



## 1. Project Data

<b>Project ID</b> P123133	<b>Project Name</b> CN-Gansu Qingyang Urban Infrastructure	
<b>Country</b> China	<b>Practice Area(Lead)</b> Transport	
<b>L/C/TF Number(s)</b> IBRD-81700	<b>Closing Date (Original)</b> 31-Dec-2017	<b>Total Project Cost (USD)</b> 100,000,000.00
<b>Bank Approval Date</b> 31-May-2012	<b>Closing Date (Actual)</b> 30-Nov-2019	
	<b>IBRD/IDA (USD)</b>	<b>Grants (USD)</b>
Original Commitment	100,000,000.00	0.00
Revised Commitment	100,000,000.00	0.00
Actual	100,000,000.00	0.00

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## 2. Project Objectives and Components

### a. Objectives

The project development objective (PDO), as stated in the Project Appraisal Document (PAD) and the Loan Agreement (LA), was "to assist Qingyang Municipality to improve selected urban infrastructure services, including urban roads and urban environmental services."

The PDO remained unchanged throughout project implementation. In the 2016 and 2018 restructuring papers, the PDO reads "to assist Xifeng District" instead of "to assist Qingyang Municipality". However, these



restructuring papers do not mention a PDO change, and the LA was not amended. Therefore, this validation of the Implementation Completion and Results Report (ICR) sticks to the PDO mentioned in the original LA.

It is worthwhile highlighting that although the project interventions focused on the Xifeng District, which is the capital of the Qingyang Municipality (PAD, para 9), capacity strengthening also directly targeted the Qingyang Municipality as such (see section 2.d).

For the purpose of this review, the PDO will be parsed into two parts as follows, in the same way as the ICR: (i) to assist Qingyang Municipality to improve selected urban roads infrastructure services, and (ii) to assist Qingyang Municipality to improve selected urban environmental services.

Note: This validation considers "urban environmental services" as services related to storm drainage, sewage collection, and sewage treatment infrastructure in line with the definition of "environmental infrastructure" in the PAD (annex 2, para 5).

**b. Were the project objectives/key associated outcome targets revised during implementation?**

Yes

**Did the Board approve the revised objectives/key associated outcome targets?**

No

**c. Will a split evaluation be undertaken?**

Yes

**d. Components**

The project was structured along the following two components:

**Component 1: Urban Infrastructure Improvements (cost at appraisal US\$163.68 million, excluding contingencies; cost revised in 2016, US\$172.47 million; actual cost US\$186.96 million)**

**Subcomponent 1.1: Urban Bypass** (cost at appraisal US\$82.26 million; cost revised in 2016, US\$96.18 million; actual cost US\$124.56 million - the cost overrun was due to increased resettlement costs explained in section 10). This subcomponent was to finance (i) the construction of bypass roads of the southern section of Xifeng District's West Ring Road and the northern section of Xifeng District's East Ring Road with installation of associated pipes; and (ii) the construction of three connection roads to the two bypass corridors of the West Ring Road and the East Ring Road (connection road from the West Ring Road to Provincial Highway 202, section of Anding Xi Road linking to West Ring Road, and section of Guxiang Road linking to the East Ring Road) with installation of associated pipes.

**Subcomponent 1.2: Integrated Road Corridor** (cost at appraisal US\$11.53 million; cost revised in 2016, US\$11.00 million; actual cost US\$3.02 million - the cost underrun was because of the use of local financing not captured in the total cost in the ICR). This included (i) the improvement of three selected main road corridors (Nan Bei Street, Anding Dong Xi Road, and West Ring Road), including road pavement, traffic channelization, lighting, and greening, along with drainage and sewage system improvements; (ii) the rehabilitation of three selected backstreets and small lanes for slow traffic (Nanyuan, Tianhe, and Xifeng



lanes); and (iii) as part of the design of the integrated road corridor, the preparation of a parking action plan, public transport action plan, and traffic safety, education and enforcement action plan.

**Subcomponent 1.3: Drainage and Sewage** (cost at appraisal US\$37.28 million; cost revised in 2016, US\$35.20 million; actual cost US\$28.40 million - the cost underrun was because of the use of local financing not captured in the total cost in the ICR). It was to finance (i) the construction of drainage and sewer mains for a section of each the West Ring Road, the Anding East Road, and the Anding West Road; and (ii) the rehabilitation of sewage collection pipes in Xifeng District and associated improvements of road pavement, street lighting, and greening along these roads.

**Subcomponent 1.4: Wastewater Treatment Plant** (cost at appraisal US\$32.31 million; cost revised in 2016, US\$30.11 million; actual cost US\$30.98 million). This subcomponent included the construction of (i) a new wastewater treatment plant in the eastern area of Xifeng District; (ii) a wastewater pumping station in Xifeng District's northern area; and (iii) wastewater trunks and collectors associated to the investments in (i) and (ii) above.

**Component 2: Institutional Strengthening and Capacity Building (cost at appraisal US\$3.30 million, excluding contingencies; cost revised in 2016, US\$3.07 million; actual cost US\$2.37 million - reason for cost underrun not provided in ICR)**

This component was for technical assistance to (i) carry out a water resource study covering, among others, water reuse, subbasin water environment improvements, and industrial wastewater discharge licenses in Xifeng District, which were expected to support the then ongoing investments of wastewater management; (ii) improve the operation and maintenance capabilities of Qingyang Municipal Water Supply and Sewage Company and Xifeng District Public Utility and Transportation Bureaus to provide urban infrastructure services in the drainage, wastewater and urban road transport sectors; (iii) build capacity and training for Qingyang Municipality's and Xifeng District's agencies involved in project implementation; (iv) strengthen Qingyang Municipal Water Supply and Sewage Company's GIS-based system to manage its drainage and wastewater pipes networks; and (v) strengthen the Qingyang Municipality's capacity for project management and construction supervision.

The 2016 restructuring cancelled a one-kilometer section of the Western Ring Road from subcomponent 1.1 because a nearby existing road provided a similar connection between the ring road and the provincial highway S202. According to the 2016 restructuring paper (pages 6 and 7), this change did not negatively affect the achievement of the PDO because the additional travel length without the cancelled section was marginal. The restructuring also cancelled the planned purchase of vehicles from component 2.

#### **e. Comments on Project Cost, Financing, Borrower Contribution, and Dates**

##### **Project Cost**

According to the ICR datasheet, the total project cost was US\$188.99 million, which is 98 percent of the appraisal estimate of US\$192.35 million. Annex 3 of the ICR mentions a total project cost is US\$189.22 million. According to the Bank task team, the total project cost is US\$188.99. The cost indicated in annex 3 includes the front-end fee of US\$0.25 mil.

##### **Financing**



The project was financed through an IBRD loan of US\$100 million (ICR, datasheet and annex 3), which was fully disbursed.

### **Borrower Contribution**

The expected Borrower contribution at appraisal was US\$92.35 million (PAD, datasheet). The actual Borrower contribution was US\$88.99 million (ICR, datasheet), which is 96 percent of the expected amount.

### **Dates and Project Restructuring**

The project was approved on May 31, 2012, became effective on September 24, 2012, and was originally expected to close on December 31, 2017. The project had two level-two restructurings. The first restructuring took place on August 23, 2016, when an amount of US\$30.63 million of the loan amount was disbursed. With this restructuring, the loan closing date was extended by 12 months, to December 31, 2018, to account for delays in project implementation. In addition, the restructuring (i) made minor changes to project activities (see section 2.d above); (ii) adjusted the project costs mainly because of the changes to project activities and higher resettlement costs than expected, and to reflect actual contract prices; (iii) increased the disbursement percentage for works to reduce immediate pressure on counterpart funding; (iv) adjusted the implementation schedule; and (v) adjusted the results framework.

The result framework changes included (i) replacing the PDO indicator of "wastewater pollution reduction in terms of Biological Oxygen Demand (BOD)" with a new sector core indicator of "volume (mass) of BOD pollution removed by treatment plant", but leaving the indicator's project end target unchanged; (ii) replacing the intermediate indicator of "road construction completed" with two intermediate sector core indicators of "roads rehabilitated, non-rural" and "roads constructed, non-rural", and aligning the targets with the actual road length to be intervened; and (iii) adapting the project end target dates to the revised loan closing date.

The project was restructured again on October 10, 2018, when US\$70 million of the loan amount was disbursed. Through this restructuring, the loan closing date was extended by 11 months, to November 30, 2019, to complete the project activities and the resettlement of affected families. The other main change introduced with this restructuring was to revise the targets of the three PDO indicators related to the project's wastewater treatment plant downwards by about two thirds of the original targets. The ICR, para 9, only mentions that the revision was based on actual capacity, and the restructuring paper does not provide any reason for the significant reduction in the targets (for details see Efficacy section).

Because the 2018 revision of three PDO indicator targets reduced the project's level of ambition, this review will apply a split rating and will assess the project outcome based on the original and revised indicator targets.

## **3. Relevance of Objectives**

### **Rationale**

At appraisal in 2012, the Gansu Province had one of the lowest gross domestic products in China and depended heavily on a few regional cities, including Qingyang Municipality for its economic development. Qingyang Municipality had abundant deposits of oil and coal and was selected to be developed as base for



energy supply and petrochemicals. Qingyang Municipality's efforts to improve the city's livability and profile to attract and retain external investments had been constrained by the shortage of essential urban infrastructure services in its central Xifeng District (PAD, para 9). Therefore, to improve selected urban infrastructure services, including urban roads and urban environmental services, was relevant.

The PDO was in line with the FY2006-10 Country Partnership Strategy, which among its key pillars included (i) reducing poverty, inequality, and social exclusion; (ii) managing resource scarcity and environmental challenges; and (iii) improving public and market institutions. To improve the competitiveness of Qingyang Municipality through improved infrastructure services was also in line with China's 2011-2015 12th Five-Year Plan (FYP), which stressed the need to accelerate coordinated regional development and sound urbanization, especially in the western region, to reduce the pressure of massive rural migration towards the coastal cities.

The PDO remained relevant by project close. Eight percent of the city's built up area still lacked drainage and sewage networks, and according to the Bank task team, the implementation of Qingyang Municipality's development plan, spelling out the municipality's infrastructure and development needs, was to be completed only by 2030. The PDO remained in line with the FY2020-25 China Country Partnership Framework. This includes engagement area 2: Promoting Greener Growth", objective 2.2: Reducing Air, Soil, Water, and Marine Plastic Pollution, and objective 2.4: Strengthening Sustainable Natural Resource Management and the engagement area 3: Sharing the benefits of growth. The PDO also remained aligned with China's 2016-2020 13th FYP. This plan puts emphasis on sustainable growth and development in China's western regions through effective and efficient development of water resources, while simultaneously protecting the environment and improving ecological security. It also seeks to accelerate efforts that make access to basic public services more equitable.

The PDO was realistic, and its level of ambition adequate for a first World Bank project in Qingyang Municipality. However, since environmental sustainability was a key focus in the country's strategies, a greater focus on public transport and non-motorized transport would have been desirable. Therefore, **the relevance of objectives is considered substantial.**

## Rating

Substantial

## 4. Achievement of Objectives (Efficacy)

### OBJECTIVE 1

#### Objective

To assist Qingyang Municipality to improve selected urban roads infrastructure services

#### Rationale

The theory of change for subobjective 1, based on the ICR (para 4) and additional information in the PAD (para 2 and annex 2), was that the activities of constructing (i) the southern and northern sections of the



Xifeng District's West and East ring roads and (ii) three connection roads to these ring roads was to lead to the output of new road infrastructure that improves connectivity from the city center to the ring roads and to the city's southern and northern development areas. In terms of outcomes, this was to reduce the travel time of through traffic, decrease through traffic, and improve traffic flows in the city center.

In addition, the activities of (i) improving three urban corridors, (ii) rehabilitating backstreets for low traffic, (iii) preparing parking, public transport, and road safety action plans, and (iv) providing capacity strengthening to Qingyang Municipality staff were to have the outputs of (i) improved and rehabilitated road infrastructure, (ii) implemented action plans, and (iii) capacitated Qingyang Municipality staff. In terms of expected intermediate outcomes, this was to lead to better urban transport infrastructure in the city center and greater capacity to manage it. In terms of outcomes, this was to lead, among others, to better public transport services (e.g. higher bus speeds, more buses), an enhanced environment for non-motorized transport, and better managed parking and traffic. It was also expected to increase public transport user satisfaction and ridership. Together with the reduced through traffic in the city center, it was expected to decrease road fatalities and injuries in the three urban corridors intervened.

Overall, the outcomes of (i) reduced travel time for freight through traffic, (ii) greater use of the new road infrastructure, thus less through traffic in the city center, (iii) higher bus speeds, (iv) greater public transport ridership, and (v) less road fatalities and injuries are all indications of the PDO of improved urban roads infrastructure services. In terms of long terms outcomes, improved urban roads infrastructure services were to (i) reduce poverty, inequality, and social exclusion, (ii) manage resource scarcity and environmental challenges, and (iii) improve public and market institutions.

## Outputs

The following outputs were achieved during the life of the project to meet subobjective 1 (ICR, paras 19 to 21 and annex 1):

- 16.11 km of non-rural roads rehabilitated, compared to a target of 16.06 km set with the 2016 restructuring (the PAD does not indicate the km of non-rural roads to be rehabilitated), hence achieving the target. This includes the following:
  - Anding Dong Xi and Nan Bei roads (according to the ICR, para 31, the latter was financed with counterpart funds to accelerate its implementation) with improved mid-block crossing, bus stops, traffic lights, and traffic channelization (ICR, para 20). The PAD (annex 2, para 8) lists a third corridor to be upgraded, West Ring road, which is not mentioned in the ICR.
  - Three upgraded slow traffic roads in the old city center with drainage, pedestrian facilities, traffic management improvements, lighting, public toilets, and trash containers (ICR, para 20).
- 5.74 km non-rural roads constructed, compared to an original target of 6.75 km (PAD, annex 2), and a revised target of 5.76 km. The original target was not achieved whereas the revised target was practically achieved. This included the following:
  - One section on the West and three sections on the East ring roads (2016 RP).
  - Guxiang road connecting the East ring road and Anding Xi road connecting the West ring road (ICR, annex 1). The PAD (annex 2, para 7), mentions three connecting roads to be constructed, but the ICR only refers to two.
- 47 reconstructed or upgraded bus stops, compared to a target of 33. This exceeds the target by 45.5 percent.



- 194 unsignalized pedestrian crossings converted to signalized mid-block crossings on three corridors (# of crossings), compared to a baseline of 15 and a target of 103. This exceeds the target by 88.3 percent.
- 28 intersections with traffic channelizing, compared to a baseline of 12 and a target of 27. This slightly exceeds the target.
- 189 staff trained, compared to a target of 120. This exceeds the target 71.8 percent. This refers to staff trained on transport and wastewater related issues.
- 5 studies completed, in line with the target. This included the parking, public transport, and traffic safety, education and enforcement actions plans related to the transport sector.
- Nine technical training events in Qingyang Municipality and several in more advanced Chinese cities like Shenzhen, Shanghai and Kunming.
- Two study tours to Washington, New York, Vancouver, London and Moscow.

## Outcomes

The construction of the new sections of the West and East ring roads enhanced the connectivity to the northern and southern development areas of the city (ICR, para 19). According to the 2016 restructuring paper (pages 6 and 7), the fact that the planned one-kilometer section of the West ring road was not completed only marginally affected connectivity and travel times because a nearby existing road provided similar connectivity between the ring road and the provincial highway S202. In addition, the construction of the Guxiang road connecting the East ring road and the Anding Xi road connecting the West ring road improved the connectivity from the city center to these ring roads.

These connectivity improvements reduced the travel times for freight through traffic from a baseline of 28.4 minutes to 15.8 minutes, exceeding the project end target of 18.2 minutes by 13.2 percent. On the West corridor (West Ring road) the freight through traffic increased from 66.2 to 82.5 trucks in 24 hours, which corresponds to 24.6 percent increase. This exceeds the project end targets of 72.0 trucks or an 8.8 percent increase by 14.6 percent and 181.0 percent, respectively. On the East corridor (East Ring road), the freight through traffic increased from 9.1 to 23.9 trucks in 24 hours. This exceeds the project end targets of 22 trucks or a 141.8 percent increase by 8.6 percent and 162.6 percent, respectively. However, it is not clear from the ICR if the increase in through traffic is mostly due to the project's connectivity enhancement or driven by normal traffic increases.

Upgrading the Nan Bei road improved traffic flows, increased bus speeds. The bus service speed during rush hour on the Nan Bei road corridor increased from a baseline 10.30 km/hour to 26.90 km/hour, which exceeds the target 15.50 km/hour by 73.5 percent. However, 26.90 km/hour is a very high speed for buses in mixed traffic, and the ICR, para 51, points out that without dedicated lanes and priority system this speed is not realistic.

Rush hour bus ridership on the same corridor more than doubled from a baseline of 5,845 to 12,700 in 2019, exceeding the target of 12,000 passengers by 5.8 percent. Bus users' satisfaction increased from 27 percent at appraisal to 72 percent by project close. This exceeds the target of 65 percent by 10.8 percent. However, the ICR does not sufficiently explain how much of these achievements are attributable to the project.

The project interventions, such as traffic channeling, traffic lights, signalized mid-block crossings, and pedestrian facilities enhanced road safety. The annual number of fatalities and severely injured people in the



project corridors, measured over a three-year period, went down from a baseline of 14 to 6 by project end. This exceeds the target of 9 fatalities and severely injured people by 33.3 percent.

Although the project exceeded all its outcome targets, for several of them substantially, the ICR does not provide sufficient evidence on the project's contribution for some of them. In addition, the result in terms of bus speed increase does not seem realistic. Therefore, the improvement of selected urban roads infrastructure services is considered as achieved with moderate shortcomings, and **the efficacy of this subobjective 1 is rated substantial.**

### **Rating**

Substantial

## **OBJECTIVE 1 REVISION 1**

### **Revised Objective**

No change - To assist Qingyang Municipality to improve selected urban roads infrastructure services

### **Revised Rationale**

There were no changes to the original outcome indicator targets.

### **Revised Rating**

Substantial

## **OBJECTIVE 2**

### **Objective**

To assist Qingyang Municipality to improve selected urban environmental services

### **Rationale**

The theory of change for subobjective 2 under the original outcome targets, based on the ICR (para 4) and additional information in the PAD (para 2 and annex 2), was that the activities of (i) constructing drainage and sewage pipes along major roads, (ii) constructing drainage and sewer mains on the West ring road and the Anding East and West roads, (iii) rehabilitating sewage and pipes in the Xinfeng districts, (iv) constructing a wastewater treatment plant, wastewater pumping station, and related wastewater trunk mains and collectors, (v) carrying out a water resource study, (vi) integrating the drainage network into the city's geographic information system (GIS), and (vii) training and capacity strengthening of staff in the water supply and sewage sector were expected to provide as outputs (i) more kilometers of new or reconstructed drainage and sewage pipes, (ii) a wastewater treatment plant, including the associated pipes and pumping station, and (iii) more staff trained in efficiently managing water supply and sewage services. In terms of outcomes, this was to increase the built up areas serviced by storm and wastewater networks and reduce pollutants in wastewater, which are both indications of improved urban environmental infrastructure services. In terms of long terms outcomes, improved urban environmental infrastructure services were to (i) reduce poverty, inequality, and



social exclusion, (ii) manage resource scarcity and environmental challenges, and (iii) improve public and market institutions.

## Outputs

The following outputs were achieved during the life of the project to meet subobjective 2 (ICR, paras 22 to 25 and annex 1):

- Wastewater treatment plant and pumping station, completed in line with the target.
- Wastewater treatment plant connection pipes, 100 percent completed in line with the target.
- New drainage and sewage pipes, 107.60 percent completed and exceeding the target of 100 percent, and reconstructed drainage and/or sewage pipes, 100 percent completed in line with the target. In total, this corresponded to 18.7 km of rainwater or drainage pipes and 40.2 km of sewage pipes, completed either together with the road works or through innovative drilling techniques.
- 14 water level sensors, installed in the main wells of the city for city-wide water level monitoring (the PAD had no target).
- Citywide GIS system with digitalized drainage network (the PAD had no target).
- Study tours for waste water treatment plant management to Shenzhen, Shanghai, Chengdu, and Hefei.
- 189 staff trained, compared to a target of 120. This exceeds the target 71.8 percent. It refers to staff trained on transport and wastewater related issues.
- 5 studies completed, in line with the target. For the water and sewage sectors, among others, this included the water resource management study.

## Outcomes

The upgrading of Qingyang Municipality's storm and wastewater network enhanced the city's capacity in different pipe construction techniques, including traditional trench, integrated ditch, and tunneling/drilling. It increased the city's built-up area served by storm and wastewater networks from 50 to 92 percent, in line with the project end target.

The water resource management study, digitalized drainage network in a citywide GIS system, the study tours and the training also enhanced the city's capacity to manage water, sewage, and storm water. The Bank task team pointed out the project capacity strengthening activities, among others, facilitated the development of the sponge city concept, which focuses on the absorption of storm water by increasing green areas, recycle the storm water, and using materials that enable water absorption.

The wastewater treatment plant, with the associated collectors and pumping station, by project end in 2019, led to the removal of 576.50 tons/year of Biochemical Oxygen Demand (BOD), compared to an original cumulative target of 1,168 tons/year. This is 49.4 percent of this target. It also led to the removal of 1,166 tons/year of suspended solids (SS), compared to an original cumulative target of 2,219 (52.5 percent), and 1,631 tons/year of Chemical Oxygen Demand (COD), compared to an original cumulative target of 2,569 (63.5 percent). According to the ICR, para 24, the treatment plant benefited an additional 150,000 inhabitants, and the quality of the water released in the nearby river complied with environmental standards.

The 2018 restructuring paper does not justify the need for the revision of the indicator targets related to the wastewater treatment plant and only mentions that they were revised "as per actual capacity". The ICR does



also not explain why the original targets were not achieved. In para 46, the ICR mentions “capacity issues in the wastewater treatment plant due to a miscalculation of the volume of water to be treated, without clarifying the nature of these capacity issues. The Bank task team initially referred to a reduction of the capacity of the wastewater treatment plant built under the project and a second wastewater treatment plant in the Qingyang Municipality. After confirming with the borrower, the Bank task team pointed out that the original targets will be achieved by end-2020, and that there was no change on the capacity of the wastewater treatment plant and the planned wastewater volume.”

In its written response to the draft ICRR, the Bank task team reiterated that the wastewater treatment plant was designed for an average yearly volume of wastewater treated for disposal of 20,000 tons/year, this target was not changed during project restructuring, and it remained unchanged throughout the project. The team provided data that showed that from April 2019, when the plant started operations, to October 2020, the plant removed 1,768.38 tons/year of BOD, exceeding the original cumulative target by 51 percent, 4,425.84 tons/year of COD, exceeding the cumulative original target by 72 percent, and 3,405.98 tons/year of SS, exceeding the original cumulative target by 53 percent.

Because the original pollution removal targets were exceeded, albeit with delay, by October 2020, and **the efficacy of this subobjective is rated substantial.**

#### Rating

Substantial

### OBJECTIVE 2 REVISION 1

#### Revised Objective

To assist Qingyang Municipality to improve selected urban environmental services (the subobjective remained unchanged but the related outcome target changed)

#### Revised Rationale

The theory of change for subobjective 2 under the revised outcome targets is the same as under the original outcome targets.

#### Outputs

The outputs achieved were the same under the original and revised outcome targets.

#### Outcomes

The outcomes achieved under the revised targets are reported under subobjective 2 above. In terms of pollution removal, by project end, the plant exceeded the revised targets by 57.9 percent for BOD, by 103.4 percent for COD, and by 68.3 percent for SS. By October 2020, the plant exceeded the revised targets by 384.5 percent for BOD, by 551.9 percent for COD, and by 391.5 percent for SS.

Overall, **based on the revised outcome targets**, the project exceeded this subobjective, and **the efficacy of the latter is rated high.**



### Revised Rating

High

## OVERALL EFFICACY

### Rationale

The first subobjective under the original outcome targets was achieved with moderate shortcomings as explained in the last paragraph under objective 1, section 4 and is rated substantial. The second subobjective under the original outcome indicator targets was exceeded, but with delay, and is rated substantial. Therefore, **the overall efficacy of the PDO under the original outcome indicator targets is rated substantial.**

### Overall Efficacy Rating

Substantial

## OVERALL EFFICACY REVISION 1

### Overall Efficacy Revision 1 Rationale

The first subobjective under the original outcome targets was achieved with moderate shortcomings as explained in the last paragraph under objective 1, section 4 and is rated substantial. There were no changes to the original outcome indicator targets. The second subobjective under the revised outcome indicator targets was exceeded, and its efficacy is rated as high. Therefore, **the overall efficacy of the PDO under the revised outcome indicator targets is rated substantial.**

### Overall Efficacy Revision 1 Rating

Substantial

## 5. Efficiency

### Economic Efficiency

At appraisal, the economic efficiency of the project was assessed through a cost benefit analysis and a cost effectiveness analysis.

The cost benefit analysis covered the urban bypass road construction, integrated traffic management, and existing roads upgrading (PAD, para 25). According to the PAD, para 24, the main economic benefits included (i) savings in travel time and costs, (ii) productivity increases, (iii) avoided loss of life and property from traffic



accidents, (iv) better access to public services, (v) energy savings and associated pollution reduction due to improved road condition in project areas, and (vi) increases in amenity and land value increase due to transportation and environmental improvement. The Bank task team pointed out that this was a general description of benefits, and not all of them were actually quantified. The benefits quantified at appraisal included savings in vehicle operating cost, passenger time cost, road accidents, and environmental benefits. The economic costs of the project included capital investment and O&M costs, including associated resettlement and environmental mitigation costs (PAD, para 24).

The analysis used a discount rate of 8 percent. Neither PAD nor ICR provided a reason for the use of a 8 percent discount rate at a time when the Bank generally still used a 12 percent discount rate. According the Bank task team, the evaluation period covered the construction period from 2012 to 2015 and the operating period from 2016 to 2035.

The economic internal rates of return (EIRR) of the three transport-related sub activities were estimated as 11.1 percent, 24.7 percent, and 11.4 percent, respectively. The Net Present Values (NPV) were estimated as RMB164.6 million, RMB233.9 million, and RMB109.8 million, respectively (PAD, para 25). The combined EIRR for the three subcomponents, recalculated by project closure, was 12.4 percent and the NPV was RMB508.3 million (ICR, page 46). Sensitivity analyses under the assumptions of a 10 percent decrease in economic benefit and a 10 percent increase in total costs showed that the road investments were economically robust with estimated EIRRs of 9.5 percent, 9.0 percent, and 21.5 percent respectively (PAD, para 25).

By project close, the cost benefit analysis was repeated, using several reasonable adjustments presented in annex 4, para 4 of the ICR to reflect the project reality. The analysis for the three transport-related subcomponents (urban bypass road construction, integrated road corridor improvement, existing roads upgrading - ICR, annex 4, table 4.2) yielded EIRRs of 10.8 percent, 27.0 percent, and 15.3 percent, respectively. The combined EIRR for these subcomponents was 13.8 percent. The NPVs were estimated as RMB175.3 million, RMB206.0 million, and RMB156.0 million, respectively. The combined NPV was estimated to be RMB537.3 million (ICR, para 33). The sensitivity analysis, assuming a 10 percent cost increase and a 10 percent decrease in benefits, still yielded a robust NPV, with estimated EIRRs of 8.7 percent, 23.3 percent, and 11.3 percent, respectively.

For subcomponent 1.4: Wastewater Treatment Plant, at appraisal, a basic cost-effectiveness approach was used to select the design alternative with the lowest unit cost to achieve the wastewater treatment outcomes. The PAD, para 26, explains that this was due to the difficulties to quantify and monetize the health benefits of treating wastewater. The PAD does not contain details on the calculation of the unit costs. Although a cost-effectiveness approach is adequate for a wastewater treatment plant given its public good nature, a comparison of the unit cost of the selected design alternative with unit costs in other Chinese cities in comparable urban settings or elsewhere would have been desirable to assess its cost-effectiveness.

At the ICR stage, no economic assessment was carried out for the wastewater treatment plant. The ICR (para 34 and annex 4) mentions that "given that the original investment options remained unchanged, while the selected option's target was reached, the economic efficiency of the wastewater treatment plant is considered to be realized."

In its written response to the draft ICRR, the Bank task team included the results of a revised cost benefit analysis for the road subcomponents that included the cost of the wastewater treatment plant without benefits. This showed an EIRR of 13.8 percent (exactly the same as the ex-post combined ex-post EIRR of the road



subcomponents without the wastewater treatment plant cost) and a NPV of US\$101.5 million. This compares to an ex-ante combined EIRR of 12.4 percent and a NPV of RMB508.3 million for the road subcomponents only.

### Administrative and Operational Efficiency

The project suffered from a two-year implementation delay mainly because of delays in (i) setting up the project accounting system, (ii) providing counterpart funds for contract and resettlement payments, (iii) transferring loan proceeds to the project management office, and (iv) paying contractors. However, seven years to implement an urban infrastructure project is not uncommon.

In US dollar terms, the project was completed at a two percent lower cost than the appraisal estimate. However, its cost in RMB was significantly higher than estimated in the PAD (ICR annex 4 and page 43).

The US dollar cost of subcomponent 1.1: Urban Bypass Road Construction was 51 percent higher than the appraisal estimate despite the cancellation of one small section. This is due to a significant increase in resettlement costs (for details see section 10). The other subcomponents and the second component were completed for less than the appraisal estimate. However, some activities under subcomponents 1.2 and 1.3 were financed with local funds and the respective amounts are not captured in the total cost. The ICR does not indicate the total amount of local funds used.

Overall, **the efficiency of project implementation is rated modest**. Even though the ex-post EIRRs of the road subcomponents with and without the wastewater treatment plant cost were slightly higher than the appraisal estimate, the reliability of the analysis raises questions because (i) the ex-post EIRRs with and without the wastewater treatment plant cost were exactly the same and (ii) the bus speed increase data is not realistic (for details see subobjective 1 in the Efficacy section above). In addition, the ICR does not provide ex-post evidence on the cost-effectiveness of the wastewater treatment plant. The project also suffered from a two-year implementation delay, certain project activities were financed with local funds not included in the total cost reported in the ICR, and the actual cost in RMB was higher than estimated at appraisal.

### Efficiency Rating

Modest

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	12.38	68.30 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	13.78	82.40 <input type="checkbox"/> Not Applicable

\* Refers to percent of total project cost for which ERR/FRR was calculated.



## 6. Outcome

With a substantial relevance of objectives and efficacy, and modest efficiency, the overall **outcome under the original outcome indicator targets is rated moderately satisfactory (4)**.

With a substantial relevance of objectives and efficacy, and modest efficiency, the overall **outcome under the revised outcome indicator targets is also rated moderately satisfactory (4)**.

Based on a disbursement share of 70 percent at the time of the restructuring on October 10, 2018, when the outcome indicators were revised, **the overall outcome rating is moderately satisfactory** ( $0.7*4+0.3*4=4.3$ , rounded down to 4, where on a 6-point scale, 4 is moderately satisfactory and 5 is satisfactory).

### a. Outcome Rating

Moderately Satisfactory

## 7. Risk to Development Outcome

There are risks that the development outcome of this project will not be fully achieved or maintained. This includes the following:

- **Technical capacity to operate and maintain project assets.** The ICR, para 77, points out the city's staff has shown their technical capacity to operate and manage the project assets. Therefore, the capacity risk is low.
- **Availability of funds to maintain the project assets.** The ICR, para 78, mentions a risk that the city did not have the necessary resources to maintain the project assets, which for the Water Supply and Sewage Company is attributed to its worrisome operating ratio. For the transport related agencies, the Bank task team pointed out that the appetite for increasing bus fares or introducing tolls is limited, hence this might put in danger their financial capacity. However, the team also explained that Gansu Province and Qingyang Municipality receive special attention from the central government, including adequate funding.
- **Increase in car ownership and use.** There is a risk that a strong increase in car ownership and use might cancel out the mobility benefits achieved through the project and decrease bus ridership and satisfaction.
- **Only partial implementation of the project studies.** The Bank task team judged that the risk is low that the project-related studies will not be implemented because most of them were part of Qingyang Municipality's urban development master plan, which they are strictly abiding to.

## 8. Assessment of Bank Performance

### a. Quality-at-Entry



The Bank task team designed the project keeping in mind the development needs of the Gansu province and Qingyang Municipality. The design brought together two sectors to achieve efficiencies by combining pipe and road construction. The design included the lessons from the Bank's urban infrastructure project portfolio in China, among other, (i) capacity building for local stakeholders during project preparation, (ii) support for high impact infrastructure investments prioritized in the city's development strategy and master plan, and (iii) focus on investments with a people-oriented approach (PAD, para 17).

The Bank task team reviewed the draft feasibility study report for the different project components, the cost estimates, and the overall design preparation (ICR, para 68). The team also identified most implementation-related risks, mainly risks in capacity, governance, and design (ICR, para 43), and considered the overall project risk as substantial. Not all risk mitigation measures proposed were sufficiently effective. For instance, confirming the counterpart funds in the annual budget was not sufficient to avoid delays because of a lack of counterpart funding. While the team strongly emphasized the city's lack of capacity to implement Bank-financed projects, they did not envisage the possibility of delays in project implementation because of these capacity issues.

The Bank task team carried out adequate safeguards and fiduciary assessments and ensured the preparation of the necessary safeguards documents. As mentioned below, the project had shortcomings in M&E (for details, see M&E section).

The borrower appreciated "the Bank task team's professionalism, dedication, and efficiency during the project preparation", including particularly "the timely guidance on fiduciary, safeguards, and the design review" (ICR, annex 5).

The project's risk identification and mitigation weaknesses are considered as minor, and the M&E related shortcomings are considered in the M&E rating. Therefore, **Bank performance in ensuring quality at entry is rated satisfactory.**

### Quality-at-Entry Rating

Satisfactory

#### b. Quality of supervision

The ICR (paras 70 to 72) points out that the Bank task team carried out 11 supervision mission during the implementation period of seven years, which is slightly less than two missions a year. According to the borrower, this did not negatively impact project implementation.

The team provided safeguard and fiduciary support and training. Given the unfamiliarity of the implementation agencies with Bank procurement rules and procedures, the project had a lower prior review threshold, and the team carried out prior reviews for 81 percent of all contracts. The team also provided prompt guidance to solve the resettlement and procurement issues during project implementation.

The borrower (ICR, annex 5), mentioned that "the project went through a challenging implementation with slow disbursement during the first three years", and that "the Bank task team conducted adequate implementation support missions, with intensive efforts to identify issues and come up with solutions." The



borrower appreciated the solid and comprehensive capacity building support provided and the diligence in ensuring the compliance with fiduciary procedures.

The Bank task team restructured the project twice to enable the completion of the project activities and the achievement of the PDO. Although the project restructuring included adjustments to the M&E, the Bank task team could have provided more guidance and exercised greater control in this area (for details, see M&E section).

Despite the somewhat fewer missions than Bank standard and the shortcomings during M&E implementation, reflected in the M&E rating, **Bank performance in supervision is rated satisfactory.**

### **Quality of Supervision Rating**

Satisfactory

### **Overall Bank Performance Rating**

Satisfactory

## **9. M&E Design, Implementation, & Utilization**

### **a. M&E Design**

The project management office had the overall responsibility to coordinate the data collection for monitoring and evaluation (M&E) and report to the Bank. The different project implementing agencies, such as Xifeng District Housing and Construction Bureau, Qingyang Municipality Water Supply and Sewage Company, Xifeng District Transportation Bureau, were responsible to collect the monitoring data and information (PAD, para 19).

The results framework included five PDO indicators, three for the first subobjective and two for the second subobjective. Several of the 13 intermediate results indicators also directly measured the achievement of the PDO. For instance, this is the case for the indicator on the decrease in road-related fatalities and injuries or the increase in bus ridership, which measure an improvement in urban roads infrastructure services. However, as pointed out in the Efficacy section, for the indicator on the increase in bus ridership the attribution is not fully clear.

The PDO indicator on the share of through traffic on the East Ring and the West Ring corridors was not fully adequate because it did not isolate the normal increase in traffic. Therefore, and since the purpose of the ring road is reduce traffic congestion in the city center, a better indicator could have been to measure changes in traffic volumes through the city center.

All indicators had baselines and targets. However, several intermediate results indicators were measured in percentage terms, and the physical targets were not provided. With respect to the targets, while they generally seem realistic, they were not ambitious. This is especially the case for the freight through traffic, where the average daily tracks on the new road section were only expected to increase by 5.8, and the revised wastewater pollution reduction targets, which were largely overachieved.



Results measuring strongly relied on surveys, such as traffic counts and travel time survey, but the PAD did not describe the survey methodologies nor mention how the baselines were obtained. The ICR (annex 1) briefly describes how the results for the road transport-related indicators were measured. However, this description gives the impression that travel times and traffic volumes were based only on a one-time measurement, which would not be in line with good practice. The Bank task team pointed out that (i) this impression is a language issue, i.e., incorrect translation, (ii) traffic counts, for instance, were not done only on one day, and (iii) the methodologies used by project closure were compatible with appraisal ones.

## **b. M&E Implementation**

The ICR (para 50) points out that the project management office collected the M&E data on a regular basis to assess the project implementation progress. The project implementing agencies collected the operational data. The project management office also made the necessary refinements to the measurement methodologies.

During the project's two restructurings, the Bank task team slightly revised the results framework by replacing two indicators with core indicators and changing the PDO indicator targets related to the wastewater treatment plant. The restructuring paper does not explain why it was necessary to change these PDO indicator targets.

As pointed out in the Efficacy section, at least for the indicator on the bus speed, the results measurement raises doubt in terms of reliability because a bus speed of 26.90 km/h in mixed traffic seems very high and, according to the ICR, para 51, is unrealistic.

## **c. M&E Utilization**

The ICR (para 52) explains that the project implementation office and the Bank used the M&E data to monitor the implementation progress. This data was the basis for the two restructurings. The M&E data also helped detect and analyze the slow implementation progress during the initial years. The M&E data was also used for the preparation of the ICR. The ICR (para 53) also points out the absence of absolute values (e.g., km of roads or drainage network constructed), which along with percentages would have been more meaningful for decision making.

## **M&E Quality Rating**

Modest

## **10. Other Issues**

### **a. Safeguards**

The project was classified as category B for environmental assessment purposes. The project was expected to have positive environmental benefits and contribute to the improvement of urban roads and urban environmental services in Xifeng District. The principal negative impacts included construction-related impacts as well as impacts during operation, such as soil erosion, sludge disposal, and noise from the



wastewater treatment plant and the roads (PAD, para 45). The following safeguards policies were triggered: Environmental Assessment OP/BP4.01, Physical Cultural Resources OP/BP 4.11, and Involuntary Resettlement OP/BP4.12.

The borrower prepared an environmental assessment, an environmental management plan, and a resettlement action plan. The project management office monitored the project's environmental and social performance. The Bank task team followed up through regular missions.

Environmental safeguards compliance was generally satisfactory, except for temporary shortcomings in dust and noise monitoring at road construction sites. This was corrected. During heavy rainstorms in October 2019, a large volume of rainwater combined with sewage poured out from the water collection well and flooded the wastewater treatment plant. Xifeng District prepared an action plan to improve the effectiveness of the wastewater treatment plant. The Bank task team clarified that once the action plan is implemented, the problem will be definitively solved.

In terms of social safeguards, according to the ICR, paras 60 to 62, the project successfully relocated a church and 35 household graves. No complaint was filed. The project affected 2,149 households, and 226 households were satisfactorily relocated. The project required the temporary occupation of 324.1 mu of land and the acquisition of 800.66 mu of land, which were successfully completed.

## **b. Fiduciary Compliance**

The project's financial management performance was moderately satisfactory throughout the implementation. The borrower provided the external financial audit reports on time, and these reports had unqualified opinions. During the first years of project implementation, the project suffered from issues, such as the retention of Bank loan funds for late distribution to the project implementation units, delayed setting up of project accounting, and unavailability of counterpart funding. This delayed project implementation. Except for the final two years, most interim financial reports (IFRs) were submitted with delays. All IFRs were of acceptable quality.

The Bank task team provided on-the-job training and implementation support to relevant project staff, which over time helped improve the project's financial management performance.

Procurement was also moderately satisfactory. The project implementation units' unfamiliarity with Bank procurement policies and procedures caused some delays in the beginning of project implementation, but then improved significantly because of the regular training on procurement procedures and contract management. The project suffered from contract variations due to inadequate project planning and project activity design depth, additional local government requirements, and the speeding up of construction (ICR, para 66).

## **c. Unintended impacts (Positive or Negative)**

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**d. Other**

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**11. Ratings**

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	
Bank Performance	Satisfactory	Satisfactory	
Quality of M&E	Modest	Modest	
Quality of ICR	---	Modest	

**12. Lessons**

The following lessons have mostly been derived and summarized from the ICR, with minor additions by IEG:

**Focusing on strong project management capacity building, combined with a wide variety of hands-on activities, and striving for innovation can lead to results beyond the project outcomes.** During the project, Qingyang Municipality and Xifeng District made considerable progress in building their capacity through the implementation of the project activities, training, and study tours to other Chinese cities and abroad. All this led, for instance, to the “Sponge City Program”, which scaled the project’s drainage rehabilitation program up to the citywide level. It also led to the extension of the integrated pipe ditch approach of the project’s road component to all main arteries of the city.

**Innovation can be an essential driver for new solutions and challenges the project implementation agencies to strive for higher levels.** Under this project, the construction of the Eastern bypass using the dyke technique instead of an originally planned bridge increased the land capacity in an environment with geographic limitations. The Beijing Dadao Huoxiangou Gully Highfill is the largest volume backfill project in the Loess Plateau. Similarly, the GIS system was a great success and is expected to be expanded to other utilities in the near future.

**Securing adequate resettlement funds and having the necessary administrative procedures for land acquisition in place before carrying out the resettlement survey, negotiations, and agreement signing are important conditions for the success of a project.** Under this project, the significant resettlement cost increase was mainly due to the unavailability of resources after the start of the negotiations with project-affected people. This happened because, while waiting for the availability of the resettlement funds, floor areas and attachments within each house plot considerably increased. In addition, the compensation policy changed during the project. These two factors could have adversely affected the achievement of development objectives. Therefore, if a project has large resettlement challenges, the timing of resettlement activities, payments, and civil works needs to be aligned to avoid cost increases.



**Flexibility in the use of loan proceeds for land acquisition can help overcome an implementation impasse.** As mentioned, under this project, the significant resettlement cost increase put the project at risk. The flexibility provided for the use of loan proceeds for resettlement payments eventually permitted the completion of the works and achievement of the outcomes. The Bank task team also canceled an activity that did not impact the final outcome but released the pressure on the counterpart financing. This brought the project back on track.

### 13. Assessment Recommended?

No

### 14. Comments on Quality of ICR

The ICR is concise but includes the required data and information. More details on project outputs, especially on capacity building activities and studies, and their impact would have been desirable. For instance, it is not clear which measures of the transport-related action plans were implemented and how they contributed to enhanced public transport.

The ICR, page 6, reconstructed the theory of change based on the information in the PAD. The reconstructed theory of change is depicted diagrammatically by arranging elements for project activities, outputs, sub-objectives, and long-term outcomes, which correspond to the CPF priorities, in respective columns. It also lists several key risks identified at appraisal as critical assumptions. The activities under the institutional strengthening and capacity building component were missing. In addition, the theory of change does not refer to the expected outcomes, such as reduction in travel time or decrease in wastewater pollution.

The quality of the efficacy analysis had shortcomings. First, despite a significant lowering of the wastewater pollution reduction targets, the ICR does not consider the possibility of applying a split rating. The ICR does also not explain why this reduction in the PDO indicator targets was necessary and if the original targets are likely to be achieved in the future.

Second, in terms of results orientation, the assessment of efficacy is largely done by reporting on achievements against indicators targets and on project outputs. A number of statements, especially related to technical assistance and capacity strengthening activities, are not clearly supported by evidence. For instance, the ICR points out that the pedestrian friendly streets and crossings, and the channeled crossroads equipped with traffic lights are evidence that Qingyang Municipality's capacity to plan, implement, and manage transport and urban infrastructure were strengthened (ICR, para 39) and that capacity building under the project contributed to sustaining the road infrastructure improvements (para 21).

Third, the ICR does not question the quality of the evidence in the Efficacy section even if, in the M&E section, it points out that the increase in the bus speed, which is one of the PDO indicators, is unrealistic. The ICR does also not discuss the adequacy of the methodologies used to assess a number of results even if the description of these methodologies in annex 1 and the respective discussion in the M&E section (ICR, para 49) raise some doubts.



Lastly, the ICR does not adequately explain how the project activities contributed to certain results, such as the increase of bus ridership and user satisfaction.

With respect to efficiency, the ICR does not include an attempt to reevaluate the cost-effectiveness of the wastewater treatment plant component, especially since its benefits seem significantly lower than expected at appraisal (for details see Efficiency section). Because of the use of different terminologies, from the ICR, it is not clear if the coverage of the cost-benefit analysis and the benefits taken into account were the same at appraisal and by project close.

Some additional, but minor issues with the quality of the ICR include the following:

- The substance of the lessons is valuable, but too many different ideas are often packed into one lesson heading. For instance, the lesson in para 79 of the ICR is about a "balanced package of investments in a people-oriented approach" and "cross-sectorial activities". In this lesson, the ICR does not only present what the package of activities ultimately led to, but it also speaks about the importance of strong management capacity building and ownership.
- There are inconsistencies in reporting the project costs between the ICR datasheet and annex 3 and project indicators (not PDO indicators) between the main text of the ICR and in annex 1 (e.g. in paragraph 20).
- The revised targets in annex 1 are reported as original targets, which causes confusion.
- Abbreviations, for instance, for QMG and XDG, EBP, QWSSC, are not included in the list of abbreviations.

#### **a. Quality of ICR Rating**

Modest