

# Biological Sinks

Tillage Management  
Afforestation

Alberta Protocol Stakeholder Consultations ~ May 17 -18, 2007  
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# Tillage System Management

- Seed Materials
  - *Tillage System Default Coefficient Protocol* (October, 2006)
    - Prepared for NOQT
    - Prepared by multi-stakeholder group  
(Lead: Dennis Haak of the Agriculture and Agri-Food Canada )
  - Other Good Practice Guidance
    - CDM protocols
- Technical Review
  - Multi-stakeholder review process under NOQT
  - Alberta process with gov't and industry stakeholders

# Tillage System Management

- Project Condition
  - Reduced Tillage or No-Tillage

<b>Parkland</b>	Reduced Till	<ol style="list-style-type: none"> <li>1. Fall tillage limited to injection of manure or fertilizer with &lt;40% soil disturbance</li> <li>2. One to two cultivations on summerfallow</li> </ol>
	No Till	<ol style="list-style-type: none"> <li>1. Up to two passes with low-disturbance openers (up to 33%) or 1 pass with a slightly higher disturbance opener (up to 40%)</li> <li>2. Discretionary tillage of up to 10%</li> <li>3. No cultivations on summerfallow</li> <li>4. No fall tillage</li> </ol>
<b>Dry Prairie</b>	Reduced Till	<ol style="list-style-type: none"> <li>1. Fall tillage limited to injection of manure or fertilizer with &lt; 40% soil disturbance</li> <li>2. One to two cultivations on summerfallow</li> </ol>
	No Till	<ol style="list-style-type: none"> <li>1. Up to two passes with low-disturbance openers (up to 33%) or 1 pass with a slightly higher disturbance opener (up to 40%)</li> <li>2. Discretionary tillage of up to 10%</li> <li>3. No cultivations on summerfallow</li> <li>4. No fall tillage</li> </ol>
<b>West</b>	Reduced Till	<ol style="list-style-type: none"> <li>1. One fall tillage With HD Cultivator or &lt; tillage</li> </ol>
	No Till	<ol style="list-style-type: none"> <li>1. Up to two passes with low-disturbance openers (up to 33%) or 1 pass with a slightly higher disturbance opener (up to 40%)</li> <li>2. Discretionary tillage of up to 10%</li> <li>3. No fall tillage</li> </ol>

# Tillage System Management

- Baseline Condition
  - Adjusted baseline approach

	NT	RT	FT
East	4.8	19.1	76.1
East-Central	20.72	20.81	58.46
Parkland	23.66	33.9	42.44
Dry Prairie	36.25	29.66	34.09
West	15.06	17.39	67.56

Net NT coefficient = Raw Coeff(FT to NT)\*(%Area in FT)/100%  
+ Raw Coeff(RT to NT)\*(%Area in RT)/100%]

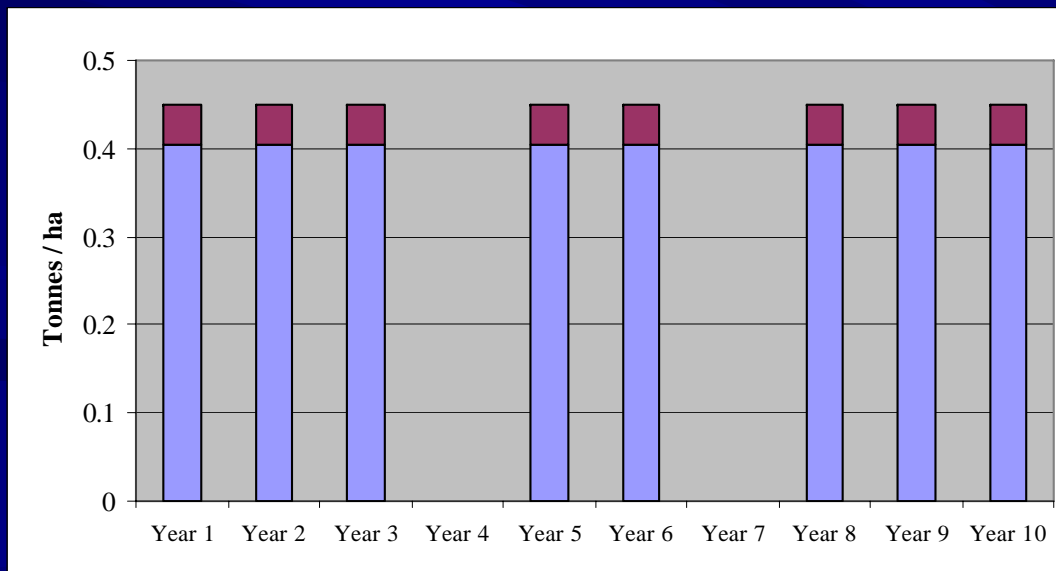
Net RT coefficient = [Raw Coeff(FT to RT)\*(%Area in FT)/100%  
+ Raw Coeff(NT to RT)\*(%Area in NT)/100%]

# Tillage System Management

- Functional Equivalence
  - Tillage practice on the same area
- Emission Reduction Mechanisms
  - Sequestration of carbon in soil
  - Nitrogen oxygen reduction
    - Parkland
    - Dry prairie
  - Energy savings

# Tillage System Management

- Dealing with Permanence
  - Use of assurance factor
    - Account for reversals
  - All offsets are permanent
    - No liability for project proponents 'ex-post'
  - Risk born by government



# Tillage System Management

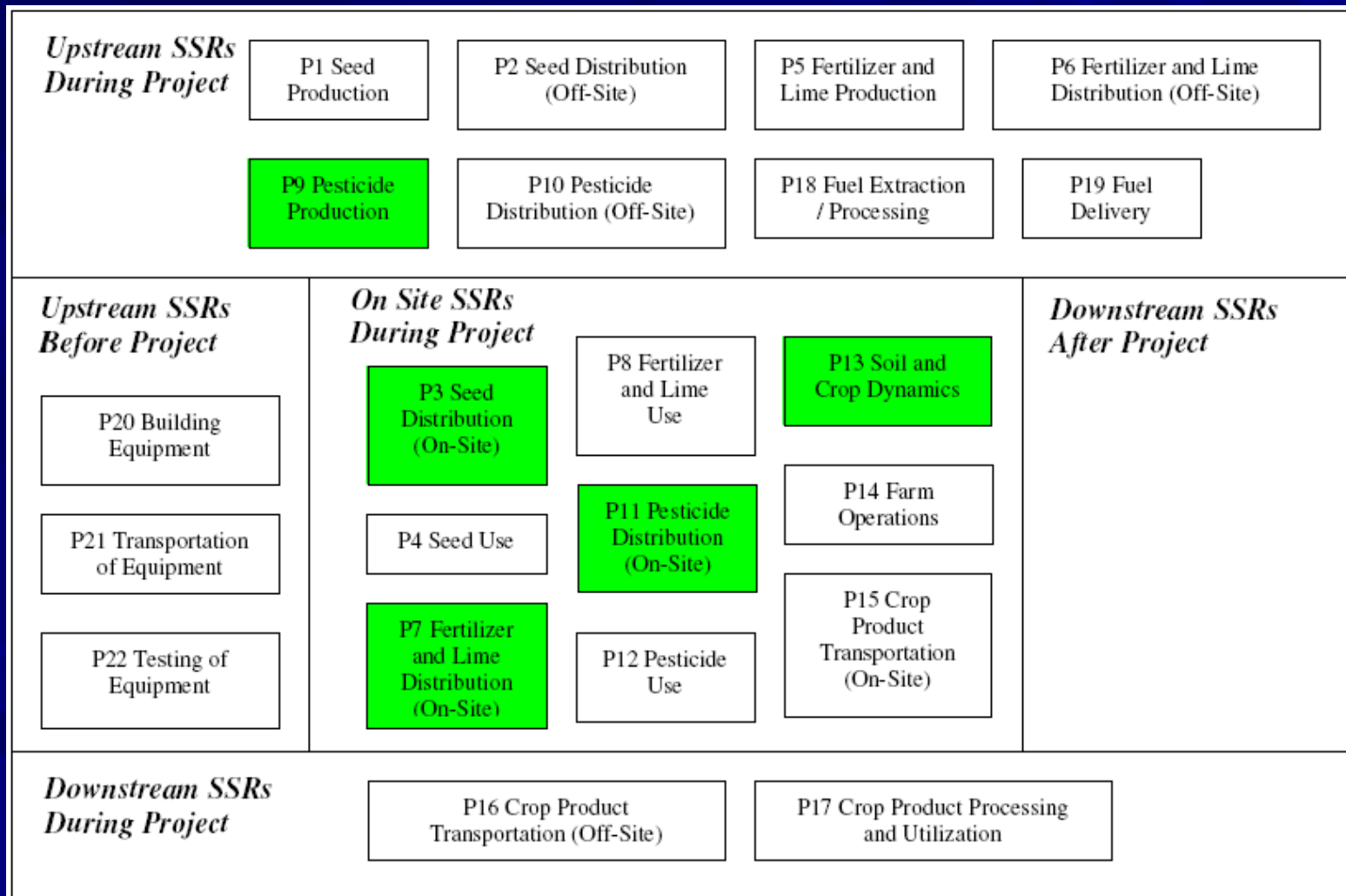
- Assurance factors
  - Input from technical group

Region	Factor	Reduced Till	No Till
East	Assurance Factor	85%	80%
	Chosen Number of Reversals	3	4
	Range of Values	Range: 2-4	Range: 1-6
East-Central	Assurance Factor	87.5%	85%
	Chosen Number of Reversals	2.5	3
	Range of Values	Range: 2-3	Range: 1-5
Parkland	Assurance Factor	87.5%	87.5%
	Chosen Number of Reversals	2.5	2.5
	Range of Values	Range: 2-3	Range: 1-4
Dry Prairie	Assurance Factor	90%	92.5%
	Chosen Number of Reversals	2	1.5
	Range of Values	Range: 0-3	Range: 1-2
West	Assurance Factor	87.5%	92.5%
	Chosen Number of Reversals	2.5	1.5
	Range of Values	Range: 2-3	Range: 1-2

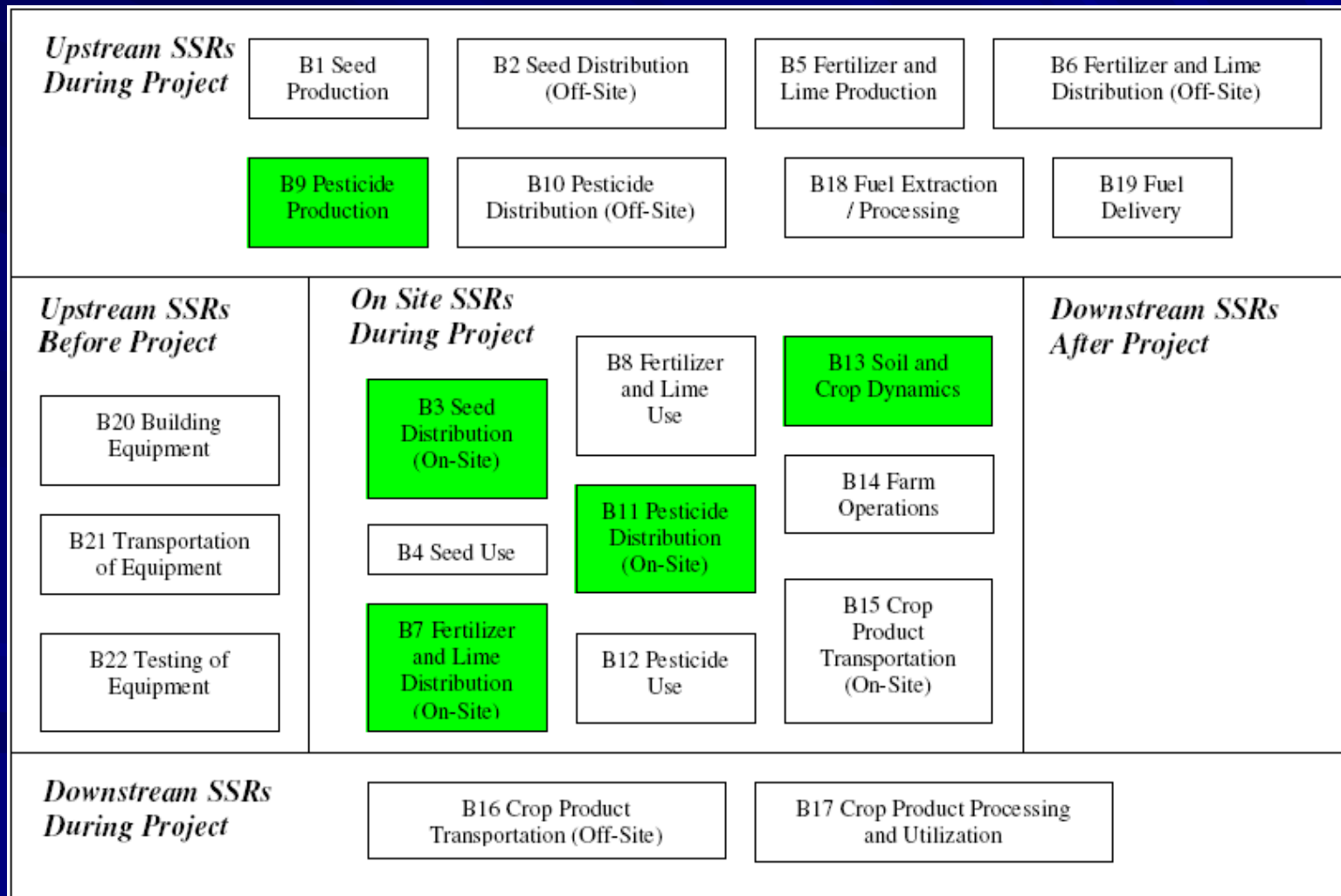
# Tillage System Management

- Applicability criteria
  - Producing annual crops
  - Confirmation of tillage practice
    - Affirmation
    - Farm records
- Flexibility mechanisms
  - Define and justify site specific SOC sequestration and N<sub>2</sub>O coefficients
    - Justify how this does not impact generic protocol
  - Site or project specific emission factors
  - Modular nature of protocol

# Tillage System Management



# Tillage System Management



# Tillage System Management

$$\text{Emission Reduction} = \text{Emissions}_{\text{Baseline}} - \text{Emissions}_{\text{Project}}$$

$$\begin{aligned} \text{Emissions}_{\text{Baseline}} = & \text{Emissions}_{\text{Energy Use}} \\ & + \text{Emissions}_{\text{Carbon Sequestration}} * \text{Assurance Factor} \\ & + \text{Emissions}_{\text{Nitrogen}} \end{aligned}$$

$$\text{Emissions}_{\text{Project}} = 0$$

- Data Capture
  - Area
  - Proof of practice

# Tillage System Management

- Questions and Comments
  - Technical issues?
  - Policy concerns?
  - Customization questions?
  - Linkage issues?

# Afforestation

- Seed Materials
  - *Offset System Quantification Protocol for Afforestation Projects (July, 2006)*
    - Prepared for NOQT
    - Prepared by multi-stakeholder group (Lead: Peter Graham of the CFS)
  - Other Good Practice Guidance
    - CDM protocols
- Technical Review
  - Multi-stakeholder review process under NOQT
  - Alberta process with gov't and industry stakeholders

# Afforestation

- Project Condition
  - Afforestation
    - Agricultural land
    - Plantations on urban land
    - Agroforestry
    - Rehabilitation of degraded industrial lands
- Baseline Condition
  - Land not previously forested
    - December 31, 1989
- Functional Equivalence
  - Sequestration of carbon on given land area

# Afforestation

- Emission Reduction Mechanisms
  - Above-ground biomass
  - Below-ground biomass
  - Soil carbon (optional)
- Dealing with Permanence
  - Use of assurance factor
    - Account for reversals
    - Set at 90%
  - All offsets are permanent
    - No liability for project proponents 'ex-post'
  - Risk born by government

# Afforestation

- Applicability criteria

- Non-treed area prior to 1989
- Definition of a treed area
- Afforesting peat lands is excluded

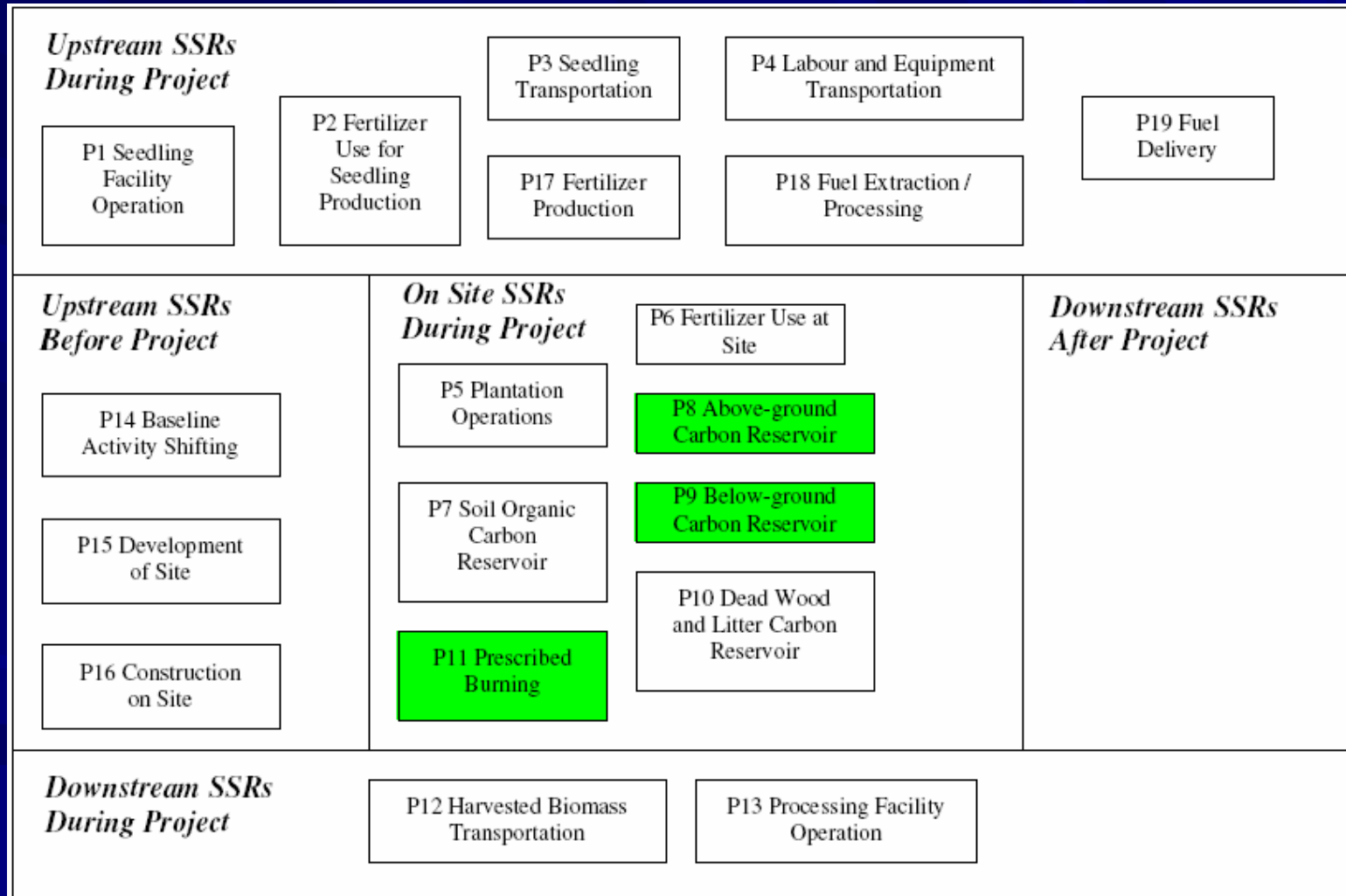
MSOffice2

- Flexibility mechanisms

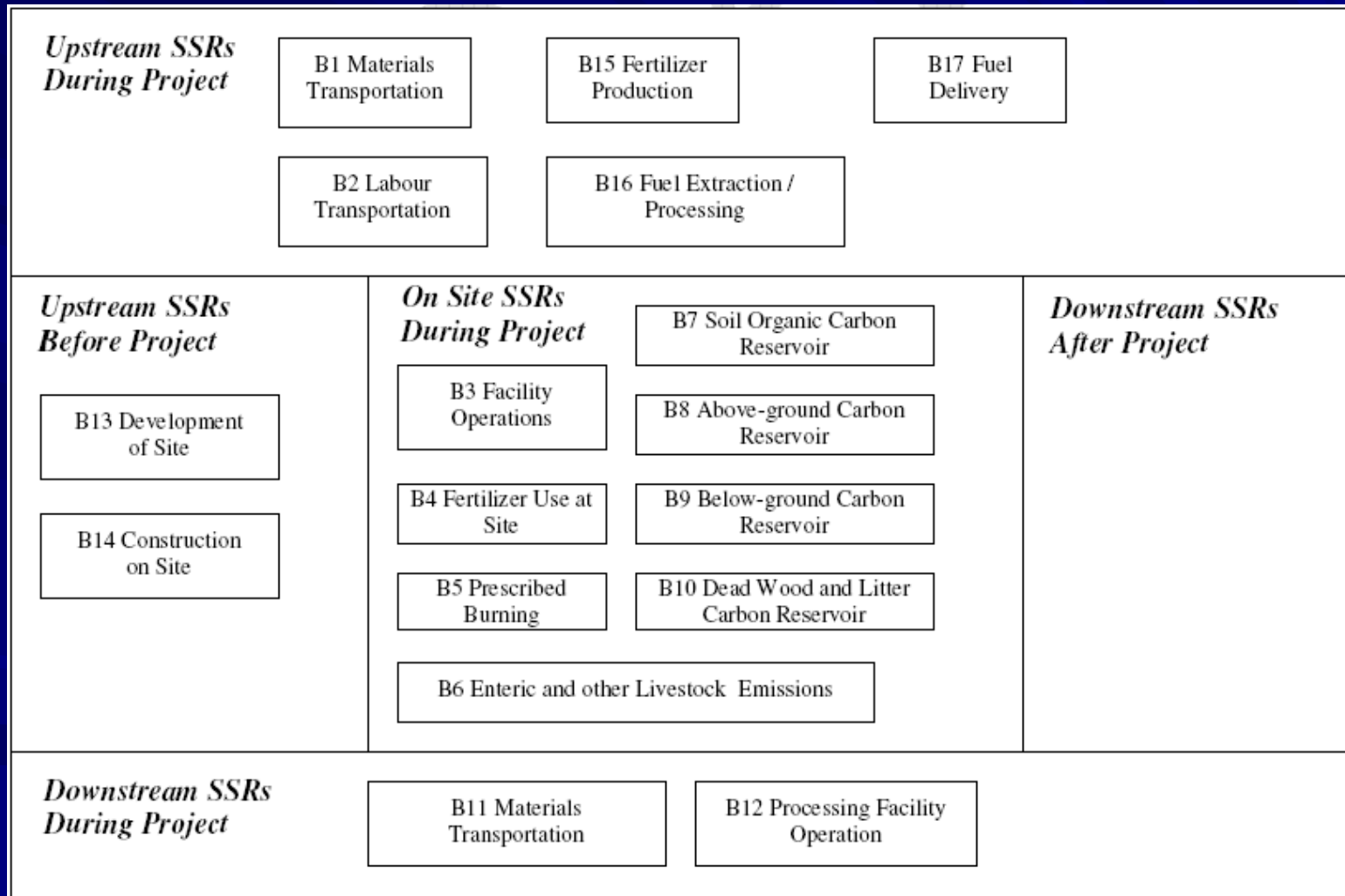
- Agroforestry considerations
- Soil organic matter must be measured from start
- Site specific emission factor usage
- Sampling methods can be modified
  - Accuracy and uncertainty

**MSOffice2** These need to be sorted out...  
, 17/05/2007

# Afforestation



# Afforestation



# Afforestation

$$\text{Emission Reduction} = \text{Emissions}_{\text{Baseline}} - \text{Emissions}_{\text{Project}}$$

$$\text{Emissions}_{\text{Baseline}} = 0$$

$$\begin{aligned} \text{Emissions}_{\text{Project}} = & - ((\text{Sequestration}_{\text{Above-ground Carbon Reservoir}} \\ & * \text{Assurance Factor}) \\ & + \text{Sequestration}_{\text{Below-ground Carbon Reservoir}}) \\ & + \text{Emissions}_{\text{Prescribed Burning}} \end{aligned}$$

- Data Capture
  - Treed Area
  - Volume of biomass
    - Accumulated
    - Harvested
  - Area affected by prescribed burn

# Afforestation

- Questions and Comments
  - Technical issues?
  - Policy concerns?
  - Customization questions?
  - Linkage issues?