APPENDIX H
Hydrology and Water Quality

DUARTE GOLD LINE STATION PROJECT EIR
HYDROLOGY AND WATER QUALITY
TECHNICAL APPENDIX

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1.0 INTRODUCTION

This study is the Hydrology and Water Quality Technical Appendix prepared as part of the *Duarte Gold Line Station Project Environmental Impact Report (EIR)*. The Duarte Gold Line Station Project (proposed project) encompasses approximately 20 acres in the south central portion of the City of Duarte, Los Angeles County (refer to **Exhibit 1**, Regional Vicinity Map). This report is a technical engineering study/evaluation solely to support the environmental document for the proposed project on issues related to drainage, surface hydrology and water quality. The level of analysis prepared is compatible with the level of planning information available.

All assessments and technical analysis in this report are in compliance with the local drainage policies and requirements for the City of Duarte, Los Angeles Regional Water Quality Control Board, Los Angeles County, and the California Environmental Quality Act (CEQA) of 1970, as amended. The hydrology analysis and water quality assessments have been prepared at a preliminary engineering level based on the information available.

The Local Vicinity Map (**Exhibit 2**) shows the proposed project is located in the south central portion of the City of Duarte. The proposed project is on the west side of Highland Avenue, approximately 0.6 miles west of the intersection of Interstates 210 and 605.

1.1 Background

Currently, the existing site is developed with a total of three buildings, asphalt parking lots, a dirt parking lot, and partially vegetated soils. One of the buildings (located at the center of the project area) is occupied by GE Aviation and the remaining two buildings are warehouses occupied by multiple tenants. The General Plan designates the project site as GL Specific Plan, and the zoning is M (Manufacturing). Surrounding land uses include Interstate 210 and single family residential to the north, single family residential to the west, the Los Angeles County Metropolitan Transportation Authority-owned railroad right-of-way to the south, and the Duarte/Lewis Business Center to the east.

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INITIAL STUDY
DUARTE STATION SPECIFIC PLAN

Regional Vicinity

Exhibit 1

Source: Google Maps, 2013.
- Project Site

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INITIAL STUDY
DUARTE STATION SPECIFIC PLAN

Local Vicinity

Exhibit 2

1.2 Definition of Level of Significance

The purpose of this technical evaluation is to determine the impact of the proposed project on surface water drainage and storm water quality within the City of Duarte. If the analysis indicates that it will result in significant impacts, then appropriate mitigation measures will be identified to minimize the potential project's impacts to a less than significant level.

Federal, state and local drainage laws and regulations govern the evaluation of impacts to surface water drainage. For this evaluation, the impacts to surface water drainage would be considered significant if the proposed project altered the drainage patterns of the site, which would result in substantial erosion, siltation, or runoff that would result in increased flooding. An increase in the amount of runoff could be considered significant if it impacts local downstream storm drain facilities on 3 Ranch Road (west of the proposed project).

In order to address the requirements of the Clean Water Act, the Los Angeles Regional Water Quality Control Board issued a National Pollution Discharge Elimination System (NPDES) Permit (Order No. R4-2012-0175, NPDES No. CAS004001) to the Los Angeles County Flood Control District, the County of Los Angeles, and the 84 incorporated cities (including the City of Duarte) within the coastal watersheds of Los Angeles County (except the City of Long Beach). The new requirements of the Municipal NPDES permit require that proposed projects include a plan (i.e., Standard Urban Storm Water Mitigation Plan [SUSMP], or functional equivalent document) to address potential water quality impacts on-site using Low Impact Development (LID), and that its potential impact on downstream waterbodies (i.e., Hydromodification) is evaluated. Since the NPDES permit was adopted November 8, 2012, the County of Los Angeles has not yet updated its guidance to address the new permit requirements. The plan (SUSMP or functional equivalent document) created for the proposed project will comply with the future guidance that is currently in development.

Development Planning for Storm Water Management

The requirement to implement a program for development planning was based on federal and state statutes, including Section 402 (p) of the Clean Water Act. The Clean Water Act amendments of 1987 established a framework for regulating storm water discharges from municipal, industrial, and construction activities under the NPDES program. The primary objectives of the municipal storm water program requirements are to:

1. Effectively prohibit non-storm water discharges, and
2. Reduce the discharge of pollutants from a storm water conveyance system to the Maximum Extent Practicable.

For this evaluation, impacts to storm water quality would be considered significant if the project did not attempt to address storm water pollution to the maximum extent practicable. Per the 2010 303(d)/305(b) Integrated Report List, the waterbodies downstream of the proposed project are impaired (awaiting the assignment of a limitation) or Total Maximum Daily Loads (TMDLs, or limitations) have been established for certain constituents (October 2011). Therefore, impacts to storm water quality will be considered less than significant if they meet the requirements of the NPDES Permit, plan (SUSMP or functional equivalent document), and address the downstream waterbody impairments.

The New Development/Redevelopment Project Performance Criteria for commercial and residential activities include the following:

- Control pollutants, pollutant loads, and runoff volume from the project by minimizing the impervious surface area and controlling runoff from impervious surfaces through infiltration, bioretention and/or rainfall harvest and use.
- Retain on-site the Stormwater Quality Design Volume (SWQDv) from the 0.75-inch, 24-hour rain event or the 85th percentile, 24-hour rain event, as determined from the Los Angeles County 85th percentile precipitation isohyetal map, whichever is greater.
- Bioretention and biofiltration systems shall meet the design specifications provided in NPDES Permit Attachment H unless approved otherwise by the Regional Water Board Executive Officer.
- When evaluating the potential for on-site retention, the maximum potential for evapotranspiration from green roofs and rainfall harvest and use shall be considered.
- If on-site retention, bioretention, and biofiltration systems are infeasible, opportunities for regional ground water replenishment offsite may be permissible.
- Implement hydrologic control measures to prevent accelerated downstream erosion and to protect stream habitat in natural drainage systems (Hydromodification), including one, or a combination of on-site, regional or sub-regional hydromodification control BMPs, LID strategies, or stream and riparian buffer restoration measures.
- Meet the Hydromodification Control Criteria by:
  - Retaining on-site the runoff volume from the 95th percentile, 24-hour storm, or
  - Post-development conditions should not exceed the pre-development conditions for the 2-year, 24-hour rainfall event, or
  - The Erosion Potential (Ep) in the receiving water channel will be approximately one, as determined by a Hydromodification Analysis Study and the equation presented in NPDES Permit Attachment J.
- If the proposed project can not meet the previously mentioned Hydromodification Control Criteria, then it may satisfy this requirement by implementing the hydromodification requirements in the County of Los Angeles Low Impact Development Manual (2009) for all projects disturbing an area greater than one acre within natural drainage systems, or meet the watershed specific Hydromodification Control Plan, if one is developed for the Los Angeles River.

2.0 EXISTING CONDITIONS

The purpose of this existing conditions evaluation is to establish a baseline to compare the pre-project and post-project conditions. The baseline conditions investigated include land use, hydrology, floodplain mapping, and surface water quality.

2.1 Existing Land Use

The 20-acre proposed project is on the north side of Duarte Road. The existing land use includes light industrial and parking areas. Surrounding land uses include industrial and low-density residential. The majority of the site is currently developed.

2.2 Hydrology

Hydrologic calculations to evaluate surface runoff associated with 2-year, 10-year and 50-year hypothetical design storm frequencies from the tributary drainage areas were performed using the Los Angeles County Tc Calculator. The Tc Calculator calculates the full modified rational runoff method yielding peak runoff rates. Hydrologic parameters used in the analysis, such as rainfall and soil classification, are presented in the Los Angeles County Department of Public Works *Hydrology Manual* (January 2006). **Exhibit 3** contains the hydrology map for the existing condition.

2.2.1 Existing Watershed Description

The drainage for the overall site is surface runoff flowing southwesterly, which enters an above ground swale, collects through grates in the swale which deliver it into the existing 30" pipe. The storm drain currently runs across the property from east (Highland Ave) towards 3 Ranch Road on the west side of the site. Los Angeles County Flood Control District has an easement over the existing storm drain. The existing storm drain eventually discharges into Rio Hondo/Sawpit Wash, which is located west of the proposed project and is ultimately tributary to the Los Angeles River.

LEGEND

DRAINAGE BOUNDARY

FLOW PATH

A / 15.5 — SUBAREA DESIGNATION / AREA (ACRES)

SCALE: 1"=150'

150 75 0 150 300 450

SCALE: 1"=150'

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EXHIBIT 3
DUARTE GOLD LINE STATION
EXISTING CONDITION HYDROLOGY MAP

2.2.2 Modified Rational Method

The Modified Rational Method is an empirical computation procedure used to develop peak runoff rate (discharge) for storms of a specific recurrence interval. Its equations are based on the assumption that the peak flowrate is directly proportional to the drainage area, rainfall intensity, and a loss coefficient, which describes the effects of land use and soil type. The following assumptions/guidelines were applied for use of the Rational Methods:

1. The Modified Rational Method hydrology includes the effects of infiltration caused by soil surface characteristics. The soils map from the *Los Angeles County Manual* indicates that the study area consists of soil type “007”.

2. The infiltration rate is also affected by the type of vegetation or ground cover and percentage of impervious surfaces. The amount of imperviousness used for the existing condition was 91% for light industrial and parking space.

3. Standard rainfall intensity data was based on the 50-year 24-hour isohyets developed by Los Angeles County. The isohyets for the project area show that the rainfall for the site is 7.5 inches (50-year), 5.4 inches (10-year), and 2.9 (2-year).

2.2.3 Existing Condition Surface Hydrology

Appendix A contains the results from the analysis for the 2-year, 10-year and 50-year storm events for the existing conditions. The flows for the 10-year storm are used to determine the local drain sizing, while the 50-year analysis is used for larger master plan facilities and floodplain mapping.

Table 1 – Existing Condition Peak Flowrates

Watershed	Area (ac.)	2 - year Q(cfs)	10 - year Q(cfs)	50 - year Q (cfs)
A (Parcel 1& 2)	15.8	12.2	29.2	44.8
B (Parcel 3)	3.3	3.3	7.5	12.1

2.3 Floodplain Mapping

The City of Duarte is a participant in the National Flood Insurance Program (NFIP). Communities participating in the NFIP must adopt and enforce minimum floodplain management standards, including identification of flood hazards and flooding risks. Participation in the NFIP allows communities to purchase low cost insurance protection against losses from flooding. The project is located in Zone X as shown on Flood Insurance Rate Map (FIRM) No. 06037C1415F effective September 26, 2008.

2.4 Storm Water Quality

This section discusses the pollutants typically found in storm water runoff and the contaminants that may be found in existing storm water runoff.

2.4.1 Nonpoint Source Pollutants

The net effect of urbanization could be an increase in pollutant discharge over naturally occurring conditions. The higher discharge could impact adjacent streams and downstream receiving waters. However, an important consideration in evaluating storm water quality from the proposed project is to assess if it impairs the beneficial uses of the receiving waters. Nonpoint source pollutants have been characterized by the following major categories to assist with determining the pertinent data and its use. Receiving waters can assimilate a limited quantity of various constituents, but there are thresholds beyond which the measured amount becomes a pollutant and results in an undesirable impact. The descriptions of these standard water quality categories provide insight into their impacts on downstream receiving waters.

- *Sediment* - Sediment is made up of tiny soil particles that are washed or blown into surface waters. It is the major pollutant by volume in surface water. Suspended soil particles can cause the water to look cloudy or turbid. The fine sediment particles also act as a vehicle to transport other pollutants including nutrients, trace metals, and hydrocarbons. Construction sites are the largest source of sediment for urban areas under development. Another major source of sediment is streambank erosion, which may be accelerated by increases in peak rates and volumes of runoff due to urbanization.

- *Nutrients* - Nutrients are a major concern for surface water quality, especially phosphorous and nitrogen, can cause algal blooms and excessive vegetative growth. Of the two, phosphorus is usually the limiting nutrient that controls the growth of algae in lakes. When phosphorus is in its orthophosphorus form, it is readily available for plant growth. The ammonium form of nitrogen can also have severe effects on surface water quality, when it is converted to the nitrate and nitrite forms of nitrogen in a process called nitrification. This process consumes large amounts of oxygen, which can impair the dissolved oxygen levels in water. The nitrate form of nitrogen is very soluble and is found naturally at low levels in water. When nitrogen fertilizer is applied to lawns or other vegetation in excess of plant needs, nitrates can leach below the root zone, eventually reaching ground water. Orthophosphate from auto emissions also contributes phosphorus in areas with heavy automobile traffic. As a general rule of thumb, nutrient discharge is greatest from development sites with the most impervious areas. Other problems resulting from excess nutrients are 1) surface algal scums, 2) water discoloration, 3) odors, 4) toxic releases, and 5) overgrowth of plants. The common chemical measures for nutrients are total nitrogen, organic nitrogen, total Kjeldahl nitrogen (TKN), nitrate, ammonia, total phosphate, and total organic carbon (TOC).

- *Trace Metals* - Trace metals are primarily a concern because of their toxic effects on aquatic life, and their potential to contaminate drinking water supplies. The most common trace metals found in urban runoff are lead, zinc, and copper. Fallout from automobile emissions is also a major source of lead in urban areas. A large fraction of the trace metals in urban runoff are attached to sediment and this effectively reduces the level that is immediately available for biological uptake and subsequent bioaccumulation. Metals associated with the sediment settle out rapidly and accumulate in the soils. Also, urban runoff events typically occur over a shorter duration, which reduces the amount of exposure, but could be toxic to the aquatic environment. The toxicity of trace metals in runoff varies with the hardness of the receiving water. As total hardness of the water increases, the threshold concentration levels for adverse effects increases.

- *Oxygen-Demanding Substances* - Aquatic life is dependent on the dissolved oxygen in the water, and when organic matter is consumed by microorganisms then dissolved oxygen is consumed in the process. A rainfall event can deposit large quantities of oxygen demanding substances in lakes and streams. The biochemical oxygen demand of typical urban runoff is on the same order of magnitude as the effluent from an effective secondary wastewater treatment plant. A problem from low DO results when the rate of oxygen-demanding material exceeds the rate of replenishment. Oxygen demand is estimated by direct measure of DO and indirect measures such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), oil and grease, and total organic carbon (TOC).

- *Bacteria* - Bacteria levels in undiluted urban runoff exceed public health standards for water contact recreation almost without exception. Studies have found that total coliform counts exceeded EPA water quality criteria at almost every site and almost every time it rained. The coliform bacteria that are detected may not be a health risk, but are often associated with human pathogens.

- *Oil and Grease* - Oil and grease contain a wide variety of hydrocarbons, some of which could be toxic to aquatic life in low concentrations. These constituents initially float on water and create the familiar rainbow-colored film. Hydrocarbons have a strong affinity for sediment and quickly become absorbed in it. The major source of hydrocarbons, primarily crankcase oil and other lubricating agents, in urban runoff is from leaking automobile engines. Hydrocarbon levels are highest in the runoff from parking lots, roads, and service stations. Residential land uses typically have a lower discharge of hydrocarbons; however the illegal disposal of waste oil into storm drains and urban runoff can be a local problem.

- *Other Toxic Chemicals* - Priority pollutants are generally related to hazardous wastes or toxic chemicals and can sometimes be detected in storm water. Priority pollutant test have been conducted in previous studies of urban runoff, which evaluated the presence of over 120 toxic chemicals and compounds. The scans rarely revealed toxins that exceeded the current safety criteria, and were primarily conducted in suburban areas not expected to have many sources of toxic pollutants (with the possible exception of illegally disposed or applied household hazardous wastes). Measures of priority pollutants in storm water include - 1) phthalate (plasticizer compound), 2) phenols and creosols (wood preservatives), 3) pesticides and herbicides, 4) oils and greases, and 5) metals.

2.4.2 Physical Characteristics of Surface Water Quality

The quantity of a material in the environment and its characteristics determine the degree of availability as a pollutant in surface runoff. Standard parameters have been developed to assess the quality of storm water. In an urban environment, the quantity of certain pollutants in the environment is a result of the land use intensity. For instance, a high density of automobile traffic makes a number of potential pollutants (such as lead and hydrocarbons) more available. The availability of a material, such as a fertilizer, is a function of the quantity and the manner in which it is applied. Applying fertilizer in quantities that exceed plant needs leaves the excess nutrients available for loss to surface or ground water.

The physical properties and chemical constituents of water have traditionally served as the primary means for monitoring and evaluating water quality. Evaluating the condition of water through a water quality standard refers to its physical, chemical, or biological characteristics. The lengthy list of storm water quality parameters are classified in multiple ways. Typically, the concentration of an urban pollutant, rather than the annual load of that pollutant, is needed to assess a water quality problem. Some of the physical, chemical or biological characteristics typically used to evaluate the quality of surface runoff are:

- *Dissolved Oxygen* - Dissolved oxygen in the water has a pronounced effect on the aquatic organisms and the chemical reactions that occur. It is one of the most important biological water quality characteristics in the aquatic environment. The dissolved oxygen concentration of a water body is determined by the solubility of oxygen, which is inversely related to water temperature, pressure, and biological activity. Dissolved oxygen is a transient property that can fluctuate rapidly in time and space, and represents the status of the water system at a particular point and time of sampling. The decomposition of organic debris in water is a slow process and the resulting changes in oxygen concentrations also respond slowly. The oxygen demand is an indication of the pollutant load and includes measurements of biochemical oxygen demand or chemical oxygen demand.

- *Biochemical Oxygen Demand (BOD)* - The biochemical oxygen demand (BOD) is a measurement of the oxygen-demanding properties of the biodegradable material in the water. Samples are taken from the field and incubated in the laboratory at 20°C, after which the residual dissolved oxygen is measured. The BOD value commonly referenced is the standard 5-day values. These values are useful in assessing stream pollution loads and for comparison purposes.

- *Chemical Oxygen Demand* - The chemical oxygen demand (COD) is a measure of the pollutant loading in terms of complete chemical oxidation using strong oxidizing agents. It can be determined quickly because it does not rely on bacteriological actions as with BOD. COD does not necessarily provide a good index of oxygen demanding properties in natural waters.

- *Total Dissolved Solids (TDS)* - TDS concentration is determined by evaporation of a filtered sample to obtain residue whose weight is divided by the sample volume. The TDS of natural waters varies widely. It is an important indicator of water quality because it affects the ionic bonding strength related to other pollutants such as metals in the water. TDS is also a major determinant of aquatic habitat, affects the saturation concentration of dissolved oxygen, and influences the ability of a water body to assimilate wastes. Eutrophication rates depend on total dissolved solids.

- *pH* - The pH of water is the negative log, base 10, of the hydrogen ion (H^+) activity. A pH of 7 is neutral, a pH greater than 7 indicates alkaline water, and a pH less than 7 represents acidic water. In natural water, carbon dioxide reactions are some of the most important in establishing pH. The pH at any one time is an indication of the balance of chemical equilibrium in water and affects the availability of certain chemicals or nutrients in water for uptake by plants. The pH of water directly affects fish and other aquatic life and generally toxic limits are pH values less than 4.8 and greater than 9.2.

- *Alkalinity* - Alkalinity is the opposite of acidity, representing the capacity of water to neutralize acid. Alkalinity is also linked to pH and is caused by the presence of carbonate, bicarbonate, and hydroxide, which are formed when carbon dioxide is dissolved. A high alkalinity is associated with a high pH and excessive solids. Most streams have an alkalinity concentration of less than 200 mg/l and ranges of 100-200mg/l seem to support well-diversified aquatic life.

- *Specific Conductance* - The measurement of water's specific conductivity, or its ability to conduct an electric current, is related to the total dissolved ionic solids concentration. Long term monitoring of a water body may show a relationship between specific conductivity and TDS. Its measurement is quick and inexpensive and can be used to approximate TDS. A specific conductivity measurement in excess of 2,000 µohms/cm indicates a TDS level too high for most freshwater fish.

- *Turbidity* - The clarity of water is an important indicator of water quality that relates to the alkalinity of photosynthetic light to penetrate the fluid. Turbidity is also a measure of light that is scattered or absorbed, and is caused by suspended clays and other organic particles. It can be used as an indicator of certain water quality constituents such as predicting the sediment concentrations.

- *Nitrogen (N)* - Sources of nitrogen in storm water include organic matter in water bodies or chemical discharges, and occurs in many forms. Ammonia and nitrate are important nutrients for the growth of algae and other plants. Excessive nitrogen can lead to eutrophication since nitrification consumes dissolved oxygen in the water. Organic Nitrogen breaks down into ammonia, which eventually becomes oxidized to nitrate-nitrogen, a form available for plants. High concentrations of nitrate-nitrogen (N/N) in water can stimulate the growth of algae and other aquatic plants, but if phosphorus (P) is present, only about 0.30 mg/l of nitrate-nitrogen is needed for algal blooms. Some fish life can be affected when nitrate-nitrogen exceeds 4.2 mg/l. There are a number of ways to measure the various forms of aquatic nitrogen. Typical measurements of nitrogen include Kjeldahl nitrogen (organic nitrogen plus ammonia), ammonia, nitrite plus nitrate, nitrite, and nitrogen in plants. The principal water quality criteria for nitrogen focus on nitrate and ammonia.

- *Phosphorus (P)* - Phosphorus is an important component of organic matter. In many water bodies, phosphorus is the limiting nutrient that prevents additional biological activity from occurring. The origin of this constituent in urban storm water discharge is generally from fertilizers and other industrial products. Orthophosphate is soluble and is considered to be the only biologically available form of phosphorus. Since phosphorus is typically found in solid particles and is a significant part of organic material, the concentration of sediment in water is an important component of the phosphorus cycle in streams. The key measurements of phosphorus include detecting orthophosphate and total phosphorus.

2.4.3 Existing Storm Water Quality

The site lacks data on storm water runoff quality. In the absence of site-specific data, expected storm water quality can be qualitatively discussed by relating typical pollutants to specific land uses.

The existing site has three buildings, an asphalt parking lot, and a partially vegetated soil area. A commercial property like the existing site typically generates pollutants such as suspended solids/sediment, nutrients, heavy metals, pathogens (bacteria/virus), pesticides, oil and grease, toxic organic compounds, and trash and debris. In addition, the existing site does not contain any structural Best Management Practices (BMPs), which would potentially decrease the pollutant concentrations in storm water runoff. Conveying flows over land through vegetation affords some infiltration and biofiltration of runoff and thus, potential pollutant removal. A draw back to conveying flows over land is that it causes erosion of the soil and thus increases suspended solids in the runoff.

Beneficial Uses, Impairments and TMDLs

To meet the requirements of the Porter-Cologne Act, the Los Angeles Regional Water Quality Control Board defined the beneficial uses of its waterbodies in the *Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (June 13, 1994). Beneficial uses are the uses of water necessary for the survival or well-being of humans, plants, and wildlife. If pollutant concentrations in waterbodies cause impairments to their beneficial uses, then the waterbody is placed on the State of California's list of impaired waterbodies (303(d) List) until a TMDL is established for the waterbody (maximum discharge of pollutants). The beneficial uses of Sawpit Wash/Rio Hondo are Municipal and Domestic Supply (MUN), Ground Water Recharge (GWR), Water Contact Recreation (REC1), Non-Contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), and Wildlife Habitat (WILD). Sawpit Wash/Rio Hondo are impaired for Bis(2ethylhexyl)phthalate (DEHP), Coliform Bacteria, Copper, Fecal Coliform, Lead, pH, Toxicity, Trash, and Zinc. Rio Hondo confluences with the Los Angeles River approximately 18 miles southwest of the proposed project, which is on the 2010 303(d) List for Ammonia, Cyanide, and Coliform.

3.0 PROPOSED PROJECT

This section discusses how the proposed project was evaluated for impacts to hydrology and water quality. The evaluation includes investigation of proposed conditions land use, proposed storm drain configuration, hydrology, floodplain mapping, and surface water quality.

3.1 Proposed Land Use Plan

The project applicant proposes to redevelop the site with a mixed use commercial and residential. It will include the following:

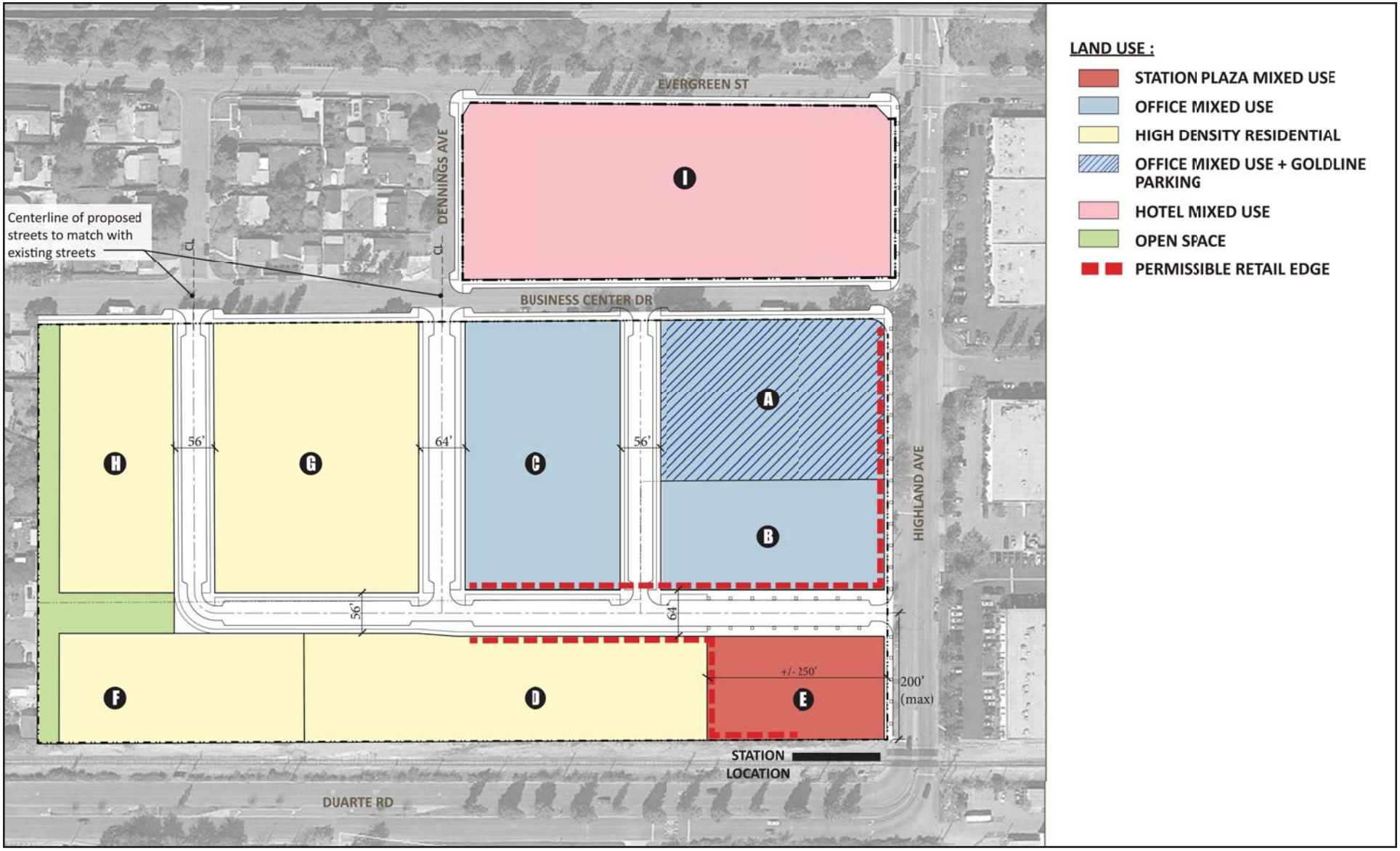
- A plaza around the Gold Line Station
- Mixed use commercial including retail, office, and hotel
- High density residential units
- Open space areas
- Roads

3.2 Hydrology

The hydrology methodology and parameters for the proposed condition are the same as discussed in the existing condition with the exception of the impervious value. The proposed condition composite impervious value used in this analysis is 85%.

3.2.1 Proposed Watershed Description

The proposed project's drainage pattern will be similar to the existing condition. Surface runoff will continue to flow southwesterly into the existing 30" pipe onsite as shown in Exhibit 6.



Source: Dahlin Group, April 5, 2013.

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INITIAL STUDY
DUARTE STATION SPECIFIC PLAN

Development Scenario

Exhibit 4

LEGEND

- DRAINAGE BOUNDARY
- FLOW PATH
- (A / 15.5) SUBAREA DESIGNATION / AREA (ACRES)

SCALE: 1"=150'

150 75 0 150 300 450

SCALE: 1"=150'

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EXHIBIT 5
DUARTE GOLD LINE STATION
PROPOSED CONDITION HYDROLOGY MAP

3.2.3 Proposed Condition Surface Water Hydrology

Appendix B contains the analysis results for the 2-year, 10-year and 50-year storm events for the proposed conditions. The flows for the 10-year storm are used to determine the local drain sizing, while the 50-year analysis is used for larger master plan facilities and floodplain mapping.

Table 2 – Proposed Condition Peak Flowrates

Watershed	Area (ac.)	2 - year, Q(cfs)	10 - year, Q (cfs)	50 - year, Q (cfs)
A (Parcel 1& 2)	15.8	11.4	28.5	44.3
B (Parcel 3)	3.3	3.0	7.4	12.0

3.3 Floodplain Mapping

The site lies in Zone X as shown on FIRM No. 06037C1415F. The proposed development will not impact any existing floodplains.

3.4 Storm Water Quality

Since the NPDES permit was recently adopted on November 8, 2012, and the permittees have not yet developed their guidance to address the new requirements, it is unclear what documentation will be required to redevelop the site. A plan (i.e., SUSMP or functional equivalent document) will need to be prepared describing how the proposed project will address its potential impacts on-site, including Hydromodification, using LID and other BMPs. It will comply with the future guidance developed by the permittees and in effect at the time of development.

Constructing the proposed project may produce potential pollutants such as nutrients, heavy metals, pesticides and herbicides, toxic chemicals related to construction and cleaning, waste materials including wash water, paints, wood, paper, concrete, food containers, and sanitary wastes, fuel, and lubricants.

4.0 IMPACTS AND PROPOSED MITIGATION

4.1 Drainage

In the proposed condition, the watershed delineation does not change as compared to the existing condition. The proposed project would result in decreased impervious area, 91% for the existing condition versus 85% for proposed condition.

Table 3 – Local Flowrate Comparison

Watershed	2-year Flowrate (cfs)		10-year Flowrate (cfs)		50-year Flowrate (cfs)	
	Existing Condition	Proposed Condition	Existing Condition	Proposed Condition	Existing Condition	Proposed Condition
A (Parcel 1& 2)	12.2	11.4	29.2	28.5	44.8	44.3
B (Parcel 3)	3.3	3.0	7.5	7.4	12.1	12.0

Due to the decrease in impervious area, mitigation is not required to reduce impacts of the proposed project. As such, there is no impact on drainage as a result of this project.

4.2 Hydrology

There is no hydrologic impact as a result of this proposed project since there is a decrease in impervious area in the proposed condition as compared to the existing condition.

4.3 Floodplain

The proposed project's location is not in a mapped floodplain. Therefore, there are no impacts to floodplains and no mitigation is required.

4.4 Water Quality

The development of the proposed project would decrease impervious areas, which would result in impacts to both pre- and post-construction storm water quality. In addition, increased pollutant loading would occur immediately offsite. However, implementation of construction and post-construction BMPs, including the preparation of a plan (i.e., SUSMP or functional equivalent document), a Notice of Intent, and a Storm Water Pollution Prevention Plan, would reduce impacts to water quality to a less than significant level.

Construction

During construction, the necessary soil excavation and compaction activities will impact the beneficial uses of downstream water bodies. The proposed project has the potential to produce typical pollutants such as nutrients, heavy metals, pesticides and herbicides, toxic chemicals related to construction and cleaning, waste materials including wash water, paints, wood, paper, concrete, food containers, and sanitary wastes, fuel, and lubricants. Prior to construction, the permit requires the following:

- Electronic submittal of the Permit Registration Documents (PRD) to the SWRCB at least 30 days before the start of construction, which includes submittal of a Notice of Intent (NOI), risk assessment, site map, SWPPP, annual fee, and a signed certification statement;
- Preparation and implementation of a SWPPP; and
- Electronic submittal of a Notice of Termination (NOT) to the SWRCB upon completion of construction and stabilization of the site.

As a result of construction, the impacts to water quality will be less than significant if mitigated.

Post-Construction

The long-term operation and maintenance of the proposed project will be a source of pollutants, including suspended solids/sediment, nutrients, heavy metals, pathogens (bacteria/virus), pesticides, oil and grease, toxic organic compounds, trash and debris, and household hazardous wastes. The vegetated areas are likely to produce suspended solids/sediment, nutrients, and pesticides. The beneficial uses of downstream water bodies may be potentially significant due to the development of the site if they are not mitigated. Therefore, the proposed project would be required to prepare and implement a plan (i.e., SUSMP or functional equivalent document) that includes post-construction BMPs (such as LID if feasible) to reduce pollutant loading. Since the Rio Hondo/Sawpit Wash is a hardened channel, the proposed project will not have to include hydromodification controls. Based on the information currently available, the plan should include non-structural and structural BMPs to mitigate the estimated 85th percentile, 24 hour rain event (Office of Water Programs, California State University, Sacramento, 2007) of 1.10 acre-feet in Subarea A and 0.23 acre-feet in Subarea B.

Water Quality Mitigation Measures

The following water quality mitigation measures were identified:

- Applicants shall prepare and electronically submit the Permit Registration Documents (PRD) to the SWRCB at least 30 days before the start of construction, which includes submittal of a Notice of Intent (NOI), risk assessment, site map, SWPPP, annual fee, and a signed certification statement.
- Applicants shall prepare and implement a SWPPP.
- Applicants shall electronically submit a Notice of Termination (NOT) to the SWRCB upon completion of construction and stabilization of the site.
- Applicant shall prepare a plan (i.e., SUSMP or functional equivalent document) in accordance with the guidance to be developed by the NPDES Permit (Order No. R4-2012-0175, NPDES No. CAS004001) permittees, which addresses post-construction BMPs. A plan (i.e., SUSMP or functional equivalent document) will be required prior to issuance of a grading permit. The post-construction BMPs may include but are not limited to the following:
    - Bioretention
    - Rainfall Harvest and Use (i.e., cisterns, rain barrels, planter areas, permeable surfaces, drywells, French drains, etc.)
    - Vegetated Swales
    - Vegetated Filter Strips
    - Green Roofs
    - Infiltration Trenches

- Media Filtration
- Porous Pavement
- Permeable Surfaces (i.e., porous concrete/asphalt, Hollywood driveways, block pavers, open cell concrete, plastic grid systems, reinforced turf, etc.)
- Other BMPs that may be approved by the City of Duarte or the county-wide program in the future to address the 2012 NPDES Permit requirements

Completing these mitigation measures during construction and post-construction of the proposed project will reduce water quality impacts to a less than significant level.

5.0 REFERENCES

California Regional Water Quality Control Board, Los Angeles Region, *Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach MS4* (Order No. R4-2012-0175, NPDES Permit No. CAS004001), November 8, 2012.

California Regional Water Quality Control Board, Los Angeles Region, *Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*, June 13, 1994.

California State University, Sacramento, Office of Water Programs, *Basin Sizer*, Version 1.45, 2007.

California State Water Resources Control Board, *California 2010 Integrated Report (CWA Section 303(d)/305(b) Report)*, October 11, 2011.

California Stormwater Quality Association, *Best Management Practice Handbook: Construction Activity*, July 2012.

California Stormwater Quality Association, *Best Management Practice Handbook: Industrial/Commercial*, January 2003.

California Stormwater Quality Association, *Best Management Practice Handbook: Municipal*, January 2003.

County of Los Angeles Department of Public Works, *Hydrology Manual*, January 2006.

APPENDIX A

Duarte - Existing Condition														
Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equation
Duarte-Ex	1A	15.76	0.91	50	7	1192.94	0.015	7.5	10	3.23	0.68	0.88	44.8	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Ex	1A	15.76	0.91	10	7	1192.94	0.015	5.4	12	2.13	0.55	0.87	29.2	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Ex	1A	15.76	0.91	2	7	1192.94	0.015	2.9	19	0.92	0.22	0.84	12.18	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Ex	1B	3.32	0.91	50	7	614.35	0.016	7.5	6	4.11	0.75	0.89	12.14	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Ex	1B	3.32	0.91	10	7	614.35	0.016	5.4	8	2.58	0.62	0.87	7.45	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Ex	1B	3.32	0.91	2	7	614.35	0.016	2.9	12	1.15	0.32	0.85	3.25	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

APPENDIX B

Duarte - Proposed Condition														
Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Tc Equation
Duarte-Pr	1A	15.76	0.85	50	7	1192.94	0.015	7.5	10	3.23	0.68	0.87	44.29	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Pr	1A	15.76	0.85	10	7	1192.94	0.015	5.4	12	2.13	0.55	0.85	28.53	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Pr	1A	15.76	0.85	2	7	1192.94	0.015	2.9	20	0.9	0.21	0.8	11.35	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Pr	1B	3.32	0.85	50	7	614.35	0.016	7.5	6	4.11	0.75	0.88	12.01	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Pr	1B	3.32	0.85	10	7	614.35	0.016	5.4	8	2.58	0.62	0.86	7.37	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Duarte-Pr	1B	3.32	0.85	2	7	614.35	0.016	2.9	13	1.1	0.3	0.81	2.96	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135