

**SPRINGBANK OFF-STREAM RESERVOIR PROJECT
ENVIRONMENTAL IMPACT STATEMENT
VOLUME 3A: EFFECTS ASSESSMENT (CONSTRUCTION AND DRY OPERATIONS)**

Assessment of Potential Effects to Federal Lands
March 2018

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18.0 ASSESSMENT OF POTENTIAL EFFECTS TO FEDERAL LANDS

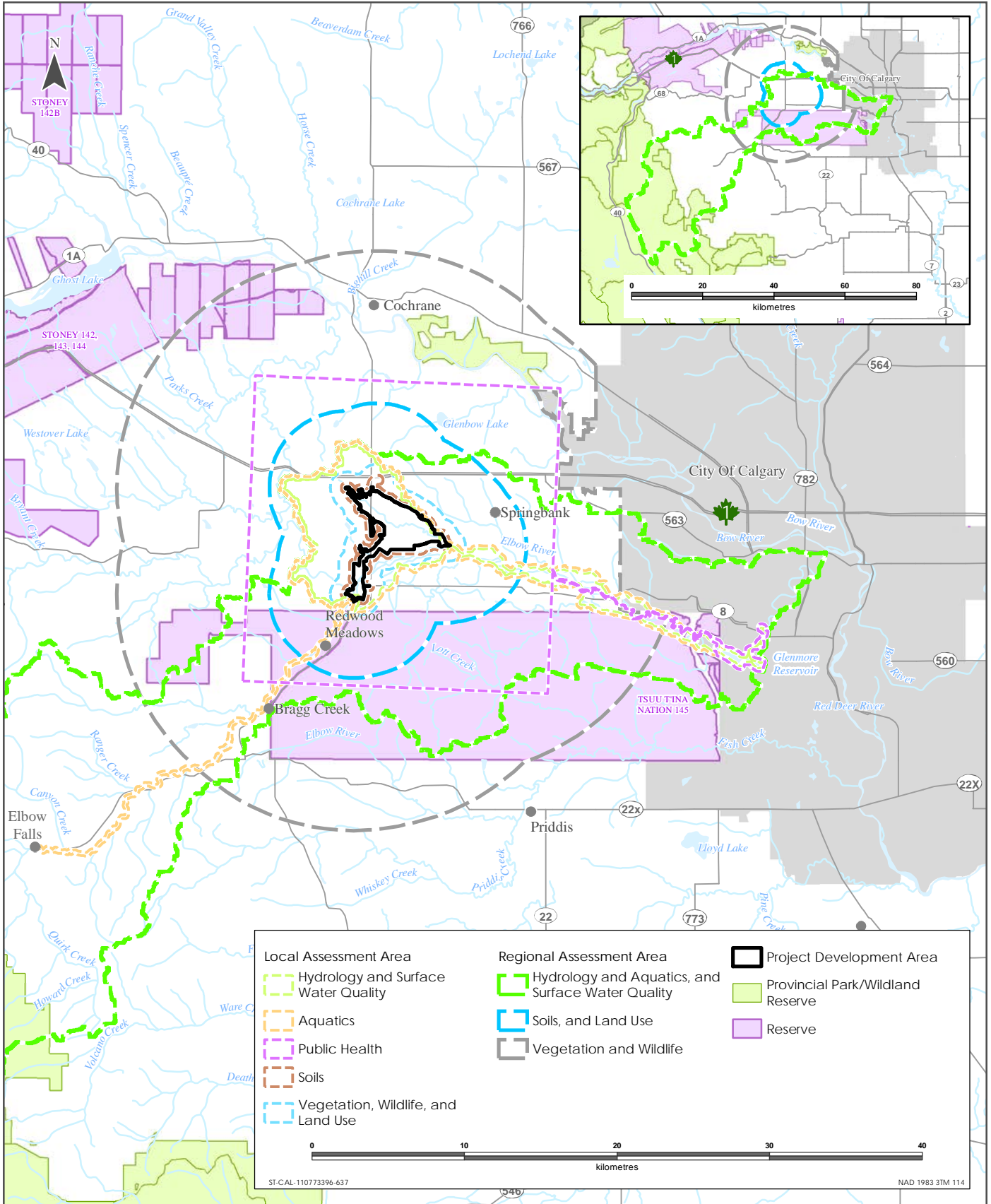
The following sections assess the potential effects of the Project during construction and dry operations on federal lands. The federal lands included within the assessment, due to their proximity to the Project site, are the Tsuut'ina Nation Reserve 145 and the Stoney Nakoda Nations Reserves 142, 143 and 144. Figure 18-1 and 18-2 illustrates the assessment areas in relation to the Tsuut'ina Nation Reserve 145 and the Stoney Nakoda Nations Reserves 142, 143 and 144. The assessment draws upon the conclusions of the detailed assessments for each of the fifteen VCs in Volume 3A. Issues and concerns raised during the Indigenous Engagement and public consultation programs relating to federal lands can be found in Volume 1, Sections 6 and 7.

18.1 AIR QUALITY AND CLIMATE

Effects to air quality and climate during construction and dry operations of the Project were evaluated at one spatial scale representing both the LAA and RAA. The LAA/RAA is a 20 km x 20 km area centered on the PDA and extending approximately 6 km from the PDA boundary. The air quality LAA is also adopted for the ambient light assessment. No local or regional spatial boundaries are used for the GHG assessment because the environmental effect associated with GHG emissions is on a global scale. However, the effect of GHG emissions is determined on provincial and federal level. The air quality LAA/RAA overlaps the northwest portion of the Tsuut'ina Nation Reserve to approximate distance of 5 km. The following effects were assessed in the EIS for air quality and climate:

- change in ambient air quality (including odour)
- change in ambient light
- change in greenhouse gases
- change in carbon sequestration capacity

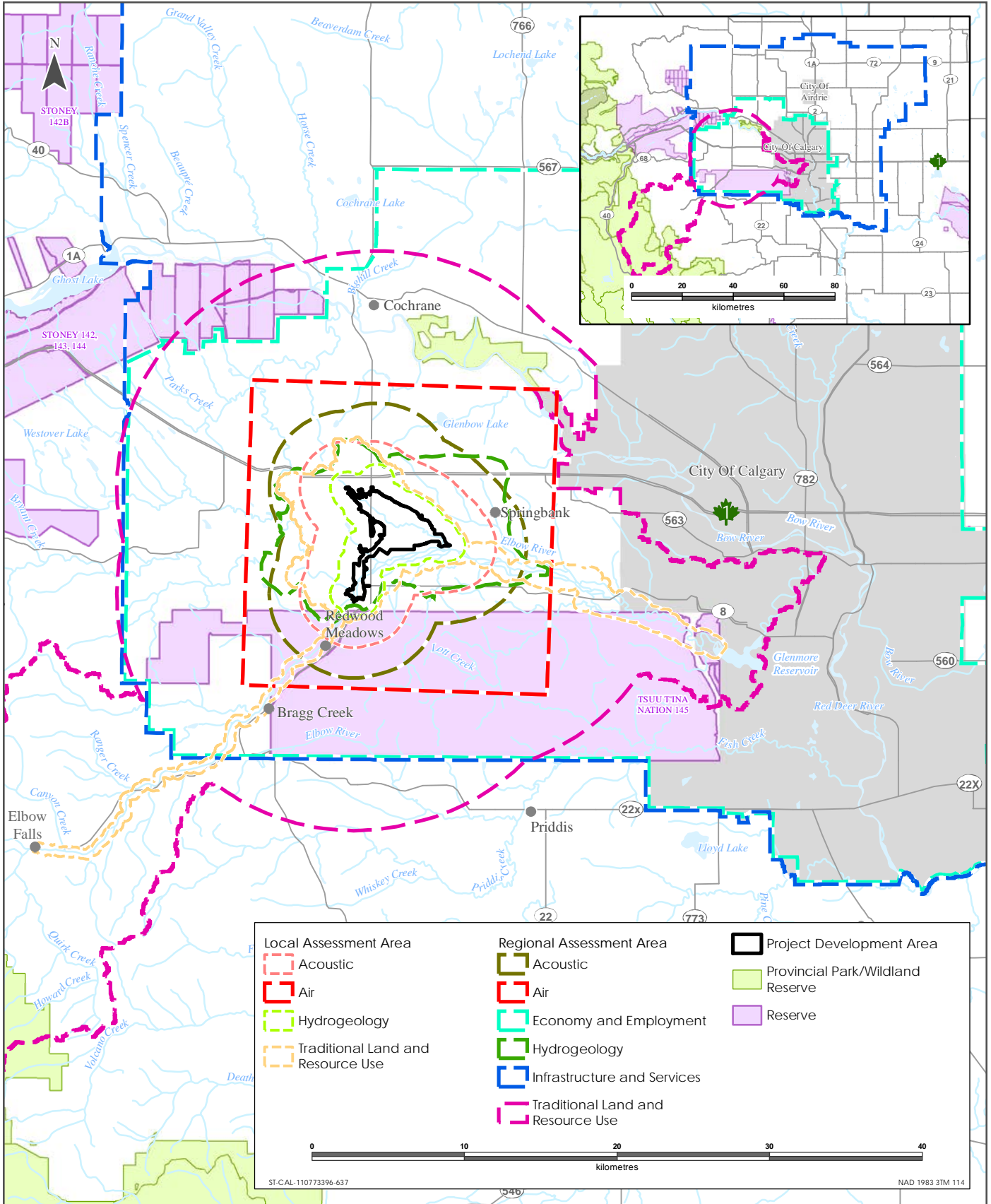
Mitigation measures for air quality and climate are provided in Volume 3A, Section 3; no additional mitigation measures beyond those identified are required specifically for federal lands.



Sources: Base Data - ESRI, Natural Earth, Government of Alberta, Government of Canada
Thematic Data - ERBC, Government of Alberta, Stantec Ltd

Assessment Areas (Part 1)





Sources: Base Data - ESRI, Natural Earth, Government of Alberta, Government of Canada
 Thematic Data - ERBC, Government of Alberta, Stantec Ltd

Assessment Areas (Part 2)



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The air quality assessment indicates that there is a potential for TSP and PM_{2.5} concentrations, and dust fall during construction to be greater than the regulatory criteria outside the PDA. These exceedances are as a result of dust generated during construction activities. The 24-hour average PM_{2.5} concentrations are predicted to be greater than the AAAQO of 30 µg/m³ at a small area near the community of Redwood Meadows in the Tsuut'ina Nation Reserve for up to 1 day per year. The 24-hour average TSP concentrations are predicted to be greater than the AAAQO of 100 µg/m³ in an area that extends approximately 2 km in the northwestern part of the Tsuut'ina Nation Reserve for up to 8 days per year. Dust fall is predicted to be greater than the AAAQO of 53 mg/100 cm² outside the PDA but is predicted to be less than the ambient guideline in the Tsuut'ina Nation Reserve. As model predictions for TSP and PM_{2.5} concentrations, and dust fall during construction indicate a potential to exceed the ambient air quality criteria outside of the PDA, an ambient air quality monitoring program would be used to determine TSP and PM_{2.5} concentrations, and dust fall during the construction period. The monitoring results will be evaluated on an ongoing basis as part of the dust management program to provide feedback on the effectiveness of the mitigation. The monitoring results will provide important information that will be used to refine the dust management program such as increased application of water on unpaved roads.

With the consideration of the mitigation measures to reduce fugitive PM emissions during construction and the implementation of an ambient monitoring program to determine the adequacy of the mitigation measures, effects on the Tsuut'ina Nation Reserve resulting from changes in air quality during construction are predicted to be not significant.

Nighttime light levels (light trespass and glare) during project construction are predicted to remain below CIE guidelines for a rural area (i.e. E2 environment) and the Project is expected to have a negligible contribution to existing sky glow. Considering the lighting mitigation measures and the use of mobile flood lighting units, effects on the Tsuut'ina Nation Reserve resulting from change in ambient lighting are rated not significant.

GHG emissions from the project construction are compared to provincial and national levels to establish a context for the magnitude of emissions. The Project results in a relatively small change of GHG emissions compared to provincial and national totals (0.03% and 0.01%, respectively). Based on these results, the effects of the Project on the Tsuut'ina Nation Reserve Reserve resulting from GHG emissions are not significant.

During construction and dry operations, the area that is expected to undergo a permanent land use change is the concrete diversion structure. This area is relatively small compared to the size of the diversion channel and the PDA. Given the small area that is to undergo a permanent land use change during construction and dry operations, effects on the Tsuut'ina Nation Reserve resulting from change in carbon sequestration capacity in the PDA are expected to be negligible and are not significant.

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Follow-up and monitoring for air quality and climate are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.2 ACOUSTIC ENVIRONMENT

Effects to the acoustic environment were assessed at the LAA scale which extends 3 km from the PDA, and within that boundary are receptors that may be affected; the LAA overlaps the northwestern part of the Tsuut'ina Nation Reserve. The RAA, which extends 5 km beyond the PDA (also overlapping the northwestern part of the Tsuut'ina Nation Reserve), was used to account for noise emissions from other works and area facilities that might interact with those from the Project. The following effect was assessed in the EIS for the acoustic environment:

- Change in acoustic environment

Mitigation measures for acoustic environment are provided in Volume 3A, Section 4; no additional mitigation measures beyond those identified are required specifically for federal lands.

The unmitigated sound levels at most receptors located outside the Tsuut'ina Nation Reserve were predicted to exceed the noise limits established based on Health Canada's preferred approach for environmental assessments during some phases of construction. However, no exceedances of threshold limits were predicted for the receptors on the Tsuut'ina Nation Reserve in any of the assessment scenarios.

Follow-up and monitoring for the acoustic environment are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.3 HYDROGEOLOGY

Effects to hydrogeology during construction and dry operations of the Project were evaluated at the LAA and RAA scale. The LAA includes a nominal one kilometre buffer surrounding the PDA to address potential localized hydrogeological effects, such as water level and water quality changes near to the construction areas and localized seepage into the diversion channel during dry operations. The LAA is reduced where the buffer extends outside of the floodplain and terrace of the Elbow River to the south; the LAA and RAA overlaps a small area at the northwest of the Tsuut'ina Nation Reserve. The following effects were assessed in the EIS for hydrogeology:

- Change in groundwater quantity
- Change in groundwater quality

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Mitigation measures for hydrogeology are provided in Volume 3A, Section 5; no additional mitigation measures beyond those identified are required specifically for federal lands.

The effects of the Project on hydrogeology during construction (dewatering) and dry operations (seepage into the diversion channel), given mitigation measures and monitoring during construction in the PDA, are not significant. For change in groundwater quality, there is a limited interaction of the Project with groundwater resources, and Project effects would not decrease the yield of groundwater supply wells to the point where they can no longer be used. Changes in groundwater quality would not deteriorate to the point where it becomes non-potable or cannot meet the Guidelines for Canadian Drinking Water Quality for a consecutive period exceeding 30 days (for those parameters which don't already, under existing conditions, exceed those guidelines). Given the limited interaction between the Project and hydrogeology in the LAA, effects on the Tsuut'ina Nation Reserve resulting from changes to hydrogeology will be negligible and are predicted to be not significant.

Follow-up and monitoring for hydrogeology are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.4 HYDROLOGY

Effects to hydrology during construction and dry operations of the Project were evaluated at the LAA and RAA scale (change in sediment transport was evaluated at the RAA [watershed] scale only). The LAA is the Elbow River from Redwood Meadows to the inlet of Glenmore Reservoir, including the outlet channel (i.e., the unnamed creek that runs through the proposed reservoir); the LAA overlaps the northeastern edge of the Tsuut'ina Nation Reserve along the Elbow River, and the RAA encompasses the majority of the Tsuut'ina Nation Reserve. The following effects were assessed in the EIS for hydrology:

- Change in hydrological regime (water quantity)
- Change in sediment transport

Mitigation measures for hydrology are provided in Volume 3A, Section 6; no additional mitigation measures beyond those identified are required specifically for federal lands.

The effects of the Project on hydrology during construction and dry operations, given mitigation measures and monitoring during construction in the PDA, are negligible and are not significant. Variations in hydrology and sediment transport are expected to have a <15% change from existing conditions and as a result, are likely not measurable within reasonable accuracy or detected by environmental receptors. Given the limited interaction between the Project and hydrology in the LAA, effects on Tsuut'ina Nation Reserve resulting from changes to hydrology and sediment transport will be negligible and are predicted to be not significant.

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Follow-up and monitoring for hydrology are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.5 SURFACE WATER QUALITY

Effects to surface water quality during construction and dry operations of the Project were evaluated at the LAA and RAA scale. The LAA is the Elbow River from Redwood Meadows to the inlet of Glenmore Reservoir, including the outlet channel (i.e., the unnamed creek that runs through the proposed reservoir); the LAA overlaps the northeastern edge of the Tsuut'ina Nation Reserve along the Elbow River, and the RAA encompasses the majority of the Tsuut'ina Nation Reserve. The following effect was assessed in the EIS for surface water quality:

- Change in surface water quality

Mitigation measures for surface water quality are provided in Volume 3A, Section 7; no additional mitigation measures beyond those identified are required specifically for federal lands.

The effects of the Project on water quality during construction and dry operations, given mitigation measures and monitoring during construction in the PDA, are negligible and are not significant. This includes downstream water quality in the Elbow River as sediment concentrations will be monitored during construction. Given the limited interaction between the Project and water quality in the PDA, effects on Tsuut'ina Nation Reserve resulting from changes to surface water quality will be negligible and are predicted to be not significant.

Follow-up and monitoring for surface water quality are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.6 AQUATIC ECOLOGY

Effects to fish and fish habitat during construction and dry operations of the Project were evaluated at the LAA and RAA scale. The LAA for aquatic ecology includes the PDA, but also incorporates drainage basin characteristics and aquatic resources in the Elbow River and tributaries that may be affected; the LAA overlaps the northwest and northeast of the Tsuut'ina Nation Reserve along the Elbow River. The RAA encompasses the majority of the Tsuut'ina Nation Reserve. The following effects were assessed in the EIS for aquatic ecology:

- permanent alteration of fish habitat
- destruction of fish habitat
- death of fish

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Mitigation measures for fish and fish habitat are provided in Volume 3A, Section 8; no additional mitigation measures beyond those identified are required specifically for federal lands.

While the Project would result in some permanent alteration or loss of fish habitat during construction, this loss would not occur on the Tsuut'ina Nation Reserve. The Project would not result in the death of fish that would threaten the long-term persistence or viability of aquatic species of management concern in the RAA; this is because of proposed mitigation during the construction phase. During dry operations, it is expected that mortality risk would be at levels similar to existing conditions. As a result, effects on aquatic resources on the Tsuut'ina Nation Reserve are negligible and not significant.

Follow-up and monitoring for aquatic ecology are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.7 TERRAIN AND SOILS

Effects on terrain and soils during construction and dry operations of the Project were evaluated at the PDA scale; the PDA does not overlap the Tsuut'ina Nation Reserve. The following effects were assessed in the EIS for terrain and soils:

- change in terrain stability
- change in soil quality and quantity

Mitigation measures for terrain and soils are provided in Volume 3A, Section 9; no additional mitigation measures beyond those identified are required specifically for federal lands.

Effects to terrain stability and to soil quality and quantity will be restricted to the PDA. As a result, effects on terrain and soils on the Tsuut'ina Nation Reserve are negligible and not significant because the PDA falls outside the Tsuut'ina Nation Reserve.

Follow-up and monitoring for terrain and soils are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

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18.8 VEGETATION AND WETLANDS

Effects on vegetation and wetlands during construction and dry operations of the Project were evaluated at the LAA and RAA scale; the LAA overlaps a small part of the northwest edge of the Tsuut'ina Nation Reserve. The majority of the Tsuut'ina Nation Reserve and the northeastern part of the Stoney Nakoda Nations Reserves are located within the RAA. The following effects were assessed in the EIS for vegetation and wetlands:

- change in landscape diversity
- change in community diversity
- change in species diversity
- change in wetland function

Mitigation measures for vegetation and wetlands are provided in Volume 3A, Section 10; no additional mitigation measures beyond those identified are required specifically for federal lands.

Direct effects on vegetation and wetlands resulting from the Project would be restricted to the PDA. Construction and dry operations of the Project would not result in the loss of native vegetation communities, wetland functions, or known occurrences of species of management concern or traditional use plants from the LAA, which overlaps the Tsuut'ina Nation Reserve. As a result, effects on vegetation and wetlands on the Tsuut'ina Nation Reserve are negligible and not significant. Effects on vegetation and wetlands on the Stoney Nakoda Nations Reserves are not predicted.

Follow-up and monitoring for vegetation and wetlands are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.9 WILDLIFE AND BIODIVERSITY

Effects on wildlife and biodiversity during construction and dry operations of the Project were evaluated at the LAA and RAA scale; the LAA overlaps a small part of the northwestern edge of the Tsuut'ina Nation Reserve. The majority of the Tsuut'ina Nation Reserve and a part of the northeast of the Stoney Nakoda Nations Reserves are located within the RAA. The following effects were assessed in the EIS for wildlife and biodiversity:

- change in habitat
- change in movement
- change in mortality risk
- change in biodiversity

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Mitigation measures for wildlife and biodiversity are provided in Volume 3A, Section 11; no additional mitigation measures beyond those identified are required specifically for federal lands.

Project activities during construction and dry operations will be restricted to the PDA. As a result, the Project will not result in an increased wildlife mortality risk or alteration of movement on the Tsuut'ina Nation Reserve or the Stoney Nakoda Nations Reserves. There will be no direct effect to wildlife habitat on the Tsuut'ina Nation Reserve or Stoney Nakoda Nations Reserves as a result of the Project; however, there is the potential for reduced habitat effectiveness (i.e., from sensory disturbance) in the small area of the LAA that overlaps the Tsuut'ina Nation Reserve near Highway 22. Although there is potential for reduced habitat effectiveness in this area, the highway already results in existing sensory disturbance to wildlife. This effect is expected to be low magnitude and not significant. The Project is not expected to affect biodiversity on the Tsuut'ina Nation Reserve or the Stoney Nakoda Nations Reserves.

Follow-up and monitoring for wildlife and biodiversity are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.10 LAND USE AND MANAGEMENT

Effects on land use and management during construction and dry operations of the Project were evaluated at the LAA and RAA scale; the LAA overlaps the northwestern edge of the Tsuut'ina Nation Reserve, and the RAA encompasses a larger portion of the northwestern part of the Tsuut'ina Nation Reserve. The following effects were assessed in the EIS for land use and management:

- change in land use
- change in parks and protected areas and unique sites or special features

Mitigation measures for land use and management are provided in Volume 3A, Section 12; no additional mitigation measures beyond those identified are required specifically for federal lands.

Project activities during construction and dry operations will be restricted to the PDA. While there will be no direct effect to land use on the Tsuut'ina Nation Reserve as a result of the Project; however, land users in the LAA portion of the Tsuut'ina Nation Reserve may be affected by temporary changes to access and nuisance noise, light, and air emissions during construction. However, these effects are limited to the construction phase or shorter and land users in the Tsuut'ina Nation Reserve are not anticipated to be affected during dry operations. Therefore, this effect is expected to be low magnitude in the Tsuut'ina Nation Reserve and not significant. Our Lady of Peace cairn and monument plaque (the only designated historic site in the LAA)

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does not reside in the Tsuut'ina Nation Reserve; in the assessment of change in parks and protected areas and unique sites or special features, none were identified in the Tsuut'ina Nation Reserve.

Follow-up and monitoring for land use and management are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.11 HISTORICAL RESOURCES

Effects on historical resources (archaeology and palaeontology) during construction of the Project were evaluated at the PDA scale; the PDA does not overlap the Tsuut'ina Nation Reserve. No additional effects are considered to occur within the PDA during dry dam operations.

Mitigation measures for historical resources are provided in Volume 3A, Section 13; no additional mitigation measures beyond those identified are required specifically for federal lands.

Effects on historical resources will be restricted to the PDA. As a result, there will be no effects to historical resources on the Tsuut'ina Nation Reserve.

Follow-up and monitoring for historical resources are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.12 TRADITIONAL LAND AND RESOURCE USE

Effects on traditional land and resource use (TLRU) during construction and dry operations of the Project were evaluated at the LAA and RAA scale. The TLRU LAA follows the wildlife and biodiversity LAA, which is the PDA plus a 1-km buffer centred on the PDA, as well as the aquatic ecology LAA, which consists of the section of Elbow River from Elbow Falls to the inlet of Glenmore Reservoir. The TLRU RAA also follows the wildlife and biodiversity RAA and aquatic ecology RAA, which consist of the PDA plus a 15-km buffer centred on the PDA and the Elbow River watershed, including Glenmore Reservoir, respectively. The LAA overlaps the northwest and northeast sections of the Tsuut'ina Nation Reserve. The majority of the Tsuut'ina Nation Reserve and a part of the northeast section of the Stoney Nakoda Nations Reserves are located within the RAA. The following effects were assessed in the EIS for TLRU:

- change in availability of traditional resources for current use
- change in access to traditional resources or areas for current use
- change in current use sites or areas
- change in Indigenous commercial activities

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Mitigation measures for land use and management are provided in Volume 3A, Section 14; no additional mitigation measures beyond those identified are required specifically for federal lands.

Project activities during construction and dry operations will be restricted to the PDA. There will be no direct effects to TLRU on the Tsuut'ina Nation Reserve or Stoney Nakoda Nations Reserves as a result of the Project; however, construction and dry operation has the potential to hinder the movement of traditionally harvested animals within the small area of the LAA that overlaps the Tsuut'ina Nation Reserve near Highway 22 due to physical barriers (i.e., permanent structures, access roads, and road realignments) and sensory disturbance. Although there is potential for reduced habitat effectiveness in this area, the highway already results in existing sensory disturbance to wildlife. This effect is expected to be low to moderate magnitude and not significant. The Project is not expected to directly affect TLRU on the Tsuut'ina Nation Reserve or the Stoney Nakoda Nations Reserves.

Follow-up and monitoring for TLRU are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.13 PUBLIC HEALTH

The LAA is defined as the total area for assessing public health associated with the Project; RAA is the same as the LAA. The LAA/RAA for the assessment of public health is a 20 km by 20 km square centered on the PDA in addition to the waters of the Elbow River from the diversion channel to the Glenmore Reservoir; the LAA/RAA overlaps the northwestern part of the Tsuut'ina Nation Reserve. The 20 km by 20 km area is the modelling domain used in the assessment of air quality to predict air quality conditions, and it encompasses the areas used to assess other hazards associated with public health (e.g., country foods), while the waters of the Elbow River to the Glenmore Reservoir apply to water quality. The following effect was assessed in the EIS for public health:

- Change to human health

Mitigation measures for public health are provided in Volume 3A, Section 15; no additional mitigation measures beyond those identified are required specifically for federal lands.

The assessment of public health shows that the effects from air quality, water quality and country foods are not significant for the construction and dry operations phases; this also includes receptors on the Tsuut'ina Nation Reserve. There are no interactions between public health with water quality and country foods.

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Follow-up and monitoring for public health are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

18.14 INFRASTRUCTURE AND SERVICES

For infrastructure and services, the LAA and RAA are the same and include the communities that might experience increased demand on infrastructure and services as a result of the Project. Because the LAA and RAA are the same, the analysis in this section uses RAA. The RAA follows the boundary of Rocky View County, and includes the City of Calgary. The Tsuu t'ina Nation Reserve and the northeastern part of the Stoney Nakoda Nations Reserves are located within the RAA. The following effect was assessed in the EIS for infrastructure and services:

- Change in transportation infrastructure and services

Mitigation measures for infrastructure and services are provided in Volume 3A, Section 16; no additional mitigation measures beyond those identified are required specifically for federal lands.

Project activities will not interact directly with any infrastructure and services located on the Tsuu't'ina Nation Reserve or the Stoney Nakoda Nations Reserves within the LAA/RAA; therefore, changes to infrastructure and services are predicted to be not significant. If population-related demands were expected, they would likely occur in the larger service areas within the LAA/RAA. However, as described above, since workers will likely live within commuting distance of the Project, no additional population-based demands are expected to be placed on any communities within the LAA/RAA, including those on the Tsuu't'ina Nation Reserve or the Stoney Nakoda Nations Reserves.

Follow-up and monitoring for infrastructure and services are provided in Volume 3C, Section 2; no additional follow-up and monitoring programs beyond those identified are required specifically for federal lands.

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18.15 EMPLOYMENT AND ECONOMY

For employment and economy, the LAA and RAA are the same and includes the communities that are most likely to be called upon to provide labour, goods and services required for construction and operations. Because the LAA and RAA are the same, the analysis in this section uses LAA. The Tsuut'ina Nation Reserve is located within the LAA/RAA. The following effects were assessed in the EIS for employment and economy:

- change in provincial economy
- change in regional labour force
- Change in regional economy

Mitigation measures for employment and economy are provided in Volume 3A, Section 17; no additional mitigation measures beyond those identified are required specifically for federal lands.

In determining effects of the Project on employment and economy, the assessment considers expected change in labour supply and demand, effects on commercial businesses from project spending (i.e., regional economy), and changes to the provincial economy. The Project would not materially affect labour supply and demand in the LAA during construction or dry operations because the available labour force greatly exceeds the workforce requirements. The Project is expected to have a largely beneficial effect on commercial businesses operating in the LAA because of opportunities associated with project spending. While there is potential for adverse effects due to competition for available labour and cost of labour supply, because of the large available workforce in the LAA, this effect is predicted to be negligible. The Project is predicted to have a beneficial effect on the provincial economy as a result of increased GDP and government revenue associated with construction expenditure.

No follow-up or monitoring is proposed with respect to Employment and Economy.