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Annex 2 Shell Quest CCS Project Environmental Assessment Commitments

Shell Canada Limited (Shell) made a number of commitments around environmental performance as part of the environmental assessment (EA) of the Quest Carbon Capture and Storage (CCS) Project (the Project). The commitments summarized in this document were identified in the following documents:

- *Quest Carbon Capture and Storage Project: Environmental Assessment* (November 2010) (see Shell 2010a, 2010b and 2010c)
- *Update to the Environmental Assessment Project Description* (Shell 2011d)
- a letter to the ERCB, dated August 25, 2011, describing the relocation of a candidate injection well and an erratum in Section 10 of the *Quest Carbon Capture and Storage Project: Environmental Assessment* (November 2010) (see Shell 2011a)
- responses to supplemental information requests from:
 - Alberta Environment and responsible and federal authorities on July 20, 2011 (see Shell 2011b)
 - Alberta Environmental and responsible and federal authorities on October 25, 2011 (see Shell 2011c)

A large number of commitments were outlined as part of conservation and reclamation plans (C&R plans) and environmental protection plans (EPPs) for the pipeline and well sites. The C&R plans and EPPs were submitted as appendices to *Volume 1: Project Description* of the environmental assessment (Shell 2010a). These plans are not reproduced below as they are extensive, and both the C&R plans and EPPs are designed as standalone documents. The majority of commitments with respect to the Project were identified as part of mitigation measures or follow-up and monitoring plans for valued environmental components (VECs) assessed in Volume 2A and 2B of the environmental assessment (Shell 2010b and 2010c).

2.1 Volume 1 Project Commitments

Commitments identified in Volume 1: Project Description (Shell 2010a) are:

- watercourse crossing methods:
 - of the 18 watercourse crossings along the CO₂ pipeline, 13 are poorly defined drainage swales with no fish habitat potential. These will be crossed using fords for vehicles and machinery, and open cut or isolated trench for the pipeline installation.
 - the primary crossing method for the North Saskatchewan River will be horizontal directional drill (HDD)
 - for Beaverhill Creek, Astotin Creek and Namepi Creek, open cut is the preferred crossing method where the channel is dry or frozen to (and including) bed substrate, whereas isolated trenched crossings will be employed if water flow is present within the channel

- CO₂ pipeline ROW monitoring. Shell will monitor the CO₂ pipeline ROW for reclamation and re-vegetation success following construction until vegetation establishment is complete. Remedial reclamation measures will be promptly implemented where required. If required, soil amendments may be placed on slopes to enhance vegetation establishment. Any remedial reclamation required on private lands will be discussed with, and approved by, the landowner. Any remedial reclamation required on Crown land will be discussed with, and approved by, the regional Lands Division Officer at Alberta Sustainable Resource Development (ASRD).
- well abandoning. For abandoning wells, Energy Resources Conservation Board (ERCB) Directive 20 requirements will be adhered to, as a minimum. Gas migration and surface casing vent flow tests will be done before downhole abandonment begins to avoid having to re-enter the well to correct a wellbore problem. Surface abandonment will be completed only after the subsurface has been abandoned to the satisfaction of the ERCB.
- waste prevention:
 - Shell will implement a waste prevention program to limit the amount of waste being generated and requiring disposal. Shell Scotford has an existing waste management plan, which will be amended to include waste from the CO₂ capture infrastructure. A separate waste management plan will be developed for the CO₂ pipeline and injection wells.
 - drilling waste will be managed according to ERCB Directive 50: Drilling Waste Management, including submission of appropriate notification, sampling and toxicity assessment (if required).
- monitoring site compliance. Shell will have on-site resources for monitoring site compliance with Shell's health, safety, security and environment (HSSE) control framework and identifying who is responsible for:
 - monitoring HSSE & social performance (SP)
 - leading HSSE & SP continuous improvement plans
 - managing the HSSE & SP skill pool
- emergency response. In keeping with Alberta ERCB Directive 71, Shell will amend its existing Scotford emergency response plan (ERP) to address CO₂ capture accidents, malfunctions, incidents or emergencies. Shell will also prepare a stand-alone site-specific ERP for the CO₂ pipeline and injection wells.

2.2 Volume 2 General Project Commitments

Commitments identified as part of the introduction to the environmental assessment (Volume 2A: Section 1 [Shell 2010b]) follow:

- Issues identified by stakeholders will be addressed and managed through ongoing consultation and feedback mechanisms that will monitor the level of concerns in relation to mitigation efforts.
- Desktop analyses, stakeholder consultation, environmental assessment and mapping will be completed to identify environmental and land user sensitivities near well pads and associated infrastructure, while taking into consideration construction, engineering, operational and safety constraints.

- Shell will develop a constraint map, which will show any overlapping sensitivities near the well pads of the CO₂ storage area.
- Once a candidate well pad, borrow pit, lateral pipeline or access road route is identified, the following desktop reviews will be completed before field assessment:
 - determine land status and/or conflicting uses, and to identify potential stakeholders (i.e., forestry, oil and gas and grazing tenure holders)
 - identify if existing disturbances (e.g., access roads, clearings and abandoned leases) can be used
 - review environmental constraint mapping to determine environmental sensitivities near project infrastructure. These will be avoided if possible. If features are identified, additional investigation will be done to assess the location through initial reconnaissance. Possible features are:
 - wildlife habitat sites (nests, dens, wildlife tree patches, known observation locations of species of management concern)
 - key wildlife habitat
 - known rare plant communities and areas of high rare plant potential
 - protected areas and other environmentally significant areas, as identified by the Alberta Tourism, Parks and Recreation
 - high quality wetlands
 - waterbodies
 - review known locations of archaeological sites. If near sites (approximately 500 m), a professional archaeologist will be contacted to advise on site selection before surveying and to develop detailed management recommendations
 - review proximity to recreational land use areas
 - obtain consent from private landowners, if necessary
- Once a preliminary site location has been refined through the desktop review, analysis and initial consultation, a qualified Shell representative will field verify the results (upon obtaining consent from the private landowner). The proposed location will be evaluated to determine construction constraints and feasibility. Results of the field scouting will be used to refine the location or route.
- Shell will contact potentially affected stakeholders identified through the desktop review and the Project's ongoing consultation program to discuss the proposed site or route, as well as construction and operating plans.
- Shell will consult with regulators on candidate well pads and borrow pits, and lateral pipeline routes and access roads.
- Shell will complete a pre-disturbance assessment for all well pads, access roads, borrow pits and lateral pipelines before construction. The following features will be assessed:
 - aquatic habitat
 - soils and terrain

- rare plants and rare plant communities
- wetlands
- wildlife and wildlife habitat
- historical resources
- land use
- Shell will implement site-specific mitigation measures included in the pre-disturbance assessments, conservation and reclamation plans, along with all mitigation measures identified in the EA.

2.3 Air Quality

Commitments were identified as part of the follow-up and monitoring program for the air quality VEC (Volume 2A: Section 5 [Shell 2010b]):

- Shell participates, and plans to continue to participate, in a number of existing monitoring and reporting programs relative to air emissions from the Scotford Upgrader:
 - Under Alberta Environment and Water's (AEW's) *Specified Gas Emitters Regulation*, Shell is required to calculate greenhouse gas (GHG) emissions annually and submit GHG intensity values. The *Specified Gas Emitters Regulation* is harmonized with the *National Mandatory Greenhouse Gas Reporting Program*. This monitoring and reporting will continue with the Project.
 - Under the *Environmental Protection and Enhancement Act* Approval for the Scotford Upgrader, Shell is required to monitor NO_x emissions on a continuous basis for each hydrogen manufacturing unit (HMU) stack and report on the results to AEW monthly, and conduct two stack surveys per year for each HMU stack and submit the results the month after the surveys were conducted. A summary of the monitoring is also submitted to AEW annually. This monitoring and reporting will continue with the Project.
 - In compliance with the *National Pollutant and Release Inventory* requirements, Shell is required to provide estimates of NO_x and other emissions annually. This monitoring and reporting will continue with the Project.
 - Shell is a participant in the Fort Air Partnership (FAP) ambient air quality monitoring program. The closest continuous monitoring stations to the Scotford Upgrader are the Scotford 2, the Redwater Industry, and the Range Road 220 monitoring sites. Among other parameters, ambient NO₂ and NO concentrations are measured at the Redwater Industry and the Range Road 220 monitoring stations. Shell plans to install a NO_x analyzer at the Scotford 2 site to measure NO and NO₂.
- The Scotford Upgrader has a monitoring program in place that includes both source and ambient monitoring. The continuation of this program with the addition of a NO_x analyzer at the Scotford 2 ambient monitoring site will help assess the influence of the emission changes associated with the Project.

2.4 Sound Environment

Commitments were identified as part of the mitigation measures for the assessment of the sound environment VEC (Volume 2B: Section 6 [Shell 2010b]):

- Where practical, noisy construction activity (e.g., piling) will be scheduled to daytime hours (i.e. 07:00 to 20:00h).
- Noise mitigation measures installed on construction equipment (e.g. mufflers) will be kept in good working condition.
- Construction traffic will be restricted to approved access routes to and from the site.
- Equipment will be turned off when not in use, where practical.
- Screening effects resulting from placing barriers and enclosures around construction equipment will be used, where practical.
- Noise complaints about construction activity will be logged and investigated to assess whether they relate to Project activities.
- Electric-driven compressors and pumps will be used at the CO₂ capture infrastructure .
- The compressor will be housed inside buildings with acoustical treatments.
- All operational noise sources will be designed to meet a maximum noise emission level of 85 dBA at 1 m, or as low as reasonably practicable.
- To minimize the likelihood of structure-borne noise that may be induced from the vibration of indoor equipment, Shell will consider installing vibration isolation pads, resilient mounts on equipment, resilient pipe support systems, and dampers where appropriate.
- There are no onsite rail networks planned for the CO₂ capture infrastructure.
- Appropriately equipped and maintained drilling rigs will be contracted.
- Where applicable, Shell will consider installing an appropriate vent silencer to limit noise levels.
- Emergency alarm testing will be restricted to daytime periods only.

Commitments were identified as part of the follow-up and monitoring program for the sound environment VEC:

- As a member of the Northeast Capital Industrial Association (NCIA), Shell complies with the noise management and monitoring requirements of the ERCB within the NCIA Regional Noise Management Plan (RNMP). The RNMP is being developed by the NCIA and will include both ERCB-regulated and non-regulated facilities in Alberta's Industrial Heartland. Input from stakeholders in the area will be incorporated in the formulation of the RNMP. Shell is an active member of the technical working group in the development of this regional model.
- Requirements for residential noise monitoring according to ERCB Directive 38 are complaint driven. No follow-up post-construction monitoring is required at the residences, unless a complaint is received. Any monitoring that might be necessary will be addressed at that time.
- The ERCB and Health Canada encourage licensees to adopt and incorporate best management practices for noise management into their design, construction, maintenance and operating procedures. These measures might include:

- taking regular noise measurements at the Shell Scotford fenceline, to determine whether any considerable changes in noise levels occur near the CO₂ capture infrastructure during operation
- restricting high noise-generating activities to the daytime, whenever practical
- Shell is committed to incorporating best management practices into its design, construction, maintenance and operating procedures to limit noise disturbances, where reasonably practical.

2.5 Geology and Groundwater Resources

The following commitment was identified as part of the assessment of the geology and groundwater resources VEC (Volume 2A: Section 7 [Shell 2010b]):

- for the construction of each Project component, dewatering, if required, will be done at a local scale and according to the conditions of dewatering licenses and best management practices.

Commitments were identified as part of the follow-up and monitoring program for the geology and groundwater VEC:

- Groundwater monitoring will be conducted as an ongoing part of the Scotford Upgrader operation and as part of the Measurement, Monitoring and Verification (MMV) Plan for the Project.
- The groundwater monitoring program will consist of a regional-scale groundwater monitoring network, which will be located within the groundwater assessment area.
- The regional network of wells will be strategically positioned within the assessment area to provide baseline groundwater quality monitoring (before injection) as well as ongoing operational monitoring during the operation and post-closure phases of the Project. Some wells will be installed approximately two years before injection.
- Monitoring wells in the regional network will be equipped with data logging multi-parameter probes capable of measuring electrical conductivity and pH and temperature.
- Groundwater samples will be periodically collected from monitoring wells and submitted for analysis of routine potability parameters, major ions, dissolved metals, select organic parameters and potentially other parameters specific to the Project.
- Monitoring wells within the regional network will be installed at locations where there is a higher level of risk of groundwater contamination. Such locations may include areas near the CO₂ injection wells, legacy wells penetrating the BCS, or other areas more susceptible to contamination.

2.6 Aquatic Resources

Commitments were identified as part of the mitigation measures outlined in the assessment of the aquatic resources VEC (Volume 2A: Section 8 [Shell 2010b]):

- A riparian buffer, or minimal disturbance zone (MDZ) will be established for all watercourses, and will be clearly identified before the start of clearing activities. Rights-of-way will be narrowed in these areas to the extent practical. Grubbing and topsoil and duff stripping in the MDZ will be

restricted to allow access crossing construction (if required), excavation of the trench and installation of the pipeline. Disturbance inside the MDZ will be limited to the extent practical (access is needed for clearing and construction crews).

- Drainage patterns including channel width and depth will be restored to match pre-disturbance conditions following construction.
- Interim stabilization and final reclamation will be carried out at all crossings. Banks should be graded to stable slopes and covered with erosion-control fabric or matting, as required to maintain slope integrity.
- Disturbed bank areas will be revegetated using native species and cover crops if required for erosion control. If there is insufficient time in the growing season remaining for the seeds to germinate, the site will be stabilized (e.g., exposed areas should be covered with erosion-control blankets).
- A qualified expert will be present during construction at all watercourse crossings with water present, to monitor water quality and document compliance with Project plans, commitments and approval conditions (e.g., sediment and erosion control).
- If culverts are used for temporary crossings, they will be removed before the restricted activity period, unless otherwise agreed with DFO.
- All vehicle crossing structures will be designed to meet expected flows during their period of operation. Temporary crossing structures and associated sediment and erosion control structures will be designed to accommodate expected flows during construction and cleanup and will be regularly monitored and maintained.
- If any crossing causes a HADD that requires DFO authorization, Shell would provide fish habitat compensation according to DFO's No Net Loss Policy so that no residual environmental effects on fish habitat would occur.

Commitments were identified as part of the follow-up and monitoring program for the aquatics resources VEC:

- An environmental inspector or fisheries biologist or technician will monitor construction at all watercourse crossings that have water at the time of construction. The level of monitoring will depend on the characteristics of the watercourse. Shell will conduct baseline surveys for any new areas of the Project development area (PDA) that have not yet been identified, such as pipeline laterals, new well pads, access roads and borrow pits.
- A fisheries biologist will be present during construction at all watercourses with flowing water at the time of construction to monitor water quality and document compliance with Project plans, commitments and approval conditions (e.g., sediment and erosion control) and Fisheries and Oceans Canada (DFO) operational guidelines. A frac-out monitoring plan will be implemented at any HDD crossings in order to determine if there is a loss of drilling fluid into the watercourse.
- Reclamation measures will be monitored until vegetation has become established, removing the risk of bank failure and slumping into the watercourse.
- If flowing water is present at the time of construction in Astotin, Beaverhill or Namepi Creeks, construction monitoring will occur. Monitoring will determine if mitigation measures are placed

correctly so that sediment does not enter the watercourse at levels that exceed the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines. Reclamation measures should be monitored after completion of construction until vegetation has become established.

- Water quality monitoring plans will be implemented at all crossing sites where the potential exists for introducing sediment into surface water. Monitoring and response plans for the inadvertent release of mud will be implemented at all HDD crossing sites.

2.7 Soils and Terrain

Commitments were identified as part of the mitigation measures identified in the assessment of the soils and terrain VEC (Volume 2B: Section 9 [Shell 2010c]):

- Salvage topsoil before construction.
- Apply tackifiers or other covers to reduce the risk of wind or water erosion to stockpiles that are to remain in place for an extended period.
- Strip topsoil where grading is required to install the CO₂ pipeline safely.
- Strip topsoil from under subsoil and spoil piles, in areas recommended for three-lift soil handling.
- Conserve topsoil according to soil handling requirements identified on the Project's environmental alignment sheets.
- Store topsoil and subsoil (i.e., subsoil from three-lift portions of the ROW) according to site-specific soil handling procedures.
- Maintain adequate separation between topsoil and spoil material.
- Replace topsoil as soon as possible after pipe installation to limit the potential for wind and water erosion.
- Perform construction work at sand dunes in winter when the ground is frozen.
- Apply erosion control measures to prevent sand at sand dunes from becoming airborne.
- Revegetate sand dune field areas in a timely manner after disturbance.
- Construct snow fences to catch blowing sand when constructing at sand dunes.

Commitments were identified as part of the follow-up and monitoring program for the soils and terrain VEC:

- Shell will conduct baseline surveys for any new areas of the PDA that have not yet been identified, such as pipeline laterals, new well pads, access roads and borrow pits.
- Follow-up to assess the effectiveness of the mitigation measures that will be required once soil replacement and right-of-way (ROW) reclamation have been completed, In particular, the effectiveness of erosion control measures and vegetation re-establishment will be assessed, particularly on coarse-textured soils.
- If evidence of erosion and inhibited vegetation regrowth are observed during follow-up, an action plan documenting remedial measures will developed and implemented where needed (e.g., further erosion control, soil amendments and possibly reseeding to facilitate reclamation success).

- Post-reclamation monitoring will be required to verify changes in soil quality.
- Follow-up will be done to assess the status of terrain integrity at periodic intervals after the pipeline is in place. This includes having a terrain specialist check steep slopes for signs of instability or sliding and having maintenance crews regularly check and repair drainage culverts and other drainage infrastructure on these slopes.
- Follow-up will be done to assess the status of dune loss or damage at periodic intervals after the pipeline is in place. This includes having a terrain specialist or maintenance crews check the dunes regularly for wind erosion damage, and promptly revegetating any newly exposed areas.

2.8 Vegetation and Wetlands

Commitments were identified as part of the mitigation measures identified in the assessment of the vegetation and wetland VEC (Volume 2B: Section 10 [Shell 2010c]):

- Areas that will require the infilling or removal of wetlands (i.e., well pads, access roads and borrow pits) will be compensated according to the Provincial Wetland Restoration/Compensation Guide (AENV 2007).
- The occurrence of leather grape fern will be transplanted to a site adjacent to the ROW where it will not be disturbed by construction or operation of the pipeline. It will be monitored for transplantation success.
- Rare plants that are found as part of additional surveys will be avoided if feasible, or transplanting or seed collection, or both, will occur.

Shell has committed to the following as part of the follow-up and monitoring program for the vegetation and wetlands VEC:

- rare plant transplantation and subsequent success monitoring for three years, if required
- wetland reclamation monitoring as part of the wetland compensation program (AENV 2007)
- implementing the Shell Weed Management Plan
- implementing the Clubroot Management Plan following procedures outlined in the Canadian Association of Petroleum Producers (CAPP) *Best Management Practices, Clubroot Disease Management* (CAPP 2008).
- reclamation monitoring for the pipeline and lateral pipeline rights-of-way after construction and near the end of the first growing season after reclamation. Monitoring will continue in the second growing season, or until satisfactory results are obtained, unless otherwise indicated in the terms and conditions of Project approval
- reclamation monitoring for the well pads, access roads and borrow pits, depending on rezoning of the land to nonindustrial use, as part of decommissioning and abandonment near the end of the first growing season after reclamation. Monitoring will continue in the second growing season, or until satisfactory results are obtained, unless otherwise indicated in the terms and conditions of Project approval.
- conducting baseline surveys for any new areas of the PDA that have not yet been identified, such as pipeline laterals, new well pads, access roads and borrow pits

2.9 Wildlife and Wildlife Habitat

Commitments were identified as part of the mitigation measures identified in the assessment of the wildlife and wildlife habitat VEC (Volume 2B: Section 11 [Shell 2010c]):

- Use existing roads and rights-of-way to reduce disturbance where possible and coordinating the development of new (temporary) roads with other industrial operators.
- Construct the route parallel to, or overlapping, the ROW of existing linear corridors (roads, seismic lines, pipelines) .
- Avoid disturbance of suitable habitat for Species at Risk and other wildlife species areas by constructing the pipelines and other infrastructure in disturbed or less sensitive areas, (e.g., avoidance of remnant riparian habitat within and along the slopes of the North Saskatchewan River valley) .
- Use setbacks if construction interferes with potential habitat for Species at Risk.
- Follow best management practices for construction including mitigation for areas of saturated lands (i.e., wetlands) and areas with high potential for erosion (i.e., sand dune areas).
- Protect wetlands, creeks and the North Saskatchewan River by:
 - using trenchless techniques for pipeline installation
 - using existing rights-of-way for temporary workspace (TWS)
 - limiting removal and disturbance of soil adjacent to wetlands and watercourses leading to wetlands
 - grading away from wetlands to avoid sedimentation
 - maintaining natural drainage patterns when storing excavated material
 - reclaiming the area, after construction, to the preconstruction profile of wetlands, allowing wetlands to regenerate naturally, monitoring the effectiveness of wetland reclamation, and making adjustments, as necessary, and compensating for wetlands where infilling or removal of wetlands is required following the *Water Act*.
- Limit the size of permanent and temporary workspace to the extent possible, and reclaiming work areas immediately following construction.
- Use Alberta's best practice guidelines for the oil and gas industry (ASRD 2004) to reduce the possibility of entrapment of western toad and other wildlife in the pipeline trench.
- Store hazardous materials securely in an appropriate location to avoid interaction with wildlife. Construction waste and debris, including all waste food products that could potentially attract wildlife, will be routinely collected and disposed in a secure location.
- Implement of breaks in the pipeline trench and spoil piles to allow movement of ground-based species.

Shell has committed to the following as part of the follow-up and monitoring program for the wildlife and wildlife habitat VEC:

- Shell will conduct further baseline surveys for any new areas of the PDA that have not yet been identified, such as pipeline laterals, new well pads, access roads and borrow pits.

- A pre-disturbance survey for active nests or dens or potential hibernation habitat will be required, if habitat clearance and site preparation is required within the recommended construction timing windows.
- Ongoing monitoring of the open trench will reduce or remove the possibility of wildlife becoming trapped and buried during trenching and backfilling.

2.10 Historical Resources

The following commitment was identified as part of the follow-up and monitoring program for the historical resources VEC (Volume 2B: Section 12 [Shell 2010c]):

- Construction monitoring will be recommended in areas of high palaeontological potential by the project palaeontologist. Shell will conduct historical resources surveys for any new areas of the PDA that have not yet been identified, such as pipeline laterals, new well pads, access roads and borrow pits.

2.11 Land Use

Commitments were identified as part of the mitigation measures identified in the assessment of the land use VEC (Volume 2B: Section 13 [Shell 2010c]):

- salvage topsoil before site development and storing topsoil separate from subsoil or using a physical barrier, such as geotextile, where separation of piles is limited by available space (to assist in reclamation of agricultural lands)
- seed topsoil remaining in storage during operation with a native grass mix or applying a tackifier mix to minimize erosion potential and weed establishment (to assist in reclamation of agricultural lands)
- relieve subsoil compaction prior to replacing topsoil (to assist in reclamation of agricultural lands)
- destroy any restricted weeds observed and controlling any noxious weeds observed (to assist in reclamation of agricultural lands)
- monitor disturbed sites for weeds and pest species such as clubroot, and developing a weed management plan (to assist in reclamation of agricultural lands)
- re-seed all disturbed areas to limit the potential for weed and invasive species establishment (to assist in reclamation of agricultural lands)
- consult with affected landowners about their preferred seed mix for reclamation
- establish crossing agreements between Shell and CN Rail and Shell and CP Rail will be required for pipeline crossings of railway lines. The only acceptable pipeline crossing method is a trenchless crossing technique, using either a bore or direction drill.
- consult with industrial operators in the LAA during construction of the pipeline, CO₂ injection wells and their associated infrastructure, to identify any interactions between the Project that may interfere with, harm or restrict access to their industrial activities, and then act to avoid conflicts, where feasible.

- continue to consult with the County of Strathcona to ensure the Project is consistent with the intent of the Municipal Development Plan (MDP)
- continue to consult with the County of Thorhild to ensure the Project is consistent with the intent of the MDP
- is consistent with all the other land use-related comments outlined in Strathcona County's May 21, 2010 letter to Shell on the Project. Specifically, Shell will:
 - adhere to the Municipal Wetland Conservation Policy which requires mitigation for wetland impacts (avoidance, minimization and compensation)
 - use existing roads for accessing pipelines wherever possible
 - maintain a minimum distance of 15 m between the pipeline ROW and any principal residence
- consider, If requested by the County of Thorhild, applying to have the CO₂ injection well sites re-designated to an industrial district in order to make the well sites more consistent with the County of Thorhild Land Use Bylaw.

The following commitment was identified as part of the follow-up and monitoring program identified for the land use VEC:

- Shell will consult with landowners and industrial operators in the PDA will continue throughout construction and will continue to communicate with the local municipalities about the Project to ensure they have accurate information about the proposed activities.

2.12 Public Health and Safety

There are several existing monitoring and reporting programs that Shell participates in relative to air emissions from the Scotford Upgrader which are relevant to the Human Health Risk Assessment (HHRA) completed as part of the EA (Volume 2B:Section 14 [Shell 2010c]). Shell plans to continue participating in these programs:

- under the *Environmental Protection and Enhancement Act* Approval for the existing Scotford Upgrader, Shell is required to monitor NO_x emissions on a continuous basis for each HMU stack and report on the results to Alberta Environment monthly, and conduct two stack surveys per year for each HMU stack submitting the results the month after the surveys were conducted. A summary of the monitoring is submitted on an annual basis. This monitoring and reporting will continue with the Project.
- in compliance with the *National Pollutant and Release Inventory* requirements, Shell is required to provide estimates of NO_x and other emissions on an annual basis. This monitoring and reporting will continue with the Project.
- the FAP ambient air quality monitoring program where the closest continuous monitoring stations to the Scotford Upgrader are the Redwater Industry and the Range Road 220 monitoring sites. Among other parameters, ambient NO₂ and NO concentrations are measured at the Redwater Industry and the Range Road 220 monitoring stations. This monitoring and reporting will continue with the Project.

The Project does not result in any additional monitoring or reporting requirements for the Scotford Upgrader as these can be integrated in existing programs.

2.13 Socio-Economics

Commitments were identified as part of the mitigation measures for the assessment of the socio-economic VEC (Volume 2B: Section 15 [Shell 2010c]):

- The capture infrastructure will use the infrastructure developed for the construction and operation of the Scotford Upgrader and Scotford Expansion 1, including a traffic signal and dedicated turning lanes at the RR 214 and Highway 15 intersection. Other traffic-related initiatives are:
 - traffic reduction programs, including considering a bus service and incentives to encourage car pooling among construction workers
 - a program of scheduling material and equipment (including modules) deliveries in off-peak hours
 - staggered shift changes with other operations using RR 214 as an access route
 - safe driving initiatives with the workforce
- Shell's onsite security will control site access, monitor traffic and parking onsite, address any other security concerns and if required, liaise with Strathcona County RCMP.
- In terms of workforce lodging for construction of the pipeline and well pads, non-resident workers (if any) will be offered live-out allowances to cover lodging and meal costs. This will be for pipeline, drilling and seismic crews only.
- Shell will continue coordinating with Alberta Health Services to ensure transfer of medical cases requiring further assistance to the appropriate hospital.
- Shell will continue to be an engaged member of the local community, communicating with residents on any issues or concerns.
- Shell is aware that some country residences remain in proximity to Shell Scotford and that the Project further emphasizes the heavy industrial nature of the area. Shell is currently working with affected residents to resolve outstanding issues through:
 - representation on the Land Trust Society board
 - facilitating joint industry and neighbour meetings
 - contributing to the Voluntary Property Purchase Program, which provides an opportunity for selected affected landowners to sell their property
- Shell will keep local service providers and authorities informed of its activities in the region during the operational life of the CO₂ pipeline.
- Warning systems, including call-out systems, will be developed and incorporated into a new Emergency Response Plan specific to the pipeline and storage components of the Project. The existing Scotford Emergency Response Plan will be updated to include the CO₂ capture infrastructure.

- Landowners whose property is affected by pipeline rights-of-way or injection wells will be compensated by Shell through acquisition of right-of-way, according to local market practices.
- Shell will extend its corporate procurement policy to the Project:
 - maximizing the use of local materials and labour while accounting for quality, value for money, schedule, and safety
 - continuing to use a combination of existing strategic procurement agreements and a competitive bid process
- Contractors will ensure road safety measures are in effect during construction, including pipe deliveries. Rig moves will be during off peak hours and advertised. Carpooling will be used to help reduce trips generated by worker movements between construction sites and lodging. CO₂ pipeline will be tunneled to cross roads, limiting disruption.
- Shell will continue ongoing coordination with the Strathcona County and Fort Saskatchewan RCMP detachments for the CO₂ capture infrastructure, and coordinate with the Redwater and Boyle detachments as required for the CO₂ pipeline and storage components of the Project.
- Shell will update and provide emergency response plans for each of the components of the Project. Response protocols will be developed with responders in the County of Thorhild, Lamont County and Sturgeon County.

The following commitments were identified as part of the follow-up and monitoring program for the socio-economic assessment:

- Shell will continue with its active community investment program, which includes initiatives such as:
 - operating the Shell Community Service Fund and supporting the local United Way as a means of assisting community groups and nonprofit organizations in Fort Saskatchewan and Strathcona County
 - offering support to specific local initiatives (e.g., Fort Saskatchewan Blue Bag recycling program, Bruderheim wetlands reclamation, regional sporting events)
 - supporting community groups, such as the Chamber of Commerce
- Shell will continue its involvement and support of broad or issue specific regional cooperation initiatives as they evolve. Current examples include:
 - the Northeast Region Community Awareness Emergency Response initiative
 - the NCIA
 - the North Saskatchewan Watershed Alliance
 - the FAP, an independent, non-profit organization that monitors and reports on the air quality within FAP's region northeast of Edmonton
 - the AIH Association
 - engagement with the "Life in the Heartland" resident group, which has evolved out of the previous Industrial Heartland Collaboration to Address Resident Interests Committee

- membership in the Alberta Council of Turnaround Industry Maintenance Stakeholders, which focuses on ensuring sufficient capacity for safe and effective plant turnarounds
- ongoing coordination with regional stakeholders, including Strathcona RCMP, the City of Fort Saskatchewan and CN Rail will continue. Issues identified by the stakeholders will be addressed through ongoing consultation and feedback mechanisms that will monitor the level of concerns in relation to mitigation measures.
- Shell will continue ongoing coordination with the Strathcona County and Fort Saskatchewan RCMP detachments for the capture infrastructure, and coordinate with the Redwater and Boyle detachments as required for the pipeline and storage components of the Project.

2.14 Effects of the Environment on the Project

Commitments were identified as part of the mitigation measures for the assessment of the effects of the environment on the Project (Volume 2A: Section 16 [Shell 2010c]):

- Where severe weather affects construction activities in such a way as to negatively impact the environment, such as through erosion, siltation of water bodies, soil compaction or rutting, Shell's construction management and environmental inspection staff will take action to prevent or reduce any potential adverse effects. Such action might include suspension, modification or addition of specific activities until weather conditions abate or effective mitigation procedures have been implemented.
- Construction activities will be halted during severe lightning storms to ensure the safety of workers.
- Weather forecasts will be monitored to ensure the proposed watercourse crossing method can be implemented as planned.
- All watercourse crossings will be constructed in compliance with DFO Operational Statements.
- If substantive climate change effects are observed through monitoring or operational observations, this information will be incorporated into management plans for the Project infrastructure, and operating procedures will be updated as necessary.

2.15 Accidents, Malfunctions and Unplanned Events

Mitigation measures identified as part of the assessment of accidents, malfunctions and unplanned events Volume 2B: Section 17 [Shell 2010c]) follow:

- To mitigate potential effects of the inadvertent releasing of drilling mud into a watercourse (i.e., frac-out), Shell will develop a drilling mud release contingency plan. This contingency plan is based on DFO Operational Statements for trenchless crossings that require monitoring of drilling mud pressure and water quality. Additionally, Shell requires its drilling contractor to submit for approval a site-specific HDD execution plan that incorporates a response plan for an inadvertent release of drilling mud.
- Shell will prepare one stand-alone, site-specific ERP for its CO₂ pipeline and injection wells. Shell will also amend the ERP for the Scotford Upgrader to include the CO₂ capture infrastructure.

- In meeting the requirements of the Energy Resources Conservation Board (ERCB) *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry*, Shell will submit the ERP for the CO₂ pipeline and injection wells to the ERCB for review and approval.
- A pipeline integrity management plan will be developed and implemented by Shell. The plan will include corrosion mitigation and monitoring and leak detection. As part of the leak detection program, aerial pipeline surveys will be conducted to detect unforeseen releases along the pipeline route.
- Shell will implement leak detection requirements, as specified in the Alberta *Pipeline Act* and *Pipeline Regulation*, and in compliance with the “Recommended Best Practice for Liquid Hydrocarbon Pipeline System Leak Detection”, as shown in CSA Z662-7 as applicable for high vapour pressure pipelines. Leak detection will be done through the use of line break valves, metering facilities and a supervisory control and data acquisition (SCADA) monitoring system.
- Real time monitoring of injection rates, down-hole pressures and temperatures will be implemented. Real time monitoring will enable the implementation of operational limits on bottom-hole injection pressures to maintain pressures within the Basal Cambrian Sands (BCS) below 90% of the fracture propagation pressure.
- Cement bond logging of all CO₂ injection and MMV casings will be implemented for integrity of annular cement seals. Should the cement bond logging indicate an ineffective annular seal, well interventions including re-cementing of the casing, recompletion of an injector well, or the outright abandonment of the well would be considered to mitigate potential impacts to aquifers above the base of groundwater protection (BGWP).
- Regular mechanical well casing integrity testing will be implemented. Should the testing indicate a compromised casing, well interventions including recompletion of a well, or the outright abandonment of the well would be considered to mitigate potential impacts to aquifers above the BGWP.
- Regular groundwater monitoring will be implemented within the Winnipegosis Formation. Should the monitoring indicate potential leaks from the BCS storage complex, injection controls could be implemented. Potential injection controls include the redistribution of injection to alternative wells, the drilling of new injection wells, extraction of BCS fluids to reduce pressures, and the cessation of injection at a given well location. These injection controls, alone or in combination, could be implemented to mitigate potential impacts to aquifers above the BGWP.
- Seismic monitoring will be conducted of the CO₂ plume to detect migration out of the BCS storage complex. Should the seismic monitoring indicate unexpected CO₂ plume behavior, injection controls including the redistribution of injection to alternative wells, the drilling of new injection wells, extraction of BCS fluids to reduce pressures, and the cessation of injection at a given well location could be implemented.
- Interferometric Synthetic Aperture Radar (InSAR) monitoring of the Project Area of Interest (AOI) will be conducted. Should the InSAR monitoring detect unexpected uplifts within the AOI, injection controls including the redistribution of injection to alternative wells, the drilling of new injection wells, extraction of BCS fluids to reduce pressures, and the cessation of injection at a given well location could be implemented.

2.16 Response to Supplemental Information Request #1 Commitments

The following commitments were identified as part of the Response to Supplemental Information Request from Alberta Environment (Shell 2011b):

- Shell will develop, and will provide to the federal government before construction starts, a Project Health Safety, Security and Environment (HSSE) Execution Plan that includes an Emergency Response Plan (ERP) for the construction phase of the Project. That plan will address prevention, preparedness, response, and mitigation of accidents or malfunctions that could affect either safety or the environment during Project construction.
- Shell will prepare a site-specific ERP for the Project. This plan will focus on preparedness and response to CO₂ emergencies, and will include the CO₂ capture and compression infrastructure, CO₂ pipeline and CO₂ injection wells. Shell will forward the site-specific Project ERP for the operation phase of the Project to the appropriate federal and provincial government agencies for review and comment before the Project operation phase.
- Shell will develop a Project Closure Plan and update this plan periodically throughout the operation phase. Shell will also continue to manage any emergency response during the pre-closure period, after injection stops, and before the Project closure certificate is received.
- Contaminated materials resulting from Project construction will be properly tracked through handling and disposal.
- Shell will update the Site Noise Management Plan to incorporate noise management policy, best management practices, monitoring, and complaint response procedure for monitoring and investigation at the fenceline.
- A non-toxic system will be used above the base of groundwater protection (surface hole) in future wells and was used to drill the surface hole in the existing Well 8-19.
- The surface casing will be set deep enough to cover the base of groundwater protection (BGWP) in accordance with ERCB *Directive 008 Surface Casing Depth Requirements* (Released: December 14, 2010) (Directive 8) for setting surface casing.
- Future wells will use a similar cement recipe and follow the same design and completion procedures as used for Well 8-19.
- Shell will keep the CO₂ injection wells as far away as possible from the legacy wells penetrating the BCS storage complex to minimize risk to containment.
- A monitoring plan will be implemented to measure total suspended solids (TSS) during construction. Before construction starts, the correlation between TSS concentration and turbidity in the North Saskatchewan River will be established.
- Shell is committed to providing to DFO and Transport Canada (TC) a contingency plan for the crossing of the North Saskatchewan River using a trenched crossing. The contingency plan will include the assessment of effects, mitigation measures and methodology summary provided above. The contingency plan will be submitted to DFO in Q3 2011 and to TC before construction or clearing activities on the bed and banks of the North Saskatchewan River.

- For temporary crossings, watercourses will be forded only if dry or frozen. Culverts will only be used on watercourses identified as not supporting fish habitat. If flowing water is present in an area identified as supporting fish habitat, then a temporary, single-span bridge will be used.
- If beaver ponds are encountered on the ROW during construction, Shell will test the dissolved oxygen level to determine whether the release of water from the pond is an issue, as identified in the DFO Operational Statement for Beaver Dam Removal. Test results will be discussed with DFO and ASRD before water is released.
- In the unexpected event that the Project cannot be reasonably excluded as the source of an accidental release, Shell proposes to work cooperatively with other CCS operators to implement control measures appropriate to the particular circumstances of the release to protect the groundwater and soil.

2.17 Update to the Environmental Assessment Commitments

Commitments were identified as part of the Update to the Environmental Assessment (Shell 2011d):

- Shell will continue to consult with ASRD on Pipeline Lease Agreement (PLA) requirements related to water withdrawal for hydrostatic testing.
- Additional environmental fieldwork will be conducted along this route during the spring and summer of 2011, to refine specific pipeline segment locations and to select site-specific mitigation measures.
- The hydrostatic test water from the first section will be reused in the second section, to limit water use.
- Shell will consult on emergency response planning with all landowners and occupants within the EPZ. Shell will also, on a good-neighbour basis, which is consistent with existing commitments, notify all landowners and occupants within a 5 km radius of Shell Scotford (i.e., the Scotford 5 km Primary Communication Area) about emergency planning for the Quest CCS Project.
- If additional substances are to be added to the current reported substance list for the Scotford Upgrader during ongoing Project planning, and these substances meet the reporting criteria under the CEPA E2 regulation, Shell will update Environment Canada on the anticipated changes.

2.18 Response to Supplemental Information Request #2 Commitments

The following commitments were identified as part of the Update to the Environmental Assessment (Shell 2011c):

- Shell will inform potentially affected residents of the expected duration and character of the noise in a timely fashion in advance of the drilling. Upon confirmation of the drilling schedule, Shell will make appropriate notifications to potentially affected residents and inform them if the Class B Adjustment is required.
- Shell will also ensure potentially affected residents are given appropriate contact information should they have any concerns or questions during the drilling operations.

- When completed, the Site Noise Management Plan will become available for ERCB review. Shell is expecting to have this document completed in Q2 2012 and will submit it to the ERCB.
- The Site Noise Management Plan will include monitoring and measurement programs to assess site noise performance. As per the RNMP framework, it is expected that the NCIA will be providing an annual noise report to the ERCB. Shell will provide the required information to the NCIA for this report.
- As an active member of the Northeast Capital Industrial Association, Shell will comply with the Regional Noise Management Plan (RNMP). Part of the RNMP involves creating a regional noise model; therefore, Shell will provide Project noise information for incorporation in to the model. Shell currently and will continue to participate, as appropriate, in NCIA efforts to validate the results of the regional model.
- An updated MMV Plan, which specifies the initial monitoring plan, will be submitted for review before baseline measurements start, at least two years before sustained CO₂ injection which is expected to occur in Q4 2015.
- The updated MMV Plan, along with the analysis of the baseline data, will be submitted as soon as the data has been analysed and incorporated into the MMV Plan. Formal submissions will occur on the three year cycle.
- An analysis of the CO₂ inventory measurement error will be included in updates to the MMV Plan submitted for review every three years, coincident with the required submission of the updated Closure Plan to Alberta Energy.
- Shell is continuing to progress engineering design for the pipeline and anticipates having the detailed engineering completed for the North Saskatchewan River crossing in 2012. Shell will incorporate the detailed engineering of the crossing into its contingency plan for submission to DFO, TC and ASRD. The contingency plan will be submitted for review in Q4 2012 before starting construction or clearing activities on the bed and banks of the North Saskatchewan River.
- In the event that a contingency crossing method is required, Shell will request the PLA be cancelled and submit a new application for the contingency method.

2.19 References

- 1) Alberta Environment (AENV). 2007. *Provincial Wetland Restoration/Compensation Guide, revised edition February 2007*. Environmental Partnerships and Education Branch, Alberta Environment, Edmonton, AB.
- 2) Alberta Sustainable Resource Development (ASRD). 2004. *Recommended Wildlife Procedures for Pipelines in Alberta*. Alberta Fish and Wildlife, Edmonton, AB.
- 3) Canadian Association of Petroleum Producers (CAPP). 2008. *Best Management Practices. Clubroot Disease Management*. Calgary, AB.
- 4) Shell Canada Limited. 2010a. Quest Carbon Capture and Storage Project, Volume 1: Project Description (November 2010). Calgary, Alberta.

- 5) Shell Canada Limited. 2010b. Quest Carbon Capture and Storage Project, Volume 2A: Environmental Assessment, Sections 1-8 (November 2010). Calgary, Alberta
- 6) Shell Canada Limited. 2010c. Quest Carbon Capture and Storage Project, Volume 2B: Environmental Assessment, Sections 9-18 (November 2010). Calgary, Alberta.
- 7) Shell Canada Limited. 2011a. Letter to Alanda Allum, Energy Resources Conservation Board. Re: Proposed Quest Carbon Capture and Storage Project – Environmental Assessment and Directive 65: Application for a CO₂ Acid Gas Storage Scheme (pursuant to Application 1689375)
- 8) Shell Canada Limited. 2011b. Quest Carbon Capture and Storage Project: Response to the Supplemental Information Request from Alberta Environment (July 2011). Calgary, Alberta.
- 9) Shell Canada Limited. 2011c. Quest Carbon Capture and Storage Project: Response to the Supplemental Information Request #2 from Alberta Environment (October 2011). Calgary, Alberta.
- 10) Shell Canada Limited. 2011d. Quest Carbon Capture and Storage Project: Update to the Environmental Assessment (July 2011). Calgary, Alberta.