

NC04B Pure Water Pipeline Alignment Alternatives

Memo Information

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Date: July 27, 2017

Purpose

This memorandum is intended to analyze and compare additional alternative alignments not previously evaluated, including reassessing possible routes through Scripps Lake Drive for the North City Pure Water Pipeline (NCPWPL), formerly known as the Miramar Pipeline.

This memorandum is to provide an overview of the issues and is not intended to be a complete analysis of all facts and issues regarding alignment alternatives.

Background

The proposed alignment of the NCPWPL has been developed and refined through the course of the design. Three potential alignment routes were originally studied between Black Mountain Road and Miramar Reservoir, identified in *Figure 1*, below.



Figure 1: Alignment Alternatives Map from Miramar Pipeline Alternatives Report

Alternative B “Central” was ranked the most advantageous, as it resulted in the least direct impact to residential areas, had the lowest 50-year life cycle cost and provided the most construction schedule float. Its principal disadvantage is that it requires the most private commercial land easement acquisitions. For more information, please see **Attachment A:** the Miramar Pipeline Alternatives Analysis Report, dated September 17, 2015.

The 10% Engineering Design Report and 10% level engineering plans, dated March 16, 2016, utilized the recommendation of the aforementioned Alternative Analysis Report. Other notable considerations discussed in the 10% Engineering Design Report were the existing utilities found within Scripps Lake Drive and where “pinch points” were identified as issues that would deter possibilities for an additional pipeline within the roadway due to space limitations. One such pinch point is noted at the intersection of Scripps Ranch Blvd. and Scripps Lake Dr. *Figure 2* represents the pinch points presented in the 10% Engineering Design Report. To note, Scripps Lake Drive was later suggested to be further evaluated as an alternate alignment by others and will be discussed later within this memo in more detail.

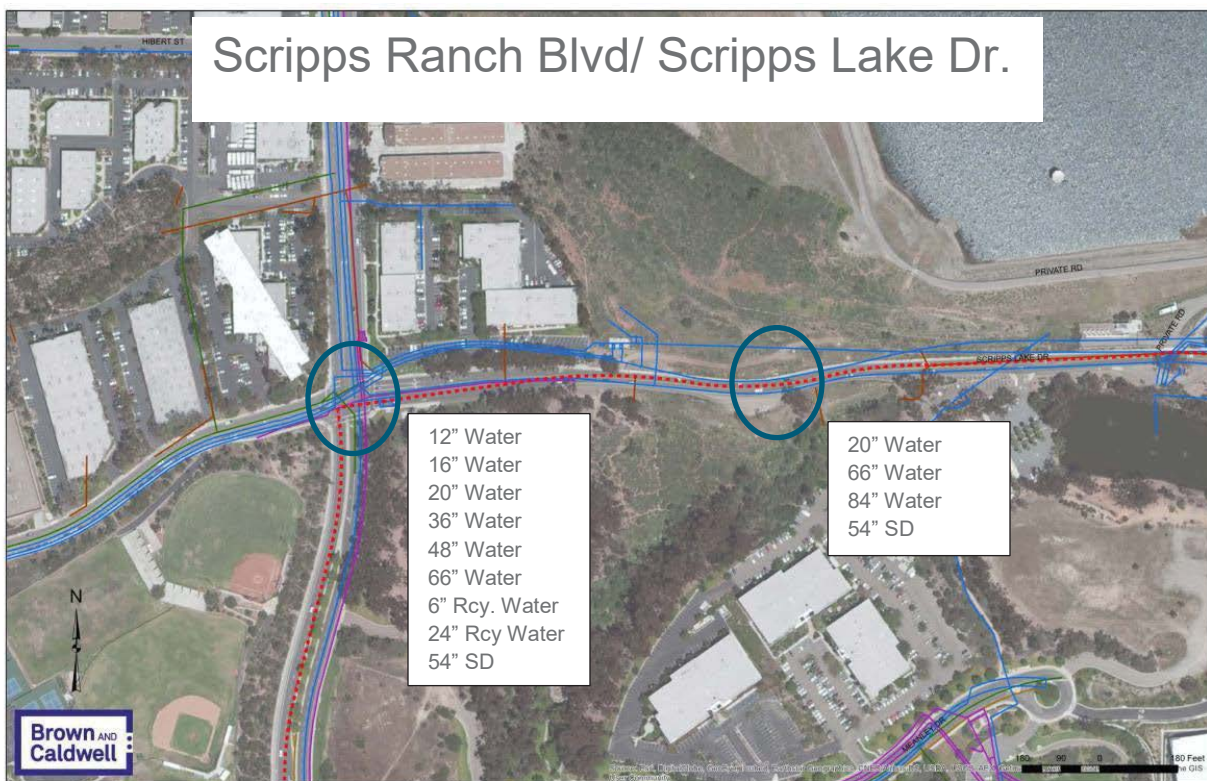


Figure 2: Pinch Point Exhibit from 10% Engineering Design Report

An initial meeting on May 5, 2016 was held with Scripps Ranch Technology Park, LLC to present and discuss the pipeline alignment through three of their parcels (APN 319-170-25, 26 & 27) as proposed in the 10% design documents. This meeting concluded with Scripps Ranch Technology Park LLC, represented by Murphy Development, indicating that they would not grant the City easement through the three properties because it conflicted with their plans for development on these three lots.

Subsequent to the May 5, 2016 meeting with Murphy Development, the City, in conjunction with the detailed design consultant (HDR), began exploring additional alignment alternatives. A key consideration of the alignment analysis is the proposed location of the dechlorination facility. The facility will be located on City property at the reclaimed water tank site located at the southeast end of Meanley Drive. This is a

very important facility that will remove chlorine from the pipeline prior to it discharging into the reservoir, as required by regulatory agencies. The location of this facility was selected because it provided adequate contact time to properly remove chlorine, it provides a safety gap prior to the water being expelled into the reservoir and it is located on property already owned by the City (see *Figure 3* for location).



Figure 3: Pure Water Pipeline Re-alignment to eliminate easements

As indicated in *Figure 3*, above, HDR evaluated the potential alignment alternatives that would intercept the proposed dechlorination facility and continue to either of three routes into the reservoir. In *Figure 3*, the three different alignments are shown through either: 1. APN 319-170-23; 2. APN 319-17-22 and; 3. along the pathway behind the Scripps Ranch Branch Library. Results are as described in Technical Memo #3 dated August 1, 2016 (**Attachment B**).

HDR recommended the path through APN 319-170-22 due to the decreased lineal footage of pipeline, trenching will not be as deep, most economical to construct and reduced energy costs due to minimizing the high point of the pipeline. The proposed alignment change eliminated the crossing through the original three Scripps Ranch Technology Park parcels but resulted in crossing of another one of their parcels at the end of Meanley Drive, it increased the length of pipeline within City roadway by 800 linear feet and resulted in an increase in construction cost of approximately \$840,000. The blue dashed line in *Figure 3* represents this proposed change. In addition, when evaluating the vacant parcel that this alignment now crosses and the concept sketch of their proposed development (**Attachment C**) obtained from Murphy Development, the NCPWPL design team felt strongly about the ability to locate the alignment alongside their future parking structure within their designated 20' undevelopable setback.

Following further evaluation of the Meanley Drive route, the design consultant looked into a cost saving route along Hoyt Park Drive that would eliminate the need to tunnel under the crossing of the San Diego County Water Authority's (SDCWA) 96" Aqueduct at Meanley Drive. The findings were that this relocation was feasible and would eliminate the tunneling of the pipeline under the SDCWA Aqueduct and it would reduce the overall pipeline length by 400' within the roadway. This alignment revision is as shown in *Figure 4*.



Figure 4: Pure Water Pipeline Current Proposed Alignment (Scripps Ranch Area) – Reroute alignment to Hoyt Park Drive.

On August 16, 2016, the City Project Manager updated Murphy Development of the latest evaluation for avoiding the three parcels, after which they requested that the City work directly with their Engineer, James Roberts.

A site meeting was held with Murphy Development at APN 319-170-22 on September 9, 2016 to review the new proposed easement location and discuss the geotechnical and property surveys necessary for the design. At that time, Murphy Development requested that the pipeline be pushed close to the property boundary, so that the easement would not impede future site development. In addition, prior to further consideration of this alignment by Murphy Development and before granting the approval to conduct geotechnical borings on their property, they requested that the City look into some other suggested alignments to the west of this parcel and report the findings back to them. A memo dated, September 14, 2016 (**Attachment D**) was sent to Murphy Development that summarized the issues discovered with these suggested alignments. After receipt of the September 14, 2016 memo, Murphy Development provided the City permission to conduct the necessary geotechnical investigations on their property.

On February 2, 2017, the City Project Manager provided James Roberts a copy of the “tentative” 60% alignment for Murphy Development’s review and because the Murphy Development proposed improvements was only concept in nature, the City had requested their input. A follow-up meeting was held on March 27, 2017 to discuss the alignment with Murphy Development. At this meeting Murphy Development told the City that they were no longer interested in allowing an easement through their property because they were concerned that the alignment would cut off access to the only ingress/egress into the lot and for apprehensions that the location of the pipeline would result in the need for them to mitigate for a pipeline falling within the structural influence line of their future parking structure. This was despite the City indicating that alignment adjustments can still be made with their input, offering to work hours opposite their contractor and buttoning up the site after every work shift. The City of San Diego received a letter dated April 13, 2017 from James G. Sandler an attorney representing Murphy Development. This letter is included as **Attachment E**.

Finally, prior to the Pure Water Program’s presentation scheduled on May 4, 2017 to the Scripps Miramar Planning Group, Mr. Wally Wulfeck requested a response to the possibility of different alignments in this same area as suggested by him. This email exchange and City response can be seen in **Attachment F**.

Alternative Alignments

Due to the latest challenges presented to the City by Murphy Development’s sudden reconsideration, the following alternative alignments were evaluated.

1. Scripps Lake Drive

Although Scripps Lake Drive was already looked into as previously discussed during the 10% design phase, the City was requested to look at this alignment again by members of the Scripps Miramar Planning Group at the meeting held on May 4, 2017. This alignment would deviate from the current proposed alignment at the Dechlorination Facility, head west on Meanley Drive, turn north on Scripps Ranch Blvd., head east on Scripps Lake Drive then enter the Miramar Water Treatment Plant Site and enter Miramar Reservoir at the current alignment. *Figure 5* represents the proposed Scripps Lake Drive Alignment Alternative.



Figure 5: Scripps Lake Drive Alignment Alternative

Figure 6a shows a closer look at the existing utilities found within Scripps Lake Drive. The information provided in these figures denotes the findings from further research into the existing utilities within these roads. As seen in these figures, additional utilities were discovered making this route more problematic for constructing a new 48” diameter pipeline due to space limitation, needing to meet separation requirements and the need to relocate large utilities found through this corridor. The additional utilities that were not described or discovered in the earlier research were a fiber optic line, SDG&E electrical, SDG&E electrical vault, City water pressure reducing station and a County Water Authority facility that is critical for the operation of the 48” aqueduct.

Figure 6b shows a closer look at the existing utilities found where Scripps Lake Drive narrows adjacent to the Scripps Ranch Branch Library. This is to also demonstrate the issues with available space for the new 48” diameter pipeline.

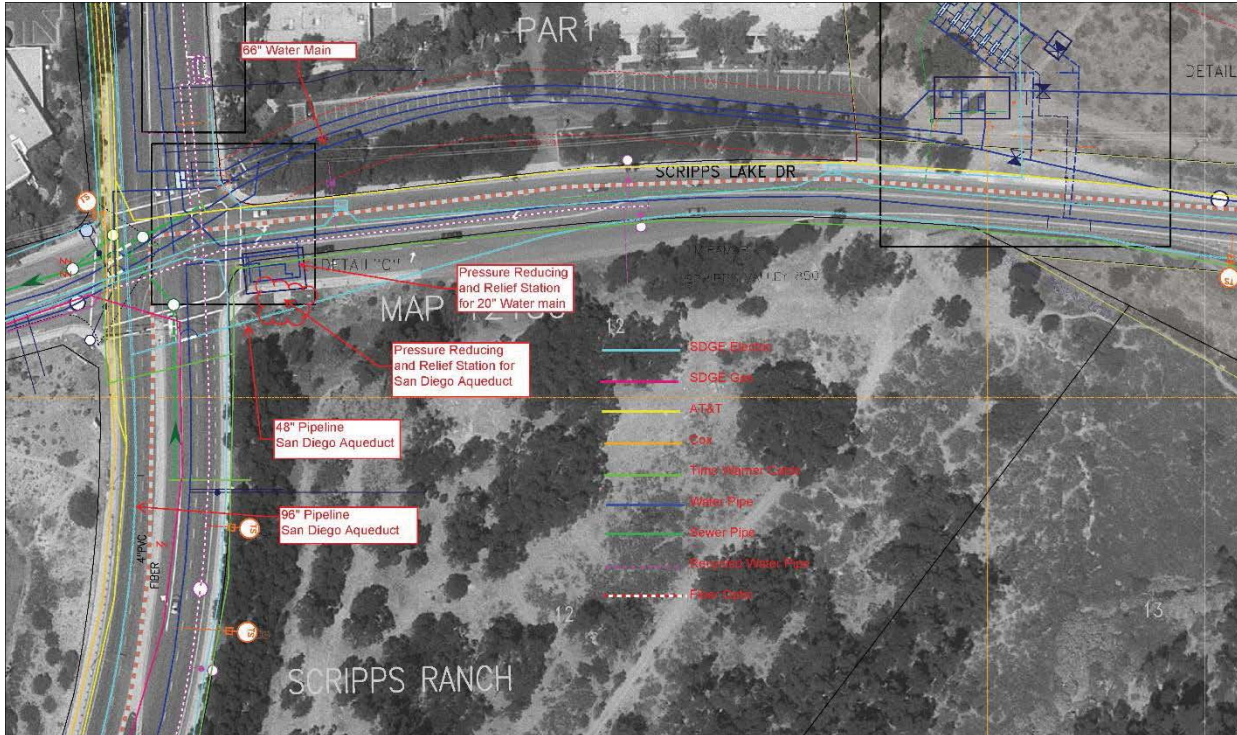


Figure 6a: Existing Utilities along Scripps Lake Drive

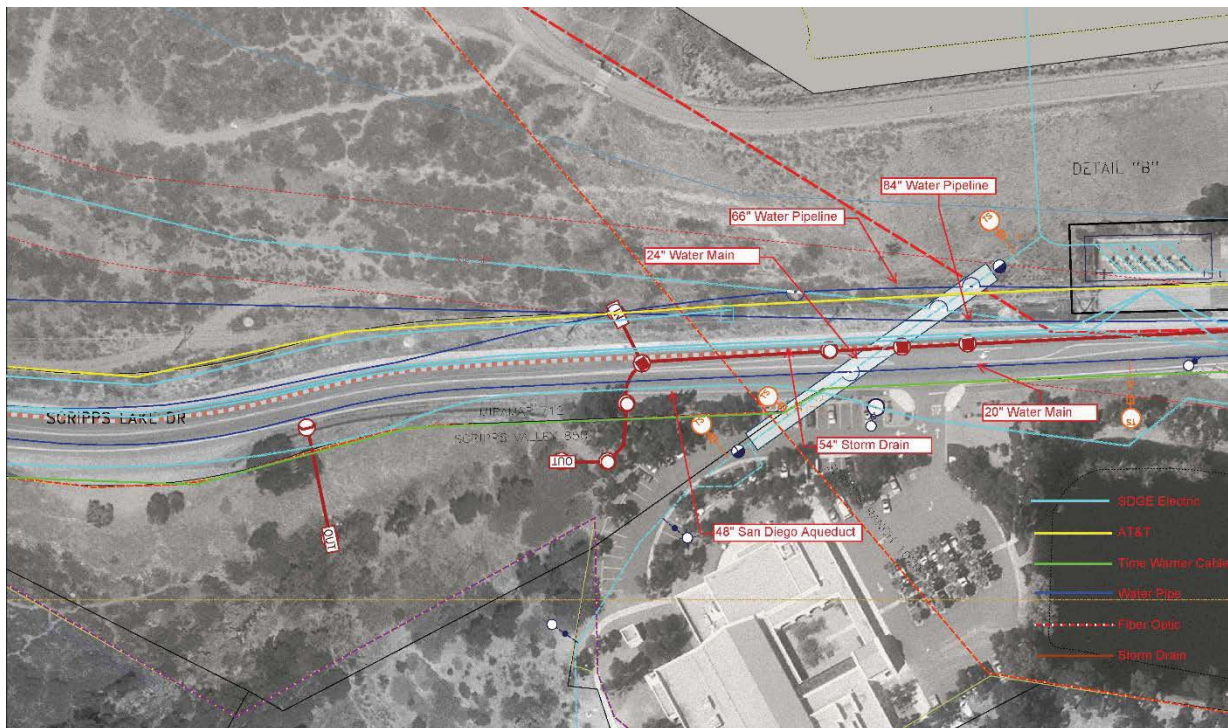


Figure 6b: Existing Utilities along narrower portion of Scripps Lake Drive

Figure 7 represents the existing utilities found within Meanley Drive. The City is currently in the process of working with SDG&E for their relocation of an electrical duct bank to allow space and proper clearance with the existing sanitary sewer for the single proposed 48" diameter Pure Water pipeline. The ability to obtain additional space for another 48" diameter pipeline would not be possible without the acquisition of easement within parcels APN 319-170-35, APN 319-170-37 and APN 319-170-38 (refer to Figure 5 for location).

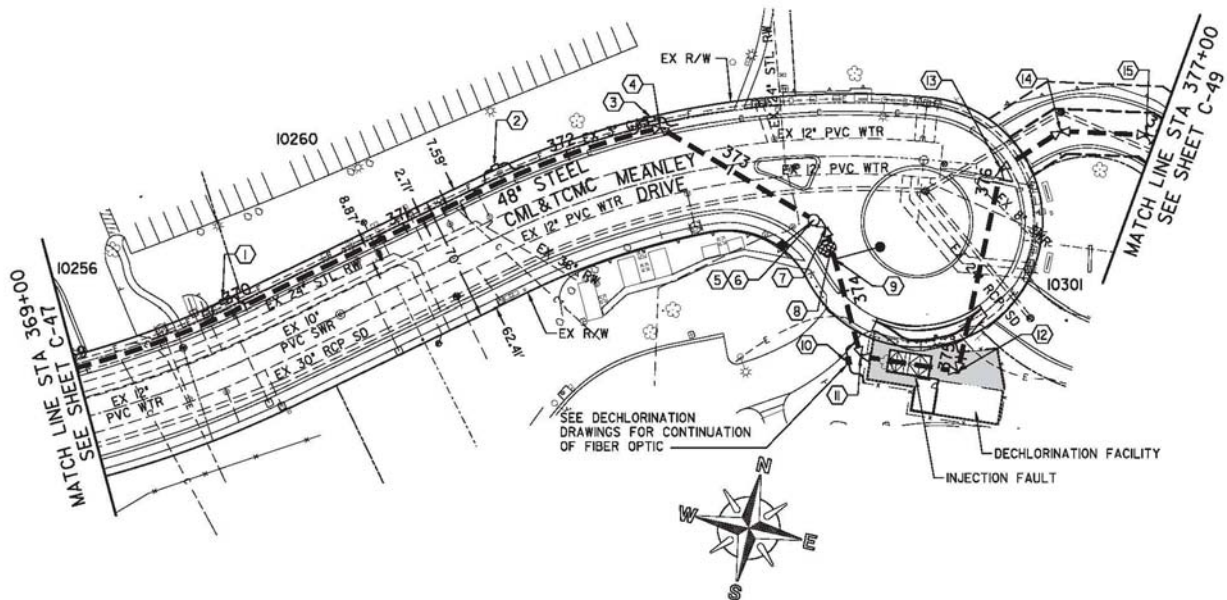


Figure 7: Existing Utilities along Meanley Drive

A Preliminary Opinion of Probable Project Cost has been developed for the Scripps Lake Drive Alignment Alternative and is presented in Table 5, "Alternate Alignment Comparisons".

In addition to the Capital Costs, long-term energy consumption at the pump station will increase due to a motor size increase from 1,000 HP to 1,250 HP motors. The additional energy costs, based on \$0.07 kW/Hr for power provided by the proposed power generation facility, yields an increase of \$92,000 annually. When calculated over the estimated 50 year life cycle this equates to an additional \$3.2 million.

The advantages and disadvantages of the Scripps Ranch Drive Alignment are summarized in Table 1.

Table 1: Scripps Lake Drive Alignment Alternative Advantages/Disadvantages

Advantages	Disadvantages
<p>Eliminates Scripps Lake Drive Tunnel</p> <p>Access to pipeline air vacuum valves would be within City right-of-way.</p>	<p>Additional 4,500 LF of Pipeline</p> <p>Additional 4,500 LF of pipeline would require increasing motor requirements to 1,250 HP at Pump Station resulting in an annual increased energy cost of approximately \$92,000. When calculated over the estimated 50 year life cycle this equates to an additional \$3.2 million.</p> <p>Alignment is in heavily congested utility corridor</p> <ul style="list-style-type: none"> • No space for 48" pipeline trench along Scripps Lake Drive without having to relocate critical utilities and/or meeting required separation requirements (Figure 6a and 6b) • No space for two 48" pipeline trenches within Meanley Drive; (Figure 7) • Due to space limitation, pipe would need to be constructed at greater depths than existing utilities. This would require the use of tunneling methods. • To make space, easement acquisition would be required across three separate parcels at an approximate cost of \$810,000 <p>Volcanic geotechnical formation</p> <ul style="list-style-type: none"> • This material is reported to have a compressive strength of up to 50,000 psi which would require blasting. • Possible dam or aqueduct damage/failure due to blasting methods. <p>Increased construction cost of \$7,153,162 when compared to current alignment</p>

[2. Modified Alignment through KBS Horizon, LLC Parking Lot \(APN 319-170-23\)](#)

The Modified Alignment through APN 319-170-23 deviates from the alignment as originally analyzed by HDR through this property. This alignment hugs the western boundary of the property, within the existing paved parking lot utilized by the tenants of this parcel, as shown as the yellow line in *Figure 8*. The red line in this figure is to provide reference to the location of the previously investigated alignment through this property.



Figure 8: Modified Alignment APN 319-170-23 Alternative

A Preliminary Opinion of Probable Project Cost has been developed for the Modified Alignment APN 319-170-23 Alternative and is presented in *Table 5, "Alternate Alignment Comparisons"*.

Similar to Alternative 1, long-term energy consumption at the pump station will increase due to a motor size increase from 1,000 HP to 1,250 HP motors. The additional energy costs, based on \$0.07 kW/Hr for power provided by the proposed Power Generation Facility, yields an increase of \$92,000 annually. When calculated over the estimated 50 year life cycle this equates to an additional \$3.2 million.

The advantages and disadvantages of the Modified Alignment APN 319-170-23 are summarized in *Table 2*.

Table 2: Modified Alignment through KBS Horizon, LLC Parking Lot Advantage/Disadvantages

Advantages	Disadvantages
<p>Alignment west of Dechlorination facility remains unchanged.</p>	<p>Raise highpoint of pipeline results in, increasing motor requirements to 1,250 HP at Pump Station resulting in increased annual energy cost of approximately \$92,000. When calculated over the estimated 50 year life cycle this equates to an additional \$3.2 million.</p> <p>Alignment will require access through parking lot for construction activities.</p> <p>Tunneling pit would be in close proximity to existing building.</p> <p>Will impact available parking to existing business tenants.</p> <p>Will require parking lot restoration after construction.</p> <p>Requires easement acquisition with estimated cost of \$737,000.</p> <p>Increased construction cost of \$780,592 when compared to current alignment.</p>

3. Modified Alignment through KBS Horizon, LLC Ingress/Egress and Landscaped Area

This modified alignment is similar to that mentioned as Alternative No. 2 but instead would impact the same property at a location that would head northerly within the landscaped areas, just west of the asphalt parking lot. *Figure 9* represents this proposed alignment.



Figure 9: Modified Alignment through KBS Ingress/Egress and Landscaped Area

A Preliminary Opinion of Probable Project Cost has been developed for the Modified Alignment APN 319-170-23 Alternative and is presented in *Table 5*, “Alternate Alignment Comparisons”.

The advantages and disadvantages of the Modified Alignment APN 319-170-23 are summarized in *Table 3*.

Table 3: Modified Alignment through KBS Horizon, LLC Ingress/Egress and Landscaped Areas Advantages/Disadvantages

Advantages	Disadvantages
<p>Alignment west of Dechlorination facility remains unchanged.</p> <p>Pumps remain at 1000 HP.</p> <p>Property Owner has indicated initial approval of proposed easement</p>	<p>Requires easement acquisition with estimated cost of \$716,000.</p> <p>Maintenance access would be required through easement.</p> <p>Would require temporary construction easement within Scripps Ranch Technology Park property (20' set-back area) for grading at bottom of slope and allow enough area for equipment movement during construction.</p> <p>Increased cost of \$1,061,314 when compared to current alignment</p>

[4. Modified Alignment completely within 20' wide setback of Scripps Ranch Technology Park Parcel \(APN 319-170-22\)](#)

This modified alignment deviates from the current proposed alignment through Scripps Ranch Technology Park’s parcel (APN 319-170-22) by way of maintaining the pipeline alignment within the 20’ wide setback and outside of the future parking lot’s estimated structural line of influence. The City had to make some conservative assumptions for the location of the property owner’s future parking structure to further evaluate this possibility. Assumptions made were that the parking structure would be built along the setback boundary located 20’ from property line with an estimated ground elevation of 655’ MSL. The result was that it is feasible to avoid encroaching within the structural influence line of the parking structure by offsetting the centerline of the 48” pipeline 8’ from the property line in order to be outside of an area that would impact and/or set restrictions on the design of their parking structure. Figure 10 represents the general location of this alternative.



Figure 10: Modified Alignment completely within 20' wide setback of Scripps Ranch Technology Park Parcel (APN 319-170-22)

A Preliminary Opinion of Probable Project Cost has been developed for the Modified Alignment APN 319-170-23 Alternative and is presented in *Table 5*, "Alternate Alignment Comparisons".

As previously offered, to address Murphy Development's concern regarding cutting off their access to the lot, the City can enforce that our contractor work the shift opposite of their operations and backfill and/or place steel plates over open trench at the end of each day.

The advantages and disadvantages of the Modified Alignment APN 319-170-23 are summarized in *Table 4*.

Table 4: Modified Alignment completely within 20' wide setback of Scripps Ranch Technology Park Parcel (APN 319-170-22) Advantages/Disadvantages

Advantages	Disadvantages
<p>Alignment west of Dechlorination facility remains unchanged.</p> <p>Pumps remain at 1000 HP</p>	<p>Maintenance access would be required through a permanent easement.</p> <p>Would require grading at bottom of slope and permanent retaining wall.</p> <p>Increased construction cost of \$371,500 when compared to current alignment.</p>

Alternative Alignment Comparisons

A Preliminary Opinion of Probable Project Construction Cost has been developed for the current proposed alignment alternative and is presented in *Table 5* to allow side-by-side comparisons to each of the four alternatives.

Note: Easements are assumed 25' wide for permanent, 15' wide for temporary construction; Increase capital cost are a result of pump size increases @ 4 each; Alternatives 1 and 2 will result in increased energy cost; Positive value in "Difference" column indicates a cost increase and Negative value indicates a cost decrease.

TABLE 5: Alternative Alignment Comparisons

Item	Current Proposed Alignment				1- Scripps Lake Drive Alignment					2. Modified Alignment through KBS Parking Lot					3. Modified Alignment through KBS Landscape					4. Modified Alignment through Murphy Development Setback				
	Quantity	Unit	Unit Cost	Total Cost	Quantity	Unit	Unit Cost	Total Cost	Difference	Quantity	Unit	Unit Cost	Total Cost	Difference	Quantity	Unit	Unit Cost	Total Cost	Difference	Quantity	Unit	Unit Cost	Total Cost	Difference
Pipeline	731	LF	\$1,054	\$770,474	5,350	LF	\$1,054	\$6,324,000	\$5,553,526	812	LF	\$1,054	\$855,848	\$85,374	835	LF	\$1,054	\$880,090	\$109,616	731	LF	\$1,054	\$770,474	\$0
Tunneling	681	LF	\$2,232	\$1,519,992	650	LF	\$2,323	\$1,509,950	-\$10,042	780	LF	\$2,232	\$1,740,960	\$220,968	745	LF	\$2,232	\$1,662,840	\$142,848	681	LF	\$2,232	\$1,519,992	\$0
Tunnel Pt. Additional Depth	0	LF	\$25,000	\$0	0	LF	\$25,000	\$0	\$0	0	LF	\$25,000	\$0	\$0	6	LF	\$25,000	\$150,000	\$150,000	0	LF	\$25,000	\$0	\$0
Easement (25' wide)	20,000	SF	\$30	\$600,000	25,000	SF	\$30	\$750,000	\$150,000	22,750	SF	\$30	\$682,500	\$82,500	22,125	SF	\$30	\$663,750	\$63,750	20,000	SF	\$30	\$600,000	\$0
Temporary Construction Easement (15' wide)	12,000	SF	\$4	\$48,000	15,000	SF	\$4	\$60,000	\$12,000	13,650	SF	\$4	\$54,600	\$6,600	13,275	SF	\$4	\$53,100	\$5,100	12,000	SF	\$4	\$48,000	\$0
Utility Relocations (Relocate 20" Water)	0	LF	\$125	\$0	2,500	LF	\$440	\$1,100,000	\$1,100,000	0	LF	\$125	\$0	\$0	0	LF	\$125	\$0	\$0	0	LF	\$125	\$0	\$0
Utility Relocations (Relocate 8" Water)	0	LF	\$125	\$0	0	LF	\$125	\$0	\$0	900	LF	\$125	\$112,500	\$112,500	900	LF	\$125	\$112,500	\$112,500	0	LF	\$125	\$0	\$0
Increased Capital Cost at Pump Station	0	EA	\$15,557	\$0	4	EA	\$15,557	\$62,228	\$62,228	4	EA	\$15,557	\$62,228	\$62,228	0	EA	\$15,557	\$0	\$0	0	EA	\$15,557	\$0	\$0
Street / Parking Paving (Slurry Seal)	0	SF	\$0.00	\$0	114,725	SF	\$2	\$229,450	\$229,450	90,000	SF	\$2	\$180,000	\$180,000	0	SF	\$2.00	\$0	\$0	0	SF	\$2.00	\$0	\$0
ADA Curb Ramps	0	EA	\$0	\$0	16	EA	\$3,500.00	\$56,000	\$56,000	0	EA	\$3,500	\$0	\$0	0	EA	\$3,500	\$0	\$0	0	EA	\$3,500	\$0	\$0
Asphalt Parking Lot Restoration (4" thick)	0	SY	\$0	\$0	0	SY	\$0	\$0	\$0	742	SY	\$41	\$30,422	\$30,422	0	SY	\$41	\$0	\$0	0	SY	\$41	\$0	\$0
Additional Shoring	0	LS	\$0	\$0	0	LS	\$0	\$0	\$0	0	LS	\$0	\$0	\$0	1	LS	\$25,000	\$25,000	\$25,000	1	LS	\$25,000	\$25,000	\$25,000
Retaining Wall Construction	0	SF	\$65	\$0	0	SF	\$65	\$0	\$0	0	SF	\$65	\$0	\$0	2,500	SF	\$65	\$162,500	\$162,500	4,500	SF	\$65	\$292,500	\$292,500
Slope grading/Private restoration of surface improvements restoration (6"AC, curb&gutter, driveway apron)	0	LF	\$0	\$0	0	LF	\$0	\$0	\$0	0	LF	\$0	\$0	\$0	700	LF	\$180	\$126,000	\$126,000	300	LF	\$180	\$54,000	\$54,000
Landscape	0	LS	\$50,000	\$0	0	LS	\$50,000	\$0	\$0	0	LS	\$50,000	\$0	\$0	1	LS	\$50,000	\$50,000	\$50,000	1	LS	\$0	\$0	\$0
Storm Drain Improvements	0	LS	\$114,000	\$0	0	LS	\$114,000	\$0	\$0	0	LS	\$114,000	\$0	\$0	1	LS	\$114,000	\$114,000	\$114,000	1	LS	\$0	\$0	\$0
Total				\$2,938,466				\$10,091,828	\$7,153,162				\$3,719,058	\$780,592				\$3,999,780	\$1,061,314				\$3,309,966	\$371,500

* Not represented in these costs : Alternatives 1 and 2 will incur an increase in energy cost of approximately \$92,000 annually.

Conclusions

Alternative 1, the realignment within Scripps Lake Drive, is the most challenging with the highest added construction cost estimated at over \$7 million. This alignment contains roadways that are congested with many existing utilities. The alignment within Scripps Lake Drive would require the relocation of other utilities to make space for the Pure Water's 48" pipeline. Due to the utility congestion within Meanley Drive, it would require easements from 3 additional property owners. Other difficulties with this alignment would be the need to trench and tunnel adjacent to critical utilities such as the County Water Authority's Aqueduct. Finally, based on maps of geological formations, dense volcanic formations are identified in this area which would require blasting methods to remove.

Alternative 2 is within the parking lot owned by KBS Horizon. This alternative would result in an increase in annual energy cost, will require parking and pavement restoration, utility relocation, easement acquisition, a tunneling receiving pit in close proximity to an existing building, an increase in construction cost estimated at \$780k and the need to come to agreement with KBS Horizon.

Alternative 3 is within the property owned by KBS Horizon, it is an alternative that results in no significant increase in energy cost and is located within a landscaped area within this property's unbuildable set back area. The disadvantages is that it would require additional grading, retaining walls, utility relocation, a permanent access for operations and maintenance staff, is estimated to be a \$1 million increase to construct and the need to come to agreement with KBS Horizon.

Alternative 4 remains within the property owned by Murphy Development, it is the alternative that results in no significant increase in energy cost, it has the smallest increase in construction cost estimated at \$370k, it is located within the unbuildable set back area, and the analysis indicates that it would not restrict the design of the property owner's proposed development. The disadvantage is that it would require additional grading, retaining walls, a permanent access for operations and maintenance staff and the need to come to agreement with Murphy Development.

Attachment A
Miramar Pipeline Alternatives Analysis Report

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**This document is for preliminary staff project study purposes. Staff has no authority to approve or implement projects or land acquisitions without prior City Council Approval*

FINAL

Task 8: Miramar Pipeline / Pump Station (SA04)

Miramar Pipeline Alternatives Analysis Report

Prepared For:

City of San Diego

Public Utilities Department

San Diego, California

September 17, 2015

Prepared By:

MWH Americas, Inc.

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Table of Contents

List of Acronyms & Abbreviations	ii
1. Executive Summary.....	1
2. Alignment Alternatives Development	2
General	2
NCPS to Black Mountain Rd.....	3
I-15 Crossing	3
Black Mountain Rd to Miramar Lake	4
3. Scoring and Evaluation of Alignments	5
4. Evaluation Findings	6
5. Recommendations.....	7

List of Tables

Table 1	Alternatives Alignment Ranking Summary
Table 2	Summary of Findings
Table A-1	Alignment Alternatives Evaluation Matrix
Table B-1	Detailed Cost Estimate: Alternative A – North Alignment
Table B-2	Detailed Cost Estimate: Alternative B – Central Alignment
Table B-3	Detailed Cost Estimate: Alternative C – South Alignment
Table B-4	Life Cycle Analysis: Alternative A – North Alignment
Table B-5	Life Cycle Analysis: Alternative B – Central Alignment
Table B-6	Life Cycle Analysis: Alternative C – South Alignment

List of Figures

Figure 1	Location Map	Figure A-5	Capital Projects Map
Figure 2	Alternative Alignments Map	Figure A-6	Land Acquisition Map
Figure A-1	Alternative A: North HGL	Figure A-7	Environmentally Sensitive Lands Map
Figure A-2	Alternative B: Central HGL	Figure A-8	Geotechnical Conditions Map
Figure A-3	Alternative C: South HGL	Figure A-9	Traffic Counts Map
Figure A-4	Permitting Map	Figure C-1	Alignment Deviations Map

List of Appendices

Appendix A	Evaluation Matrix and Supporting Maps
Appendix B	Conceptual Cost Estimates
Appendix C	Corridor Study and Alternatives Development
Appendix D	Caltrans Coordination Meeting Minutes and Presentation



List of Acronyms & Abbreviations

ACRONYM	DEFINITION
Blvd	Boulevard
CFS	Cubic Feet per Second
Ct	Court
Dr	Drive
HDPE	High Density Polyethylene
HGL	Hydraulic Grade Line
MCAS	Marine Corps Air Station
MGD	Million Gallons per Day
MTS	San Diego Metropolitan Transit System
MWTP	Miramar Water Treatment Plant
NC	North City
NCAWPF	North City Advanced Water Purification Facility
NCPS	North City Pump Station (NCAWPF Effluent)
O&M	Operations & Maintenance
Rd	Road
READ	City of San Diego's Real Estate Assets Department
ROW	Right-of-Way
RWS	Recycled Water Study
WA	San Diego County Water Authority



1. Executive Summary

The proposed Miramar pipeline will convey 30 MGD (46.4 CFS), on an annual average basis, of highly purified water from the North City Advanced Water Purification Facility (NCAWPF) to Miramar Lake. Delivery to the lake via the pipeline will be achieved using the proposed North City Pump Station (NCPS), which will serve as the NCAWPF's only effluent pump station. This analysis presents the three (3) alignment alternatives proposed for the Miramar pipeline, along with the evaluation performed to select the preferred alignment. Provided herein is a summary describing the three (3) proposed alignment alternatives, the results of the evaluation with rankings, and a recommendation for advancing this task (Task 8) to the 10% Design Phase.

Applicable data points were collected within a pre-determined study area, as defined in the Refinement of Recycled Water Study (RWS), which is shown in **Figure 1**. Data points collected included, but were not limited to, environmentally-sensitive areas, geotechnical conditions, current land use, permitting requirements, planned capital projects, rights-of-way and real property acquisition, and current traffic conditions. All data points were evaluated relative to their potential to impact a pipeline's constructability, schedule, and cost. Furthermore, a broader consideration was given to each data point's potential to impact the goals and objectives of the Pure Water Program. The three (3) principle alignment alternatives developed using this data were named:

1. Alternative A – North Alignment
2. Alternative B – Central Alignment
3. Alternative C – South Alignment

These three alternatives are shown on **Figure 2**.

Once the principle three alternatives were established, an evaluation matrix was developed and specifically tailored to this project. The matrix accounts for the risks associated with constructing each alternative relative to its anticipated 50-year life cycle cost. The objective was to compare the alternatives side-by-side in a manner that would highlight the alignment with the best risk-to-cost balance. To achieve this objective, the alternatives were numerically ranked against each other across a range of project specific criteria. These criteria were organized into five (5) major risk categories:

1. Alignment Characteristics
2. Schedule and Coordination
3. Pipeline Operation and Maintenance
4. Constructability
5. Cost

Each category produced a score that quantified the comparative importance of the risks across all categories. The objective of assessing the comparative importance was to focus on: 1) construction feasibility, 2) impact to the Program's schedule, and 3) total cost to the City. Ultimately, the final score highlighted the preferred alignment via "the lowest score wins" method. **Table 1** provides a summary of the ranking results for each of the above five (5) categories, as well as the total scores awarded to each alternative.

The results of the evaluation matrix ultimately identified Alternative B – Central Alignment as the preferred alignment. Additional detail is provided under **Appendix A – Evaluation Matrix and Supporting Maps**, as well as **Appendix B – Conceptual Cost Estimates**.

It is recommended that the above mentioned alignment advance into the 10% design phase with additional consideration given to the I-15 crossing at Miramar Road. A 10% design will be completed for this alignment and submitted to the City along with a 10% Engineering Design Report for use by the final pipeline designer.



2. Alignment Alternatives Development

The three alternative alignments evaluated herein were developed based on the conceptual alignment presented in the Refinement of Recycled Water Study (RWS) Technical Memorandum No. 7 (Brown and Caldwell, July 2015). The technical memorandum studied an area bounded by Interstate 805 (I-805) to the west, Mira Mesa Blvd and Scripps Ranch Blvd to the north, MCAS Miramar and the Navy Operations Center to the south, and the existing WA easements and Miramar Lake's eastern banks to the east. The study area described above is shown in **Figure 1**.

The above mentioned study area served as the boundary for which data was collected and alignment alternatives were further developed under this task (Task 8). The work performed under this analysis was intended to: 1) determine the feasibility of constructing the conceptual alignment identified in the RWS, and 2) explore other viable alternatives within the predefined study area. The result was the identification of three (3) principle alignment alternatives, each with various options for deviations. For reference, the routes reviewed and ultimately rejected during this analysis are discussed in **Appendix C**. Considerations used in developing the three (3) principle alternate alignments are provided below:

General

The proposed alignments primarily include one (1) 48-inch pipeline. Smaller pipe sizes were proposed in areas that required special accommodations for construction and operational flexibilities. The pipeline would be located entirely within the City of San Diego's city limits, and is intended to convey highly purified water from the NCPS to Miramar Lake with no service connections or redundancies along the way. All three alternative alignments assumed discharge into Miramar Lake via a submerged HDPE pipeline. Highly purified water delivered by this pipeline may need to be blended with imported WA water upon discharge into Miramar Lake. The lake's water would then be drawn and treated by the Miramar Water Treatment Plant (MWTP) for potable use. The option to bypass the lake and connect directly to the MWTP was evaluated but not considered feasible at this time due to current regulatory restrictions. Although strategies for blending imported water with highly purified water did not factor into this analysis, the options for blending, and their impact on the MWTP itself, are being evaluated under Task Order No. 4.

Construction methods for the pipeline are anticipated to be primarily open-cut, with the exception of a tunnel crossing at Interstate 15 (I-15). Welded steel pipe (WSP), with a minimum 1/4" wall thickness, pursuant to Health Department standards, was the assumed material of choice for establishing material costs, hydraulic losses, anticipated trench widths, and installation rates for construction. The construction schedule for this project (Task 8) is a critical factor to the successful completion of the Pure Water Program.

Pursuant to the Program's current cooperative agreement, the delivery of purified water to the reservoir(s) must begin by December 31, 2023; however, the Pure Water Program has identified several opportunities for accelerating the schedule, thereby putting the updated completion of the Miramar pipeline at July 1, 2021. Starting on January 1, 2016, this deadline allows 72 months (6 years) for final designer ramp-up, final design, property acquisition, contractor procurement, final regulatory approval, and construction and commissioning. Specifically, the budgeted schedule would allow:

- 4 months for final designer ramp-up
- 18 months for final design
- 8 months for property acquisition
- 8 months for contractor procurement
- 6 months to obtain final regulatory approvals



- 28 months for construction and commissioning

For the three principle alignments evaluated, the timeframe for construction was estimated to be between 18 and 26 months.

NCPS to Black Mountain Rd

Based on the Task 8 analysis, coupled with the RWS's findings, Miramar Rd was selected as the preferred route between the NCPS and I-15. All three alignment alternatives share the Miramar Rd corridor leading to I-15 as a common route. The alignment starts at the NCPS and follows Eastgate Mall to Miramar Rd and then turns east. The alignment then follows Miramar Rd to the intersection with Black Mountain Rd and then travels south along the ROW along Miramar Rd. Two key challenges identified along this route were: 1) crossing the MTS railroad ravine at the San Diego Metropolitan Transit Authority Railroad Crossing and the Burlington Northern Santa Fe Railway Crossing, and 2) the MCAS Miramar access gate at Mitscher Way. Other east-west corridors that were considered and ultimately rejected, such as Mira Mesa Blvd, are discussed in **Figure C-1**.

I-15 Crossing

A key constraint for defining alternative alignments east of I-15 was the location of the I-15 crossings. Factors for evaluating the crossing at I-15 included total tunnel length, surrounding property ownership, staging-area availability and access, ease of construction and permitting, and impact on overall alignment length. These elements helped determine the potential crossing locations, which ultimately established the alternative alignments east of I-15.

Alternatives for crossing I-15 were sent to Caltrans for review. A meeting with Caltrans was held on August 26, 2015 to obtain their feedback (see Appendix D for presentation and meeting minutes). Below is a description of the preferred crossings with feedback provided by Caltrans:

- **Mira Mesa Blvd:** This crossing location was chosen to access the northern corridor to Miramar Lake, which is identified as Alternative A – North Alignment. The preferred option is to open-cut or tunnel within the Mira Mesa ROW directly under the existing I-15 overpass. Caltrans noted that obtaining approval to go under the overpass on a street with such high traffic volumes would be an extremely difficult and lengthy process. An additional option available for crossing I-15 at Mira Mesa Blvd includes tunneling from adjacent private properties as well as Caltrans ROWs. Key challenges to be faced with this option include: permitting, high traffic volumes, crossing the existing 96-inch WA pipeline, and mitigating impacts to the existing bridge structure or I-15 on/off ramps. In general, this crossing was Caltrans' least favorite of the preferred options and could thereby be difficult to secure their approval.
- **Via Excelencia:** This crossing location, which is associated with Alternative B – Central Alignment, was originally proposed in the RWS conceptual alignment. Of the three options, this location presents the shortest tunneling length. However, permanent utility easements, limited construction access, and utility conflicts on both sides of I-15 could potentially increase the overall tunnel length. Cost and scheduled impacts associated with securing the easements and avoiding utilities factored heavily into the feasibility of this crossing's location. Staging is available in the private parking lot on the east side of I-15, but truck traffic and maneuverability within the parking area will be difficult during regular business hours. No alternate method for crossing I-15 is available at this location if the two private property easements cannot be secured. Caltrans took no exception to this crossing so long as their utility assets were avoided.



- **Miramar Rd:** This crossing location is the preferred option for crossing I-15, and is represented as part of Alternative C – South Alignment. The alignment would tunnel from property formally owned by the County of San Diego on the east side of I-15 to a receiving pit in a public ROW cul-de-sac on the west side. The tunneling length is the second shortest Caltrans ROW crossing, with staging available on both sides of the interstate away from heavily trafficked streets. Key challenges to this crossing include a skewed crossing of the interstate and the greatest tunnel depth of all options considered. Caltrans took no exception to this crossing so long as the skewed angle of the tunnel was less than 30-degrees off-perpendicular in relation to the interstate.

Black Mountain Rd to Miramar Lake

Three viable alternatives were identified east of I-15 to Miramar Lake. These alignment alternatives are shown in **Figure 2** and were analyzed in greater detail using the Alignment Alternatives Evaluation Matrix discussed below in Sections 3 and 4. Additionally, options for deviations from the principal three alternatives are presented in **Figure C-1**. Below is a description of each alternative alignment from the point where they diverge off of the Miramar Rd corridor up to Miramar Lake.

- **Alternative A – North Alignment:** This alignment continues north along Black Mountain Rd to Mira Mesa Blvd and turns east. Following Mira Mesa Blvd, the alignment will cross under the interstate. The alignment turns north at Scripps Ranch Blvd and follows the ROW for approximately 3,500 feet before turning south towards the lake. The pipeline will then drop across undeveloped City-owned parkland down into the Lake via a new subaqueous discharge pipeline. It should be noted that, unlike Alternatives B and C, if blending with imported WA water is needed, Alternative A will require the addition of a new WA turn-out on the north side of the lake. This turn-out would increase the total construction cost by approximately \$3-5 million and require additional coordination with the WA. The turn-out described above was not a major factor in this evaluation because blending requirements were unknown at the time of this analysis.

This alignment was chosen to utilize the wide public ROWs identified along the route. Key challenges associated with this alternative include: 1) difficulties in obtaining a Caltrans encroachment permit; 2) the higher HGL required due to the existing topography; 3) anticipated energy dissipation due to the elevated HGL; and 4) environmental impact mitigation within the parkland area north of the lake. Optional deviations for the North Alignment (see **Figure C-1**) include use of Activity Rd to bypass the MCAS main access gate.

- **Alternative B – Central Alignment:** The conceptual draft of this alignment was originally presented in the RWS. Revisions to the conceptual RWS alignment were required for both constructability and to reduce life-cycle O&M costs (see **Figure C-1**). These deviations were required in order to 1) avoid heavy utility congestion along Scripps Ranch Blvd and Scripps Lake Dr., and 2) to reduce the dynamic head required to discharge into the lake. The result was an alignment that is approximately two miles shorter than the conceptual alignment shown in the RWS.

At Black Mountain Rd, this alignment will turn north and then east on Carroll Centre Rd, then south on Via Pasar, and then east on Via Excelencia. It is here where two (2) permanent private property easements, one on each side of I-15, will be required to cross the interstate. From the cul-de-sac at Old Grove Rd, located east of I-15, the alignment generally continues northeast along Business Park Avenue, turns east on Carroll Canyon Rd, then north along Scripps Ranch Blvd. At Scripps Ranch Ct, the alignment turns east and continues out of the public ROW. This portion of the alignment will require additional permanent easements along three (3) City properties and four (4) private properties (i.e. 6 private properties in total for entire alignment). The alignment continues northeast along these proposed easements to Scripps Lake Dr, where the alignment crosses under the Roadway and onto the MWTP site. From there the alignment has the option to connect to the lake via a new subaqueous discharge pipeline, or turn east to tap the existing



MWTP's 108" Overflow pipe. Key challenges include construction schedule, required easement acquisition, and trenchless crossing of the I-15 through two (2) private property easements.

- **Alternative C – South Alignment:** At Black Mountain Rd, this alignment continues east towards I-15 along Miramar Rd. The alignment turns north at Kearny Mesa Rd and enters a cul-de-sac, where it then crosses I-15. Access pits for the tunnel will be located in the cul-de-sac to the west, and the County ROW to the east. The alignment continues east of I-15 on Pomerado Rd, north along Scripps Ranch Blvd, east on Aviary Dr, and north on Red Cedar Dr. to Scripps Lake Dr. The alignment then crosses Scripps Lake Dr onto the MWTP site. From here it has the option to turn west and then north to connect to a new subaqueous discharge pipeline, or to turn east to tap the existing MWTP's 108" Overflow pipe.

In general, business and residential properties are developed along this alignment and are adjacent to 60-100 foot ROWs. An easement over school district property is anticipated along Red Cedar Dr. to avoid heavy utility congestion. Additionally, WA easement crossings and relocation of existing utilities along the narrow 60-foot corridors are also anticipated. Options for avoiding these conflicts are shown in **Figure C-1**. Key challenges include mitigating impacts to the residential community, scheduling work around the school's calendar, and utility conflicts/relocations in narrow 60-foot ROWs.

In summary, three (3) viable alignment alternatives were identified. These alignment alternatives, as shown in **Figure 2**, were evaluated in greater detail using the Alignment Alternatives Evaluation Matrix discussed below. Additionally, options for deviating from the three (3) principle alternatives are discussed in **Appendix C** and are shown in **Figure C-1**.

3. Scoring and Evaluation of Alignments

In order to objectively evaluate each alternative, various criteria were defined to assess potential impacts to the project's constructability, schedule, and costs. Criteria were developed based on available data and input from the City's staff. Ultimately, a total of 24 individual evaluation criteria were defined to quantitatively and qualitatively account for the foreseeable impacts associated with each alignment alternative. Rankings for each of these criteria were established based on desktop studies performed in topic areas including, but not limited to: environmental, geotechnical, traffic, permits, real property, construction methods, and O&M. Results of each desktop study were summarized and illustrated on the maps found in **Appendix A**.

Then, all the criteria were organized into five major categories, which included: 1) Alignment Characteristics, 2) Schedule and Coordination, 3) Pipeline Operation and Maintenance, 4) Constructability, and 5) Cost. The purpose of these categories was to organize the criteria in a manner that would highlight the comparative importance of each category relative to the risk associated with successfully implementing each alternative. The intent was to assign, in order of priority, risks associated with: 1) construction feasibility, 2) impact to the program's schedule, and 3) total cost to the City.

To provide additional objectivity to this evaluation, a non-weighted ranking methodology was used for all criteria. This method, as approved by the City's staff, directly ranked each alternative against the others. This method used a 1 to 3 ranking, which was applied using the follow logic:

- Rank 1 = First Choice; least impacted by criteria (Best)
- Rank 2 = Second Choice; moderately impacted by criteria (Better)
- Rank 3 = Third Choice; most impacted by criteria (Good)

Once a ranking was assigned for each of the 24 criterion, all ranking values were tallied and a total score was assigned. The lowest score would be identified as the preferred alignment alternative that best balanced risks and costs. A summary of the evaluation ranking results, including the preferred alignment (highlighted in green), is provided in **Table 1**.

Table 1- Alternatives Alignment Ranking Summary			
Criterion/Alignment	Alternative A "North"	Alternative B "Central"	Alternative C "South"
1. Subtotal – Alignment Characteristics	14	10	11
2. Subtotal – Schedule and Coordination	10	8	12
3. Subtotal – Pipeline Operation & Maintenance	6	5	7
4. Subtotal – Constructability	14	15	11
5. Subtotal – Cost	7	3	3
<i>Total Ranking Score</i>	51	41	44
<i>Final Ranking</i>	3	1	2

The results of this evaluation ultimately identified Alternative B – Central Alignment as the preferred alignment. For more detail pertaining to the ranking of each criterion see **Appendix A** – Evaluation Matrix and Supporting Materials. Cost tables showing estimated construction, annual O&M, and 50-year life cycle costs are included in **Appendix B**.

4. Evaluation Findings

In addition to highlighting the preferred alignment based on this risk/cost matrix, the above evaluation also provided organized findings relative to the pros and cons associated with each alignment alternative. **Table 2** below summarizes the high-level findings resulting from the evaluation matrix.

Table 2- Summary of Findings			
Finding/Alignment	Alternative A "North"	Alternative B "Central"	Alternative C "South"
Principal Pro(s)	- Entirely within City ROW/public land	- Least direct impact to residential areas	- Best I-15 Crossing - Land acquisition optional
Principal Con(s)	- Most traffic congestion - Highest pumping costs	- Most private land acquisition - Tunnel is in private property	- Greatest direct impact to residential areas
Construction Schedule	6 months float	10 months float	2 months float
Construction Cost	All alternatives are within 5% of each other		
50-yr Life Cycle Cost	15% more than least cost alternative (\$37 Million <u>more</u> over 50 Years)	Least cost alternative	3% more than least cost alternative (\$7 Million <u>more</u> over 50 Years)
Greatest Risk To	Cost <u>and</u> Schedule	Constructability	Schedule

The above summary of findings is briefly discussed below in additional detail for reference.

- **Alternative A – North Alignment** is located entirely on public streets and, on the final approach to Miramar Lake, in a City-owned parkland with no need to acquire private lands or private property easements. This will assist in expediting the overall schedule; however, high traffic volumes and utility congestion slow the overall production rate during construction. The topography encountered by approaching Miramar Lake from the north ultimately requires an HGL that is approximately 100-feet higher



than the other two alternatives. This elevated HGL drives up the energy required to deliver purified water to Miramar Lake. In turn, this elevated HGL requires more pumping energy, which increases the annual O&M costs. Although the cost to construct this alternative is similar to the others, the 50-year life cycle cost of the elevated HGL is approximately 15% higher than in Alternatives B and C.

- **Alternative B – Central Alignment** presents great opportunities as it relates to mitigating impacts to traffic, local area residents, and ease of construction. However, the feasibility to construct Alternative B hinges on the successful acquisition of easements along six (6) private properties and three (3) City-owned properties. Specifically, two (2) of the private properties easements are required for the I-15 tunnel crossing, and the other four (4) private properties easements are required for the approach to the MWTP site. Using the private property easements for the approach to the MWTP site avoids the utility congestion at the Scripps Lake Dr. and Scripps Ranch Blvd intersection. The utility congestions in this area ultimately lead to extremely difficult construction conditions down Scripps Lake Dr. en-route to the Lake. Without an easement through all eight properties unique to this alignment, Alternative B will not be constructible. Therefore, it is recommended that actions be taken during the 10% design, and the final design, to mitigate the risks that these properties present on the project's viability.
- **Alternative C – South Alignment** has the greatest risk of not meeting the Program's schedule goal of July 1, 2021. Allowing only two (2) months of estimated float, construction operations would essentially need to be performed with no delays. This narrow window for success presented too great of a risk to the Program. Additionally, Alternative C has the potential to create the greatest upset to the local area residents. This is based on the foreseeable construction operation impacts to traffic along Pomerado Rd, access to public parks and schools, as well as its disturbance to neighborhoods with streets containing narrow ROWs that are congested with utilities. Alternative C does not require land acquisition, but there are two (2) properties which have been identified as optional for acquisition in order to mitigate some of these disturbances. Although this option is feasible without acquiring easements, construction will be slow and disruptive. This condition is anticipated to generate several complaints, especially as utility relocation adjacent to the school progresses. However, it should be noted that Alternative C has the most favorable I-15 crossing. This crossing presents the Contractor with the best working conditions and thereby mitigates some of the most substantial constructability, schedule, and cost risks on this project. This benefit was accounted for in the evaluation matrix and is considered in the recommendations below.

5. Recommendations

The previous sections summarized the results of this evaluation, and ultimately identified a preferred pipeline alignment. The following is a list of recommended actions for moving Task 8 forward:

1. Advance 10% Design using Alternative B – Central Alignment.
2. Explore using the I-15 crossing at Miramar Rd instead of Via Excelencia to mitigate construction related risks and costs.
3. Discussion easements with the Real Estate Assets Department (READ) relative to the preferred options for crossing I-15.
4. Complete 10% Design using the I-15 crossing with the greatest probability of success relative to READ's input.
5. Re-engage Caltrans with a more complete 10% Design of the proposed crossing of I-15 for concurrence.



Figures

LEGEND

- ALTERNATIVE A (NORTH)
- ALTERNATIVE B (CENTRAL)
- ALTERNATIVE C (SOUTH)

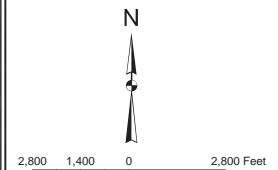
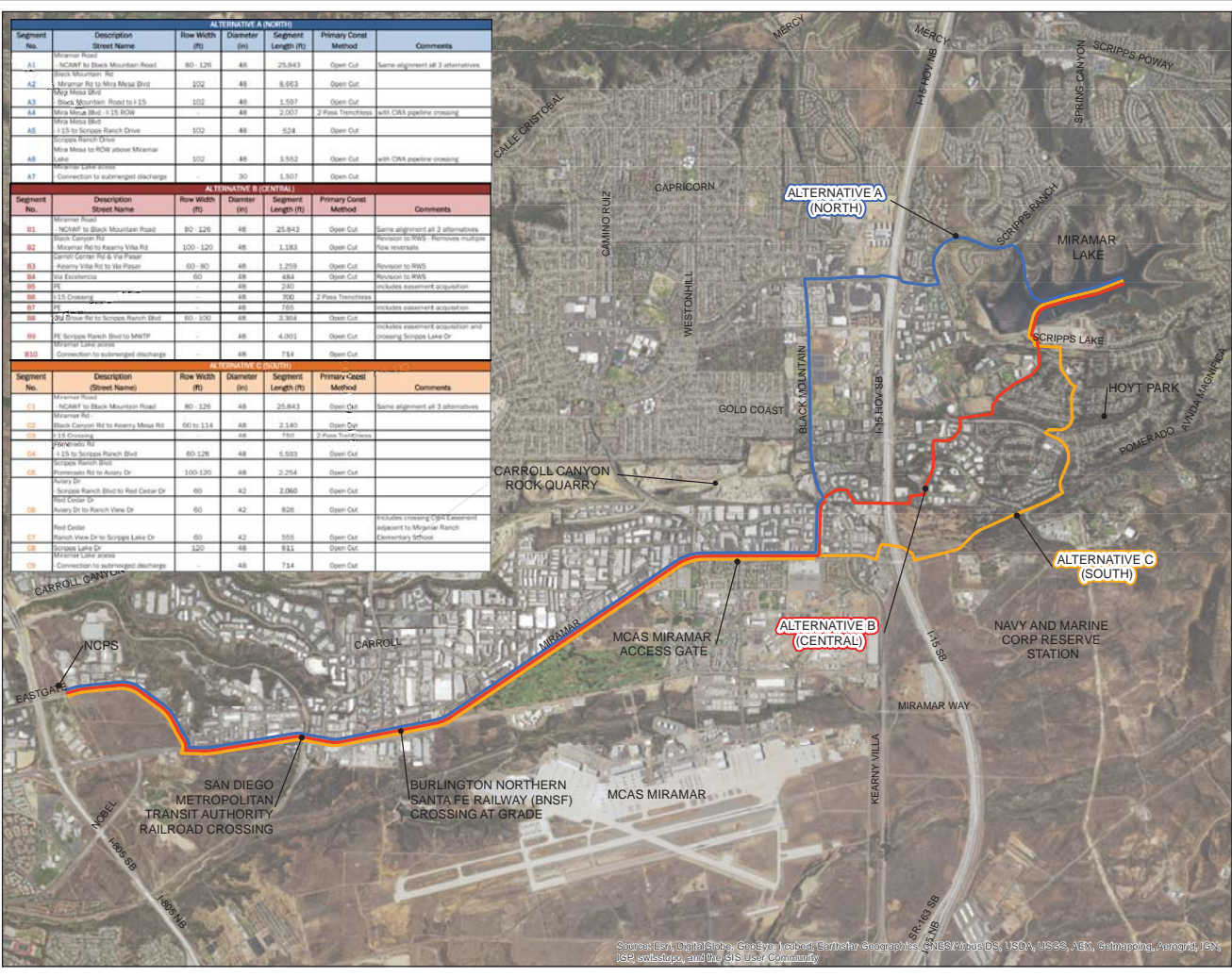


Figure 2
ALIGNMENT ALTERNATIVES
MAP
TASK 8
SAN DIEGO, CALIFORNIA



ALTERNATIVE A (NORTH)						
Segment No.	Description (Street Name)	Row Width (ft)	Diameter (in)	Segment Length (ft)	Primary Cost Method	Comments
A1	Miramar Road	-	-	-	-	-
A2	NCAAF to Black Mountain Road	80-126	48	25,843	Open Cut	Same alignment as 3 alternatives
A3	Black Mountain Rd	102	48	6,663	Open Cut	
A4	Miramar Rd to Mira Mesa Blvd	102	48	1,597	Open Cut	
A5	Black Mountain Road to I-15	-	48	2,007	2 Pass Trenchless	with CWS pipeline crossing
A6	Mira Mesa Blvd to Scripps Ranch Drive	102	48	524	Open Cut	
A7	Mira Mesa to ROW above Miramar Lake	102	48	3,552	Open Cut	with CWS pipeline crossing
A8	Westinghouse 20000	-	-	-	-	-
A9	Connection to subsewer discharge	30	30	1,307	Open Cut	
ALTERNATIVE B (CENTRAL)						
Segment No.	Description (Street Name)	Row Width (ft)	Diameter (in)	Segment Length (ft)	Primary Cost Method	Comments
B1	Miramar Road	-	-	-	-	-
B2	NCAAF to Black Mountain Road	80-126	48	25,843	Open Cut	Same alignment as 3 alternatives
B3	Black Canyon Rd	100-120	48	1,043	Open Cut	Revised to BWS - Removes multiple flow reversals
B4	Capricorn Rd to Kearney Villa Rd	80-80	48	1,259	Open Cut	Revised to BWS
B5	Kearney Villa Rd to Via Pajar	60	48	484	Open Cut	Revised to BWS
B6	VE	60	48	240	Open Cut	includes easement acquisition
B7	I-15 Crossing	-	48	700	2 Pass Trenchless	
B8	VE	60	48	100	Open Cut	includes easement acquisition
B9	Sp Scripps Ranch Blvd to Scripps Ranch Blvd	80-120	48	3,304	Open Cut	
B10	VE Scripps Ranch Blvd to MTRP	-	48	4,201	Open Cut	includes easement acquisition and crossing Scripps Lake Dr
B11	MTRP 1000 20000	-	-	-	-	-
B12	Connection to subsewer discharge	48	48	714	Open Cut	
ALTERNATIVE C (SOUTH)						
Segment No.	Description (Street Name)	Row Width (ft)	Diameter (in)	Segment Length (ft)	Primary Cost Method	Comments
C1	Miramar Road	-	-	-	-	-
C2	NCAAF to Black Mountain Road	80-126	48	25,843	Open Cut	Same alignment as 3 alternatives
C3	Miramar Rd	60 to 114	48	2,140	Open Cut	
C4	I-15 Crossing	-	48	760	2 Pass Trenchless	
C5	Scrapers Rd	80-128	48	5,593	Open Cut	
C6	I-15 to Scripps Ranch Blvd	-	-	-	-	-
C7	Scripps Ranch Blvd	100-120	48	2,254	Open Cut	
C8	Kearney Dr	60	42	2,060	Open Cut	
C9	Red Cedar Dr	60	42	826	Open Cut	Includes crossing CWS Lateral adjacent to Miramar Ranch Elementary School
C10	Red Cedar	60	42	555	Open Cut	
C11	Ramon Vane Dr to Scripps Lake Dr	120	48	314	Open Cut	
C12	Scripps Lake Dr	120	48	314	Open Cut	
C13	MTRP 1000 20000	-	-	-	-	-
C14	Connection to subsewer discharge	48	48	714	Open Cut	

Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroV, IGN, 16N, 16E, swisstopo, and the GIS User Community



Appendix A: Evaluation Matrix and Supporting Maps

TABLE A-1: ALIGNMENT ALTERNATIVES EVALUATION MATRIX
Task 8 - Miramar Pipeline and Pump station

Ranking Priority:
1 - First Choice, least impacted by criteria (Best)
2 - Second Choice, moderately impacted by criteria (Better)
3 - Third Choice, most impacted by criteria (Good)

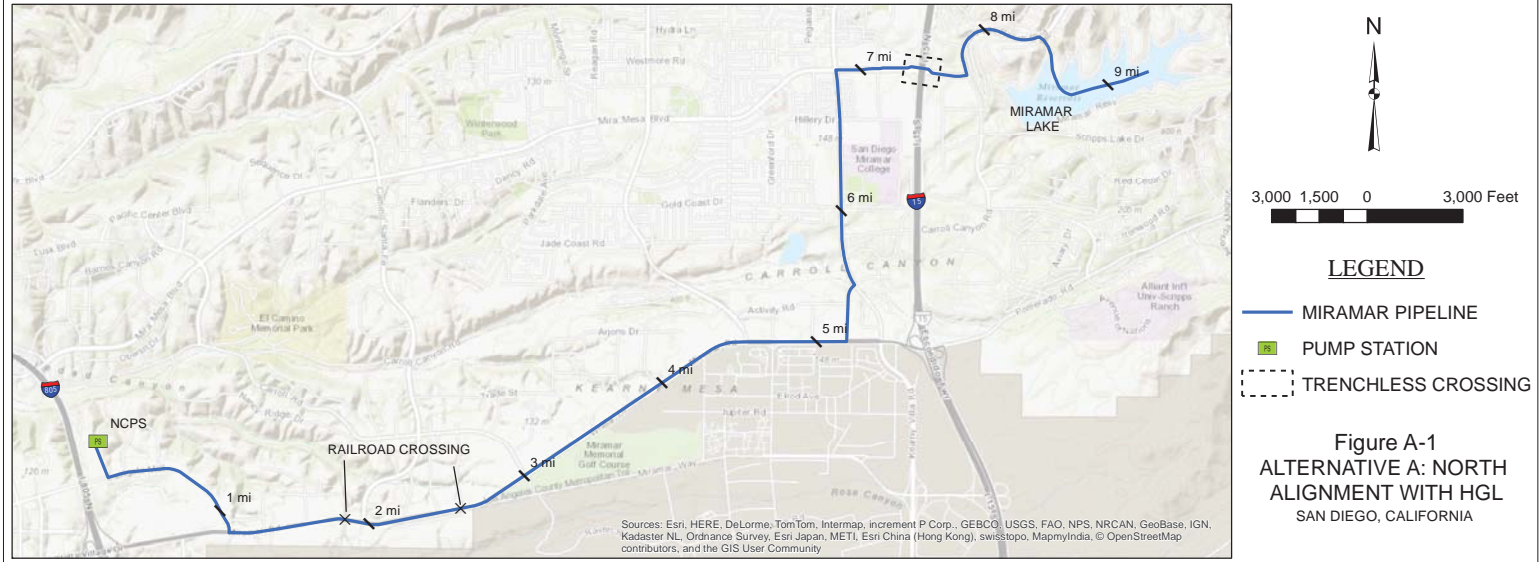
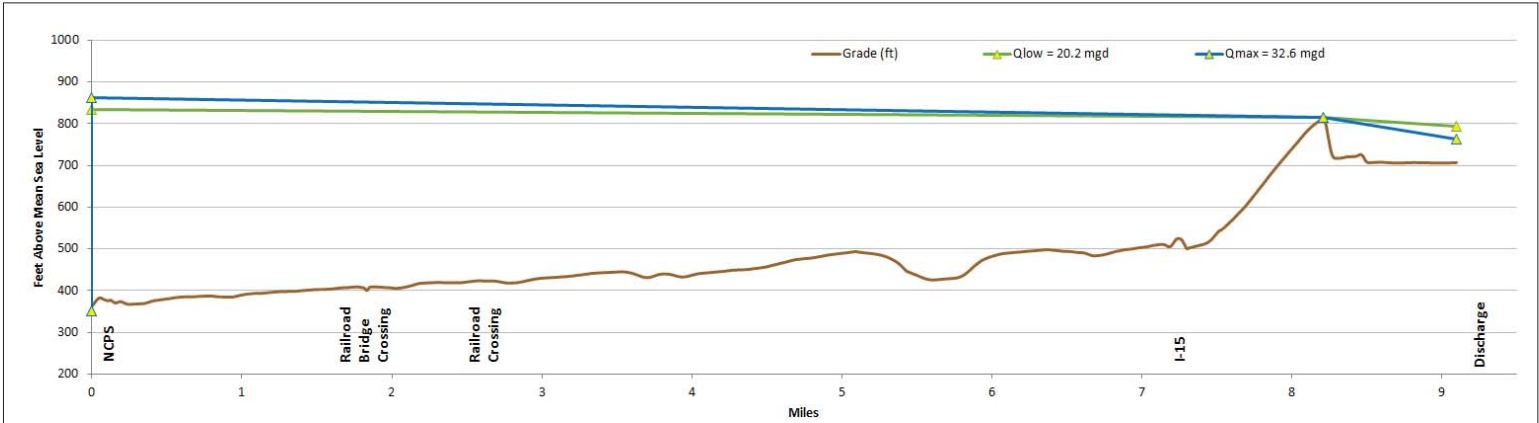
***The following table evaluates three alignment alternatives (see Figure 2) for the delivery of highly purified water from the NCPS to Miramar Lake.**

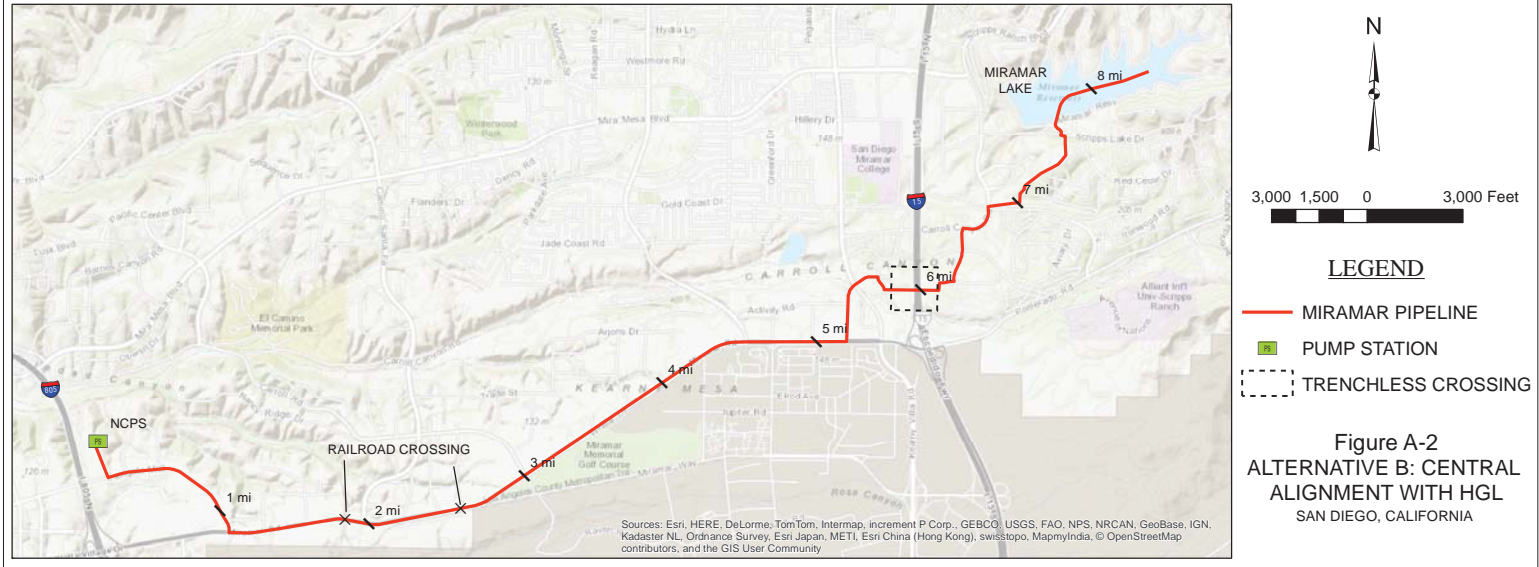
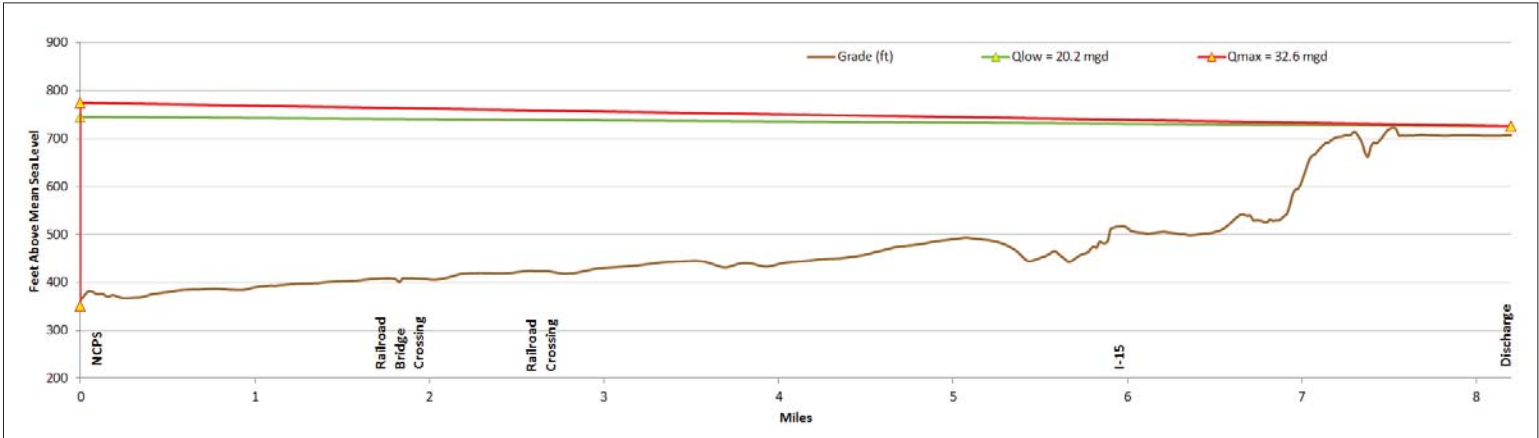
Cat.	Parameter/Condition	Criteria Definition	Alternative A: North*			Alternative B: Central*			Alternative C: South*		
			Rank	Description	Rank	Description	Rank	Description			
1. ALIGNMENT CHARACTERISTICS	1a. Approximate Alignment Length (LF)		3	48" Nominal Diameter w/ reduction to 30" downstream of high point. 8.5 Miles 43,800 LF 1,200 LF	1	48" Nominal Diameter 7.5 Miles 39,100 LF 700 LF	2	48" Nominal Diameter w/ 42" in congested corridor 8.1 Miles 41,750 LF 750 LF			
	NCPs to Miramar Reservoir (Miles)										
	Length of Open-Cut Trench (LF)										
	Length of Tunneling (LF)										
	1b. Static Hydraulic Profile			3	370 FT 815 FT 510 FT Low End: 14,000 gpm @ 210 psi High End: 22,600 gpm @ 220 psi 1,500 HP 3 pumps plus 1	1	370 FT 720 FT 410 FT Low End: 14,000 gpm @ 165 psi High End: 22,600 gpm @ 175 psi 1,250 HP 3 pumps plus 1	1	370 FT 725 FT 410 FT Low End: 14,000 gpm @ 165 psi High End: 22,600 gpm @ 175 psi 1,250 HP 3 pumps plus 1		
	Elevation NCPs - Discharge										
	High Point Elev. (Static head)										
	Total Dynamic Head (TDH)										
	Pumping pressures & operating ranges										
	Installed motor HP										
	1c. Discharge Location			3	North side of Miramar Lake with <u>no</u> MWTP Connection option	1	South side of Miramar Lake with MWTP Connection option.	2	South side of Miramar Lake with MWTP Connection option. May require a segment parallel to Scripps Lake Dr		
	1d. Estimated Construction Duration (Field Construction)	Considerations:		2	80-120 LF/day per crew 1 Crew(s) per shift 1 Shift(s) per working day	1	18 Months using 110 LF/day per crew Estimated Float = 6 Months	3	26 Months using 80 LF/day per crew Estimated Float = 2 Months		
	1e. Additional Time for Land Acquisition	Considerations:		1	Private / Residential Commercial City / Public	3	9 Months	2	6 Months		
	1f. Total Length of Easements	Percentage of total pipeline length requiring a permitted or permanent easement.		2	5% in Permitted Caltrans ROW	3	15% in Permitted Caltrans ROW and Permanent Easements	1	3% in Permitted Caltrans ROW and Permanent Easements		
	CATEGORY 1 - SUBTOTALS			14		10		11			
	2.a Coordination Requirements:			Ranking for 2.a =		1		3			
			Subtotal of i - ix below =	17	16		21				
i) General Permitting	- Number of permits - Difficulty / LOE of permits <u>See Appendix A, Figure A-4</u>		2	See Appendix A, Figure A-4: ~ 1 additional permit (high risk) ~ 2 additional permit (med risk)	3	See Appendix A, Figure A-4: ~ 2 additional permit (high risk)	1	See Appendix A, Figure A-4: ~ 1 additional permit (high risk)			
ii) Department of Health Services Approval	- Ability to meet offset requirements w/o mitigation/ relocation. - available ROW		1	~ large ROW widths (95% +/- > 100 FT) to meet separation requirements	2	~ mixed ROW widths (84% +/- > 80 ft.) to meet separation requirements	3	~ mixed ROW widths with narrow 60 ROW (74% +/- > 80 ft., 24% +/- < 60 ft.) Mitigation for reduce separation anticipated.			
iii) Caltrans I-15 Crossing Permitting	- Ease of Permit Approval - Impact to ramps - Impact to tunneling ops - Results from meeting w/ Caltrans held on 8/26/2015.		3	Least preferred by Caltrans: ~ I-15 crossing at Mira Mesa Blvd with Caltrans approval for open cut or trenchless construction in Mira Mesa Blvd at bridge underpass ~ required structural review of bridge ~ alignment crosses access ramps ~ Alternative options available if required to revise crossing	1	Preferred by Caltrans: ~ I-15 crossing will require private property easements on both sides to cross. ~ No impact to access ramps or freeway traffic ~ impacts entry and parking on commercial properties ~ no alternatives to revise crossing location	1	Preferred by Caltrans: ~ I-15 crossing will be in public ROW and former county parcel. Land purchase is optional, not required. ~ minimal interference with access ramps and traffic ~ alternatives to revise crossing location			
iiii) Railroad Crossing - City's Metropolitan Transit System (MTS) - BMS rail crossing at grade	- Existing MOU - Need to obtain new MOU.		1	Two railroad crossings, both on Miramar and are comment to all alternatives.	1	Two railroad crossings, both on Miramar and are comment to all alternatives.	1	Two railroad crossings, both on Miramar and are comment to all alternatives.			
v) MCAS Miramar and Naval Operations	- Avoid impacts to access		1	Two military entrance crossing: ~ North & West entrance to MCAS	1	Two military entrance crossing: ~ North & West entrance to MCAS	3	Three military entrances crossings: ~ North & West entrance to MCAS ~ Naval observatory			
vi) Contaminated Sites	- Crossing areas of known contamination - Planned CIP - Pavement Moratoriums <u>See Appendix A, Figure A-5</u>		2	8 additional sites ~ 4 CIPs ~ 3 Moratoriums	1	6 additional sites ~ 4 CIPs ~ 0 Moratoriums	3	12 additional sites; concentrated in CALTRANS ~ 1 CIPs ~ 2 Moratoriums			
vii) Public/Community Relations Coordination	- Direct impact to community - Community engagement - Likelihood of community complaints management		2	~ large group, broad impact to non-resident commuters and business.	1	~ large group, broad impact to commuters, schools and businesses.	3	~ larger resident group, specific impact in residential areas and elementary school access			
viii) Utility Coordination	- Number of conflicts/utility congestion - Service Disruptions - Relative difficulty for conflict negotiations		1	See 4.g - Utility Conflicts	2	See 4.g - Utility Conflicts	2	See 4.g - Utility Conflicts			
ix) SDCWA Crossing	- Easement access - Conflicting utilities		1	96" at I-15 and Mira Mesa Blvd and Easement crossing at Scripps Ranch Blvd.	2	Multiple crossing and parallel pipelines along Scripps Ranch Blvd and Scripps Lake Dr. Includes 66", 72", 84" and others	3	54" and 84" at Red Cedar Drive. Parallel Construction Red Cedar Dr. Requires narrow ROW crossing w/ possible closures and restricted school access			
2.b Environmental Permits	- Special Permit Requirements - Limited access/timing for construction - ACP Handling/Hauling/Disposal - Difficulty of obtaining permits		3	See 4.a - Environmental	2	See 4.a - Environmental	1	See 4.a - Environmental			
2.c Local Communities/Schedule Impacts	- Disruption to community / business - Impacts to residents - Home owner group coordination - Fire/police stations coordination - Alternate traffic/emergency routing - Impacts to Businesses - Ingress Egress via construction area		2	Mostly commercial with minor impacts to residential: ~ minor residential ~ major business & commercial shopping ~ Fire Station 44 on Black mountain Road ~ Elementary, Middle School and College	1	Disruption during construction primarily in the form of noise and traffic disruptions: ~ Predominantly commercial. ~ No residential. ~ No impact to schedule.	3	Residential areas and Elementary Schools restricting noise and schedule: ~ more residential ~ greatest impact to federal/navy ~ Construction widening of Pomerado has previously failed to pass based on public impact. (Anticipate 9 am to 3 pm construction restrictions)			
2.d Duration of Construction and Ability to Meet July 2021 Deadline	- Design and Property acq. concurrent - 28 months total available for constr. - Can deadline be met accounting for risk		2	~ Float ~6 months ~ Primary delay risks are traffic control, limited construction operations, and utility conflicts	1	~ Float ~10 months ~ Primary delay risk is property acquisition	3	~ Float ~2 months ~ Primary delay risks are property acquisition, narrow ROWs, limited construction operations, and utility conflicts			
2.e Real Property Acquisition for Permanent Easement/ROW	- Public vs private property availability - Establish easements - Purchase Property - Legal risks that may impact schedule <u>See Appendix A, Figure A-6</u>		1	See 1.e - Additional Time for Land Acquisition: ~ Lake Access via City owned property ~ All in ROW or City Property ~ No easement acquisition in non-city property anticipated	3	See 1.e - Additional Time for Land Acquisition: ~ Lake Access via City owned property ~ Required, six (6) easements through commercial property ~ Required, one (1) easement through San Diego School Board property ~ Easements required for tunnel, which presents significant risk to project	2	See 1.e - Additional Time for Land Acquisition: ~ Lake Access via City owned property ~ Required, one (1) easement through San Diego School Board property ~ Optional, one (1) private property parcel purchase. Unused and inaccessible property, which will facilitate tunneling operations. ~ Easements required for tunnel, which presents significant risk to project			
CATEGORY 2 - SUBTOTALS			10		8		12				

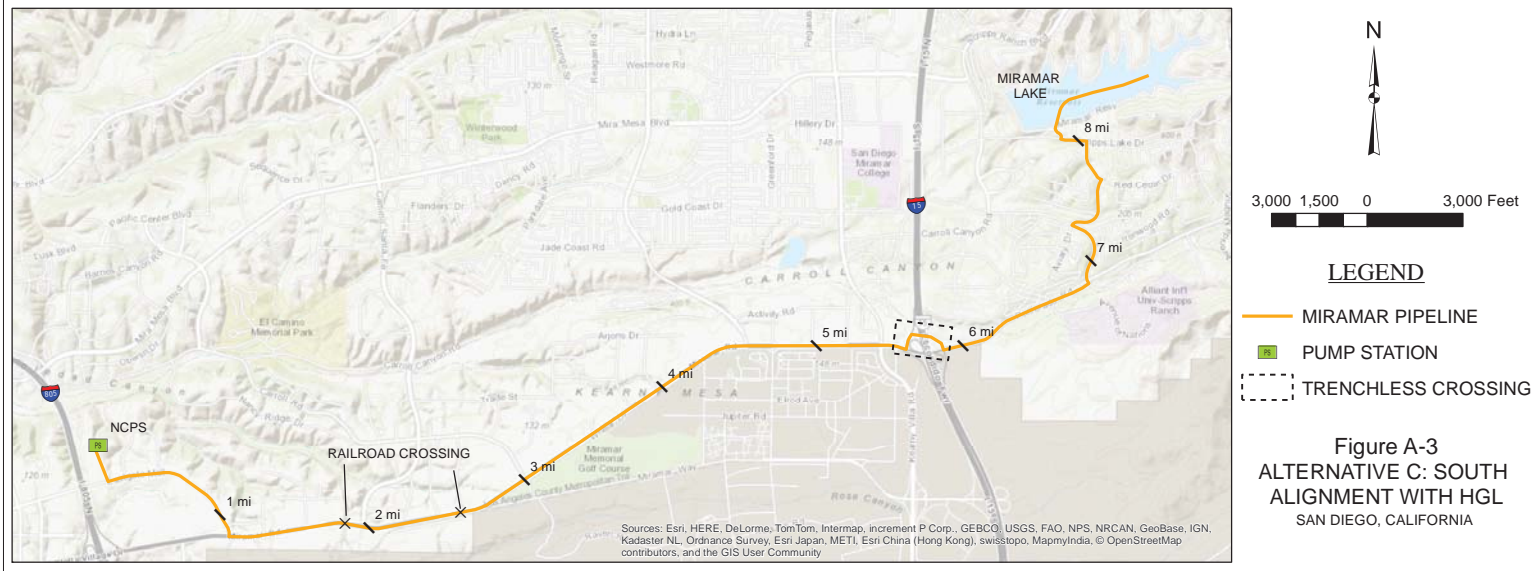
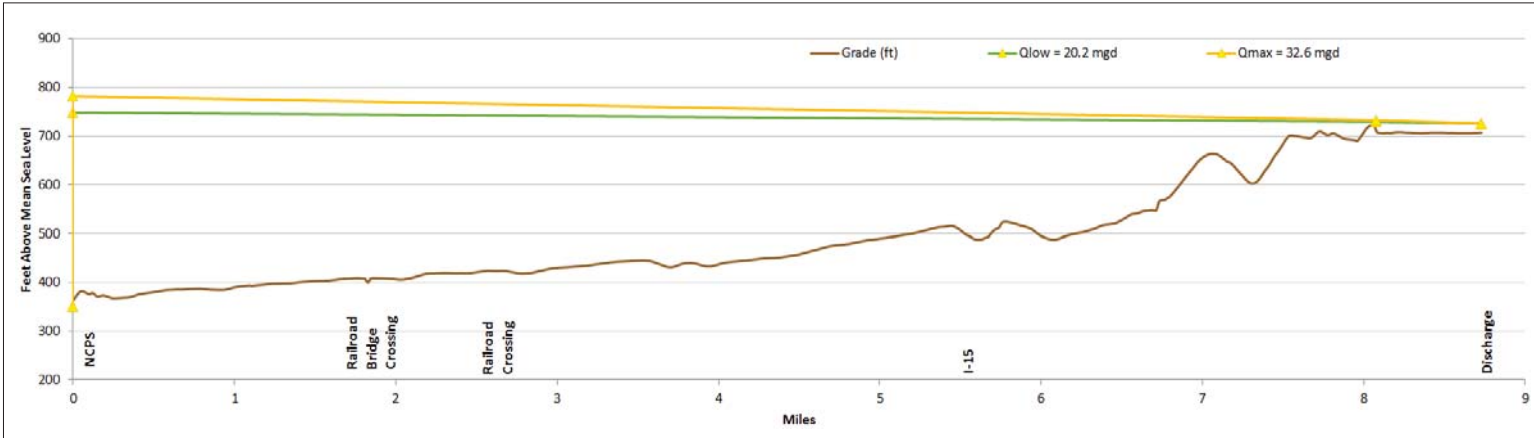
TABLE A-1: ALIGNMENT ALTERNATIVES EVALUATION MATRIX
Task 8 - Miramar Pipeline and Pump station

Ranking Priority:
1 - First Choice; least impacted by criteria (Best)
2 - Second Choice; moderately impacted by criteria (Better)
3 - Third Choice; most impacted by criteria (Good)

*The following table evaluates three alignment alternatives (see Figure 2) for the delivery of highly purified water from the NCPS to Miramar Lake.									
Cat.	Parameter/Condition	Criteria Definition	Alternative A: North*		Alternative B: Central*		Alternative C: South*		
			Rank	Description	Rank	Description	Rank	Description	
3. PIPELINE OPERATION & MAINTENANCE	1a. Approximate Alignment Length (LF)			48" Nominal Diameter w/ reduction to 30" downstream of high point.		48" Nominal Diameter		48" Nominal Diameter w/ 42" in congested corridor	
	3a. O&M Considerations		Ranking for 3.a =	3		1		2	
			Subtotal of i - iv below =	9	6	8	8		
	i) Access to Manways, vaults, valves, low points and air valves/Siting of appurtenances			3	All appurtenances are located in trafficked areas	1	Most appurtenances are located out of trafficked areas	1	Mixed; appurtenances are located in both trafficked and non-trafficked areas
	ii) Access to Tunnel and shafts		Ability to repair/access/ depth of crossing based on topography	1	In CALTRANS ROW and shallow	3	Within private property, with varying slopes and grades	2	All in public ROW, but is the deepest crossing
	iii) Traffic Control - Safety and Access		Crew access and safety performing maintenance	3	See 4.c - Traffic Control	1	See 4.c - Traffic Control	2	See 4.c - Traffic Control
	iv) Pipeline Appurtenance maintenance at High/low points		Total high/low points which may require appurtenances Appurtenances (i.e. air valves, blow off structures) requiring maintenance	2	Least number of high and low points. Has highest highpoint which requires energy dissipation.	1	Local topographic high and low points	3	Most local topographic high and low points
3b. O&M Risk (consequence of failure)		Limited access Difficult to repair	2	~ Maintenance and access at I-15 underpass. ~ Greatest impact to businesses ~ Greatest effect on traffic	1	~ Maintenance and access on private property required at I-15 crossing. ~ Alignment crosses 100 Yr. flood plain at Black Mountain Road.	3	~ Maintenance and access on private property if utility congestion requires use of easements at Red Cedar Dr. and Aviary Dr. ~ Alignment parallels flood plain at Miramar Rd and Pomerado Rd east of Black Mountain Rd. ~ Longest I-15 Crossing ~ Greatest impacts to residents	
3c. Operating Permit Requirements		Identify permits required Flag long lead permit items Access to special special properties, e.g. ESAs	1	Entire alignment is in public ROW or City owned property	3	Alignment has the most private property easements. Most critical segment, the tunnel under I-15, is on private property	2	Most private property easements, and a school district easement	
CATEGORY 3 - SUBTOTALS			8		8		7		
4. CONSTRUCTIBILITY	4a. Environmental Resources	ESLs Archeological Paleontological Known areas of potential contamination Wetlands and waterways <i>See Appendix A, Figure A-7</i>	3	~ 20 additional points ~ Dechlor facility will be in park	2	~ 19 additional points ~ Dechlor facility will on MWTP site.	1	~ 17 additional points ~ Dechlor facility will on MWTP site.	
	4b. Geotechnical	Poor and loose materials in Flood Plain Suitable for backfill material Corrosive soils Seismic fault line areas Construction on side slopes <i>See Appendix A, Figure A-8</i>	3	~ Unsuitable for backfill (longest LF), similar haulage distances ~ Cemented hard to excavate ~ Some metavolcanic rock by Dam	2	~ Unsuitable for backfill, similar haulage distances ~ Some metavolcanic rock by MWTP	1	~ Unsuitable for backfill, similar haulage distances ~ Mostly all stadium conglomerate	
	4c. Traffic Control	Pipe laying production rate Need for vertical shoring Open cut feasibility Trenchless need Schedule impacts <i>See Appendix A, Figure A-9</i>	3	~ Highest Traffic Count = 175,307 ~ Highest traffic volumes. Mira Mesa contains the highest traffic counts of all alignments w/ extensive traffic control ~ Traffic disruptions impacts commercial office spaces, high density shopping, and schools w/ detours and lane closures	1	~ Highest Traffic Count = 27,759 ~ Most of alignment, aside from Miramar, does not run along major thoroughways ~ Traffic disruptions mostly impact commercial office spaces w/ detours and lane closures	2	~ Highest Traffic Count = 135,027 ~ Pomerado presents high traffic counts and is a narrow road. ~ Traffic disruptions impacts residential w/ road closures and detours to construct	
	4.d Tunneling (anticipated permitted Xings)	Length Setup and staging area available Depth of crossing	2	~ Tunneling operations and staging in public parcel ~ Staging in ROW w/ controlled access ~ Longest casing and Caltrans ROW crossing ~ Moderate access depth	3	~ Tunneling operations, staging, and approaches on Private Property w/ limited access ~ Shallowest access depth Safety risks to public	1	~ Excellent staging & access ~ Varying grades and slopes ~ Deepest and longest tunnel ~ All in public ROW or public land	
	4.e Clearing Grubbing/Tree Removal	Extent of clearing and grubbing Requires removal of mature trees	1	~ Limited clearing required in alignment to access Lake. (3%)	2	~ Clearing of side slopes behind commercial properties and City held property to construct. (13%)	2	~ Clearing on Pomerado Rd in undeveloped road ROW and possible removal of trees at school to avoid utility relocation on Red Cedar Dr. (13%)	
	4.f Construction Methods	Feasibility to construct ROW and TCE availability (long/short lead)	1	~ Open cut construction for majority of alignment with open cut or trenchless crossing of I-15 w/ Caltrans approval ~ Large ROW for contractor staging ~ Approach to lake is most difficult of the options.	3	~ Open cut construction for majority of alignment with trenchless crossing of I-15. ~ Large ROW and PE contractor staging ~ Private property trenching and tunneling ~ Requires the most clearing of trees, side slope and "off-road" construction.	2	~ Open cut construction for majority of alignment with trenchless crossing of I-15. ~ Narrow residential ROW on Pomerado and in Residential Area.	
	4.g Utility Conflicts	Number of conflicts/utility congestion Service Disruptions Health and safety risks Deflect alignment or relocate utility	1	~ Buried utilities will be crossed and paralleled in the pipeline alignment with heavy congestion in Mira Mesa Dr. ~ Mix of commercial and industrial service connections. Limited disruption. ~ Options exist to use alternate routes or tunnel in wide ROW to avoid utilities.	2	~ Buried utilities will be crossed and paralleled in the corridor. Heaviest congestion of all three options seen on the Carroll Canyon, Scripps Ranch Blvd and Scripps Lake corridors. Revised to avoid. ~ Mix of commercial and industrial service connections. Limited disruptions.	2	~ Buried utilities will be crossed and paralleled in the corridor with heavy congestion in Red Cedar Dr. and Aviary Dr. (60' ROW). ~ Mix of commercial, and residential services. ~ Service disruptions in residential areas. ~ Utility relocation or parallel trench w/ reduced offset may be required to construct. ~ Relocation of 20" ACP or PE on school property required to construct.	
CATEGORY 4 - SUBTOTALS			14		18		11		
5. COST	5a. Total Project Cost	Pipeline construction Pump station construction Soft costs	1	\$109,000,000 \$32 -30%/+50% Estimate Range = \$ to \$	1	\$100,000,000 \$31 -30%/+50% Estimate Range = \$ to \$	1	\$105,000,000 \$32 -30%/+50% Estimate Range = \$ to \$	
	5b. Total Annual O&M Cost	Electrical Cost Routine Maintenance Repair and replacement of appurtenances	3	\$5,200,000 / year	1	\$4,400,000 / year	1	\$4,500,000 / year	
	5c. Life Cycle Net Present Value (50-yr)	NPV on a 50-yr life cycle Discount rate of 4% Pump replacement every 20 yrs.	3	\$278,000,000	1	\$241,000,000	1	\$248,000,000	
	CATEGORY 5 - SUBTOTALS			7		3		3	
			TOTAL =	51	41	44			
			FINAL RANK =	3	1	2			







LEGEND

- ALTERNATIVE A (NORTH)
- ALTERNATIVE B (CENTRAL)
- ALTERNATIVE C (SOUTH)

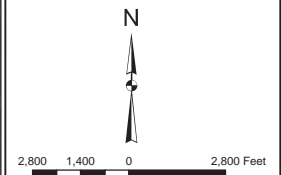
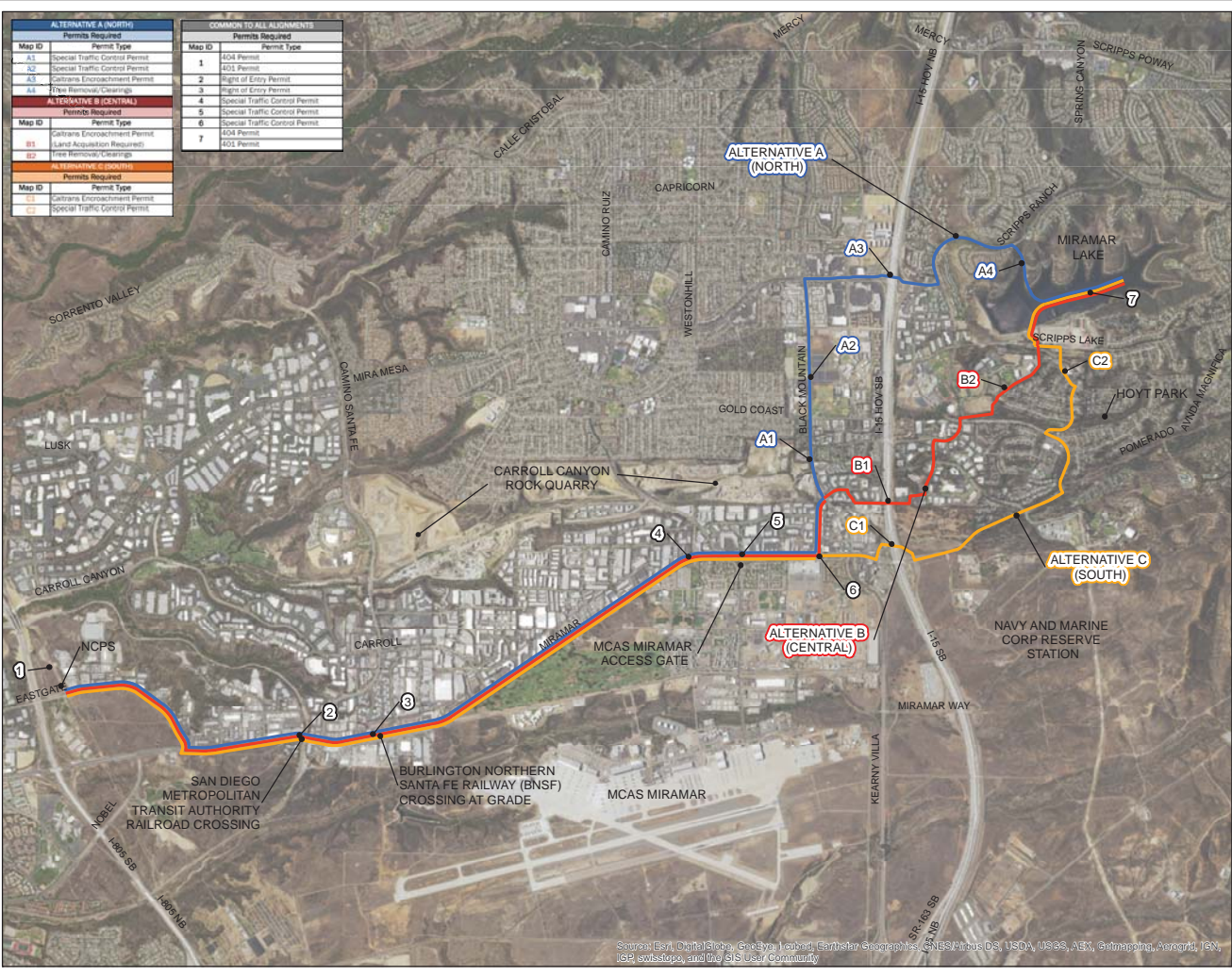
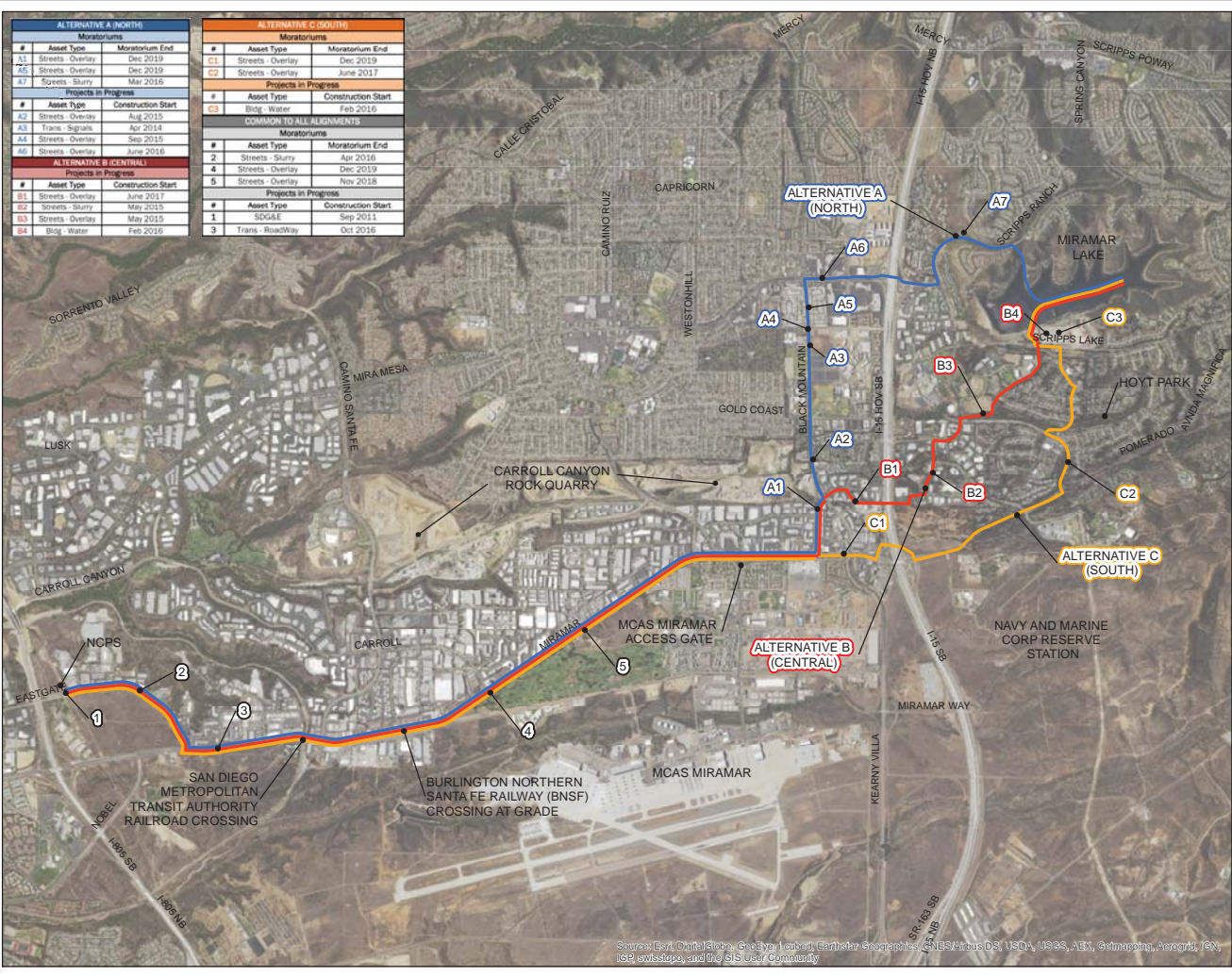


Figure A-4
PERMITTING MAP
TASK 8
SAN DIEGO, CALIFORNIA



Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroV, IGN, 1999, swisstopo, and the GIS User Community



ALTERNATIVE A (NORTH)		
Moratoriums		
#	Asset Type	Moratorium End
A1	Streets - Overlay	Dec 2019
A5	Streets - Overlay	Dec 2019
A7	Streets - Slurry	Mar 2018
Projects in Progress		
#	Asset Type	Construction Start
A2	Streets - Overlay	Aug 2015
A3	Trans - Signals	Apr 2018
A4	Streets - Overlay	Sep 2015
A6	Streets - Overlay	June 2016
ALTERNATIVE B (CENTRAL)		
Projects in Progress		
#	Asset Type	Construction Start
B1	Streets - Overlay	June 2017
B2	Streets - Slurry	May 2015
B3	Streets - Overlay	May 2015
B4	Biog - Water	Feb 2016

ALTERNATIVE C (SOUTH)		
Projects in Progress		
#	Asset Type	Construction Start
C1	Streets - Overlay	Dec 2019
C2	Streets - Overlay	June 2017
C3	Biog - Water	Feb 2016
COMMON TO ALL ALIGNMENTS		
Moratoriums		
#	Asset Type	Moratorium End
1	Streets - Slurry	Apr 2018
2	Streets - Slurry	Apr 2018
3	Streets - Overlay	Dec 2019
4	Streets - Overlay	Nov 2018
5	Streets - Overlay	Nov 2018
Projects in Progress		
#	Asset Type	Construction Start
1	Signal	Sep 2011
3	Trans - RoadWay	Oct 2016





LEGEND

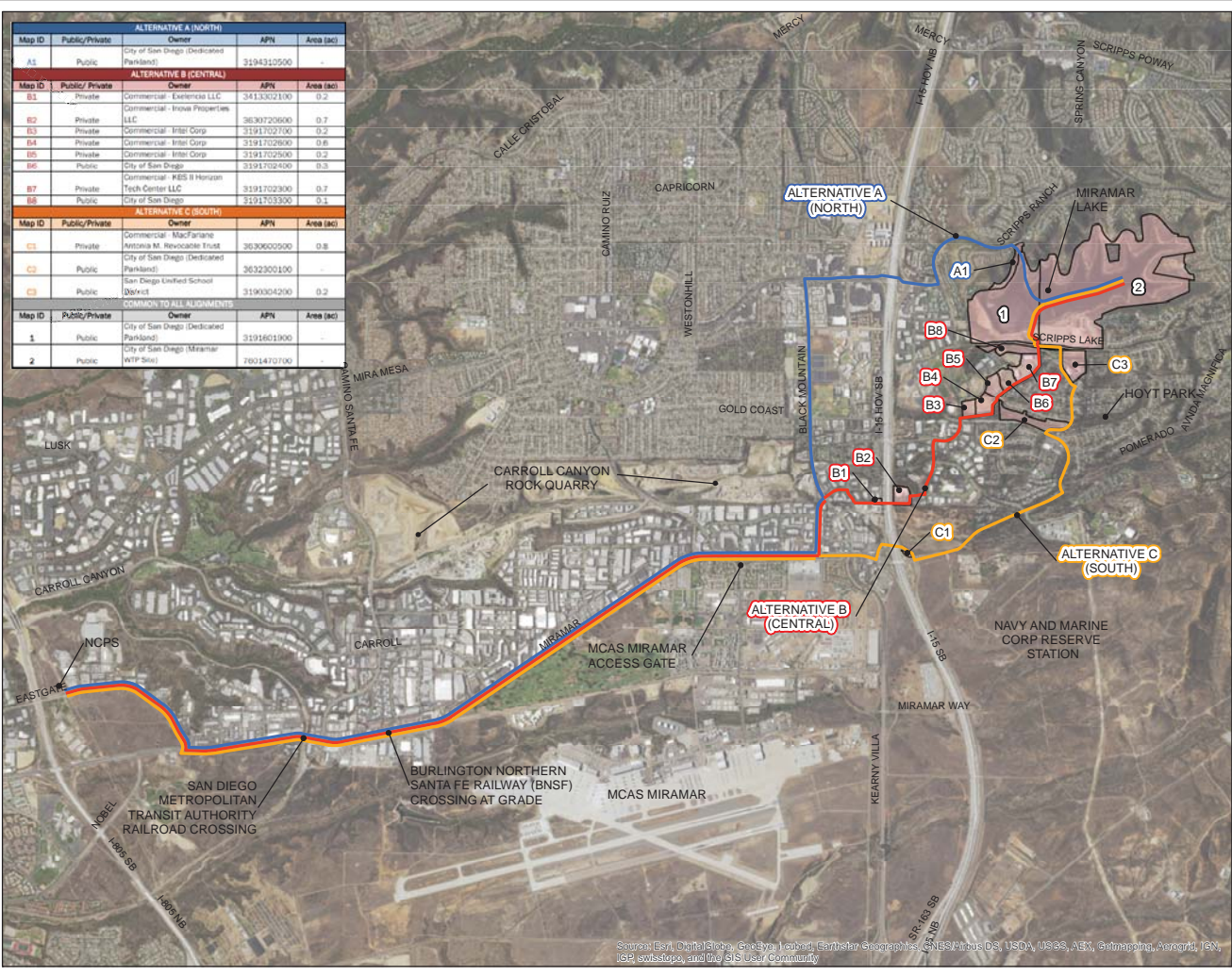
- ALTERNATIVE A (NORTH)
- ALTERNATIVE B (CENTRAL)
- ALTERNATIVE C (SOUTH)



2,800 1,400 0 2,800 Feet

Figure A-5
 CAPITAL PROJECTS
 MAP
 TASK 8
 SAN DIEGO, CALIFORNIA

Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, Esri, Swisstopo, and the GIS User Community



ALTERNATIVE A (NORTH)				
Map ID	Public/Private	Owner	APN	Area (ac)
A1	Public	City of San Diego (Dedicated Parkland)	3194310500	-
ALTERNATIVE B (CENTRAL)				
Map ID	Public/Private	Owner	APN	Area (ac)
B1	Private	Commercial - Laverne LLC	3413302100	0.2
B2	Private	Commercial - Inova Properties LLC	3830720600	0.7
B3	Private	Commercial - Intra Corp	3191702700	0.2
B4	Private	Commercial - Intra Corp	3191702600	0.6
B5	Private	Commercial - Intra Corp	3191702500	0.2
B6	Public	City of San Diego	3191702400	0.3
B7	Private	Commercial - RES B Horizon Tech Center LLC	3191702300	0.7
B8	Public	City of San Diego	3191703300	0.1
ALTERNATIVE C (SOUTH)				
Map ID	Public/Private	Owner	APN	Area (ac)
C1	Private	Commercial - MacFarlane Andrew M. Revocable Trust	3630600500	0.8
C2	Public	City of San Diego (Dedicated Parkland)	3632300100	-
C3	Public	San Diego Unified School District	3190304300	0.2
COMMON TO ALL ALIGNMENTS				
Map ID	Public/Private	Owner	APN	Area (ac)
1	Public	City of San Diego (Dedicated Parkland)	3191801900	-
2	Public	City of San Diego (Miramar WTP Site)	7801470700	-





LEGEND

- ALTERNATIVE A (NORTH)
- ALTERNATIVE B (CENTRAL)
- ALTERNATIVE C (SOUTH)



2,800 1,400 0 2,800 Feet

Figure A-6
 LAND ACQUISITION
 MAP
 TASK 8
 SAN DIEGO, CALIFORNIA

Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, 1999, swisstopo, and the GIS User Community

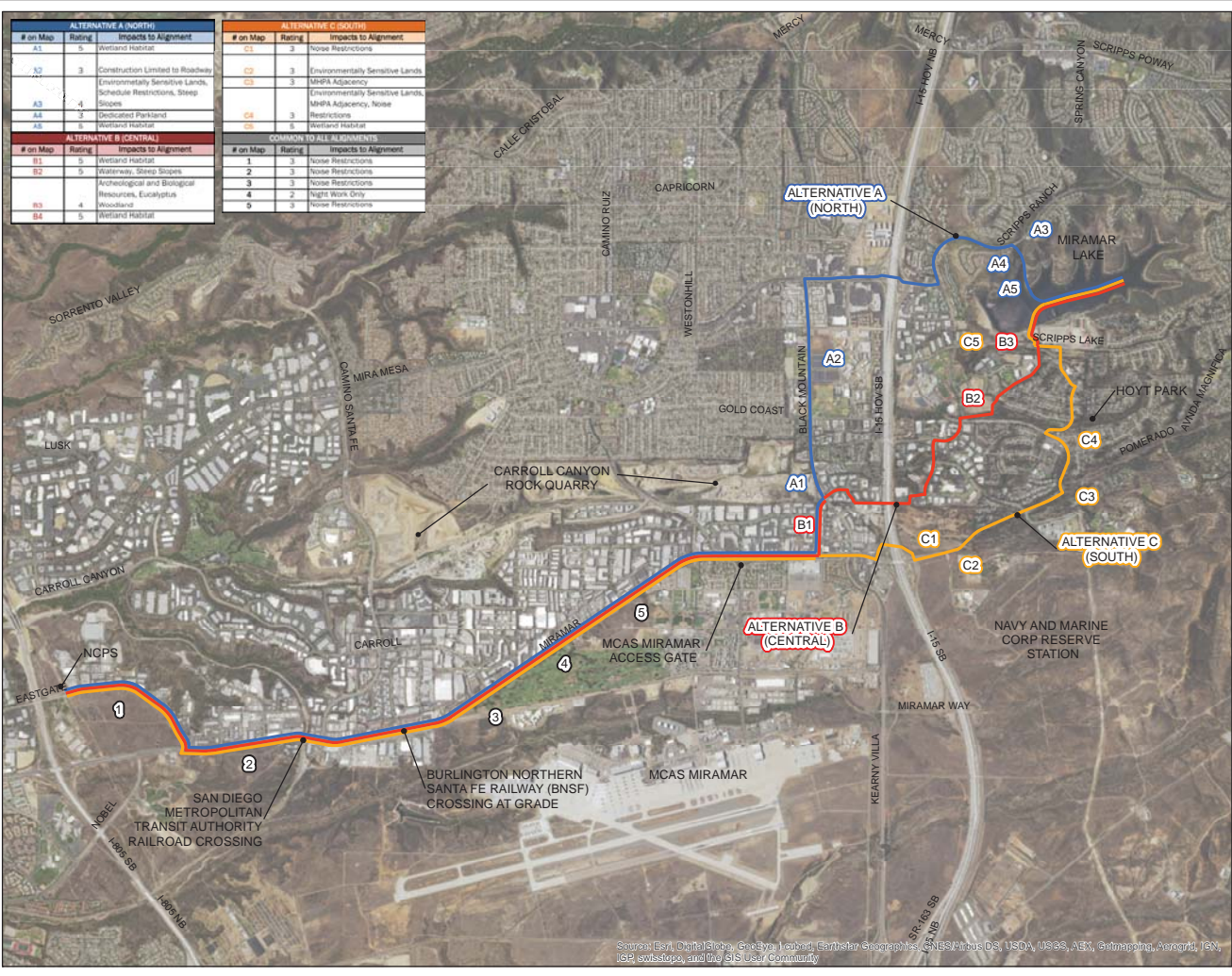
LEGEND

- ALTERNATIVE A (NORTH)
- ALTERNATIVE B (CENTRAL)
- ALTERNATIVE C (SOUTH)



2,800 1,400 0 2,800 Feet

Figure A-7
ENVIRONMENTALLY SENSITIVE
LANDS MAP
TASK 8
SAN DIEGO, CALIFORNIA



Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, GEMapping, AeroGRID, IGN, Esri, swisstopo, and the GIS User Community

LEGEND

- ALTERNATIVE A (NORTH)
- ALTERNATIVE B (CENTRAL)
- ALTERNATIVE C (SOUTH)

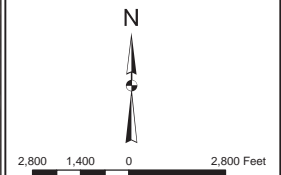
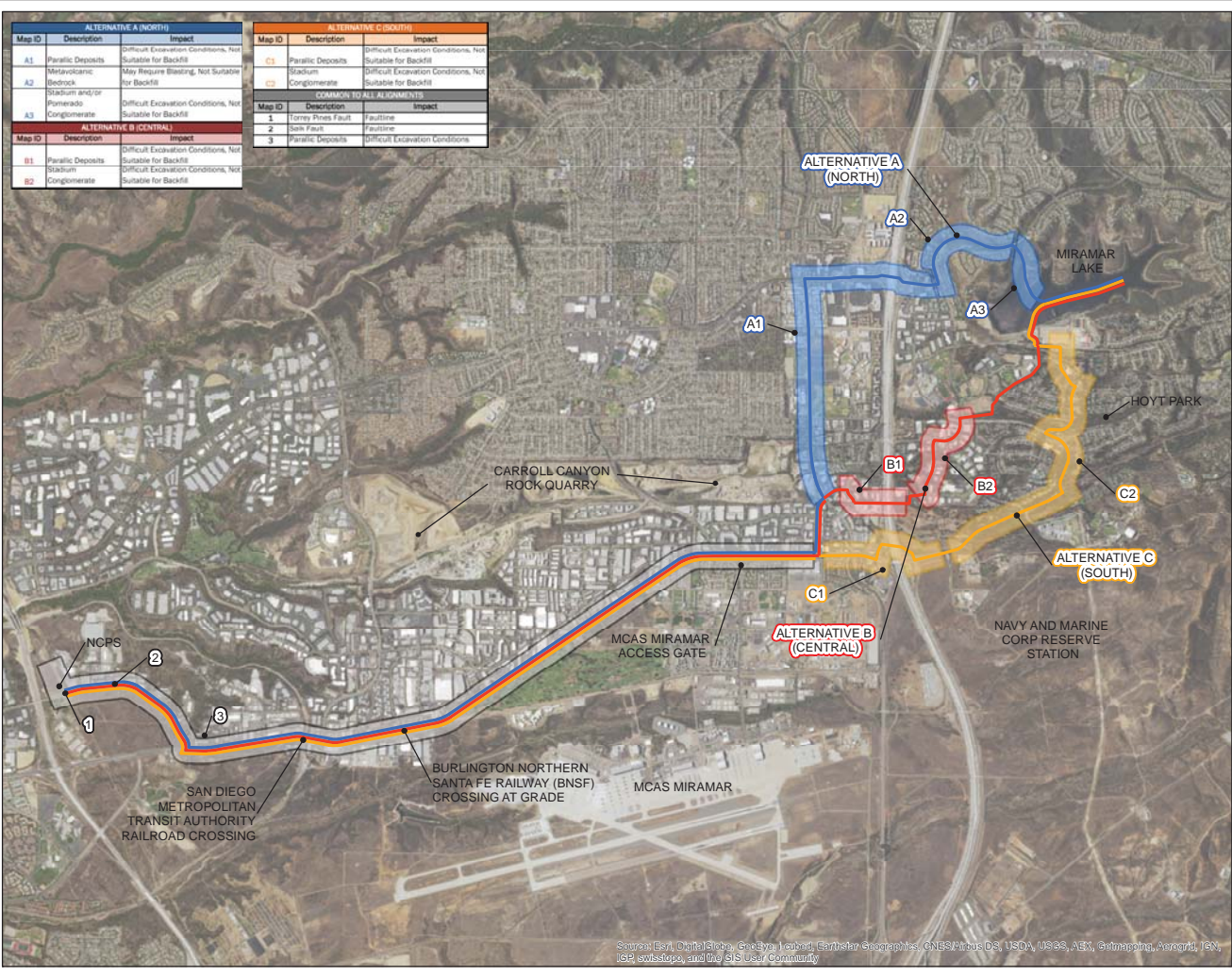


Figure A-8
GEOTECHNICAL CONDITIONS
MAP
TASK 8
SAN DIEGO, CALIFORNIA



Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, 199, swisstopo, and the GIS User Community

LEGEND

- ALTERNATIVE A (NORTH)
- ALTERNATIVE B (CENTRAL)
- ALTERNATIVE C (SOUTH)

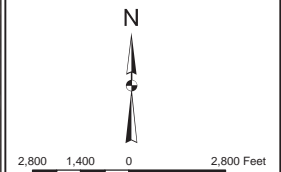
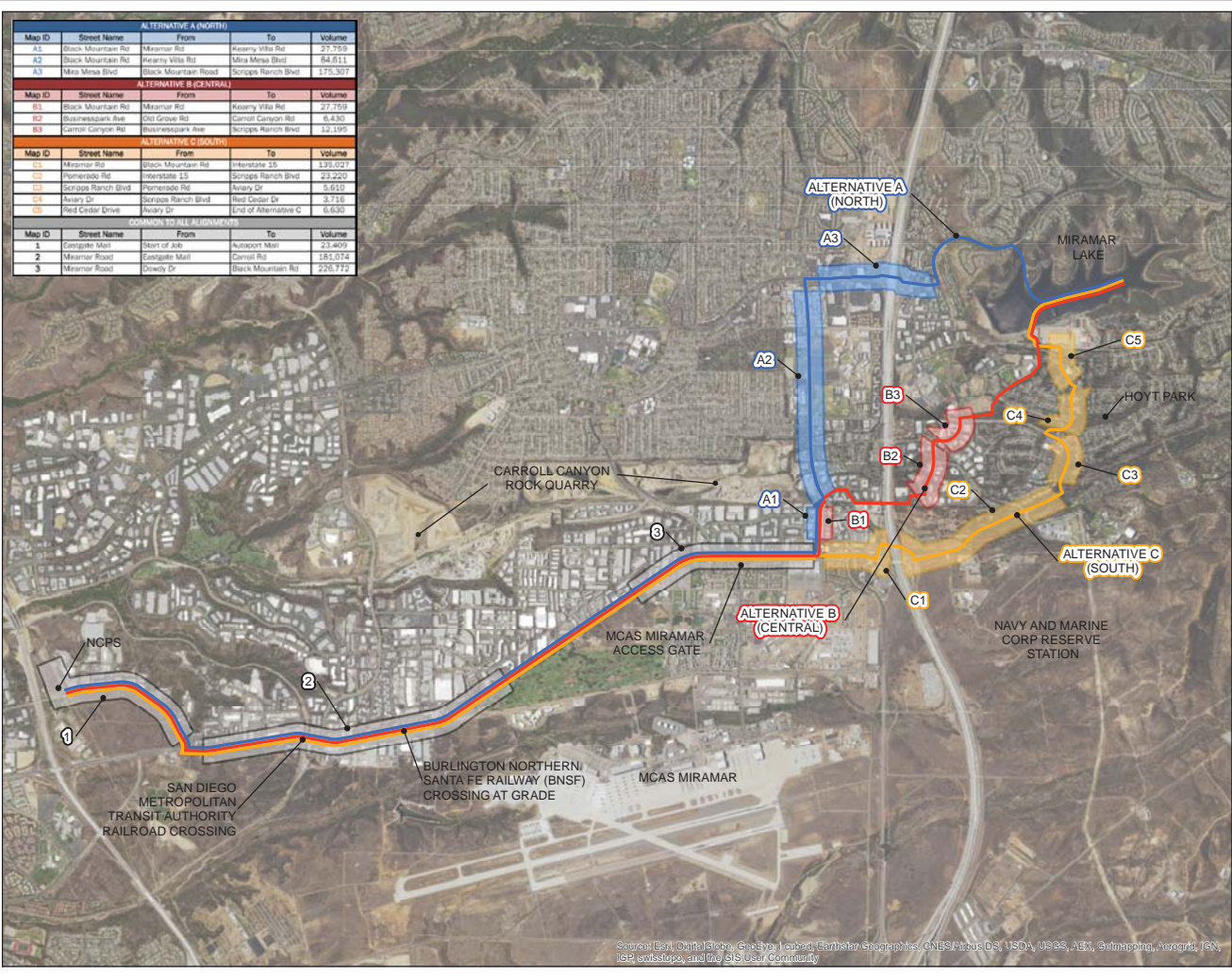


Figure A-9
TRAFFIC COUNTS
MAP
TASK 8
SAN DIEGO, CALIFORNIA



ALTERNATIVE A (NORTH)				
Map ID	Street Name	From	To	Volume
A1	Black Mountain Rd	Miramar Rd	Keamy Villa Rd	27,759
A2	Black Mountain Rd	Keamy Villa Rd	Mira Mesa Blvd	84,811
A3	Mira Mesa Blvd	Black Mountain Road	Scraggs Ranch Blvd	175,307
ALTERNATIVE B (CENTRAL)				
Map ID	Street Name	From	To	Volume
B1	Black Mountain Rd	Miramar Rd	Keamy Villa Rd	27,759
B2	Businesspark Ave	Old Grove Rd	Carroll Canyon Rd	6,430
B3	Carroll Canyon Rd	Businesspark Ave	Scraggs Ranch Blvd	12,195
ALTERNATIVE C (SOUTH)				
Map ID	Street Name	From	To	Volume
C1	Miramar Rd	Black Mountain Rd	Interstate 15	138,027
C2	Pomerado Rd	Interstate 15	Scraggs Ranch Blvd	23,220
C3	Scraggs Ranch Blvd	Pomerado Rd	Avary Dr	5,910
C4	Avary Dr	Scraggs Ranch Blvd	Red Cedar Dr	5,718
C5	Red Cedar Drive	Avary Dr	End of Alternative C	6,630
COMMON TO ALL ALIGNMENTS				
Map ID	Street Name	From	To	Volume
1	College Way	Start of Job	Autosport Mall	21,409
2	Miramar Road	Eastgate Mall	Carroll Rd	181,074
3	Miramar Road	Dewey Dr	Black Mountain Rd	228,772

Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroV, Gmapping, AeroGRID, IGN, IS2, swisstopo, and the GIS User Community



Appendix B: Conceptual Cost Estimates

1. Detailed Cost Estimate

TABLE B-1: ALTERNATIVE A - NORTH ALIGNMENT

SCENARIO DATA							CAPITAL COST							ANNUAL COST				
Item	Description	Capacity			Unit	Diameter	Unit Cost	Unit	Unit Cost Multipliers			Final Unit Cost	Quantity	Cost	O&M %	Annual O&M Cost	Annual Elect Cost	Total Annual Cost
		Used	Average/Duty	Peak/Installed					Site ¹	Pressure ²	Misc ⁴							
PUMP STATION NCPS	NCWRP Pump Station	3,991	4,500	6,000	hp	NA	\$3,215	hp	1.0	1.0	1.0	\$3,215	6,000	\$19,290,337	2.5%	\$482,258	\$4,432,149	\$4,914,408
		3,991	4,500	6,000	hp													
PUMP STATION SUBTOTAL = \$19,290,337 PUMP STATION SOFT COSTS = \$13,503,236 PUMP STATION TOTAL = \$32,793,573																		
PIPELINE Miramar Pipe New Open-Cut Pipeline in Road 0.0 0.0 mgd 48 \$672 LF 1.0 1.0 1.0 \$672 42,446 \$28,524,002 1.0% \$285,240 Miramar Pipe New Open-Cut Pipeline in Road 0.0 0.0 mgd 30 \$420 LF 1.0 1.0 1.0 \$420 4,701 \$1,974,566 1.0% \$19,746 Pressure Reducing Station Pressure Reducing Station 0.0 0.0 mgd NA \$80,000 LS 1.0 1.0 1.0 \$80,000 1 \$80,000 1.0% \$800 Trenchless Crossings Interstate 15 Crossing 0.0 0.0 mgd 48 \$2,517 LF 1.0 1.0 1.0 \$2,517 900 \$2,265,408 1.0% \$22,654 Discharge Structure Discharge Structure 0.0 0.0 mgd NA \$610,000 LS 1.0 1.0 1.0 \$610,000 1 \$610,000 1.0% \$6,100																		
FOOTNOTES Note this is a Class 4 Cost Estimate with a -30%/+50% accuracy according to the Association of Cost Engineering (ACE) International cost estimate classification system. 1 For pump stations, "Used" is actual (not rated) HP where HP = (flow.gpm * head, ft) / (3960*efficiency). "Average" is installed duty motor HP, "Peak" is total installed motor HP. 2 Site multiplier is to account for unique site expenses. 1.0 = greenfield, 1.5 = existing facility 3 Pressure multiplier accounts for increased HP cost. 1.0 = open-cut to 200-psi, 1.3 = open-cut to 260-psi 4 Misc. allows for additional unit price adjustment. 5 Escalation of construction costs to mid-point of construction.														PIPELINE SUBTOTAL = \$33,453,976	\$334,540	\$0	\$334,540	
														PIPELINE SOFT COSTS = \$23,417,783				
														PIPELINE TOTAL = \$56,871,759				
														SCENARIO SUBTOTAL = \$52,744,313	\$816,798	\$4,432,149	\$5,248,947	
														SCENARIO SOFT COSTS = \$36,921,019				
														SCENARIO ESCALATION ⁵ = \$19,426,254				
														SCENARIO TOTAL = \$109,091,586				

TABLE B-2: ALTERNATIVE B - CENTRAL ALIGNMENT

SCENARIO DATA							CAPITAL COST							ANNUAL COST				
Item	Description	Capacity			Unit	Diameter	Unit Cost	Unit	Unit Cost Multipliers			Final Unit Cost	Quantity	Cost	O&M %	Annual O&M Cost	Annual Elect Cost	Total Annual Cost
		Used	Average/Duty	Peak/Installed					Site ¹	Pressure ²	Misc ⁴							
PUMP STATION NCPS	NCWRP Pump Station	3,309	3,750	5,000	hp	NA	\$3,408	hp	1.0	1.0	1.0	\$3,408	5,000	\$17,037,952	2.5%	\$425,949	\$3,674,428	\$4,100,377
		3,309	3,750	5,000	hp													
PUMP STATION SUBTOTAL = \$17,037,952 PUMP STATION SOFT COSTS = \$11,926,566 PUMP STATION TOTAL = \$28,964,518																		
PIPELINE Miramar Pipe New Open-Cut Pipeline in Road 0.0 0.0 mgd 48 \$672 LF 1.0 1.0 1.0 \$672 42,330 \$28,445,840 1.0% \$284,458 Trenchless Crossings Interstate 15 Crossing 0.0 0.0 mgd 48 \$2,517 LF 1.0 1.0 1.0 \$2,517 950 \$2,391,264 1.0% \$23,913 Discharge Structure Discharge Structure 0.0 0.0 mgd NA \$610,000 LS 1.0 1.0 1.0 \$610,000 1 \$610,000 1.0% \$6,100																		
FOOTNOTES Note this is a Class 4 Cost Estimate with a -30%/+50% accuracy according to the Association of Cost Engineering (ACE) International cost estimate classification system. 1 For pump stations, "Used" is actual (not rated) HP where HP = (flow.gpm * head, ft) / (3960*efficiency). "Average" is installed duty motor HP, "Peak" is total installed motor HP. 2 Site multiplier is to account for unique site expenses. 1.0 = greenfield, 1.5 = existing facility 3 Pressure multiplier accounts for increased HP cost. 1.0 = open-cut to 200-psi, 1.3 = open-cut to 260-psi 4 Misc. allows for additional unit price adjustment. 5 Escalation of construction costs to mid-point of construction.														PIPELINE SUBTOTAL = \$31,447,104	\$314,471	\$0	\$314,471	
														PIPELINE SOFT COSTS = \$22,170,208.54				
														PIPELINE TOTAL = \$53,617,313				
														SCENARIO SUBTOTAL = \$48,485,056	\$740,420	\$3,674,428	\$4,414,848	
														SCENARIO SOFT COSTS = \$34,096,775				
														SCENARIO ESCALATION ⁵ = \$17,891,593				
														SCENARIO TOTAL = \$100,473,424				

Life Cycle Analysis (LCA)

TABLE B-4: ALTERNATIVE A - NORTH ALIGNMENT

Description	Cost	Year	FV	NPV
Scenario Total ¹	\$109,091,586	0	\$109,091,586	\$109,091,586
Pump Station Subtotal ²	\$19,290,337			
Pump & Motor Replacement ³	\$2,352,462	20	\$3,854,782	\$1,759,272
Pump & Motor Replacement ³	\$2,352,462	40	\$6,316,509	\$1,315,660
Total Annual Costs, Reoccurring Years 1 to 50	\$5,248,947		\$511,690,216	\$185,571,205
Total Net Present Value =				\$278,311,469

TABLE B-5: ALTERNATIVE B - CENTRAL ALIGNMENT

Description	Cost	Year	FV	NPV
Scenario Total ¹	\$100,473,424	0	\$100,473,424	\$100,473,424
Pump Station Subtotal ²	\$17,037,952			
Pump & Motor Replacement ³	\$2,077,783	20	\$3,404,689	\$1,553,855
Pump & Motor Replacement ³	\$2,077,783	40	\$5,578,979	\$1,162,040
Total Annual Costs, Reoccurring Years 1 to 50	\$4,414,848		\$430,378,584	\$156,082,470
Total Net Present Value =				\$241,380,196

TABLE B-6: ALTERNATIVE C - SOUTH ALIGNMENT

Description	Cost	Year	FV	NPV
Scenario Total ¹	\$105,275,453	0	\$105,275,453	\$105,275,453
Pump Station Subtotal ²	\$17,037,952			
Pump & Motor Replacement ³	\$2,077,783	20	\$3,404,689	\$1,553,855
Pump & Motor Replacement ³	\$2,077,783	40	\$5,578,979	\$1,162,040
Total Annual Costs, Reoccurring Years 1 to 50	\$4,490,691		\$437,772,078	\$158,763,818
Total Net Present Value =				\$248,008,462

LCA Unit Costs and Assumptions (See "Unit Cost" tab in Appendix C Table 3 complete listing)

PUMP STATIONS	Total Pump & Motor Cost / Pump Station Cost (%) = 8.1%
	Motor Cost / Pump Cost (%) = 36.6%
ESCALATION	Escalation from Oct 2014 to Oct 2019 (mid-point of construction), 4% APY = 21.7%
O&M	Pump Station O&M (%) = 2.5%
	Pipeline O&M (%) = 1.0%
	Average Electricity cost (\$/KW-hr) = \$0.17
SOFT COSTS	Total Soft Cost, New Pump Station (%) = 70.0%
	Total Soft Cost, Pump Replacement (%) = 50.0%
	Total Soft Cost, North Pipeline (%) = 70.0%
	Total Soft Cost, Central Pipeline (%) = 70.5%
	Total Soft Cost, South Pipeline (%) = 73.0%
LIFE CYCLE ANALYSIS	LCA Duration (years) = 50
	LCA Escalation / Inflation Rate, APY (%) = 2.5%
	LCA Discount Rate, APY (%) = 4.0%

Footnotes

- Scenario total is complete construction cost w/ soft costs (engineering, contingency, etc.) and has been escalated to the mid-point of construction.
- Pump station construction only. Basis of replacement calculation. Not directly in NPV.
- Replacement value = (8.1% of Pump Station Subtotal) x (1.5 soft cost markup)

$$FV_{\text{Ordinary Annuity}} = C \times \left[\frac{(1+i)^n - 1}{i} \right]$$



Appendix C: Corridor Study and Alternatives Development



Appendix C: Corridor Study and Alternatives Development

Alignment Alternative Deviations Considered

Several corridors were reviewed when developing alignment alternatives between the NCPS and Miramar Lake. Options for deviating from the principle three (3) alignment alternatives, which are shown in **Figure 2**, included: 1) Mira Mesa Blvd, 2) an existing sewer easement paralleling the southern boundary of the Carrol Canyon Rock Quarry, and 3) existing WA easements. These options are briefly described below and shown on **Figure C-1**:

- **Mira Mesa Blvd:** Starting at the NCPS, this alignment proceeds north to Mira Mesa Blvd and travels east. The ROW along Mira Mesa is 80-120 feet wide with high-density residential areas and commercial shopping districts. This route was eliminated based on the disturbance to the adjacent residential communities and the resulting impact on the project's schedule. Significant schedule impacts are anticipated due to heavy daytime traffic counts identified within high-density residential areas and commercial shopping districts. As a result, it was believed that daily construction activities would also be restricted and night-time construction operations would be impermissible adjacent to the residential dwellings. Furthermore, replacement of the existing median along Mira Mesa, which includes a raised median and landscaping, was considered unfavorable.
- **Rock Quarry Alignment:** Starting at the NCPS, this alignment follows the initial route along Miramar Rd. At Camino Santa Fe, it turns north to join an existing sewer easement going east. This option was eliminated due to the limited width of the existing easement (20-30 feet wide), which currently houses the Carroll Canyon Trunk Sewer at a depth of 20-feet below grade. Other factors included: 1) the easement is in a 100-year floodway that would require special Army Corps permits, 2) O&M crews will have limited access to the easement in the future, and 3) existing rock quarry buffer zones and future plans for development limit the likelihood of expanding the existing easement width.
- **WA Easements:** A north-south WA easement located to the east of Aviary Dr was considered as a possible approach route to the MWTP. This option was eliminated based on language in the WA's standard easement leasing contracts. The language precludes the WA from co-leasing or sharing their easements with any others agencies. In order to use a portion of the WA's easement, an agency such the City would have to negotiate with the WA to relinquish the portion of the easement desired back to the original property owner. At that time, the City would then enter into negotiations with the original property owner to establish a new agreement for the easement. This process posed a substantial risk to the schedule, and therefore was not pursued any further.

I-15 Crossings

A total of seven (7) potential I-15 crossing locations were identified. These crossing locations are briefly described below and are shown on presentation included in this appendix:

1. **Mira Lee Way:** This crossing location was eliminated, as it is the furthest to the north and extends the overall pipeline length by approximately 10%. The tunnel would cross using two public ROW streets; Mira Lee Way and Erma Rd. Both ROWs are narrow and offer limited space for tunneling operations. Additionally, the Erma Rd ROW is located in a residential area, so 24-hour tunneling operations are anticipated to be impermissible.
2. **Mira Mesa Blvd (preferred):** This crossing location was chosen as a preferred option for accessing the northern corridor to Miramar Lake, which is identified as Alternative A – North Alignment. The preferred option is to open cut or tunnel within the Mira Mesa ROW directly under the existing I-15 overpass. Caltrans noted that obtaining approval to go under the overpass on a street with such high



traffic volumes would be an extremely difficult and lengthy process. Additional options available for crossing I-15 at Mira Mesa Blvd included tunneling from adjacent private properties and Caltrans ROWs. These options also proved to be difficult with earning Caltrans' approval due to high traffic volumes. Key challenges to be faced with this option include permitting, high-traffic volumes, crossing the existing 96-inch WA pipeline, and mitigating impacts to the existing bridge structure or I-15 on/off ramps. In general, this crossing was Caltrans' least favorite of the preferred options.

3. **Maya Linda Rd:** This crossing location was reviewed as a viable option due to the public ROW to the west, and the San Diego Unified School District site located to the east. This site was eliminated due to the limited staging area on the east side in order to maintain access to the residential housing, as well as the heavy utility congestion along both Trenea Street and Scripps Lake Dr. This site was also eliminated due to a strongly sloped embankment on the east side requiring the deepest access pits and tunneling bore paths of all the available options.
4. **Gold Coast Dr:** This crossing location was eliminated due to limited staging areas, property access, and private ownership. The east side of the interstate is privately owned, which would require an easement. Using Gold Coast Dr on the western side of the interstate would block the only access to the adjacent apartment complex.
5. **Carroll Canyon Rd:** This crossing location was eliminated due to limited staging areas and potential utility conflicts. There are a number of existing water and recycled water lines that currently cross I-15 at this same location. The conflicts with the existing utility crossings, as well as the apartment complexes abutting the ROW, presents substantial risk to construction operations and overall project schedule.
6. **Via Excelencia (preferred):** This crossing location, which is associated with Alternative B – Central Alignment, was originally proposed in the RWS's conceptual alignment. Of the three options, this location presents the shortest tunneling length. However, permanent utility easements, limited construction access, and utility conflicts on both sides of I-15 could potentially increase the overall tunnel length. Cost and scheduled impacts associated with securing the easements and avoiding utilities factored heavily in the feasibility of this crossing's location. Staging is available in the private parking lot on the east side of I-15, but truck traffic and maneuverability within the parking area will be difficult during regular business hours. No alternative for crossing I-15 is available at this location if the two private property easements cannot be secured. Caltrans took no exception to this crossing so long as their utility assets were avoided.
7. **Miramar Rd (preferred):** This crossing location is the preferred option for crossing I-15, and is represented as part of Alternative C – South Alignment. The alignment would tunnel from property formally owned by the County on the east side of I-15, to a receiving pit in a public ROW cul-de-sac on the west side. The tunneling length is the second shortest Caltrans ROW crossing, with staging available on both sides of the interstate away from heavily trafficked streets. Key challenges to this crossing include a skewed crossing of the interstate, and the greatest depth of all options considered. Caltrans took no exception to this crossing so long as the skewed angle of the tunnel was less than 30-degrees off-perpendicular to the interstate.

For reference, Appendix D includes the slides used to present the above I-15 crossings to Caltrans during the August 26, 2015 project coordination meeting, as well as the corresponding meeting minutes.

LEGEND

- BASELINE ALIGNMENTS A, B, C
- ALIGNMENT DEVIATIONS**
- ALTERNATIVE A (NORTH) DEVIATION
- ALTERNATIVE B (CENTRAL) DEVIATION
- ALTERNATIVE C (SOUTH) DEVIATION
- INITIAL STUDY OPTIONS**
- ROCK QUARRY
- MIRA MESA
- CWA EASEMENT
- MIRAMAR RANCH SCHOOL EASEMENT

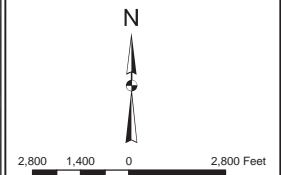
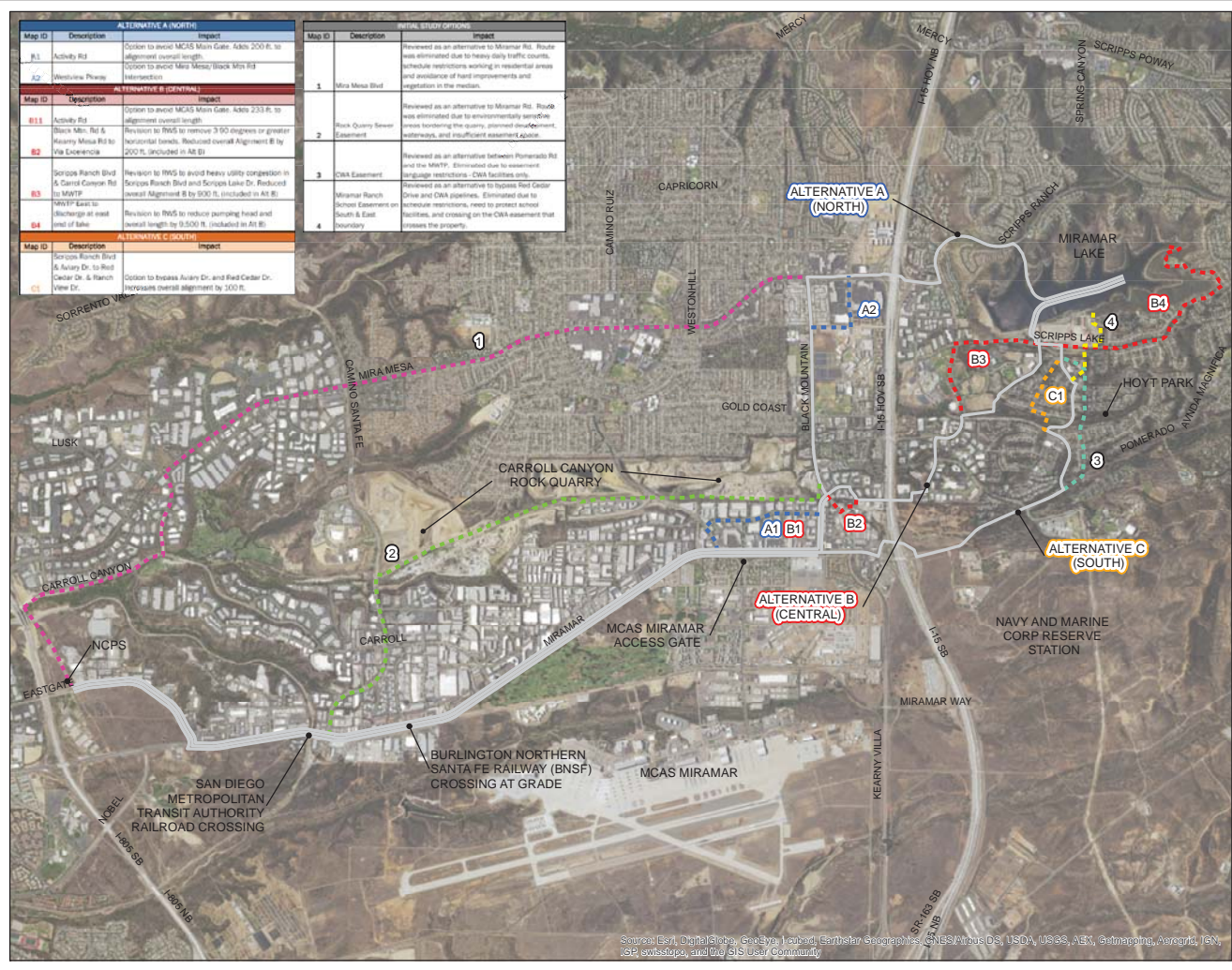


Figure C-1
ALIGNMENT DEVIATIONS
MAP
TASK 8
SAN DIEGO, CALIFORNIA



Map ID	Description	Impact
ALTERNATIVE A (NORTH)		
A1	Activity Rd	Option to avoid MCAS Main Gate. Adds 200 ft. to alignment overall length.
A2	Westview Pkwy	Option to avoid Mira Mesa/Black Mt Rd Intersection.
ALTERNATIVE B (CENTRAL)		
B1	Activity Rd	Option to avoid MCAS Main Gate. Adds 233 ft. to alignment overall length.
B2	Black Mt. Rd & Miramar Blvd to Via Escondido	Revision to RWIS to remove 3 50 degree or greater horizontal bends. Reduced overall Alignment B by 200 ft. (included in A2 B1)
B3	Scripps Ranch Blvd & Camino Canyon Rd to MWDTP	Revision to RWIS to avoid heavy utility congestion in Scripps Ranch Blvd and Scripps Lake Dr. Reduced overall Alignment B by 900 ft. (included in A2 B1)
B4	MWDTP Easement to Exchange at east end of lake	Revision to RWIS to reduce pumping head and overall length by 9,500 ft. (included in A2 B1)
ALTERNATIVE C (SOUTH)		
C1	Scripps Ranch Blvd & Avary Dr. to Red Cedar Dr. & Ranch View Dr.	Option to bypass Avary Dr. and Red Cedar Dr. Reduces overall alignment by 300 ft.

Map ID	Description	Impact
INITIAL STUDY OPTIONS		
1	Mira Mesa Blvd	Reviewed as an alternative to Miramar Rd. Route was eliminated due to heavy daily traffic counts, schedule restrictions working in residential areas and avoidance of hard improvements and vegetation in the median.
2	Rock Quarry Sewer Easement	Reviewed as an alternative to Miramar Rd. Route was eliminated due to environmentally sensitive areas including the quarry, stream, steep-sloped waterways, and insufficient easement width.
3	CWA Easement	Reviewed as an alternative between Pomarado Rd and the MWDTP. Eliminated due to easement language restrictions - CWA facilities only.
4	Miramar Ranch School Easement on South & East boundary	Reviewed as an alternative to bypass Red Cedar Drive and CWA pipelines. Eliminated due to schedule restrictions, need to protect school facilities, and crossing on the CWA easement that crosses the property.

Source: Esri, DigitalGlobe, GeoEye, IGN, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroV, IGN, 160, 162, swisstopo, and the GIS User Community



Appendix D: Caltrans Coordination Meeting Minutes and Presentation

Task 8 – Miramar Pipeline & Pump Station City of San Diego and Caltrans Coordination

Meeting Information

Date: August 26, 2015

Location: Caltrans District 11, Planning Department, 4050 Taylor Street MS-240, San Diego, CA 92110

Start/End Time: 2:30 p.m. – 4:00 p.m.

Meeting Purpose/Objectives

Purpose: Coordinate interstate crossing, as well as the use of Caltrans lands, with Caltrans.

Objectives:

1. Introduce the Pure Water Program’s objectives, and the Task 8 Miramar Pipeline Project
2. Obtain input on the various options for crossing I-15, as well as using I-805 land for parking.

Meeting Participants

PUD – Public Utilities Dept.

Ann Fox, Caltrans – Permit Division
Jacob Armstrong, Caltrans – Planning Division
Michael Pedersen, Caltrans – Utilities Division
Roy Abboud, Caltrans - Planning Division
Amer Barhoumi, City of San Diego, PUD
Anthony Van, City of San Diego, PUD

JP Semper, Brown and Caldwell (BC)
Victor Occiano, Brown and Caldwell

Sign-in Sheet Attached

Meeting Minutes

The following meeting Minutes are supplemental to the information presented in Attachment A and the notes shown in Attachment B.

- PUD introduced the objectives of the City’s Pure Water Program. BC provided a summary of the Task 8 – Miramar Pipeline and Pump Station. Caltrans requested confirmation that no above-ground facilities, such as a pump station, would permanently reside in Caltrans ROW. BC confirmed.

- Caltrans noted that a successful EIR will be key to this project's success, especially when crossing the interstate. Caltrans requested that special attention be given to how Caltrans is referred to in the EIR, and that proper coordination with Caltrans remain ongoing and frequent throughout the EIR process.
- BC presented the seven (7) potential locations identified for crossing I-15. BC then discussed the three (3) preferred options; 1) Mira Mesa Blvd, 2) Via Excelencia, and 3) Miramar Rd.
- Mira Mesa Blvd: Caltrans noted this option as being the least favorable due to high traffic volumes. As a result of traffic volumes, open cutting would be extremely difficult to permit, any impact to on/off ramps would be impermissible, and obtaining approvals would most likely present a schedule impact. This option would only be acceptable if tunneling operations were set back into adjacent properties away from the trafficked streets.
- Via Excelencia: Caltrans noted this as being a favorable option. They requested that BC obtain Caltrans' GIS to design around existing Caltrans storm drains in the area. Caltrans noted that obtaining easements will be important to the crossings success, and therefore starting the process early will be key.
- Miramar Rd: Caltrans noted this as a favorable option. Caltrans noted that for skewed crossings of the interstate the angle of the crossing must be less than 30-degrees from perpendicular. Caltrans requested the BC check the crossing angle, and report back with their findings. Caltrans noted that obtaining easements will be important to the crossings success, and therefore starting the process early will be key.
- PUD also introduced the potential need of utilizing Caltrans land for a parking lot in Caltrans' ROW. PUD shared conceptual drawings showing auxiliary parking, intended to serve the future full-scale Advanced Water Purification Facility, which would be located on the east side of I-805 and north of Eastgate Mall. Caltrans noted that they would have to check with the geotechnical engineers if this land is required for the slope stability of I-805. If not, or if measures can be taken to protect the slope's stability, Caltrans would be willing to relinquish the land to PUD. Caltrans noted that in order to relinquish land the property must first go through a valuation process. Caltrans mentioned that a land agreement to exchange the land for recycled water could be an option.

Action Items

- BC to request Caltrans GIS for the subject area.
- BC to check if proposed X-ing at Miramar Road is less than the 30-degree off perpendicular.
- Caltrans to confirm with geotechnical engineers if land next to I-805 is required for slope stability.

Decision Items

- Caltrans confirmed that the Mira Mesa crossing is the least desirable of the option present, and would be the hardest to permit.

Attachment A – Slide Presentation

Attachment B – Meeting Sign In Sheet

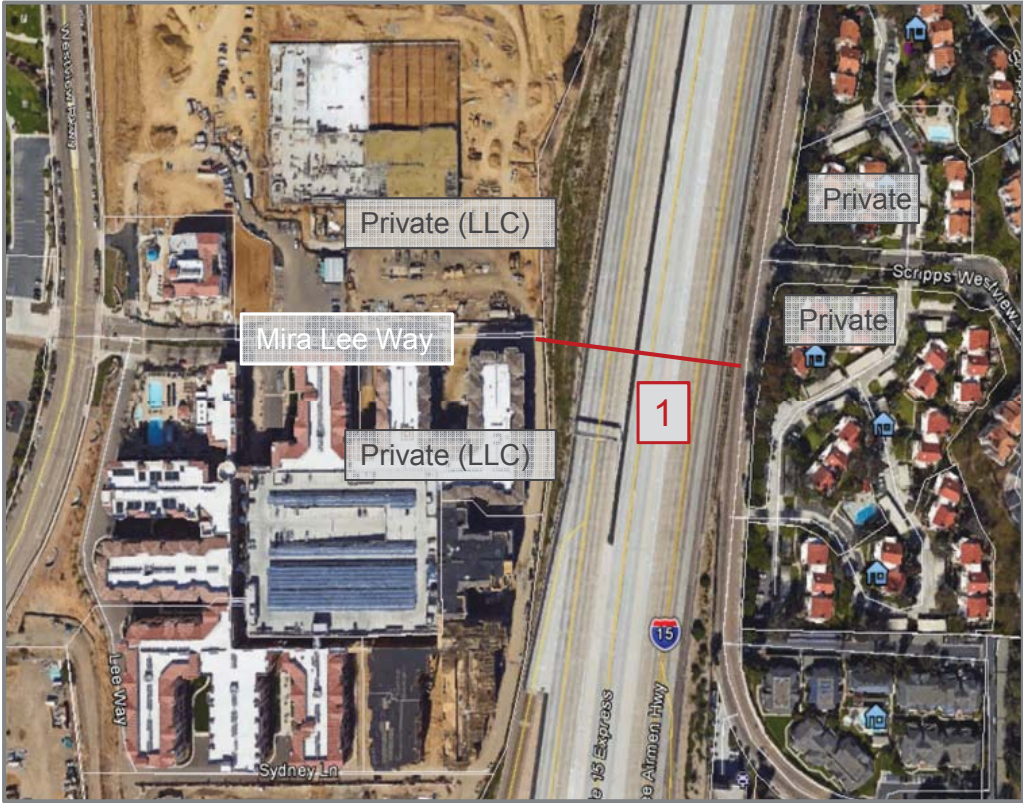
Potential I-15 Crossings

1. Mira Lee Way
2. Mira Mesa Blvd
3. Maya Linda Rd
4. Gold Coast Dr
5. Carroll Canyon Rd
6. Via Excelencia
7. Miramar Rd



1. Mira Lee Way

- Property
 - ROW/Private
- Distance
 - 400'
 - Adds 4,800 LF of pipeline



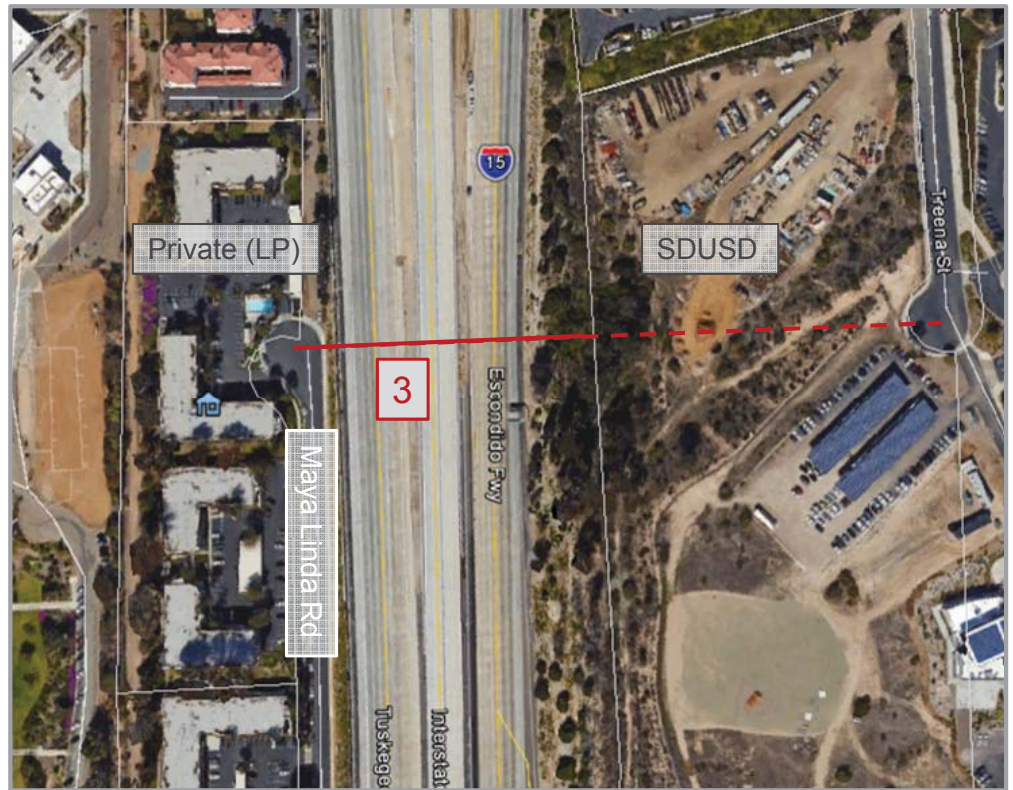
2. Mira Mesa Blvd

- Property
 - Caltrans
- Distance
 - 2A: 450'
 - 2B: 1200'
 - 2C: 450'
 - 2D: 650'



3. Maya Linda Rd

- Property
 - West side: ROW
 - East side: SDUSD/ROW
- Distance
 - To brush: 450'
 - To cul-de-sac:



4. Gold Coast Dr

- Property
 - West side: ROW
 - East side: Private
- Distance
 - 500'



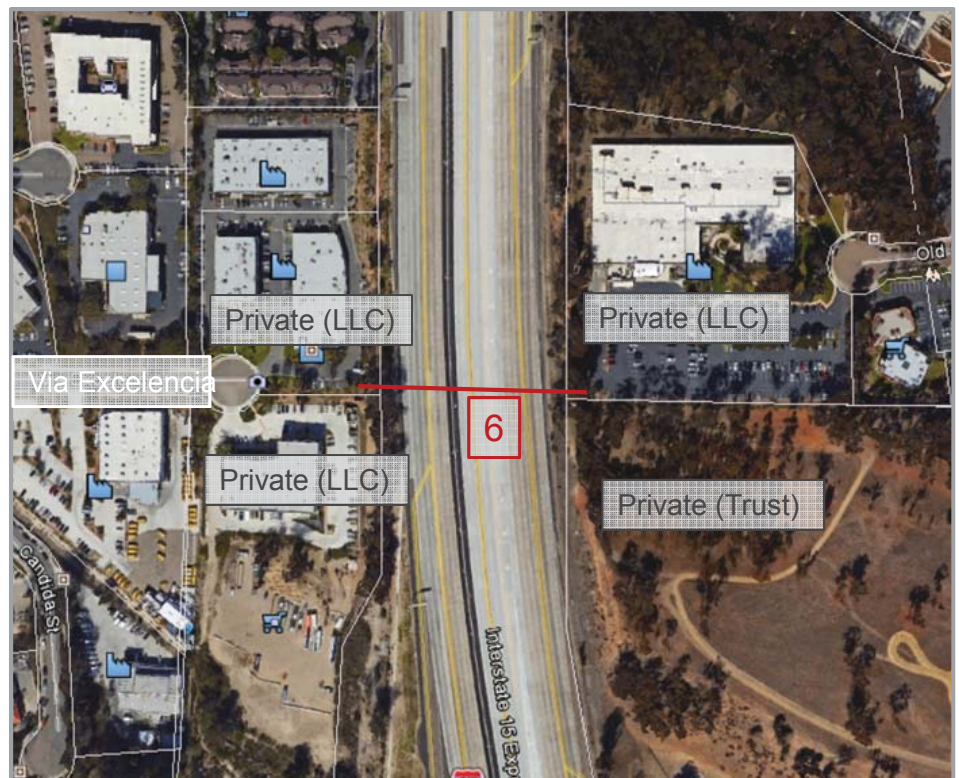
5. Carroll Canyon

- Property
 - West side: Private
 - East side: Private
- Distance
 - 600'



6. Via Excelencia

- Property
 - West side: ROW
 - East side: Private
- Distance
 - To parking lot: 700'



7. Miramar Rd

- Property
 - Caltrans
- Distance
 - 7A: 750'
 - 7B: 400'
 - 7C: 450'



Attachment B
10% HDR Technical Memo #3

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Technical Memorandum No. 3

Meanley Drive to Lake Miramar Pipeline Alignment Analysis

To: Jeff Soriano and Wendy Gamboa

Date: August 1, 2016

From: Kathy Haynes/HDR

Copy: Doug Biglen/HDR, Dean Gipson/HDR

Objective:

To determine the most cost effective alignment alternative for the North City Conveyance System from Meanley Drive to Lake Miramar.

Introduction:

The purpose of the North City Conveyance System is to convey purified water from the proposed Advanced Water Purification Facility (AWPF) to the Miramar Reservoir. A de-chlorination facility is a required element of the system. The optimal location for the de-chlorination facility is at the existing Reclaimed Water Tank located at the end of Meanley Drive. With the de-chlorination facility located at the Reclaimed water tank a preferred alignment will need to be selected from Meanley Drive to Miramar Reservoir.

Alternative Analysis:

At the roundabout at the easterly terminus of Meanley Drive, three alternative alignments were identified; a description of each Alignment is noted below. Attachment A provides a Map of the Alignments.

- Alignment 1 – Is the eastern-most alignment and proceeds east past Meanley Drive onto APN 319-170-23-00 which consists of three multi-story office buildings and associated parking.
- Alignment 2 – Is the center alignment and proceeds northeast past Meanley Drive onto APN 319-170-22-00 which is a rough graded parcel part of the Scripps Ranch Business Park Development.
- Alignment 3 – Is the western-most alignment and proceeds north outside of the Meanley Drive Right-of-Way along an existing City of San Diego Utility Easement at APN 319-170-33-00 to the Scripps Ranch Public Library Property before heading north east to the Miramar Reservoir.

A rough order magnitude Opinion of Probable Construction Cost (OPCC) was developed to compare the three alternatives along with a review of the alignment alternative's potential advantages and disadvantages, as summarized in the Tables 1, 2 and 3, below. Costs have been rounded to the nearest \$1,000 to conform with the level of magnitude for this estimate.

Table 1 - Alternative 1

ALTERNATIVE 1 – APN 319-170-23-00	
<u>Advantages</u>	<u>Disadvantages</u>
<ul style="list-style-type: none"> • No Utility Conflicts 	<ul style="list-style-type: none"> • Paving Required - Additional costs associated with pavement of parking lot.
<ul style="list-style-type: none"> • No Retaining Wall Required 	<ul style="list-style-type: none"> • Construction will impact businesses – Pavement construction may impact schedule by adding up to 68 days. • Temporary and Permanent Easements Required
Alternative 1 Total Cost = \$5,828,000	

Table 2 - Alternative 2

ALTERNATIVE 2 – APN 319-170-22-00	
<u>Advantages</u>	<u>Disadvantages</u>
<ul style="list-style-type: none"> • No Utility Conflicts 	<ul style="list-style-type: none"> • Temporary and Permanent Easements Required
<ul style="list-style-type: none"> • No Retaining Wall Required 	
<ul style="list-style-type: none"> • Passes Through Undeveloped Land Additional Pavement Unnecessary. 	
<ul style="list-style-type: none"> • Minimal Community Disruption/Impact 	
<ul style="list-style-type: none"> • Minimal Landscaping Issues 	
<ul style="list-style-type: none"> • Lowest Overall Cost 	
Alternative 2 Total Cost = \$3,982,000	

Table 3 - Alternative 3

ALTERNATIVE 3 – APN 319-170-33-00	
<u>Advantages</u>	<u>Disadvantages</u>
<ul style="list-style-type: none"> • City Owned Property 	<ul style="list-style-type: none"> • Multiple Utility Conflicts including a Water Main.
	<ul style="list-style-type: none"> • Retaining Wall Required, 550ft long 6ft high – May impact construction schedule by adding up to 110 days.
	<ul style="list-style-type: none"> • Passes Through Library and Miramar Lake Parking Lot- High Community impact.
	<ul style="list-style-type: none"> • Heavy Tree/Brush landscaped Area- Additional Landscaping Required.
	<ul style="list-style-type: none"> • Temporary and Permanent Easements Required.
	<ul style="list-style-type: none"> • Impact to Construction Schedule due to Retaining wall – May impact construction schedule up to 23 days.
	<ul style="list-style-type: none"> • Additional Costs Associated with Concrete Path Required.
	<ul style="list-style-type: none"> • Highest Overall Cost
Alternative 3 Total Cost = \$5,001,000	

*OPCC's costs are provided as Attachment 2

Recommendation:

Alternative 2 -APN 319-170-22-00 Central Alignment has the least total cost at approximately \$3,982,000. Along with being the most cost effective option, Alternative 2 has the least impact on adjacent businesses and the community. Based on these considerations HDR recommends Alternative 2 – Central Alignment.

Disclaimers:

- Depending on Property Owner's willingness to provide an easement, Alternative 1 Eastern Alignment could be considered a viable option.
- OPCC were developed as a rough order magnitude intended for comparison use only.

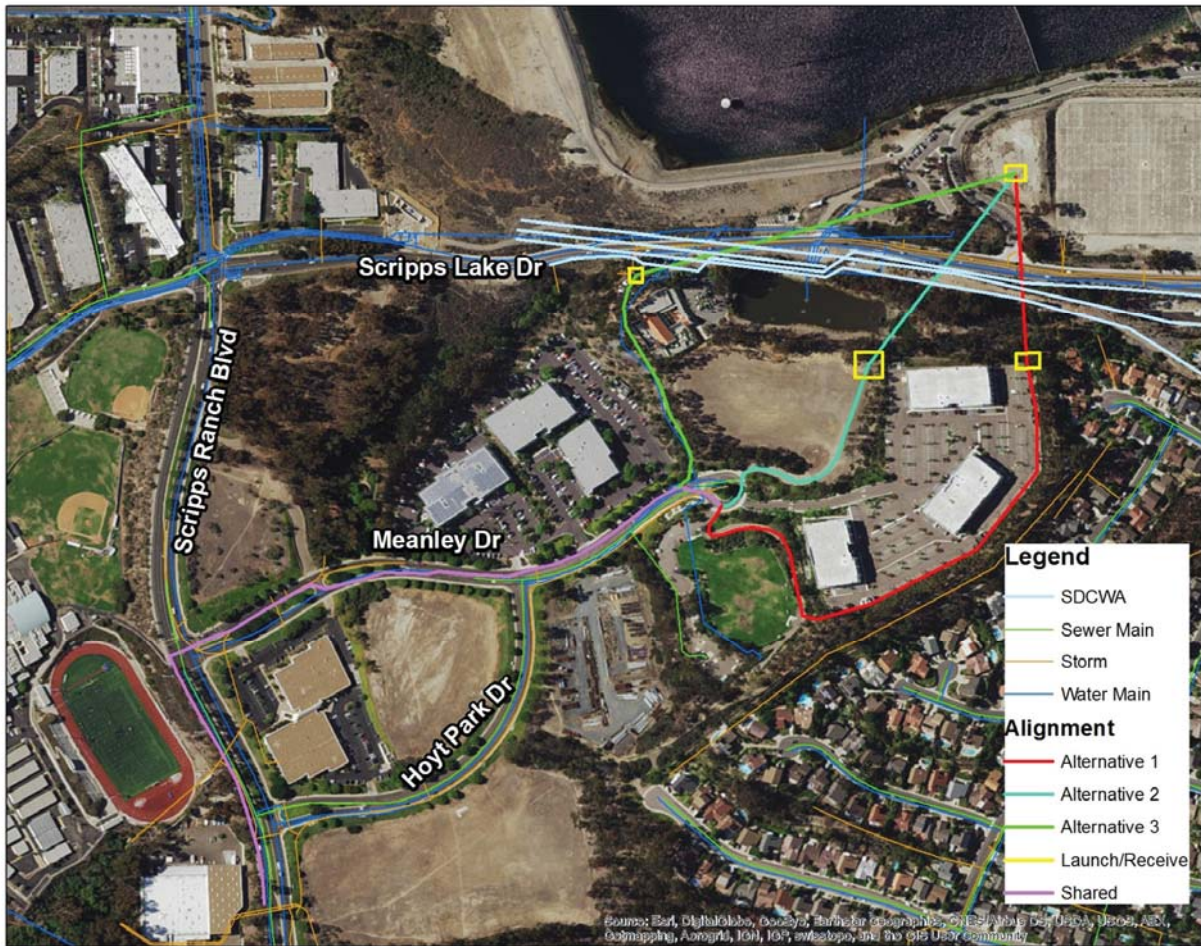
Attachments:

1. Alignment Map
2. Opinion of Probable Construction Costs (OPPC's)

North City Conveyance System



Attachment 1 – Alignment Map



Attachment 2 – Opinion of Probable Construction Costs

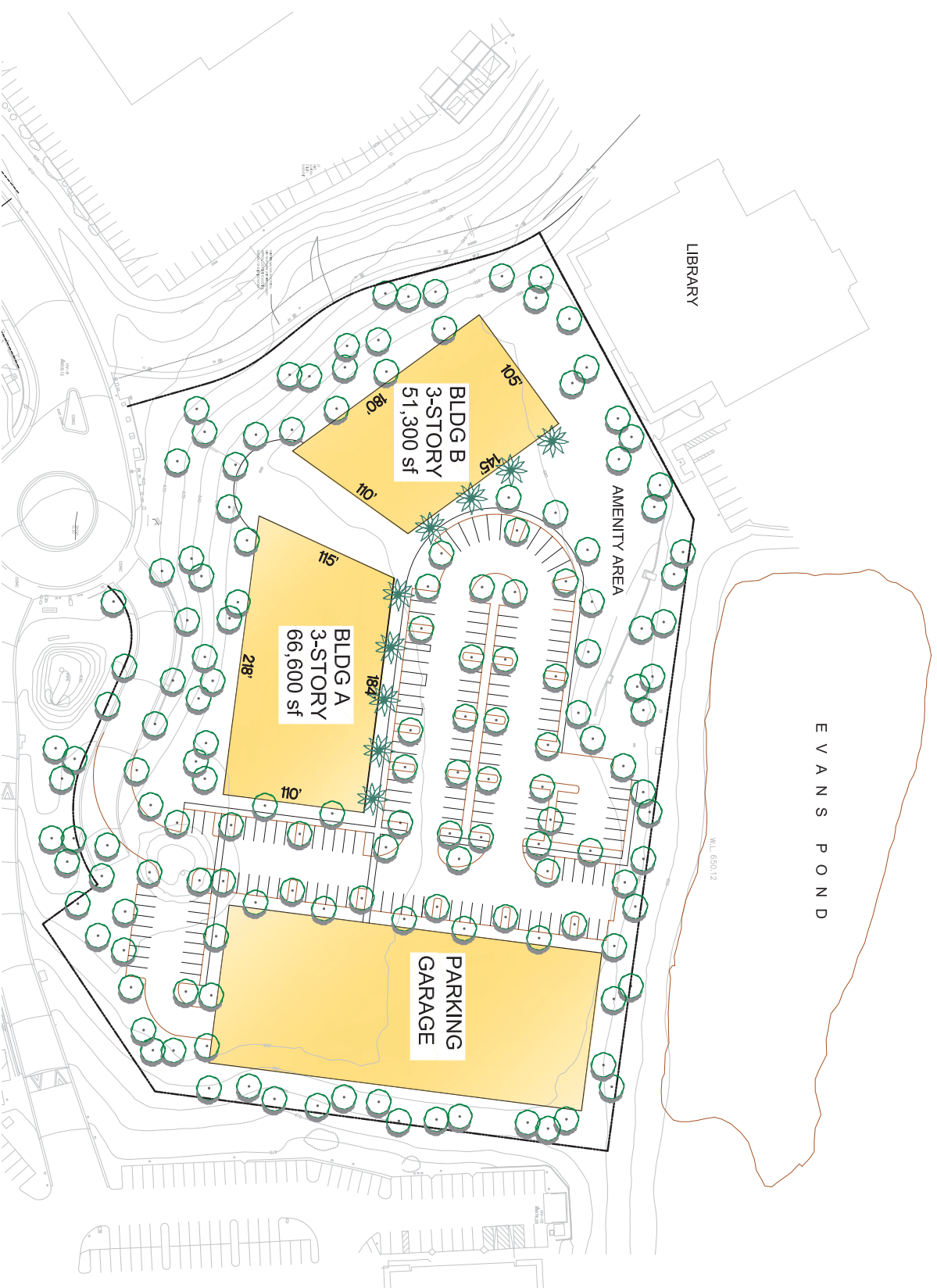
ALTERNATIVE NUMBER	1	2	3
Open Cut Trench Construction Length (ft)	1,832	775	743
Open Cut Trench Construction Unit Cost (\$/ft)	\$1,054	\$1,054	\$1,054
Open Cut Trench Construction Cost	\$1,930,928	\$816,850	\$783,122
Tunnel Launch Shaft Depth (ft)	92	92	92
Tunnel Launch Shaft Unit Cost (\$/ft)	\$7,000	\$7,000	\$7,000
Tunnel Launch Shaft Cost	\$644,000	\$644,000	\$644,000
Tunnel Receiving Shaft Depth (ft)	40	20	14
Tunnel Receiving Shaft Unit Cost (\$/ft)	\$3,000	\$3,000	\$3,000
Tunnel Receiving Shaft Construction Cost	\$120,000	\$60,000	\$42,000
Total Tunnel Construction Length (ft)	595	755	1,222
Tunnel Construction Unit Cost (\$/ft)	\$2,232	\$2,232	\$2,232
Tunnel Construction Cost	\$1,328,040	\$1,685,160	\$2,727,504
Construction Cost	\$2,092,040	\$2,389,160	\$3,413,504
6' High Retaining Wall Construction Length (ft)	0	0	550
6' High Retaining Wall Construction Cost (\$/ft)	\$301	\$301	\$301
Retaining Walls Cost	\$0	\$0	\$165,550
Asphalt Paving R&R, 4" thick (yd ²)	1,573	0	146
Asphalt Paving R&R, 4" thick, Unit Cost (\$/yd ²)	\$41	\$41	\$41
Total Asphalt Paving R&R, 4" thick Cost	\$64,493	\$0	\$5,986
PCC Sidewalk R&R, 4" thick, Area (yd ²)	0	0	310
PCC Sidewalk R&R, 4" thick, Unit Cost (\$/yd ²)	\$75	\$75	\$75
Total PCC Sidewalk R&R, 4" thick, Cost	\$0	\$0	\$23,250
Total Asphalt Paving R&R and PCC Sidewalk R&R Cost	\$64,493	\$0	\$29,236
Landscaping/Irrigation R&R Area (ft ²)	0	0	1,400
Landscaping/Irrigation R&R Unit Cost (ft ²)	\$0	\$0	\$12.25
Total Landscaping/Irrigation R&R cost	\$0	\$0	\$17,150
Permanent 30' Wide Waterline Easement Length (ft)	1,852	825	630
Permanent 30' Wide Waterline Easement Area (ft ²)	55,560	24,750	18,900
Permanent 30' Wide Waterline Easement Unit Cost (\$/ft ²)	\$30	\$30	\$30
Permanent 30' Wide Waterline Easement Cost	\$1,666,800	\$742,500	\$567,000
Temporary 10' Wide Construction Easement Length (ft)	1,852	825	630
Temporary 10' Wide Construction Easement Area (ft ²)	18,520	8,250	6,300
Temporary 10' Wide Construction Easement Unit Cost (\$/ft ²)	\$4	\$4	\$4
Temporary 10' Wide Construction Easement Cost	\$74,080	\$33,000	\$25,200
Total Permanent and Temporary Easement Cost	\$1,740,880	\$775,500	\$592,200
Total Construction and Easement Cost	\$5,828,341	\$3,981,510	\$5,000,762

PCC - Portland Cement Concrete
R&R - Remove and Replace

Attachment C
Scripps Ranch Technology Park Lot 3 Concept

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PROJECT DATA

GROSS - 6,060 ACRES=263,973 S.F.
 NET USABLE - 4.28 ACRES=186,544 S.F.
 ALLOWED F.A.R.: 2.0

COVERAGE: 45% BASED ON GROSS
 63% BASED ON USEABLE

BUILDING A:
 FIRST FLOOR: 17,100 S.F.
 SECOND FLOOR: 17,100 S.F.
 THIRD FLOOR: 17,100 S.F.
 TOTAL: 51,300 S.F.

BUILDING B:
 FIRST FLOOR: 22,200 S.F.
 SECOND FLOOR: 22,200 S.F.
 THIRD FLOOR: 22,200 S.F.
 TOTAL: 66,600 S.F.

OVERALL AREA:
 PARKING: ON GRADE 171 SPACES
 PARKING GARAGE 346 SPACES
 TOTAL 517 SPACES (4.38/1000)

Attachment D

PM Letter to Murphy Development – Evaluation of Additional Alignments

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THE CITY OF SAN DIEGO

MEMORANDUM

DATE: September 14, 2016

TO: Scripps Ranch Technology Park/Murphy Development

FROM: Jeff Soriano, Project Manager, Public Utilities Department, Pure Water

SUBJECT: Pure Water Alternate Alignment Evaluation West of Lot 3

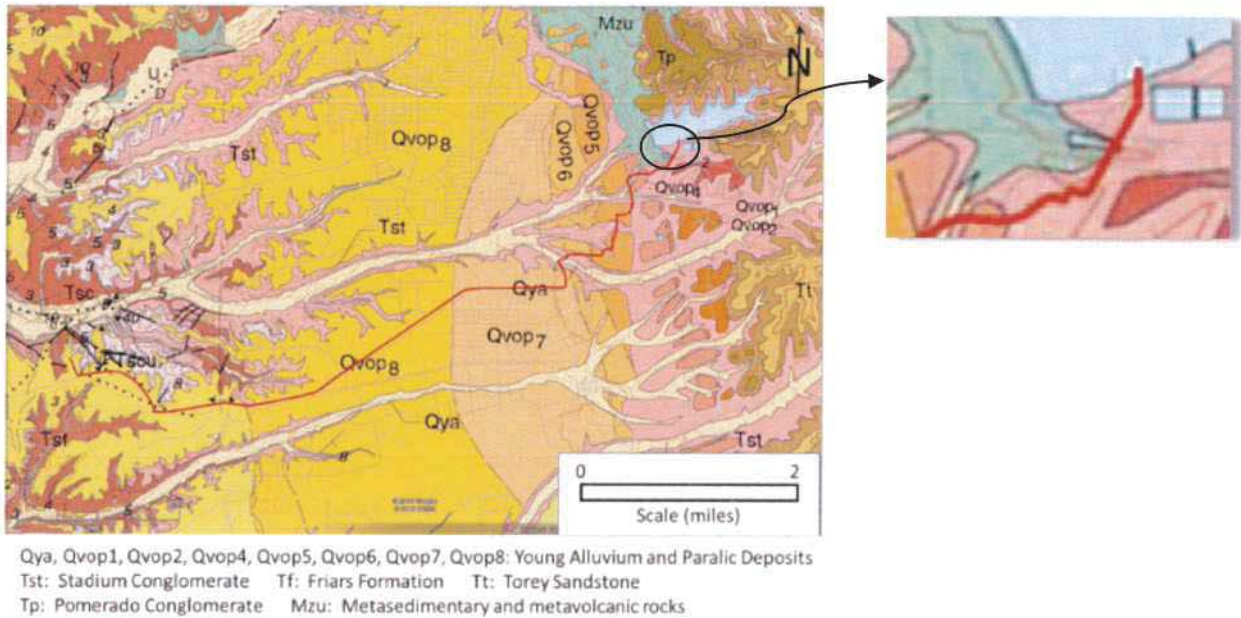
The design consultant initially looked into an alignment west of Lot 3. This alignment extended from Meanley Drive and followed along the walking path to the Scripps Ranch Library (bright green line in **Figure 1** below). From the library parking lot, pipeline installation in a northeasterly direction would continue in order to arrive at the final location at the Miramar reservoir. As you'll see in the image below, the alignment is significantly longer than the proposed alignment (teal line, **Figure 1**) shown from Lot 3, with many utilities to cross under and the dam and other facilities to pass alongside. Similarly, an alignment further west of this would impose an even longer path to the final destination with the same utilities, dam and facilities to contend with.

FIGURE 1:




Figure 2 shows the proposed pipeline alignment (seen as a red line) overlaid on the geology map, with the zoomed in view showing that the area to the west of Lot 3 is found within the “Metasedimentary and metavolcanic rock” formation, labeled “Mzu” (Green area). It was brought to the City’s attention that this formation can range in compressive strength of up to 50,000 pounds per square inch, where special mechanical excavation techniques, including blasting would be required. Similarly, an alignment further west, starting from an area that Murphy Development staff refers to as Lot 13, would require an even longer stretch of pipeline within this same material. Trenching via “mechanical excavation techniques” or “blasting” is not possible. In regards to “mechanical excavation”, a large enough excavation to install the 48-inch diameter pure water pipeline on Scripps Lake Drive is not possible due to the conflicts with a large number of existing utilities previously mentioned. In addition, “blasting” is not allowed because of the close proximity to the dam and the San Diego County Water Authority water aqueducts.

FIGURE 2:



In summary, any alignment crossing Scripps Lake Drive from the west of Lot 3 imposes the following issues and risks that deem these alignments impractical: 1. Existing utility conflicts along Scripps Lake Drive; 2. Required long stretches of tunneling, excavations, blasting methods through strong volcanic material and; 3. endangering the stability of SDCWA aqueducts, Miramar Dam and other existing utilities and facilities along Scripps Lake Drive. In conclusion, the crossing at Lot 3, as shown in **Figure 2** is just outside the "Mzu" material and is the shortest tunnel/excavation length crossing the utilities in Scripps Lake Drive. Based on these high risk and prohibitive construction methods, the City concludes that the crossing from Lot 3 is the most practical and constructible path.



Jeff Soriano
Project Manager

Attachment E
Murphy Development Letter to City

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April 13, 2017

VIA E-MAIL

Jeff Soriano
Project Manager
City of San Diego
Public Works Department
City of San Diego

Re: Scripps Ranch Technology Park/Miramar Pure Water Pipeline and Pump Station Project

Dear Mr. Soriano:

This firm represents Scripps Ranch Technology Park LLC (SRTP) with regard to the City's plans to construct the Miramar Pure Water Pipeline and Pump Station.

The Scripps Ranch Technology Park is a full vested, fully entitled development project. Entitlements date back to 1986, when a Planned Industrial Development Permit was obtained. The EIR for the project has been approved. Lots are graded, streets, curbs and sidewalks are in place. SRTP intends to fully develop the entire Park, including Lot 3. Lot 3 is the portion of SRTP's property which the City, as of August 2016, now wishes to encroach upon to construct the Miramar Pure Water Pipeline and Pump Station.

We understand that the City's most recent proposal is to seek to acquire a permanent easement and a temporary construction easement across SRTP's single point of access to Lot 3 of the SRTP project, effectively denying access to Lot 3 for the duration of the still unscheduled construction of the City's project. Without access to the property, and depending on when the City elects to take the easement, development of the property becomes unfeasible and/or the developed property becomes uninhabitable. In either scenario the City's action will constitute a full taking of a 6 acre property, the fair market value of which, **today**, before any buildings are constructed, may exceed \$11M.

We also understand that other alternatives are available to the City to fulfill the purposes for which acquisition of easements from SRTP is sought. None of the alternatives will render any property unbuildable or uninhabitable, as would be the effect of the City's current plans regarding SRTP Lot 3. For example, the City could choose a route involving NO taking or

April 13, 2017

Page 2

acquisition of private property by routing the project along public right of ways (Scripps Ranch Boulevard and Scripps Lake Drive).

If the City persists in its intention to take easements across the only ingress and egress to SRTP Lot 3, attempted exercise of the City's eminent domain powers will be necessary. Considering the available alternatives, the City will not be able to fulfill the requirements of California Code of Civil Procedure Section 1245.230 which provides in pertinent part that no Resolution of Necessity can issue, and no condemnation can proceed, unless:

“The proposed project is planned or located in the manner that will be most compatible with the greatest public good and the least private injury.”

With these facts in mind, SRTP urges the City to reconsider its plans. SRTP is prepared to meet with City representatives to assist the City in considering alternatives to the current plan to take easements across the only ingress and egress to SRTP Lot 3. SRTP sees no possibility, however, of cooperation or compromise which would lead to agreement on any variation of the current City plans if Lot 3 is to be involved.

SRTP looks forward to the City's moving on from current plans and adoption of alternatives.

Your response may be made directly to Kaitlin Arduino at Murphy Development. I will appreciate your also forwarding a copy of this letter to the appropriate representative of the City Attorney's office; contact from the City Attorney's office should be made to me.

Thank you.

Very truly yours,



James G. Sandler

cc: Scripps Technology Business Park

Attachment F
Email Exchange City to Mr. Wulfeck

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From: Soriano, Jeff
To: "whwulfeck@gmail.com"
Cc: [Balo, Keli](mailto:Balo_Keli); "srilko4@aol.com"; [Lemons, Sarah](#); [Genevieve Fong](#); [Haynes, Kathy \(Kathy.Haynes@hdrinc.com\)](mailto:Haynes_Kathy)
Subject: RE: Scripps Miramar Ranch Community Planning Meeting 5-4-17 North City Project
Date: Friday, April 28, 2017 9:55:00 AM

Hello Wally,

I'm the Project Manager for the pipeline design and wanted to provide you a response in Keli's absence regarding our evaluation of the alternate alignments you asked about below.

The "yellow" alignment would need to be adjusted to first travel to the location of our dechlorination facility proposed on City property at the top of Meanly Drive and then back-track down Meanley Drive again to the location where the pipeline would enter the landscaped parcel. There is no space within Meanley Drive for two 48" pipeline alignments due to the many existing underground utilities within this street.

The "orange" alignment was found to have conflicts with an existing water main in the same location, would require heavy tree/landscape removal and construction of retaining walls.

In addition, for both suggested alignments, entering into the reservoir at the locations shown is not feasible because the pipe would need to penetrate through the dam. Finally, the tunnel crossing of Scripps Lake Drive would be difficult due to the dense volcanic geotechnical formation discovered west of our proposed alignment which would involve blasting operations to remove. Blasting around the CWA aqueducts and the dam is not advisable.

If there's any questions related to the design that you may have, please feel free to contact me.

Thanks,

Jeff Soriano
Project Manager
City of San Diego
Public Works Department

(858) 292-6336

From: whwulfeck@gmail.com [<mailto:whwulfeck@gmail.com>] **On Behalf Of** Wally Wulfeck
Sent: Wednesday, April 26, 2017 3:57 PM
To: Balo, Keli <KBalo@san Diego.gov>
Cc: Rob@itsthewinetalking.info <srilko4@aol.com>; Soriano, Jeff <JSoriano@san Diego.gov>; Lemons, Sarah <SLemons@san Diego.gov>; Genevieve Fong <gfong@cookandschmid.com>
Subject: Re: Scripps Miramar Ranch Community Planning Meeting 5-4-17 North City Project

Thank you Keli,
Could you please comment on why the alternative routes I've

shown in yellow or orange on the attached picture were not chosen? These are what we asked for 6 months ago.

--Wally

On Wed, Apr 26, 2017 at 3:22 PM, Balo, Keli <KBalo@san Diego.gov> wrote:

Please see sheets from the design plans that show the location of the tunnel at Scripps Ranch Technology Park. The pipeline is proposed along the eastern boundary of the parcel and the tunnel shaft would be located just south of Evans Pond.

I have also included a draft figure from the biology report that zooms out a bit so you can see the pipeline alignment in relation to the library.

If you have any other questions, please let me know! I look forward to coming to your meeting next week.

Keli

