

Saving the NFIP: A Transfer of Development Rights and Land Swap Strategy
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The National Flood Insurance Program, or NFIP, is a federal program that provides flood insurance for homes and businesses that are located within formally designated flood zones. This mandatory program was created with the intention of providing financial assistance for at-risk developments and to provide residents with the support they need to recoup and recover from losses. Instead this program has turned into a life-line which has antithetically supported and made people reliant on the insurance payouts. Overtime, the NFIP has been left supporting increasingly riskier properties which have left the program and consequently the nation in debt. As sea levels rise, anywhere from 0'-6' over the coming century, current planning models and funding of mitigation and adaptation techniques will be insufficient. An estimated 7% of total land area in the U.S. is exposed to significant flood risk. (Ward, 576) The true cost of flood insurance is misrepresented by the premiums placed on the extremely-at-risk homes that experience reoccurring flood events. It would be inappropriate to discontinue coverage of these properties as long as they are inhabited, as the overall financial and health consequences could cause great hardship to the residents. That said, the NFIP, as well as state and local governments do not have sufficient funding or authorization they need to buy people out of their properties. This strategy would require tremendous amounts of political and financial capital which is often not feasible for small or large areas especially during years when so much money is spent on mitigation and adaptation measures. The adoption of a federal program, like Transfer of Development Rights, which allow for a mutually beneficial plan-of-action between public & private sector is necessary to solve the fundamental issues with the National Flood Insurance Program.

A 'transfer of development rights' agreement is defined as a transfer of development density from a sending site to a receiving site, described later. The proposed policy solution suggests utilizing the land use-density of the existing parcels within a sending site as the additional base density value for a receiving

site. The sending and receiving site density values, when summed, are a guaranteed value for the ability to be developed at the receiving site. The additional density bonus is subject to the local jurisdictions discretion, as they must evaluate the overall needs of the community which includes the need to eliminate homes in flooding areas, and the appropriateness of the increased development intensity of a specified receiving site.

Transfer of Development Rights (TDR's) do not require a change to development regulations and does not require an involuntary reduction in property value, but does allow for the entire transfer mechanism to be regulated by the free market. This is a national issue that needs a comprehensive solution tailorable to each municipality's needs. Encouraging and adopting language regarding the mechanism of transferring development rights could help to alleviate the current burden on the insurance programs financial stability, while providing incentives to developers and concerned governing bodies. Most importantly this could also provide an exit strategy for the 4.4 million NFIP policy holders across the nation, 48,000 of which experience multiple floods within a ten year period. (Kick, 5) Regardless whether or not the municipality and or the homeowner currently want to use a retreat strategy on these at-risk parcels, there is a strong possibility that this will naturally happen overtime as a result of sea-level rise, riverine flooding, or a similar flood related hazard.

While a large percentage of the nation's homes are not directly impacted by special flood hazard areas, it has become a national issue, in that 85% of disaster declarations are because of flooding. On average 82 fatalities and \$10 billion in damages annually have been claimed over the past 10 years. (Firshing, 26) Many areas have tried to mitigate and attempted to adapt, but to no avail. With climate change the need and ability to mitigate or adapt is being compounded and some jurisdictions are failing to meet the challenge. The last option is to retreat from areas that suffer repeated flooding in a development friendly way. A way that both mitigates and addresses a housing shortage issue, while at the same time pays landowners for their property without increasing the federal debt.

The proposed transfer mechanism encourages homes within the Federal Emergency Management Agency, or FEMA, classified special-flood hazard areas, generally A & V Zones, to be available for a transfer of development rights agreement as the sending site. Sending sites may be groupings of adjacent properties, large apartment complexes, or if approved by a regional authority individual homes spread out through a designated area. Areas available for receiving sites must be generally one contiguous area or multiple larger areas. The intention is to avoid inappropriate density and zoning transitions throughout a community. After homes have been procured for a transfer of development rights, they are rezoned or redesignated to open space with no development value or future ability to be developed. The local jurisdiction and private developer would negotiate an agreement as to any additional benefits, and the ownership of the future open space area.

There is no standard formula for transferring density between two areas. As a result, the following mathematical formula is suggested to create a base within the use of this mechanism:

$$\frac{(X + Y) \times ((X/Z)(D) + 1)}{T} = P$$

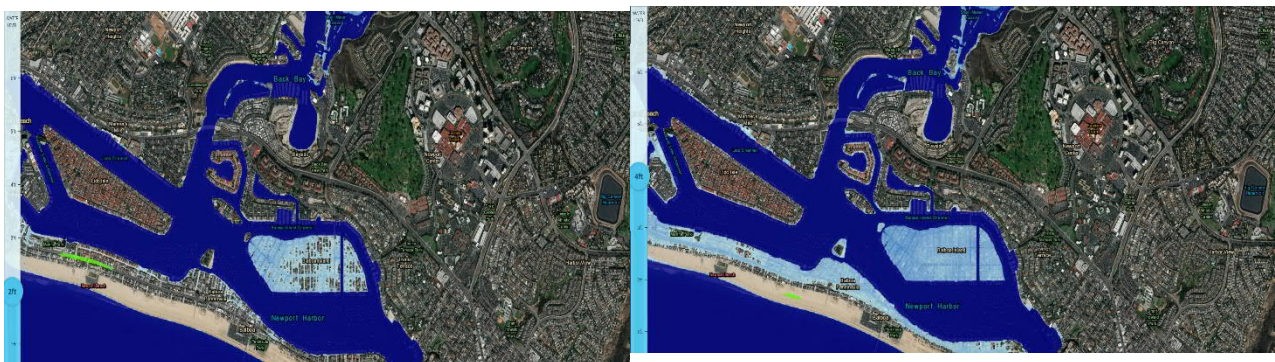
X – Existing density of land use at sending property
Y – Existing density of zoning or land use at receiving property
Z – Existing density of zoning at sending property
X/Z – Ratio of land use & zoning to show realized density potential of sending site
D – Density bonus multiplier
T – Total number of acres at receiving site
P – Proposed density per acre at receiving site

Table 1: Variable inputs to TDR Formula

The formula is broken up into three main pieces. The first piece is (X+Y), and this gives the base density of a transfer of development rights with no density bonus by summing the existing density of land use at sending site and the existing density of zoning or land use at receiving site. The second piece of the formula calculates the density bonus ratio. The (X/Z) calculates the ratio of the land use & zoning to show the realized density potential of sending site. If a sending site is not developed to the full potential it will be a fraction of one. If the sending site is developed past the originally zoned potential, there are more residents in danger than an original assessment had predicted. If there is no zoning to be found then this

will become only one and will not affect the density bonus multiplier D. The D value is assigned by the governing jurisdictional agency. If there is no density bonus assigned by the agency then this number becomes 0. The value of 1 located at the end of this part ensures that the final number of units never decreases and only increases. In scenarios where the land use is higher than the original zoning, the ratio may produce a result higher than 100%. As mentioned, this means more residents are at risk and should be given incentives for procurement of these properties. The third piece of the formula is the gross acreage of the receiving site. This allows for the final product, the P Value, to be a calculation of the total density per gross acre. Density per gross acres is a consistent form of measurement for development intensity throughout the nation, which may be assigned by the governing agency and approving body. The density per acre will create a base and trackable statistic which will allow FEMA to track the overall results of the program. The final unit of analysis for the process of transfer of development right is the proposed density per acre at receiving site.

A case study of how this would work is Balboa Island in Newport Beach, Orange County, CA which is discussed below. The site was chosen as an example for a transfer of development rights because National Oceanographic and Atmospheric Administration, or NOAA, Sea-Level Rise Maps model Balboa Island as heavily affected by rising seas. As shown in Figures 1 and 2, by four-feet of seal level rise the entire island is flooded. Additionally, Newport Beach has issued extensive studies and implemented mitigation measures to slow down the flooding, however it has not created a permanent solution.



Figures 1 and 2: Shows Balboa Island with a projection at two-feet (left) and four-feet (right) of sea-level rise. (NOAA)

Balboa Island is located inside of Newport Harbor area and is approximately 128 acres. The island is completely surrounded by water and is only connected to the mainland by a two-lane bridge. There are 1,411 privately owned parcels on the small island, made up primarily of residential single family and duplex homes. Additionally, there are small commercial areas that service the needs of the residents. (Newport Beach General Plan) An existing sea-wall immediately protect homes from daily tidal changes, with sea wall elevations varying between 7.6' and 8.7'. In a 2011 study, a sample size of 91 parcels were surveyed for their first floor elevations. This study showed that these elevations ranged from 6.2' to 11'6. (Poon, 10) The FEMA Flood Insurance Rate Map has the base flood elevation for the area at 9.0'. The 2011 study, reported that 85% of the surveyed homes had a first floor elevation below the FEMA Base Flood Elevation. (Poon, 8)

In addition to FEMA mapping, other data from governmental agencies show the possibility of flooding to the area. The 2011 study cites two notable times, 2005 & 2010, when the sea-walls were overtopped during storm events. (Poon, 13) US Army Corps of Engineers, or USACE, publishes their sea level rise predictions in three data points: high, medium and low. The USACE expects anywhere from 2.75' to 4.25' in sea-level rise over the next 40 years. (USACE Sea-Level Rise Projections) While sea-level rise will be initially protected by the sea-walls surrounding the island, these will not be sufficient to totally prevent flooding during high-tide events which historical data shows annually are 5' higher than the mean tide height. (Poon, 7)

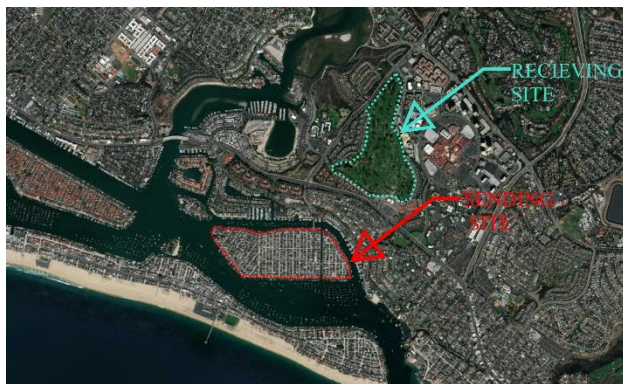


Figure 3: Shows the sending and receiving site in Newport Beach (ESRI Maps)

As shown, there is a clear and present danger to the residents of Balboa Island in Newport Beach. While the residents may not experience day-to-day flooding, there is a potential for this to occur in the future, making this a great contender for a transfer of development rights program. The

area is primarily zoned R2 (Two-Unit Residential) with a land use of RT (Two-Family Residential). (Newport Beach General Plan)

The zoning is intended to be limited to a maximum of two residential dwelling units per lot, the RT land use is consistent with the density restrictions as is the zoning. (Newport Beach General Plan)

Land Use Description	Number of Properties	Residential Unit Allocation
Commercial	77	0
Duplex	587	2
Multi-Family Dwelling	104	2.5
Quadruplex	2	4
Single Family Residential	611	1
Mixed-Use	4	.5
Triplex	27	3
Total	1411	
Projected Total Residential Units on Balboa Island		2,136

Table 2: Shows the property breakdown of analyzed units on Balboa Island.

The receiving site is currently the Newport Beach Country Club and Golf Course. This site is roughly 120 acres and is zoned PC-47, which means this is a planned community within the City of Newport Beach and there are no planned residential developments or available units for the site. In addition, the site has no special flood hazard area designation and is well above sea-level. The receiving site and sending site use access from the same main roads and would likely not create a major increase to the areas Average Daily Trips, a density measurements used by the City of Newport Beach for analysis. (Newport Beach General Plan).

Table 2, above, shows the type of properties on Balboa Island and how many of each. The third column discusses the assumed residential unit allocations for each type of property. For example, a duplex technically means there are two households within that property, therefore the assumed residential unit allocation is two. Table 3, below, shows two examples with X_1 showing if all available residential units were utilized in the transfer. While X_2 shows an example with less than half of the residential units being utilized for a transfer of development rights. Table 4, page 7, shows the calculation of the Z value by taking the

X	SFR	Duplex	Triplex	Multi-Family	Quad-ruplex	X Value
X_1	611	587	27	104	2	2,134
X_2	150	200	27	104	2	899

Table 3: Shows the existing land use of the sending property.

Total Parcels	Zoning Density Permitted	Z Value
1,331	2 Units per Parcel	2,662
483	2 Units per Parcel	966

Table 4: Shows the existing density of the zoning at sending property.

Table 5: Shows the calculation breakdown as it goes through the formula.

	X	Y	Z	D	T	P
X ₁	2,134	0	2,662	.5	120 AC	24.9
				1.25		35.6
X ₂	899		966	.5		10.9
				1.25		16.2

total number of utilized parcels at their base zoning density, the assumed original density is found.

The results show (Tables 5) a transfer of development rights from Balboa Island to the Newport Beach Country Club is possible. The large vacant area is in close proximity to the site and is large enough to handle all of the units being transferred during all four circumstances. Table 5, above, shows the possible density transfers. The values of X₁ show a transfer of units valuing 2,134, the .75 (from .5 to 1.25) increase in the density bonus (D Value) resulted in a 50% increase of units. This is important as it shows the how Newport Beach City Council may opt to increase the desirability of the program by adjusting the density bonus. Additional influences to the final density calculation are the type of land-use and density at the sending site. Depending on the number of higher-density properties (2+ units) the X-Value can be quickly manipulated for a higher resulting density value as shown in X₂ which maintained the same number of high-density units and decreased the number of single family residential units. In calculating the X Value for X₂, 483 units were used as the sending site. The final X Value was nearly double because the higher intensity values. Additionally, the higher X value brings the X/Z value closer to zero which allows for a greater advantage of the density bonus.

As presented, the proposed policy solution will stop payouts to high-risk properties through a transfer of development rights. Reevaluating the current practices of the National Flood Insurance Program which are keeping residents in danger, is essential. The above case study used a mechanism called 'transfer of development rights' to show how this proposed policy could not only provide homeowners an economically viable way out of their homes but also provide incentives to private

developers to help solve public-sector issues. Through a formula of converting base density at a sending site, to a possible increased development density at a receiving site, the formula showed that this policy could be successfully implemented. The results showed that a national policy tailored at a local level, could be highly effective. NFIP administrators and local government officials alike should be looking for policy initiatives that support private-sector incentives for helping their community. However, this does require self-regulation on the part of the developer to evaluate the number of properties necessary to make a density transfer physically and financially feasible. Without this cooperation, residents will remain in at-risk areas and local and regional governments will be forced to spend excessively on mitigation activities.

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