BBC RESEARCH & CONSULTING

Projected Effects on Dacono from Anadarko Oil and Gas Development

FINAL REPORT

Final Report

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SECTION I.
Introduction

The City of Dacono (the City), a rapidly growing community in Northern Colorado, was recently notified by Anadarko Petroleum Corporation (APC) that the company had purchased approximately 500 acres of surface land and subsurface mineral rights within the City's current municipal boundaries. APC also informed the City that it plans on developing a total of four well pads and 73 wells on its four parcels. At least three of the four parcels purchased by APC would otherwise have been likely candidates for development within the next decade or so to support the City's growing population and future vision. The City has a history of mineral development, including coal mining and oil and gas production, but the activity proposed by APC is unprecedented in the ways it may impact the City's current population and future development patterns.

The City retained BBC Research & Consulting (BBC) to evaluate and quantify the positive and negative impacts of APC's proposed oil and gas activities on the City. During the past 20 years, BBC has conducted numerous economic and fiscal impact studies regarding oil and gas development on public and private lands. During the mid-2000s, BBC examined the economic, demographic, and fiscal effects of oil and gas development in northwestern Colorado for the State of Colorado and the Associated Governments of Northwest Colorado. More recently, BBC's oil and gas-related experience has included studies for state and local governments, including economic and fiscal impact evaluations for Boulder County, Colorado Department of Transportation (CDOT), Arapahoe County, Douglas County, and the City of Thornton. BBC has also completed work in Williams County, North Dakota, the home of the Bakken Shale and the nation's richest oil play, as part of their Comprehensive Plan.

There are two primary objectives of this report. First, the report identifies both the positive and negative impacts that APC's activities may create for the City. Second, the report documents and estimates the fiscal and economic impacts APC's activities will have on the City. Oil and gas development will bring greater tax revenue to the City, but will also create short-term adverse effects for the City's current residents and lead to a different pattern of future development with higher costs of providing public services to future residents and businesses.

BBC developed fiscal impact models of the costs and benefits to the City and its residents. The models characterize the future trajectory of the City's development assuming APC had not acquired 500 acres of land in the City's core development zone. BBC utilized the City's planning documents and discussions with City staff to better understand how the City would have developed over the short, medium, and long term. Next, BBC used information provided by the City and APC to estimate the extent and magnitude of the impacts that APC's proposed activities will have on the City. The differences between these two scenarios represent the incremental impacts of APC's activities.

Any analysis based on projections of future activity beyond twenty years is inherently uncertain. While APC provided specific information regarding its future plans and its expectations regarding the productivity of its wells, these are projections that may not prove entirely accurate. Most of the tax revenues that the City would receive from APC's activities are partly dependent on future energy prices, which are also uncertain. Perhaps the greatest degree of uncertainty in this analysis surrounds the projections of how (and when) the City would have developed in the absence of APC's land purchase and future activities, and how it will develop now that the APC acreage is not available for residential and commercial development.

The projections provided in this report are BBC's best estimates based on information provided by the City, information provided by APC, and information gleaned from previous studies of the topics addressed herein. While the specific numbers may not prove entirely accurate, BBC believes the magnitudes of the estimates and their scales relative to one another provide reliable information for the City.

This report is organized into five sections, including this introduction:

- Section II summarizes the key findings from BBC's evaluation and analysis. It includes a description of the primary positive and negative aspects of APC's plans and activities from the City's perspective, and quantitative estimates of the effects in the near term, medium term and long-term. It also describes and compares cumulative positive and negative effects over the next 20 years and beyond.

- Section III provides important context for this evaluation. It includes information on the history of the City and the City's vision for its future (prior to the APC land purchase). It also provides specific information regarding APC's plans, and a layman's description of how oil and gas activity normally proceeds over its various phases.

- Section IV describes and quantifies projected negative impacts of APC's plans on the City and its residents. Key aspects of those impacts include effects on the City's road infrastructure; short-term effects on residential property values during drilling and completion; longer term fiscal consequences of a more dispersed development pattern in the City; and effects on the City's future growth and growth-related revenues and dedications.

- Section V describes and quantifies the projected positive impacts of APC's plans on the City. Positive impacts stem from the tax revenues projected to result from APC's activities. These include property taxes, severance taxes, and other revenue streams.

SECTION II.
Key Findings

As described in greater detail in Section IV and Section V of this report, BBC Research & Consulting (BBC) evaluated the positive and negative effects of Anadarko Petroleum Corporation's (APC's) plans for the City of Dacono (the City) and developed quantitative estimates of those effects where feasible.

Overview of Benefits and Costs to the City from APC's Plans

Benefits

- Primary benefit will be a major, short-term increase in property tax revenues associated with APC's properties. Longer term property tax increase will be smaller.

- APC's activities will also produce increases in other revenue sources (particularly sales/use taxes and severance taxes), but these increases will be small relative to the property tax benefit.

- Potential opportunities could arise from negotiations between the City and APC, particularly regarding the availability and use of APC's lands when no longer needed for oil and gas development and production.

Costs/adverse impacts

- Energy-related traffic will impact roads and the cost of road service (primarily during the drilling and development phase).

- Will likely have a short-term impact on nearby residential property values (and the well-being of nearby homeowners) during well drilling and completion phases.

- Will require the City and its residents to modify their plans and expectations for the City's future.

- Will remove almost 500 acres of strategically located land from future development, and make the integrated, mixed-use vision in the Comprehensive Plan much more difficult to achieve.

- May reduce the attractiveness of the City for residential and commercial developers, new residents and businesses, and will likely reduce the City's growth rate.

- Reduced growth will also reduce tax and impact fee revenues, and water dedication or cash-in-lieu, from new residential and commercial development.

- Will lead to more geographically dispersed development in the City, resulting in higher costs to provide infrastructure and services.

Quantitative Estimates of Benefits and Costs

BBC developed several models to estimate the impacts that APC's activities would impose on the City. The models were based on information gathered from the City, APC, previously published literature, and some simplifying assumptions. Due to the uncertain nature of APC's activities and the future trajectory of development in the City, impacts were estimated under different assumptions in order to provide a likely range of potential outcomes. The models and their assumptions are discussed in more detail in Section IV and Section V.

The results from BBC's quantitative analyses are summarized below in terms of near term, medium term, and long term impacts.

Near term, 2018-2022 (years 1 to 5)

- APC develops, drills, and completes wells on its properties. Based on current plans, the workforce will begin to ramp up in the third quarter of 2018 and reach about 100 workers per day by the fourth quarter of 2018. The workforce is expected to peak during the third quarter of 2019, with an average of almost 140 workers per day.

- APC's employees (and contractors) are projected to spend about $117,000 to $175,000 in the City during the two year development process, producing about $4,000 to $5,000 in sales tax revenues for the city during this period. The City may also collect sales and use taxes on equipment and materials used during development, but the amount of that revenue is unknown.

- Production begins on some wells in 2019. All wells are producing by 2020. Due to lags in the property tax assessment and collection process, the City does not begin to receive additional property tax revenues until 2021. Projected additional property tax revenues in that year are about $1.6 to $2.7 million. Property tax revenues are projected to peak at between $4.1 million and $6.8 million in 2022.

- APC's wells will also produce additional severance tax revenues. Due to the way severance tax revenues are allocated in Colorado, this benefit would be shared with the State of Colorado and the rest of Weld County. Effects on the City are modest at about $4,000 to $7,000 per year in 2021, with a peak estimated severance tax benefit to the City of between $10,000 and $17,000 in 2022.

- City road maintenance costs are projected to increase by about $128,000 to $213,000 during the 18 month period when APC is developing its pads. In addition, APC's activities will create impacts to the City's roads of about $4,000 to $7,000 per year during the 20-year period of well production.

- Residential property values of existing homes within approximately ½ mile of the well pads are temporarily reduced by about 15 to 20 percent during the well drilling and completion activities (2019 and 2020). About one sixth (16%) of homes in the City are estimated to fall within this radius of the planned pad sites (excluding the Tula site, which is not yet planned). In aggregate, this is a short-term, estimated reduction in residential property values of approximately $6 to $8 million. The duration of these impacts is brief

(approximately one to two years based on the projected development schedule) and may or may not result in noticeable reductions in subsequent assessed values and property tax revenues for the city.

- Potential development that would have occurred on the properties owned by APC does not occur. Development on other properties within approximately ½ mile of the well pads is deferred during this period. This results in an estimated reduction of approximately 16 to 32 percent in the new growth forecast to occur in the City during this period, and results in approximately 177 to 353 fewer residents and approximately 62 to 124 fewer homes being built in the City by the end of 2022. This is associated with a loss of potential future property tax revenue of about $38,000 to $75,000 per year.

- The City receives less dedication of new water supplies (or less cash-in-lieu) due to the reduction in development. Over the five year period and reduction is estimated to be equivalent to between 46 and 93 C-BT units, with a current value of approximately $1.2 million to $2.4 million.

- APC makes approximately 55 acres in the northwest quarter of Section 1 (approximately the southeast corner of York Street and Hwy 52) available for other development. Based on current commercial land values in the City, this land may be worth about $2.1 million.

Medium term, 2023-2027 (years 6 to 10)

- Production continues on APC's wells. Projected additional property tax revenues average between $1.6 million and $3.7 million per year over this period.

- Residential property values recover in areas within ½ mile of the wells.

- Potential development adjacent to APC's properties becomes more likely. APC's properties themselves continue to remain off limits to future development.

- More development occurs south of APC's properties, at a higher cost to provide city services than would have been incurred by contiguous development on the APC properties. The additional capital costs of serving the new development are projected to be between approximately $105,000 and $210,000. The additional costs for city operations are projected to be between $10,000 and $20,000 per year.

- APC's activities continue to create impacts to the City's roads of about $4,000 to $7,000 per year during the 20-year period of well production.

Longer term, 2028-2037 (years 11 to 20)

- Production continues on APC's wells, but declines steadily. Production ends by 2037. Annual property tax revenues from APC's activities decline from about $700,000 to $1.2 million in 2028 to between $53,000 and $88,000 by 2038.

- The remaining quantifiable effects on the City stem from the more dispersed development pattern that resulted from APC's ownership of the parcels. Cumulative additional capital costs associated with serving the less densely developed city are about $232,000 to

$463,000 by 2037. Annual operational costs are between $22,000 and $43,000 higher by 2037 than they would have been without APC's activities.

- APC's activities continue to create impacts to the City's roads of between $4,000 and $7,000 per year during the 20-year period of well production.

- APC's parcels remain off limits to future development. This results in a cumulative total of between 253 and 506 fewer homes being built in the City, resulting in a population that is between 721 and 1,441 people smaller than current forecasts anticipate.

Cumulative impacts, 2018-2038 (years 1 to 20). BBC estimated the cumulative benefits and costs of APCs activities in the City from 2018 to 2038 (Figure II-1 to Figure II-4). Figure II-1 shows the cumulative benefits that the City is projected to collect through sales, property, and severance taxes over the 20-year duration of APC's activities. Note the delay in the City's collection of property tax revenue during the first three years as well as the subsequent decline in all three categories of tax revenues.

Figure II-1.
Cumulative Benefits of APC's Activities in Dacono 2018 to 2038

	Sales Tax Rev from APC workers		APC Property Tax		APC Severance Taxes		Total Benefits	
Year	Low	High	Low	High	Low	High	Low	High
2018	$1,023	$1,535	$0	$0	$0	$0	$1,023	$1,535
2019	$2,473	$3,709	$0	$0	$0	$0	$2,473	$3,709
2020	$0	$0	$0	$0	$0	$0	$0	$0
2021	$0	$0	$1,646,328	$2,743,880	$4,115	$6,863	$1,650,443	$2,750,743
2022	$0	$0	$4,064,372	$6,773,953	$10,169	$16,952	$4,074,541	$6,790,905
2023	$0	$0	$2,481,327	$4,135,544	$6,206	$10,347	$2,487,533	$4,145,891
2024	$0	$0	$1,950,835	$3,251,392	$4,877	$8,133	$1,955,712	$3,259,525
2025	$0	$0	$1,505,469	$2,509,115	$3,763	$6,275	$1,509,232	$2,515,390
2026	$0	$0	$1,162,905	$1,938,175	$2,905	$4,846	$1,165,810	$1,943,021
2027	$0	$0	$909,577	$1,515,962	$2,271	$3,789	$911,848	$1,519,751
2028	$0	$0	$708,447	$1,180,745	$1,767	$2,950	$710,214	$1,183,695
2029	$0	$0	$544,389	$907,314	$1,356	$2,265	$545,745	$909,579
2030	$0	$0	$414,722	$691,203	$1,032	$1,724	$415,754	$692,927
2031	$0	$0	$317,725	$529,541	$789	$1,319	$318,514	$530,860
2032	$0	$0	$247,801	$513,002	$614	$1,028	$248,415	$514,030
2033	$0	$0	$192,789	$321,315	$476	$798	$193,265	$322,113
2034	$0	$0	$150,422	$250,703	$370	$621	$150,792	$251,324
2035	$0	$0	$114,090	$190,150	$279	$470	$114,369	$190,620
2036	$0	$0	$88,238	$147,064	$215	$362	$88,453	$147,426
2037	$0	$0	$67,355	$112,258	$162	$275	$67,517	$112,533
2038	$0	$0	$52,551	$87,585	$125	$213	$52,676	$87,798
Total	**$3,496**	**$5,244**	**$16,619,342**	**$27,798,901**	**$41,491**	**$69,230**	**$16,664,329**	**$27,873,375**

Source: BBC Research & Consulting.

Figure II-2 shows the cumulative financial costs that the City is projected to experience during the 20-year period of APC's activities as a result of road impacts and increased costs to serve a more dispersed development pattern. Note that the cost of providing services increases over time as a result of an increased, but spatially dispersed, population.

Figure II-2. Cumulative Financial Costs of APC's Activities in Dacono

Note:

Service costs include both capital and service expenditures.

Total financial costs are the sum of road impact costs and increased services costs.

Source:

BBC Research & Consulting.

	Road Impact Costs		Increase in Service Costs		Total Financial Costs	
Year	Low	High	Low	High	Low	High
2018	$85,383	$142,305	$13,919	$27,837	$99,301	$170,142
2019	$46,491	$78,352	$27,837	$55,674	$74,328	$134,026
2020	$3,800	$7,200	$41,756	$83,511	$45,556	$90,711
2021	$3,800	$7,200	$51,866	$103,732	$55,666	$110,932
2022	$3,800	$7,200	$61,976	$123,952	$65,776	$131,152
2023	$3,800	$7,200	$72,087	$144,173	$75,887	$151,373
2024	$3,800	$7,200	$82,197	$164,394	$85,997	$171,594
2025	$3,800	$7,200	$92,307	$184,614	$96,107	$191,814
2026	$3,800	$7,200	$103,541	$207,082	$107,341	$214,282
2027	$3,800	$7,200	$114,775	$229,549	$118,575	$236,749
2028	$3,800	$7,200	$126,008	$252,016	$129,808	$259,216
2029	$3,800	$7,200	$137,242	$274,484	$141,042	$281,684
2030	$3,800	$7,200	$148,476	$296,951	$152,276	$304,151
2031	$3,800	$7,200	$163,079	$326,159	$166,879	$333,359
2032	$3,800	$7,200	$177,683	$355,366	$181,483	$362,566
2033	$3,800	$7,200	$192,287	$384,574	$196,087	$391,774
2034	$3,800	$7,200	$206,891	$413,782	$210,691	$420,982
2035	$3,800	$7,200	$221,495	$442,989	$225,295	$450,189
2036	$3,800	$7,200	$237,222	$474,443	$241,022	$481,643
2037	$3,800	$7,200	$252,949	$505,898	$256,749	$513,098
2038	$3,800	$7,200	$268,676	$537,352	$272,476	$544,552
Total	**$204,074**	**$357,457**	**$2,794,267**	**$5,588,533**	**$2,998,341**	**$5,945,990**

Figure II-3 shows the cumulative opportunity costs that the City is projected to experience during the twenty-year period of APC's activities as a result of the loss of development impact fees, commercial tax revenue, property tax revenue, and C-BT dedications.

Figure II-3.
Cumulative Opportunity Costs of APC's Activities in Dacono

Year	Loss of Impact Fees		Loss of Commercial Tax Revenue		Loss of Future Property Tax Revenue		Lost Value of CBT Dedications		Total Opportunity Costs	
	Low	High	Low	High	Low	High	Low	High	Low	High
2018	$84,443	$168,887	$10,473	$20,945	$8,457	$16,914	$271,276	$542,552	$374,649	$749,298
2019	$84,443	$168,887	$20,945	$41,890	$16,914	$33,828	$271,276	$542,552	$393,579	$787,157
2020	$84,443	$168,887	$31,418	$62,836	$25,371	$50,742	$271,276	$542,552	$412,508	$825,016
2021	$61,339	$122,678	$39,025	$78,050	$31,514	$63,028	$197,053	$394,105	$328,931	$657,861
2022	$61,339	$122,678	$46,632	$93,265	$37,657	$75,314	$197,053	$394,105	$342,681	$685,362
2023	$61,339	$122,678	$54,240	$108,479	$43,800	$87,601	$197,053	$394,105	$356,432	$712,863
2024	$61,339	$122,678	$61,847	$123,694	$49,943	$99,887	$197,053	$394,105	$370,182	$740,363
2025	$61,339	$122,678	$69,454	$138,908	$56,087	$112,173	$197,053	$394,105	$383,933	$767,864
2026	$68,154	$136,309	$77,907	$155,813	$62,912	$125,824	$218,947	$437,895	$427,920	$855,841
2027	$68,154	$136,309	$86,359	$172,718	$69,738	$139,476	$218,947	$437,895	$443,198	$886,398
2028	$68,154	$136,309	$94,811	$189,623	$76,564	$153,127	$218,947	$437,895	$458,477	$916,954
2029	$68,154	$136,309	$103,264	$206,528	$83,389	$166,779	$218,947	$437,895	$473,754	$947,511
2030	$68,154	$136,309	$111,716	$223,433	$90,215	$180,430	$218,947	$437,895	$489,033	$978,067
2031	$88,601	$177,201	$122,705	$245,409	$99,088	$198,177	$284,632	$569,263	$595,025	$1,190,051
2032	$88,601	$177,201	$133,693	$267,386	$107,962	$215,923	$284,632	$569,263	$614,888	$1,229,773
2033	$88,601	$177,201	$144,681	$289,362	$116,835	$233,670	$284,632	$569,263	$634,749	$1,269,497
2034	$88,601	$177,201	$155,669	$311,339	$125,708	$521,417	$284,632	$569,263	$654,610	$1,579,220
2035	$88,601	$177,201	$166,658	$333,315	$134,582	$269,164	$306,526	$613,053	$696,366	$1,392,733
2036	$95,416	$190,832	$178,491	$356,982	$144,138	$288,276	$306,526	$613,053	$724,571	$1,449,143
2037	$95,416	$190,832	$190,324	$380,649	$153,694	$307,387	$306,526	$613,053	$745,961	$1,491,921
2038	$95,416	$190,832	$202,158	$404,316	$163,250	$236,499	$306,526	$613,053	$767,350	$1,444,700
Total	**$1,630,048**	**$3,260,097**	**$2,102,470**	**$4,204,940**	**$1,697,818**	**$3,575,636**	**$5,258,460**	**$10,516,920**	**$10,688,796**	**$21,557,593**

Source: BBC Research & Consulting.

Figure II-4 shows the cumulative net gains and losses that the City is projected to experience during the 20-year period of APC's activities. The low scenarios reflect the net gains under the lowest possible tax revenues and the highest possible financial and opportunity costs and the high scenarios reflect the net gains under the highest possible tax revenues and lowest possible financial and opportunity costs. The City is better off when it considers only the direct financial costs that APC's activities will create relative to the revenues expected from those activities. When the broader set of opportunity costs are included in the cumulative benefit-cost calculation, the net benefits are positive under the high scenario but negative under the low scenario (Figure II-4). In both scenarios, the early years and the late years of APC's activities generate combined financial and opportunity costs for the City in excess of the revenue received in compensation.

Figure II-4.
Net Financial and Opportunity Costs of APC's Activities in Dacono

Note:

Financial costs include road impacts and costs of providing service to a more dispersed development pattern. Opportunity costs include: loss of developer impact fees; commercial tax revenue, residential property tax revenue; and C-BT dedications.

Source:

BBC Research & Consulting.

Year	Net Gain (Loss) with Combined Financial and Opportunity Costs	
	Low	High
2018	($911,750)	($472,415)
2019	($915,399)	($464,212)
2020	($915,750)	($458,078)
2021	$881,628	$2,366,132
2022	$3,258,005	$6,382,433
2023	$1,623,275	$3,713,559
2024	$1,043,733	$2,803,332
2025	$549,532	$2,035,336
2026	$95,665	$1,407,746
2027	($211,321)	$957,964
2028	($465,978)	$595,396
2029	($683,472)	$294,769
2030	($866,486)	$51,605
2031	($1,204,917)	($231,059)
2032	($1,343,947)	($282,355)
2033	($1,468,028)	($508,737)
2034	($1,849,432)	($613,991)
2035	($1,728,576)	($731,055)
2036	($1,842,356)	($818,181)
2037	($1,937,524)	($890,190)
2038	($1,936,598)	($952,042)
Total	**($10,829,694)**	**$14,185,958**

Observations

BBC has the following observations regarding the purely financial benefits and costs to Dacono (excluding the opportunity costs).

As is often the case with resource development projects and public finance, the timing of the receipt of the tax proceeds and the financial costs faced by the City are somewhat misaligned. During the first three years of APC's activities, the City is projected to incur expenditures that exceed the proceeds received from APC by about $46,000 to $162,000. During years 5 through 14 of the project, the City is projected to receive approximately $112,000 to $6.7 million more than it will spend to compensate for the impacts created by APC's activities. During the last 7 to 8 years of the project, the City may once again incur costs that exceed the proceeds received from APC by about $15,000 to $492,000. Beyond 2038, the residual effects of the APC project on the City currently appear to be entirely negative, particularly if APC does not relinquish the properties for alternative commercial or residential development.

From the narrow standpoint of the City's finances, the benefits from APC's planned project appear likely to substantially exceed the direct financial costs imposed by the project. However, the purpose of a local government is not merely to maximize its fund balances. If the City had a choice, it would likely prefer that APC had not purchased these key parcels for oil and gas development and that it could move forward in fostering the future vision for the City described in its 2017 Comprehensive Plan. However, the substantial property tax revenues likely to result from APC's project may provide opportunities for the City to enhance the quality of life for its residents, and the attractiveness of the City in other ways.

SECTION III.
Context for this Evaluation

This section provides background regarding the City of Dacono's (the City's) expectations and vision for its future (prior to the APC land purchase). The latter portions of this section describe Anadarko Petroleum Corporation's (APC's) plans, and a layman's description of how oil and gas activity normally proceeds over its various phases.

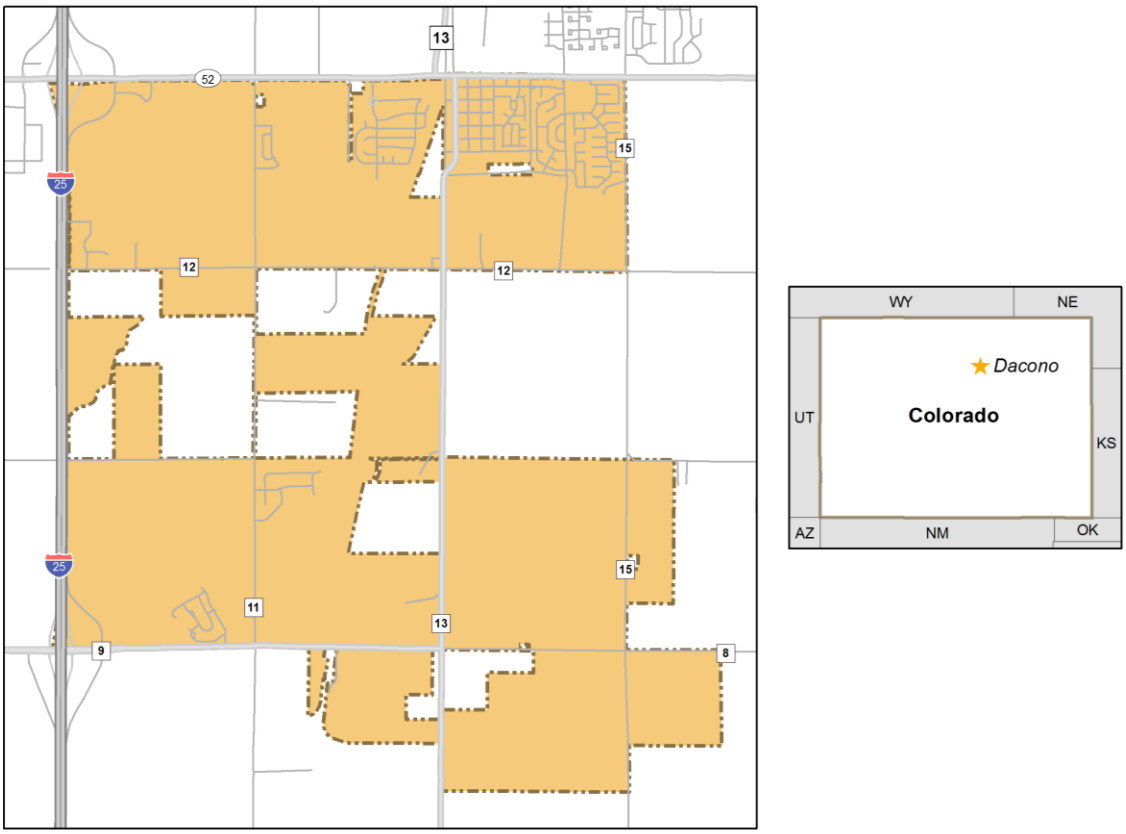
History of Dacono and Future Plans and Expectations

The City of Dacono was settled at the turn of the 20th century on the plains of Northern Colorado approximately 30 miles north of downtown Denver. Early inhabitants settled the City as a coal mining community. Over time, the City developed around the three pillars of coal mining, farming, and the railroad. The farms surrounding the City produced a variety of crops, including sugar beets, corn, wheat, grain, potatoes, and onions. The City's coal mines were also powerful economic engines for the City and operated from the early 1900's until the early 1970's, but coal production declined dramatically after natural gas was discovered under many parts of the City in what is today known as the Wattenberg Field[1].

The modern-day City (Figure III-1) covers a geographic area of approximately 8.2 square miles. The city of 5,090 residents (U.S. Census 2016) is located between the rapidly growing Denver Metro Area and Northern Colorado. The City is positioning itself to benefit from this growth by developing in ways that enhance specific dimensions of the City's character to appeal to current and future residents. The City has done this in part by concentrating growth along its northern boundary against Colorado State Highway 52 between York Street and Holly Street. The City planned on accommodating future growth in the northern part of its municipal boundary in order to maintain contiguous development patterns and enhance the character of the City. The City has also developed along its southwestern boundary, but to a lesser extent. There is a notable lack of development in the City's southeastern area that is partially due to the high cost of extending municipal services to this part of the city.

[1] The Wattenberg Field is a large area in north-central Colorado that covers more than 2,000 square miles. It contains large natural gas deposits and was one of the first places where hydraulic fracturing (i.e. fracking) was used to recover oil and natural gas.

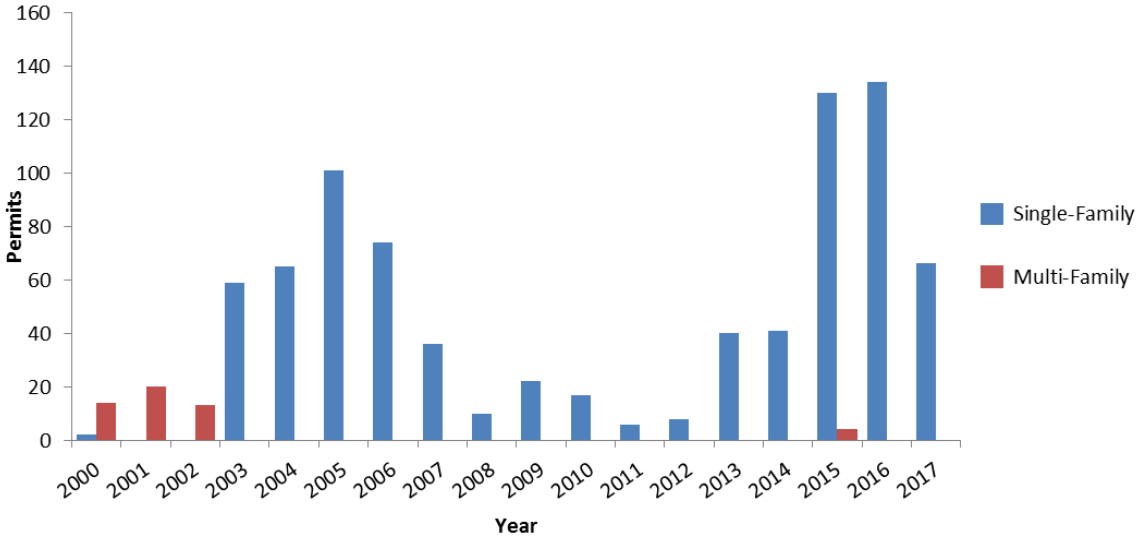
Figure III-1.
Map of the City of Dacono's Current Municipal Boundary



Source: ESRI, USGS National Transportation Dataset.

Housing. The City's housing stock has grown significantly over the last 15 years. In 2000, the City had 1,136 housing units, but by 2015 the housing stock had increased by 63 percent to 1,854 units (U.S. Census, 2000; 2015). The number of building permits issued in recent years reflects developers' continued interest in the City (Figure III-2). The City remains one of the few relatively affordable areas along the Front Range for purchase of a single family home. As a result, single family homes account for more than 50 percent of the City's housing stock. Mobile homes and multi-family residences are also common in the City and account for the remaining 50 percent of residential housing stock. According to the American Community Survey, more than 40 percent of the homes in the City were valued between $200,000 and $500,000 in 2016. BBC conducted an analysis of the multiple listing service (MLS) database of home sales in newly developed parts of Dacono in 2017. The analysis showed that the median price of the 155 homes sold during that time was $339,000.

Figure III-2.
Building Permits Issued by the City of Dacono, 2000 to 2017



Note: Between 2000 and 2017, the City of Dacono issued a total of 811 single family home building permits and 51 multi-family development building permits. More building permits were issued in 2015 and 2016 than in any other two-year period in the last 17 years.

Source: City of Dacono Department of Community Development

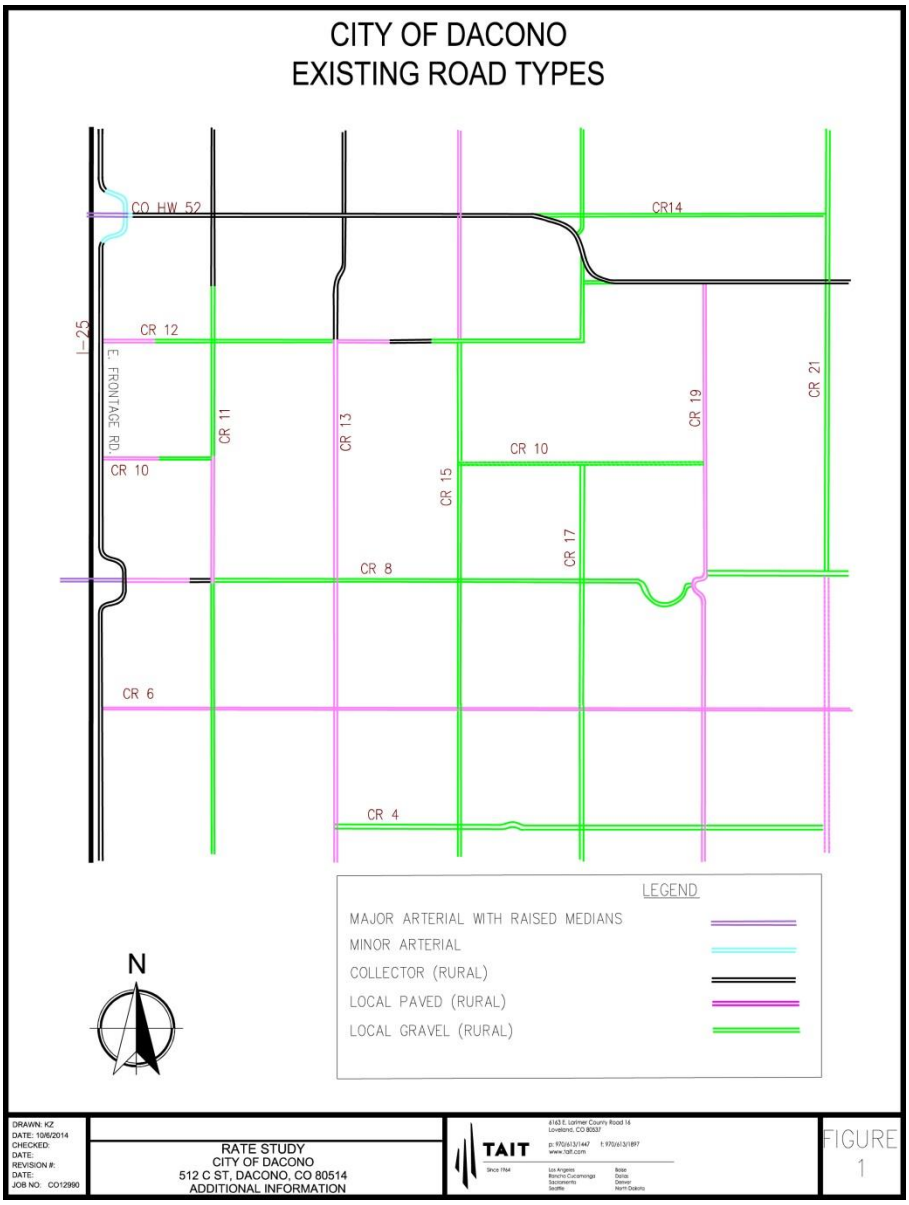
City finances. Despite its rapid growth, the City has maintained a strong fiscal position. The City uses seven different funds to provide services to the community and make capital investments in infrastructure. The city manages a general fund, a water fund, a street fund, a capital equipment fund, a conservation trust fund, an economic development authority of Dacono fund, and an impact fee fund. At the end of the 2016 fiscal year, the combined funds collected total revenues of $9.4 million against expenditures of $7.3 million. Despite running a small deficit, the combined fund balance at the end of the FY 2016 was $9.2 million. The City's reserves demonstrate the City's fiscal health and ability to invest in projects and activities that help realize the City's long term vision.

City road network. The City manages approximately 60 miles of roadway inside the City's current boundary (Figure III-3). Most of the roads managed by the City are defined as local paved roads, which are 2-lane paved roads with a paved width of less than 40', and local gravel roads, which are defined as 2-lane gravel roads with a width of approximately 24'. Local paved roads include Colorado Boulevard between Grandview Boulevard and Summit Boulevard. Local gravel roads include parts of Holly Street and Summit Boulevard, east of York Street. The City also manages several miles of rural collector roads, which are roadways with a width of 40' or more with no sidewalk. Rural collector roads include the East Frontage Road, which runs parallel to I-25, and State Highway 52, which is maintained by Weld County. The City also manages two short sections of major arterial roads, which are 4-lane paved roads with raised medians. The City has spent between $858,320 and $1.8 million on road maintenance and construction each year during the last three years.

Figure III-3.
City of Dacono's Existing Road Network and Road Types

Source:

Tait and Associates; City of Dacono Rate Study CO1299B.



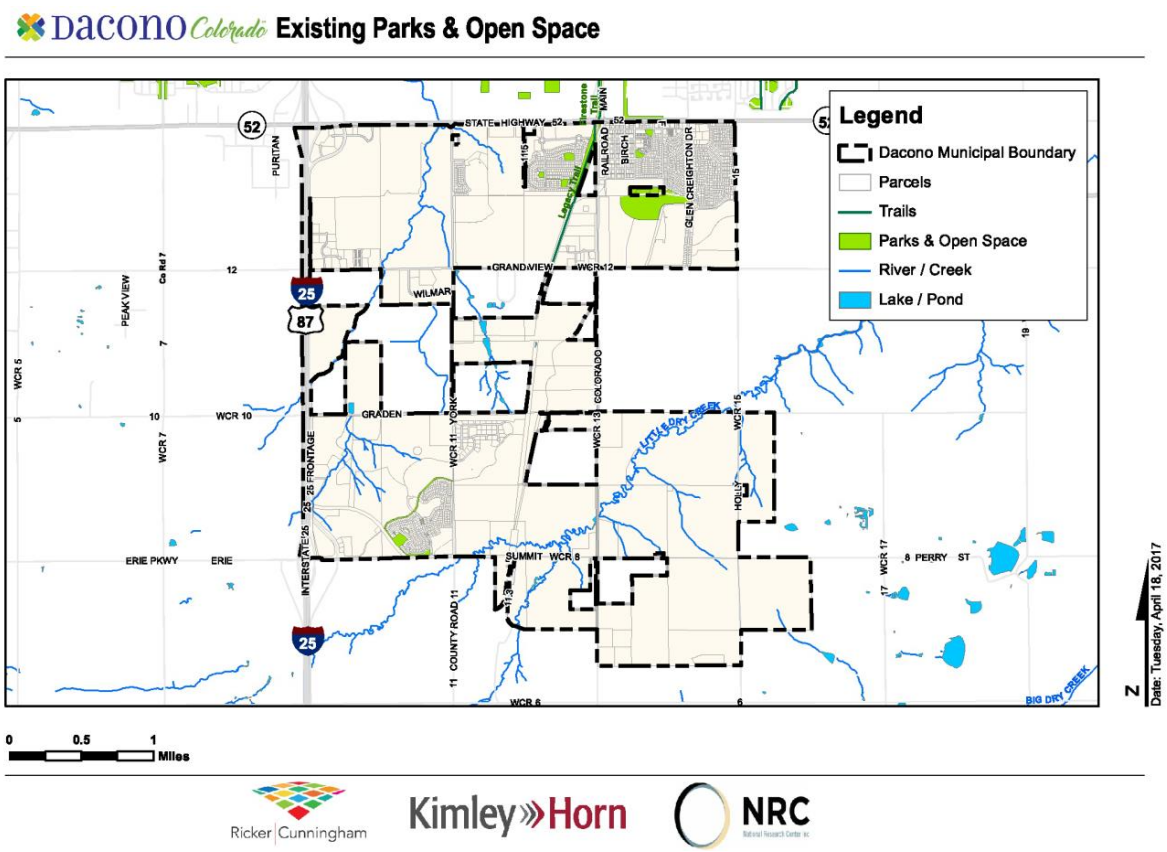
Water. The City was among the northern Front Range communities that BBC Research & Consulting (BBC) analyzed as part of our studies regarding water dedication and/or cash-in-lieu requirements for Greeley and Fort Collins. The City is also a Northern Integrated Supply Project (NISP) participant. Under the terms of its water service agreement with Central Weld Water Conservancy District (CWCWD), the City is responsible for providing raw water supplies, while CWCWD treats the water and provides it to master meter(s) in the City. The City then distributes the water to its customers.

The City has historically relied on new development to dedicate Colorado-Big Thompson (C-BT) units to provide for its raw water requirements. However, the supply of C-BT units available to transfer (generally from agricultural C-BT owners) is dwindling rapidly, and the price of C-BT units has more than tripled since 2012 to a current value of at least $26,000. Consequently, the City has joined 14 other small and mid-size communities in the Northern Front Range in

sponsoring the proposed NISP project. The City has subscribed for 1,250 acre-feet of firm yield from the NISP project, enough water to serve approximately 2,500 future homes. However, water from NISP will also be expensive, and the capital costs for the City's share appear likely to be in the range of $30 million to $35 million. New development is expected to play a critical role in financing the City's NISP commitment by paying cash-in-lieu of water rights dedication.

Parks, trails, and open space. There are approximately 178 acres of open space in the City, including landscaping, drainage, and parks, most of which is located near the City's existing residential developments in the northern part of the City's municipal boundary (Figure III-4). Parks compose 18 acres of the 178 acres of open space in the City. Three parks are owned and maintained by the City, and four parks, all of which are smaller than the City-owned parks, are owned by homeowners associations (HOAs). The City's primary park is the 11.5-acre Clem Dufour Park, which is located in the city center between SH 52 and Grand View Boulevard. The park features a number of amenities, including a BMX track, a splash pad, and baseball fields. The City's plan to improve its outdoor recreation amenities includes upgrades to the BMX track; additional sporting fields at Clem Dufour Park; a splash pad; a skate park and roller hockey facility; and an indoor soccer and football facility.

Figure III-4.
Parks and Open Space in Dacono



Note: Most of the Dacono's parks and open space are located in the northern part of the City, near previous development and 3 of APC's parcels.

Source: City of Dacono Parks and Trails Master Plan, 2008.

The City's goal is to provide 7.5 acres of park area per 1,000 residents. Based on 2015 American Community Survey population estimates, the City currently supplies 3.98 acres of park space per 1,000 residents.

Current oil and gas production. The City, like much of Weld County, has a history of oil and gas production that began in the 1970s and continues to this day. According to data retrieved from the Colorado Oil and Gas Conservation Commission (COGCC), there are currently 179 active wells in the City, of which approximately 39 percent have been established since 2010 (Figure III-5).

Figure III-5.
Oil and Gas Wells in Dacono as of 2017

Well sites in Dacono	Count	1970 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to present
Currently active						
Producing	106	58	12	7	7	22
Shut-in*	65	3	4	10	6	42
Temporarily abandoned	7	1	2	0	0	4
Waiting on completion	1	0	0	0	0	1
Total	**179**	**62**	**18**	**17**	**13**	**69**
Currently inactive						
Plugged & abandoned	36	34	2	0	0	0
Dry & abandoned	4	4	0	0	0	0
Abandoned location	20	4	2	5	5	4
Total	**60**	**42**	**4**	**5**	**5**	**4**

Note: (*) Shut-in denotes wells that are capable of producing but are not currently active, often due to labor or equipment

Source: Colorado Oil and Gas Conservation Commission.

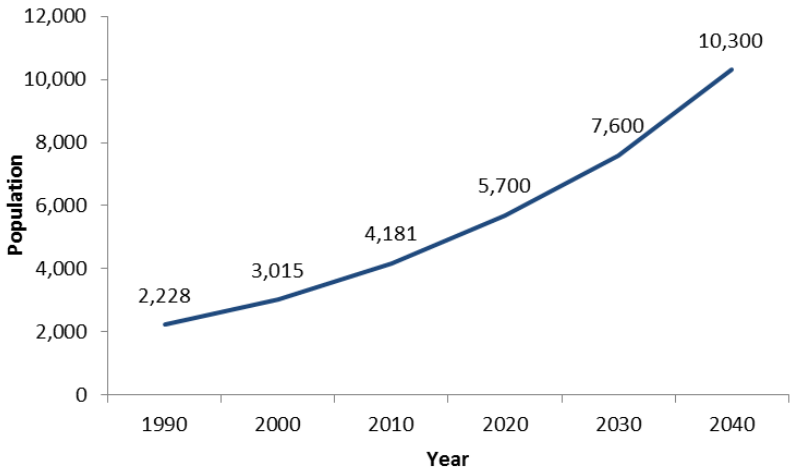
The well development being proposed by APC is not a new phenomenon to the City, which as Figure III-5 shows, has a recent history of oil and gas development. It is the location, density, and land purchase associated with APC's proposed activities that are unprecedented in the City and the cause of the City's concern.

Future vision. Over the next four decades, the population of Northern Colorado is expected to grow significantly, continuing an ongoing trend. Many of the communities in Weld County, including the City, experienced rapid population growth between 1990 and 2010 (Figure III-6) even though the rate of growth slowed towards the end of that period due to the national recession that began in 2008. Overall, the average annual population growth for Weld County during this time was 3.3 percent, while the City grew at an average annual rate of 3.2 percent. Population forecasts produced for the NISP, a proposed water storage project in Northern Colorado, suggest that the region's population will continue to increase over the next several decades. The City is attempting to position itself to capture part of this growth while also developing in a manner that is consistent with the vision of the City and its residents. Estimates suggest that the City's population will continue to grow quickly at roughly a 3 percent annual rate over the next 25 years, eventually reaching 10,300 people by 2040 (Figure III-6).

Figure III-6.
City of Dacono Historical and Forecasted Population, 1990 to 2040

Source:

U.S. Census 1999, 2000, 2010; City of Dacono and Harvey Economics projections for NISP EIS.



As part of its strategy, the City released its Dacono Forward Comprehensive Plan (the Plan) in 2017. The Plan was the outcome of a process that engaged City residents, property and business owners, and representatives to lay out a vision for the City's future development for several decades to come. The Plan is an important guiding document for the City because it is designed around a set of goals, objectives, and ideas that are meant to leverage and enhance the City's best attributes to attract future residents and businesses. APC's activities present challenges for many of the City's goals and objectives described in the Plan:

- Creating connections between neighborhoods and existing and new public and open spaces … and a growing number of civic and recreational facilities;
- Developing a new Old Town Center;
- Expanding commercial offerings and services by incorporating them into neighborhood centers (2017 Dacono Forward, page 14);
- Setting high aesthetic standards for new development; and
- Creating a sustainable tax base.

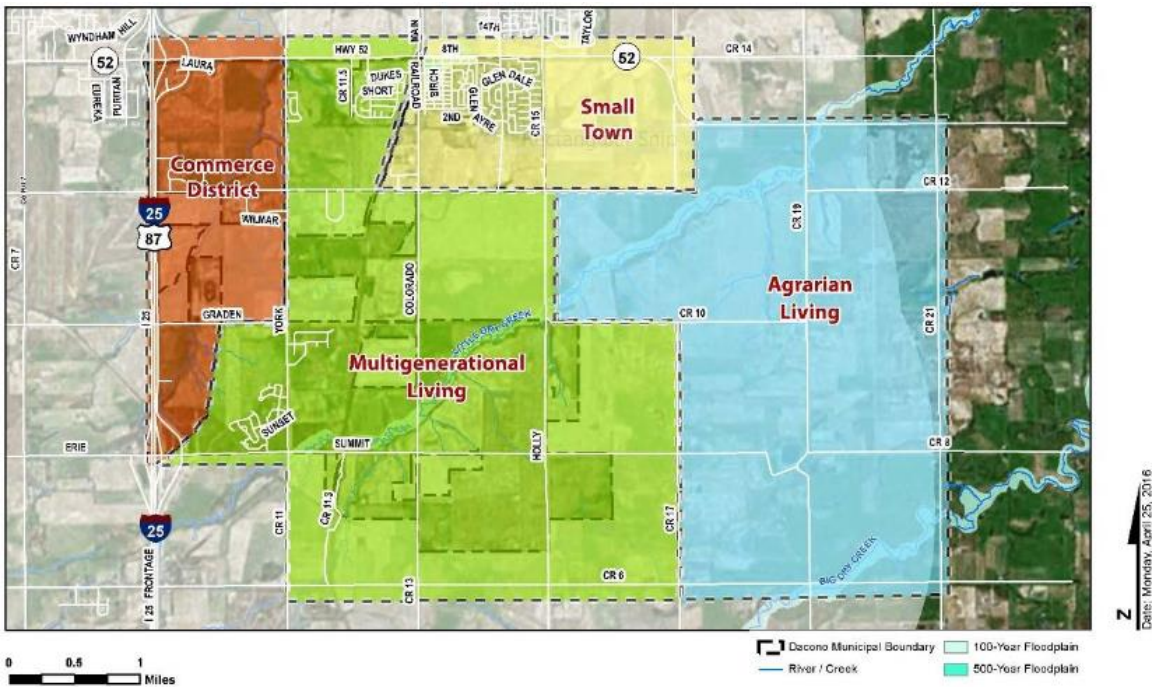
Further goals identified in the comprehensive plan that may be disrupted by APC's activities include:

- Creating a supportive environment for business growth in close proximity to both residential and non-residential uses; and
- Managing and directing growth in a fiscally prudent manner (2017 Dacono Forward, page 38).

In general, the Dacono Forward Comprehensive Plan describes a future in which new development, and redevelopment of underutilized parcels within the City, creates four distinctive districts (Figure III-7). These would include the Commerce District, concentrated along the western and northwestern edges of the City; the Small Town District, building on the

existing urban core along the City's northern and northwestern edges; the Multi-Generational Living District, comprising the central and south-central portions of the City; and the Agrarian Living District, encompassing the City's eastern and southeastern lands.

Figure III-7.
Development Districts in Dacono



Source: Dacono Forward Comprehensive Plan Update, 2017.

The districts were identified based on their strategic potential to create a strong sense of place in line with the City's values and with the overarching goal of creating a community physically connected through thoughtful, deliberate, and contiguous development. To support this vision, the City planned on developing along its northern boundary where previous development has already occurred. As part of this effort, City planners designed gateways into each district along with new areas of parks, open space, trails, and recreation facilities. Non-vehicular connections, roads, and other transportation improvements were also included in the plans for each district to further build a sense of community, simplify mobility, and attract future residents.

For example, the Dacono Parks, Trails, and Outdoor Recreation Master Plan discusses the City's plans for establishing a network of parks and trails throughout the city in order to foster a small town sense of community and create a higher quality of life based in part on the ease of walking or biking from one part of the city to another. The City has plans to establish 19 parks and approximately 20 miles of trail as part of its plan. The vision of the 2008 Parks, Trails, and Outdoor Recreation Master Plan and the 2017 Comprehensive Plan is to unite the City's trail segments with projects such as the Legacy and Dry Creek Trails and a cohesive Dacono Loop Trail. APC's parcels physically separate the City, making it more difficult to develop trails and parks that connect the City's neighborhoods.

APC's Purchase of Land and Planned Oil and Gas Activities

In 2017, APC purchased approximately 500 acres within the City for near term oil and gas development.

Description of parcels owned by APC. APC plans on developing four well pads and 73 oil and gas wells on four parcels within the City (Figure III-8):

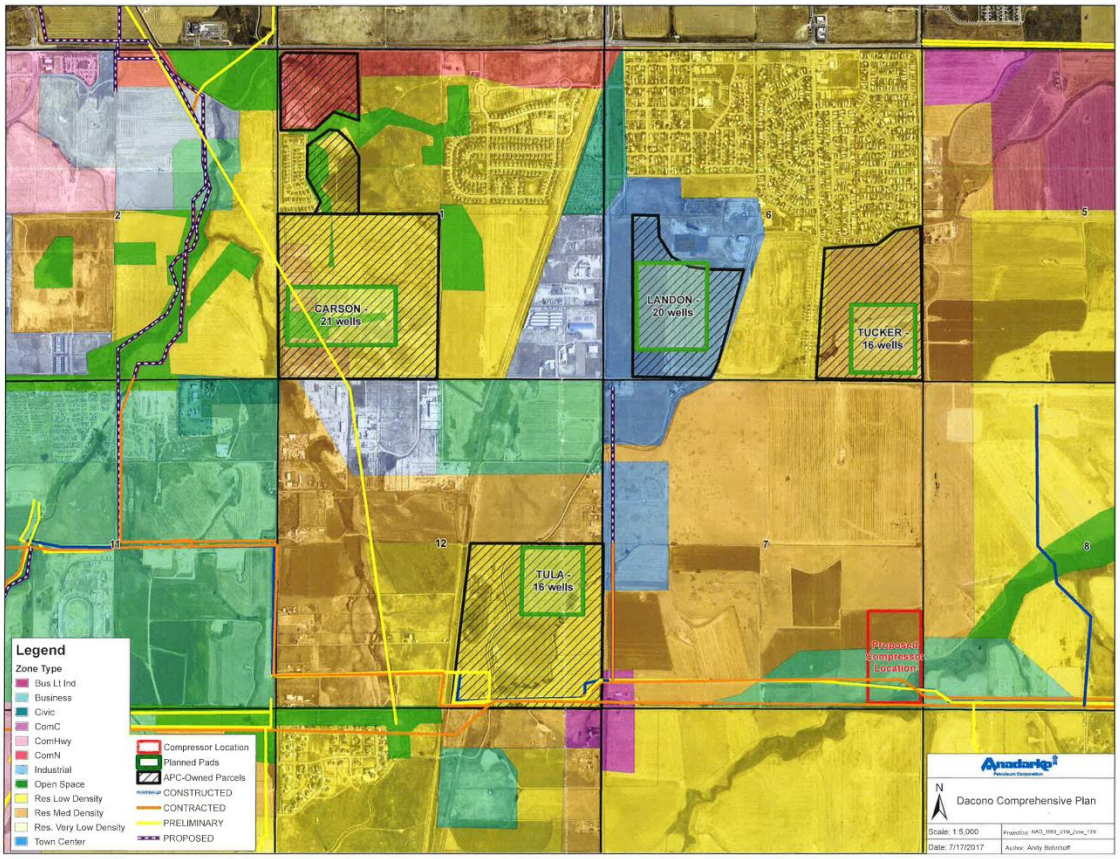
- **Carson parcel:** Located in the City's Multigenerational Living District, covers an area of approximately 211 acres in the northwest of the City's municipal boundary. The site is currently undeveloped, although a developer did submit plans to the City for a residential development known as Legacy Park that was not yet developed.

- **Landon parcel:** Located in the City's Small Town District, covers an area of approximately 71 acres. The Landon parcel borders several of the City's parks and community facilities, including the water park, baseball fields, large grass athletic field, an entertainment facility, and the BMX track.

- **Tucker parcel:** The parcel covers an area of approximately 82 acres in the City's Small Town District. The parcel shares its northern edge with an area of relatively dense residential development. New residential development is also occurring near the site.

- **Tula parcel:** The parcel is the southernmost of APC's four parcels. It is bordered on the west by a decommissioned rail line and it also contains a portion of the City's Legacy Trail. The parcel was originally zoned for mixed use development. A developer had previously submitted plans for the proposed Miller Ranch development, but the project was not yet developed.

Figure III-8.
Parcels Owned by APC in the City of Dacono



Note: The green boxes contained within each parcel outline the approximate location of the well pads that will be built by APC.
APC's parcels are displayed with dark black boundaries and cross hatching

Source: APC.

General description of oil and gas activities. Recent advances in drilling technology have made the extraction of oil and gas in the Wattenberg Field economically attractive. These advances are hydraulic fracturing (i.e. fracking) and horizontal drilling. The process of hydraulic fracturing involves pumping water mixed with sand and proprietary fracking fluids into rock formations under high pressure to fracture the rock and release the oil and gas contained within it. Horizontal drilling increases the size of the production zone. For example, a horizontal formation that is 50 feet thick would only be exposed to 50 feet with a vertical well, but a horizontal well would be exposed to a longer length of the formation, increasing oil and gas production.

Once APC begins developing their parcels, there are five stages in the development and operation of multi-well oil and gas pads:

- **Pad construction:** The first stage of development is the construction phase. In the construction phase, crews build a road to the drilling site and construct a well pad. This process requires building a gravel road and grading a pad site generally three to five acres in area. Pad sites may contain anywhere from one to twenty wells, and the total size of the

pad will depend on the number of wells planned for that location. Typical pad sites can take from one to two weeks to construct.

- **Drilling:** The next stage of development is the drilling stage. This stage requires one drilling rig to drill the well bores into the earth and continue horizontally in the direction of the intended extraction locations. A single rig generally drills all wells on the pad consecutively. In the City area, typical wells reach vertical depths of between 6,000 to 8,000 feet, and can extend up to two miles horizontally into the shale formation. New drilling technologies and techniques allow oil and gas companies to drill these wells in about two weeks on average.

- **Completion:** Once drilling is complete, the workers use a fracking gun to penetrate through the well casing and fracture the shale at the furthest depths of each well. Next, a highly pressurized mixture of water is pumped into the fractures starting at the deepest end of the well. The fracking fluid flows through the fractures and begins to crack the shale along natural weaknesses in the rock. During this stage, between three and five million gallons of water are pumped at high pressures into the shale and then subsequently retrieved. The completion stage can take about one week, depending on the depth and horizontal extension of the well.

- **Production:** Once the wells are complete, the well pad transitions to the production phase of pumping oil or gas and produced water from the wells for storage, disposal, or distribution. As oil and gas is pumped from each well, the contents are sent to machines that separate the oil, gas, water, and other gases. The produced water is either released into evaporative ponds or injected into underground injection wells, which often requires transport by pipeline or truck. In areas of highly clustered energy development, pipelines may be constructed to transport energy and produced water away from the site to common holding or distribution facilities.

- **Reclamation:** Once the productive life of the wells has been exhausted, the well pads are reclaimed and restored to their semi-native state with plant species that are suitable for the local area. In some cases, pads may be reclaimed to enhance habitat for wildlife or to provide other types of amenities valued by the community.

APC's parcel development plans. APC plans to develop a combined 73 wells across all four parcels beginning in 2018 (Figure III-9). Each well is anticipated to produce oil and gas over a period of approximately 20 years. The majority of APC's well development activities will occur in 2018, during which the company plans on developing 54 wells across its four parcels. At the end of 2018, the Tucker and Tula parcels will contain the largest density of wells (16 wells each), but by 2019 the well densities on the Carson and Landon parcels will increase to 21 and 20 wells per parcel, respectively. In total, development of all four parcels is projected to take approximately 18 months from beginning to end (APC 2017).

Figure III-9.
APC Well Development Plan for Each Parcel in the City of Dacono

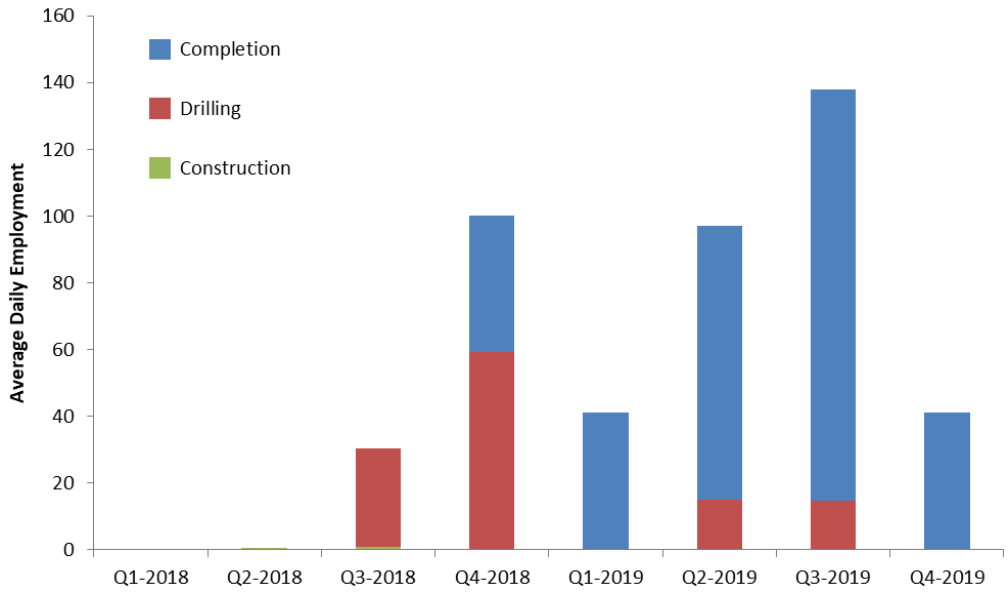
Source:
APC.

Parcel	Development Timeline	Completed Wells 2018	Completed Wells 2019	Total
Carson	Q2 2018 - Q1 2019	13	8	21
Landon	Q1 2019 - Q4 2019	9	11	20
Tucker	Q3 2018 - Q2 2019	16	-	16
Tula	Q3 2018 - Q2 2019	16	-	16
Total		**54**	**19**	**73**

Workforce. During the development of each pad, APC will employ a workforce of between six and 90 employees per pad. In total, APC's pad development activities will bring between 24 and 360 employees to the City each day during the 18 month development phase. During the construction phase of pad development, APC anticipates each pad will be staffed with approximately six employees, although the exact number may vary. Once pad development reaches the drilling phase the workforce will expand to approximately 24 employees who will work in two shifts of 12 workers. During the completion phase, 90 employees will work on the pads in two shifts of 45 workers.

Figure III-10 depicts the estimated size of APC's (and its contractors') workforces during the pad construction, drilling, and completion phases. The workforce is currently projected to peak at almost 140 workers per day in the third quarter of 2019.

Figure III-10.
Projected Daily Workforce During APC Well Development and Completion



Source: BBC based on information provided by APC.

Water. The drilling and completion phases of well development are water intensive activities. APC has plans in place to meet its water needs by using a temporary above-ground pipeline system that will bring water to each pad site. APC will remove produced water (i.e. water that

has been used during the drilling and/or production phase) from the site via truck so it can be properly disposed of. APC will not rely on the City to treat any produced water.

Roads. APC's activities will make significant use of the City's road network to access its sites. APC will support a fleet of vehicles that will be needed to develop the company's parcels over the 18 month development period. These vehicles include: pickup trucks and passenger vehicles; tandem trucks; semi-trucks with trailers; and trucks hauling oversized loads. The types of trucks and number of trips required during each phase of development vary according to each parcel, but generally 2,000 truck trips are needed during the construction phase, 2,000 truck trips are needed during the drilling phase, 7,900 truck trips are needed during the completion phase, 1,700 truck trips are needed during the production facility construction phase, and 1,000 truck trips are needed during the reclamation phase.

Land disposal. Once the wells are completed and production begins, APC may dispose of some of the land belonging to each parcel. Currently, APC is evaluating the disposal of 55 acres from the northwest section of the Landon parcel. At a minimum, the City is requesting a right-of-way be preserved to guarantee connectivity of two planned residential subdivisions to a major collector road.

SECTION IV.
Negative Effects for Dacono from APC's Activities

Oil and gas production and hydraulic fracturing can impose costs and adverse impacts on the City of Dacono (the City) and its residents. Potential adverse effects include impacts to environmental quality; human health and safety; the "quiet enjoyment" of residential properties; and effects on the manner in which the City develops in the future. For example, increased truck traffic and noise would occur during pad construction and well development and would cause deterioration to City streets. Well pad construction sites may be large and unattractive, and fracturing can be a cause for concern among local residents. In April 2017, an explosion believed to have been caused by an oil and gas flowline killed two residents in nearby Firestone. Such extreme incidents are rare, but the City may incur costs to mitigate other impacts or enforce protective measures like buffer zones or erecting physical barriers between oil and gas infrastructure and city residences. Given the location of the parcels Anadarko Petroleum Corporation (APC) plans on developing, the company's activities are likely to create a number of negative impacts for the City. The most prominent impacts may include:

- Impacts of energy-related traffic on roads and cost of road service (primarily during the drilling and development phase).
- A short-term impact in the quiet enjoyment of their homes for nearby property owners and a corresponding impact on their property values during well drilling and completion activity.
- The need for the City and its residents to modify their plans for the City's future, as expressed in Dacono's 2017 Comprehensive Plan. For example:
    - Need to reroute/relocate planned community trails, recreational facilities, gateways, and other community amenities and connectors – generally at an increased cost.
    - Fostering more dispersed development in the City, resulting in higher costs to provide infrastructure and services.
    - Potentially reducing the attractiveness of the City for residential and commercial developers, and new residents and businesses.
- Potential reduction in anticipated residential and commercial growth in the City.
- Corresponding reduction in water dedication (or cash-in-lieu payments) and increase in the cost of future development due to higher costs of obtaining water service.

Impact on Transportation Infrastructure

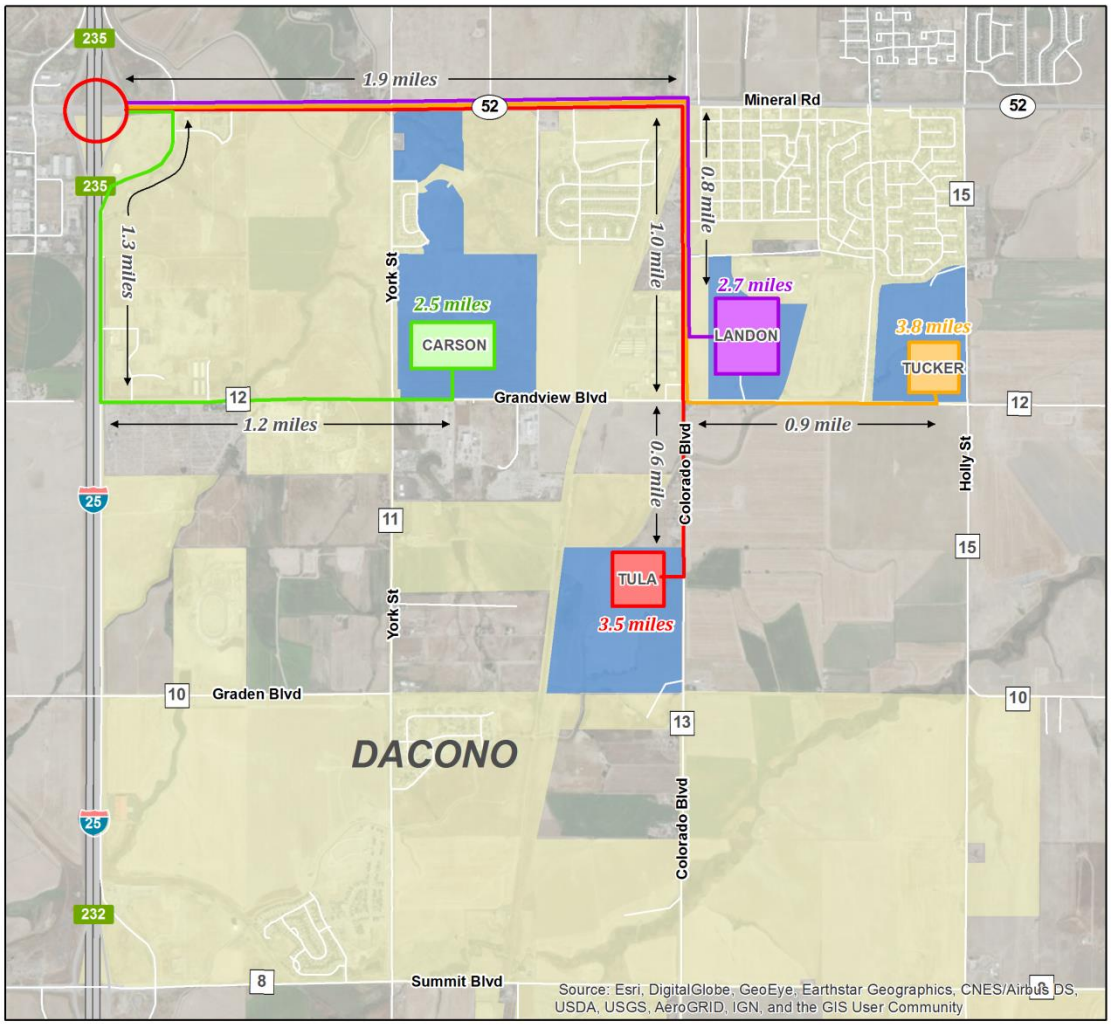
APC's proposed activities within the City are likely to impact the City's network of roadways by increasing the number and size of vehicles using the City's roads. Oil and gas development requires the transport of heavy equipment to the well site to build access roads, construct well pads, and transport drilling rigs. Heavy trucks may also be required to bring fresh water to the well site and remove produced water and extracted resources off site. The number of trips that are required to develop a site and produce oil and gas depends on the number of wells located on each pad. The trips required to develop APC's parcels will incrementally decrease each road's service life. The actual impact will depend on the road's surface condition, including the surface type and the remaining service life, as well as the Equivalent Single Axle Load (ESAL) of each vehicle.[1]

Estimated additional road maintenance costs. BBC developed a simple model to estimate the impacts and associated costs of APC's activities on the City's road network (Figure IV-1). The City is accessed from I-25 by a northern and a southern exit. However, trucks will access the parcels from the northern exit since Summit Boulevard (WCR 8) does not permit construction traffic. The northern exit is located at the intersection of I-25 and State Highway 52, which is maintained by Weld County.

All of APC's parcels will be accessed from the intersection of I-25 and Highway 52 (Figure IV-1). Figure IV-2 shows the distances APCs vehicles will likely travel on the County's and City's roads to access each parcel. In total, APCs vehicles are projected to use approximately 6.3 miles of the City's roads to access their parcels (Figure IV-2). APC's vehicles are projected to travel approximately 50 percent of their miles on the City's paved roads, like Colorado Boulevard and Grandview Boulevard. APC's vehicles are also projected to use approximately 1 mile of the City's local gravel roads.

[1] The ESAL is a concept developed by the American Association of State Highway Officials to measure the relationship between axles carrying different weights and the amount of damage they cause to road surfaces.

Figure IV-1.
Map of Roads Likely to be Impacted by APC's Activities in Dacono



Note: BBC assumed trucks would use the route with the shortest distance from the interstate to the well pad of each parcel.

Source: BBC Research & Consulting.

Figure IV-2.
Distance Traveled on Dacono's Road Network by APC's Vehicles

Parcel	Origin/Destination of Trucks	County Road Type	City Road Type			Total City Road Use	Total City and County Road Use
		Rural Collector	Rural Collector	Local Paved	Local Gravel		
Carson	I-25 & HWY 52	1.3	-	0.6	0.6	1.20	2.50
Landon	I-25 & HWY 52	1.9	0.8	0.8	-	1.60	3.50
Tucker	I-25 & HWY 52	1.9	1.0	0.5	0.45	1.90	3.80
Tula	I-25 & HWY 52	1.9	1.0	0.6	-	1.60	3.50
Total		**7.00**	**2.80**	**2.45**	**1.05**	**6.30**	**13.30**

Note: Mileage estimates were calculated in GIS based on Figure IV-1.

Source: BBC Research & Consulting.

APC estimated the number of trips that the company's vehicles will need to make beginning with the construction phase and ending with the reclamation phase of development for each parcel (Figure IV-3). Each of APC's parcels will require between 13,245 (Tula parcel) and 15,959 (Carson parcel) truck trips to develop pads and wells according to APC's production plans. Semi-trucks with trailers will make the most trips (19,563 in total). Pickup trucks generate the second largest number of trips (16,222 in total). Tandem trucks, which are defined as any truck with a single front axle and double rear axles, need to make between 1,837 and 2,055 trips to develop each pad. Oversized loads, which are defined as truck loads that exceed the standard legal size and weight limits for a specified portion of road, will be used for approximately 543 trips.

Figure IV-3.
Vehicle Trips by Type Required to Develop APC's Well Pads

	Truck Type				
Parcel	Pickups	Tandem Trucks	Semi with Trailer	Oversized Load	Total
Carson	6,505	2,055	7,199	200	15,959
Landon	6,202	2,012	7,011	195	15,420
Tucker	5,041	1,844	6,297	174	13,356
Tula	4,979	1,837	6,255	174	13,245
Total	**16,222**	**5,693**	**19,563**	**543**	**57,980**

Source: APC.

The impact that each trip will have on the City's roads depends on the ESAL of each truck as well as the number of ESALs a given stretch of road is designed to accommodate before it needs to be repaired. Larger ESAL factors are associated with greater impacts to a roads surface. Tandem trucks, which are trucks with a single front axle and two rear axles, have an ESAL factor of approximately 1.009. Oversized loads, which are defined as truck loads exceeding the standard legal size and weight limits for a specified portion of road, have the highest ESAL factor (approximately 1.362) of the vehicles APC plans to use as part of its activities. Semis pulling trailers have an ESAL of approximately 1.043 and pickup trucks have an ESAL of 0.15. Multiplying the ESAL for each vehicle by the number of trips each vehicle is projected to make yields the total impact that each vehicle will likely have on the City's roads over the course of APC's activities.

According to a 2014 Road Impact Fee Rate Study conducted for the City, the roads in the City fall into three categories: rural collectors, local paved, and local gravel roads. BBC worked with Felsburg, Holt and Ullevig to estimate the design ESALS for roads in the City of Thornton as part of a previous project to calculate the potential road impacts from oil and gas development. The study quantified the design ESALs for different types of roads, including rural collectors and local paved roads, using information from the City of Thornton and the Colorado Department of Transportation. Rural collectors are the busiest roads in the City and are designed to handle more traffic than local paved or gravel roads. As such, they have a design ESAL of approximately 547,500. Local paved roads, in contrast, have a design ESAL of 73,000. Gravel roads do not have an ESAL factor, but increased use may increase the frequency with which the gravel road needs to be graded, have gravel applied, and have dust suppressed.

When the impact of APC's activities are calculated on a one-mile equivalent basis, the results show that APC's activities on the Landon parcel will consume approximately 2 percent of the life-span of the rural collector road used to access the site (Figure IV-4). APC's activities to develop the Tucker and Tula parcels are each projected to consume approximately 1.7 percent of the rural collector road's lifespan. The activities to develop each parcel are projected to consume between 12.8 percent and 14.8 percent of the local paved road's one-mile equivalent lifespan.

Figure IV-4.
ESALs Used by APC During Pad Development of Parcels in the City of Dacono

Source:
BBC Research & Consulting.

Parcel	Total Pad ESAL	Road Type		
		Rural Collector	Local Paved	Local Gravel
Carson	10,830		14.8%	N/A
Landon	10,538	1.9%	14.4%	N/A
Tucker	9,422	1.7%	12.9%	N/A
Tula	9,361	1.7%	12.8%	N/A

The total fiscal impact of APC's pad-development activities on the City's roads can be found by multiplying the single-mile replacement costs of each road type by the percent of the one-mile equivalent road life that will be consumed by APC's vehicles. According to the Colorado Department of Transportation, in 2011, replacing 1 mile of a two-lane rural collector road would cost an estimated $1.1 million. In 2017 dollars, the estimated cost increases to $1.3 million per mile. In 2014, the City commissioned a study to estimate the cost of upgrading its road network. The study found that the cost of updating local paved roads was $192,937 in 2017 dollars. Oil and gas vehicles increase the amount of servicing required by unpaved roads. A 2011 study by BBC, conducted on behalf of Douglas County, found that the average cost of maintaining an unpaved road goes up by $54,174 in 2017 dollars when oil and gas vehicles use it to access and develop a pad and wells.

In total, APC's activities to develop all four well pads will create between $128,000 and $213,500 in road impacts during the 18 month pad development phase (Figure IV-5). During the 20-year production phase, APC's activities will create annual road impacts in the City between $3,800 and $7,200 each year. During the production phase, the number of trips required to service the wells declines significantly. Given the relatively low frequency of truck trips during the production phase, we assume the costs of maintaining gravel roads are unaffected by APC's activities.

Figure IV-5.
Short and Long Term Road Impact Costs Due to APCs Activities in the City of Dacono

Parcel	18 Month Pad Development Impacts			Annual Impacts During Production		
	Low	Middle	High	Low	Middle	High
Carson	$25,335	$33,780	$42,225	$755	$1,006	$1,258
Landon	$31,295	$41,726	$52,158	$932	$1,243	$1,988
Tucker	$43,974	$58,632	$73,290	$1,310	$1,746	$1,988
Tula	$27,470	$36,627	$45,784	$818	$1,091	$1,988
Total	**$128,074**	**$170,765**	**$213,457**	**$3,814**	**$5,086**	**$7,222**

Source: BBC Research & Consulting.

Impact on Residential Property Values

Another potential concern regarding APC's plan to develop more than 70 oil and gas wells on properties within the City is whether the development of these wells will affect the value of nearby properties within the City. Effects on nearby property values could impact the City's property tax revenues in the short-term and could affect the financial wellbeing of some current City residents.

The effect of oil and gas development on local property values has been discussed and evaluated for a number of years, in a variety of locations across North America. Attempts to isolate and quantify this effect have included "hedonic" property value studies based on statistical analyses of market transactions in areas with extensive oil and gas development activity and other methods including sales comparison analyses and surveys of prospective homebuyers and realtors.

Until recently, most of the statistical analyses have focused on more rural areas with large lot development patterns (such as rural La Plata County, Colorado; rural areas of Garfield County, Colorado; and rural areas in Pennsylvania and Alberta, Canada). These earlier studies generally found that close proximity to active drilling activity temporarily reduced residential property values, with estimates of the reduction ranging from about 4 percent to 20 percent. However, the adverse impact was limited to properties in close proximity (e.g. generally within a half mile or less of well sites) and diminished or disappeared after wells were completed and production began.

Three recent studies appear to provide information more directly relevant for the City. These studies include a 2010 study by Integra Realty Resources for the Town of Flower Mound, Texas; surveys of homeowners conducted by professors at the University of Denver's Daniels College of Business and Cleveland State University in 2013; and a hedonic property value study focused on Weld County, conducted by Dr. John Loomis at Colorado State University (CSU) in 2014.

The Flower Mound, Texas study used multiple research methods to evaluate effects of wells on property values. That study found that homes at price points above $250,000 immediately adjacent to well sites decreased in value by 3 to 14 percent. However, in cases where the well site was obstructed by buffers such as trees or other structures, the value was not negatively impacted, even in close proximity. Using a slightly different method, the study authors found more modest impacts on property values at somewhat greater distances – indicating a 2 to 7 percent decrease in value of homes within a radius of 1,000 to 1,500 feet of well sites (2010 Integra Realty Resources).

The study conducted by the University of Denver and Cleveland State University involved surveys of more than 550 homeowners in the Houston, Texas and Alabama-Florida Panhandle areas. The homeowners were asked how much they would bid for a home identical to their own, in a neighborhood identical to their own, that was a quarter mile away from a drill site that was visible from the home. The survey research indicated that the Texas homeowners would bid about 6 percent less than the values of their current home under this scenario, while the

Alabama-Florida homeowners would discount the hypothetical property by about 15 percent (2013 Akron Beacon Journal).

The most directly applicable study for the City appears to be the 2014 study conducted by CSU. That study examined all residential property sales in Weld County between 2009 and 2012. The study found that in urban areas, or incorporated townships, the number of wells being drilled within a half mile of a home at the time of its sale had a temporary negative impact on the home's value. The impact, however, was relatively small – estimated as about a 1 percent reduction in price per well within one half mile of the home. As in most of the other studies, the impact was found to dissipate beyond the half mile distance, and to also disappear once the wells moved from drilling and completion into actual production (2014 Colorado State University).

Given the context for the various studies, BBC believes the results from the 2014 CSU study are the most applicable for the City. Based on that study's results, the development of APC's wells within the City has the potential to affect nearby property values during the drilling and completion stages. That affect is likely to be confined to lands within a half mile or less of the drilling sites (Figure IV-6). Much of that land would be within the parcels that APC has purchased, while most of the remainder is undeveloped at present. However, it appears that the southern portions of some of the existing residential developments in the City could experience decreases in property values during the drilling and completion stages of well development.

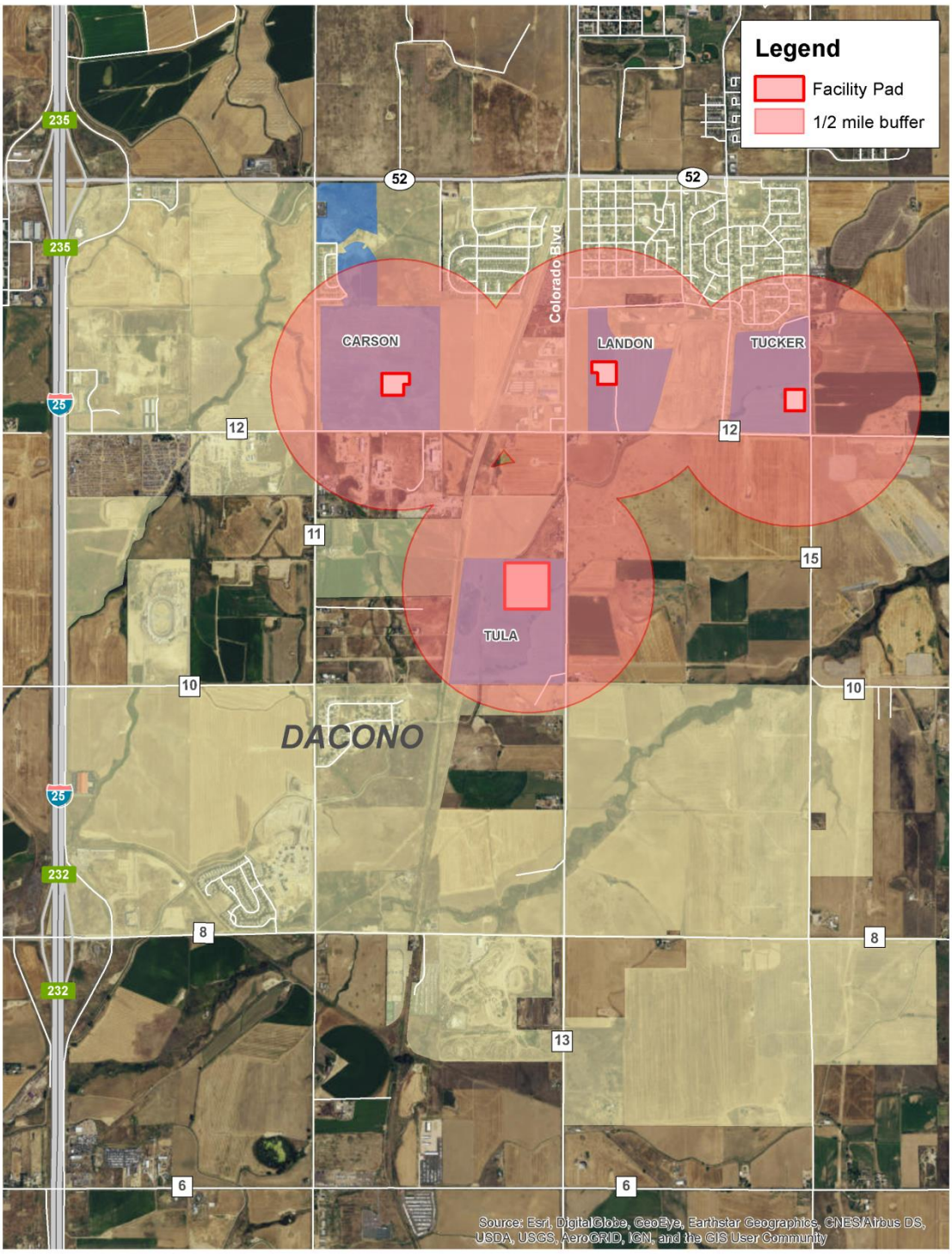
Based on the most recently published tax assessment information, the assessed value of all residential property in the City in 2016 was about $20.6 million. When divided by Colorado's residential assessment rate in 2016 (7.96%), the estimated market value of all residential property in the City was about $258.3 million.

BBC estimates that approximately one sixth (16%) of the homes in the City may be within ½ mile or less from at least one of the well pads that APC proposes to develop. The current value of these homes (prior to APC's activities) is estimated to be approximately $41.8 million. Based on the 2014 CSU study, and the number of wells APC expects to develop on its parcels, these homes could see a short-term, 15 to 20% reduction in value during the well drilling and completion phases. In aggregate, this corresponds to a reduction in overall City residential values of $6 to $8 million.

While this reduction primarily indicates the greater difficulty (and reduced profitability) of selling these nearby homes during well drilling and completion activities, it can also be interpreted as a measure of the reduction in the value of "quiet enjoyment" that the homeowners will receive from their properties during this time.

As noted earlier, both the 2014 CSU study and the other studies of the effects of oil and gas development on residential property values have found that the impacts on residential property values are a short-term effect, confined to the well drilling and completion period. The values of affected properties should recover after the wells are completed and move into the mature production phase. Based on the study in Flower Mound, Texas, it would also appear that effects on nearby properties could be at least partly mitigated through the development of visual and auditory buffers around the drilling sites.

Figure IV-6.
Properties within Approximately 1/2 Mile of APCs Proposed Oil and Gas Pads in Dacono



Note: Circles with half mile radius were drawn from the center of the proposed well pads on each parcel.

Source: BBC Research & Consulting.

Deferred or Permanently Displaced Future Development

The City's current municipal boundary encompasses an area of approximately 8 square miles, of which approximately 3 square miles are developed, leaving an undeveloped area of approximately 5 square miles (3,200 acres). The parcels purchased by APC cover an area of approximately 500 acres, which is 16 percent of the undeveloped area in the City's current municipal boundary.

The City competes with other small communities northeast of Denver – such as Frederick, Firestone, and Erie – to capture the new growth occurring in the region. In this context, developers consider multiple potential locations for their projects and are not limited to choosing to develop in the City. Consequently, the reduction of prime developable acres in the City is likely to have an effect on the City's development and population and commercial growth.

In the near-term, APC's land acquisition may have at least a proportional negative effect on the City's growth, assuming that each undeveloped acre in the City was equally likely to be developed. In other words, removing 16 percent of the undeveloped acres in the City's municipal boundary could lead to a 16 percent decrease in the City's population growth. However, the parcels acquired by APC were probably more likely to be developed than other parcels due to their prime location in the City's preferred growth corridor. As a result, APC's acquisition could have a larger negative impact on future growth. If the parcels now owned by APC were twice as likely to be developed in the near-term as the average undeveloped parcel in the City, the impact of removing the APC-owned parcels from residential and commercial development could reduce future growth by as much as 32 percent.

The delayed and/or permanently deferred development imposes opportunity costs on the City because it cannot realize the benefits of growth that would have otherwise occurred. BBC focused on modelling the opportunity costs projected to occur due to:

- Foregone collection of developer impact fees;
- Loss of property tax revenue;
- Lost value of C-BT dedications;
- Loss of commercial tax revenue;
- Increased cost of providing services; and
- Loss of park dedications.

BBC also considered other impacts of reduced growth that could not be quantified, but are discussed later in this section.

Estimated impacts of reduced development and growth. Under the population forecast for the City developed for the NISP EIS, the City was anticipated to grow at a rate of between 180 to 248 people per year from 2018 to 2038 (Figure IV-7). In total, the forecast indicated that

approximately 4,500 people would move to the City during this time. If the rate of population growth is reduced by 16 percent to reflect the proportional negative impact that APC's land acquisition may have on the City's population growth, the growth rate slows to between 151 and 208 people per year. Under a 32 percent reduction, the rate of population growth slows further to between 122 and 190 people per year. Under the 16 percent growth reduction scenario, 721 fewer people would move to the City between 2018 and 2038. Under the 32 percent scenario, 1,441 fewer people would move to the City.

BBC used the population growth estimates in Figure IV-15 to estimate the City's opportunity costs of deferred or permanently displaced development. We first calculated the number of homes that would have been built under each growth scenario by using the U.S. Census's average household size in the City (2.85 people per home).

Next, we estimated the loss of impact fees that would have been collected by the City under both lower growth scenarios by multiplying the loss of built homes by the impact fees the City would have charged developers. According the City's residential impact fee schedule, developers pay the City $6,070 in impact fees per residential unit.

To calculate the loss of residential property tax revenue, BBC used the multiple listing service (MLS) database to analyze the value of homes sold in Dacono's new developments during 2017. The analysis showed that the median price of homes sold in newly developed areas of Dacono was about $339,000 in 2017. BBC combined this estimate with the City's general fund mill levy of 22.462 and the Colorado assessment rate for residential property to calculate the property tax revenue the City would have collected from the new homes if they had been built. New homes would have also been required to dedicate 3/4ths of a C-BT unit to the City to meet the City's water dedication requirements. C-BT units have recently been trading for approximately $26,000.[2]

BBC calculated the loss of commercial tax revenue by dividing the City's 2016 commercial sales tax revenue by the 2016 population to estimate the current sales tax revenue per capita ($264). We multiplied this number by the reduction in population growth under both lower growth scenarios.

[2] The City of Dacono requires home sites under 6,000 square feet to dedicate 0.5 C-BT units to the City; home sites between 6,000 and 10,000 square feet must dedicated 0.75 C-BT units; and sites over 10,000 square feet must dedicate 1 C-BT unit. To capture this range we assumed the average new home built in Dacono would dedicate 0.75 C-BT units.

Figure IV-7.
Dacono Population Growth Rates Under NISP Projections and Reduced Growth Projections Due to APC's Activities

Source:

NISP population forecasts; BBC Research and Consulting.

Year	Forecasted Growth	Forecasted Growth Under 16 Percent Reduction	Forecasted Growth Under 32 Percent Reduction
2018	248	208	169
2019	248	208	169
2020	248	208	169
2021	180	151	122
2022	180	151	122
2023	180	151	122
2024	180	151	122
2025	180	151	122
2026	200	168	136
2027	200	168	136
2028	200	168	136
2029	200	168	136
2030	200	168	136
2031	260	218	177
2032	260	218	177
2033	260	218	177
2034	260	218	177
2035	260	218	177
2036	280	235	190
2037	280	235	190
Total Population Growth	**4,503**	**3,783**	**3,062**

Population and housing impacts at build out. If APC does not sell its parcels once production is completed, it would decrease the number of residents and homes ultimately developed within the City's current boundaries by about 5,000 people and 1,961 houses (Figure IV-8). For this calculation, the zoning densities were multiplied by the area of each parcel that would be dedicated to residential development. BBC used zoning densities supplied by the City and from development plats to estimate the number of residential units that could have been built on each parcel.

Figure IV-8.
Estimated Number of Homes That Could be Built on APC's Parcels in the City of Dacono

Parcel	Acres	Zoning Density (DU/acre)	Residential Area as Percent of Total	Acres of Residential Development	Number of Homes that Could be Built
Carson	211	9.0	50%	105	945
Landon	72	8.4	39%	28	235
Tucker	82	8.7	50%	41	357
Tula	135	8.0	39%	53	424
Totals	**500**	**8.5**	**-**	**227**	**1,961**

Source: City of Dacono.

Development plats were available for the Carson and Tula parcels. A development known as Legacy Park was approved to be built on 105 acres of the Carson parcel. The average residential

density was approximately 9.0 DUs per acre.[i] The Tula parcel was also considered for a development. The proposed development, known as Miller Ranch, was a 159 acre mixed use development with open space and a trail network. The proposed development had a residential density of 8.4 DUs per acre and devoted approximately 54 acres of the development's area to residential construction. Forty-four percent of the development was allocated to commercial development (70 acres) and 22 percent was allocated to open space and public use (35 acres). The City believes that residential homes developed in the Carson parcel would have had 5,000 square foot lots, implying a density of 8.7 DUs per acre.

Increased costs of water dedication and future development. As discussed in Section III, the City has subscribed for 1,250 acre-feet of firm yield from the NISP project, enough water to serve approximately 2,500 future homes. The capital costs for the City's share of water from the proposed project appear likely to be in the range of $30 million to $35 million. The City anticipated covering the costs of the project in part with revenue generated from future development. If APC's activities slow down future development in the City, the City's cost to participate in the NISP project will be shared amongst a smaller number of residents. This, in turn, would increase the cost that each existing household would have to pay, in addition to increasing the cash-in-lieu of water rights dedication that developers would have to pay. The net effect could be to further discourage future development in the City.

Other costs of delayed or deferred future development. The City has other development goals that may also be impacted by reduced growth due to APC's planned activities. The City is served by both the St. Vrain Valley School District and the Weld County RE-8 School District. Dacono students attending St. Vrain Valley School District currently have to attend schools outside of Dacono because there are no district schools within the City's boundaries. School construction in Colorado is in part predicated on populations and deferred and/or permanently delayed development in Dacono may impact the District's ability to finance and construct an adequate number of schools in the short and medium terms.

The City also has ambitions of expanding its retail tax base. Retail businesses often follow demand, meaning that retailers invest in growing communities. If Dacono's population grows at a slower rate than its neighboring communities due to APC's activities, retailers may decide to invest in other communities where growth prospects are better.

Impacts of More Dispersed Future Development

Apart from the potential advantages of relatively compact growth in terms of "place making," enhancing the marketability of the City to future businesses, and the quality of life for existing and future residents, numerous studies have shown that more compact and contiguous development also offers fiscal benefits to local governments and taxpayers.

It is not possible to specifically estimate the fiscal benefits of more compact development in the City without developing specific plans and engineering cost estimates for future infrastructure and services. However, meta-studies of this literature compiled by the U.S. Environmental Protection Agency (EPA) and the Brookings Institution have summarized the benefits of more compact development (2012 EPA; 2004 Brookings Institution). Distilling the literature, the

Brookings Institution study estimated that more compact development reduces the costs of road building by an average of approximately 12 percent, and the costs of providing water and sewer infrastructure by about 6 percent. Annual operations and maintenance costs are estimated to be reduced by about 4 percent through more compact development.

The development of oil and gas wells on the four large parcels purchased by APC – and particularly the three parcels north of Weld CR 12 (Grand View Boulevard) – is likely to result in more dispersed development in the City. At least in the short and medium timeframes, much of the new development in the City may have to "leap frog" the APC parcels, requiring longer road, utility, and service access to reach newly developed parcels.

The City's costs of serving dispersed developments would increase its service costs. Previous studies have shown that non-contiguous growth increases the costs of capital projects related to water and transportation infrastructure by 6 and 12 percent, respectively. According to the City's 2017 Comprehensive Plan, the City spends approximately $762 per person to supply services. These costs are likely to increase by 4 percent with non-contiguous development or approximately $30 per person per year.

SECTION V.
Positive Effects for Dacono from APC's Activities

From the City of Dacono's (the City's) standpoint, the potential benefit from Anadarko Petroleum Corporation (APC's) plans to develop and operate 73 wells within the City would be an increase in tax revenues for the City. This section describes the primary sources of additional tax revenues anticipated from APC's proposed activities, and provides quantitative estimates of those potential revenues.

Sources of Potential Tax Revenues

Various taxes are levied against oil and gas development, production, and property by multiple jurisdictions. Municipalities receive tax revenues for both severance and property taxes assessed on oil and gas developers.

Severance taxes. A severance tax is imposed on producers (or any party with a working or royalty interest) for the sale of nonrenewable natural resources such as oil, gas, coal, and metal. These taxes are collected by the State of Colorado, with a portion of the severance tax revenue allocated for distribution to local governments. The amount of revenue collected by the state and distributed to local governments depends on several factors.

Annual severance taxes for oil and natural gas sales are based on gross income produced by all wells except "stripper wells"[1]. Production costs associated with transportation, processing, and manufacturing are deducted from the taxable sale value to account for the costs of moving the gas from the point of severance (the wellhead; where valuation is supposed to occur) to the point of valuation (usually a regional gathering location).

Figure V-1 illustrates the calculation of gross severance tax due based on a variable tax rate. Taxpayers may credit 87.5 percent of ad valorem taxes paid to local governments on oil and gas production to determine the net severance tax due.[2,3]

[1] Stripper wells produce less than 15 barrels of crude oil or 90,000 cubic feet of gas per year on average.

[2] Excluding taxes related to stripper wells or taxes on buildings, improvements, and equipment.

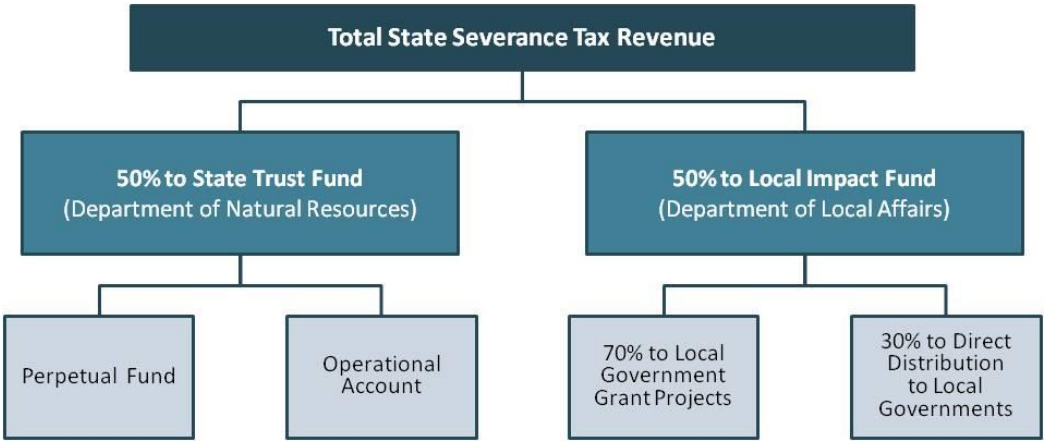
[3] This credit is designed to eliminate the disincentive to invest in jurisdictions with high property taxes.

Figure V-1.
Calculation of Colorado Severance Taxes

Source: Colorado Department of Revenue.

State severance tax distribution is a complex process, as depicted in Figure V-2. Colorado's severance tax revenues are first split evenly between the State Trust Fund and the Local Impact Fund. The State Trust Fund provides funding for Water Conservation and Department of Natural Resources operations. The Local Impact Fund allocates 70 percent of its collections to a local government grant program that awards funding through a competitive process. The remaining 30 percent of Local Impact Fund revenue is directly distributed to local governments.

Figure V-2.
Colorado Severance Tax Distribution

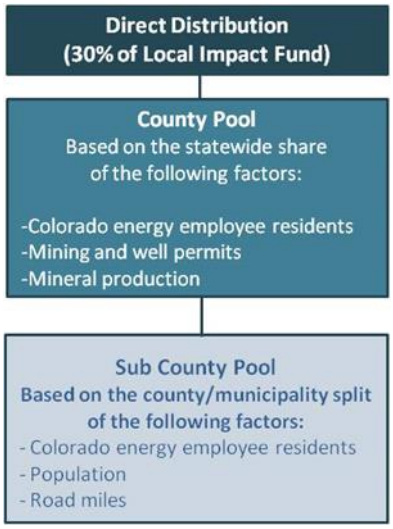


Source: Colorado Department of Local Affairs.

Direct severance tax distribution to local governments involves two steps. Funds are first allocated among Colorado counties based on their share of the state's resource production, energy employee residence, and drilling/mining permits. The second step in the distribution of state severance tax revenues is a sub-county allocation, where the severance tax funds allocated to each county are divided among the county and its municipalities based on the proportion of the state's road mileage, population, and energy worker residence in each jurisdiction. Figure V-3 demonstrates the flow of severance tax revenues from the Local Impact Fund to local governments.

Figure V-3.
Colorado County and Sub-County Severance Tax Distribution

Source:
Colorado Department of Local Affairs

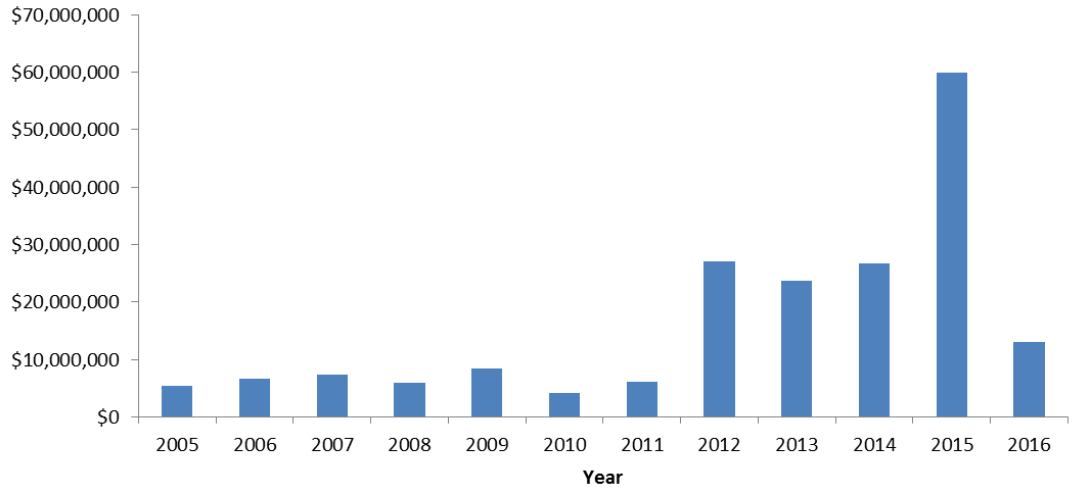


According to the City's 2017 budget, the City received $131,572 in sub-county severance tax distributions in 2015, although that amount dropped to $35,854 in 2016. In 2017, the City anticipated receiving sub-county severance tax distributions of approximately $35,000. The City's previous tax collections show that the fiscal impact of severance taxes may be modest compared to other revenue streams generated by APC's activities.

Increased property values and property taxes. Local governments also collect property tax from oil and gas wells. Many factors influence property tax revenues from oil and gas resources, including well production levels, resource market value, and the mill levy rate. Oil and gas real property is assessed at 87.5 percent of actual value, which is significantly higher than commercial real property (29 percent) and residential real property (7.96 percent). Oil and gas personal property is assessed at the standard commercial assess rate of 29 percent.

According to the City's 2017 budget, the assessed value of oil, natural gas and natural gas liquids real property was over $12.9 million in 2016 (Figure V-4). With the City's current mill levy of 22.462 applied, the City received oil and gas property tax revenue of approximately $290,737 in 2017. The assessed values of oil and gas production in the City have been highly variable from year to year. Between 2006 and 2016, revenue received by the City from property taxes related to oil and gas production ranged from a low of $94,187 in 2011 to a high of $1.3 million in 2016. In 2015, the assessed value of oil and gas production in the City was $59.9 million, 78 percent greater than the assessed value in 2016. The instability of property tax revenue from oil and gas production makes it difficult for the City to rely on it to fund on-going activities. Instead, it is often used to fund one-time activities.

Figure V-4.
Assessed Value of Oil and Gas Production in Dacono, 2005 to 2016

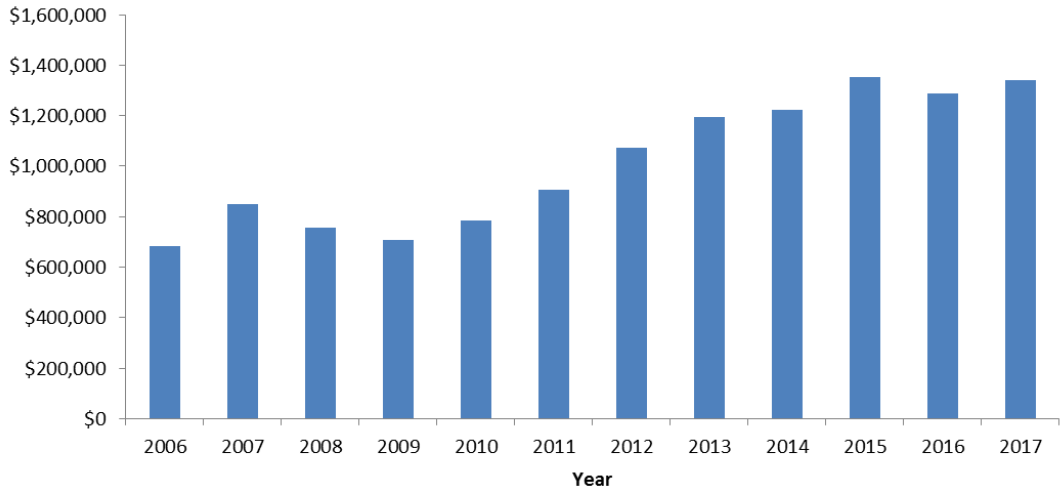


Source: City of Dacono 2017 Budget.

Increased sales taxes. Sales tax is generated from transaction between individuals and businesses for tangible goods and services sold within the City limits. When oil and gas companies develop new well pads and wells they bring in six to 90 workers per pad during different phases of development. Previous studies have found positive correlations between oil and gas development and sales tax revenue collected at the county level. A study from 2012 on the Marcellus shale play in Pennsylvania found that sales tax revenues in counties with 150 or more recently drilled wells collected 28.9 percent more sales tax than counties with no wells (Costanzo and Kelsey 2012). A more recent study from Oklahoma used statistical analysis to show that every 1 percent increase in oil and gas production increased county sales tax revenue by between 0.034 and 0.042 percent (Johnston and Whitacre 2016). The study also found that that certain businesses are impacted more by oil and gas development than others: food stores, automotive dealers, gasoline stations, and restaurants collect a disproportionate share of the increased sales tax revenue created by oil and gas development.

While the results of these studies conclusively show that oil and gas development increases sales tax revenue, the size of the effects found by the studies suggest that the actual impacts can range from being quite modest to making a significant contribution to local sales tax revenue. The City's current sales tax rate is 3 percent, and in 2015, the most recent year for which data is available, it generated $1.4 million in revenue for the City (Figure V-5). The city has a number of retail establishments that may capture additional sales tax revenue from APC's employees and contractors. However, the relatively short duration of pad and well development create a small window of opportunity for the City's businesses to capture additional sales tax revenue. Over the long run, APC's activities will most likely make only modest contributions to the City's sales tax revenue given the small number of employees it takes to manage producing wells.

Figure V-5.
Sales Tax Revenue Received by the City of Dacono, 2006 to 2017



Note: Sales tax revenue for 2016 and 2017 is projected, and not actual.

Source: City of Dacono 2017 Budget.

Projected Tax Revenues from APC Activity

BBC Research & Consulting (BBC) developed projections of the tax revenues that would accrue to the City from the anticipated oil and gas production on the wells APC is expecting to develop. We also estimated the additional sales tax revenues to the City from expenditures by APC's workforce during the well development, drilling, and completion activities.

Property tax revenues. By far the largest source of revenue from the APC project for the City would be property taxes on APC's production. To estimate the assessed value of APC's production during the projected 20 year lifespan of the wells, and the corresponding property tax revenues for the City, BBC:

1. Estimated the annual production from APC's anticipated wells on the four parcels APC now owns in the City over the projected 20 year life of the wells.

2. Projected the annual value (price) APC will receive for that production.

3. Multiplied the resulting gross revenues by the 87.5% assessment rate for oil and gas in Colorado.

4. Multiplied the assessed value by the City's current general fund property tax rate of 22.462 mills (2.2462%).[4]

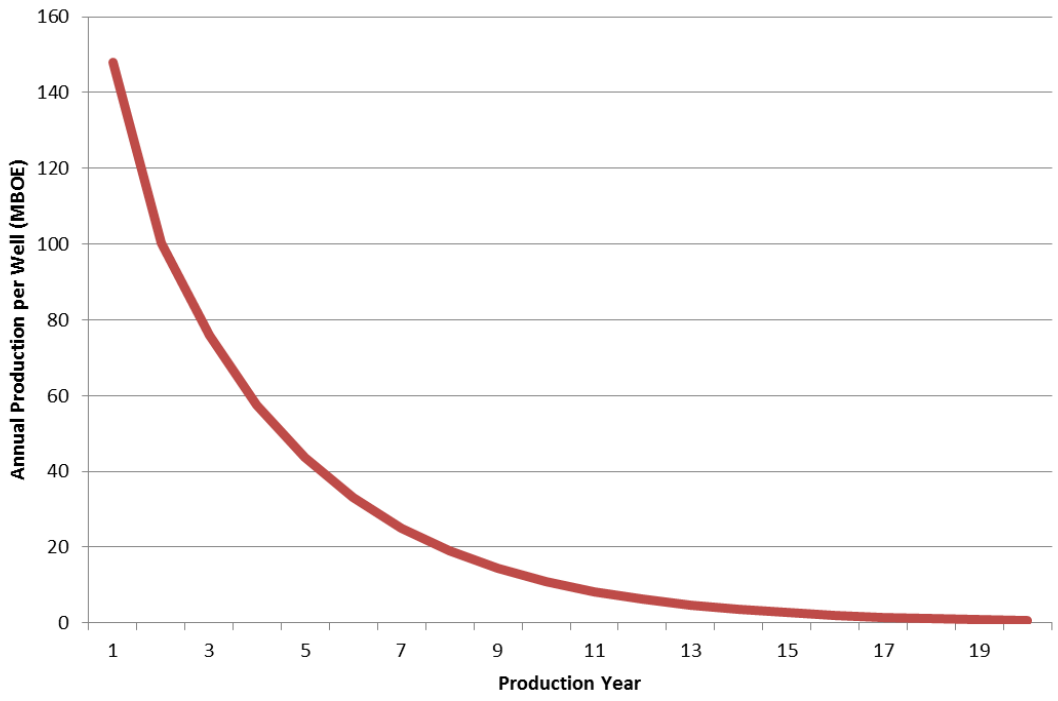
[4] Note that Dacono also currently levies a small property tax for debt service (less than 3 mills as of 2017). Since that mill levy is based on the amount of revenue required to make the annual debt service payment, the increased assessed valuation from Anadarko's activities would not produce more revenue for the City from that levy, but would slightly reduce the overall taxes levied on other property owners. Since there is no net effect on City revenues, and the debt service will be completed by 2025, this analysis focuses only on the larger general fund mill levy.

Well production. In response to written questions provided to APC by BBC and the City, APC provided information on the "representative" production expectations for the City wells from a recent investor report (APC/KMG, 11/7/2017). During a follow-up meeting with the City and BBC on November 15, 2017, APC further clarified that information.

The productivity of the wells APC expects to develop in the City can be approximated by the information provided for "Contiguous Core Type Wells" in the DJ Basin in the 2017 APC Investor Book. That information includes the production decline curve for the first year of production for these types of wells, the projected total production over the life of the well, and the mix of products (oil, gas, and natural gas liquids) each well is expected to produce.

Based on that information, BBC developed a projected production decline curve extended over the full 20 year life of the wells (see Figure V-6). Over the full 20-year lifespan, each well is projected to produce approximately 560,000 barrels of oil equivalent (BOE). The BOE metric is computed in terms of the energy content (in British Thermal Units or BTUs) of the various products from the wells. However, as described later, the values of a BOE of oil differ from the values of a BOE of natural gas or natural gas liquids. The productivity of these wells, like others in the Wattenberg field, declines rapidly, with about 58 percent of the total production occurring during the first three years.

Figure V-6.
Representative Production Decline Curve for APC's Wells in Dacono



Source: BBC Research & Consulting; APC.

Energy prices and projected value of production. While the total production for APC's well can be expressed simply in terms of BOE, the value of that production is a bit more complex because

it is based on both the mix of products produced by the wells and because it is valued at the wellhead.

Approximately 34 percent of the production is expected to be in the form of crude oil, about 32 percent in the form of natural gas, and about 34 percent in the form of natural gas liquids (APC/KMG, 11/7/2017). Based on data from the U.S. Department of Energy, Energy Information Administration (EIA), the value of natural gas is currently about 37 percent of the value of crude oil on a barrel of oil equivalent basis.[5]

Data from EIA also provide insight into the difference between value at the wellhead and value at the traditional key locations for pricing crude oil (West Texas Intermediate or WTI) and natural gas (the Henry Hub or HH). Based on EIA data, wellhead prices for crude oil in Colorado are approximately 87 percent of the WTI price of crude oil. Wellhead prices for natural gas are approximately 95 percent of the HH price.

Applying the product mix and location conversions described above means that the value per BOE of APC's production is likely to be about 53 percent of the published WTI value of a barrel of oil. At recent prices of approximately $50 per barrel WTI, APC is likely to receive a little over $26 per BOE from its anticipated wells in the City.

The prices of oil and natural gas are expected to rise in the future. For BBC's base case projections of the gross revenue produced by APC's wells (and the property taxes received by the City), BBC used EIA's base case forecasts of oil prices (together with the conversions described previously). Based on EIA's forecasts, the price of oil is expected to be about $64 per barrel in 2019 and to increase to about $100 per barrel by the end of APC's production in 2038. These prices are in current (2017) dollars and do not include adjustments for general price inflation in the future. Based on the anticipated productivity and product mix of APC's wells and the EIA base case oil price forecast, the 73 anticipated APC wells in the City would collectively produce about $1.4 billion in gross revenue over the 20-year life of the wells.

In reality, the future is more uncertain than may be implied by these individual price and production assumptions. There is both "upside risk" if the price of oil rises more rapidly than anticipated in the EIA forecast or the wells are more productive than the representative information provided by APC, and "downside risk" if the opposite occurs. For the purposes of the City evaluation, downside risk is the most relevant. BBC developed a low scenario for APC's revenues (and City property taxes) by assuming that future oil and gas prices are 20 percent lower than forecast by EIA and that APC's wells in the City are 25 percent less productive than the "representative well" shown in their 2017 Investor Book. Under those assumptions, the low scenario forecast of APC's future revenues from their wells in the City would be about $850 million in current (2017) dollars.

[5] Barrel of oil equivalents are based on the BTUs created by burning alternative fuels relative to burning crude oil. At present, the value of 1 million BTUs of natural gas at the Henry Hub is approximately 37 percent of the value of 1 million BTUs of crude oil at the West Texas Intermediate price (EIA 2017).

Projected property tax revenues. Given the production, price, and revenue estimates described above, it is relatively simple to project future property tax revenues for the City from APC's production estimates. As noted earlier, the value of oil and gas production is assessed at 87.5 percent in Colorado. The City then applies its 22.462 mill general fund property tax rate to the assessed value. Figure V-7 depicts the projected annual property tax revenues expected to be received by the City from the APC wells. Note that there is typically a two year delay in Colorado between production and the receipt of the property tax revenues, which is reflected in the figure.

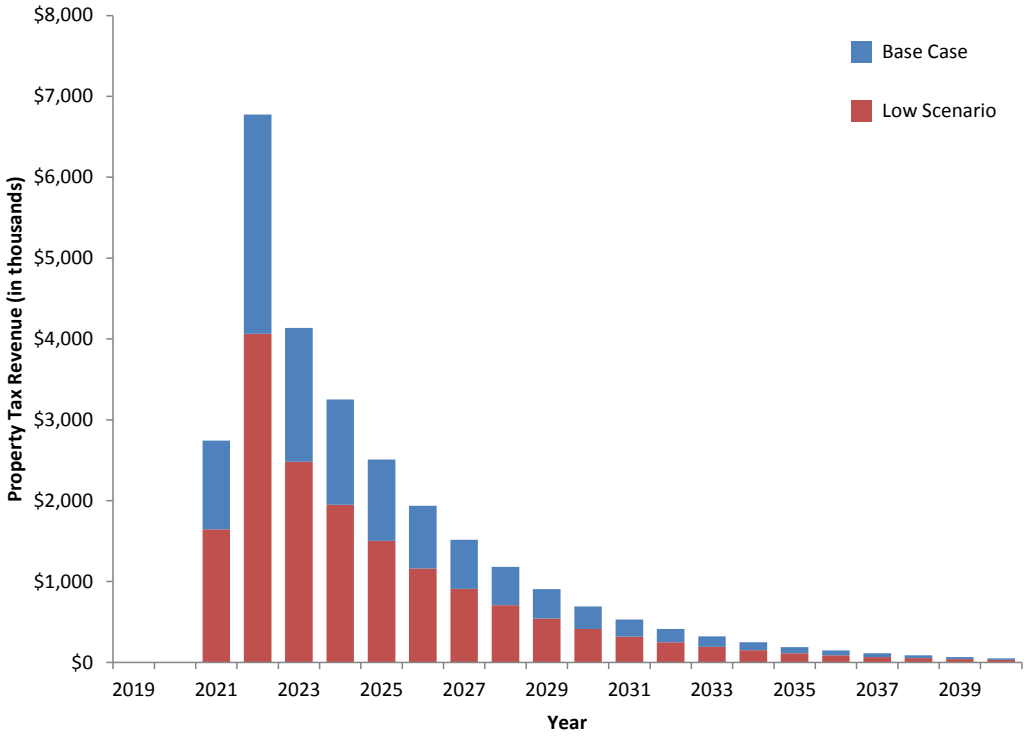
In the near term (2018-2022), and assuming production begins on some wells in 2019 and all wells are producing by 2020 (as indicated in APC's written responses to questions), BBC projects that the City would receive between $1.6 to $2.7 million in property tax revenues in 2021. Property tax revenues from APC's wells are projected to peak at between $4.1 million and $6.8 million in 2022.

In the medium term (2023-2027), production would decline but remain substantial. Projected additional property tax revenues for the City average between $1.6 million (low scenario) and $2.7 million per year (base case) over this period.

Longer term (2028-2037), production would continue on APC's wells, but would decline steadily. Production would end by 2037. Annual property tax revenues from APC's activities decline from between $0.7 and $1.2 million in 2028 to between $50,000 and $90,000 by 2038.

Over the full 20 years of production, cumulative property tax revenues to the City are projected to be between $17 million (low scenario) and $28 million.

Figure V-7.
Projected Dacono Property Tax Revenues from APC Production



Source: BBC Research& Consulting; APC.

Severance tax revenues. APC's proposed wells would produce substantial severance tax revenues for the State of Colorado. However, for the City, the severance tax benefits would be modest (particularly in comparison to the property tax revenues) for the following reasons:

- Energy companies can deduct local property taxes (as quantified previously) from their severance tax obligation.

- As discussed earlier in this section, only 15 percent of the severance tax revenues paid to the State of Colorado are returned to local governments (cities and counties) as direct distributions.

- Although the factors used in determining Weld County's share of the overall direct distribution of severance tax revenues may be increased by APC's activities in the City, the factors determining the City's share of the distribution to Weld County are unlikely to change. The county's share of the overall direct distribution is based on its residents' share of statewide oil and gas employees, its share of statewide oil and gas permits, and its share of the overall "mineral production index." The City's share of the dollars allocated to Weld County is based on its number of oil and gas employees, its road network, and its overall population.

Based on the same pricing and production assumptions described in the preceding discussion of potential property tax revenues for the City, BBC estimates that APC's proposed wells would

produce a cumulative total of between $28 million and $46 million in severance tax revenues for the State of Colorado (an average of $1.4 to $2.3 million per year). Weld County (including all of its incorporated cities) is projected to receive between $4.1 and $6.9 million from direct severance tax distributions over the 20 year period (or an average of about $205,000 to $345,000 per year).

Historically, the City has only received 1 percent of the direct severance tax distributions to Weld County. BBC anticipates that the City would receive a cumulative total of between $41,000 and $69,000 in additional severance tax revenues over the 20 year period from APC's wells. Based on APC's projected development schedule and the production decline curve shown earlier, the additional severance tax revenues to the City would peak in approximately 2022 at between $10,000 and $17,000. Figure V-8 shows the projected total severance tax payments to the State of Colorado from APC's planned wells and the projected direct distributions to Weld County and the City.

Figure V-8.
Projected Severance Tax Distributions from Anadarko's Wells in Dacono (in thousands of 2017 dollars)

	Total Payments to State of Colorado		Direct Distribution to Weld County		Direct Distribution to Dacono	
Year	Base Case	Low Scenario	Base Case	Low Scenario	Base Case	Low Scenario
2019	$0	$0	$0	$0	$0.0	$0.0
2020	$0	$0	$0	$0	$0.0	$0.0
2021	$4,575	$2,743	$686	$412	$6.9	$4.1
2022	$11,301	$6,779	$1,695	$1,017	$17.0	$10.2
2023	$6,898	$4,137	$1,035	$621	$10.3	$6.2
2024	$5,422	$3,252	$813	$488	$8.1	$4.9
2025	$4,183	$2,508	$628	$376	$6.3	$3.8
2026	$3,231	$1,937	$485	$290	$4.8	$2.9
2027	$2,526	$1,514	$379	$227	$3.8	$2.3
2028	$1,966	$1,178	$295	$177	$2.9	$1.8
2029	$1,510	$904	$227	$136	$2.3	$1.4
2030	$1,149	$688	$172	$103	$1.7	$1.0
2031	$880	$526	$132	$79	$1.3	$0.8
2032	$685	$409	$103	$61	$1.0	$0.6
2033	$532	$318	$80	$48	$0.8	$0.5
2034	$414	$247	$62	$37	$0.6	$0.4
2035	$313	$186	$47	$28	$0.5	$0.3
2036	$241	$143	$36	$21	$0.4	$0.2
2037	$183	$108	$27	$16	$0.3	$0.2
2038	$142	$83	$21	$13	$0.2	$0.1
Total	**$46,152**	**$27,661**	**$6,923**	**$4,149**	**$69.2**	**$41.5**
Annual Avg.	*$2,308*	*$1,383*	*$346*	*$207*	*$3.5*	*$2.1*

Source: BBC Research & Consulting.

Sales tax revenues. APC's planned oil and gas activities in the City are also likely to produce additional sales and use tax revenues for the City. One source of these revenues would be the expenditures of APC's employees (and contractor employees) in local stores, restaurants, and other establishments.

Based on current plans, the workforce will begin to ramp up in the third quarter of 2018 and reach about 100 workers per day by the fourth quarter of 2018. The workforce is expected to peak during the third quarter of 2019, with an average of almost 140 workers per day (as discussed in Section III).

Assuming the average employee spends between $20 and $30 per week on taxable retail sales in the City, APC's employees (and contractors) are projected to spend a cumulative total of $117,000 to $175,000 in the City during the two year development process. These worker expenditures would produce about $3,500 to $5,200 in sales tax revenues for the city during this period.

Other potential revenues from APC operations. While production based property taxes would be the major source of revenues for the City from APC's activities, the City may also receive additional revenues related to APC's operations that cannot be reliably estimated, including:

- Ad-valorem taxes on personal property. In addition to the production-related property taxes described earlier, the City may also receive additional taxes from the personal property APC develops on its properties; and

- Sales and use taxes on drilling equipment and supplies. It is likely that some portion of APC's expenditures to develop, drill, and complete its proposed wells will be subject to use taxes. Use tax revenues from oil and gas development are very difficult to project.

Disposition of APC's Land

Apart from increased tax revenues, the other potential benefit for the City from APC's proposed activities would occur if APC dedicated some portion of its lands for use by the City after it completes the development of its wells, or after the wells complete their production.

APC has indicated that no final decisions have been made with regard to the company's decision to dispose of land on each of its properties once the wells have been completed. APC has expressed interest in working with the City to identify strategies that allow APC's properties to benefit the City while still addressing APC's own needs. To this end, APC is evaluating the possible disposal of 55 acres from the Carson parcel. The 55 acres are located in the northwest quarter of Section I.