

Chapter 3

Storm Drainage Collection System

The Existing System. The City's existing storm drainage network is composed of street gutter facilities, inlets and a network of various sized storm drain pipe-lines which convey runoff to larger pipelines and V-channels, located throughout the City, ultimately leading (outside of the City) to the Santa Ana Riverbed. However, as the City continues to develop vacant parcels with rooftops, parking lots and driveways, the existing City-owned storm drainage system will reach capacity and the ability of the existing drainage lines to collect additional runoff from developing areas will diminish regardless of the availability of a good system of wash channels. Additionally, there are areas in the City, such as near safety facilities such as the fire stations, that require storm drainage improvements to insure adequate safety response times to a few large vacant areas to be developed.

The City currently has 43,425 linear feet of reinforced concrete pipe, box and channel, with excess of 100 inlet boxes, approximately 44 combination boxes and 75 junction boxes¹. The estimated value of the City storm drainage system (excluding "locals") capital improvements is approximately \$8,883,269. There is no existing Storm Drainage Impact Fee Fund.

Property-based Benefit Reasoning. Initially, the use of separate zones was considered for each drainage basin within the City because each area may have its own capital needs for storm-water collection. Storm-water runoff from the most south-easterly part of Barton Road may not directly impact the homeowner east of the Observation Drive; similarly, a small debris detention basin near the Civic Center required to handle runoff from the Civic Center parking lot may provide little *direct* benefit to a home on Van Buren Street. In each case, there can be some distinct property-related areas of benefit for each drainage basin, but direct benefits are only part of the equation.

User-based Benefit Reasoning, the Human Element. The owners and users of all developed and undeveloped parcels benefit, directly and indirectly, from all City-wide existing and future storm drainage improvements. As the various systems within the greater community of the City of Grand Terrace develop, concurrent with development of private property, the benefits are generally recognized as:

1. Proposed development projects can only be approved by the City when precautions, generally in the form of infrastructure improvements, have been made that assure that developed and undeveloped downstream parcels will not be adversely affected (i.e., inundated, flooded, cut off from access in and out), by storm water from the project being proposed. The avoidance of downstream or down-zone damage from the development of an upstream parcel may not be a

major concern to a developer, but the City must concern itself with such issues when approving private development proposals.

2. The private development being assessed an impact fee will receive the same storm-water protection from other development projects upstream or up-zone from it's own development.
3. Storm water must be adequately controlled and removed to large scale flood control channels or creeks to assure access by public safety vehicles to all parts of the City, regardless of which zone a call for service is in. Sheriff, fire and other emergency calls, as well as public works emergency responses, cannot wait during heavy rainstorms. To the contrary, emergency calls for service probably increase during such storm events and the City's public safety and maintenance units must be able to respond, *to all zones*.
4. The City of Grand Terrace's citizens and business owners/employees must also be able to travel safely in heavy rain through one zone to another. An adequate and sufficient storm drainage system will provide such protection.

RCS recommends consideration of a *single* zone storm drainage fee for the City. Storm run-off does recognize a boundary between north or south Grand Terrace. It will leave one part of the City and pass through another to reach its ultimate local destination, the Santa Ana River.

Demand Upon Infrastructure Created by the Development of Underdeveloped or Undeveloped Parcels. The construction of flood control and storm drainage facilities is essential to the preservation of private property, public streets, curbs and other facilities. The county or a regional level of government is generally responsible for *flood control*², and cities are generally responsible for *storm drainage*. The building of new homes and businesses on presently undeveloped land will increase the amount of *runoff* and thus accelerate the need for additional storm drainage facilities to handle increased runoff from these developing areas. As the vacant land is developed and bare dirt or turf is replaced with impervious rooftop, parking lots, driveways, pools, and sidewalks, greater amounts of the rainfall *runs off* of the developed parcel. The amount of the run-off varies with differing types of development (i.e land-use) and the varying amounts are referred to as the *runoff coefficients*. Approximately 0.740 (or 74.0%) of rainfall that falls on a parcel developed with detached dwellings exits that developed parcel. The rate for attached dwelling run-off is not much higher at 0.830 (83.0%) than detached dwelling residential uses. Mobile homes have a run-off of 0.800. Most business uses such as lodging, commercial and office have a runoff coefficient of 0.850 or 85.0% with industrial acres slightly higher at 0.900 or 90.5%.

Clearly, the amount of water runoff increases with development. The cumulative effects of additional runoff must be managed with the appropriate capital facilities. These costs of the new storm drainage (and flood control revenue shortages) will be distributed by the coefficients of drainage, i.e., the percentage of property that will end up with impervious coverage such as asphalt or cement-based concrete drives or parking lots, rooftop, pools and any other hard surface that does not allow any absorption into the soil.

The Purpose of the Fee. The costs of extending the same level of storm drainage protection to the newly developing homes and businesses as is provided to the existing community (that has largely paid for the existing system) can be calculated, a fee imposed and collected. The fee revenues can then be used to expand the storm drainage facilities necessary to extend that same level of services. The City staff has identified eight storm drainage projects required to fully complete the City's network of pipes and small channels and are estimated to cost a total of \$2,291,660. There is no existing Storm Drainage Impact Fee Fund balance to off-set that amount.

As noted in previous Chapters, where the amount of equity of the existing community is larger than the marginal needs fee, the difference may be returned to the General Fund as repayment from the developing properties for the creation of the excess storm drainage capacity. Such is the case with the City of Grand Terrace's stormwater collection system due to the significant up-front construction of storm drainage facilities.

The Use of the Fee. The construction of flood and storm drainage facilities in the City of Grand Terrace is essential to the preservation of private property, public streets, curbs and other facilities. The building of new homes and businesses on presently undeveloped land will require the installation of additional storm drains and inlets to handle increased runoff from these developing areas. This Chapter reviews the costs of storm drainage and flood control facilities needed to serve future development.

The revenues raised from a properly calculated and supported Storm Drainage Facilities Impact Fee would be limited to capital(ized) costs related to that growth. The fees would be used to construct additional or parallel storm drainage lines necessary to increase the drainage capacity of the system. Conversely, the Storm Drainage Impact Fee receipts would not be used to repair, replace or rehabilitate any existing storm drainage lines.

The Relationship Between the Need for The Fee and The Type of Development Project. Upon the identification of the costs of storm drainage facilities generated by future development, costs must be further distributed for each of the land uses (i.e., business/residential uses) based on their estimated storm runoff. Detached dwellings (greater than one acre/dwelling) development provides the most turf percentage per parcel and thus the greatest percolation, and conversely the least runoff of storm-water. As such, these land uses should not bear the same cost as Commercial or Industrial development, which generally have little or no turf area (or stated

another way, a higher percentage of impervious area) and therefore generate a higher amount of runoff. For this Report, costs were distributed between land uses on established runoff coefficients. A listing of these runoff coefficients is provided below in Table 3-1.³

Table 3-1
Storm Drainage Runoff Coefficients
(@ 2" per Hour Rainfall)

Proposed Land Use	Runoff Coefficient
Detached Dwellings	0.740
Attached Dwellings	0.830
Mobile Homes	0.800
Commercial/Office Uses	0.850
Industrial Uses	0.900

Dwelling Density Anomaly Adjustment. Since this impact fee is determined by applying a drainage factor to the type of land use zone, differences between what the development code allows and what is actually approved can significantly skew the cost figures. As a result it has been necessary to adjust to the average densities of the General Plan at build-out. As an example, the City anticipates future approval of 378 detached dwelling units on 367.4 acres in the City for an average of 1.03 units per acre. However, the existing 2,827 detached dwelling units occupy 820 acres for an average of 3.45 units per acre. Assuming a storm drainage impact fee or equity of \$5,000 per acre, each existing detached unit, @ 3.45 units/acre, would have an equity share of about \$1,449, ($\$5,000 \text{ per acre} \div 3.45 \text{ units per acre} = \$1,439/\text{unit}$) while the future detached units, @ 1.03 units/acre, would be assessed about \$4,854, ($\$5,000 \text{ per acre} \div 1.03 \text{ units per acre} = \$4,854/\text{unit}$). Thus the use of the average densities at General Plan build-out, as identified on Table 3-2 on the following page, has been employed on each of Schedules 3.2 and 3.3 to eliminate this density problem unique to storm drainage.

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Table 3-2
Average Units or Square Feet per Acre at Build-out

Land-use Designation	Acres	Units or S.F.	Units or S.F. per Acre
Detached Dwelling Units	1,187.3	3,205	2.70
Attached Dwelling Units	109.6	1,729	15.78
Mobile Home Units	32.8	315	9.60
Commercial/Office Use Square Feet	170.7	3,346,061	19,602
Industrial Use Square Feet	248.9	5,421,042	21,780

Even without any additional development, the City would probably still desire to construct certain storm drainage lines to improve service to the existing community. Table 3-3, on the following page, indicates the impact fee amounts that would need to be imposed to pay for the cost of completing the portion of the system's collection pipes and channels identified by staff to be financed with impact fees. It would not be unreasonable to expect future development to finance some of the identified storm drainage needs if there is no violation of the proportionality rule.

Table 3-3
Marginal Needs-based Storm Drainage Facilities Impact Fees

Land Use	Allocation of Costs	Total Cost Per Unit or SF
Detached Dwelling Units	\$1,166,404	\$1,176/Unit
Attached Dwelling Units	\$115,728	\$226/Unit
Mobile Homes	\$3,432	\$357/Unit
Commercial/Office Uses Square Feet	\$527,309	\$0.186/S.F.
Industrial Uses Square Feet	\$478,787	\$0.177/S.F.

The Relationship Between the Use of the Fee and the Type of Development Paying the Fee. The Storm Drainage Impact Fees that are imposed and collected will be used to mitigate the storm water runoff generated by the type of development. If the development is a commercial or industrial property generating a significant amount of runoff, the fee collected will be proportionally higher and will be enough to construct the required additions to the storm drainage system downstream from this development.

From time to time the City may require an applicant of a private project to construct an improvement (or portion thereof) that is on the list of required improvements at the end of this Chapter. This is often done to expedite the project for the applicant/developer. The developer should receive a credit for any money expended on this required improvement against their calculated storm drainage impact fee. An ordinance addressing the issue of credits should be prepared and added to the appropriate chapter of the Grand Terrace Municipal Code.

The Relationship Between the Amount of the Fee and the Cost of the Portion of the Facility Attributed to the Development Project. Similar to the section above, the relationship is based upon the projected amount of storm water that will need to be collected and safely transported to flood control channels or rivers. The downstream collection lines (lines further down from the proposed project but prior to the outfall into a river or flood control channel) need to be sized to handle all of the storm-water collected upstream. Storm-water that is collected in one location accumulates with feeder lines along the way and thus the downstream system must be built increasingly larger (at increasing higher material and construction costs) the farther it gets away from its source.

Table 3-4, on the following page, distributes the total equity value of the existing system consisting of the actual storm drainage pipe and channels at \$8,833,269. Please note that the impact fee, by land use, is in terms of *units* such as residential dwellings or commercial and industrial square feet of building pad (including multiple floors).

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Table 3-4
Existing Community Financial Commitment or
Storm Drainage System Equity-based Proportionality Test

Land Use	Allocation of Equity	Total Equity Per Unit or SF
Detached Dwelling Units	\$6,541,212	\$2,915/Unit
Attached Dwelling Units	\$680,390	\$559/Unit
Mobile Home Units	\$270,497	\$886/Unit
Commercial/Office Units	\$235,941	\$0.461/S.F.
Industrial Units	\$1,195,228	\$0.439/S.F.

Of note is the fact that Table 3-4, the investment "equity" of the current community is far greater, (by nearly 250%) than that of the previously exhibited Marginal Needs-based impact fees identified in Table 3-3 indicating that the City has put in place, a far greater percentage of the entire system required at build-out than is necessary from the remaining development.

Table 6-5, below, indicates that the 1,364.92 acres of run-off created by the currently developed community represents about 60.9% of the total acre stormwater runoff at build-out. At the same time the currently developed community's investment in the existing storm drainage system, at \$8,833,269 is far greater at about 79.4% of the cost of the total system at build-out.

Table 3-5
Comparison of Storm Drainage System Attributes

Infrastructure Factor	Existing Community	Future Community	Total at Build-out
Acres of Run-off	830.76	534.16	1,364.92
Percentage of Total	60.9%	39.1%	100.0%
Cost of Total System	\$8,833,269	\$2,291,660	\$11,124,929
Percentage of Total	79.4%	20.6%	100.0%

Table 3-6, is a summary of Schedule 3.4 at the end of the Chapter. It distributes the cost of the entire storm drainage system, at build-out by the fully built-out community as if the system were built at once and charged to a General Plan built-out community. It represents a schedule of water distribution impact fees that would even-out the contribution by all users, at build-out. Obviously, a portion of the Table 3-6 impact fees would represent recoupment of the advance-built portion of the system.

Table 3-6
Fair Share at Build-out Storm Drainage Distribution Impact Fee
by Land Use

Proposed Land Use	Allocation of Costs	Cost Impact per Unit S.F. or Acre/Space
Detached Dwelling Units	\$7,161,125	\$2,234/Unit
Attached Dwelling Units	\$741,461	\$429/Unit
Mobile Home Units	\$213,872	\$679/Unit
Commercial/Office Uses Square Feet	\$1,182,653	\$0.353/S.F.
Industrial Uses Square Feet	\$1,825,818	\$0.337/S.F.

While it appears that the City can present a good argument that a great deal of the storm drainage system has been pre-built, an argument for recoupment should only be considered with greater detail than has been offered here, most likely consisting of a commercially prepared appraisal of the storm drainage assets. However, the disparity identified in Table 3-5 clearly makes a good argument for the remaining development creating almost 40% of the total run-off could finance the remaining 20% of the storm drainage system.

Recommended Storm Drainage Impact Fee. The adoption of Table 3-3, previously listed, and based upon Schedule 3.2 at the end of this chapter, as the storm drainage impact fees would generate capital to construct all of the eight identified projects. The proposed development impact fees contained within Schedule 3.2 do not exceed the community financial commitment or equity-based fees in Table 3-4 and thus not violating any proportion requirements.

RECAP OF RECOMMENDED STORM DRAINAGE IMPROVEMENTS IMPACT FEES

- Adopt Schedule 3.2 for the five land-uses and the *marginal Needs-based* per acre figure (from the third column from the right side of the Schedule 3.2) for developments that do not involve a building pad, (e.g. additional asphalt parking area).
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CHAPTER ENDNOTES

2. Assuming inlet boxes at 440 linear foot intervals, combination boxes at 750 foot intervals and junction boxes at 300 linear foot intervals.
2. Projects of major importance generally involving the control of large quantities of flood water (over 500 C.F.S.) through numerous cities and unincorporated areas.
3. San Bernardino Hydrology Manual, Williamson and Schmidt, Irvine, CA 1986, Figure D-4b, Runoff Coefficient Curves, Soil Group - B, Cover Type - Urban Landscaping, AMC-II, Index Number 56, page D-15.

Schedule 3.1

City of Grand Terrace
 2005-06 Development Impact Fee Study
 Allocation of Project Cost Estimates
 Storm Drainage Facilities

Line #	Description	Estimated Cost	Construction Needs That Repair/Replace Infrastructure Capacity (1)		Construction Needs That Increases Required Infrastructure Capacity	
			Percent Need	Apportioned Dollar Cost	Percent Need	Apportioned Dollar Cost
SD-01	Oriole - Tanager to Pico	\$91,830	0.00%	\$0	100.00%	\$91,830
SD-02	Pico - Oriole to Mt. Vernon	\$201,530	0.00%	\$0	100.00%	\$201,530
SD-03	Mt. Vernon - Main to Pico	\$201,530	0.00%	\$0	100.00%	\$201,530
SD-04	Mt. Vernon - Van Buren to Pico	\$183,650	0.00%	\$0	100.00%	\$183,650
SD-05	Pico - Mt. Vernon to Michigan	\$606,420	0.00%	\$0	100.00%	\$606,420
SD-06	Michigan - Main to Pico	\$198,910	0.00%	\$0	100.00%	\$198,910
SD-07	Michigan - Pico to Van Buren	\$296,770	0.00%	\$0	100.00%	\$296,770
SD-08	Van Buren - Michigan to Channel	\$511,020	0.00%	\$0	100.00%	\$511,020
Sub-Total Estimated New Project Costs		\$2,291,660	0.00%	\$0	100.00%	\$2,291,660
LESS: Any Storm Drainage-related Impact Fee Fund Balance		\$0	0.00%	\$0	100.00%	\$0
Sub-Total Financial Adjustments		\$0	0.00%	\$0	100.00%	\$0
Total - Storm Drainage Capital Project Needs		\$2,291,660	0.00%	\$0	100.00%	\$2,291,660
						Forward to Schedule 3.2

NOTES:

1. Or represents existing demand or are the responsibility of the existing community or has a separate financing source.

Schedule 3.2

City of Grand Terrace
 2005-06 Development Impact Fee Study
 Marginal Needs-based Impact Fees
 Storm Drainage Facilities

Proposed Land Use	Undeveloped		Drainage Run-off Coefficient	Total Acres to be Protected	Percentage of Total Benefit	Allocation of Expansion Costs	Cost Distribution Per Acre	Average Units or Square Feet/Acre	Development Impact Fee per Unit or Square Foot
	Acres	Units							
Detached Dwelling Units	367.4	378	0.740	271.88	50.90%	\$1,166,404	\$3,175	2.70	\$1,176 per Unit
Attached Dwelling Units	32.5	403	0.830	26.97	5.05%	\$115,728	\$3,561	15.78	\$226 per Unit
Mobile Home Units	1.0	10	0.800	0.80	0.15%	\$3,432	\$3,432	9.60	\$357 per Unit
Commercial/Offices (Units	144.6	2,834,449	0.850	122.91	23.01%	\$527,309	\$3,647	19,602	\$0.186 per S.F.
Industrial Uses (units = SF	124.0	2,700,720	0.900	111.60	20.89%	\$478,787	\$3,861	21,780	\$0.177 per S.F.
TOTAL	669.5	--	--	534.16	100.00%	\$2,291,660	In Total Storm Drainage Collection System Capital Needs.		

Schedule 3.3

City of Grand Terrace
 2005-06 Development Impact Fee Study
 Community Financial Commitment or Equity-based Impact Fees
 Storm Drainage Facilities

Proposed Land Use	Developed		Drainage Run-off Coefficient	Total Acres Protected	Percentage of Total Benefit	Allocation of Infrastructure "Equity"	Distribution of "Equity" per Acre	Average Units or Square Feet/Acre	Current Financial Commitment per Unit or Square Foot
	Acres	Units							
Detached Dwelling Units	820	2,827	0.740	606.73	73.03%	\$6,451,212	\$7,868	2.70	\$2,915 per Unit
Attached Dwelling Units	77	1,326	0.830	63.99	7.70%	\$680,390	\$8,825	15.78	\$559 per Unit
Mobile Home Units	32	305	0.800	25.44	3.06%	\$270,497	\$8,506	9.60	\$886 per Unit
Commercial/Offices (Units	26	511,612	0.850	22.19	2.67%	\$235,941	\$9,040	19,602	\$0.461 per S.F.
Industrial Uses (units = SF	125	2,720,322	0.900	112.41	13.53%	\$1,195,228	\$9,569	21,780	\$0.439 per S.F.
TOTAL	1,080	--	--	830.76	100.00%	\$8,833,269 in Total Equity in Current Storm Drainage Assets			
						\$8,833,269 in Equity in Existing Storm Drainage Collection System.			
						\$0 in Storm Drainage Impact Fee Fund Balance.			

Schedule 3.4

City of Grand Terrace
 2005-06 Development Impact Fee Study
 Fair Share at Buildout-based Impact Fees
 Storm Drainage Facilities

Proposed Land Use	Total *Build-out*		Drainage Run-off Coefficient	Existing Impervious Surface	Percentage of Impervious Surface	Allocation of Total System Cost	System Cost Distribution per Acre	Average Units or Square Feet/Acre	Recoupment Impact Fee per Unit or Square Foot
	Acres	Units							
Detached Dwelling Units	1,187.3	3,205	0.740	878.60	64.37%	\$7,161,125	\$6,031	2.70	\$2,234 per Unit
Attached Dwelling Units	109.6	1,729	0.830	90.97	6.66%	\$741,461	\$6,765	15.78	\$429 per Unit
Mobile Home Units	32.8	315	0.800	26.24	1.92%	\$213,872	\$6,520	9.60	\$679 per Unit
Commercial/Offices (Units	170.7	3,346,061	0.850	145.10	10.63%	\$1,182,653	\$6,928	19,602	\$0.353 per S.F.
Industrial Uses (units = SF	248.9	5,421,042	0.900	224.01	16.41%	\$1,825,818	\$7,336	21,780	\$0.337 per S.F.
TOTAL	1,749.3	--	--	1,364.92	100.00%	\$11,124,929	Storm Drainage System Nominal Cost @ GP Build-out		