June 2019 | **Rail Safety Study**

HAMILTON HIGH SCHOOL EXPANSION

Hamilton Unified School District

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Project Number HASD-01.0

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1. Introduction

1.1 PURPOSE

This report presents the results of a Rail Safety Study (RSS) prepared for the Hamilton Unified School District (District) which is evaluating expansion of the existing facilities at Hamilton High School. The RSS identifies rail lines within a 1,500-foot radius of the school site and evaluates the actual or potential endangerment to school occupants from an incident (derailment or other accident) that could occur along the rail lines.

1.2 SCHOOL SITE LOCATION

The District intends to modernize the existing Hamilton High School, which is located at 620 Canal Street, Hamilton City, Glenn County, California. As part of the proposed project, the District would acquire an approximately 45-acre property adjacent to the existing school; construct new playing fields, a gymnasium and parking lot on the expanded site; modernize existing buildings; and plan future construction of new classroom buildings. The 45-acre project site is bounded by agricultural land to the north, commercial/agricultural properties (Westermann Farms and Dollar General) to the east, West 6th Street/State Route 32 (SR-32) to the south, and Canal Street/State Route 45 (SR-45) and the Glenn-Colusa Canal to the west (Figure 1). The California Northern Railroad (CFNR) right-of-way is approximately 600 feet east of the site.

1.3 REGULATORY REQUIREMENTS

Under Education Code Section 17251, the California Department of Education (CDE) requires preparation of a rail safety study if a school is within 1,500 feet of a railroad easement. CDE standards and regulations for this process are presented in California Code of Regulations, Title 5, Sections 14010, 14011, and 14012. Information on assessing safety hazard related to railroads is discussed in Section 14010 (d):

> *If the proposed site is within 1,500 feet of a railroad track easement, a safety study shall be done by a competent professional trained in assessing cargo manifests, frequency, speed, and schedule of railroad traffic, grade, curves, type and condition of track needed for sound and safety barriers, need for pedestrian and vehicle safeguards at railroad crossings, presence of high pressure gas lines near the tracks that could rupture in the event of a derailment, preparation of an evacuation plan. In addition to the analysis, possible and reasonable mitigation measures must be identified.*

1. Introduction

1.4 STUDY OBJECTIVES

To meet the requirements of CCR Title 5 Sections 14010(d), and CDE's policy on railroads, the following objectives have been established:

- Identify all active and inactive rail lines located within 1,500 feet of proposed or existing school sites.
- Identify all natural gas and hazardous liquid pipelines crossing or located within railroad track easements that lie within 1,500 feet of proposed or existing school sites.
- Identify track characteristics, including whether it is single or double track, curvature, track gradient, switching equipment, signage, and warning systems.
- Identify locations and characteristics of crossings, including type (vehicular or pedestrian), relationship to rail line (at grade, elevated, or below grade), and accident history.
- Identify rail line operational information, including type of rail traffic (passenger, freight, or both), type of cargo (hazardous and/or non-hazardous), frequency of train traffic, length of trains, speed, and track maintenance schedule (if available).
- Conduct an incident analysis, using accident data provided by federal and state agencies (National Transportation Safety Board, Federal Railroad Administration, Federal Transportation Administration, and California Public Utilities Commission) to determine the probability of an accident occurring within 1,500 feet of the proposed school site.
- Conduct an additional site-specific analysis of potential risk to occupants of the proposed school site, based on rail line characteristics, train speeds, presence of at-grade vehicle crossings, etc.

1.5 ASSESSMENT METHODOLOGY

The RSS process is composed of three steps. The first step is to collect existing information on the rail line and conduct a qualitative safety assessment, based on rail traffic, type of cargo, train speed, and highway-rail crossings. The second step involves calculating the probability of an accident or derailment on the rail line within a 1,500-foot radius of the school. Finally, the accident/derailment probability is modified to account for site-specific conditions, including accident data for the railroad owner/operator and the probability that the students would be in school when an accident occurs. The results are used to determine the likelihood that a railroad incident would result in an unacceptable safety hazard to occupants of the school.

Source: ESRI, 2019

0 1,000
Scale (Feet)

Project Boundary

1,500-ft Radius

At-Grade Railroad Crossing

Figure 1
Site Location and Railroad Location Map

1. Introduction

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2. Railroad Operating Conditions

2.1 RAILROAD LOCATION AND OWNERSHIP

There is a 50-foot wide railroad easement that contains one main line track within 1,500 feet of the school site. The trackage is owned by Union Pacific (UP), and California Northern Railroad (CFNR) operates over UP railroad tracks under a long-term lease. The railroad easement is approximately 600 feet east of the school site and the closest track is approximately 625 feet from the school's property boundary at its nearest location. The track is oriented in a southeast-to-northwest direction and there is only limited freight traffic along this line. North of the site the track curves gently to the west.

CFNR is a Class III short-line railroad company owned by Genesee & Wyoming, Inc. The CFNR mainly transports food and agricultural commodities along the West Valley Line, which extends from Davis to Tehama. There is one at-grade crossing within 1,500 feet of the site located at 6th Street/State Route 32, approximately 950 feet from the school site. The location of the rail line and the highway-rail crossing with respect to the school site are shown in Figure 1.

2.2 SITE RECONNAISSANCE

PlaceWorks conducted a site reconnaissance on May 20, 2019 during typical afternoon school hours (1:30 pm to 4:40 pm). Photographs documenting the condition of the tracks and highway-rail crossings are provided in Appendix A. Table B in Appendix B provides more detailed observations from the site reconnaissance. The reconnaissance consisted of evaluating the following:

- Train traffic
- Track condition
- Presence of spurs
- Highway-rail crossings
- Safety devices at each crossing (signage, flashing lights, and gates)
- Potential for trespass by students onto the railroad easement during travel to and from school.

2.2.1 Track Conditions

The railroad easement east of the school site is approximately 50 feet wide and contains one CFNR main line track. The track is constructed of continuously welded steel, are maintained to Class 1 standards, and appeared to be in good condition at the time of the site reconnaissance. The tracks are relatively straight east of the school site but just and north of the site the track curves gently to the northwest.

The CFNR track near the school site is a branch line off the West Valley Subdivision, which extends from Woodland to Tehama. The Hamilton City Branch line served the Holly Sugar Plant until the closure of the

2. Railroad Operating Conditions

facility in 2006. Freight activity on the rail line was greatly reduced with the Holly Sugar Plant closure. Shipments along the Hamilton City Branch continued with cars destined for Simplot Fertilizer and the Sierra Nevada Brewery until Simplot ceased operation and Sierra Nevada built its own offload facility of the East Valley Line (Trainorders.com, 2019). In January 2019, the first train in several years made a delivery to Nutrien Ag Solutions in Hamilton City with a single locomotive and one hopper car of potassium sulfate.

The Federal Rail Administration (FRA) website states that there are a total of 4 switching trains per day that pass by the school site on this section of track. However, it appears that the FRA information from 2015 overestimates the current amount of train traffic on this branch line. A train count of four switching trains per day is valid for the West Valley Subdivision track, which is 9.4 miles west of the school site, but is not applicable for the Hamilton City Branch track, which has seen very limited traffic in recent years. However, the Hamilton City Branch is still used on occasion as a parking lot for the UP Railroad (i.e., to store centerbeams) and limited shipments to Nutrien Ag Solutions are expected to continue in the future.

It is estimated that train traffic on this line is currently limited to one train per week or less (Chino Enterprise Record, 2019). The maximum speed for trains along this section of track is 10 mph. No trains were observed during PlaceWorks' site reconnaissance on May 20, 2019 between the hours of 1:30 pm to 4:30 pm. One local business employee reported they had not observed any train activity in several years during business hours.

The at-grade 6th Street/SR-32 crossing was monitored during typical afternoon commute hours (1:30 pm to 4:30 pm) to determine pedestrian usage and to see whether pedestrians were trespassing within the railroad right-of-way. Only two pedestrians were observed using the crossing between 1:30 pm to 4:30 pm; one student and one adult. There are no sidewalks and no fencing or walls in the vicinity of the school site to restrict access and minimize the potential for trespassing at the 6th Street/SR-32 crossing. However, freight traffic along this track is very limited. Table B in Appendix B provides more detailed observations from the site reconnaissance.

2.2.2 Highway-Rail Crossings

There is one at-grade highway-rail crossing at 6th Street/SR-32 within 1,500 feet of the school site. The at-grade crossing could create a risk for trespassing because there is unlimited access to the railroad right-of-way in the vicinity of the crossing and the school site. However, the freight traffic along this line is very limited at one train per week or less. Detailed information regarding the at-grade crossing is provided in Appendix C and summarized herein:

6th Street/State Route 32 Crossing – Post Mile: 0170.30, DOT: 762194L

The 6th Street/SR-32 at-grade crossing is approximately 950 feet east of the school site and crosses the railroad tracks at a 90-degree angle. 6th Street/SR-32 is a three-lane street at this location. At the crossing intersection, there are train-activated automatic gates, cantilevered flashing lights, bells, crossbucks, signage, and pavement markings. The crossing surface between the tracks is concrete. According to FRA records, there have been no reported accidents at this crossing.

Crossing Accident Prediction

The accident prediction for this crossing was determined, according to the protocol specified in the Department of Transportation (DOT) Railroad-Highway Crossing Handbook (DOT, 2007). The prediction is based on the physical and operating characteristics of the crossing as well as five years of accident history data. The results are provided in Appendix C and summarized herein:

Table 1 Crossing Accident Prediction

Crossing Location	Probability of Train-Vehicle Accident
6th Street/State Route 32	0.007

The available data indicate that the probability of a vehicle-train collision at the 6th Street/SR-32 crossing, which is the only at-grade crossing within 1,500 feet of the school site, within a one-year time frame is 0.7 percent.

The attendance area for Hamilton High School includes the area east of the railroad track. Therefore, some of the high school students walking to or from school would have to use the 6th Street crossing or could shortcut across the railroad right-of-way and the track to reach the school site. During PlaceWorks' site reconnaissance, only two pedestrians were observed using the 6th Street/SR-32 crossing, including one student. No students were observed short-cutting across the track or trespassing within the railroad easement. In the vicinity of the school site, the railroad right-of-way is not fenced on either side of the easement which allows open access and the potential for trespassing within the easement. Since there is unrestricted access to the railroad right-of-way at the 6th Street/SR-32 crossing, the Safe Routes to School program should address safety precautions to be used by students traveling to and from the school site.

2.3 HAZARDOUS MATERIAL TRANSPORT

CFNR has the authorization to transport all types of cargo, based on Department of Transportation (DOT) and FRA regulations, which includes hazardous materials and chemicals. The freight traffic along the tracks near the school site is minimal since the closure of the Holly Sugar Plant in 2006; no freight trains were observed during PlaceWorks' site reconnaissance within a 3-hour period between 1:30 pm and 4:30 pm. Current freight traffic is estimated to be less than one train per week and the only known customer on this branch line is Nutrien Ag Solutions, which received a shipment of potassium sulfate, an ingredient in fertilizer, in January 2019. Therefore, the possibility of a hazardous material release impacting the school site is minimal due to the extremely low freight activity and the low probability of hazardous material transport. The CFNR mainly transports food and agricultural commodities.

The California Public Utilities Commission (CPUC) has identified hazard sites that have increased risk of derailment (CPUC, 2017). The CFNR Pacific Region West Valley Subdivision, which includes the branch line in the vicinity of the school site, was not listed. The transport of hazardous materials and chemicals constitutes less than 4% of the total freight traffic in California (AAR, 2017). Additionally, no hazardous material releases from trains traveling within Glenn County have been reported in the last ten years (FRA, 2019).

2.4 HIGH PRESSURE NATURAL GAS AND HAZARDOUS LIQUID PIPELINES

Information obtained from the National Pipeline Mapping System (2019) indicates that there are two high pressure natural gas pipelines located within the railroad right-of-way east of the school site. Signage for the natural gas pipelines was observed during the site reconnaissance. The pipelines are aligned east of the track and do not cross the track. The pipelines were analyzed in greater depth in the Pipeline Safety Hazard Assessment for the school site (PlaceWorks, 2019).

The probability of pipeline damage occurring as a result of a derailment is included in the pipeline analysis. The results of the pipeline assessment show that there would be no adverse impacts to students or staff at the school site in the unlikely event that the pipelines were to rupture. In addition, there have been no reported derailments within Glenn County on main line tracks during the past ten years of record.

2.5 RAILROAD NOISE

Railroad noise levels are dependent on the type of track, number of locomotives, number of cars, speed of trains, and the presence of at-grade crossings that require the engineer to sound warning horns/whistles. Noise sources associated with freight trains include:

- Wheel/Rail Rolling Noise. This results from the interaction of steel wheels rolling on steel rails. It increases in direct proportion to train speed and increases at locations with special track work, such as crossovers and turnouts. The CFNR track in the vicinity of the school site is relatively straight with no crossovers or turnouts. The average speed of freight trains in the vicinity of the school site is 10 mph. The tracks in the vicinity of the school site are constructed of continuously welded steel, which greatly reduces the noise of passing trains.

- Train Horn. The CPUC requires a train audible warning to be sounded in advance of every at-grade crossing. The train horns must be between 96 and 110 decibels at 100 feet. Because there is an at-grade crossing at 6th Street/State Route 32, train horns would be sounded in the vicinity of the school site.

- Grade Crossing Bells. The CPUC also requires that at-grade crossings be equipped with bells that ring when a train is approaching the crossing. Because this noise source is minor (85 dBA at 10 feet) compared to train horns at at-grade crossings, this noise source was not subject to further evaluation.

A noise screening assessment was conducted per the methodology presented in the CREATE Noise and Vibration Assessment Methodology (CREATE, 2011). Noise screening distances for train traffic have been developed by CREATE for low, medium, and high train activity within different noise condition categories. Freight traffic can be characterized as low activity for the track east of the site (less than 40 trains per day). A screening distance of 400 feet is identified for the ambient category of "normal suburban residential" for the scenario for unobstructed sight lines (i.e., no buildings or walls) between the railroad tracks and the noise

receptor (i.e., school site). As the track is located 625 feet from the school site, noise from trains traveling along the railroad tracks are not anticipated to adversely impact students and staff at the school site.

2.6 POTENTIAL FOR TRESPASS OVER THE RAILROAD EASEMENT

A potential safety issue is the trespass of students in the railroad easements during their travel to and from school. Accidents involving trespassers on railroad easements account for more than 400 trespasser fatalities and 500 related injuries every year (Metro Magazine, 2015). Accidents involving trespassers on railroad easements accounted for 123 fatalities and 86 injuries in California in 2017 (CPUC, 2019).

During PlaceWorks' site reconnaissance, only two pedestrians were observed using the 6th Street/SR-32 crossing, including one student. No students were observed short-cutting across the track or trespassing within the railroad easement. However, there is still a potential danger of engaging in unsafe crossing practices in or around the 6th Street/SR-32 crossing because the right-of-way in this area is not fenced and there is open access. Although there is very limited freight traffic along this branch line, trespass over the railroad easement should be addressed as part of the Safe Routes to School program.

2. Railroad Operating Conditions

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3. Incident Analysis and Determination of Risk

The probability that an accident or derailment could occur along the section of track within 1,500 feet of the school site was determined based on railroad accident rates and site-specific conditions.

3.1 RAILROAD ACCIDENT RATES

Statewide accident and derailment rates from the FRA for the last five years of record were used to determine the probability of heavy rail accidents along the CFNR system (FRA, 2019). The results are summarized in Table 2.

Table 2 Statewide CFNR Accident and Derailment Rates

Year	Total Train Miles	Total Train Accidents	Total Derailments	Derailment Probability	Accident Rate/Train Mile	Derailment Rate/Train Mile
2014	83,951	0	0	0.0	0.0E-00	0.0E-00
2015	80,754	2	1	0.5	2.5E-05	1.2E-05
2016	79,491	5	0	0.0	6.3E-05	0.0E-00
2017	77,748	2	0	0.0	2.6E-05	0.0E-00
2018	76,912	1	0	0.0	1.3E-05	0.0E-00
Average	**79,771**	**2**	**0.2**	**0.1**	**2.5E-05**	**2.5E-06**

Next, the railroad accident and derailment rates were evaluated using FRA data for CFNR main line tracks in Glenn County over a 5-year period from 2014 to 2018. There were no reported accidents or derailments along CFNR main lines within Glenn County. Additionally, there were no releases of hazardous materials during any of the CFNR freight train accidents during this five-year period. Because of the very low frequency of accidents in Glenn County for CFNR freight trains and the fact that there were no accidents on main line tracks, a site-specific adjustment to the CFNR average accident and derailment rates could not be made. However, it should be noted that use of the Statewide CFNR accident and derailment rates in this analysis will overestimate the probability of accidents and derailments in the Glenn County area and in the vicinity of the school site. Furthermore, predicted accident and derailment rates along the Hamilton City Branch line next to the school site would be even lower because of the very limited freight traffic along this track.

The probability of a hazardous material release if an accident were to occur could not be calculated from the data reported above, because there have been no hazardous material releases in Glenn County along CFNR tracks over the past five years. Therefore, the following equation was used to determine the probability of a hazardous material release:

$$P_{HAZ} = P_D \times P_T \times P_R$$

Where P_{HAZ} = probability of a derailment resulting in a hazardous material release
P_D = annual CFNR derailment rate = 2.5E-06

3. Incident Analysis and Determination of Risk

P_T = probability of train carrying hazardous materials (0.103 from AAR analysis)
P_R = probability of hazardous material release = 0.0029x + 0.0243 (Barkan et al, 2003)
x = speed of train in mph = 10 mph

The calculated probability of a hazardous material release is 1.4×10^{-8}. The actual rate in Glenn County is expected to be much less than this value due to the limited transport of hazardous materials in this area.

Based on the information presented above, the accident and derailment rates used for this risk assessment are as follows:

- Main line accident rate for CFNR freight trains – 2.5×10^{-5}
- Main line derailment rate for CFNR freight trains – 2.5×10^{-6}
- Probability of a hazardous material release – 1.4×10^{-8}

3.2 SITE SPECIFIC INCIDENT ANALYSIS

The likelihood of an accident or derailment occurring within a 1,500-foot radius of the school during school hours was determined using the calculated accident and derailment rates presented in Section 3.1. Based on current information from the Chino Enterprise Record 2019 article and the site reconnaissance conducted by PlaceWorks, the number of trains passing by the school site was assumed to be one train per week. The length of the rail lines within a 1,500-foot radius of the school site was calculated to be 5,350 feet, or 1.01 mile. The probability of an accident or derailment on the CFNR tracks occurring within a 1,500-foot radius of the school site is calculated as follows:

$$PA = P(A) \times D \times N$$
or
$$PD = P(D) \times D \times N$$
or
$$PH = P(H) \times D \times N$$

Where PA = probability of an accident occurring within a 1,500-foot radius of the school site
PD = probability of a derailment occurring within a 1,500-foot radius of the school site
PH = probability of a hazardous material release occurring within a 1,500-foot radius
P(A) = probability of a CFNR accident per mile per year = 2.5×10^{-5}
P(D) = probability of a CFNR derailment per mile per year = 2.5×10^{-6}
P(H) = probability of a hazardous material release = 1.4×10^{-8}
D = distance along rail tracks within 1,500 feet of the school = 5,350 feet = 1.01 mile
N = number of trains per year, during school attendance hours and days
= 1 train per week during school hours x 180 days/year = 36 trains/year

The calculated probabilities are:

- Annual probability of a CFNR accident within 1,500 feet of the school site = 9.1×10^{-4}

- Annual probability of a CFNR derailment within 1,500 feet of the school site = 9.1×10^{-3}
- Annual probability of a CFNR hazardous material release within 1,500 feet of the school site = 5.0×10^{-7}

This is equivalent to a CFNR accident in the vicinity of the school site once every 1,100 years or a derailment once every 11,000 years. The probability of a hazardous material release happening in the vicinity of the school site is estimated to occur once every 2 million years.

3.3 ADDITIONAL INCIDENT ANALYSIS

One major concern is the possibility of debris from a derailment impacting the students and staff at the school. A study conducted by the Los Angeles Unified School District (LAUSD) indicated that debris from a derailment typically extends no more than 128 feet (about 1.5 rail car lengths) from the centerline of the track. The nearest CFNR track is approximately 625 feet from the edge of the school site and therefore, no debris from a derailment would reach the school site. Based on a review of FRA accident reports in Glenn County for the last five years, there have been no rail accidents on the CFNR main line during this time period. Therefore, the potential of debris from a derailment reaching the campus site is negligible.

Another concern is the possibility of a derailment resulting in the release of hazardous materials that could impact students and staff at the school. As reported in Section 3.2, there have been no hazardous material releases from CFNR freight trains in Glenn County for the past five years of record. Additionally, the calculated probability of a hazardous material release happening in the vicinity of the school site is estimated to occur once every 2 million years. Furthermore, most of the commodities transported along the branch line next to the school site are agricultural products.

In general, the transport of hazardous materials and chemicals does not constitute a major portion of the total freight traffic in California. In 2015, intermodal transport consisted of 70% of the total freight traffic originating in California and chemical transport was less than 4% of the total freight traffic (AAR, 2017). Also, the hazardous materials accident-caused release rate has declined by nearly 90% since 1980 (Barkan et al, 2003). Therefore, the probability of a hazardous material release impacting students and staff is considered negligible in the unlikely occurrence of a derailment near the school site.

3. Incident Analysis and Determination of Risk

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4. Findings and Conclusions

Findings

- The California Northern Railroad (CFNR) operates one mainline track within a 50-foot wide easement that is approximately 600 feet east of the school site. The closest track is approximately 625 feet from the school's property boundary at its nearest location.
- The CFNR track is Class 1 with continuously welded rail. Trains passing by the school site are estimated to be traveling at approximately 10 mph.
- Freight traffic along the Hamilton City Branch line has been greatly reduced since the closure of the Holly Sugar Plant and other businesses along the line. Based on recent information and the site reconnaissance conducted by PlaceWorks, the number of trains passing by the school site is likely to be only one train per week or less (Chino Enterprise Record, 2019).
- No trains were observed during PlaceWorks' site reconnaissance on May 20, 2019 between the hours of 1:30 pm to 4:30 pm.
- In January 2019, the first train in several years made a delivering to Nutrien Ag Solutions in Hamilton City with a single locomotive and one hopper car carrying potassium sulfate.
- There is one at-grade crossing within 1,500 feet of the school site at 6th Street/SR-32, which is approximately 950 feet east of the school site. During PlaceWorks' site reconnaissance, only two pedestrians were observed between 1:30 pm to 4:30 pm; one student and one adult were seen using the crossing. No students were observed trespassing within the railroad easement.

Conclusions

- Since there is unrestricted access to the railroad right-of-way at the 6th Street/SR-32 crossing, the Safe Routes to School program should address safety precautions to be used by students traveling to and from the school site.
- The 6th Street/SR-32 at-grade crossing has appropriate safety devices, including crossing gates, cantilevered flashing lights, bells, crossbucks, and pavement markings, which minimize the potential for vehicle/train interaction.
- The probability of a CFNR accident or derailment occurring near the school site is calculated to be 9.1 x 10^{-4} and 9.1 x 10^{-5}, respectively. This is equivalent to a CFNR accident in the vicinity of the school site once every 1,100 years or a CFNR derailment once every 11,000 years.
- Noise from trains traveling along the railroad track are not anticipated to adversely impact students and staff at the school site since the tracks and at-grade crossing are beyond the CREATE screening distance of 400 feet.

In summary, there are no unusual circumstances present that would present special risks to students or staff at the school site from operations along the CFNR railroad tracks.

4. Findings and Conclusions

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5. Recommendations

Based on the analysis presented in the previous sections, there are no mitigation measures or special provisions required at this school site. However, there is unrestricted access to the railroad right-of-way at the 6th Street/State Route 32 crossing. Therefore, pedestrian safety and the dangers of trespassing in railroad rights-of-way should be addressed in the Safe Routes to School program.

Operation Lifesaver, which is a non-profit international public education program established in 1972 to end collisions, death, and injuries at highway-rail crossings and on railroad rights-of-way, has a Safety Education Program. The program addresses rail safety and teaches students, at age-appropriate levels, to understand rail signage, the importance of avoiding the railroad easements, and safe driving skills in the vicinity of railroads. Operation Lifesaver provides free presentations to schools and community groups and offer free programs to students that attend schools within a 0.5-mile radius of a railroad track.

5. Recommendations

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6. References

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Appendix A. Photographic Essay

Appendix

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PLACEWORKS

PHOTO ESSAY

Client Name: Hamilton Unified School District

Site Location: Hamilton High School Expansion

Project No.: HASD-01.0

Photo No:	Date:
1	5/20/2019

Description:

View looking to the north at the 6th Street/Highway 32 railroad crossing. The photo shows the at-grade highway-rail crossing. Safety features including crossbucks, signage, crossing gates, cantilevered flashing lights, and bells are visible on the photo.

Photo No:	Date:
2	5/20/2019

Description:

View looking to the southeast of the railroad right-of-way and single track, south of 6th Street/Highway 32

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PHOTO ESSAY

Client Name: Hamilton Unified School District

Site Location: Hamilton High School Expansion

Project No.: HASD-01.0

Photo No:	**Date:**
3	5/20/2019

Description:

View looking to the north of the California Northern Railroad Company (CNFR) crossing box, north of the 6th Street/Highway 32 railroad crossing. 6th Street is visible in the foreground of the photograph. The railroad right-of-way and electrical power poles are also visible in the photograph.

Photo No:	**Date:**
4	5/20/2019

Description:

View looking to the northwest at the 6th Street/Highway 32 highway/railroad crossing. The concrete crossing surface can be seen in the photo as well as the safety features (crossing arms, cantilevered flashing lights, and crossbucks) installed at the crossing.

Appendix B. Site Reconnaissance

TABLE B

6th Street/Highway 32 Crossing - Site Reconnissance

5/20/2019 - 1:30 PM to 4:30 PM

6th Street/HWY 32 Crossing (Single Track owned by CFNF)									
time	owner/ operator	# ocomotives	locomotive number	# freight cars	# passenger cars	elapsed time (s)	direction	speed (mph)	notes
	No trains observed during 3 hour reconnaissance								

Scouting Observations - 6th Street/HWY 32
One at-grade crossing with signage, crossing arms, cantilevered flashing lights, and bells.
CFNR track appears to be continuously welded rail (CWR).
During observation, 2 pedestrians were seen using the crossing (1 students and 1 non-student).
No sidewalks on either side of 6th Street at crossing.
No obstructions/fencing to limit access into the railroad right-of-way.
Crossing Number: 762194L

Appendix C. Highway-Rail Crossing Data

Appendix

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U. S. DOT CROSSING INVENTORY FORM

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

OMB No. 2130-0017

Instructions for the initial reporting of the following types of new or previously unreported crossings: For public highway-rail grade crossings, complete the entire inventory Form. For private highway-rail grade crossings, complete the Header, Parts I and II, and the Submission Information section. For public pathway grade crossings (including pedestrian station grade crossings), complete the Header, Parts I and II, and the Submission Information section. For Private pathway grade crossings, complete the Header, Parts I and II, and the Submission Information section. For grade-separated highway-rail or pathway crossings (including pedestrian station crossings), complete the Header, Part I, and the Submission Information section. For changes to existing data, complete the Header, Part I Items 1-3, and the Submission Information section, in addition to the updated data fields. Note: For private crossings only, Part I Item 20 and Part III Item 2.K. are required unless otherwise noted. An asterisk * denotes an optional field.

A. Revision Date (MM/DD/YYYY)	B. Reporting Agency	C. Reason for Update (Select only one)	D. DOT Crossing Inventory Number
09 / 18 / 2017	☒ Railroad ☐ Transit ☐ State ☐ Other	☒ Change in Data ☐ New Crossing ☐ Closed ☐ No Train Traffic ☐ Quiet Zone Update ☐ Re-Open ☐ Date Change Only ☐ Change in Primary Operating RR ☐ Admin. Correction	762194L

Part I: Location and Classification Information

1. Primary Operating Railroad	2. State	3. County
California Northern Railroad Company (CFNR)	CALIFORNIA	GLENN

4. City / Municipality	5. Street/Road Name & Block Number	6. Highway Type & No.
☒ In ☐ Near HAMILTON CITY	HWY 32 (Street/Road Name) * (Block Number)	ST 32

7. Do Other Railroads Operate a Separate Track at Crossing? ☐ Yes ☒ No	8. Do Other Railroads Operate Over Your Track at Crossing? ☐ Yes ☒ No
If Yes, Specify RR	If Yes, Specify RR

9. Railroad Division or Region	10. Railroad Subdivision or District	11. Branch or Line Name	12. RR Milepost
☐ None Pacific Region	☐ None West Valley	☐ None HAMILTON LEAD	(prefix) | 0170.30 | (suffix) (nnnn.nnn)

13. Line Segment *	14. Nearest RR Timetable Station *	15. Parent RR (if applicable)	16. Crossing Owner (if applicable)
62.72	HAMILTON	☒ N/A	☒ N/A

17. Crossing Type	18. Crossing Purpose	19. Crossing Position	20. Public Access (If Private Crossing)	21. Type of Train		22. Average Passenger Train Count Per Day
☒ Public ☐ Private	☒ Highway ☐ Pathway, Ped. ☐ Station, Ped.	☒ At Grade ☐ RR Under ☐ RR Over	☐ Yes ☐ No	☒ Freight ☐ Intercity Passenger ☐ Commuter	☐ Transit ☐ Shared Use Transit ☐ Tourist/Other	☐ Less Than One Per Day ☐ Number Per Day 0

23. Type of Land Use
☒ Open Space ☐ Farm ☐ Residential ☐ Commercial ☐ Industrial ☐ Institutional ☐ Recreational ☐ RR Yard

24. Is there an Adjacent Crossing with a Separate Number?	25. Quiet Zone (FRA provided)
☐ Yes ☒ No If Yes, Provide Crossing Number	☒ No ☐ 24 Hr ☐ Partial ☐ Chicago Excused Date Established

26. HSR Corridor ID	27. Latitude in decimal degrees	28. Longitude in decimal degrees	29. Lat/Long Source
☒ N/A	(WGS84 std: nn.nnnnnnn) 39.7464194	(WGS84 std: -nnn.nnnnnnn) -122.0126694	☒ Actual ☐ Estimated

30.A. Railroad Use *	31.A. State Use *
30.B. Railroad Use *	31.B. State Use *
30.C. Railroad Use *	31.C. State Use *
30.D. Railroad Use *	31.D. State Use *
32.A. Narrative (Railroad Use) *	32.B. Narrative (State Use) *

33. Emergency Notification Telephone No. (posted)	34. Railroad Contact (Telephone No.)	35. State Contact (Telephone No.)
800-800-2203	800-800-2203	415-703-3722

Part II: Railroad Information

1. Estimated Number of Daily Train Movements

1.A. Total Day Thru Trains (6 AM to 6 PM)	1.B. Total Night Thru Trains (6 PM to 6 AM)	1.C. Total Switching Trains	1.D. Total Transit Trains	1.E. Check if Less Than One Movement Per Day ☐ How many trains per week?
0	0	4	0	20

2. Year of Train Count Data (YYYY)	3. Speed of Train at Crossing
2015	3.A. Maximum Timetable Speed (mph) 25 3.B. Typical Speed Range Over Crossing (mph) From 0 to 25

4. Type and Count of Tracks
Main 1 Siding 0 Yard 0 Transit 0 Industry 0

5. Train Detection (Main Track only)
☒ Constant Warning Time ☐ Motion Detection ☐ AFO ☐ PTC ☐ DC ☐ Other ☐ None

6. Is Track Signaled?	7.A. Event Recorder	7.B. Remote Health Monitoring
☐ Yes ☒ No	☐ Yes ☐ No	☐ Yes ☐ No

U. S. DOT CROSSING INVENTORY FORM

A. Revision Date *(MM/DD/YYYY)*	PAGE 2	D. Crossing Inventory Number *(7 char.)*
09/18/2017		762194L

Part III: Highway or Pathway Traffic Control Device Information

1. Are there Signs or Signals? ☒ Yes ☐ No

2. Types of Passive Traffic Control Devices associated with the Crossing

2.A. Crossbuck Assemblies *(count)*	2.B. STOP Signs *(R1-1) (count)*	2.C. YIELD Signs *(R1-2) (count)*	2.D. Advance Warning Signs *(Check all that apply; include count)* ☒ None
4	0		☐ W10-1 ____ ☐ W10-3 ____ ☐ W10-11 ____ ☐ W10-2 ____ ☐ W10-4 ____ ☐ W10-12 ____

2.E. Low Ground Clearance Sign *(W10-5)*	2.F. Pavement Markings	2.G. Channelization Devices/Medians	2.H. EXEMPT Sign *(R15-3)*	2.I. ENS Sign *(I-13)* Displayed
☒ Yes *(count____)* ☐ No	☒ Stop Lines ☐ Dynamic Envelope ☒ RR Xing Symbols ☐ None	☒ All Approaches ☐ Median ☐ One Approach ☐ None	☐ Yes ☐ No	☒ Yes ☐ No

2.J. Other MUTCD Signs ☒ Yes ☐ No	2.K. Private Crossing Signs *(if private)*	2.L. LED Enhanced Signs *(List types)*
Specify Type ____ Count 2 Specify Type ____ Count 0 Specify Type ____ Count ____	☐ Yes ☐ No	

3. Types of Train Activated Warning Devices at the Grade Crossing *(specify count of each device for all that apply)*

3.A. Gate Arms *(count)*	3.B. Gate Configuration	3.C. Cantilevered *(or Bridged)* Flashing Light Structures *(count)*	3.D. Mast Mounted Flashing Lights *(count of masts)* 2	3.E. Total Count of Flashing Light Pairs
Roadway 2 Pedestrian ____	☐ 2 Quad ☐ 3 Quad ☐ 4 Quad ☐ Full *(Barrier)* Resistance ☐ Median Gates	Over Traffic Lane 2 ☐ Incandescent Not Over Traffic Lane 0 ☐ LED	☐ Incandescent ☐ LED ☐ Back Lights Included ☐ Side Lights Included	8

3.F. Installation Date of Current Active Warning Devices: *(MM/YYYY)*	3.G. Wayside Horn	3.H. Highway Traffic Signals Controlling Crossing	3.I. Bells *(count)*
____/____ ☒ Not Required	☐ Yes Installed on *(MM/YYYY)* ____/____ ☐ No	☐ Yes ☒ No	2

3.J. Non-Train Active Warning	3.K. Other Flashing Lights or Warning Devices
☐ Flagging/Flagman ☐ Manually Operated Signals ☐ Watchman ☐ Floodlighting ☐ None	Count 0 Specify type ____

4.A. Does nearby Hwy Intersection have Traffic Signals?	4.B. Hwy Traffic Signal Interconnection	4.C. Hwy Traffic Signal Preemption	5. Highway Traffic Pre-Signals	6. Highway Monitoring Devices *(Check all that apply)*
☐ Yes ☒ No	☐ Not Interconnected ☐ For Traffic Signals ☐ For Warning Signs	☐ Simultaneous ☐ Advance	☐ Yes ☐ No Storage Distance * ____ Stop Line Distance * ____	☐ Yes - Photo/Video Recording ☐ Yes – Vehicle Presence Detection ☐ None

Part IV: Physical Characteristics

1. Traffic Lanes Crossing Railroad	2. Is Roadway/Pathway Paved?	3. Does Track Run Down a Street?	4. Is Crossing Illuminated? *(Street lights within approx. 50 feet from nearest rail)*
☐ One-way Traffic ☐ Two-way Traffic ☐ Divided Traffic Number of Lanes 2	☒ Yes ☐ No	☐ Yes ☒ No	☐ Yes ☒ No

5. Crossing Surface *(on Main Track, multiple types allowed)* Installation Date * *(MM/YYYY)* ____/____ Width * ____ Length * ____
☐ 1 Timber ☐ 2 Asphalt ☐ 3 Asphalt and Timber ☒ 4 Concrete ☐ 5 Concrete and Rubber ☐ 6 Rubber ☐ 7 Metal
☐ 8 Unconsolidated ☐ 9 Composite ☐ 10 Other *(specify)* ____

6. Intersecting Roadway within 500 feet?	7. Smallest Crossing Angle	8. Is Commercial Power Available? *
☐ Yes ☒ No If Yes, Approximate Distance *(feet)* ____	☒ 0° - 29° ☐ 30° - 59° ☐ 60° - 90°	☒ Yes ☐ No

Part V: Public Highway Information

1. Highway System	2. Functional Classification of Road at Crossing	3. Is Crossing on State Highway System?	4. Highway Speed Limit
☐ (01) Interstate Highway System ☒ (02) Other Nat Hwy System (NHS) ☐ (03) Federal AID, Not NHS ☐ (08) Non-Federal Aid	☒ (0) Rural ☐ (1) Urban ☐ (1) Interstate ☐ (5) Major Collector ☐ (2) Other Freeways and Expressways ☐ (3) Other Principal Arterial ☐ (6) Minor Collector ☒ (4) Minor Arterial ☐ (7) Local	☒ Yes ☐ No 5. Linear Referencing System *(LRS Route ID)* * 6. LRS Milepost *	____ MPH ☐ Posted ☐ Statutory

7. Annual Average Daily Traffic *(AADT)*	8. Estimated Percent Trucks	9. Regularly Used by School Buses?	10. Emergency Services Route
Year 1988 AADT 002300	15 %	☐ Yes ☒ No Average Number per Day 0	☐ Yes ☐ No

Submission Information - ***This information is used for administrative purposes and is not available on the public website.***

Submitted by ____ Organization ____ Phone ____ Date ____

Annual WBAPS 2018

WEB ACCIDENT PREDICTION SYSTEM

Accident Prediction Report for Public at-Grade Highway-Rail Crossings

Including:

Disclaimer/Abbreviation Key
Accident Prediction List

Provided by:

Federal Railroad Administration
Office of Safety Analysis
Highway-Rail Crossing Safety & Trespass Prevention

Data Contained in this Report:
Crossing: 762194I'

Date Prepared: 4/29/2019

U.S. Department
of Transportation
Federal Railroad
Administration

USING DATA PRODUCED BY WBAPS

(Web Accident Prediction System)

1200 New Jersey Avenue, SE
Third Floor West
Washington, DC 20590

WBAPS generates reports listing public highway-rail intersections for a State, County, City or railroad ranked by predicted collisions per year. These reports include brief lists of the Inventory record and the collisions over the last 10 years along with a list of contacts for further information. These data were produced by the Federal Railroad Administration's Web Accident Prediction System (WBAPS).

WBAPS is a computer model which provides the user an analytical tool, which combined with other site-specific information, can assist in determining where scarce highway-rail grade crossing resources can best be directed. This computer model does not rank crossings in terms of most to least dangerous. Use of WBAPS data in this manner is incorrect and misleading.

WBAPS provides the same reports as PCAPS, which is FRA's PC Accident Prediction System. PCAPS was originally developed as a tool to alert law enforcement and local officials of the important need to improve safety at public highway-rail intersections within their jurisdictions. It has since become an indispensable information resource which is helping the FRA, States, railroads, Operation Lifesaver and others, to raise the awareness of the potential dangers at public highway-rail intersections. The PCAPS/WBAPS output enables State and local highway and law enforcement agencies identify public highway-rail crossing locations which may require additional or specialized attention. It is also a tool which can be used by state highway authorities and railroads to nominate particular crossings which may require physical safety improvements or enhancements.

The WBAPS accident prediction formula is based upon two independent factors (variables) which includes (1) basic data about a crossing's physical and operating characteristics and (2) five years of accident history data at the crossing. These data are obtained from the FRA's inventory and accident/incident files which are subject to keypunch and submission errors. Although every attempt is made to find and correct errors, there is still a possibility that some errors still exist. Erroneous, inaccurate and non-current data will alter WBAPS accident prediction values. While approximately 100,000 inventory file changes and updates are voluntarily provided annually by States and railroads and processed by FRA into the National Inventory File, data records for specific crossings may not be completely current. Only the intended users (States and railroads) are really knowledgeable as to how current the inventory data is for a particular State, railroad, or location.

It is important to understand the type of information produced by WBAPS and the limitations on the application of the output data. WBAPS does not state that specific crossings are the most dangerous. Rather, the WBAPS data provides an indication that conditions are such that one crossing may possibly be more hazardous than another based on the specific data that is in the program. It is only one of many tools which can be used to assist individual States, railroads and local highway authorities in determining where and how to initially focus attention for improving safety at public highway-rail intersections. WBAPS is designed to nominate crossings for further evaluation based only upon the physical and operating characteristics of specific crossings as voluntarily reported and updated by States and railroads and five years of accident history data.

PCAPS and WBAPS software are not designed to single out specific crossings without considering the many other factors which may influence accident rates or probabilities. State highway planners may or may not use PCAPS/WBAPS accident prediction model. Some States utilize their own formula or model which may include other geographic and site-specific factors. At best, PCAPS and WBAPS software and data nominates crossings for further on-the-ground review by knowledgeable highway traffic engineers and specialists. The output information is not the end or final product and the WBAPS data should not be used for non-intended purposes.

It should also be noted that there are certain characteristics or factors which are not, nor can be, included in the WBAPS database. These include sight-distance, highway congestion, bus or hazardous material traffic, local topography, and passenger exposure (train or vehicle), etc. Be aware that PCAPS/WBAPS is only one model and that other accident prediction models which may be used by States may yield different, by just as valid, results for ranking crossings for safety improvements.

Finally, it should be noted that this database is not the sole indicator of the condition of a specific public highway-rail intersection. The WBAPS output must be considered as a supplement to the information needed to undertake specific actions aimed at enhancing highway-rail crossing safety at locations across the U.S. The authority and jurisdiction to appropriate resources towards the safety improvement or elimination of specific crossings lies with the individual States.

U.S. Department
of Transportation
Federal Railroad
Administration

ABBREVIATION KEY

for use with WBAPS Reports

1200 New Jersey Avenue, SE
Third Floor West
Washington, DC 20590

The lists produced are only for public at-grade highway-rail intersections for the entity listed at the top of the page. The parameters shown are those used in the collision prediction calculation.

RANK:	Crossings are listed in order and ranked with the highest collision prediction value first.
PRED COLLS:	The accident prediction value is the probability that a collision between a train and a highway vehicle will occur at the crossing in a year.
CROSSING:	The unique sight specific identifying DOT/AAR Crossing Inventory Number.
RR:	The alphabetic abbreviation for the railroad name.
CITY:	The city in (or near) which the crossing is located.
ROAD:	The name of the road, street, or highway (if provided) where the crossing is located.
NUM OF COLLISIONS:	The number of accidents reported to FRA in each of the years indicated. Note: Most recent year is partial year (data is not for the complete calendar year) unless Accidents per Year is 'AS OF DECEMBER 31'.
DATE CHG:	The date of the latest change of the warning device category at the crossing which impacts the collision prediction calculation, e.g., a change from crossbucks to flashing lights, or flashing lights to gates. The accident prediction calculation utilizes three different formulas, on each for (1) passive devices, (2) flashing lights only, and (3) flashing lights with gates. When a date is shown, the collision history prior to the indicated year-month is not included in calculating the accident prediction value.
WD:	The type of warning device shown on the current inventory record for the crossing where: FQ=Four Quad Gates; GT = All Other Gates; FL = Flashing lights; HS = Wigwags, Highway Signals, Bells, or Other Activated; SP = Special Protection (e.g., a flagman); SS = Stop Signs; XB = Crossbucks; OS = Other Signs or Signals; NO = No Signs or Signals.
TOT TRNS:	Number of total trains per day.
TOT TRKS:	Total number of railroad tracks between the warning devices at the crossing.
TTBL SPD:	The maximum timetable (allowable) speed for trains through the crossing.
HWY PVD:	Is the highway paved on both sides of the crossing?
HWY LNS:	The number of highway traffic lanes crossing the tracks at the crossing.
AADT:	The Average Annual Daily Traffic count for highway vehicles using the crossing.

PUBLIC HIGHWAY-RAIL CROSSINGS RANKED BY PREDICTED ACCIDENTS PER YEAR AS OF 12/31/2017*

*Num of Collisions: Most recent year is partial year (data is not for the complete calendar year) unless Accidents per Year is 'AS OF DECEMBER 31'.

RANK	PRED COLLS.	CROSSING	RR	STATE	COUNTY	CITY	ROAD	NUM OF COLLISIONS 17*	16	15	14	13	DATE CHG	W D	TOT TRN	TOT TRK	TTBL SPD	HWY PVD	HWY LNS	AADT
1	0.006554	762194L	UNR	CA	GLENN	HAMILTON CI	HWY 32	0	0	0	0	0		GT	4	1	25	YES	2	2,300
TTL:	0.006554							0	0	0	0	0								

1.12 - Ten Year Accident/Incident Overview

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1.12 - TEN YEAR ACCIDENT / INCIDENT OVERVIEW
BY CALENDAR YEAR (January-December)
You Chose Months January Through December
Run Date: Fri, May 24, 2019

Reporting Level:... ALL - - - - - Railroad Group:... ALL RAILROADS
CALIFORNIA, GLENN COUNTY
ALL RAILROADS SELECTED

Accident/Incident Data Is Current Through The Month of February 2019

Category	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019 PARTIAL	% Change From CY 2018 to CY 2019	% Change From CY 2010 to CY 2019	Total For CY 2010 to CY 2019
Number of railroads included	.	.	1	.	.	.	.	.	.	.	.	.	.
TOTAL ACCIDENTS/INCIDENTS 1/	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Total fatalities	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Total nonfatal conditions	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Employee on duty deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Nonfatal EOD injuries	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Nonfatal EOD illnesses	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Total employee on duty cases	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Cases with days absent from work	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Trespasser deaths, not at HRC	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Trespasser injuries, not at HRC	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Trespasser Incidents, not at HRC	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Passengers kld in train accs or crossing incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Passengers inj in train accs or crossing incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Passengers kld in other incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Passengers inj in other incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
TRAIN ACCIDENTS (Not at Grade-Crossings)	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Train accident deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Train accident injuries	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Human factor caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Track caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Motive power/equipment caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Signal caused, all track types	.	.	.	.	.	.	.	.	.	.	.	.	.
------- Signal caused, main line track	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Miscellaneous caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Collisions	.	.	.	.	.	.	.	.	.	.	.	.	.
------- Collisions on main line track	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Derailments	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Other types, e.g., obstructions	.	.	.	.	.	.	.	.	.	.	.	.	.

Category	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019 PARTIAL	% Change From CY 2018 to CY 2019	% Change From CY 2010 to CY 2019	Total For CY 2010 to CY 2019
--- Train accidents on main line 5/	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Accidents on yard track	.	.	.	.	.	.	.	.	.	.	.	.	.
--- HAZMAT RELEASES	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Cars carrying hazmat	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Hazmat cars damaged/derailed	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Cars releasing	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Accidents with reportable damage over $100K	.	.	.	.	.	.	.	.	.	.	.	.	.
..... PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Accidents with reportable damage over $500K	.	.	.	.	.	.	.	.	.	.	.	.	.
..... PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Accidents with reportable damage over $1M	.	.	.	.	.	.	.	.	.	.	.	.	.
..... PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
HIGHWAY-RAIL INCIDENTS	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Highway-rail incidents deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Highway-rail incidents injuries	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Incidents at public xings	.	.	.	.	.	.	.	.	.	.	.	.	.
..... PERCENT of total Highway-rail incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
OTHER ACCIDENTS/INCIDENTS 3/	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Other incidents deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Other incidents injuries	.	1	.	.	.	.	.	.	.	.	.	.	1

FOOTNOTE 1. Total Accidents is the sum of Train Accidents, Crossing Incidents, and Other Accidents/Incidents
FOOTNOTE 2. Class I Railroad Group selections are reported based on the System Reporting Level to ensure all subsidiary railroads are included
FOOTNOTE 3. Other Accidents/Incidents are events other than Train Accidents or Crossing Incidents that cause physical harm to persons
FOOTNOTE 4. Data does not support rates being calculated when either or both Region and/or State are selected
FOOTNOTE 5. Percent Change columns are not calculated when the current year is 'Partial' or 'No Data' is available. See FAQ for More Detail.

1.12 - TEN YEAR ACCIDENT / INCIDENT OVERVIEW BY RAILROAD / REGION / STATE / COUNTY

BY CALENDAR YEAR (January-December)

Run Date: Fri, May 24, 2019

CALIFORNIA, GLENN COUNTY

***** ONLY THOSE RAILROADS REPORTING ACCIDENTS/INCIDENTS ARE INCLUDED IN THIS REPORT. *****

***** MULTIPLE REPORTS ARE OFTEN REQUIRED TO REPORT A SINGLE ACCIDENT/INCIDENT. *****

Obs	Railroad	Total Accident/Incident Records	Percent Of Total	Form 57	Percent Of RR Total	Form 54	Percent Of RR Total	Form 55a	Percent Of RR Total	System Railroad	Consolidated Railroad
1	California Northern RR Co. [CFNR]	1	100.000	.	.	.	.	1	100.000		
		1	**100.000**	**0**		**0**		**1**			

FOOTNOTE 1. Form 55a used for reporting deaths and injuries. Form 54 for train accidents, and Form 57 for highway-rail crossing incidents

1.12 - Ten Year Accident/Incident Overview

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1.12 - TEN YEAR ACCIDENT / INCIDENT OVERVIEW
BY CALENDAR YEAR (January-December)
You Chose Months January Through December
Run Date: Mon, Apr 29, 2019

Reporting Level:... INDIVIDUAL - - - - Railroad Group... CALIFORNIA NORTHERN RR CO. (CFNR)
CALIFORNA
CALIFORNIA NORTHERNRR CO. (CFNR)

Accident/Incident Data Is Current Through The Month of January 2019

Category	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019 PARTIAL	% Change From CY 2018 to CY 2019	% Change From CY 2010 to CY 2019	Total For CY 2010 to CY 2019
Number of railroads included	1	1	1	1	1	1	1	1	1	1	.	.	.
TOTAL ACCIDENTS/INCIDENTS 1/	1	2		5		2	5	2	1	1	.	.	19
--- Total fatalities	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Total nonfatal conditions	1	2		2			3						8
--- Employee on duty deaths													
--- Nonfatal EOD injuries	1	2					2						5
--- Nonfatal EOD illnesses													
--- Total employee on duty cases	1	2					2						5
--- Cases with days absent from work		2					1						3
--- Trespasser deaths, not at HRC													
--- Trespasser injries, not at HRC													
--- Trespasser incidents, not at HRC													
--- Passengers kld in train accs or crossing incidents													
--- Passengers inj in train accs or crossing incidents													
--- Passengers kld in other incidents													
--- Passengers inj in other incidents													

Category	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019 PARTIAL	% Change From CY 2018 to CY 2019	% Change From CY 2010 to CY 2019	Total For CY 2010 to CY 2019
TRAIN ACCIDENTS (Not at Grade-Crossings)	.	.	.	.	.	1	.	.	.	.	.	.	1
--- Train accident deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Train accident injuries	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Human factor caused	.	.	.	.	.	1	.	.	.	.	.	.	1
--- Track caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Motive power/equipment caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Signal caused, all track types	.	.	.	.	.	.	.	.	.	.	.	.	.
------- Signal caused, main line track	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Miscellaneous caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Collisions	.	.	.	.	.	.	.	.	.	.	.	.	.
------- Collisions on main line track	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Derailments	.	.	.	.	.	1	.	.	.	.	.	.	1
--- Other types, e.g., obstructions	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Train accidents on main line &	.	.	.	.	.	1	.	.	.	.	.	.	1
--- Accidents on yard track	.	.	.	.	.	.	.	.	.	.	.	.	.
--- HAZMAT RELEASES	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Cars carrying hazmat	.	.	.	.	.	5	.	.	.	.	.	.	5
--- Hazmat cars damaged/derailed	.	.	.	.	.	.	.	.	.	.	.	.	0
-- Cars releasing	.	.	.	.	.	.	.	.	.	.	.	.	0
--- Accidents with reportable damage over $100K	.	.	.	.	.	.	.	.	.	.	.	.	.
---. PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Accidents with reportable damage over $500K	.	.	.	.	.	.	.	.	.	.	.	.	.
---. PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Accidents with reportable damage over $1M	.	.	.	.	.	.	.	.	.	.	.	.	.
---. PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
HIGHWAY-RAIL INCIDENTS	.	.	.	3	.	1	2	2	1	1	.	.	10
--- Highway-rail incidents deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Highway-rail incidents injuries	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Incidents at public xings	.	.	.	3.000	.	.	1.000	2.000	1.000	1.000	.	.	8

Category	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019 PARTIAL	% Change From CY 2018 to CY 2019	% Change From CY 2010 to CY 2019	Total For CY 2010 to CY 2019
..... PERCENT of total Highway-rail incidents	.	.	.	100	.	.	50	100	100	100	.	.	.
OTHER ACCIDENTS/INCIDENTS 3/	1	2	.	2	.	.	3	.	.	.	.	.	8
--- Other incidents deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Other incidents injuries	1	2	.	2	.	.	3	.	.	.	.	.	8

FOOTNOTE 1. Total Accidents is the sum of Train Accidents, Crossing Incidents, and Other Accidents/Incidents
FOOTNOTE 2. Class I Railroad Group selections are reported based on the System Reporting Level to ensure all subsidiary railroads are included
FOOTNOTE 3. Other Accidents/Incidents are events other than Train Accidents or Crossing Incidents that cause physical harm to persons
FOOTNOTE 4. Data does not support rates being calculated when either or both Region and/or State are selected.
FOOTNOTE 5. Percent Change columns are not calculated when the current year is 'Partial' or 'No Data' is available. See FAQ for More Detail

1.12 - TEN YEAR ACCIDENT / INCIDENT OVERVIEW BY RAILROAD / REGION / STATE / COUNTY
BY CALENDAR YEAR (January-December)
Run Date: Mon, Apr 29, 2019

CALIFORNIA

***** ONLY THOSE RAILROADS REPORTING ACCIDENTS/INCIDENTS ARE INCLUDED IN THIS REPORT *****
***** MULTIPLE REPORTS ARE OFTEN REQUIRED TO REPORT A SINGLE ACCIDENT/INCIDENT. *****

Obs	Railroad	Total Accident/Incident Records	Percent Of Total	Form 57	Percent Of RR Total	Form 54	Percent Of RR Total	Form 55a	Percent Of RR Total	System Railroad	Consolidated Railroad
1	California Northern RR Co. [CFNR]	19	100.000	10	52.632	1	5.263	8	42.105		
		19	**100.000**	**10**		**1**		**8**			

FOOTNOTE 1. Form 55a used for reporting deaths and injuries. Form 54 for train accidents, and Form 57 for highway-rail crossing incidents

1.12 - Ten Year Accident/Incident Overview

Back to Query Page Print Version

1.12 - TEN YEAR ACCIDENT ' INCIDENT OVERVIEW
BY CALENDAR YEAR (January-December)
You Chose Months Januar/ Through December
Run Date: Mon, Apr 29, 2019

Reporting Level:... INDIVIDUAL - - - - - Railroad Group... CALIFORNIA NORTHERN RR CO. [CFNR]
CALIFORNIA, GLENN COUNTY
CALIFORNIA NORTHERNRR CO. [CFNR]

Accident/Incident Data Is Current Through The Month of January 2019

Category	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019 PARTIAL	% Change From CY 2018 to CY 2019	% Change From CY 2010 to CY 2019	Total For CY 2010 to CY 2019
Number of railroads included	.	.	1	.	.	.	.	.	.	.	.	.	.
TOTAL ACCIDENTS/INCIDENTS 1/	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Total fatalities	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Total nonfatal conditions	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Employee on duty deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Nonfatal EOD injuries	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Nonfatal EOD illnesses	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Total employee on duty cases	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Cases with days absent from work	.	1	.	.	.	.	.	.	.	.	.	.	1
--- Trespasser deaths, not at HRC	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Trespasser injuries, not at HRC	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Trespasser incidents, not at HRC	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Passengers kld in train accs or crossing incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Passengers inj in train accs or crossing incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Passengers kld in other incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Passengers inj in other incidents	.	.	.	.	.	.	.	.	.	.	.	.	.

Category	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019 PARTIAL	% Change From CY 2018 to CY 2019	% Change From CY 2010 to CY 2019	Total For CY 2010 to CY 2019
TRAIN ACCIDENTS (Not at Grade-Crossings)	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Train accident deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Train accident injuries	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Human factor caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Track caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Motive power/equipment caused	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Signal caused, all track types	.	.	.	.	.	.	.	.	.	.	.	.	.
------ Signal caused, main line track	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Miscellaneous caused	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Collisions	.	.	.	.	.	.	.	.	.	.	.	.	.
------ Collisions on main line track	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Derailments	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Other types, e.g., obstructions	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Train accidents on main line &	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Accidents on yard track	.	.	.	.	.	.	.	.	.	.	.	.	.
--- HAZMAT RELEASES	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Cars carrying hazmat	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Hazmat cars damaged/derailed	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Cars releasing	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Accidents with reportable damage over $100K	.	.	.	.	.	.	.	.	.	.	.	.	.
... PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Accidents with reportable damage over $500K	.	.	.	.	.	.	.	.	.	.	.	.	.
... PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Accidents with reportable damage over $1M	.	.	.	.	.	.	.	.	.	.	.	.	.
... PERCENT of all train accidents	.	.	.	.	.	.	.	.	.	.	.	.	.
HIGHWAY-RAIL INCIDENTS	.	.	.	.	.	.	.	.	.	.	.	.	.
--- Highway-rail incidents deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Highway-rail incidents injuries	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Incidents at public xings	.	.	.	.	.	.	.	.	.	.	.	.	.

Category	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 20'5	CY 2016	CY 2017	CY 2018	CY 2019 PARTIAL	% Change From CY 2018 to CY 2019	% Change From CY 2010 to CY 2019	Total For CY 2010 to CY 2019
.... PERCENT of total Highway-rail incidents	.	.	.	.	.	.	.	.	.	.	.	.	.
OTHER ACCIDENTS/INCIDENTS 3/	.	1	.	.	.	.	.	.	.	.	.	.	1
-- Other incidents deaths	.	.	.	.	.	.	.	.	.	.	.	.	.
-- Other incidents injuries	.	1	.	.	.	.	.	.	.	.	.	.	1

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Run Date: Mon, Apr 29, 2019

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1	California Northern RR Co. [CFNR]	1	100.000	.	.	.	.	1	100.000		
		1	**100.000**	**0**		**0**		**1**			

FOOTNOTE 1. Form 55a used for reporting deaths and injuries. Form 54 for train accidents, and Form 57 for highway-rail crossing incidents

June 2019 | **Dam Inundation Study**

HAMILTON HIGH SCHOOL EXPANSION

Hamilton Unified School District

Prepared for:

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Project Number HASD-01.0

PLACEWORKS

PLACEWORKS

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1. Introduction

1.1 PURPOSE

This report presents the results of a dam inundation study prepared for the expansion project at Hamilton High School. The Hamilton Unified School District (District) is planning to expand existing facilities at the current high school campus (project site), which is within the dam inundation zones of Black Butte Lake and Shasta Lake and Reservoir. This study will focus on the potential for flooding at the school site in the unlikely event of a catastrophic failure on either the Black Butte Dam or Shasta Dam.

1.2 SCHOOL SITE LOCATION

The District intends to modernize the existing Hamilton High School, which is located at 620 Canal Street, Hamilton City, Glenn County, California. As part of the proposed project, the District would acquire an approximately 45-acre property adjacent to the existing school; construct new playing fields, a gymnasium and parking lot on the expanded site; modernize existing buildings; and plan future construction of new classroom buildings. The 45-acre project site is bounded by agricultural land to the north, commercial/agricultural properties (Westermann Farms and Dollar General) to the east, West 6th Street/State Route 32 (SR-32) to the south, and Canal Street/State Route 45 (SR-45) and the Glenn-Colusa Canal to the west (Figure 1). The site location and vicinity are shown on Figure 1, and an aerial photograph of the school site is shown on Figure 2.

1.3 REGULATORY REQUIREMENTS

Under Education Code Section 17212 and Section 17212.5 and the California Code of Regulations (CCR), Title 5, Section 14010(g), a school shall not be sited within an area of flood or dam flood inundation unless the cost of mitigating the flood or inundation impact is reasonable.

1.4 ASSESSMENT METHODOLOGY

The California Department of Education (CDE) has developed risk analysis procedures for evaluating flooding associated with releases from large diameter water pipelines and aqueducts, as described in CDE's *Guidance Protocol for School Site Pipeline Risk Analysis* (CDE, 2007). However, the CDE has not yet developed a protocol for evaluating safety hazards associated with water storage tanks or reservoirs/dams. A potential safety issue associated with siting a new school downstream from a dam, reservoir, or storage tank is the potential for flood inundation of the school site due to failure of these structures. The most probable cause of failure is a large magnitude earthquake and associated strong ground shaking, which can cause structural damage and a release of impounded water.

1. Introduction

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Source: Google Earth Pro, 2019

Project Boundary

0 3,500
Scale (Feet)

Figure 1
Site Location and Vicinity

1. Introduction

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Source: Google Earth Pro, 2019

Project Boundary

0 1,000
Scale (Feet)

Figure 2
Aerial Photograph

1. Introduction

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2. Hazard Assessment

2.1 BACKGROUND AND REGULATORY INFORMATION

Dam failure is the uncontrolled release of impounded water from behind a dam, which can cause downstream flooding and affect property and life. There are many potential causes of a dam failure, including deficiencies in the original design, the quality of construction, and poor maintenance and operation of the dam, as well as acts of nature, including precipitation in excess of the design flood and damage from earthquakes.

The Black Butte Dam is classified as an earth dam. Earthfill dams typically fail gradually due to water overtopping the dam crest or piping, which is a form of internal erosion caused by seepage. With catastrophic failure, a flood wave will gradually build to a peak and then decline until the reservoir is empty. In the unlikely event that Black Butte Dam failed, there should be adequate time to initiate advance warnings and start evacuation procedures. Shasta Dam is a 602-foot high concrete gravity dam. Concrete gravity dams must be sized and shaped to resist overturning, sliding, and crushing at the toe. Concrete gravity dams tend to have a partial breach, as one or more monolith sections fail. This is typically due to earthquakes (ground rupture or severe ground shaking) and/or structural/design flaws.

Dam failure is a very rare occurrence. This is no historic record of dam failure in Glenn County or Hamilton City (Glenn County, 2016). Similarly, there is no historic record of dam failure in Tehama County, where Black Butte Dam is located (Tehama County, 2018), and there is no record of failure for the Shasta Dam in Shasta County (Shasta County, 2011). Since 1929, the State of California has supervised all non-federal dams in California through the Dam Safety Program under the jurisdiction of the Department of Water Resources, Division of Safety of Dams (DSOD). Engineers and engineering geologists review and approve plans and specifications for the design of dams and oversee their construction. In addition, over 1,200 dams are inspected on a yearly schedule to ensure that they are performing and being maintained in a safe manner. Ongoing programs of review, modification, seismic retrofitting, and total reconstruction of existing dams are intended to ensure that dams can withstand the maximum credible earthquake for the area.

The California Office of Emergency Services (Cal-OES) is required by State laws to work with State and federal agencies, dam owners and operators, municipalities, floodplain managers, planners, and the public to make available dam inundation maps. Dam inundation maps are used in the preparation of Local Hazard Mitigation Plans (LHMPs) and General Plan Safety Element updates. In addition, the Federal Emergency Management Agency (FEMA) requires all dam owners to develop Emergency Action Plans (EAPs) for warning, evacuation, and post-flood actions in the event of a dam failure (FEMA, 2013).

On June 27, 2017, Governor Brown signed SB 92 into law, which set forth new requirements focused on dam safety. As part of this legislation, dam owners must now submit inundation maps to the Department of Water Resources, DSOD. After the maps are approved, the dam owner must submit an EAP to Cal-OES.

The owner must submit updated plans and inundation maps every 10 years, or sooner under certain conditions. Cal-OES will review and approve the EAPs. This legislation set forth additional provisions for EAPs including compliance requirements, emergency preparedness and evacuation exercises, and coordination with local public safety agencies. On October 19, 2017, emergency regulations were adopted to provide standards for preparing and submitting maps to the Department of Water Resources, DSOD for their review and approval.

The United States Department of the Interior Bureau of Reclamation (USBR) and the United States Army Corps of Engineers (USACE) each have a Dam Safety Program that recognizes the catastrophic nature of potential dam failure and operates a comprehensive dam safety program, which includes:

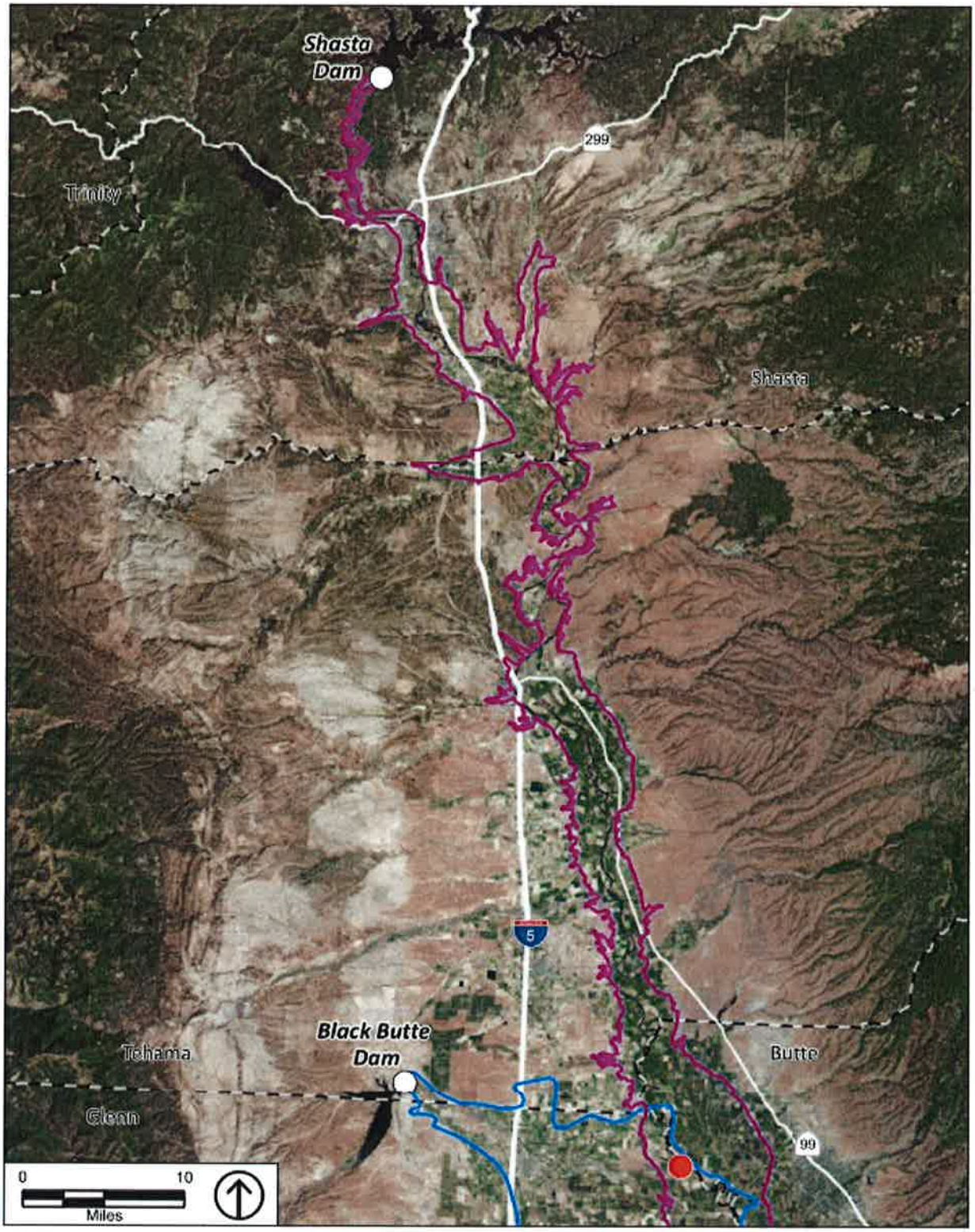
- Periodic special engineering studies;
- Surveillance and monitoring programs;
- Routine inspections and maintenance activities; and
- Maintaining emergency response and preparedness plan.

The County of Glenn has an Emergency Preparedness section within the Sheriff/Office of Emergency Services, which is responsible for the Emergency Operations Plan (EOP). The EOP establishes the framework for implementation of the California Standardized Emergency Management System (SEMS), which will notify residents and workers within the City in the event of a disaster. Details regarding the SEMS are provided in the County's Emergency Operations Plan (Glenn County, 2015). The Glenn County Sheriff's Office administers the CodeRED Emergency Notification System for Glenn County residents and businesses (Glenn County, 2017). CodeRED is a multiplatform messaging service which delivers messages via phone, text, email, mobile app, social media, and FEMA's Integrated Public Alert and Warning System (IPAWS). The Hamilton City Fire Protection District is responsible for reviewing the EOP on an annual basis and coordinating revision of the plan as required. AlertSCC is the way for anyone who lives and works in Glenn County to get emergency warnings sent directly to their cell phone, mobile device, email, or landline. Glenn County, USBR, and USACE coordinate preparedness efforts to mitigate against, plan for, respond to, and recover from natural hazards, including the possibility of dam failure.

2.2 PHYSICAL SETTING

Topography around the site is relatively flat with a very gentle gradient to the east. The site lies at an approximate elevation of 153 feet above mean sea level (msl) and is approximately 0.55 mile southwest of the Sacramento River. The Glenn-Colusa Canal is located approximately 130 feet west of the site.

Surrounding land uses are agricultural fields or vacant land to the north and east, commercial properties adjacent to the south fronting 6th Street/State Route 32, residences farther south across 6th Street, and a parking lot and the Glenn-Colusa Canal to the west. The site is approximately 17.4 miles east from Black Butte Dam and 69.6 miles south from Shasta Dam. There are intervening residential structures, agricultural land, and undeveloped land between the dams and the school site that would attenuate to some extent the impact of a release from the dam. Nevertheless, a catastrophic failure of the dam could result in water flowing onto the site. The dam inundation zones and the school site are shown on Figure 3.



Source:FEMA, 2015; ESRI, 2017; PlaceWorks, 2017.

County Boundary
Dam
Project Location
Shasta Dam Inundation Zone Boundary
Black Butte Dam Inundation Zone Boundary

Figure 3
Dam Inundation Zones

2. Hazard Assessment

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2.3 BLACK BUTTE DAM

Black Butte Dam is owned and operated by USACE and was built in 1963. Black Butte Lake is located on Stoney Creek west of the City of Orland in Tehama County and offers water-related recreation. Black Butte Dam is an earthfill dam with a reservoir capacity of 143,700 acre-feet and a surface area of approximately 4,560 acres. The USACE inspects the 17 California dams under their jurisdiction on an annual basis (USACE, 2017). Inspection items at Black Butte Dam include the dam, control tower's outlet works, bulkhead gate and gate hoist, and visual inspections of the embankment, dikes, and spillway.

The school site and Hamilton City are subject to potential dam inundation from the Black Butte Dam. A map of the dam inundation zone based on a 1975 study is provided in Appendix A. According to this map, flood water resulting from dam failure would reach the school site in approximately 7 hours. No water depth is specified on this inundation map. The closest edge of the dam inundation zone to the school site is located along the Sacramento River approximately 0.6 mile to the northeast.

As noted above, there have been no dam failures in Glenn County or Tehama County in the past. Earthfill dams typically fail gradually and there would be additional warning signs before the dam would catastrophically release floodwaters. As flood depths are not predicted to reach the school for at least 7 hours, there would be adequate time for the safe evacuation of students and staff at Hamilton High School in the unlikely event of a dam failure.

2.4 SHASTA DAM

Shasta Dam is owned and operated by USBR and was built between 1938 and 1945. The dam is a 602 feet high concrete gravity dam, which provides flood control, power and water supply.

Lake Shasta, located in Shasta County, is a key facility of the Central Valley Project which provides irrigation and municipal water to the State's Central Valley. Stored water is also used for salinity control for the Sacramento-San Joaquin River Delta. The lake offers water-related recreation within the Whiskeytown-Shasta-Trinity National Recreation Area. Shasta Dam has a reservoir capacity of 4,522,000 acre-feet and a surface area of approximately 30,000 acres, making it the State's largest reservoir and third largest body of water. Additionally, feasibility studies evaluated the raising of the Shasta Dam by 18.5 feet and enlarging Shasta Reservoir by over 600,000 acre-feet. The current project completion date is 2024 (USBR, 2019).

California has had approximately 45 failures of non-federal dams. The most common failure mechanism for non-federal dams in California is overtopping of earthen dams (Shasta County, 2011). Of the concrete dams that failed, all were of the thin-arch design. Shasta Dam is a federally controlled and inspected dam and is considered a thick arch design (Shasta County, 2011). Seismic activity is monitored and tunnels throughout the dam allow inspectors to monitor for cracks and seepage. As the dam is built on bedrock, the probability of a dam failure is considered extremely low (Shasta County, 2011).

The school site and Hamilton City is subject to potential dam inundation from Shasta Dam. A map of the dam inundation zone based on a 1975 study, which was revised in 1976, is provided in Appendix A. According to this map, flood water resulting from dam failure would reach the school site in approximately 22

2. Hazard Assessment

hours with a water surface elevation of 165 feet msl. As the site lies at an approximate elevation of 153 feet, the flood depth could be approximately 12 feet at the school site. However, it should be noted that the dam inundation map was prepared 43 years ago and changes in dam operation and sediment accumulation within the reservoir could result in lower water storage volumes and reduced flood depths. The closest edge of the dam inundation zone to the school site is approximately 0.75 mile to the west.

As noted above, there have been no dam failures in Glenn County or Shasta County in the past. Concrete dams typically do not fail catastrophically, and there would be additional warning signs before the dam would release its floodwaters. As flood depths are not predicted to reach the school for nearly one full day, there would be adequate time for the safe evacuation of students and staff at Hamilton High School in the unlikely event of a dam failure.

3. Summary and Recommendations

The school site is within the inundation zones of Black Butte Dam and Shasta Dam. Black Butte Dam is located 17.4 miles to the west of the site in Tehama County. According to the inundation map prepared by the USACE for Black Butte Dam, flood water resulting from dam failure would reach the school site in approximately 7 hours. Shasta Dam is located 69.6 miles to the north of the site in Shasta County. According to the inundation map prepared by the USBR for Shasta Dam in 1976, flood water resulting from dam failure would reach the school site in approximately 22 hours with a maximum depth of 12 feet.

The probability of dam failure is very low, and Glenn County, Tehama County, and Shasta County have never been impacted by a dam failure. Dams are continually monitored by various government agencies, including the DSOD. Dam owners are required to maintain EAPs that include procedures for damage assessment and emergency warnings. In addition, municipalities and counties address the possibility of dam failure in the Safety Elements of General Plans and the Local Hazard Mitigation Plans. The Hamilton City Fire Protection District coordinates the County of Glenn Emergency Preparedness section within the Sheriff/Office of Emergency Services. The County of Glenn maintains the EOP in accordance with the State of California's SEMS.

It is highly unlikely that either the Black Butte Dam or Shasta Dam would experience a catastrophic failure, even in the case of a maximum credible earthquake. As flood depths would not reach the school site for 7 hours at the earliest, there would be adequate time for the safe evacuation of students and staff at Hamilton High School in the unlikely event of a dam failure.

However, because the school site is located within the inundation zones for two dams, it is recommended that the District coordinate with the Glenn County Sheriff/Office of Emergency Services to ensure that they are notified via the SEMS and CodeRED in the case of an imminent dam failure or other natural disaster.

3. Summary and Recommendations

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4. References

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4. References

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Appendix A. Dam Inundation Maps

Appendix

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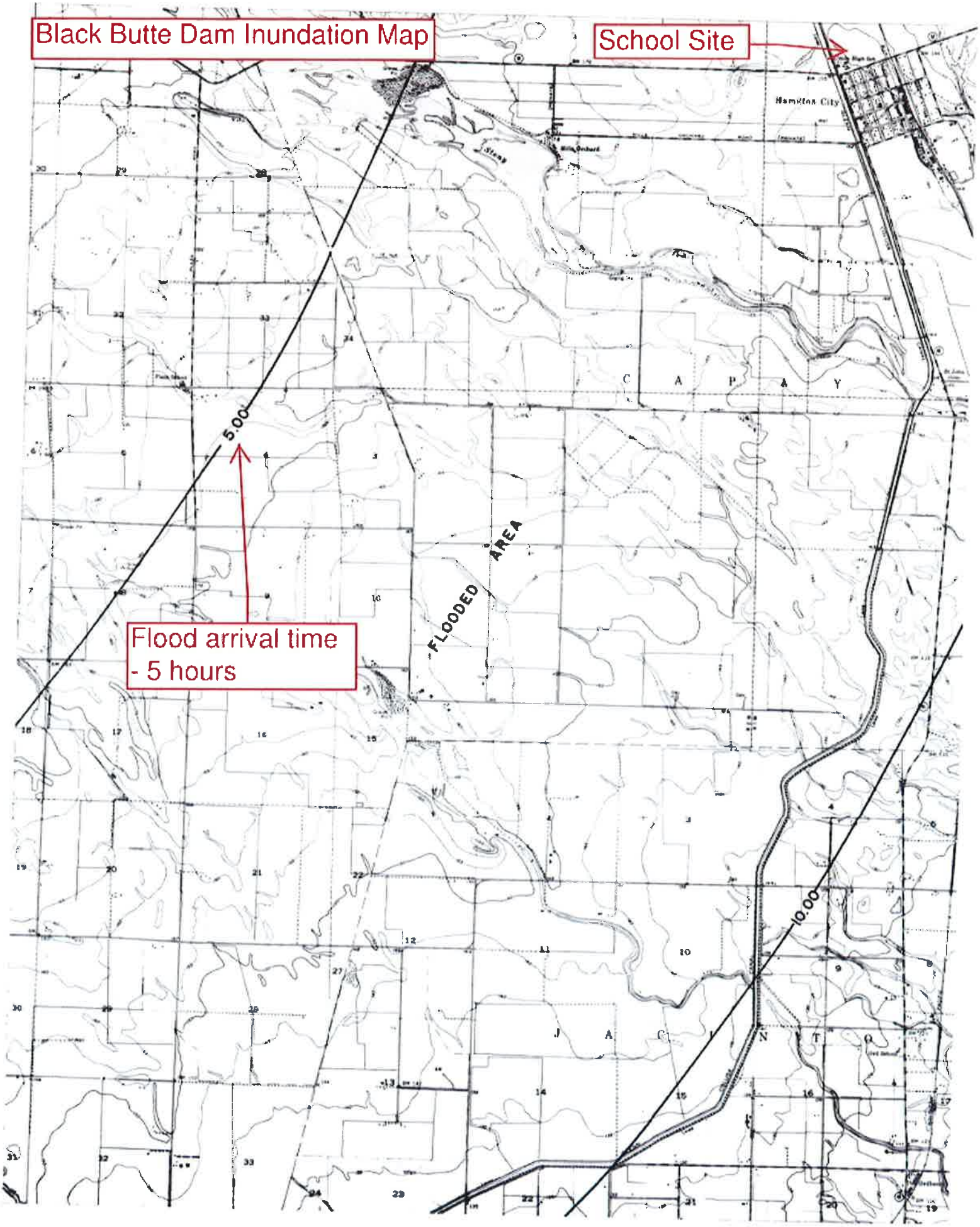
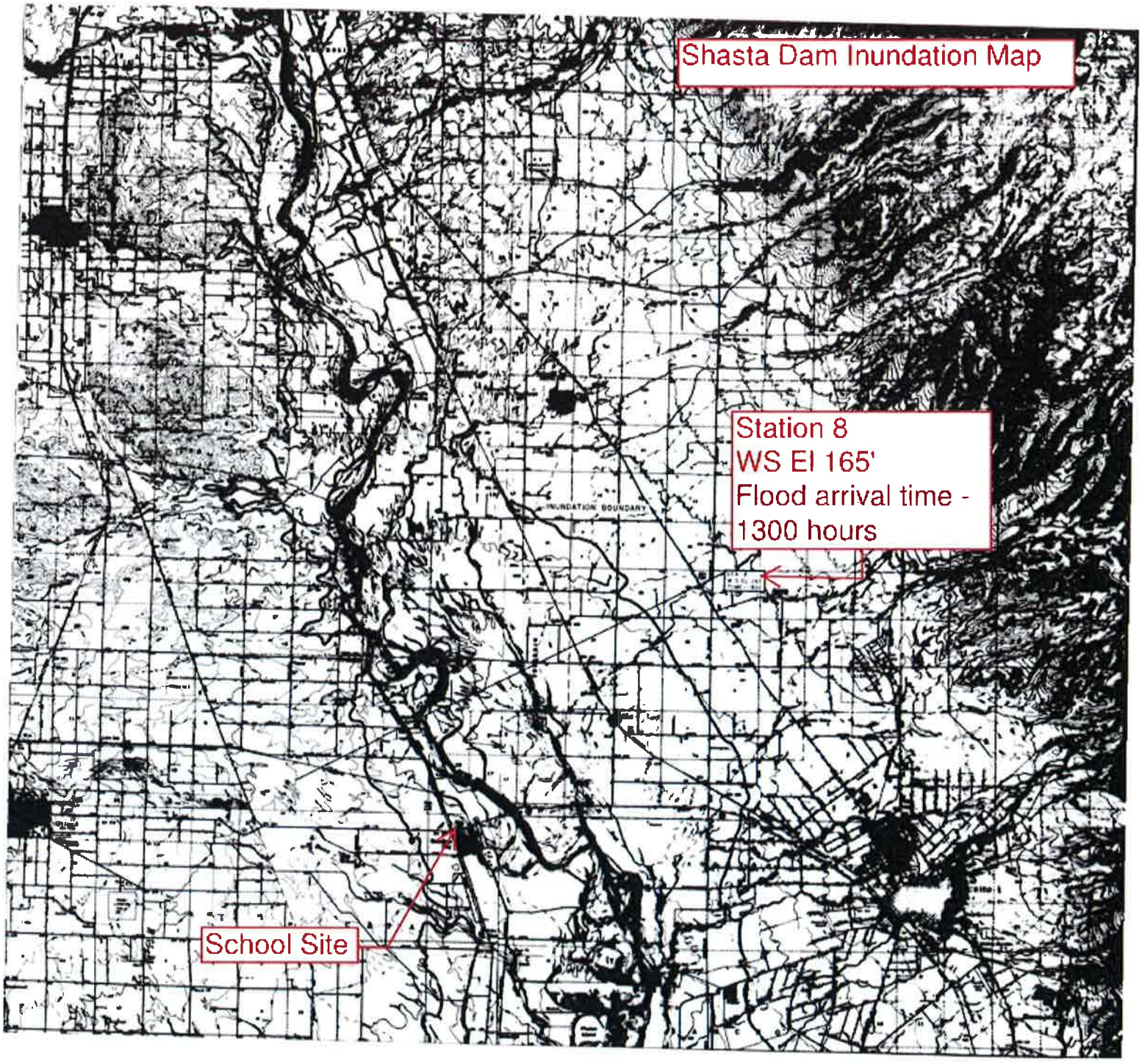

Black Butte Dam Inundation Map
School Site
Hamilton City
5.00
Flood arrival time
- 5 hours
FLOODED
AREA
10.00
C A P A Y
J A C I N T O


Shasta Dam Inundation Map
Station 8
WS El 165'
Flood arrival time -
1300 hours
INUNDATION BOUNDARY
School Site