APPENDIX G

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TECHNICAL MEMORANDUM

To: Greg Baird, City of Modesto

From: John Farnkopf, HF&H

Subject: **Sewer Capacity Charge Peer Review**

Date: January 24, 2007

Brown & Caldwell (B&C) submitted a January 10, 2007 Draft Report to the City of Modesto titled *City of Modesto Sewer Capacity Charges*. The City of Modesto retained HF&H to conduct a peer review of this study. The peer review in this technical memorandum reports our findings, which are briefly summarized as follows and then explained in detail. The memo concludes with a set of guidelines for setting the capacity charge and the associated charge that we derived using the B&C model.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. Legal requirements

1.1. The capacity charges in the Draft Report satisfy the governing legal requirements.

2. Methodology

2.1. We agree with the use of the marginal cost method.

2.2. We recommend adding any growth-related facilities and capacity in the existing sewer system to the future facilities already in the Draft Report calculation if there is currently significant available capacity.

2.3. We recommend that the final report describe how future updates will treat facilities after they have been constructed.

2.4. We recommend that the final report include a process for updating the capacity charge that accounts for the variance between estimated and actual values (e.g., construction costs, escalation rates, borrowing rates, flow per EDU).

2.5. We recommend deleting Alternative 1 from the final report because we see no benefit from including it.

2.6. We recommend presenting both Alternatives 2 and 3 in the final report and leave the decision to the City as to the extent to which the City will achieve full cost recovery. By doing so, it is important to explain that the recommended capacity charges recover less than the full cost of the facilities that benefit growth so that both developers and rate payers understand the consequences.

2.7. We recommend that the final report explain why the residential capacity charges were calculated based on unit costs rather than EDUs, addressing how the potential shortfall will be paid.

3. Engineer's Report

3.1. We recommend changing the costs allocated to growth in the Draft Report to match the Carollo addendum.

3.2. We recommend that the final report explain the reason for using 15.7 mgd rather than 14.1 mgd as the capacity for calculating the capacity charge.

4. Determination of ESFRDU Loadings

4.1. We recommend reviewing the estimated future sewered water use per EDU with Carollo and City staff to confirm that demand hardening in response to metering currently unmetered customers, as well as other conservation measures, has been considered.

5. Cost Escalation Factors

5.1. We recommend reducing the 5.0% cost escalation factors to 3%.

6. Interest Costs

6.1. We recommend linking the interest rates used for calculating the interest cost of debt service to the cost escalation factors to maintain consistency, using a spread of 2.5%.

7. Bond Assumptions

7.1. We recommend that the City's financial advisor review the assumptions used in the Draft Report concerning the number of bond issuances and the issuance costs.

8. Present Value of Interest Costs

8.1. We recommend correcting the present value factors so that they equal the cost escalation factors.

ANALYSIS

1. Legal Requirements[1]

Section 66000 et seq. of the California Government Code (enacted by AB 1600 and known as the "Mitigation Fee Act") contains the legal requirements for setting development impact fees of which sewer capacity charges are one type. This Act is quite extensive. In deriving capacity charges, the following are the key provisions of the Act that we believe should be complied with:

> 66001(3). Determine how there is a reasonable relationship between the fee's use and the type of the development project on which the fee is imposed.
>
> 66001(4)(b). . . . [T]he local agency shall determine how there is a reasonable relationship between the amount of the fee and the cost of the public facility or portion of the public facility attributable to the development on which the fee is imposed.
>
> 66013(a). Notwithstanding any other provision of the law, when a local agency imposes fees for a water connections or sewer connections, or imposes capacity charges, those fees or charges shall not exceed the estimated reasonable cost of providing this service for which the fee or charge is imposed . . .

[1] HF&H is not a law firm and has not sought legal advice in preparing this peer review, particularly those sections related to the governing law. The opinions expressed in this report are those of HF&H and reflect our interpretation of the law and our rate-making experience working with attorneys on capacity charge litigation. HF&H's opinions on legal matters should not be regarded as legal advice. The City should consult with an attorney for a legal opinion.

In addition to these provisions for determining capacity charges, Sections 66001(d) and 66001(e) contain detailed requirements for accounting for capacity charge revenues and determining whether refunds are required.

The Act does not explicitly prescribe methods for deriving capacity charges aside from requiring that result is reasonable. Fees and charges are generally regarded by the courts as being unreasonable if they are arbitrary, capricious, or discriminatory.

Based on the foregoing legal background, ***it is HF&H's opinion that the capacity charges in the Draft Report satisfy the governing legal requirements*** for the following reasons:

- As required by Section 66001(3), the Draft Report in conjunction with the Carollo report[2] establish the relationship between the use of the fee and the type of development on which the fee is imposed. These documents adequately describe the types and costs of sewerage facilities that will be required to provide sewer service for growth.
- As required by Section 66001(4)(b), the Draft Report indicates the relationship between the amount of the fee and the facilities attributable to growth.
- As required by Section 66013(a), the Draft Report indicates that revenue from the capacity charges does not exceed the capital cost of the sewer service provided for growth.

We believe that each of the foregoing provisions was reasonably satisfied because:

- No arbitrary decisions were made. There was a logical basis for each decision and recommendation. Choices between alternatives were not arbitrary.
- No capricious actions were taken. All data are factual and assumptions are well-reasoned. Data were not created whimsically.
- No discrimination occurs. Rate-making is an inherent process of differentiation. No distinctions are made in the Draft Report that unduly discriminate against growth.

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[2] *Engineer's Report: Justification and Cost Allocation For Proposed Wastewater Collection System and Treatement Plant Improvements.* Carollo Engineers. August 14, 2006 draft.

2A. Methodology and Analysis - Types of Methods

B&C recommends using the marginal cost method. This is one of the most common methods of setting capacity charges and is certainly legally defensible as an industry standard. ***We agree with the use of the marginal cost method*** to derive Modesto's capacity charge.

We note that the marginal cost method two characteristics that may be problematic. The first potentially problematic characteristic is that the marginal cost method does not include the cost of existing facilities that provide capacity for growth. Apparently Modesto's existing facilities are at full capacity. However, if there are any significant components of Modesto's current sewer facilities that are still able to accommodate growth, the costs of those facilities (and the corresponding growth they could accommodate) are excluded from B&C's marginal cost calculation. For example, the treatment facilities may be at full capacity but there may be portions of the collection system that contain surplus capacity. If this surplus capacity can be quantified, it would be reasonable to include it in the calculation.

The marginal cost method typically does not include the increment of existing capacity that is available for growth, presumably to simplify the calculation. This can lead to an inconsistency as future facilities are constructed and become existing facilities. At that time, the question may be raised as to whether constructed facilities should continue to be included in the calculation. Such facilities often drop out as updated capacity charges are calculated perhaps because it is assumed that their capacity is fully subscribed to as soon as they are built or, again, to simplify the calculation. The marginal cost method is therefore prone to excluding growth-related capacity in existing facilities because of its focus on future capacity.

We conditionally recommend adding any growth-related capacity in the existing facilities to the future facilities in the B&C calculation so that all of the growth-related facilities and capacity are included in the calculation. We condition this recommendation because the additional effort required may not be justified if there is very little existing capacity for growth. Going forward with updates of the capacity charge, the City should have a procedure in place for dealing with facilities after they are constructed. ***We recommend that the final report describe how future updates will treat facilities after they have been constructed.***

The second potentially problematic characteristic of the marginal cost method is due to the fact that costs include future facilities whose costs are necessarily estimated. Actual construction costs will vary from estimates, often quite substantially and are typically greater. This characteristic of the method should be addressed so that the variance between estimated and actual costs is accounted for in future updates of the calculation. The variance should roll forward in future years in order to recover growth's reasonable share of the costs. Because the variance may be either positive or negative, both the City and development community are protected from being paid too little or from paying too much, as the case may be. ***We recommend that the final report include a process in updating the capacity charge that accounts for this variance.*** This process is essential in demonstrating that growth is paying its reasonable share and that refunds are not due.

2B. Methodology and Analysis - Alternatives

Using the marginal cost method, B&C developed three alternatives at the direction of the City. The result is a much longer report, which increases the effort to document and understand the findings, increases the possibility of errors, and increases the opportunities for challenge. The reasons given for presenting these three alternatives do not justify in our view including any alternatives that are not recommended. Alternative 1 (No Interest Costs) was "carried forward to serve as a reference point" and "is not a candidate for adoption".[3] Alternative 2 (Total Interest Costs) was "carried forward because it is frequently used by some utilities" but "fails to take into account the time value of the annual interest payments".[4]

We recommend deleting Alternative 1 from the final report because we can see no benefit from including it. We do not agree, however, with the statement that Alternative 2 "fails to take into account the time value of annual interest." It is true that Alternative 2 does not take into account the time value of interest, but that is not a failing. The Mitigation Fee Act does not specifically require the time value of money to be reflected in deriving capacity charges.

The City is only required to set reasonable capacity charges. We interpret that to mean that the revenue from the charges cannot exceed the cost of the facilities that benefit growth. The charges can generate less revenue, but not more. We do not interpret that

[3] Draft Report. Page 3-9.
[4] Ibid..

to mean that the charges need to charge each connection the same amount in constant dollars. In fact, trying to do so introduces economic principles and techniques that tend to shift the calculation from a cost basis to a value basis, which makes it difficult to determine what the cost is of the facilities that benefit growth.

To account for the time value of money, B&C recommended Alternative 3, which adds the present value of the interest cost to the construction cost. The consequence of this approach is that growth's reasonable share of costs is not fully recovered. Figure 3.7 and Table 3.15 show that Alternative 3 is projected to generate $382 million, which is well below growth's $585 million share as derived in Table 3.8. Indeed, Alternative 3 achieves only 65% cost recovery; in effect, rate payers would end up covering one-third of the cost of growth-related improvements.

Because Alternative 3 does not recover growth's full share of the debt service cost, we regard Alternative 3's capacity charges as being less reasonable than Alternative 2's capacity charges.[5] The revenue projected from Alternative 2 in Table 3.11 is $553 million, which is 95% of full cost recovery.

Full cost recovery may not be the City's primary goal, although the first study objective in the Draft Report was to "Recover the cost of capacity in facilities constructed to meet the needs necessitated by growth."[6] Based on Figure 3.7, cumulative revenue from Alternative 3 capacity charges is close to the cumulative debt service cost until buildout. After buildout occurs, no additional revenue is received from capacity charges and the remaining debt service cost must be borne by rate payers. Hence, until buildout, the City does recover sufficient revenue to recover its costs based on the annual cash flow shown in Figure 3.7.

Given the fact that the City does not currently have a sewer capacity charge, B&C's recommended capacity charge will go a long way initially toward recovering costs. Over time, the City can increase the capacity charge to achieve greater cost recovery and can even recoup under collections in the early years by rolling them forward into the out years - as long as by doing so the City does not recovers more than growth's reasonable share.

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[5] Further analysis would be required to determine why Alternative 2 does not achieve full cost recovery.
[6] Draft Report. Page ES-1.

Alternatives 2 and 3 are both justifiable. They both result in reasonable capacity charges, particularly because neither alternative overcharges development. ***We recommend presenting both Alternatives 2 and 3 in the final report and leave the decision to the City as to the extent to which the City will achieve full cost recovery.*** The City may chose to adopt a series of capacity charges beginning with Alternative 3 and ending with a capacity charge that achieves full cost recovery. This series could be adopted over several years. This transition period would allow developers time to adapt.

2C. Methodology and Analysis - Calculation of Capacity Charges

In each of the three alternatives, the equivalent single-family capacity charge is calculated based on the unit costs for flow, BOD, and TSS. As an example, in Alternative 3, the capacity charge is $4,690/EDU in 2007. If $4,690/EDU is multiplied times the total number of EDUs, 54,483, the product is $255,525,000 in revenue. The cost in 2007 is $296,211,000, which is $40,686,000 more than the revenue from the charges. If, on the other hand, the cost is divided by the total EDUs, the capacity charge is $5,437/EDU ($296,211,000/54,438 = $5,437[7]), $747 more than $4,690.

The inconsistency between calculating capacity charges based on unit costs and EDUs stems from the fact that the capacity added by the CIP is different for flow, BOD, and TSS. Whereas the 15.7 mgd flow capacity will exactly accommodate 54,483 EDUs, the 54,300 klbs/day of BOD and 43,100 klbs/day of TSS are much more than would be needed if all 54,483 EDUs that eventually connected were residential-strength customers. In designing the plant, higher strength loadings were used for the non-residential EDUs that are expected.

Said another way, if the Draft Report's $4,690 were used and all the connections were residential, $40,686,000 would go unpaid. Of the $102,593,000 allocated to BOD and TSS in 2007 ($88,208,000 + $14,385,000 = $102,593,000, as shown in Table 3.13), only $61,907,000 ($102,593,000 - $40,686,000 = $61,907,000) would be paid based on a charge of $4,690/EDU. This charge is based on residential strength concentrations for BOD and TSS, which is weaker than the concentrations for which the plant is designed.

If $5,437/EDU were used, all of the costs would be recovered. However, a the question arises as to whether it is fair to include the $747 in additional BOD and TSS capacity in

[7] If the number of paying EDUs is used, the capacity charge is $6,088/EDU ($296,211,000/48,655 = $6,088).

the capacity charge for equivalent single-family residential dwellings. It is a common practice to calculate residential capacity charges by dividing the total cost by the total EDUs of added capacity, ignoring unit costs. In effect, this defines an EDU on the basis of flow only. Non-residential capacity charges are calculated based on unit costs for flow, BOD, and TSS. As a result, residential capacity charges often include the costs of additional BOD and TSS capacity to insure that rate payers are not left paying for higher-strength growth.

Practically speaking, not all of the future connections will be residential. There will be some amount of higher-strength non-residential customers whose charges will help cover some, if not all, of the additional BOD and TSS capacity. Setting the residential capacity charges based on unit costs, as was done in the Draft Report, exposes the City to a potential shortfall if the projected high-strength connections do not occur.

Conversely, setting the residential capacity charge based on EDUs increases the charge 16% ($747/$4,690 = 16%) to hedge against under collections. We do not regard a 16% differential as unreasonable. It should be considered a premium charged to compensate rate payers for taking on debt issuance on behalf of growth. This premium should be accounted for in future updates. All of the revenue from capacity charges should be credited against of the cost of projects and reflected in future capacity charges so that the sum of all revenue from charges equals the final project costs. In this way, full cost recovery is achieved - and nothing more. ***We recommend that the final report explain why the residential capacity charges were calculated based on unit costs rather than EDUs, addressing how the shortfall will be paid.***

3. Engineer's Report

Carollo issued a September 18, 2006 addendum to the August 14, 2006 draft report. The addendum indicates $175.70 million allocated to growth. Table 2.9 in the Draft Report indicates $176,575,450 allocated to growth. The difference appears to be with the Jennings Road Facilities. This difference is not explained in the Draft Report. As slight as this difference is, the two final reports should agree. ***We recommend changing the costs allocated to growth in the Draft Report to match the Carollo addendum.***

B&C calculated capacity charges based on 15.8 mgd, which equals 54,483 EDUs based on an estimated flow of 290 gpd/EDU. Of the 54,483 additional EDUs, 5,828 EDUs (11%) are not subject to the new capacity charges. In other words, only 48,655 EDUs (or 14.1 mgd, which is the product of 290 gpd/EDU times 48,655 EDUs) are available to

pay for the cost of the new facilities. This raises a question as to whether the capacity charge calculation should be based on 15.8 mgd, which was used by B&C, or 14.1 mgd. Full cost recovery is not possible if 15.8 mgd is used. Using 14.1 mgd means that 89% of the EDUs will subsidize the 11% that are not subject to the new capacity charge. ***We recommend that the final report explain the reason for using 15.7 mgd rather than 14.1 mgd as the capacity for calculating the capacity charge.***

4. Determination of ESFRDU Loadings

290 gpd/EDU is used by in the Draft Report with a reference[8] to Appendix E, which contains a May 25, 2006 memo from William Wong to Carollo Engineers. Table 1 of this memo shows assumptions of 2.9 people/DU and 100 gpd/capita, the latter of which comes from "Current City of Modesto Standards." The product of these assumptions is 290 gpd/EDU.

The question is whether the 100 gpd/capita will continue in future water use patterns. In view of the fact that the City will be converting unmetered water customers to meters and billing based on metered water use, water use per EDU will gradually decrease both inside as well as outside. The amount of this decrease and the rate at which it will occur is difficult to forecast. ***We recommend conservatively reducing the estimated future sewered water use per EDU that will occur in response to metering, as well as other measures that will harden water demand between now and buildout, if this has not already been factored into deriving the 290 gpd/EDU factor.***[9]

The result of this reduction would be to increase the number of EDUs that can be accommodated hydraulically in the 15.7 mgd added capacity. The additional EDUs will presumably place the same BOD and TSS loading on the plant (i.e., residential strength concentrations will increase as the same BOD and TSS are discharged in less water). This, in turn, will affect the future unit costs for flow, BOD, and TSS, which doesn't need to be factored into the present calculations but should be reflected in future updates. For now, however, a slight increase in the number of EDUs as a result of more

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[8] Draft Report. Page 3-1.

[9] The Carollo report [page 5] states, "Flow reductions from water conservation are already included in the coefficients used to calculate the projected flows, so no additional conservation savings were incorporated into the projections. This approach is consistent with the City's 2004 Water System Improvements Engineer's Report." Carollo used 117 gpd/EDU for gross per capita flow, which apparently includes industrial flow. The City staff memo in Appendix E of the B&C Draft Report discusses per capita flows and historical trends. These sources do not appear to factor in future conservation savings.

efficient water use may be warranted pending discussion with Carollo and City staff to evaluate how this should be considered in the plant design.[10]

As stated in the Draft Report, the average concentrations used in the report for BOD and TSS in single-family residences fall within the range recommended by the State Water Resources Control Board's *Revenue Program Guidelines.*

5. Cost Escalation Factors

Cost escalation is used in several tables in the analysis. In Table 3.7, project costs in 2006 dollars are escalated to projected construction dates using cost escalation factors that are the same as the cost escalation factors that are later used to escalate the capacity charge into future years. Both of these uses of escalation factors are appropriate because construction cost inflation is the appropriate economic measure.

After actual inflation was adjusted for between the completion of the cost estimates in the Carollo report and the capacity charge calculations in the Draft Report, a constant 5.0% cost escalation factor was used throughout the remaining 42 years to 2049. The 5.0% is derived in Table 3.2, which is based on the changes in various cost indices in the most recent five years. These changes are strongly influenced by a spike in inflation during the last three years. We believe 5.0% is too high based on long-term trends, which have averaged closer to 3%. The use of 5.0% for the next 42 years exceeds long-term historical trends. ***We recommend reducing the 5.0% cost escalation factors to 3%.***

6. Interest Costs

Interest rates are used for calculating the interest component of debt service in Table 3.8. 5.50% was used for the first three bonds in 2008, 2009, and 2010 and 7.00% for the latter two bonds in 2012 and 2020, based on input from the City's financial advisor. Increasing the cost of borrowing is inconsistent with holding the cost escalation factors constant at 5.0%. Because inflation rates and borrowing rates track each other, the spread between them remains fairly constant. ***We recommend linking the interest rates used for calculating the interest cost of debt service to the cost escalation factors to maintain consistency, using a spread of 2.5%.***

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[10] It appears from the Carollo draft report and the City staff memos in the B&C Draft Report that constant flows per EDU were assumed for future projections. The extent to which these flows reflect demand hardening is not discussed.

7. Bond Assumptions[11]

The smallest project is projected to cost $29 million and the largest is $210 million. In our experience, the magnitude of the cost of these proposed projects warrants debt financing. Five issuances seems logical although another structure may unfold as delays are encountered and projects are not constructed as quickly. For purposes of calculating capacity charges, the five issuances in B&C's draft report are defensible.

As discussed above, the interest rates used in the Draft Report should track the estimated inflation rate. Because the estimated inflation rate is too high in our opinion, reducing the inflation rate will require reducing the interest rate on the bonds, thereby reducing the interest cost.

The debt issuance costs in the Draft Report are a constant 3.0% regardless of the size of the bond. In our experience, issuance costs (as a percent of the principal) depend on the size of the bond. We would expect the issuance costs (as a percent of the principal) to be higher for smaller issues than for larger issues.

We recommend that the City's financial advisor review the assumptions used in the Draft Report concerning the number of bond issuances and the issuance costs.

8. Present Value of Interest Costs

The present value of interest costs is derived in Table 3.12. The present value factors are equal to the interest rates used for determining the cost of borrowing. This is incorrect. The present value factors should be based on the cost escalation factors because the time value of money is a function of inflation, not the cost of borrowing. ***We recommend correcting the present value factors so that they equal the cost escalation factors.***

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[11] HF&H is not a financial advisory firm; we are rate consultants. We have not sought advice from a municipal finance specialist in preparing this peer review. The opinions expressed in this report are those of HF&H and reflect our rate-making experience working with financial advisors as part of debt issuance. The City should consult with its financial advisor on matters concerning bond assumptions.

GUIDELINES FOR A REVISED CAPACITY CHARGE

Assumptions

The following guidelines and assumptions were followed in calculating a revised capacity charge.

Cost recovery. Recover all of the costs allocated to growth. Because debt financing is contemplated for all of the CIP, growth's share of the costs includes principal and interest on the bonds.

Surplus capacity in existing facilities. There is no significant capacity in the existing sewer system currently available for growth. Going forward, we would "anchor" the calculation so that the current system capacity and connections serve as the baseline. Over time, this will mean that today's marginal cost calculation will include facilities after they are constructed.

Cost per EDU. For present purposes, base the residential capacity charges on the cost per EDU rather than on the unit costs of flow, BOD, and TSS to insure full cost recovery. We would base non-residential capacity charges on the unit costs.

Number of EDUs. The costs can only be recovered from the unvested EDUs, 48,655, and not from the amount of added capacity, 54,483 EDUs. Hence, the calculations are based on 48,655 EDUs to protect rate payers from subsidizing the vested connections.

Flow per EDU. Conservation measures, particularly metering will improve water use efficiency, reducing the flow per EDU from today's 290 gpd. The amount of this reduction is difficult to estimate but can be accounted for as it occurs in future updates. For present purposes, using 290 gpd is more conservative because it projects fewer EDUs.

Cost escalation. Long-term historical construction cost inflation has been less than recent inflation. Given the length of the planning horizon in this calculation, we would use the long-term average of 3%. Like other factors and assumptions in the analysis, updates can correct for variances between assumed and actual values.

Interest rates on debt. Interest rates should track inflation. We would use a constant 2.5% spread or 5.5% for all bonds. Like cost escalation, variances between assumed and actual values can be accounted for in updates.

Issuance costs. We expect the issuance costs to range from 3% to 7% in inverse proportion to the size of the bonds (i.e., higher issuance costs for smaller bonds).

Present value factors. We would not adjust for the present value. Instead, we would calculate an unvarying amount for the following reasons:

1. Introducing present values into the calculation shifts the calculation from a cost to a value basis. Although most capacity charge methodologies introduce a certain element of value, the present value methodology as used in the Draft Report does not fully recover costs because it undervalues the cost of capacity.
2. The City is under no legal obligation to discount the charges in the early years in an effort to maintain the charges in constant dollars. The effect of doing so is that connections at the beginning of the period are more costly than in later years. It is appropriate to front-load the charges to mitigate the risk to rate payers, who are faced with covering the cost of debt service if enough connections do not occur. When later connections occur, the rate payers are at less risk because the base of customers has grown and for a shorter period of time before the debt is retired. Later connections are also connecting to facilities with shorter remaining lives that are therefore of lower value.

Updates. In updating the capacity charges, revenue from capacity charges should be credited against the costs so that non-residential charges based on unit costs are netted out, thereby potentially reducing the residential charges based on EDUs. Interest on surplus or deficit balances should also be rolled forward into the calculation and credited or debited against the cost of facilities. Accounting for revenues and interest on fund balances insures that the calculation achieves cost recovery, which is assuring to both rate payers and growth that costs are being equitably distributed.

Transition into full charges. The City has the discretion to set its capacity charges at any amount up to but no greater than full cost recovery. Because the capacity charges are a new charge, the charge should be phased in over three to five years to give growth time to adapt. The City has the option to roll forward any subsidy during the transition period to future years to maintain full cost recovery.

Conclusion

The model used in preparing the Draft Report was revised based on the foregoing assumptions to derive a total principal and interest cost of $475,705,000. This amount includes $230,459,000 in principal, which represents the 2006 construction costs escalated to the projected year of construction for each bond (plus issuance costs). The $245,246,000 in interest cost is based on the escalated construction costs. Dividing the $475,705,000 by the 48,655 unvested EDUs yields a residential capacity charge of $9,777/EDU.

Rounded to $9,800, this amount would be charged to each EDU without present value adjustments. Cumulative revenue from this capacity charge may exceed cumulative debt service payments in the early years. The fund balance plus interest earnings should be credited against the cost of the facilities and factored into future capacity charge calculations. Other factors such as actual construction costs, actual inflation rates and borrowing costs, and conservation impacts on per capita water use should all be reflected in future calculations. The resulting capacity charges will gradually change over time, probably rising but potentially even falling. At all times, however, the calculations should demonstrate that the charges are reasonable because they do not collect more revenue than the costs of the improvements that benefit growth.

BC RESPONSE TO SEWER CAPACTIY CHARGE PEER REVIEW

Brown and Caldwell has reviewed the "Sewer Capacity Charge Peer Review" performed by John Farnkopf of HF&H Consultants, LLC (HF&H). HF&H makes eight findings and recommendations for consideration by the City. Brown and Caldwell's (BC) response to each of the eight findings and recommendations is set forth below. Our itemized responses correspond to the numbering of the findings and recommendations in the peer review memorandum dated January 24, 2007.

1. Legal Requirements
   We concur that the capacity charges meet the governing legal requirement and agree with their findings, that they do.

2. Methodology
   - 2.1 HF&H agrees with our use of the marginal cost method to calculate capacity charges.
   - 2.2 HF&H "conditionally recommends adding any growth-related capacity in the existing facilities in the BC calculation."

     BC concluded from a cursory analysis of available capacity in the existing facilities, that cost of this depreciated capacity was less than $100. Because: (1) this value was minimal compared to the value of the proposed new facilities; (2) staff could not clearly identify those specific collection and conveyance facilities that had capacity available for growth and the amount of that capacity (excepting the subtrunk sewers); and (3) the City will continue to recover the cost in subtrunk sewers via a subtrunk sewer charge of $645/gross acre, the Sewer Task Force agreed with BCs recommendation to exclude consideration of collecting a capacity charge for any capacity that may be available in the existing sewer facilities.

   - 2.3 HF&H recommends that the final report describe how future updates will treat facilities after they have been constructed.

     We concur with this recommendation and this description appears in the final report. In brief, the capacity charges are based on the Capital Improvement Plan (CIP) provided by Carollo Engineers and the capacity charge calculations will not change unless, in the future, additional facilities are added to the CIP. At that point a separate capacity charge will be calculated for those facilities based on their cost and the amount of capacity they add to the system. This separate charge will be added to the existing charge. It is expected that the existing charge will only be modified for changes in the actual cost of the proposed CIP, changes in the bond issues (amount, term, timing of the issues, and interest rates), and changes in the per capita flow (100 gpd) used to calculate the EDU capacity charge.

   - 2.4 HF&H recommends that the final report include a process for updating the capacity charge that accounts for the variance between estimated and actual values (e.g., construction costs, escalation rates, borrowing rates, flow per EDU).

BC has created a capacity charge spreadsheet calculation model into which the actual values (e.g., construction costs, the amount of the bond issue[s]), the bond interest rates, bond terms, the bond issue date(s), construction cost escalation rates, flow per EDU [metered and unmetered], etc.) can be substituted for the projected values as necessary. Running the updated model will result in the calculation of updated capacity charges.

2.5 HF&H recommends deleting Alternative 1 from the final report because they see no benefit from including it.

BC and the Sewer Task Force have elected to continue to include Alternative 1 (the capacity charge without consideration of the recovery of debt interest costs) in the final report. By including this alternative, it is clear how the capacity charge is impacted by recovering either the entire interest cost (Alternative 2) or the present value of the interest cost (Alternative 3). Interest is a significant portion of the capacity charge (about 35 percent under Alternative 3 and about 57 percent under Alternative 2 and it is important that this be understood by the stakeholders.

2.6 HF&H recommends presenting both Alternatives 2 and 3 in the final report and leave the decision to the City as to the extent to which the City will achieve full cost recovery. By doing so, it is important to explain that the recommended capacity charges are less than the full cost of the facilities that benefit growth so that both developers and rate payers understand the consequences.

BC recommended that the City adopt Alternative 3 and the Sewer Task Force has agreed with the BC recommendation. The cumulative revenue from capacity charges are shown in Table 3.11 of the Sewer Capacity Charges report for Alternative 2 and in Table 3.15 for Alternative 3. It is clear from these tables that the cumulative revenues from Alternative 3 are about 22 percent less than those under Alternative 2 ($387.3 million verses $499 million).

2.7 HF&H recommends that the final report explain why the residential capacity charges were calculated based on unit costs rather than EDUs, addressing how the potential shortfall will be paid.

The draft and final Sewer Capacity Charges reports completely explain why each new connection will pay a capacity charge based on the same unit costs (separately for flow, BOD and TSS) of capacity. Adopting HF&Hs recommendation of using EDUs would result in new connections which have BOD and TSS concentrations in excess of 200 mg/l being subsidized by residential strength connections.

In addition, this would be against the City policy as stated in Resolution 2005-412. This resolution states that both rates and charges assessed all users will be uniform.

HF&H explains this themselves on page 8 of their peer review memorandum (after they calculate that the capacity charge for an EDU would be $5,437 rather than $4,690 when calculated by HF&Hs suggested methodology) when they state; "However, a question arises as to whether it is fair to include the $747 ($5,437 less $4,690) in additional BOD and TSS capacity in the capacity charge for equivalent single-family residential dwellings." We conclude that it is not fair and therefore the methodology is unchanged.

3.0 HF&H recommends changing the costs allocated to growth in our draft report to match the Carollo Engineers addendum and to explain the reason for using 15.8 mgd rather than 14.1 mgd as the capacity for calculating the capacity charge.

BC used the $175.6 million for the CIP allocable to growth as presented in the August 14, 2006 draft of the "Carollo report." HF&H correctly points out that in the September 18, 2006 addendum to the August 14, 2006 draft report, the CIP allocable to growth was increased to $175.7 million. It was subsequently revised to $176.6 million and it is this later value that we have used in our final report.

The portion of the CIP allocable to growth provides for an additional 15.7 mgd (revised from the 15.8 mgd in the draft) of flow capacity (as well as 54,300 lbs/day of BOD capacity and 43,100 lbs/day of TSS capacity). This capacity is used for all new future connections, including those that paid only $500 for an EDU connection, but have yet to connect to the City sewer system. The capacity that will be used by these "vested" connections is about 1.6 mgd. If BC recovered the cost of 15.7 mgd of capacity ($176.6 million) from new connections that use only 14.1 mgd of this capacity, these new connections would be subsidizing the "vested" connections. This is not allowed under the Mitigation Fee Act of 1987 (AB 1600) as codified in the California Government Code §66000-66025. Instead, the shortfall in capacity charge receipts will be made up by rate payers. This is allowed under applicable regulations and the BC methodology has been discussed and accepted at Sewer Task Force meetings.

4.0 HF&H recommends reviewing the estimated future sewered water use per EDU with Carollo Engineers and City staff to confirm that demand hardening in response to metering currently unmetered customers, as well as other conservation measures, had been considered.

BC has reviewed the assumption of 100 gpd per capita wastewater discharge with City staff and the Sewer Task Force members on numerous occasions. The conclusion was always that this is the best assumption at the time. This winter water use will be monitored in the future, as more single family residential customers become metered and more use data is tabulated, to determine if this assumption of 100 gpd per capita water discharge estimate is still valid. If not, the capacity charge for EDUs will be adjusted accordingly.

5.0 HF&H recommends reducing the 5.0 percent cost escalation factors to 3 percent.

BC does not agree. As indicated in Table 3.2 of our final report, the Engineering News Record 20-City Construction Cost Index and the Engineering News Record San Francisco Construction Cost Index have increased at an average annual rate of 5.6 percent and 5.3 percent, respectively over the 3-year period, 2004 through 2006. These are both good measures of the construction cost escalation the City of Modesto will likely face in the future. Should construction cost escalation moderate in the future, the escalation rate of 5 percent used in capacity charge calculation model may be modified accordingly.

6.0 HF&H recommends linking the interest rate used for calculating the interest cost of debt service to the cost escalation factors to maintain consistency, using a spread of 2.5 percent.

BC disagrees. The linkage that HF&H refers to is a general relationship between cost inflation (usually measured by the consumer price index [CPI] or the Implicit Price deflator [IPD]) and the nominal interest rate on riskless investments (e.g., government bonds). The so-called constant which relates these two variables is called the real rate of interest. The relationship is as follows:

$$i_N = i_f + i_r$$

where: i_N = nominal interest rate on a "riskless" investment
i_f = the level of cost inflation
and i_r = the real rate of interest

It is true that there is a so-called "average" rate for i_r, the real rate of interest, but the amount of the average is in question. HF&H say 2.5 percent while the reference sited in the rest of this response (and included in this appendix as part of this response) says 3 percent.[1] In addition, although there is an average (whether 2.5 percent or 3 percent), the term "average" hides the fact that this rate is extremely volatile. As shown in Figure 2 of the reference, the real rate varies from about 0 percent in 1980 to about 5.5 percent in 1986. Finally, the relationship is meant to relate the nominal rate and cost inflation as measured by an index such as the CPI or the IPD. Whether the same "average" real rate (2.5 percent or 3.0 percent or whatever) is still valid if we use the ENR CCI or some other index that is a measure of construction cost inflation (rather than an index of general price inflation) is questionable. As a consequence, we will not attempt to relate the debt interest rate and the construction cost inflation rate by a constant of 2.5 percent.

7.0 HF&H raises several questions about the bond assumptions. The major questions regard: (1) the assumed interest rates; and (2) the 3 percent issuance cost per issue regardless of its size.

[1] The Natural Rate of Interest, *FRBSF Economic Letter*, Number 2003-32, October 31, 2003.

The interest rates of 5.5 percent for the first two issues and 5.0 percent for the remaining three issues were provided to BC by the City's Financial Advisor. These projected interest rates seem reasonable to BC. The thirty year term for each issue was also provided by the City's Financial Advisor.

We recognize that a significant portion of the issuance costs, such as legal and financial advisor costs, are fixed and thus the issuance costs, as a percentage of the size of the issue, will vary with the size of the issue (relatively high for a relatively small issue and relatively low for a large issue). The 3 percent issuance cost basis was assumed to be an average and was provided to BC by the City's Financial Advisor. We believe that it is reasonable for projection purposes.

All bond assumptions, such as: (1) when the bonds will be issued, (2) their exact size (a function of actual construction costs and the amount of capitalized interest), and (3) the structure of the annual debt service payments, will influence the issuance costs and calculation of annual debt service payments. When the actual values are known exactly, the model will be revised accordingly.

8. HF&H believes the "present value factors" (discount rate) used to determine the present value of the interest payments is incorrect. HF&H believes the "present value factors" (discount rate) should be based on the cost inflation factors because the time value of money is a function of inflation, not the cost of borrowing.

   We have used a cost inflation factor of 5 percent and a discount rate of 4.85 percent as provided by the City's Financial Advisor. These values are reasonable for projection purposes.

FRBSF ECONOMIC LETTER

Number 2003-32, October 31, 2003

The Natural Rate of Interest

A key question for monetary policymakers, as well as participants in financial markets, is: "Where are interest rates headed?" In the long run, economists assume that nominal interest rates will tend toward some equilibrium, or "natural," real rate of interest plus an adjustment for expected long-run inflation.

Unfortunately, the "natural" real rate of interest is not observable, so it must be estimated. Monetary policymakers are interested in estimating it because real rates above or below it would tend to depress or stimulate economic growth; financial market participants are interested because it would be helpful in forecasting short-term interest rates many years into the future in order to calculate the value and, therefore, the yields of long-term government and private bonds. This *Economic Letter* describes factors that influence the natural rate of interest and discusses different ways economists try to measure it.

Defining the natural rate of interest

In thinking about the natural rate of interest, economists generally focus on real interest rates. They believe that movements in those rates, more so than in nominal rates, influence businesses' decisions about investment spending and consumers' decisions about purchases of durable goods, like refrigerators and cars, and new housing, and, therefore, economic growth.

Over 100 years ago, Wicksell defined the natural rate this way:

> There is a certain rate of interest on loans which is neutral in respect to commodity prices, and tends neither to raise nor to lower them. (1936 translation from 1898 text, p. 102.)

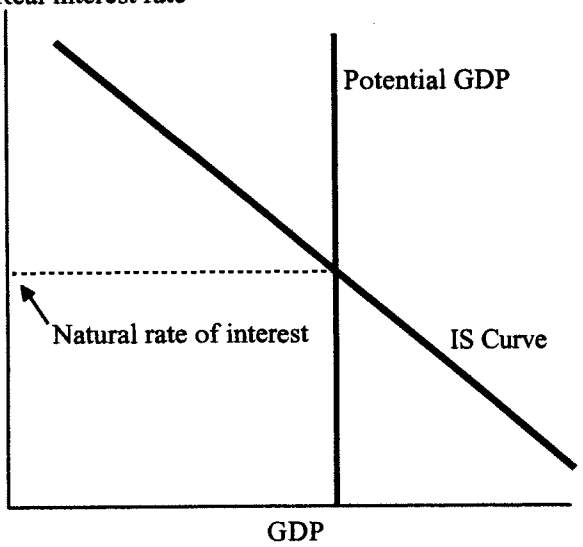
Since then, various definitions of the natural rate of interest have appeared in the economics literature. In this *Letter,* the natural rate is defined to be the real fed funds rate consistent with real GDP equaling its potential level (potential GDP) in the absence of transitory shocks to demand. Potential GDP, in turn, is defined to be the level of output consistent with stable price inflation, absent transitory shocks to supply. Thus, the natural rate of interest is the real fed funds rate consistent with stable inflation absent shocks to demand and supply.

This definition of the natural rate takes a "long-run" perspective in that it refers to the level expected to prevail in, say, the next five to ten years, after any existing business cycle "booms" and "busts" underway have played out. For example, the U.S. economy is still at a relatively early part of its recovery from the 2001 recession, so the natural rate refers not to the real funds rate expected over the next year or two, but rather to the rate that is expected to prevail once the recovery is complete and the economy is expanding at its potential growth rate.

Figure 1 shows what determines the natural rate in a stylized form. The downward-sloping line, called the IS (investment = saving) curve shows the negative relationship between spending and the real interest rate. The vertical line indicates the level of potential GDP, which is assumed to be unrelated to the real interest rate for this diagram. (In principle, potential GDP is also a function of the real rate, but this modification does not affect the basic point.) At the intersection of the IS curve and the potential GDP line, real GDP equals potential, and the real interest rate is the natural rate of interest.

Importantly, the natural rate of interest can change, because highly persistent changes in aggregate supply and demand can shift the lines. For example,

Figure 1
Determination of the natural rate of interest



in a recent paper, Laubach (2003) finds that increases in long-run projections of federal government budget deficits are related to increases in expected long-term real interest rates; in Figure 1, an increase in long-run projected budget deficits would be represented by a rightward shift in the IS curve and a higher natural rate. In addition, economic theory suggests that when the trend growth rate of potential GDP rises, so does the natural rate of interest (see Laubach and Williams (2003) for supporting evidence).

Measuring the natural rate of interest

Although it is relatively straightforward to define the natural rate of interest, it is less straightforward to measure it. If the natural rate were constant over time, one might estimate it simply by averaging the value of the real funds rate over a long period. For example, the average real fed funds rate over the past 40 years has been about 3%, so if history were a good guide, then one would expect real interest rates to return to 3% over the next five to ten years.

But predicting the natural rate using a long-term average is akin to using a baseball player's lifetime batting average to predict his batting average over the next season. This makes sense only if the likelihood of getting a hit doesn't change much over a career. In reality, the factors that affect a baseball player's performance—experience, age, and the quality of opponent pitching—change from year to year. For example, Barry Bonds's batting average over the past three seasons was well above his career average, suggesting an important change in the factors that determine whether Barry gets a hit. The leap in performance is even greater when looking at his home run hits: over the past three years, he has hit home runs at a rate over 50% higher than during the rest of his career. Indeed, Barry Bonds's performance during the 2003 season was much closer to his record over the past three seasons than his career statistics would predict, showing that long-term averages can be misleading predictors.

The same logic of time variation in batting averages of baseball players applies to the natural rate of interest. The factors affecting supply and demand evolve over time, shifting the natural rate around. If these movements are sufficiently large, the long-term average could be a poor predictor of the natural rate of interest.

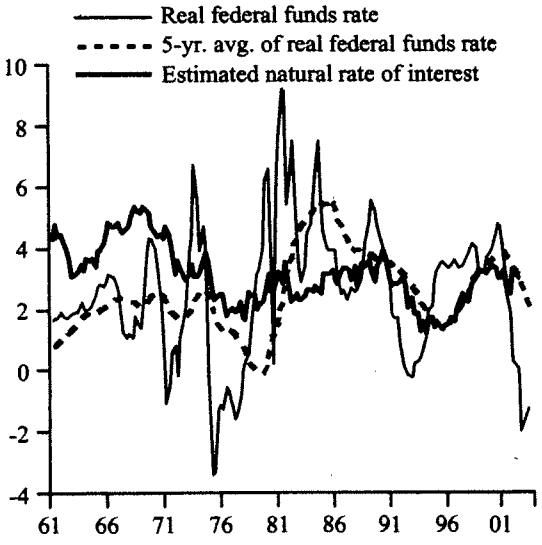
One way to allow for structural changes that may influence the natural rate of interest is to compute averages of past values of the real funds rate while putting less weight on older data. Figure 2 illustrates such a calculation, taking the average over the past five years. Other more sophisticated statistical approaches identify the natural rate by using weighted averages of past data, and they yield plots similar to those in the figure.

Although such averaging methods tend to work well at estimating the natural rate of interest when inflation and output growth are relatively stable, they do not work so well during periods of significant increases or declines in inflation when real interest rates may deviate from the natural rate for several years. For example, during the late 1960s and much of the 1970s, inflation trended steeply upward, which suggests that the real funds rate was below the natural rate on average. The averaging approach misses that point, however, and ascribes this pattern of low real rates to a low natural rate.

Estimating the natural rate of interest with an economic model

Since the averaging approach does not work well when interest rates deviate from the natural rate for long periods, economists also use other economic variables to estimate the natural rate. For example, Bomfim (1997) estimated the location and slope of the IS curve and potential output shown in Figure 1 using the Federal Reserve Board's large-scale model of the U.S. economy, and thereby derived estimates of the natural rate of interest. In terms of the baseball analogy, these methods try to estimate some aspect of a player's abilities, taking into account the effects of relevant observable char-

Figure 2
Estimates of the natural rate of interest



acteristics, say, the player's age and the quality of the opposing pitcher.

Laubach and Williams (2003) use a simple macroeconomic model to infer the natural rate from movements in GDP (after controlling for other variables, including importantly, the real fed funds rate). In their model, if the real fed funds rate is above the natural rate, monetary policy is contractionary, pulling GDP down, and, if it is below the natural rate, monetary policy is stimulative, pushing GDP up.

An important component of their procedure is a statistical technique known as the Kalman filter; this method works on the principle that you partially adjust your estimate of the natural rate of interest based on how far off the model's prediction of GDP is from actual GDP. If the prediction proves true, you do not change your estimate of the natural rate. If, however, actual GDP is higher than predicted, then monetary policy probably was more stimulative than you had thought, implying that the difference between the real fed funds rate and the natural rate of interest was more negative than you thought. The estimate of the natural rate goes up by an amount proportional to the GDP prediction error, or "surprise." If GDP is lower than predicted, the estimate of the natural rate is lowered. This procedure is designed to allow for the possibility of a change in the natural rate and also to protect against overreacting to every short-term fluctuation in GDP.

The final estimate for the natural rate of interest that Laubach and Williams get for mid-2002 is about 3%, coincidentally not far from the historical average of the real funds rate (Figure 2). But, for other periods, the estimates range from a little over 1% in the early 1990s to over 5% in the late 1960s. The high estimates in the late 1960s reflect the fact that output was growing faster than expected, given the history of real interest rates and the prevailing estimates of the natural rate of interest. The natural rate estimates fell during the early 1990s owing to the slow recovery from the recession of 1990–1991 even with low real fed funds rates.

These results show that the procedure for estimating the natural rate using the Kalman filter was not "fooled" by the period of the late 1960s and 1970s, but instead recognized it as one of excessive growth and inflationary pressures resulting from real rates that lay well below the true natural rate of interest. Similarly, it was not fooled by the early 1980s into thinking that the natural rate had increased sharply because policy had tightened; instead, it recognized that real rates well above the natural rate had contributed to the slowing of economic activity and, in fact, had little longer-term implications for real interest rates.

Conclusion

Economists have made progress in estimating the natural rate of interest in recent years. But they have not yet hit a "home run." For example, although the Kalman filter has proven its usefulness in this effort, it is important to note that the resulting estimates are not very precise; that is, from a statistical viewpoint, we cannot be confident that these estimates are correct. Furthermore, as Orphanides and Williams (2002) point out, these estimates are sensitive to the choice of statistical methods, which further obscures our ability to measure the natural rate of interest accurately.

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