestrian-oriented infill development
Improved movement of people, goods and services		Reduced dependence on foreign oil: 12.7 million barrels less per year	Enhanced public safety due to separation of tracks and highways
		Reduced greenhouse gas emissions: 12 billion pounds less per year	

Source: http://www.cahighspeedrail.ca.gov/project_vision.aspx

3 - Will Environmental Costs and Benefits Materialize? Costs Will…

- Opportunity costs of massive investment (note: highest ridership est. for 2030 is about what BART alone carries now)
- Many environmental costs are the result of construction of the rail lines – land takings, severance, access disruption, visual impacts -
- Some are the result of operating trains, whether or not they attract passengers – noise, a good part of the energy and emissions
- Mitigation is required in CA, and is being aggressively pursued, but is imperfect

Benefits?

- depend on detailed system operation – number of runs, number of stops, travel time and cost compared to alternatives – not settled yet
- Jobs- presented as benefits, but some of these jobs are costs!
- Relative benefits for energy use, air pollution, GHG emissions depend on mode shares (ridership forecasts are the big issue here)
- Ridership may also be affected (probably second or third order effect) by local development patterns and transit investments – mostly outside control of CHSRA (regional and local plans)
- Alternatives to HSR could improve performance over time – reducing benefits - or deteriorate further, increasing HSR's relative attractiveness
  - Depends in part on technology (e.g., how fast vehicle emissions and energy use improve in air, auto modes; improvements in ATC and highway ops as well)
  - Also depends in part on public policy (e.g., willingness to widen highways, add runways – these are NOT very popular in CA – and to subsidize minor airports and their air services)

Concerns about the Project

- **Megaproject:** concern that costs are underestimated, ridership overestimated
  - E.g., David Levinson, Reason Foundation: could reach $80B+ in costs with only ~20 M riders a year by 2030
  - Funding for even current ~$40 B not secured and having to borrow more could raise total costs substantially (see, e.g., Enthoven et al.)
  - Ridership estimates went up substantially between CRA and CSI forecasts – not clearly explained
  - Methodological problems? dispute between ITS and CHSRA & CSI, e.g.
- Why is this an environmental issue?
  - Many environmental benefits depend on ridership levels: air quality, energy, CO2 emissions avoidance, urban revitalization due to station area activity
  - Some environmental costs are also a function of ridership, e.g. traffic impacts around stations

Concerns about the project (cont.)

- Many environmental costs result from **building the system** - whether or not there is good ridership: takings, severance, circuity, impacts on parks, farmland, visual impact. Reducing impacts may require costly mitigation measures or changes in facilities and services.
  - Lawsuits already filed over Peninsula impacts
  - More litigation may be filed over parks, other impacts as details are developed
- Some impacts depend on **number of trains operating** regardless of ridership, e.g. noise, vibrations, a portion of energy and emissions impact
- Some impacts are a **function of ridership** – e.g., traffic in station areas - therefore out of pocket costs, access, wait, and in-vehicle travel times) will be critically important, as well LOS on competing modes .
- Risky business: load factors, frequency of service, number of stops, link speeds
- Mitigation costs and impacts not yet fleshed out

Concerns (cont.)

- Life cycle analysis (cradle to grave, from manufacturing of vehicles, guideways, and stations including production of inputs, through disposal of same, e.g., solid waste disposal) - can change environmental assessment considerably
  - Such analysis is not currently required, but is increasingly common
  - Concern applies to all modes, not just HSR

Costs and Benefits Compared to What?

- Comparative environmental costs and savings depend on what is assumed to be happening in air and highway transport (the competition)
- What do we compare?
  - HSR construction compared to new construction of equivalent capacity for air and highway travel, e.g., widened roadways, more flights, more runways?
  - Effects of additional use with little or no capacity expansion and resulting congestion?
  - Assume other modes will produce technological advances that accommodate increased demand without deterioration in conditions?
  - Assume current subsidies and services will continue, e.g., subsidies to minor airports, subsidies to transit services?

- Existing plans only help a little – not enough detail; assumptions and time horizons differ

→ *SCENARIOS needed*.

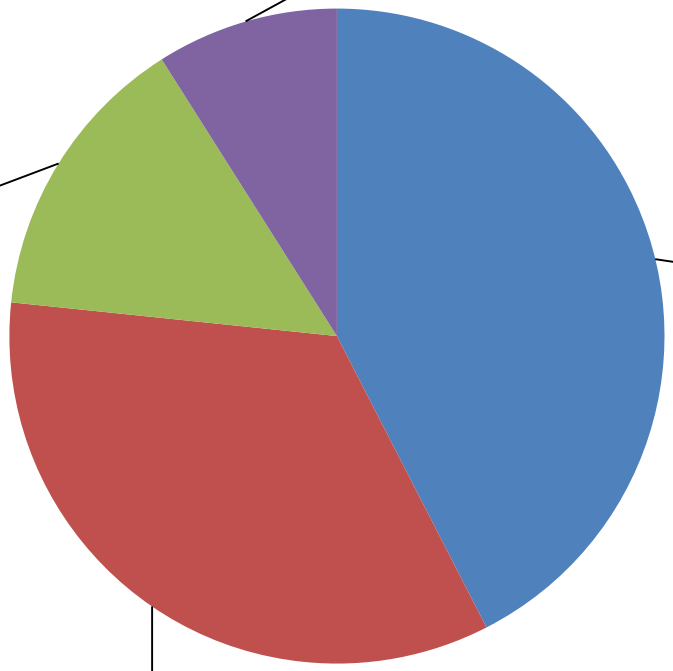
Additional Questions with Environmental Consequences

- How use of rail ROW would affect ability to move more freight by rail (only sketchily analyzed to date in publicly available studies)
- Longer term effects of global warming – e.g., flooding, storms affecting CA airports (could change cost functions
- How AB32 and SB375 plans will change local investments in higher densities, transit; how they will affect investments in highways and airports
- Effect of comfort, ability to use time more effectively during travel; affect on mode choice (SP surveys address this in part, but how well do they predict esp. for Californians with limited train experience?)
- Induced travel – how many new trips would be made that are not made now? (could be negative from an environmental perspective)
- How mitigation, segment by segment, will affect costs and impacts – e.g., if have to tunnel on Peninsula, who will cover costs and what will impact be

Infill Development Potential – Fresno

footprint area (existing buildings), 14%

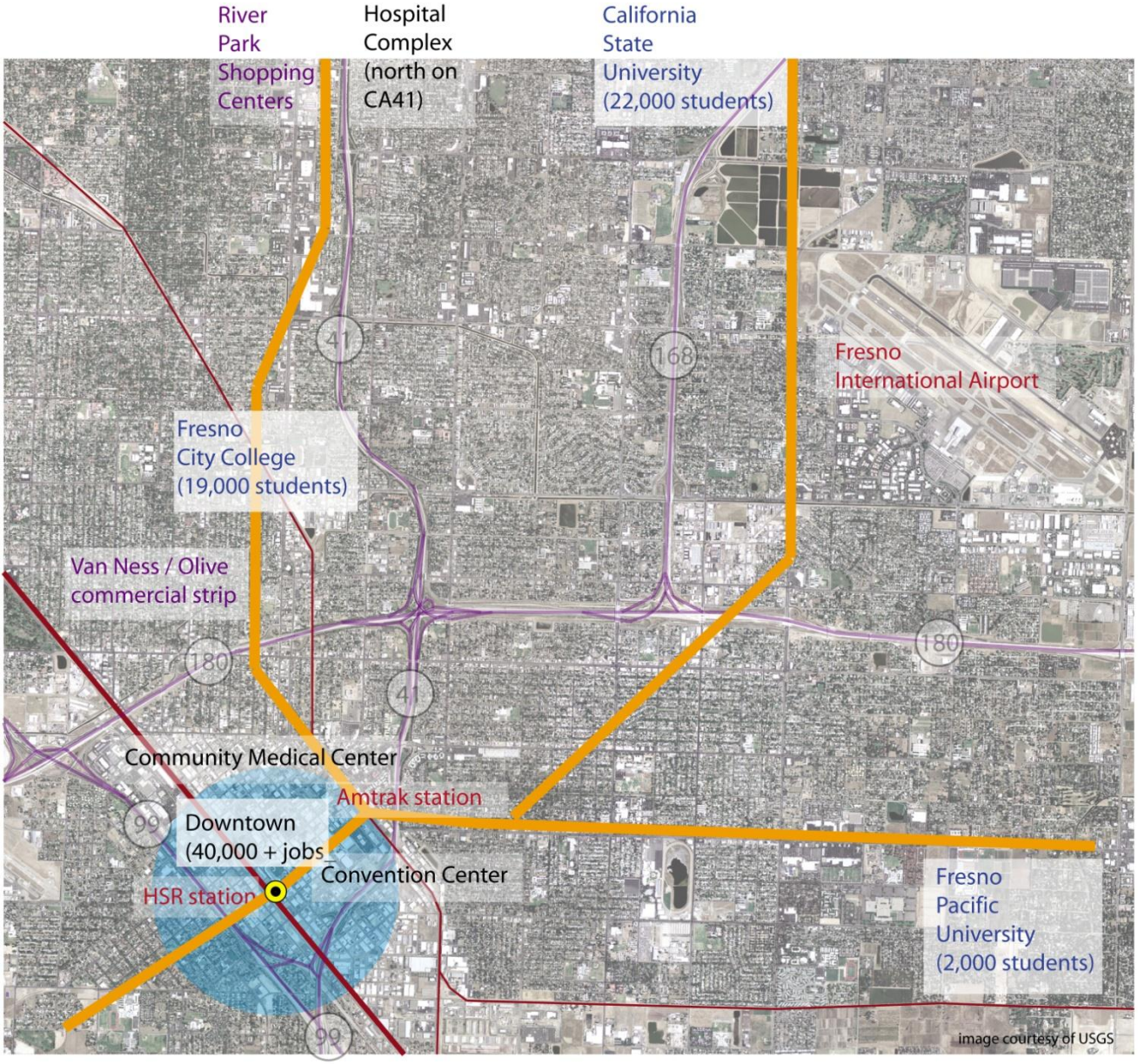
parking lot area, 9%



Un(der)developed block area (not including parking and buildings), 43%

right of way area, 34%

Infill Examples



Possible future BRT corridors connecting major employment and activity centers

BRT corridors should connect the major regional destinations (California State University, Fresno City College, Fresno International Airport, the River Park Shopping Centers, and the Fresno Pacific University) to the downtown.

Within the downtown, it is important that these bus routes connect the HSR station, the Amtrak station, the Community Medical Center and other important destinations.

N

0 1 mile

Possible BRT corridors

Rail

HSR corridor

Freeways

15 minute walk from HSR station

Summing Up: Risks, but Potential as Well

- Ability to make productive use of time on train may be more attractive than previously considered
- SB375 plans to increase densities, activity levels around transit and HSR station areas could create more supportive environments for HSR use
- SB375 plans to improve local transit with intermodal connectivity could make it easier to use HSR