Alternative Narrowing Process

Small Isolated Delta Conveyance Facility

Alternative 3C

Alternatives 3C and 3A are identical except for the type of isolated facility used to convey 5,000 cfs from a diversion on the Sacramento River at Hood to the Clifton Court Forebay. Alternative 3C proposes a pipeline option for the isolated facility, while alternative 3A proposes an open canal

Canal (Alt 3A)	**Pipeline (Alt 3C)**
Pumping plant lift: 10 ft	Pumping Plant lift: 150 ft
Length of canal: 44 miles	Length of pipeline: 44 miles
Canal: trapezoidal section 340 ft wide, 27 ft deep	Pipeline: three side-by-side buried 18 foot inside diameter concrete pipelines
Width of Right-of-Way: 1,000 ft	Width of Right-of-Way: 500 ft
Right-of-Way: 5,330 acres	Right-of-Way: 2,515 acres
Siphon crossings under all waterways	Pipeline crossing under all waterways
Bridges over canal for all county roads, state highways, and railroads	Pipeline crossing under all county roads, state highways
Vulnerable to introduction of pollutants	Water quality protected
Easier to construct turnouts to service areas	More difficult to turnout for service areas
Potential for recreation and waterfowl habitat areas	Potential for wildlife habitat established over buried pipeline
Easier to increase the capacity of the canal at some future date	Need to bury another pipeline to increase capacity in future. An assurance against expansion.
Energy cost: $1 Million/year	Energy Cost: $12 Million/year
Capital Cost: $857 Million	Capital Cost: $2,067 Million

Recommendation:
Given that the alternatives 3A and 3C are identical except for the conveyance method, the environmental impacts of both alternatives can be mitigated so that the difference between the impacts are slight, and the conveyance method in 3C costs 2 to 3 times that of 3A, it is recommended that alternative 3A adequately represents the alternative concept and alternative 3C be dropped from consideration

Alternative Narrowing Process

Small Isolated Delta Conveyance Facility

Alternative 3D

Alternatives 3D and 3B are identical except for the type of isolated facility used to convey 5,000 cfs from a diversion on the Sacramento River at Hood to the Clifton Court Forebay. Alternative 3D proposes a pipeline option for the isolated facility, while alternative 3B proposes an open canal

Canal (Alt 3B)	Pipeline (Alt 3D)
Pumping plant lift: 10 ft	Pumping Plant lift: 150 ft
Length of canal: 44 miles	Length of pipeline: 44 miles
Canal: trapezoidal section 340 ft wide, 27 ft deep	Pipeline: three side-by-side buried 18 foot inside diameter concrete pipelines
Width of Right-of-Way: 1,000 ft	Width of Right-of-Way: **500 ft**
Right-of-Way: 5,330 acres	Right-of-Way: 2,515 acres
Siphon crossings under all waterways	Pipeline crossing under all waterways
Bridges over canal for all county roads, state highways, and railroads	Pipeline crossing under all county roads, state highways
Potential for recreation and waterfowl habitat areas	Potential for wildlife habitat established over buried pipeline
Vulnerable to introduction of pollutants	Water quality protected
Easier to construct turnouts to service areas	More difficult to turnout for service areas
Easier to increase the capacity of the canal at some future date	Need to bury another pipeline to increase capacity in future. An assurance against expansion.
Energy cost: $1 Million/year	Energy Cost: $12 Million/year
Capital Cost: $857 Million	Capital Cost: $2,067 Million

Recommendation:
Given that the alternatives 3B and 3D are identical except for the conveyance method, the environmental impacts of both alternatives can be mitigated so that the difference between the impacts are slight, and the conveyance method in 3D costs 2 to 3 times that of 3B, it is recommended that alternative 3B adequately represents the alternative concept and alternative 3D be dropped from consideration

Alternative Narrowing Process

Chain of Lakes

Alternative 3F

Alternative 3F, "Chain-of-Lakes", utilizes a connected chain of up to eight lakes, created by flooding Delta islands, that would convey water via siphons beneath Delta channels to Clifton Court Forebay. An enlarged Delta Cross Channel would include a new intake facility capable of diverting 10,000 cfs through new fish screens. All or a major portion of seven Delta islands would be converted to storage and conveyance facilities. Siphons would convey water under river and slough crossings to Clifton Court Forebay. Distributed pump stations with cylindrical fish screens (total capacity 5,000 cfs) would be added to facilitate filling of islands from adjacent channels and returning flow from storage along the conveyance route.

The conveyance facility in alternative 3F is compared to the large isolated facility (15,000 cfs) in alternative 3E with in-Delta storage

Chain-of-Lakes (Alt 3F)	**Large Isolated plus in-Delta storage (Alt 3E)**
Replace diversion at Delta Cross Channel and small distributed screens with a screened intake on Sacramento River at Hood (15,000 cfs capacity) to reduce tidal influence and impacts on resident Delta Species.	15,000 cfs screened intake at Hood
Provides operational storage to the pumps. Maximum storage is 825 TAF with a usable storage of approx. 174 to 200 TAF.	In-Delta storage provides 180 to 200 TAF of operable storage to the pumps.
Compared to other alternatives, requires the most extensive land use conversion of in-Delta prime agricultural land, ecosystem habitat and future habitat restoration areas.	Impacted acreage is mostly prime agricultural land.
Impacted acreage: 37,000 acres	Impacted acreage: 18,728
Net Evaporation Loss: 18,000 to 36,000 Ac-ft year	Net Evaporation Loss: 9,000 to 18,000 Ac-ft year
Could create TOC problems in treatment of export drinking water.	Has operational flexibility to use isolated facility and/or storage in takes
Capital Cost: $2,367 Million	Capital Cost: $1,712 Million

Recommendation

Given that the chain-of-lakes conveyance/storage has the most extensive land use conversion of in-Delta prime agriculture land, ecosystem habitat, and future restoration areas and that options are available that achieve the same objectives at substantially reduced cost, it is recommended that alternative 3F be dropped from consideration.

Alternative Narrowing Process

Multiple Intakes Conveyance Option

Alternative 2C

The Multiple Intakes Conveyance Option in alternative 2C, would utilize three isolated conveyance channels to convey water to Clifton Court Forebay(CCFB) from two diversion locations on the San Joaquin River and one on Old River near Franks Track. This conveyance option would provide flexibility to divert water from different locations in the Delta depending on need and operating criteria. Each diversion would be unscreened and would convey water by an isolated open channel to CCFB. At CCFB new fish screens would be constructed at the Skinner Fish facility and at the Tracy Pumping Plant (or at the head-end of the CCFB). The objective of the multiple intakes to use real time monitoring at each intake to determine which intake or combination of intakes to use to reduce fishery impacts while improve water supply and water quality. Alternative 3I includes the same conveyance option in 2C as will as the supporting facilities that would make the conveyance option more effective.

Multi Intake Conveyance (Alt 2C)	Multi Intake Conveyance (Alt 3I)
Three intakes and isolated facilities in the western, central, and southern Delta	Three intakes in the western, central, and southern Delta plus extension of the central Delta isolated facility to a screened intake on the Sacramento River at Hood. Siphon to convey Sacramento River water from this extension under the San Joaquin River to the central isolated facility.
To alleviate entrainment into the three intake pumps and the isolated channels where fish would be subject to predation, fish screens would be provided at each intake.	All intakes would be screened.
Still draws Sacramento River water across the Delta continuing some of the same anadromous fishery problems	Offers option to fully screen Sacramento River water. Offers flexibility to adjust diversions between north and south Delta to avoid anadromous fishery problems.
No new storage.	Surface and groundwater storage in the Sacramento and San Joaquin Valleys. Off-Aqueduct surface storage south of the Delta. Adds flexibility for management of diversions.
Capital Cost of Conveyance: $2,281 Million	

Recommendation

The Alternative 2C conveyance option is very expensive and may have limited flexibility without supporting facilities. Alternative 3I includes the conveyance option in 2C as will as the supporting options that would make the conveyance option more effective. Therefore, it is recommended that alternative 2C be dropped from consideration and the multiple conveyance option analyzed in alternative 3I.

Alternative Narrowing Process

Western Delta Isolated Conveyance Facility

Alternative 3G

Alternative 3G, the Western Delta Isolated Conveyance Facility, utilizes the Deep Water Ship Channel (DWSC), and a western Delta conveyance pipeline, tunnel and channel to convey 5,000 cfs from the intake on the Sacramento River near Sacramento to Clifton Court Forebay. A new intake facility capable of diverting 5,000 cfs would be constructed at the upstream end of the DWSC. Downstream of the screens, a low lift pump station would provide the hydraulic head to move 5,000 cfs through the channel during periods of insufficient head to flow by gravity alone. In order to maintain operations of the Port of Sacramento a ship lock would be constructed at the downstream end of the channel. Immediately upstream from the lock, a new unscreened pumping plant would lift water into a pressurized pipeline that follows the Sacramento River to a tunnel that crosses the Sacramento and San Joaquin Rivers to Brentwood. From there, an open canal conveys water to Clifton Court Forebay. Except for the conveyance facilities type and route this alternative and alternative 3B, a small east side isolated conveyance facility, are identical.

Ship Channel (Alt 3G)	Eastside Canal (3B)
Intake location is near Sacramento further away from tidal influence and proximity to Delta fish habitat.	Intake located on Sacramento River Near Hood
Intake is located upstream of the discharge of the Sacramento Regional Waste Water Treatment Plant, a benefit to water quality	Intake is downstream of Sacramento Regional WWTP.
Could provide feeder lines to North Bay Aqueduct and Contra Costa Canal.	Could provide feeder lines to east and southeast Delta service areas.
Ships locks could have impact on Port of Sacramento shipping schedules.	No impacts on navigation
Canal route passes through one of the fastest urbanizing areas in the state	Route avoids major urbanizing areas
Right-of-way needed: 705 acres	Right-of-way needed: 5,330 acres
Potential for wildlife habitat established over buried pipeline	Potential for recreation and waterfowl habitat areas
Need to bury another pipeline or construct new tunnel to increase capacity in future. An assurance against expansion.	Easier to increase the capacity of the canal at some future date
Capital Cost: $2,302 Million	Capital Cost: $857 Million

Recommendation

Given that the alternatives 3G and 3B are identical except for the conveyance method, there is little environmental impact difference between the two alternatives, and the conveyance method in 3G costs 2 to 3 times that 3B, it is recommended that alternative 3B adequately represents the alternative concept and alternative 3G be dropped from consideration.